



# PROJECT MANUAL

Including specifications  
for the construction of the

## BURTON ISD

### 2021 BOND PROGRAM

ADDITIONS AND RENOVATIONS

701 N RR STREET  
BURTON, TX 77835



**RELIANCE**  
ARCHITECTURE

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12 Chisolm Trail Road | Suite 200 | Round Rock, Texas 78681 | (512) 758-7660

Date Issued: XX/XX/20XX.

## PROJECT MANUAL

Including

## SPECIFICATIONS

for the construction of the

XXXXXX ISD

## 2021 bond program

Street Address; City, TX 7XXXX

*Prepared by:*

### Reliance Architecture, LLC

12 Chisolm Trail Road | Suite 200 | Round Rock, Texas 78681 | (512) 758-7660

www.reliancearchitecture.com

*Project Manager: Antonio Naylor*

*Email: antonio@reliancearchitecture.com*

*Consultants:*

### Hendrix Consulting Engineers

115 E. Main, Round Rock, Texas 78664

512-218-0060

### Gil Engineering Consultants

506 E Braker Lane, Austin, Texas 78753

512-853-4203

### LOC Structural Division

1707B Kinney Ave; Austin, TX 78704

512-499-0908

### Counihan and Associates

13132 Kellies Farm Lane; Austin, Texas 78727

512-388-4665

### True North Consulting Group

13284 Pond Springs Road, Suite 304, Austin, Texas 78729

512-451-5445

*Document issue date: 10/30/14*

*Pre-bid Date: 11/13/14*

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*Bid Date: 11/20/14*

*Required completion date: 3/27/15*

*Liquidated damages \$100.00 per day*

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XX/XX/20XX

#### CONSULTANT SECTIONS

- FOOD SERVICE SPEC SECTIONS
- MEP SPEC SECTIONS
- GEOTECHNICAL REPORT
- CIVIL ENGINEER'S SPEC SECTIONS



**DIVISION 00 – PROJECT PROCUREMENT AND CONTRACTING REQUIREMENTS**

**00 11 19 - REQUEST FOR PROPOSAL**

Competitive sealed proposals for the Project Title Project will be received at the district administration building ([address, city, TX zip](#)) until [2:00PM on did date](#) & at that time will be publicly opened & read aloud. Within 45 days after the date of opening proposals, the district intends to rank proposals based upon the published criteria & afterwards enter negotiations with the top ranked firm(s). The district reserves the right to waive any formalities, reject any & all proposals, & to accept the proposal(s) that in the District's opinion is most advantageous. Construction Documents are available from Reliance Architecture for a conditionally refundable deposit; contact [Project Manager at \(512\) 758-7660](#).

**00 11 20 - COMPETITIVE SEALED PROPOSAL SELECTION CRITERIA**

ITEM	MAX SCORE RANGE
<a href="#">Responsiveness of Submittal</a>	10
<a href="#">Reputation/References</a>	20
<a href="#">Company's experience &amp; past performance</a>	20
<a href="#">Past relationship with the Owner &amp; Design Team</a>	10
<a href="#">Time to complete</a>	10
<a href="#">Proposed Fee</a>	30
TOTAL	100

**00 22 16 - SUPPLEMENTARY INSTRUCTIONS TO PROPOSERS**

1. INSTRUCTIONS TO BIDDERS: American Institute of Architects document A701, latest edition, by reference forms a part of this specification. Copies of this document are available for review from the AIA website.
2. QUALIFICATION: It is the intention of these documents that only thoroughly qualified companies & individuals be employed on this project. The proposal of any Proposer that does not meet the qualification criteria or submit required data as instructed may be rejected. In considering a proposal for contract award, the Owner may also take into consideration the Proposer's past history of successfully completing school projects, their financial solvency, history of timely payments to subcontractors, history of completing projects on time, safety record & history of cost control.
3. ABBREVIATIONS: Abbreviations used generally follow the Construction Specifications Institute publication TD 2-4, November 1986. In the case of any discrepancy or question on the part of the Contractor, written request for clarification should be submitted immediately to the Architect. The Architect's resulting interpretation of abbreviations is final & binding on all parties involved in the work.
4. SITE INSPECTION: Each Proposer, before submitting a proposal for this work, shall visit the site to familiarize & satisfy himself with the existing conditions & requirements of the site & building under which he will be obligated to perform his work or that will in any manner affect the work. Contractors will not be allowed extra time or payment for conditions which can be determined by examining the site.
5. DOCUMENT CHECK: Prior to submissions of the Proposal, it is the Proposer's responsibility to check his set of Drawings & specifications with the Index of Drawings & the Table of Contents to verify that his proposal is based upon a complete set of documents.
6. PROPOSALS: Proposals must be based upon Contract Documents prepared & issued by Reliance Architecture. It is specifically understood & provided that the proposal submitted represents a true & correct statement of his proposal & contains no cause or claim of omission or error.
7. RESERVATION OF RIGHTS: The Owner reserves the right to reject any & all proposals when such rejection is in the best interest of the Owner, & to reject the proposal of any Proposer who, in the Owner's opinion, is not in a position to perform the Contract. The Owner will not award the Contract to any firm currently involved in bankruptcy or bankruptcy reorganization. The Owner may reject the proposal of any Proposer that does not meet the qualification criteria or submit required data as instructed. By submission of a proposal, the Contractor acknowledges the above & holds the Owner & Architect harmless of any claim that may arise from proposal selection.
8. TERMINATION OF PROPOSAL: No proposal shall be withdrawn or terminated for a period of 60 days subsequent to the opening of proposals without consent of the Owner, except if a proposal is accepted & a contract executed, or all proposals rejected.
9. TAX EXEMPT STATUS: The Owner is tax exempt as a school district & will provide certification upon request.
10. PAYMENT: Contingent upon the stipulations of the agreement & general conditions, payment will be made to the Contractor monthly for the value of work completed & materials stored on the site during the application period, less retainage.
11. CONFLICTS AND AMBIGUITIES. The Owner will not be bound by any oral or other informal explanation of the requirements of the Contract Documents. Any prospective Proposer detecting a conflict or ambiguity in the Contract documents should call the same to the attention of the Architect and request the issuance of a clarifying addendum.
12. SUBSTITUTION OF MATERIALS. Where a particular item of material or equipment is specified by brand name, it is not necessarily intended by the Owner to discriminate against all other products, but rather to prescribe a definite standard whereby to indicate the quality and capacity of the material or equipment required. Any prospective Proposer who may desire to propose a substitute should feel free to do so, requesting the issuance of an addendum approving the substitute. However, any such request must be submitted in writing five days before the time for closing receipt of proposals, and non-response to such a request will not constitute a granting of the request. Sufficient information should accompany the request to enable the Architect to promptly render a decision on a proposed substitution of materials or equipment
13. WITHDRAWAL AND AMENDMENT. Any Proposer may withdraw or amend his proposal at any time before the time for closing receipt of proposals. Any such amendment must be in writing and signed by the Proposer.
14. EXAMINATION OF SITE AND CONTRACT DOCUMENTS. Each Proposer shall visit the site of the proposed Work and shall fully acquaint himself with the conditions and limitations as they exist, including those of labor, and shall also thoroughly examine the

Contract Documents. Failure of the Proposer to visit the site and acquaint himself with the Contract Documents shall in no way relieve Proposer from any obligations with respect to his proposal.

16. ASBESTOS. The Contractor shall comply with all applicable provisions and requirements of Federal and State laws and regulations on removal and/or encapsulation of asbestos in public schools, including 15 USCA sections 2641 et seq.; 40 CFR part 763; Tex. Rev. Civ. Stat. art. 4477-3a; and 25 Tex. Admin. Code § 295.31 et seq.
17. CHANGE ORDERS: Reimbursement for change orders will be limited to the actual cost of materials & labor, plus a 10% mark-up to the subcontractor & a 5% mark-up to the Contractor. If no Subcontractor labor is involved, Contractor may mark-up 10%. Equipment rental from the Contractor or subcontractor, office overhead & supervision will not be considered for reimbursement. Copies of all receipts for this work will be submitted with the relevant application for payment. A Change Order must be issued prior to performing any such work. Work performed without proper authorization will, at the Architect's option, remain without reimbursement to the Contractor or be removed at the Contractor's expense. All Contractor initiated requests for change order will be submitted to the Architect. No extra time or resulting damages will be allowed as a result of time required to evaluate or process change orders.
22. WAGE RATES: Local prevailing wage rates must be paid on this project.
23. INSURANCE REQUIREMENTS: Specific insurance requirements are contained in SECTION 00 73 00, modification of 11.1.2, General Conditions
24. SCOPE OF WORK: Each proposer shall include in his proposal amount all items of work that may be reasonably inferred from the Contract Documents. It is the intent of these documents that all systems, fixtures, materials & finishes will be provided in a completely functional & aesthetic manner, in accordance to all codes & standards in effect. All equipment will be provided with appurtenances & connection to services normally required for a properly functioning system. Each trade must review & consider the Construction Documents in their entirety before submitting a proposal & must identify any conflicts with other trades in their proposal. Each Proposer must submit all questions regarding perceived ambiguities, conflict or intent of the Contract Documents to the Architect in writing before submitting a proposal. The Architect's interpretation of the Contract Documents will be final & binding without added cost or time.
25. CLAIM FOR DELAY: Any claim for damages directly or indirectly from extension of the Contract time shall not be valid unless approved in writing by the Owner & Architect.
26. ACM NOTIFICATION: Notify the Owner immediately upon encountering any asbestos containing material.

**00 22 17 - CONSTRUCTION MANAGER'S SUPPLEMENTARY INSTRUCTIONS**

★★

00 42 13 - PROPOSAL FORM: COMPETITIVE SEALED PROPOSAL

The undersigned, having carefully examined the Construction Documents (the Plans, Specs, Addenda), all related material & the proposed project site, hereby propose to furnish all materials, labor, tools & equipment to complete this project in full accordance to the Contract Documents within the time limits & price as follows.

BASE PROPOSAL:

\_\_\_\_\_ dollars(\$\_\_\_\_\_ .00).

BID ALTERNATES (mark either add or deduct):

1. Bid Alternate description.

add / deduct\_\_\_\_\_ dollars(\$\_\_\_\_\_ .00).

2. Bid Alternate description.

add / deduct\_\_\_\_\_ dollars(\$\_\_\_\_\_ .00).

3. Bid Alternate description.

add / deduct\_\_\_\_\_ dollars(\$\_\_\_\_\_ .00).

4. Bid Alternate description.

add / deduct\_\_\_\_\_ dollars(\$\_\_\_\_\_ .00).

5. Bid Alternate description.

add / deduct\_\_\_\_\_ dollars(\$\_\_\_\_\_ .00).

We propose to complete the work within \_\_\_\_\_ consecutive calendar days, per the General Conditions. There will be a liquidated damages charge to the Contractor of \$300 per day for each day the project is not completed beyond this limit.

We acknowledge receipt of the following Addenda: \_\_\_\_\_.

By the act of submitting a proposal for the proposed contract, the Proposer represents that:

1. The Proposer and all subcontractors the Proposer intends to use have carefully and thoroughly reviewed the drawings, specifications and other construction documents and have found them complete and free from ambiguities and sufficient for the purpose intended.
2. The Proposer and all workers, employees and subcontractors the Proposer intends to use are skilled and experienced in the type of construction represented by the construction contract documents.
3. The proposal figure is based solely upon the construction contract documents and properly issued written addenda and not upon any other written representation.
4. Neither the Proposer nor any of his employees, agents, intended suppliers or subcontractors have relied upon any verbal representations from the Owner, or the Owner's employees or agents including architects, engineers or consultants, in assembling the proposal figure.

Respectfully submitted:

Signature/Title \_\_\_\_\_

Company \_\_\_\_\_

**00 42 26 - PROPOSAL FORM: CONSTRUCTION MANAGEMENT, MULTIPLE-PRIME CONTRACT**

The undersigned, having carefully examined the Construction Documents (the Plans, Specs, Addenda), all related material & the proposed project site, hereby propose to furnish all materials, labor, tools & equipment to complete this project in full accordance to the Contract Documents within the time limits & price as follows.

BASE BID:

\_\_\_\_\_ dollars(\$\_\_\_\_\_.00).

We propose to complete the work within \_\_\_\_\_ consecutive calendar days after Notice to Proceed, per the General Conditions.

We acknowledge receipt of the following Addenda: \_\_\_\_\_.

By the act of submitting a bid for the proposed contract, the Bidder represents that:

1. The Bidder and all subcontractors the Bidder intends to use have carefully and thoroughly reviewed the drawings, specifications and other construction documents and have found them complete and free from ambiguities and sufficient for the purpose intended.
2. Discrepancies not brought to the Architect's attention prior to acceptance of bids have been bid in the more costly manner as may be determined by the Architect.
3. The Bidder and all workers, employees and subcontractors the Bidder intends to use are skilled and experienced in the type of construction represented by the construction contract documents.
4. The bid figure is based solely upon the construction contract documents and properly issued written addenda and not upon any other written representation.
5. Neither the Bidder nor any of his employees, agents, intended suppliers or subcontractors have relied upon any verbal representations from the Owner, or the Owner's employees or agents including architects, engineers or consultants, in assembling the bid figure.
6. This proposal has been coordinated with & complies with all provisions of the contract documents (drawings, specifications, conditions, addenda) & includes all items of work required for complete & functional operation.

Respectfully submitted:

Signature \_\_\_\_\_

Name/Title \_\_\_\_\_

Company Name \_\_\_\_\_

Address (Seal if corporation) \_\_\_\_\_

**ATTACHED IS A FULL DESCRIPTION OF ALL WORK INCLUDED IN THIS PROPOSAL.**

**00 43 43 - PREVAILING WAGE RATES**

SEE: <http://www.wdol.gov/dba.aspx>

**00 45 13 - BIDDER'S QUALIFICATIONS**

**PART 1 - GENERAL**

- 1.1 GENERAL - It is the intention of these documents that only thoroughly qualified companies & individuals be employed on this project. The Owner may, at their option, reject the proposal of any proposer that does not meet the qualification criteria or submit required data as instructed. In considering a proposal for contract award, the Owner may also take into consideration the proposer's past history of successfully completing school projects, their financial solvency, history of timely payments to subcontractors, history of completing projects on time, safety record & history of cost control on projects.
- 1.2 SUBCONTRACTOR - Within 24 hours of proposal opening, the low proposer(s) & any other proposer notified by the Architect will deliver to the Architect's & Engineer's offices complete & notarized "Contractors Qualification Statement", AIA document A305 for proposed mechanical, plumbing, electrical, steel erection, & roofing subcontractors. As a minimum, all proposed subcontractors must meet, & show proof of, the following:
  - A. Three years in business under the current company name.
  - B. Experience of the proposed business entity on 3 public projects of equal or greater construction cost..
  - C. No involvement of proposed business entity or any of its principals in bankruptcy or bankruptcy reorganization for the past 5 years.
  - D. Full time employment of adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work.
  - E. Availability of all equipment required for proper performance of the work.
  - F. Financial reserves required for proper performance of the work.

**PART 2 - PRODUCTS: NOT APPLICABLE**

**PART 3 - EXECUTION: NOT APPLICABLE**



## 00 73 00 - SUPPLEMENTARY GENERAL CONDITIONS

GENERAL: American Institute of Architects document A201 as modified, by reference forms a part of this specification. These Supplementary Conditions are modifications or additions to the requirements of AIA A201-1987, "General Conditions of the Construction Contract" & shall apply to all other sections of work.

ADD THE FOLLOWING TO 1.1.3 - The Work shall include the obligation of the Contractor to visit the site of the project prior to submitting a proposal. Such site visit shall be for the purpose of familiarizing the Contractor with the conditions as they exist & the character of the operations to be carried on under the Contract Documents, including all existing site conditions, access to the site, physical characteristics of the site & surrounding areas.

DELETE THE TEXT OF 1.2.2 & REPLACE WITH THE FOLLOWING - Execution of the Contract by the Contractor is a representation that the Contractor has carefully examined the Contract Documents & the site, & represents that the Contractor is thoroughly familiar with the nature & location of the Work, the site, the specific conditions under which the Work is to be performed, & all matters which may in any way affect the Work or its performance. The Contractor further represents that as a result of such examination & investigations, the Contractor thoroughly understands the Contract Documents & their intent & purpose, & is familiar with all applicable codes, ordinances, laws, regulations & rules as they apply to the Work, & that the Contractor will abide by same. Claims for additional time or additional compensation as a result of the Contractor's failure to follow the foregoing procedure & to familiarize itself with all local conditions & the Contract Documents will not be permitted.

ADD THE FOLLOWING TO 1.2.3 - In the event of discrepancies within the Contract Documents, the highest standard as judged by the Architect will prevail. In the event of conflicting provisions within the Contract Documents, Specifications will take precedence over Drawings; the more specific provision will take precedence over the less specific; the more stringent will take precedence over the less stringent. In all cases, the more expensive item will take precedence over the less expensive. On Drawings, figures take precedence over scaled dimensions.

ADD THE FOLLOWING SECTION 1.2.6 - The Contractor will be required to provide, without additional compensation or added time, all items of work that may be reasonably inferred from the Contract Documents. It is the intent of these documents that all systems, fixtures, materials & finishes will be provided in a completely functional & aesthetic manner, in accordance to all codes & standards in effect. All equipment will be provided with appurtenances & connection to services normally required for a properly functioning system. Each trade must review & consider the Construction Documents in their entirety before submitting a proposal & must identify any conflicts with other trades in their proposal. The Contractor must submit any question regarding perceived ambiguities, conflict or intent of the Contract Documents to the Architect in writing before submitting a proposal. The Architect's interpretation of the Contract Documents will be final & binding on the Contractor, without added cost or time.

ADD THE FOLLOWING TO 3.3 - The Contractor expressly recognizes that the Architect does not owe him any duty to supervise or direct his work as to protect the Contractor from the consequences of his own acts or omissions. The Contractor shall inspect all materials as delivered to the premises & shall reject any materials that will not conform with the Contract Documents when properly installed.

ADD THE FOLLOWING TO 3.12.6 - The Architect will reject any shop drawings that has not been properly reviewed & so stamped & signed by the Contractor prior to the submission. The Architect will also reject any shop drawing that does not show signs of a reasonable attempt at proper review of the submitted material.

ADD THE FOLLOWING TO 4.2.12 - The Architect will be the final authority in matters regarding interpretation the instructions & intent of the Contract Documents. Should any question arise regarding discrepancies in the Contract Documents, the Contractor shall make written request for clarification & receive such clarification from the Architect before proceeding, or proceed at his own risk. Any work not performed in compliance with the instructions & intent of the Contract Documents will be corrected at the Contractor's expense.

ADD THE FOLLOWING SECTION 4.2.14 - CONTRACTOR REQUESTS FOR INFORMATION:

In order to manage an orderly exchange of supplementary design information, the architect will accept a maximum of one Request for Information (RFI) per week per discipline, which may include multiple topics. RFIs should be submitted at a regular weekly meeting. RFIs in excess of one per week will be returned with no action taken.

The architect will respond no sooner than the following week in the form of an Architect's Supplementary Information (ASI), numbered in corresponding format to the RFI received. If a response cannot be made at that time, a response will be returned at

the next soonest weekly meeting that adequate professional care will allow. The Architect will make all reasonable effort to respond to RFIs within 14 days.

Any RFI item that at the architect's sole discretion meets any of the following criteria may be returned with no action taken:

- The question is obviously discernible from the construction documents.
- The question is frivolous or without merit.
- The question has been previously discussed & resolved in a construction meeting.

The Contractor will review any RFI submitted by a subcontractor prior to submission to the Architect to ensure such RFIs are not already answered in the Contract Documents. The Architect shall be reimbursed by the Contractor for time spent reviewing RFIs which are already answered or inferable by the Contract Documents in accordance with the Architect's standard rates. Any question that relates to a substitution or change proposed by the Contractor will be answered at the architect's normal hourly rates & billed to the Contractor.

The Architect's response to RFIs will create no cause for delay in the project, no additional cost to the Owner, or cause any claim by the Contractor against the Architect or his consultants.

ADD THE FOLLOWING TO 4.3.1 - The Contractor shall not be entitled to any claim for damages of any kind arising directly or indirectly from extension of the Contract Time without prior written approval of the Owner & Architect.

DELETE THE LAST 7 WORDS OF 7.3.6.3 & REPLACE WITH – "not rented from the Contractor".

DELETE 7.3.6.5 IN ITS ENTIRETY.

ADD THE FOLLOWING SECTION 10.1.5 - It is the intent of these Documents to specify & have installed products & materials that contain no asbestos bearing materials. If any product incorporated by the Contractor within this construction is found to contain asbestos bearing materials, this material shall be properly removed & legally discarded by the Contractor with no expense to the Owner and/or Architect. If any asbestos bearing materials are encountered during this construction, the Contractor shall immediately stop work in the vicinity of the asbestos & notify the Architect immediately. Upon completion of this Project, the Contractor & Suppliers shall submit to the Owner certification that no asbestos bearing materials has been incorporated into this construction.

ADD THE FOLLOWING SECTION 10.1.6 - Comply with all laws governing safety, specifically the "Occupational Safety and Health Standards" (OSHA). General Contractor is to be responsible for controlling access to the site by means of appropriate fencing, gates & barricades. Care and caution shall be exercised by all members of all construction crews to provide a safe environment. Also, note that the Contractor is to maintain discipline of all construction crews and construction workers. [Fraternalizing with students, possession or use of tobacco products, alcohol beverages, illegal drugs or firearms on school property is strictly forbidden; violation by any individual is grounds for legal action & immediate removal from the project.](#)

ADD THE FOLLOWING SECTION 10.2.8 - The Contractor shall promptly report to the Owner & Architect in writing all accidents arising out of or in connection with the Work that cause death, personal injury, or property damage. The report shall give full details & information in the possession of the Contractor. The Contractor shall immediately notify the Owner & Architect by telephone of such accident.

ADD THE FOLLOWING TO 11.1.2 - The Contractor will maintain at his expense during the term of this Contract insurance of at least the limits stated in parenthesis: Workmans Compensation & Employers Liability Insurance covering all employees (per State requirements), Comprehensive General Liability Insurance (\$500,000/ person/ occurrence), Comprehensive Auto Liability Insurance (\$500,000/ person/ occurrence) & Builders Risk insurance (at the Contract amount). The Contractor will either require each of his subcontractors to maintain coverage equal to the above, or insure their activities in his own policy. Issuing insurance company must have a "Best" rating of no less than B+ & be authorized to issue in Texas using State Board of Insurance Broad Form Policy. The school district will be named as a beneficiary or co-insured.

DELETE THE TEXT OF 11.4.1 & ADD THE FOLLOWING – As required by statute, Contractor shall furnish separate Performance & Payment Bonds in amounts equal to 100% of the Contract Sum as security for both the faithful performance of this Contract, & payment of all persons performing labor & furnishing materials in connection with this Contract. Bonds shall be delivered to the Owner prior to the date of execution of the Contract & must comply with the requirements of article 5160 of the revised civil statutes of Texas as amended by acts of the Legislature. Surety companies executing Bonds must be authorized to issue surety bonds in Texas in at least the amount of the bond. Bonds shall be signed by an agent resident in state & date of bond shall be the date of execution of the contract. Surplus lines carriers or individual sureties will not be accepted. If at any time during the

continuance of the contract, the surety of the Contractor's bond becomes irresponsible, the contract may be suspended, & all payment due to the contractor withheld. The surety issuing bonds is required to reinsure any risk in excess of 10% of its capital & surplus with an authorized, accredited, or trustee reinsurer, licensed in the state of Texas, who may not reinsure an amount greater than 10% of its capital & surplus. All proposals must include a 5% bid bond.

ADD THE FOLLOWING SECTION 11.5 - If the Owner or Contractor is damaged by the failure of the other to purchase or maintain any insurance or bond required by these Contract Documents, without the written consent of the other, then the party failing to so purchase or maintain such insurance or bonds shall pay all costs insured by the other party, including, but not limited to, reasonable attorney fees.

ADD THE FOLLOWING TO 13.5.1 - Other than those specifically required, the Owner may request any testing necessary to determine Contractor's compliance with the Construction Documents. If not in compliance, testing will be paid for by the Contractor. Contractor will coordinate this work at the Owner's instruction. Contractor will provide & pay for any testing specifically referred to in the Construction Documents.

ADD THE FOLLOWING SECTION 13.5.7 - Contractor shall notify Owner & Architect 24 hours minimum in advance of performing any work which would cover or otherwise make it difficult to inspect any work. Should any of said work be covered without proper notification having been given, Contractor shall uncover that work for inspection at his own expense.

**00 73 17 - WORKERS COMPENSATION INSURANCE**

A. Definitions:

- (1) Certificate of coverage ("certificate"). A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the project.
- (2) Duration of the project. Includes the time from the beginning of the work on the project until the contractor's/person's work on the project has been completed and accepted by the governmental entity.
- (3) Persons providing services on the project ("subcontractor" in SS406.096.) Includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

B. The contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all employees of the contractor providing services on the project, for the duration of the project.

C. The Contractor must provide a certificate of coverage to the governmental entity prior to being awarded the contract.

D. If the coverage period shown on the contractor's current certificate of coverage ends during the duration of the project, the contractor must, prior to the end of the coverage period, file a new certificate of coverage with the governmental entity showing that coverage has been extended.

E. The contractor shall obtain from each person providing services on a project, and provide to the governmental entity:

- (1) a certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage showing coverage for all persons providing services on the project; and
- (2) no later than seven days after receipt by the contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

F. The contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

G. The contractor shall notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project.

H. The contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

I. The contractor shall contractually require each person with whom it contracts to provide services on a project, to:

- (1) provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all of its employees providing services on the project, for the duration of the project;
- (2) provide to the contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project;
- (3) provide the contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
- (4) obtain from each other person with whom it contracts, and provide to the contractor.
  - a certificate of coverage, prior to the other person beginning work on the project; and
  - a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
- (5) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;
- (6) notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and
- (7) contractually require each person with whom it contracts, to perform as required by paragraphs (1) - (7), with the certificates of coverage to be provided to the person for whom they are providing services.

J. By signing this contract or providing or causing to be provided a certificate of coverage, the contractor is representing to the governmental entity that all employees of the contractor who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

K. The contractor's failure to comply with any of these provisions is a breach of contract by the contractor which entitles the governmental entity to declare the contract void if the contractor does not remedy the breach within ten days after receipt of notice of breach from the governmental entity.

**00 73 18 – CONSTRUCTION MANAGER’S SUPPLEMENTAL INSTRUCTIONS**

## DIVISION 01 – GENERAL REQUIREMENTS

### 01 11 00 - SUMMARY OF WORK

#### PART 1 - GENERAL

- 1.1 SUMMARY OF THE WORK: The general scope of this project includes, but is not limited to furnishing all materials, labor, fees, tools, accessories & equipment to completely perform all sitework, mechanical, electrical, plumbing, & general construction for this project.
- 1.2 GENERAL REQUIREMENTS: The Drawings represent the finished project & the definition of all project requirements will be provided by combining all of the Drawings. The General Conditions, Supplementary Conditions, & requirements of Division 1 & Division 0 apply to all sections of the specifications. The Contractor shall verify all field conditions which will affect the fabrication of components for new construction prior to the start of construction. Unless otherwise indicated, the drawings do not indicate the method of construction. All work will be provided complete, in the quickest time practical, & in a neat workmanlike manner. Provide any items of work not specifically indicated, but obviously or normally required to completely & properly execute the work. Use adequate numbers of skilled workmen who are thoroughly trained & experienced in the necessary crafts & who are completely familiar with the specified requirements & the methods needed for proper performance of the work.
- 1.3 GENERAL STRUCTURAL REQUIREMENTS: The Contractor shall take all measures necessary to protect the project during construction, including but not be limited to bracing and shoring of dead loads, construction loads and wind loads. The Contractor will be required to correct at his own expense any subsidence, structural damage or other objectionable conditions caused by his operations.
- 1.4 BUILDING SYSTEMS COORDINATION: Coordination is required by all trades with the work of all others to insure proper placement of each building system in relation to the others. The drawings & specifications are not intended to depict the exact location of each component. As the party in the field, the Contractor is in the best position to verify that the final placement all systems are coordinated. With the Architect's approval, make minor adjustments as may be required to accomplish a proper fit & coordination between building systems.
- 1.5 WATERTIGHTNESS: The drawings & specifications are not intended to depict each & every detail. As the party in the field, the Contractor is in the best position to verify that all conditions are completed to provide a watertight building envelope & the Contractor shall be responsible to do so.
- 1.6 DISCREPANCIES: Issuance of these construction documents (drawings and specifications) contemplates further cooperation among the Owner, the Contractor, and all parties involved in the design. Design and construction are complex, and although the design services have been performed with due care and diligence, perfection cannot be guaranteed. Communication is necessary and any discrepancy shall be reported immediately to the Architect whose interpretation shall be final and shall not be cause for claims for additional costs. Failure to provide written notice to the Architect, or changes made without consent, shall relieve the Owner, Architect & Engineers of responsibility for any consequences. Discrepancies not brought to the Architect's attention prior to acceptance of proposals will be deemed to have been proposed in the more costly manner.
- 1.7 REGULATORY REQUIREMENTS: All work will be performed in compliance with the latest edition of applicable regulatory requirements. Code requirement will establish the minimum requirements in the absence of direct instructions in the Construction Documents.

#### PART 2 - PRODUCTS

- 2.1 NOT APPLICABLE

#### PART 3 - EXECUTION

- 3.1 NOT APPLICABLE

## 01 11 16 - WORK BY OTHERS

### PART 1 - GENERAL

#### 1.1 ITEMS BY OWNER - Owner to provide material & labor for the following:

- A. Meter deposits & tap fees
- B. Building permit & inspection fees
- C. Construction testing (except as noted otherwise, or retesting in the event of failure)
- D. \*\*.

### PART 2 - PRODUCTS

#### 2.1 NOT APPLICABLE

### PART 3 - EXECUTION

- 3.1 OWNER'S RESPONSIBILITIES: Negotiate selection, purchase, and delivery with Vendor. Transmit all pertinent information to Contractor via Architect. Pay for all costs, taxes, and delivery to the Work site. Coordinate delivery times with Contractor. Jointly inspect received products with Contractor. With Contractor's assistance, file shipping and damage claims. Obtain shop drawings. Obtain Special Warranties. Coordinate special training for operation and maintenance.
- 3.2 CONTRACTOR'S RESPONSIBILITIES: Coordinate delivery times with Owner. Show all Owner furnished products on Progress Schedule. Upon delivery to the Work site, inspect, handle, store, and protect in same manner as required for products purchased by Contractor. Assist Owner with filing shipping and damage claims. Repair or replace items damaged by construction activities.



## 01 21 00 - ALLOWANCES

### PART 1 - GENERAL

- 1.1 RELATED SECTIONS: 00700 General Conditions. See AIA A201 "General Conditions of the Contract for Construction", 1987 Edition. See AIA A201 "General Conditions of the Contract for Construction", 1987 Edition.
- 1.2 ALLOWANCE AMOUNTS: General Contractor/CMAR to include an allowance in the total contract amount for certain items of work not specified in other sections. These items include the following:
  - A. CONTINGENCY ALLOWANCE: \$100,000.
- 1.3 RENOVATION CONTINGENCY ALLOWANCE: Cost inclusions in Allowance will be directed by Owner, approved by Architect, and acknowledged by Contractor by means of a Change Order or Construction Change Directive for any costs associated with Concealed or Unknown Conditions. There will be no additional cost inclusions in Contract Sum for allowances otherwise.
- 1.4 ADMINISTRATION OF ALLOWANCES: Include all Allowances in Contract Sum. List each Allowance separately on Application and Certificate for Payment, the Progress Schedule, Schedule of Values, and any other applicable and appropriate listings. Subdivide each allowance as appropriate and as directed by Architect. Execute partial and final payments pursuant to same procedures as required for all other Subcontractors. At Contract Closeout, credit sums remaining in an allowance to Owner by Change Order.

### PART 2 - PRODUCTS

- 2.1 NOT APPLICABLE

### PART 3 - EXECUTION

- 3.1 NOT APPLICABLE

## 01 22 00 - UNIT PRICES

### PART 1 - GENERAL

- 1.1 REQUIREMENTS INCLUDE - Designated Contractors: Provide unit prices on Bid Form for specified items.
- 1.2 DEFINITIONS: Unit Price means a fixed price, including all overhead, profit and all other costs of whatever nature and character, for a specified unit of work. Unit prices in the Bid Form, when accepted by Owner and incorporated into the Contract, shall be the same for additional, deducted or omitted units of work.

### PART 2 - PRODUCTS

#### 2.1 UNIT PRICE ITEM SCHEDULE

A. \*\* (\$/LF)

B. \*\* (\$/SF)

### PART 3 - EXECUTION: NOT APPLICABLE

## 01 23 00 - ALTERNATES

### PART 1 - GENERAL

- 1.1 DESCRIPTION: The Owner reserves the right to accept any or all Alternate Proposals. Base & related alternate items will not be awarded to separate contractors. Bidder may submit a price on any or all alternate items. Alternate bid items are to be stated as an addition or deduction from the base bid total.

### PART 2 - PRODUCTS

- 2.1 NOT APPLICABLE

### PART 3 - EXECUTION

- 3.1 PROPOSAL ALTERNATES:

1. Bid alternate description.
2. Bid alternate description.
3. Bid alternate description.
4. Bid alternate description.
5. Bid alternate description.

## 01 25 00 - SUBSTITUTIONS PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Individual requirements for submittals are described in other pertinent Sections of the Specifications.
- C. CSI Substitution Request Forms
  - 1. CSI Form 1.5C (Substitution Request During the Bidding Phase)
  - 2. CSI Form 13.1A (Substitution Request After the Bidding Phase)

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract. Where a definite product is specified, it is not necessarily the intention to discriminate against other products, but rather to set a definite standard & indicate the quality & capacity of equipment within the class found satisfactory for the Owner's use. Alternate or substitute items shall not deviate in basic construction or function from the specified item. The acceptance of a manufacturer in no way allows the accepted manufacturer to substitute a product that does not conform to the originally specified item. It is incumbent upon the approved manufacturer to provide the item, quality & construction specified.

#### 1.3 DEFINITIONS

- A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests for substitutions. The following are not considered to be requests for substitutions:
  - 1. Substitutions requested during the bidding period, and accepted by Addendum prior to award of the Contract, are included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
  - 2. Revisions to the Contract Documents requested by the Owner or Architect.
  - 3. Specified options of products and construction methods included in the Contract Documents.
  - 4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

#### 1.4 SUBMITTALS

- A. Substitution Request Submittal: The Architect will consider requests for substitution if received within 30 days after date of Notice To Proceed. Requests received more than 30 days after date of Notice To Proceed may be considered or rejected without consideration at the discretion of the Architect.
  - 1. Submit request for substitution using the appropriate CSI Form as referenced in 1.1.C.
  - 2. Submit request for substitution for consideration electronically. Failure to provide all requested information in the format requested will be grounds for rejection.

3. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
4. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
  - a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate contractors, that will be necessary to accommodate the proposed substitution.
  - b. A detailed side-by-side comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
  - c. Product Data, including Drawings and descriptions of products and fabrication and installation procedures.
  - d. Samples, where applicable or requested.
  - e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. The proposed substitution will not extend the Contract Time.
  - f. Cost information, including a proposal of the net change, if any in the Contract Sum.
  - g. The Contractor's certification that the proposed substitution conforms to requirements in the Contract Documents in every respect and is appropriate for the applications indicated.
  - h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

## 1.5 CONSIDERATION

- A. Conditions: The Architect will receive and consider the Contractor's request for substitution when one or more of the following conditions are satisfied, as determined by the Architect. When the Architect approves a substitution, it is assumed that the manufacturer makes a product that is equal or that he will special build one that is equal. If the following conditions are not satisfied, the Architect will return the requests without action except to record noncompliance with these requirements.
  1. Extensive revisions to the Contract Documents are not required.
  2. Proposed changes are in keeping with the general intent of the Contract Documents.
  3. The request is timely, fully documented, and properly submitted.
  4. The specified product or method of construction cannot be provided within the Contract Time. The Architect will not consider the request if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
  5. The request is directly related to an "or-equal" clause or similar language in the Contract Documents.
  6. The requested substitution offers the Owner a substantial advantage, in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the Owner must assume. The Owner's additional responsibilities may include compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner, and similar considerations.

7. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
  8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where the Contractor certifies that the substitution will overcome the incompatibility.
  9. The specified product or method of construction cannot be coordinated with other materials and where the Contractor certifies that the proposed substitution can be coordinated.
  10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.
  11. Where a proposed substitution involves more than one prime contractor, each contractor shall cooperate with the other contractors involved to coordinate the Work, provide uniformity and consistency, and assure compatibility of products.
- B. The Contractor's submittal and the Architect's acceptance of Shop Drawings, Product Data, or Samples for construction activities not complying with the Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval.

#### 1.6 ARCHITECTS ACTION

- A. Architect's Action: If necessary, the Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. The Architect will notify the Contractor of acceptance or rejection of the substitution within 14 days of receipt of the request, or 7 days of receipt of additional information or documentation, whichever is later.
1. Use the product specified if the Architect cannot make a decision on the use of a proposed substitute within the time allocated.

#### PART 2 - PRODUCTS

2.1 NOT APPLICABLE

#### PART 3 - EXECUTION

3.1 NOT APPLICABLE

## 01 26 00 - CONTRACT MODIFICATION

### PART 1 - GENERAL

- 1.1 SUMMARY: This Section specifies administrative and procedural requirements for handling and processing contract modifications.
- 1.2 OWNER-INITIATED PROPOSAL REQUESTS: The Architect will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications. Proposal requests issued by the Architect are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.
  - A. Breakdown: Copies of all receipts or quotes for this work will be submitted with the relevant application for payment with quantities and unit costs shown. Labor and Material shall be broken out. Cost of each scope of work shall be clearly delineated.
- 1.3 CONTRACTOR-INITIATED PROPOSALS: When latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect. Use AIA Document G709 for Change Order Proposal Requests.
  - A. Breakdown: Copies of all receipts or quotes for this work will be submitted with the relevant application for payment with quantities and unit costs shown. Labor and Material shall be broken out. Cost of each scope of work shall be clearly delineated.
- 1.4 MINOR CHANGES IN THE WORK: The Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or Contract Time, on AIA Form G710, Architect's Supplemental Instructions.
- 1.5 CONSTRUCTION CHANGE DIRECTIVE: When the Owner and the Contractor disagree on the terms of a Proposal Request, the Architect may issue a Construction Change Directive on AIA Form G714. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Maintain detailed records on a time and material basis of work required by the Construction Change Directive. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
- 1.6 CHANGE ORDER PROCEDURES Reimbursement for change orders will be limited to the actual cost of materials & labor, plus a 10% mark-up to the subcontractor & a 5% mark-up to the General Contractor, if not explicitly specified as different in the Owner Contractor agreement. If no Subcontractor labor is involved, General Contractor may mark-up 10%, if not explicitly specified as different in the Owner Contractor agreement. Equipment rental from the Contractor or subcontractor, office overhead & supervision will not be considered for reimbursement. A Change Order (AIA G701) or Architect's Field Order (AIA G708) must be issued prior to performing any such work. Work performed without proper authorization will, at the Architect's option, remain without reimbursement to the Contractor or be removed at the Contractor's expense. All Contractor initiated requests for change order will be submitted by Contractor on AIA G701, or substantially similar document. No extra time or resulting damages will be allowed as a result of time required to evaluate or process change orders.
  - A. Breakdown: Copies of all receipts for this work will be submitted with the relevant application for payment with quantities and unit costs shown. Labor and Material shall be broken out. Cost of each scope of work shall be clearly delineated.
- 1.7 ALLOWANCE USAGE PROCEDURES: Changes to be paid for out a contingency or other allowance shall follow the procedures of 1.6 CHANGE ORDER PROCEDURES and be submitted on a document similar to AIA G701 titled "Allowance Usage Order". The document should specify the name of the allowance to from which funds will be distributed.

### PART 2 - PRODUCTS

- 2.1 NOT APPLICABLE

### PART 3 - EXECUTION

- 3.1 NOT APPLICABLE

## 01 29 73 - SCHEDULE OF VALUES

### PART 1 - GENERAL

- 1.1 Arrange schedule of values on or consistent with format of AIA Document G703.
- 1.2 Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- 1.3 Identification: Include the following Project identification on the schedule of values:
  - A. Project name and location.
  - B. Name of Architect.
  - C. Architect's project number.
  - D. Contractor's name and address.
  - E. Date of submittal.
- 1.4 Arrangement:
  - A. Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section.
  - B. Identify site mobilization, bonds and insurance, and all cost for all other General conditions and Division 1 General Requirements.
  - C. Allowances: Provide separate line items in the Schedule of Values for each Allowance.
  - D. In case of projects with multiple sites or buildings included under one project, provide a breakdown per site and/or building.
- 1.5 Format: Format the schedule of values in tabular form with separate columns to indicate the following for each item listed:
  - A. Related Specification Section
  - B. Description of the Work
  - C. Change Orders (numbers) that affect value
  - D. Dollar value of the following
    1. Labor
    2. Materials
- 1.6 Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
- 1.7 Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
- 1.8 Revise schedule to list approved Change Orders, with each Application for Payment.
- 1.9 Revise schedule to show any costs againsts allowances charged, with each Application for Payment.
- 1.10 Submit an updated schedule with each Application for Payment.

### PART 2 - PRODUCTS

- 2.1 NOT APPLICABLE

### PART 3 - EXECUTION

- 3.1 NOT APPLICABLE



## 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

### PART 1 GENERAL

#### 1.1 SUMMARY

- A. This Section specifies management and coordination activities including:
  - 1. Coordination of construction and administrative activities.
  - 2. Ceiling coordination drawings, which include responsibilities for the General Contractor and specific Subcontractors.
  - 3. Bidder-design systems.
  - 4. Meeting requirements.
- B. Related Sections:
  - 1. 01 25 00 - SUBSTITUTIONS PROCEDURES
  - 2. 01 26 00 - CONTRACT MODIFICATION
  - 3. 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION.
  - 4. 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND OTHER SUBMITTALS

#### 1.2 GENERAL COORDINATION PROVISIONS

- A. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Architect of any error, inconsistency, omission, or apparent discrepancy discovered.
- B. Allot time in construction scheduling for liaison with Architect; establish procedures for handling queries and clarifications. Use "Request for Interpretation" form for requesting information.
- C. In addition to other specified meetings, hold coordination meetings and preconstruction conferences with personnel and subcontractors to ensure coordination of Work.
- D. Coordinate scheduling, submittals, and Work of various Specification sections to avoid conflicts and ensure efficient and orderly sequence of installation of interdependent construction elements.
- E. Coordinate Work of various Specification sections having interdependent responsibilities for installation, connection, and operation.
- F. Where Bidder-Design systems and building elements are indicated, incorporate documentation of bidder's design into the submittal process and provide all substantiating documentation in a timely manner, including, but not limited to shop drawings, agency submittals and informational submittals as required by the individual technical sections.
- G. Verify that characteristics of operating equipment are compatible with building utilities and services.
- H. Except as otherwise indicated, conceal pipes, ducts, conduit and wiring in construction. Coordinate locations of fixtures and outlets with finish elements.
- I. Make provision to accommodate items scheduled for later installation.
- J. Coordinate and utilize Project Record Documents in Closeout Submittals.

- K. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of schedules.
  - 2. Installation and removal of temporary facilities.
  - 3. Delivery and processing of submittals.
  - 4. Progress meetings and pre-installation conferences.
  - 5. Project closeout activities.

### 1.3 REQUEST FOR INTERPRETATION (RFI)

- A. When field conditions or Contract Document contents require clarification by the A/E or A/E's sub-consultants, after informal discussion with appropriate design team members determines that clarification is required or confirmation of understanding is needed, a written RFI is to be submitted.
- B. Identify the nature and location of each clarification/verification using the RFI form; provide as a minimum the following information:
  - 1. Project name and number;
  - 2. Date;
  - 3. Date response required by;
  - 4. RFI number;
  - 5. Subject;
  - 6. Initiator of the question;
  - 7. Indication of costs, if known or anticipated;
  - 8. Indication of schedule impact;
  - 9. Location on site;
  - 10. Contract drawing reference;
  - 11. Contract specification section and paragraph reference;
  - 12. Descriptive text
  - 13. Recommended solution(s); and
  - 14. Space for reply on same page as questions.
- C. Architect's response to RFIs will be made in writing within the time limits agreed upon with the Owner and Contractor or otherwise with reasonable promptness.
- D. If no agreement is made concerning the time within which interpretations required of the Architect shall be furnished, then delay shall not be recognized on account of failure by the architect to furnish such interpretations until 15 days after written request is made for them.
- E. If Architect is able to respond to a request for interpretation by making specific reference to Drawing sheet or Specification Section, Contractor shall reimburse Owner for charges of Architect and Architect's Consultants for performing review services for the Contractor.
- F. The Contractor shall be responsible for development and weekly maintenance of an RFI log. The log will be transmitted to the Owner and Architect at each construction progress meeting.

### 1.4 MECHANICAL AND ELECTRICAL COORDINATION

- A. Contractor shall:
  - 1. Resolve all "tight", restricted, or inaccessible conditions involving Work of various Sections in advance of installation.

2. Before Work proceeds in these areas, prepare ceiling coordination drawings in accordance with paragraphs below.
3. Provide supplementary drawings and additional Work necessary to resolve problematic conditions.

1.5 CEILING COORDINATION DRAWINGS

A. General Requirements for Drawings:

1. Ceiling coordination drawings are not shop drawings and are not to be submitted to Owner or Architect for approval. Subcontractors shall be responsible to participate and prepare coordination drawings that illustrate their contract area of responsibility.
2. Ceiling coordination drawings shall show relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in space provided or to function as intended.
3. Prepare composite ceiling coordination drawings to scale of 1/4" = 1'-0" or larger; show ceilings, building structure above equipment, elevator shafts, duct shafts, mechanical systems, and electrical systems in relationship with each other. Include dimensions where critical.
4. Prepare ceiling coordination drawings utilizing different colors to illustrate work of separate trades.
5. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to efficient flow of Work affecting one or more trades.
6. Locate drilled inserts and anchors to avoid structural reinforcements and maintain clearances as required by the Structural Drawings.
7. Mechanical Systems: Include, but do not necessarily limit to following:
  - a. Proposed locations of piping, ductwork, dampers, equipment, and terminations for HVAC, plumbing and fire sprinkler systems.
  - b. Proposed locations for access panels.
  - c. Clearances for installing and maintaining insulation.
  - d. Clearances for servicing and maintaining equipment.
8. Electrical Systems: Include, but do not necessarily limit to following:
  - a. Major raceway systems (i.e., cable tray, etc).
  - b. Panels.
  - c. Conduit and junction boxes for all electrical and fire alarm systems, including all low voltage systems.
  - d. Lighting fixtures.
  - e. Fire alarm devices.
  - f. Clearances for servicing equipment.

B. Documentation Process:

1. HVAC subcontractor shall initiate the coordination drawings and create the electronic drawing files with the appropriate background for the complete coordination process. Backgrounds shall include reflected ceiling plan, beam soffit elevations, ceiling heights, roof openings, and other items to be installed.
  2. Each subcontractor shall incorporate their information via an added drawing layer on the background and transmit to the next trade. Drawings shall include accurate location, size, and elevation for each element to be installed by subcontractor. Each subcontractor shall be responsible to fully coordinate their work with the preceding trades (or "cloud" a possible conflict area for further review). The sequence of adding information and transmitting the drawings shall be as follows:
    - a. HVAC Subcontractor
    - b. Plumbing Subcontractor
    - c. Fire Sprinkler Subcontractor
    - d. Electrical Subcontractor.
  3. Upon completion by all trades, drawings shall be transmitted back to the HVAC subcontractor for printing and issuance back to the Contractor. These final drawings will then be copied and used as a review tool and upon resolution of all conflicts, a construction aid. Final changes shall be made by the appropriate subcontractor and transmitted back to the HVAC subcontractor. HVAC subcontractor shall be responsible for issuing and transmitting back to the Contractor the final version of the coordination drawings.
  4. Subcontractors shall coordinate with other affected trades to prevent conflicts and cooperate in making reasonable modifications in layouts as needed to coordinate systems in space available.
  5. Subcontractors shall notify Contractor of remaining conflicts and other coordination issues requiring resolution prior to commencing construction in each affected area.
  6. If necessary, Contractor will call meetings with subcontractors to resolve any remaining conflicts on the ceiling coordination drawings. Architect shall be invited to attend these meetings.
- C. Contractor shall submit certification to Architect and Owner that coordination documents have been completed and coordination issues have been identified and resolve prior to commencing construction in each affected area. Certification shall be signed and dated by Contractor and each subcontractor indicating that:
1. All related conditions have been checked with all trades.
  2. No apparent conflicts exist.
  3. The requirements of the Contract Documents have been complied with.
  4. All elements of a complete installation are included.
- D. Contractor shall make coordination documents available in field office for review by Architect and Owner during entire period of construction.
- E. BIM Option: At Contractor's option, Contractor and Subcontractors may utilize Building Information Management (BIM) software to accomplish the requirements of ceiling coordination drawings.

## 1.6 BIDDER-DESIGN SYSTEMS

- A. Where indicated in the Contract Documents, provide design, engineering and fabrication for the complete installation of building system or assembly included in the Bidder's Cost of the Work. Include all accommodations for complete installation of system, including coordination with each trade forming a component part of the system or assembly as

required to meet the design and performance criteria, and as required to maintain the integrity of the building design aesthetic. Architect will be the judge for acceptance of Bidder-Design systems.

- B. For systems identified in the Drawings as Deferred Submittals, submit documents per Sections on Submittal Procedures.
- C. Coordinate in field with affected trades for proper relationship to Work based on Project conditions.
- D. Notify Architect of conflicts and other coordination issues requiring resolution prior to commencing construction in each affected area.

#### 1.7 COORDINATION OF SPACE

- A. Coordinate use of Project space and sequence of installation of plumbing, fire protection, mechanical and electrical Work and as required by Ceiling Coordination Drawings, above. Follow routings shown for pipes, ducts, and conduits as closely as practicable, with due allowance for available physical space; make runs parallel with building lines. Utilize space efficiency to maximize accessibility for other installations, for maintenance, and for repairs.
- B. Layout of plumbing, fire protection, mechanical, and electrical systems, equipment, fixtures, piping, ductwork, conduit, specialty items, and accessories indicated on Drawings is diagrammatic. Variations in alignment, elevation, and details required to avoid interference and satisfy architectural and structural limitations are not necessarily shown.
- C. Prior to installation of material and equipment, review and coordinate Work with Architectural and Structural Drawings to establish exact space conditions. Where available space is inadequate or where reasonable modifications are not possible, request information from Architect before proceeding.
- D. Coordinate installation to prevent conflicts and cooperate in making, without extra charge, reasonable modifications in layout as needed.
- E. Provide clear access to control points, valves, strainers, control devices, and specialty items of every nature related to such systems and equipment to obtain maximum head room. Provide adequate clearances as necessary for operation and maintenance.

#### 1.8 COORDINATION OF CONTRACT CLOSEOUT

- A. Coordinate completion and clean up of Work in preparation for Substantial Completion.
- B. To minimize disruption of Owner's activities after occupancy of premises, coordinate access to site by various trades for correction of defective Work and for correction of Work not in accordance with Contract Documents.

#### 1.9 GENERAL MEETING REQUIREMENTS

- A. Schedule meetings and conferences throughout progress of Work; each session scheduled, administered, and presided by entity indicated. Requirements for meetings and conferences include:
  - 1. Prepare agenda for each conference and meeting. Provide agenda to all attendees minimum 24 hours before meeting is scheduled to begin.
  - 2. Distribute written notice to participants 7 days in advance of scheduled date.
  - 3. Make physical arrangements.
  - 4. Record minutes and attendees; include significant proceedings and decisions.
  - 5. Distribute minutes electronically within 5 days after each meeting.
  - 6. Distribute minutes to each participant and to entities affected by decisions made at meeting.

- 7. Distribute minutes to Architect and Owner.
- 8. Maintain in field office one copy of agenda and minutes for each conference and meeting.
- B. Representatives attending meetings shall be qualified and authorized to act on behalf of entity each represents.
- C. Architect and professional consultants may attend meetings to ascertain that Work is consistent with Contract Documents.
- D. Owner may be present at meetings and may propose agenda items.

1.10 PRECONSTRUCTION CONFERENCE

- A. Schedule preconstruction conferences no later than 7 days prior to commencement of Work. Convene at Project site.
- B. Attendees:
  - 1. Architect and professional consultants; Contractor presides over meeting and is responsible for minutes.
  - 2. Owner.
  - 3. Major subcontractors & trade foremen.
  - 4. Others as appropriate.
- C. Minimum Agenda:
  - 1. Administrative and procedural issues:
  - 2. Designation of key personnel.
  - 3. Review and clarify responsibilities of parties to contract.
  - 4. Communications procedures.
  - 5. Review of proposed subcontractors, materials, equipment, and products.
  - 6. Application for payment procedures; schedule of values, proposal requests, change orders.
  - 7. Critical work sequencing; long lead time items and scheduling of full size mock-ups.
  - 8. Submittal and construction progress schedules.
  - 9. Submittal requirements; complete, correct, and timely submittals; scheduled dates.
  - 10. Procedures for submitting product data, shop drawings, samples, and other submittals.
  - 11. Product options and substitutions procedures to extent indicated in other Sections.
  - 12. Procedures for requests for interpretations (RFI), minor changes, field decisions, construction change directives, proposal requests, change orders, and filing claims.
  - 13. Procedures for testing and inspection, including timely notification, including review of preliminary testing at time of meeting.
  - 14. Responsibilities and limitations of authority of testing laboratories; distribution of reports.

- 15. Procedures for maintaining Project Record Documents.
- 16. Schedule for progress meetings.
- D. Site mobilization and utilization:
  - 1. Use of premises; office and storage areas, including Owner's requirements.
  - 2. Temporary utilities and services.
- E. Interior Floor Slab Requirements
  - 1. Effects of construction schedule, concrete work, timing of building enclosure, and temporary facilities such as construction drying; remediation options.

#### 1.11 PROGRESS MEETINGS

- A. Schedule weekly meetings as necessary by progress of Work; day, location, and time to be determined. Convene at Project site.
- B. Attendees:
  - 1. Contractor; presides over meeting and is responsible for minutes.
  - 2. Subcontractors as appropriate.
  - 3. Owner, Architect, and professional consultants may attend as appropriate.
  - 4. Others as appropriate to agenda.
- C. Minimum Agenda:
  - 1. Approval of minutes of previous meeting.
  - 2. Work progress since previous meeting:
    - a. Current activities.
    - b. Critical activities.
  - 3. Deviations from schedule.
  - 4. Field observations, problems, conflicts, and decisions.
  - 5. Deficiencies:
    - a. Identification of items.
    - b. Status of correction.
  - 6. Requests for Information (RFIs):
    - a. Review of RFI log.
    - b. Status of clarification and discipline responsible.
  - 7. Status of change order proposals (COPs).

8. Changes and modifications:
    - a. Status of change orders.
    - b. Pending changes.
    - c. Pending claims and disputes.
    - d. Clarification decisions of Architect or Owner.
  9. Accounting of all allowances.
  10. Problems and conflicts which impede planned progress.
  11. Construction Progress and Submittal Schedules:
    - a. Off-site fabrication and delivery schedules.
    - b. Effect of proposed changes on construction progress schedule and coordination.
    - c. Submittal schedules, status of submittals, and effect on construction progress schedule.
    - d. Corrective measures to regain projected schedule.
  12. Planned progress during succeeding Work period.
  13. Adequacy of work forces.
  14. Coordination between elements of Work.
  15. Maintenance of Project Record Documents.
  16. Other business relating to progress of Work.
- D. Meeting Minutes:
1. Include column to indicate who is required to take action and date action is to be completed. Each of these items requiring action will be carried in subsequent minutes of meeting as "old business" until noted as "resolved."
  2. As minimum, separate into following categories:
    - a. Old business.
    - b. New business.
    - c. Work progress.
    - d. Deficiencies.
    - e. RFIs.
    - f. Proposed changes.
    - g. Schedules.
    - h. Submittals.



- i. Other business, including events to be accomplished by next meeting.

**1.12 PREINSTALLATION CONFERENCES**

- A. Schedule pre-installation conferences required in individual Specification sections. Convene at Project site prior to commencing Work of the section.
- B. Attendees:
  - 1. Project superintendent; presides over meeting and is responsible for minutes.
  - 2. Subcontractor (installer, applicator, or erector).
  - 3. Material or equipment supplier.
  - 4. Manufacturers' representative.
  - 5. Others directly affecting, or affected by the work.
  - 6. Testing agency (if necessary).
  - 7. Subcontractors as appropriate.
  - 8. Owner, Architect, and professional consultants may attend as appropriate.
  - 9. Others as appropriate to agenda.
- C. Minimum Agenda:
  - 1. Access to work and conditions of proper installation.
  - 2. Conditions of installation, such as substrates, existing and surrounding conditions, and environmental conditions.
  - 3. Conditions detrimental to installation.
  - 4. Preparation procedures, including protection of adjacent work.
  - 5. Verify installers' receipt and understanding of installation instructions.
  - 6. Review submittals, installation procedures, and sequence.
  - 7. Review coordination with other work.
  - 8. Evaluate delivery schedule and Construction Progress Schedule.
  - 9. Observe sample installation.
  - 10. Required protection procedures.
  - 11. Observe actual installation areas.

**1.13 CLOSEOUT CONFERENCE**

- A. Schedule Project Closeout conference prior to requesting Substantial Completion.
- B. Attendees:

1. Contractor; presides over meeting and is responsible for minutes.
2. Major subcontractors.
3. Owner, Architect, and professional consultants may attend as appropriate.
4. Others as appropriate to agenda.

C. Minimum Agenda:

1. Start-up of facilities and systems.
2. Testing, adjusting, and balancing.
3. System demonstration and observation.
4. Operation and maintenance instructions for the owner's personnel.
5. Contractor's inspection of work.
6. Contractor's preparation of an initial "punch list."
7. Procedure to request Architect inspection to determine date of substantial completion.
8. Completion time for correcting deficiencies.
9. Inspections by authorities having jurisdiction.
10. Certificate of occupancy and transfer of insurance responsibilities.
11. Partial release of retainage.
12. Preparation for final inspection.
13. Closeout submittals:
  - a. Project Record Documents.
  - b. Operating and maintenance documents.
  - c. Operating and maintenance materials.
  - d. Warranties and bonds.
  - e. Affidavits.
14. Final application for payment.
15. Final cleaning.
16. Contractor's demobilization of site.
17. Maintenance.

PART 2 PRODUCTS

2.1 NOT APPLICABLE

PART 3 EXECUTION

3.1 NOT APPLICABLE

**01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION****PART 1 - GENERAL**

- 1.1 DESCRIPTION: The work progress schedule requirement is established to ensure adequate planning, scheduling, management, and execution of the work by the Contractor, and to enable the Owner to evaluate work progress and make contract time adjustments. The work specified in this section consists of submitting a contract schedule, monthly updates, four-week schedules for progress meetings, and a final as-built schedule. The planning, scheduling, management, and execution of the work in accordance with the contract is the responsibility of the Contractor.
- 1.2 SUBMITTALS: Except as modified in this section, the procedures required by Section 01 33 23, Submittal Procedures, shall be observed.
- A. Submit a statement of CPM capability within 10 days following the Owner's delivery of the fully executed contract, stating that the Contractor has in-house capability, or if not, naming a scheduling subcontractor to be employed by the Contractor to prepare the schedules required. Include with this submittal scheduler's name and list of qualifications demonstrating that the scheduler has performed scheduling for projects of the same magnitude and complexity of this project. Failure to provide this information may result in disqualification of the proposed scheduler.
- B. At the preconstruction meeting, submit for review by the Owner, a work progress schedule meeting the requirements below.
- C. Within 5 days of receipt of review comments from the Owner, incorporate the Owner's comments, finalize, and resubmit the work progress schedule for Owner approval.

**PART 2 - PRODUCTS**

- 2.1 NOT APPLICABLE

**PART 3 - EXECUTION****3.1 CONTRACT SCHEDULE SUBMITTAL REQUIREMENTS**

- A. The contract schedule submittal shall be developed in Critical Path Method (CPM) format using Primavera Project Management (P6)®, Microsoft Project®, or pre-bid approved equal. It shall include:
1. A CPM Network Diagram:
    - a. Time-scaled (by week, starting Monday), grouped by work areas and sorted by early start dates.
    - b. The diagram shall be clear, neat, and legible. Each sheet shall contain a title block, a revision block, project name and contract number, Contractor, type of tabulation (initial, update, project status), project duration, scheduled substantial completion date, and a legend explaining the basic notation, terms, and codes used.
    - c. Identify critical path activities, including critical paths to contract milestone dates.
    - d. Activity durations shall not exceed 10 days. Should an activity require more than 10 days, it shall be subdivided to define appropriate activities. The Owner may approve using longer durations on such non-construction activities as the procurement and fabrication of materials and equipment.
    - e. All activity descriptions shall clearly define the location and type of work to be performed.
    - f. Show schedule critical deliverables (i.e., permits, submittals, etc).
    - g. Schedule fabrication and delivery of all materials and equipment.

- h. Scheduled start or completion dates imposed on the schedule by the Contractor shall be consistent with contract milestone dates and other restrictions. Contract milestone dates are the work area starting and completion dates and shall be clearly identified and connected to the appropriate activities.
- i. Schedule shall include contingencies for normal weather delays and seasonal periods of heavy traffic flow.
- j. Schedule shall list resources required to perform work within durations shown. Indicate the estimated quantities of work anticipated where applicable.
- k. Failure to include any element of work required for performance of this contract shall not excuse the Contractor from timely completion of work required to achieve the contract milestones, notwithstanding the acceptance of the contract schedule submittal.
- l. The contract duration shall be the duration specified in the contract documents and awarded by the Owner.
- m. Schedules extending beyond the contract completion date will not be accepted.
- n. Schedules showing the work completed in less than the contract duration may be found by the Owner to be impractical, requiring resubmittal.
- o. Schedules showing the work completed in less than the contract duration, if practical to the Owner, shall be considered to have Float. Float is the time between the scheduled duration of the work and the contract duration. Float is a resource available to both the Contractor and the Owner, and is non-compensable. Acceptance of a schedule showing the work completed in less than the contract duration shall not constitute a change to the contract completion date.
- p. Schedule shall be coded by activity identifying shift work, restricted hours, electrical work, etc.
- q. All Owner-required activities shall be shown as part of the critical path.
- 2. Narrative: The contract schedule submittal shall include a "stand-alone" document that conveys, in writing:
  - a. The Contractor's schedule assumptions; constraints; critical path/critical activities and why they are critical; permit requirements; coordination required with the Owner, other contractors, utilities or any other parties; and long lead delivery items.
  - b. Basis for resources. Include anticipated quantities of work for each activity and the production rates used in determining resource allocation for activities.
- 3. The contract schedule submittal shall include a compact disc containing a copy of the project files. All data shall be written to disk via the Primavera Project Management (P6)®, Microsoft Project® Backup, or pre-bid approved equal utility.
- 4. The final, accepted work progress schedule shall be the baseline from which changes in duration and logic shall be determined and shall be the basis for planning, scheduling, managing and executing the work.

### 3.2 MONTHLY UPDATE REPORT

- A. No later than 30 days after acceptance of the contract schedule and monthly thereafter, the Contractor shall submit a Monthly Update Report.
- B. The Monthly Update Report shall consist of:

1. An updated CPM Network Diagram of the contract schedule, format as previously specified herein, and a compact disc containing an exact copy of the submittal. All data shall be written to disk via the Primavera Project Management (P6), Microsoft Project Backup, or pre-bid approved equal utility.
  2. A narrative which identifies the work actually completed and reflects the progress along the critical path in terms of days ahead of or behind the contract milestone dates. Specific requirements of the narrative are as follows:
    - a. If the Monthly Update Report indicates an actual or potential delay to the contract milestone dates, the narrative shall identify the problem, cause, and the activities affected.
    - b. The narrative shall also address the following:
    - c. A detailed change in duration of any activity and/or logic changes to activities which were performed in a sequence different from the accepted contract schedule.
    - d. Activities proposed to be added to or deleted from the contract schedule.
    - e. Identification of executed change orders.
  3. Incorporation of all Owner-accepted schedule revisions.
  4. The mutually agreed-to Monthly Update Report shall be the basis for evaluating the Contractor's progress. Documents in a single Monthly Update Report shall have the same data date irrespective of the dates of preparation of the individual documents.
  5. If the latest completion time for any required contract milestone date as indicated by the current Monthly Update Report does not fall within the time allowed by the contract, the Contractor shall prepare and submit a plan to recover the lost time.
- C. The Owner may call for more frequent status meetings (weekly, biweekly, etc.), at no additional cost to the Owner, at which the Contractor shall provide the required information.
- D. Review of Monthly Update Report:
1. The Owner will review the monthly report and respond within 7 days after receipt.
  2. If necessary, the Contractor shall resubmit within 7 days of receipt of review comments.
- E. Applications for Payment: Submission of monthly schedule updates shall accompany applications for progress payments, and will be a condition of payment.
- 3.3 PROGRESS MEETING SCHEDULES: During on-site construction, at each progress meeting, the Contractor shall provide a one week back and three week forward activity schedule. This schedule shall be in Gantt bar chart form and include, but not be limited to, reporting of the following:
- A. Detailed listing of specific work items, duration of work items, actual work hours, resources to be used in accomplishing work items, work area closing and opening dates and times, operational impacts, and other pertinent items.
  - B. The weekly progress meeting schedules shall be submitted not less than 24 hours in advance of the scheduled progress meeting.
- 3.4 SCHEDULE MONITORING: If the progress of critical path activities falls behind the time lines shown on the latest, accepted version of the CPM schedule by 7 days, the Contractor shall document the means he will employ to bring work back on schedule.
- 3.5 CONTRACT SCHEDULE REVISIONS: Proposed revisions to the accepted contract schedule shall be submitted to the Owner on a separate fragnet for review and acceptance prior to incorporation into the current contract schedule. This fragnet must clearly

outline the impact of the revision within the context of the contract schedule. Each proposed revision shall be submitted with the following minimum components:

- A. A CPM Network Diagram showing revised and affected activities.
- B. An Activity Report and Predecessor/Successor Report for all revised and affected activities.

- 3.6 CONTRACT TIME ADJUSTMENTS: Float is not for the exclusive use or benefit of either the Owner or the Contractor. Extensions of time for contract performance as specified in the contract will be granted only to the extent that time adjustments to the affected work items exceed the total float time along the affected path(s) of the contract schedule current at the time of the delay.
- 3.7 AS-BUILT SCHEDULE AND DOCUMENTATION: Within 15 days after substantial completion, the Contractor shall submit for the Owner's acceptance a final, as-built CPM Network Diagram.
- 3.8 SUSPENSION OF PAYMENTS: If the Contractor fails at any time to submit a schedule or update as noted above, the Owner reserves the right to suspend progress payments wholly or in part until the Contractor submits a schedule which is accepted by the Owner.

# 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND OTHER SUBMITTALS

## PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. The purpose of Contractor submittals is to demonstrate for those portions of the Work for which submittals are required, the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents.
- B. By approving and submitting submittals, the Contractor/CM represents that the Contractor/CM has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information within such submittals with the requirements of the Work and of the Contract Documents.
- C. The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals. The Architect's review is only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

### 1.2 GENERAL REQUIREMENTS

- A. All submittals to be made by Electronic Submission in PDF format.
- B. Submittals shall be initiated by the trade contractor, submitted to the Contractor/CM for review & approval, & then submitted to the Architect for action.
- C. Submit submittal register & receive architects concurrence prior to any other submissions.
- D. Schedule submittals to allow adequate time for review and resubmission, if necessary.
- E. Submittals may be returned without action if made out of sequence or schedule, or are missing required information.
- F. All food service submittals must be submitted at once with extra time for review.
- G. All Doors, Frames & Storefront must be submitted at one time.
- H. Please allow extra review time for the following submittals, as they will likely take longer than two weeks:
  - 1. Structural Steel
  - 2. Metal Building
  - 3. Hollow Core Planks
  - 4. Rebar
  - 5. MEP
  - 6. Food Service
  - 7. Doors & Storefront
  - 8. Casework

### 1.3 PROJECT INITIATION SUBMITTALS - Prior to the submission of any application for payment, submit the following:

- A. Executed Agreement & any amendments
- B. Project Construction schedule
- C. Schedule of values
- D. Insurance certificates
- E. Performance & payment bonds
- F. Project Submittal Schedule
- G. Final list of all trade contractors/ subcontractors
- H. Sub-contractor & superintendent qualifications
- I. Pre-construction conference agenda & schedule

J. Schedule of projected rain days per month

#### 1.4 SCHEDULING

- A. Prepare & submit to Architect for approval a submittal register showing all required Shop Drawings, Product Data, Samples. Schedule item submission date and projected approval date as required to not cause delay to construction schedule.
- B. Schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Include certifications to be submitted with the pertinent drawings at the same time. No delay damages or time extensions will be allowed for time lost in late submittals. An additional 10 calendar days will be allowed and shown on the register for review and approval of submittals for food service equipment, structural steel & HVAC control systems.
- C. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.
- D. Submittals called for by the contract documents will be listed on the register. If a submittal is called for but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Architect does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the register or marked "N/A."
- E. Re-submit register and annotate monthly by the Contractor with actual submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.
- F. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.5 SHOP DRAWINGS: Should be the independently produced work of the contractor. Reproductions of the construction drawings will be returned without comment. Present in a clear and thorough manner. Title each drawing with Project name and number; identify each element of shop drawings by reference to sheet number and detail, schedule, or other appropriate identification of Contract Documents. Identify field dimensions; show relation to adjacent products or elements of the Work; show critical features.

1.6 PRODUCT DATA: Submit only pages which are pertinent; mark product data to specifically identify only pertinent products; reference each to Specification Section and Article number. Show standards, performance characteristics, and capacities; wiring and piping diagrams; controls; component parts; finishes; dimensions; and required clearances. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the Work. Delete information not applicable.

1.7 COLOR SELECTION SAMPLES: Color selection samples for all exterior items and all interior items requiring such will be submitted together at one time, no longer than 45 days after notice to proceed.

1.8 SAMPLES: Submit full range of manufacturer's standard finishes of the actual product, except when more restrictive requirements are specified, indicate colors, textures, and patterns for Architect selection. Submit samples to illustrate functional characteristics of products, including parts and attachments.

1.9 MANUFACTURER'S PUBLISHED INSTRUCTIONS: Furnish manufacturer's published instructions for storage, preparation, assembly, installation, start-up, adjusting, balancing, and finishing.

1.10 SUBMITTAL REQUIREMENTS: Apply Contractor/CM's approval certification, certifying to review, verification of products, field dimensions, quantities, field construction criteria, and coordination of information with requirements of Work and Contract Documents. Coordinate submittals into logical groupings to facilitate interrelation of the several items: 1. Finishes which involve Architect selection of colors, textures, or patterns. 2. Associated items which require correlation for efficient function or for installation.



- 1.11 **HARDCOPY SUBMITTAL:** As requested by Architect, submit opaque reproductions of shop drawings, product data and manufacturer's published instructions. Submit number of samples specified in individual Specifications Sections. Identify Project by title and number. Identify Work and product by Specifications section and Article number.
- 1.12 **RESUBMITTALS:** Make re-submittals under procedures specified for initial submittals; identify changes since previous submittal.
- 1.13 **CONTRACTOR'S EXAMINATION:** Review submittals prior to delivery to Architect; verify quantities, field measurements, field construction criteria, assembly and installation requirements, manufacturer's catalog numbers, and conformance of submittal with requirements of Contract Documents. Sign or initial each sheet of shop drawings and product data, and each sample label to certify coordination and compliance with requirements of Contract Documents. Notify Architect in writing at time of submittal of any deviations from requirements of Contract Documents. Do not fabricate products or begin work which requires submittals until return of submittal with Architect acceptance. Contractor will receive, review, approve & forward multiple copies of product submittals & shop drawings to the Architect in a timely manner. Do not proceed with manufacture prior to review of shop drawing. Architect's review is only for general conformance with design concept & Contract Documents' requirements. Contractor is responsible for confirming & correlating dimensions, & construction techniques. Architect's review & action does not allow deviation from the requirements of the Contract Documents, does not relieve Contractor, Subcontractor or supplier from complying with every aspect of the Contract Documents, nor from responsibility for errors & omissions in submittals.
- 1.14 **ARCHITECT'S REVIEW:** Allow 14 days for Architect's review of each submittal. Daily allowance is time in possession of Architect and exclusive of delivery from and to Contractor and exclusive of resubmissions. Architect's review is limited to aesthetics, architectural design, and information contained in Contract Documents. Similarly, Consultant's review is limited to design relating to its specific field of expertise and its information contained in Contract Documents. Architect's or Consultant's review is neither a verification of Contractor's examination nor a substitution of Contractor's responsibilities. Architect or Consultant may inform Contractor of any conspicuous errors on a submittal without prejudice to being held harmless to Contractor's examinations and responsibilities.
- 1.15 **DISTRIBUTION:** Duplicate as necessary and distribute reproductions of shop drawings, products data, manufacturer's instructions, and samples, which bear Architect stamp of approval, to Project site, Subcontractors, suppliers, and other entities requiring information.

## PART 2 - PRODUCTS

- 2.1 NOT APPLICABLE

## PART 3 - EXECUTION

- 3.1 NOT APPLICABLE

## 01 35 00 - SPECIAL PROJECT PROCEDURES

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings Specifications or other conditions of the contract, apply to this section
- 1.2 PUBLISHED REGULATIONS: The Contractor shall at all times abide by the published City ordinance, regulations, laws, etc. of the Owner and all amendments, including those that may be issued during the duration of the Contract. Particular attention is called to those regulations pertaining to circulation, noise, sanitation, safety and behavior.
- 1.3 OUTAGES: When required during any occupancy of the buildings by the Owner, utility and service outages shall be kept to a minimum and will be permitted only with written advance approval of the Owner. Outages that will, in the opinion of the Owner, severely affect building occupants must be completed during off-hours or on weekends or holidays at no additional cost to the Owner. Work on off-hours, weekends and/or holidays shall comply with the Owner's policies and the City ordinances and comply with any special permits as issued by the City. Contractor shall give sufficient advance notice to the Owner of a requirement for utility outages to permit Owner to make necessary arrangements with those affected. All requests for outages shall be made in writing to the Owner a minimum of seven (7) calendar days in advance of the interruption in service. Service outages (electrical, water, sewerage, telephone, TV cable, gas, or any other public or private utility serving the Owner's property) shall not be interrupted during normal business hours. In the event the Work requires disruption of service(s), the Contractor shall schedule this work for non-business hours at no additional cost to the Owner. Necessary utility and service outages affecting off-site properties and persons shall be arranged with the related utilities and public authorities at the sole expense of the Contractor. Requests for outages will not be considered unless they include an identification of all areas which will be affected by the proposed outage. Contractor shall be responsible for all costs of the Owner arising from outages occurring without approval of the Owner, including accidental outages.
- 1.4 MAINTENANCE OF BUILDING SECURITY: The Contractor shall make every effort to maintain the security of the construction site. The Contractor shall cooperate with the Owner in particularly sensitive areas where security and special safeguards are required.
- 1.5 PROTECTIVE NIGHT LIGHTING: The Contractor shall provide adequate outdoor lighting to illuminate security zones, staging, stockpiles, trenches, projections, and the like, with the intent of protecting the materials and construction from vandalism, theft, and to protect the public from injury and property damage. Such lighting shall be in addition to temporary power and lighting required under the Temporary Facilities Section. Cost for installing protective night lighting shall be included in the Contractor's contract price for the work.
- 1.6 PUMPING AND DRAINING: The Contractor shall take over the responsibility for site drainage in areas under his control upon entering the premises and shall maintain such drainage during the life of this Contract as approved by the Owner, and/or Architect, and so as not to adversely affect the adjacent areas. Legally remove by pumping, draining or bailing any water which may accumulate or be found on the site within the contract limits where excavating and grading are to be done, whether from snow, rain, surface flow, springs, ground water, backing up of drains or sewers, or from any other cause, always, and under any circumstances and contingencies that may arise. Form all pump wells, sumps, dams, flumes or other necessary works to keep trenches and excavations entirely clear of water. The Contractor shall have at all times upon the site, sufficient and satisfactory pumping machinery. Pump wells or well points and underdrains as may be required, shall be provided where needed to properly handle the water. The final trimming excavation shall not be done until dewatering means are in place and in operation. Water from trenches and excavations shall be disposed of in accordance with applicable law so as to not cause injury to public health nor to public or private property, nor to the existing work or to the work completed or in progress, nor to the surfaces of roads, walks, and streets, nor cause any interference with the use of the same by the public. Newly made and existing concrete and masonry shall be protected from injury resulting from dewatering work by protective coverings.
- 1.7 BROKEN GLASS: The Contractor shall be responsible for all broken, cracked, and/or scratched glass (new and existing) damaged during the construction period and shall replace all such defective glass before final acceptance.
- 1.8 HOURS OF WORK: The contractor, in preparing all schedules and in undertaking all work, shall respect the following time restrictions: Monday to Saturday-7:00AM to 7:00PM-Holidays excluded. All work schedules are subject to City ordinances. Other time may apply as requested and approved by the Owner.

- 1.9 EMERGENCY PHONE CONTACT LIST: Each contractor shall provide an emergency phone number contact list for their firm and all subcontractors. List to be kept current during the entire construction period.

PART 2 - PRODUCTS

- 2.1 NOT APPLICABLE

PART 3 - EXECUTION

- 3.1 NOT APPLICABLE

## 01 41 00 - REGULATORY REQUIREMENTS

### PART 1 - GENERAL

- 1.1 All work will be performed in compliance with the latest edition of applicable regulatory requirements. Code requirement will establish the minimum requirements in the absence of direct instructions in the Construction Documents. Applicable regulatory requirements include the following:

- A. International Building Codes.
- B. National Electric Code.
- C. NFPA 101 - Life Safety Code.
- D. Texas Accessibility Standards.
- E. Americans with Disabilities Act.

### PART 2 - PRODUCTS

- 2.1 NOT APPLICABLE

### PART 3 - EXECUTION

- 3.1 NOT APPLICABLE

## 01 41 33 - ACCESSIBILITY REQUIREMENTS

### PART 1 - GENERAL

- 1.1 GENERAL: Comply with facility requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG) 2010 & the Texas Accessibility Standards (TAS) 2012. In addition to any attributes of new construction or alterations indicated in other sections or in the drawings, comply with the requirements of this section.
- 1.2 WALKWAY REQUIREMENTS: Minimum clear width – 36 inches. Running slope - 1:20 maximum. Cross slope - 1:50 maximum. Change in level from 0.25" to 0.50" requires 1:2 beveled edge. Change in level greater than 0.50" requires ramp. Surface to be firm, stable & non-slip. Walkway grates to have no gap greater than 1/2 inch, long dimension perpendicular to dominant direction of travel.
- 1.3 ACCESSIBLE PARKING: Locate as shown, as close as practical to accessible entry. Standard space is 96" wide with 60" side aisle. Van space is 96" wide with 96" side aisle. Two spaces may share an aisle. Maximum slope 1:50. Provide designating signage.
- 1.4 CURB RAMPS: Provide curb ramp wherever an accessible route crosses a curb. Maximum slope 1:12 & a minimum of 36" wide. Do not project into traffic lanes. Surface to be either truncated dome per 705 of TAS (required in TXDOT ROW) or grooves 1/8" deep, 1/4" to 3/4" wide, & 3/4" to 2" apart.
- 1.5 RAMPS: Provide ramps wherever slope of accessible route exceeds 1:20, as shown. Maximum slope 1:12 if rise greater than 6", with transitions flush. Minimum width 36". Maximum rise between landings is 30 inches. Provide a minimum 1.25" diameter to maximum 2" inch diameter handrail both sides, 34"-38" above ramp surface. Surface firm, stable & slip-resistant. A curb or barrier shall be provided that prevents the passage of a 4 inch diameter sphere, where any portion of the sphere is within 4 inches of the finish floor or ground surface.
- 1.6 STAIRWAYS: Risers shall be 4 inches high minimum and 7 inches high maximum. Treads shall inches deep minimum. Open risers are not permitted. Provide a minimum 1.25" diameter to maximum 2" inch diameter handrail both sides, 34"-38" above stair nosings. At top of stair flight, extend handrail 12 inches minimum from the first riser nosing. At bottom of stair flight, handrails shall extend at least equal to one tread depth beyond the last riser nosing.
- 1.7 ENTRIES: At all entries, 5' approach on either side of entry to have a slope no greater than 2%.
- 1.8 DOORS: Provide accessible doors at accessible entrances & into accessible space, as shown. Provide clear opening of 32" minimum, with the door 90 deg open (face of door to stop). Maximum threshold height - 1/2". Provide lever operated, push-type, or U-shaped handles. Adjust new & existing interior doors with closers to open with less than 5 lbf force. Adjust interior & exterior doors to close from 90 degrees open to 12 degrees from latch in no less than 5 seconds.
- 1.9 DRINKING FOUNTAINS: Accessible drinking facilities shall be provided, as shown. Spout heights at 36" and 40". Spout height, location, controls, operation & clearances meet ADAAG and TAS.
- 1.10 WATER CLOSETS: Provide at least one (1) accessible WC for both men & women, as shown. Seat height to be from 17" to 19". Provide grab bars. Flush controls on open side & dispenser mounting location on side wall side to meet ADAAG and TAS.
- 1.11 TOILET STALL: Provide at least one (1) accessible toilet stall for both men & women, as shown. Minimum dimensions - 36" wide x 69" deep, with 32" outward swinging door. Provide a 42" grab bar at side wall and a 36" grab bar at rear wall.
- 1.12 URINALS: Provide accessible urinal(s) with elongated rim at 17" above floor. Provide required clear floor space & flush controls to meet ADAAG and TAS.
- 1.13 LAVATORIES & MIRRORS: Provide accessible lavatory & mirror for both men & women toilet rooms, as shown. Lavatory to be less than 34" high & extend at least 17" from wall, with knee clearance below; provide insulation on drain & hot water pipes. Controls must be operable by the handicapped. Mirrors must be mounted with bottom 40" high maximum.
- 1.14 GRAB BARS: Provide 42" minimum length grab bars at side walls and 36" minimum grab bars at rear walls shown. Bar diameter 1.5"; space from bar to wall 1.5". Mounting to support 250 lb.

1.15 CHILD MOUNTING HEIGHTS: Refer to TAS Table 604.9 for water closets and toilet compartments mounting heights for children's use.

1.16 SIGNAGE: Provide signs which designate permanent rooms that may be used by the public, complying with ADAAG and TAS requirements for braille, character, height, finish & contrast. Directional signs to functional spaces shall comply with requirements for character, height, finish & contrast (directories are exempt). Designate accessible parking, loading, entrances, & toilet facilities with the international symbol of accessibility. Provide sign at non-accessible entries directing to accessible entries. Room signs shall be on the wall at the latch side of the door, 60" AFF to centerline.

## PART 2 - PRODUCTS

2.1 NOT APPLICABLE

## PART 3 - EXECUTION

3.1 NOT APPLICABLE

**01 42 13 - ABBREVIATIONS AND ACRONYMS****PART 1 - GENERAL**

- 1.1 Abbreviations used generally follow the Uniform Drawing System (UDS) as published by the Construction Specifications Institute (CSI). In the case of any discrepancy or question on the part of the Contractor, written request for clarification should be submitted immediately to the Architect. The Architect's resulting interpretation of abbreviations is final & binding on all parties involved in the work.

A.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION: NOT APPLICABLE

## 01 45 23 - TESTING AND INSPECTING SERVICES

### PART 1 - GENERAL

- 1.1 REQUIREMENTS INCLUDED: The Owner shall provide or contract for, independently of the contractor, the inspection services, the testing of construction materials, and the verification testing services necessary for acceptance of the facility by the district.
- 1.2 DUTIES OF THE GEOTECHNICAL ENGINEER: Attend preconstruction meeting. Review available soils information performed for the project. Monitor the subgrade and fill pad preparation below the building area and the method of construction of this pad. Perform specified testing and sampling of earthwork materials. Ascertain compliance of materials and pad preparation with the requirements of the Contract Documents. Perform additional tests or monitoring of the work as deemed necessary by the Geotechnical Engineer, the Architect, Engineer, the Contractor or the Owner. Submit written report of each test and inspection performed with a copy directly to the Structural Engineer in accordance with Section 01 31 00. Submit a statement with a copy directly to the Structural Engineer at the completion of the related part of the project summarizing the services performed and the compliance/noncompliance of the test results or items monitored with regard to the specified requirements. Statement shall be signed and sealed by the Geotechnical Engineer.
- 1.3 ADDITIONAL RESPONSIBILITIES OF THE CONTRACTOR: Cooperate with geotechnical engineer's representatives, provide access to Work and to manufacturer's operations and provide adequate facilities as required for storage and curing of test samples. Secure and/or deliver to the geotechnical engineer adequate quantities of representational samples of materials proposed to be used and which require testing. Provide copies of product's test reports as required. Furnish one complete set of project plans and specifications to the Geotechnical Engineer to facilitate inspections and testing and to provide direction on the storage and curing of test samples. Assist geotechnical engineer in obtaining and handling samples at the Project site or at the source of the product to be tested. Notify geotechnical engineer sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests. Submit a written statement with a copy directly to the Structural Engineer at the completion of the Project stating that to the best of his knowledge, the Structural Portion of the Project has been built in accordance with these plans and specifications. Employ and pay for the services of the geotechnical engineer to perform additional inspections, sampling and testing required:
  - A. For the Contractor's convenience.
  - B. When initial tests indicate Work does not comply with Contract Documents.
- 1.4 SPECIFIC TESTS, INSPECTIONS AND METHODS REQUIRED: Geotechnical engineer shall provide the following soil testing/monitoring of the subgrade and fill pad:
  - A. A minimum of at least one laboratory test for moisture-density relationship of the subgrade material. Test in accordance with Texas Highway Department Test Procedure TEX 113E.
  - B. A minimum of at least one laboratory test for moisture-density relationship of the select fill. Test in accordance with Texas Highway Department Test Procedure TEX 113-E.
  - C. One field density test each 2,000 SF for subgrade below building for "Density Control of Compaction" in accordance with latest ASTM D-2922 and ASTM D-3017.
  - D. One field density test per lift each 2,000 SF for select fill below building for "Density Control of Compaction in accordance with latest ASTM D-2922 and ASTM D-3017.
  - E. Pier inspection & monitoring.
  - F. At least one field density test per lift for each 200 linear feet of select fill within plumbing trenches for "Density Control of Compaction" in accordance with latest ASTM D-2922 and ASTM D-3017. Fill material below the pipe and up to 12" above the pipe need not be tested for compaction.
  - G. Any other tests specifically required by other sections of the specifications.

### PART 2 - PRODUCTS



2.1 NOT APPLICABLE

PART 3 - EXECUTION

3.1 NOT APPLICABLE

## **01 50 00 - TEMPORARY FACILITIES**

### **PART 1 - GENERAL**

- 1.1 CONSTRUCTION UTILITIES: Construction utilities are to be provided by the Contractor.
- 1.2 TEMPORARY JOB SIGN: Provide a 4'x 8'x 5/8" plywood job sign with professionally printed and attached full color vinyl graphics, securely mounted on 4x4 posts, the design & location of which will be provided by the Architect. This sign will be erected within 2 weeks after the contract date & prior to any request for payment. No other construction signage will be allowed.
- 1.3 FIELD OFFICE: Provide & maintain a clean, secure, weathertight, temporary field office with electrical & phone service during the course of the project; cell phone use is acceptable. A complete set of Construction Documents & daily project log will be kept there at all times.
- 1.4 TRASH RECEPTACLES: Provide trash receptacles on the job site. Each trade is responsible for their own clean-up, to be performed daily. If not performed in a timely manner the Owner may have this work done separately & charged against the contract amount.
- 1.5 PORTABLE TOILET: Provide & properly maintain a portable toilet on site for the use of the workers. Workers shall use portable toilet facilities provided by the General Contractor / CM and shall not use other onsite restroom facilities or those of the project under construction.
- 1.6 PERIMETER SECURITY: Provide perimeter security to control access to the site by means of appropriate fencing, gates & barricades.
- 1.7 CONSTRUCTION ENTRY: Provide rock entry as required by governing jurisdiction & to limit mud from adjacent roadways.
- 1.8 SURVEYING & LAYOUT MEASUREMENT: Contractor is responsible for setting any and all other elements necessary to the Work. Means and methods for those settings are at selection of Contractor. Set appropriate and accurate locating devices as required for the Work.

### **PART 2 - PRODUCTS**

- 2.1 NOT APPLICABLE

### **PART 3 - EXECUTION**

- 3.1 NOT APPLICABLE

## 01 56 39 - TEMPORARY TREE AND PLANT PROTECTION

### PART 1 - GENERAL

- 1.1 Description: This item shall govern the proper care and treatment of all trees and other vegetation in the vicinity of any development activity.
- 1.2 Submittals: The submittal requirements for this specification item shall include:
  - A. Identification of the location, type of protective fencing (i.e. A, B or C), materials of construction and installation details;
  - B. Proposed tree dressing;
  - C. Type, location and construction details for proposed tree wells;
  - D. Location, type, materials of construction and installation details for permeable paving;
  - E. Type and rate of application of fertilizer.
- 1.3 Quality Assurance:
  - A. Tie back branches to provide temporary clearance.
  - B. Do not prune if boring insects are flying (they are attracted to fresh wounds).
  - C. All pruning shall be performed by qualified arborist (ISA Certified Arborist or Tree Worker).
  - D. All pruning shall follow ISA's Tree Pruning Guidelines or most recent ANSI A300 Pruning Standards, and ANSI Z133.1 Safety Standards.

### PART 2 - PRODUCTS

- 2.1 Protective Fencing: Protective fencing is designated as the materials used to protect the root zones of trees as illustrated in City of Austin Standard Detail 610S-1. Three basic types of protective fencing materials are allowed. Type A and Type B are typical applications and shall be installed where damage potential to a tree root system is high, while Type C shall be installed where damage potential is minimal. The specific type of protective fencing for the work shall be as indicated on the Drawings. Type C fence materials shall be subject to approval by the Architect. Type C fencing shall be replaced by Type A or Type B fencing as directed by the Engineer or designated representative if it fails to perform the necessary function.
  - A. Type A Chain Link fence (Typical Application-high potential damage): Type A protective fencing shall be installed in accordance with City of Austin Standard Details 610S-2 and 610S-4 and shall consist of a minimum five-foot (1.5 meters) high chain link fencing with tubular steel support poles or "T" posts.
  - B. Type B Wood Fence (Typical Application-high potential damage): Type B protective fencing shall be installed in accordance with City of Austin Standard Details 610S-3 and 610S-5 and shall consist of any vertical planking attached to 2x4-inch (50 x 100 mm) horizontal stringers which are supported by 2x4-inch (50 x 100 mm) intermediate vertical supports and a 4x4-inch (100 x 100 mm) at every fourth vertical support.
  - C. Type C Other Materials (Limited Application-minimal potential damage): The following materials may be permitted as alternates for limited or temporary applications (3 days or less) where tree damage potential is minimal:
    1. High visibility plastic construction fencing. - The fabric shall be 4 feet (1.2 meters) in width and made of high density polyethylene resin, extruded and stretched to provide a highly visible international orange, non-fading fence. The fabric shall remain flexible from -60oF to 200oF (-16oC to 93oC) and shall be inert to most chemicals and acid. The fabric pattern may vary from diamond to circular with a minimum unit weight of 0.4 lbs./Ft. (0.6 kilograms per meter). The fabric shall have a 4 foot (1.2 meters) width minimum tensile yield strength (Horizontal) of 2000 psi [13.9 megaPascals], ultimate tensile strength of 2680 psi [18.5 megaPascals] (Horizontal) and a maximum opening no greater than 2 inches (50 mm).
    2. Other approved equivalent restraining material. - The fencing materials, identified in (a) and (b) above, shall be supported by steel pipe, tee posts, U posts or 2" x 4" (50 mm x 100 mm) timber posts that are a minimum of 5-1/2 feet (1.68 meters) in height and spaced no more than 8 feet (2.44 meters) on centers. The fabric shall be secured to post by bands or wire ties.
- 2.2 Trunk Protection (Limited Application): When indicated on the Drawings or directed by the Architect, tree trunk protection shall be provided in accordance with City of Austin Standard Details 610S-4 and 610S-5. Tree trunk protection shall consist of any 2 x 4-inch (50 x 100 mm) or 2 x 6-inch (50 x 150 mm) planking or plastic strapping.

- 2.3 Tree Dressing: Tree dressing of any damaged areas shall be accomplished using any approved asphaltic tree wound paint, immediately after damage occurs.
- 2.4 Tree Wells for Raised Grades: When existing grades are raised by more than 6 inches (150 mm), the tree root system shall be protected by the installation of tree wells in accordance with City of Austin Standard Detail 610S-6. Native stone, railroad ties or equivalent timber shall be used for the separator wall of the well and PVC conforming to ASTM D-2729, SDR-35 shall be used for the aeration systems in fill areas.
- 2.5 Permeable Paving (Environmental Criteria Manual Section 3.5.A.1): Permeable segmented pavers in conjunction with PVC pipe aeration system or concrete on gravel base with cored holes shall be used to protect existing tree root zones when indicated on the Drawings or directed by the Architect.
- 2.6 Fertilizer: Fertilizer shall conform to City of Austin Standard Specification Item No. 606S, "Fertilizer".

### PART 3 - EXECUTION

- 3.1 Protective Fencing: All trees and shrubs in the proximity of the construction site shall be carefully checked for damage prior to initiation of any development activity. All individual trees, shrubs, and natural areas scheduled for preservation shall be protected during construction with temporary fencing as indicated on the Drawings or directed by the Architect. Protective fences shall be installed prior to the start of any site preparation work (clearing, grubbing, or grading), and shall be maintained in functioning condition throughout all phases of the construction project. Protective fence locations in close proximity to intersecting streets or drives shall adhere to the sight distance and desirable sight triangle.
  - A. Protective fences shall be constructed at the locations (typically the outer limits of the Critical Root Zone) and with materials indicated on the Drawings to prevent the following:
    - 1. Soil compaction in the root zone area resulting from vehicular traffic or storage of equipment or materials.
    - 2. Root zone disturbances due to grade changes [greater than 6" (150 mm) cut or fill] or trenching not reviewed and authorized by the Architect.
    - 3. Damage to exposed roots, trunks or limbs by mechanical equipment.
    - 4. Other activities detrimental to trees such as chemical storage, concrete truck cleaning, and fires.
- 3.2 Repair of Damage: Tree roots scarred by equipment shall be cut cleanly and covered with topsoil. When tree roots are pruned, a comparable portion of selected branches shall be cut from the tree on the opposite side. Limb pruning shall be made at the branch collar. All limbs greater than 1 inch (25 mm) in diameter shall be precut in accordance with ANSI 300 pruning methods to prevent splitting. All cut limbs shall be treated with an approved tree dressing. Tools shall be disinfected with alcohol or 5 ppm chlorine solution between repairs to trees to prevent the transmission of diseases from one tree to another. All trees damaged during construction shall receive an application of fertilizer within the drip line conforming to Standard Specification Item No. 606S, "Fertilizer" at the rate of 4 pounds per caliper inch (.07 kilograms per caliper mm).
- 3.3 Cutting and Filling Around Trees: When the depth of an excavation or embankment exceeds 6 inches (150 mm) within the drip line of any tree with a diameter greater than 8 inches (200 mm), a tree well shall be constructed to protect the tree as indicated on the Drawings.
- 3.4 Paving Around Trees: Where paving within the dripline of any tree greater than a 6 inch (150 mm) diameter is necessary, a permeable pavement and aeration system must be installed as indicated on the Drawings, except for street construction.
- 3.5 Tree Removal: Any trees which are indicated on the Drawings for removal or which may interfere with the construction shall be removed subject to the approval of the Architect. When a tree or shrub is scheduled for removal, it shall be cut to a depth of 12 inches (300 mm) below the surrounding ground line. After removal, soil shall be placed in the hole to a depth matching the existing grade. The tree shall be cut into sections that can be managed, removed from the site and disposed of. All work shall be conducted in such a manner as to protect all facilities, improvements and vegetation in the work area. All damage resulting from tree removal or pruning shall be repaired at the Contractor's own expense.
- 3.6 Final Cleanup: All temporary tree and shrub preservation and protection measures shall be removed when the construction has been completed.

## 01 57 19.11 - INDOOR AIR QUALITY (IAQ) MANAGEMENT

### PART 1 - GENERAL

#### 1.1 SCOPE:

- A. Special requirements for Indoor Air Quality (IAQ) management during construction operations.
  - 1. Control of emissions during construction.
  - 2. Moisture control during construction.
- B. Procedures for testing baseline IAQ. Baseline IAQ requirements specify maximum indoor pollutant concentrations for acceptance of the facility.

#### 1.2 RELATED SECTIONS

- A. 10 81 50 - Integrated Pest Management (IPM).

#### 1.3 DEFINITIONS

- A. Adequate ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of particulates, dust, fumes, vapors, or gases.
- B. Hazardous Materials: Any material that is regulated as a hazardous material in accordance with 49 CFR 173, requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261. Throughout this specification, hazardous material includes hazardous chemicals.
  - 1. Hazardous materials include: pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).
- C. Indoor Air Quality (IAQ): The composition and characteristics of the air in an enclosed space that affect the occupants of that space. The indoor air quality of a space refers to the relative quality of air in a building with respect to contaminants and hazards and is determined by the level of indoor air pollution and other characteristics of the air, including those that impact thermal comfort such as air temperature, relative humidity and air speed.
- D. Interior final finishes: Materials and products that will be exposed at interior, occupied spaces; including flooring, wallcovering, finish carpentry, and ceilings.
- E. Packaged dry products: Materials and products that are installed in dry form and are delivered to the site in manufacturer's packaging; including carpets, resilient flooring, ceiling tiles, and insulation.
- F. Wet products: Materials and products installed in wet form, including paints, sealants, adhesives, special coatings, and other materials which require curing.

#### 1.4 QUALITY ASSURANCE

- A. Coordinate with Section 01 74 13 (01740) – Progress Cleaning.
- B. Coordinate with Section 10 81 50 (10295) – Integrated Pest Management (IPM).

### PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 IAQ MANAGEMENT - EMISSIONS CONTROL

- A. Follow "Sheet Metal and Air Conditioning Contractor's National Association Indoor Air Quality Guidelines for Occupied Buildings under Construction, 1995."
- B. HVAC Protection:
  - 1. Seal return registers during construction operations.
  - 2. Provide temporary exhaust during construction operations
  - 3. To the greatest extent possible, isolate and/or shut down the return side of the HVAC system during construction. When ventilation system must be operational during construction activities, provide temporary filters.
- C. Source Control: Provide low and zero VOC materials as specified.
- D. Pathway Interruption: Isolate areas of work as necessary to prevent contamination of clean or occupied spaces. Provide pressure differentials and/or physical barriers to protect clean or occupied spaces.
- E. Housekeeping: During construction, maintain project and building products and systems to prevent contamination of building spaces.
- F. Temporary Ventilation: Provide an ACH (air changes per hour) of 1.5 or more and as follows:
  - 1. Provide minimum 48 hour pre-ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously during the ventilation period. Do not ventilate within limits of Work unless otherwise approved by Architect.
  - 2. Provide adequate ventilation during and after installation of interior wet products and interior final finishes.
  - 3. Provide filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 as determined by ASHRAE 52.2 during construction. Coordinate with work of Division 23 Heating Ventilating and Air Conditioning (HVAC).
- G. Scheduling: Schedule construction operations involving wet products prior to packaged dry products to the greatest extent possible.
- H. Flush-Out: After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 cu.ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60%.

3.2 IAQ MANAGEMENT - MOISTURE CONTROL

- A. Housekeeping:
  - 1. Keep materials dry. Protect stored on-site and installed absorptive materials from moisture damage.
  - 2. Verify that installed materials and products are dry prior to sealing and weatherproofing the building envelope.
  - 3. Install interior absorptive materials only after building envelope is sealed and weatherproofed.
- B. Inspections: Document and report results of inspections; state whether or not inspections indicate satisfactory conditions.
  - 1. Examine materials for dampness as they arrive. If acceptable to Architect/Owner, dry any damp materials completely prior to installation; otherwise, reject materials that arrive damp.
  - 2. Examine materials for mold as they arrive and reject materials that arrive contaminated with mold.

3. Inspect stored and installed absorptive materials regularly for dampness and mold growth. Inspect weekly, and after each rain event.
    - a. Where stored on-site or installed absorptive materials become wet, notify Architect. Inspect for damage. If acceptable to Architect/Owner, dry completely prior to closing in assemblies; otherwise, remove and replace with new materials.
  4. Basement: Monitor basement and crawlspace humidity, and dehumidify when relative humidity is greater than 85 percent for more than 2 weeks or at the first sign of mold growth.
  5. Site drainage: Verify that final grades of site work and landscaping drain surface water and ground water away from the building.
  6. Weather-proofing: Inspect moisture control materials as they are being installed. Include the following:
    - a. Air barrier: Verify air barrier is installed without punctures and/or other damage. Verify air barrier is sealed completely.
    - b. Flashing: Verify correct shingling of the flashing for roof, walls, windows, doors, and other penetrations.
    - c. Insulation layer: Verify insulation is installed without voids.
    - d. Roofing: In accordance with ASTM D7186 Standard Practice for Quality Assurance Observation of Roof Construction and Repair
  7. Plumbing: Verify satisfactory pressure test of pipes and drains is performed before closing in and insulating lines.
  8. HVAC: Inspect to verify:
    - a. condensate pans are sloped and plumbed correctly;
    - b. access panels are installed to allow for inspection and cleaning of coils and ductwork downstream of coils;
    - c. ductwork and return plenums are air sealed;
    - d. duct insulation is installed and sealed; and
    - e. chilled water line and refrigerant line insulation are installed and sealed.
- C. Schedule
1. Schedule work such that absorptive materials, including but not limited to porous insulations, paper-faced gypsum board, ceiling tile, and finish flooring, are not installed until they can be protected from rain and construction-related water.
  2. Weather-proof as quickly as possible. Schedule installation of moisture-control materials, including but not limited to air barriers, flashing, exterior sealants and roofing, at the earliest possible time.
- D. Testing for Moisture Content: Test moisture content of porous materials and absorptive materials to ensure that they are dry before sealing them into an assembly. Document and report results of testing. Where tests are not satisfactory, dry materials and retest. If satisfactory results cannot be obtained with retest, remove and replace with new materials.
1. Concrete: Moisture test prior to finish flooring application as specified in Division 09.
  2. Wood: Moisture test with a hand-held moisture meter; unless otherwise indicated acceptable upper limits for wood products measured at the surface are < 12% for interior, < 15% for exterior.

3. Gypsum Board, Gypsum Plaster, Insulation, and other absorptive materials: Moisture test with a Pinless Moisture Meter to assess patterns of moisture, if any. Acceptable upper limits for gypsum products before painting are < 12%.

E. Testing for Moisture Penetration:

1. Windows: Test as per ASTM E1105 Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference; unless otherwise indicated, acceptable upper limits are no leakage for 15 minutes.
2. Horizontal Waterproofing (not roofing): Test as per ASTM D5957 Standard Guide for Flood Testing Horizontal Waterproofing Installations; acceptable upper limits are no leakage for 15 minutes.
3. Masonry: Test as per ASTM C1601 Standard Test Method for Field Determination of Water Penetration of Masonry Wall Surfaces; acceptable upper limits are no leakage for 15 minutes.
4. Exterior Walls:
  - a. Air tightness of the enclosure test: ASTM E779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization or ASTM E1827
    - i. Air Leakage: The mean value of the air leakage flow rate calculated from measured data at 0.3 in wg (75 Pa) must not exceed 0.25 cu ft/ minute per square foot of envelope area. Measurements must be referenced at standard conditions of 14.696 psi (101.325 KPa) and 68 deg F.
  - b. Water Leakage: Review as per ASTM E2128 Standard Guide for Evaluating Water Leakage of Building Walls.



# 01 57 19.12 - NOISE & ACOUSTICS MANAGEMENT

## PART 4 - GENERAL

- 4.1 SCOPE: Special requirements for noise and acoustics management during demolition, renovation, or new construction operations.
- 4.2 DEFINITIONS
- A. Ambient noise level: The total noise associated with a given environment, being usually a composite of normal or existing sounds from all sources near and far, excluding the noise source at issue.
  - B. Daytime: The hours from 7 a.m. to 9 p.m. on weekdays and 9 a.m. to 9 p.m. on weekends and holidays.
  - C. Nighttime: All non-daytime hours.
  - D. Property line: The real or imaginary line along the ground surface and its vertical extension, which separates real property owned or controlled by one person from contiguous real property owned or controlled by another person or from any public right- of-way or from any public space.
  - E. Receiving noise area: Any connected or adjacent facility that is in operation during construction, and any real property where people live or work and where noise is heard, excluding the project or source area.

## PART 5 - PRODUCTS

## PART 6 - EXECUTION

### 6.1 NOISE MANAGEMENT

- A. Noise Control: Perform work operations to minimize noise. Perform noise-producing work in less sensitive hours of the day or week as directed by Owner.
- B. Repetitive and/or intermittent, high-level noise: Permitted only during Daytime.

1. Do not exceed the following dB limitations:

Sound Level in dB	Time Duration of Impact Noise
70	More than 12 minutes in any hour
80	More than 3 minutes in any hour

2. Provide equipment, sound-deadening devices, and take noise abatement measures that are necessary for compliance.
3. Maximum permissible construction equipment noise levels at 50 feet (dB):

<u>EARTHMOVING</u>	<u>dB</u>	<u>MATERIALS HANDLING</u>	<u>dB</u>
Front Loaders	75	Concrete Mixers	75
Backhoes	75	Concrete Pumps	75
Dozers	75	Cranes	75
Tractors	75	Derricks Impact	75
Scrapers	80	Pile Drivers	95
Graders	75	Jack Hammers	75
Trucks	75	Rock Drills	80
Pavers, Stationary	80	Pneumatic Tools	80
Pumps	75	Saws	75
Generators	75	Vibrators	75
Compressors	75		

C. Ambient Noise:

1. Maximum noise levels (dB) for receiving noise area shall be as follows at the measurement locations below:
  - a. Inside adjacent or attached facility
    - i Classroom: 50 dB
    - ii Office: 55 dB
    - iii Public Area: 65 dB
  - b. Residential area
    - i Daytime: 65 dB
    - ii Nighttime: 60 dB
  - c. Commercial / Industrial area
    - i Daytime: 67 dB
    - ii Nighttime: 65 dB
2. In the event the existing local ambient noise level exceeds the maximum allowable receiving noise level (dB), the receiving noise level maximum for construction operations shall be adjusted as follows:
  - a. Inside adjacent or attached facility: Maximum 3 additional dB above the local ambient as measured within the space.
  - b. Residential area: Maximum 3 additional dB above the local ambient as measured at property line.
  - c. Commercial / Industrial area: Maximum 5 additional dB above the local ambient as measured at the property line.

6.2 FIELD QUALITY CONTROL

- A. Assess potential effects of construction noise on adjacent neighbors as follows:
  1. Ambient noise measurement: Measure at the property line at a height of at least four (4) feet above the immediate surrounding surface. Average the ambient noise level over a period of at least 15 minutes.
  2. Ambient noise measurement at urban sites: Conduct during morning peak traffic hour between 7 A.M. and 9 A.M. and afternoon peak traffic hour between 4 P.M. and 6 P.M. In addition, conduct a 24-hour measurement at the proposed project site to document the noise pattern throughout the day. Adjust and weight for seasonal and climatic variations.
  3. Assess potential effects of construction noise on facility occupants as follows: Ambient noise measurement: Measure in center of room or area at a height of four (4) feet above finished floor. Average the ambient noise level over a period of 15 minutes.
- B. Monitor noise produced from construction operations on a regular basis of no longer than once per week for exterior and every other week for interior. Measure at times of increased noise such as demolition, coring or drilling, sawing, etc.

## 01 57 19.13 - ENVIRONMENTAL MANAGEMENT

### PART 1 - GENERAL

#### 1.1 SCOPE

- A. Special requirements for environmental management during construction operations.
- B. Monitoring requirements.

#### 1.2 DEFINITIONS

- A. Environmental pollution and damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.

### PART 2 - PRODUCTS

#### 2.1 DUST CONTROL

- A. Biobased content:
  - 1. Dust Suppressants: Products formulated to reduce or eliminate the spread of dust associated with gravel roads, dirt parking lots, or similar sources of dust, including products used in equivalent indoor applications. Provide minimum 85% biobased content.
  - 2. Non-Durable Films: Products that are used in packaging, wrappings, linings, and other similar applications. Films that are intended for single use for short-term storage or protection before being discarded. Non-durable films that are designed to have longer lives when used are included in this item. Provide minimum 85% biobased content.
  - 3. Semi-Durable Films: Products that are used in packaging, wrappings, linings, and other similar applications. Films that are designed to resist water, ammonia, and other compounds, to be re-used, and to not readily biodegrade. Products in this item are typically used in the production of bags and packaging materials. Provide minimum 45% biobased content.

### PART 3 - EXECUTION

- 3.1 ENVIRONMENTAL PROTECTION: Protection of natural resources: Comply with applicable regulations and these specifications. Preserve the natural resources within the Project boundaries and outside the limits of permanent Work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by Owner.

- A. Confine demolition and construction activities to maximum 40 feet beyond the building perimeter, 10 feet beyond solid paving, and 25 feet beyond pervious paving, or the work area limits indicated on the Drawings.
  - 1. Disposal operations for demolished and waste materials that are not identified to be salvaged, recycled or reused:
    - a. Remove debris, rubbish, and other waste materials resulting from demolition and construction operations, from site.
    - b. No burning permitted.
    - c. Transport materials with appropriate vehicles and dispose off-site to areas that are approved for disposal by governing authorities having jurisdiction.
    - d. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways. Remove spillage and sweep, wash, or otherwise clean project site, streets, or highways.
- B. Water resources: Protect groundwater resources from contaminants.

1. Comply with requirements of the National Pollutant Discharge Elimination System (NPDES).
  2. Oily substances: Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water.
    - a. Store and service construction equipment at areas designated for collection of oil wastes.
  3. Mosquito abatement: Prevent ponding of stagnant water conducive to mosquito breeding habitat.
  4. Prevent run-off from site during demolition and construction operations.
  5. Stream Crossings: Equipment will be permitted to ford live streams if temporary culverts or bridges are constructed for the purpose. Remove temporary culverts and bridges upon completion of work and repair the area to its original condition, unless otherwise accepted in writing by Architect.
- C. Land resources: Prior to construction, identify land resources to be preserved within the Work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and landforms without permission from Owner.
1. Conserve distinctive geological, topographical, and historic features and character of the site.
  2. Earthwork: As specified in Division 31 and as follows:
    - a. Erodible soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils, except where the constructed feature obscures borrow areas, quarries, and waste material areas. Clear areas in reasonably sized increments only as needed to use the areas developed. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
    - b. Delineate work zones so as to restrict compaction of soil elsewhere.
    - c. Delineate buffer zones around moist areas and shorelines, if present on site.
    - d. Erosion and sedimentation control devices: Construct or install temporary and permanent erosion and sedimentation control features as required.
  3. Tree and plant protection:
    - a. Prior to start of construction, tag each tree and plant scheduled to remain with value as approved by Owner. In the event of damage to tree or plant, Owner may at Owner's discretion, deduct the indicated value of the damaged tree or plant from the Contract Sum.
- D. Air Resources: Comply with IAQ Management Plan and as follows:
1. Prevent creation of dust, air pollution, and odors.
  2. Sequence construction to avoid disturbance to site to the greatest extent possible.
  3. Use mulch, water sprinkling, temporary enclosures, and other appropriate methods to limit dust and dirt rising and scattering in air to lowest practical level.

- a. Do not use water when it may create hazardous or other adverse conditions such as flooding and pollution.
- 4. Store volatile liquids, including fuels and solvents, in closed containers.
- 5. Properly maintain equipment to reduce gaseous pollutant emissions.
- E. Fish and Wildlife Resources: Manage and control construction activities to minimize interference with, disturbance of, and damage to fish and wildlife.
  - 1. Do not disturb fish and wildlife.
  - 2. Do not alter water flows or otherwise significantly disturb the native habitat related to the project and critical to the survival of fish and wildlife, except as indicated or specified.
  - 3. Identify and conserve wildlife corridors that intersect the site.

### 3.2 FIELD QUALITY CONTROL

- A. Comply with requirements of agencies having jurisdiction and as specified herein.

## 01 73 29 - CUTTING AND PATCHING

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings Specification or other conditions of the contract, apply to this Section.
- 1.2 SUMMARY: This Section specifies administrative and procedural requirements for cutting and patching. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
- 1.3 SUBMITTALS: Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:
  - A. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
  - B. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
  - C. List products to be used and firms or entities that will perform Work.
  - D. Indicate dates when cutting and patching is to be performed.
  - E. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
  - F. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
  - G. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.
- 1.4 QUALITY ASSURANCE:
  - A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load carrying capacity or load deflection ratio.
    1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
      - a. Foundation construction.
      - b. Bearing and retaining walls.
      - c. Structural concrete.
      - d. Structural steel.
      - e. Lintels.
      - f. Structural decking.
      - g. Stair systems.
      - h. Miscellaneous structural metals.
      - i. Equipment supports.
      - j. Piping, ductwork, vessels and equipment.
  - B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
    1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
      - a. Shoring, bracing, and sheeting.
      - b. Primary operational systems and equipment.

- c. Air or smoke barriers.
- d. Water, moisture, or vapor barriers.
- e. Membranes and flashing.
- f. Fire protection systems.
- g. Noise and vibration control elements and systems.
- h. Control systems.
- i. Communication systems.
- j. Conveying systems.
- k. Electrical wiring systems.

1.5 Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

- A. If possible retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:

## PART 2 - PRODUCTS

2.1 MATERIALS: Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

## PART 3 - EXECUTION

3.1 INSPECTION: Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

### 3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

### 3.3 PERFORMANCE:

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
  - 1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
  - 1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
  3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
  4. Comply with requirements of applicable Sections of Division 2 where cutting and patching requires excavating and backfilling.
  5. By pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by passing and cutting.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
  2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
- 3.4 **CLEANING:** Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.



## 01 74 13 - PROGRESS CLEANING

### PART 1 - GENERAL

- 1.1 SCOPE: During the progress of the work, the Contractor shall store materials and equipment in an orderly manner and shall at ALL times keep the premises free from debris, litter, rubbish, and obstruction.

### PART 2 - PRODUCTS

#### 2.1 CLEANING MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
- B. Cleaning agents shall meet Green Seal GS-37 Standards.
- C. Disposable paper products, supplies and trash bags shall meet the minimum requirements of the US Environmental Protection Agency's Comprehensive Procurement Guidelines.
- D. If the Green Seal GS-37 Standard is not applicable, use only low VOC products.

### PART 3 - EXECUTION

#### 3.1 PROGRESS CLEANING

- A. General: Provide progress cleaning. Do not conflict with related Project Sections. Resolve with AE should any conflicts arise.
- B. Each contractor shall keep the building and premises free from all surplus material, waste material, dirt and rubbish caused by his employees or work, and at the completion of his work he shall remove all such surplus material, waste material, dirt and rubbish, as well as his tools, equipment and scaffolding, and shall leave his work clean and spotless, unless more exact requirements are specified. In case of dispute, the owner may remove all such items and charge the cost of such removal to the contractor.
- C. Each sub-contractor shall perform his clean-up daily and shall transport his rubbish to an on-site location designated by the Contractor who will arrange for its removal.
- D. Each contractor / sub-contractor shall remove all debris totally on a daily basis and at NO TIME shall the owner's waste containers be used. Requests for dumpster usage and placement must be verified with the Architect of Program Manager. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.
- E. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- F. Employ experienced workers or professional cleaners for progress cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

## **01 77 00 - PROJECT CLOSEOUT PROCEDURES**

### **PART 4 - GENERAL**

- 4.1 **WARRANTY:** The Contractor will warranty all equipment, materials & workmanship for a period of at least 1 year after completion, unless the manufacturer or specification provides for a longer warranty period. The Contractor will make prompt repairs or replacement of any defective work detected during that period at no charge to the Owner. Within 30 days prior to the end of this warranty period, the Contractor will either arrange & hold an on-site review of the project with the Architect & Owner's representative or extend his warranty for another 1 year period. All warranty periods begin upon substantial completion.
- 4.2 **RECORD DRAWINGS:** Upon completion the Contractor will provide the Owner with two set of record prints with additions & variations shown in red. Remove Architects and Engineers seals from record drawings.
- 4.3 **OPERATING INSTRUCTIONS:** On completion, the Owner will be provided with all instructions & warranties in a loose leaf binder, & the Contractor will demonstrate the operation of all equipment. Contractor will record attendance of training sessions with a sign-in sheet and submit to Architect.
- 4.4 **PUNCH LIST COMPLETION:** There will be thirty (30) consecutive calendar days allowed to complete punch list items after substantial completion, plus any legitimate time extensions addressed in the general conditions.
- 4.5 **SUBSTANTIAL COMPLETION SUBMISSIONS:** Prior to substantial completion inspection, submit all required items, including but not necessarily limited to the following:
  - A. Written request for inspection (minimum 24hrs prior).
  - B. Punch list.
  - C. Final cleaning & touch-up.
  - D. Excess material stock.
  - E. Test Reports.
  - F. No asbestos affidavit.
  - G. Final Completion Submissions: Prior to final completion, submit all required items, including but not necessarily limited to the following:
    - H. Completion of punch list items, except as waived by Owner.
    - I. Written request for final inspection.
    - J. AIA G706 (Contractor's affidavit of all debts paid).
    - K. AIA G706A (Contractor's waiver or release of liens).
    - L. Subcontractor waiver or release of liens.
    - M. Final application for payment.
    - N. Removal of temporary facilities.
    - O. Warranties.
    - P. Instruction/maintenance manual.
    - Q. Consent of Surety to final payment.
    - R. As-built drawings.
- 4.6 **DIGITAL SUBMISSION**
  - A. All closeout documents to be submitted in hardcopy as well as scanned and delivered in pdf format.
  - B. Include manufacturer's software as needed.

### **PART 5 - PRODUCTS**

- 5.1 **NOT APPLICABLE**

### **PART 6 - EXECUTION**

- 6.1 **NOT APPLICABLE**

## **01 78 23 - OPERATION AND MAINTENANCE DATA**

### **PART 1 - GENERAL**

- 1.1 RELATED DOCUMENTS: Drawings Specification or other conditions of the contract, apply to this section.
- 1.2 SUMMARY: This Section includes the following:
  - A. Format and content of manuals.
  - B. Schedule of submittals.
- 1.3 RELATED SECTIONS
  - A. 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND OTHER SUBMITTALS
  - B. 01 45 23 - TESTING AND INSPECTING SERVICES
  - C. Individual Specifications Sections: Specific requirements for operation and maintenance data.
- 1.4 QUALITY ASSURANCE: Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- 1.5 FORMAT
  - A. Prepare data in the form of an instructional manual.
  - B. Binders: Commercial quality, 8-1/2 x 11", three D-side ring binders with durable plastic covers; 2" maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
  - C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
  - D. Provide tabbed indexed for each separate product and system, with typed description of product and major component parts.
  - E. Text: Manufacturer's printed data, or typewritten data on 20-lb paper.
  - F. Drawings:
    1. Provide sketches and small drawing up to 11" x 17" in size with reinforced punched binder tab. Bind in with text.
    2. Larger drawings to be bound together for each system or product.
  - G. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, in three parts as follows:
    1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Construction Manager, SubContractor, and major equipment suppliers.
    2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by Specification Section. For each category, identify names, addresses, and telephone numbers of SubContractor/ Contractors and suppliers. Identify the following:
      - a. Significant design criteria.

- b. List of equipment.
  - c. Parts list for each component.
  - d. Operating instructions.
  - e. Maintenance instructions for equipment and systems.
  - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following:
- a. Shop drawings and product data.
  - b. Air and water balance reports.
  - c. Certificates.
  - d. Copies of warranties and bonds.

#### 1.6 CONTENTS, EACH VOLUME

- A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Subconsultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: List names, addresses and telephone numbers of SubContractors and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- E. Typed Text: A required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
- F. Warranties and Bonds: Bind in copy of each.

#### 1.7 MANUAL FOR MATERIALS AND FINISHES

- A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: As specified in individual Product Specification Sections.
- E. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.
- F. The O&M Manual will include all of that O&M data referenced or addressed in divisions 2 to 16 Sections.

**1.8 MANUAL FOR EQUIPMENT AND SYSTEMS**

- A. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed or by label machine.
- C. Include color-coded wiring diagrams as installed.
- D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Include routine procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operation and maintenance instructions.
- H. Include Sequence of Operation by controls manufacturer.
- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Provide control diagrams by controls manufacturer as installed.
- K. Provide Contractor's coordination drawings with color-coded piping diagrams as installed.
- L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- N. Include test and balancing reports.
- O. Additional Requirements: As specified in individual Product Specification Sections.
- P. Provide a listing in Table of Contents for design data, with tabbed indexed and space for insertion of data.

**1.9 SUBMITTALS**

- A. Submit electronic copy of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Submit one copy of completed volumes 45 days prior to Substantial Completion. This copy will be reviewed and returned (after final inspection), with Architect's comments. Revise content of all document sets as required prior to final submission.
- D. Submit two sets of revised final volumes in final form within ten days after final inspection. Final release of retainage by the Owner is contingent, among other things, upon receipt and review by the Architect of all O&M manuals due the Owner by the Contractor. Final payment will not be made until such time as all manuals have been submitted and approved.

## 1.10 DIGITAL SUBMISSION

- A. All closeout documents to be submitted in hardcopy as well as scanned and delivered in PDF format.
- B. Include manufacturer's software as needed.

## PART 2 - PRODUCTS

## 2.1 NOT APPLICABLE

## PART 3 - EXECUTION

## 3.1 NOT APPLICABLE

## **01 78 46 - EXTRA STOCK MATERIALS**

### **PART 1 - GENERAL**

- 1.1 GENERAL: The Owner is to be provided extra stock of materials under certain sections of the work. These items will be delivered to the Owner's designated storage facility at the end of the project. Applicable items include the following:
- A. SECTION 08 71 00 - DOOR HARDWARE: Furnish 3 dozen extra screws and other fasteners of each size, type and finish used with the hardware items provided. These screws and fasteners are to be delivered to the hardware installer for use during installation. All extra screws and fasteners and all special installation tools furnished with the hardware shall be turned over to the owner at the completion of the job. All installation tools provided by the manufacturers shall be turned over to the owner at the completion of the job.
  - B. SECTION 09 30 13 - CERAMIC TILING: Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents. Furnish quantity of full-size units equal to 50 SF of amount installed, for each type, composition, color, pattern, and size indicated.
  - C. SECTION 09 51 23 - ACOUSTICAL TILE CEILINGS: Deliver to the Owner for his use in future modifications, an extra stock of approximately 200 SF of each type of acoustical material installed, packaging each type of material separately, distinctly marked, and adequately protected against deterioration.
  - D. SECTION 09 65 19 - RESILIENT TILE FLOORING: Deliver to the Owner for his use in future modifications an extra stock of approximately 100 SF of each color and pattern in each material installed under this Section, packing each type of material separately, distinctly marked, and adequately protected against deterioration.
  - E. SECTION 09 68 13 - TILE CARPETING: Deliver to the Owner for his use in future modifications an extra stock of approximately 100 SF of each color and pattern in each material installed under this Section, packing each type of material separately, distinctly marked, and adequately protected against deterioration.
  - F. SECTION 09 68 16 - SHEET CARPETING: Deliver to the Owner for his use in future modifications an extra stock of approximately 100 SF of each color and pattern in each material installed under this Section, packing each type of material separately, distinctly marked, and adequately protected against deterioration.
  - G. SECTION 09 91 00 - PAINTING: Upon completion of the work of this Section, deliver to the Owner an extra stock equaling 5 gallons of each color, type, and gloss of paint used in the work, tightly sealing each container, and clearly labeling with contents and location where used.

### **PART 2 - PRODUCTS**

- 2.1 NOT APPLICABLE

### **PART 3 - EXECUTION**

- 3.1 NOT APPLICABLE

## DIVISION 02 – EXISTING CONDITIONS

### 02 40 20 - ALTERATION OF EXISTING CONDITIONS

#### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings Specification or other conditions of the contract, apply to this section.
- 1.2 ALTERATIONS: This Section describes coordination between the demolition, stabilization and restoration, and finishes of the work of this Contract. Cutting, fitting and patching of all existing and new construction as required for the work of all trades is specifically required to be performed by the Contractor, or subcontractor(s) selected by the Contractor as most appropriately responsible for the material or assembly to be altered, as required for the proper execution of the work of all trades. Preparation of existing surfaces to receive finishes to be applied under various Sections of the Specification is described herein. It is the responsibility of the Contractor to ensure that this preparation is properly completed prior to application of finishes under such other Sections.
- 1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS: Principal classifications of work related to the work of this Section are specified to be performed under the Sections of the Specifications. Refer to the Sections for description of the extent and nature of the indicated work, and for coordination with related trades. It is the responsibility of the Contractor to fully coordinate the work of this Section with that of all other trades to complete the work contained within the contract documents (contract, contract drawings and specifications).
- 1.4 INTENT: It is the intent of this Section to require close coordination between operations involving the removal and modification of various portions of the existing structure and operations applying new construction and finishes to the structure. Coordination is required to ensure proper fit between the several parts of the work, without damage to existing construction to remain, resulting in substantial construction and systems that are fully operational in accordance with the Contract Documents. In addition, this coordination is particularly important in this Project for the preservation and restoration of portions of the building having historical significance. This coordination is the responsibility of the General Contractor for this Contract. It is the intent of this Section that to the extent it is inconsistent with any other terms and provisions of the Contract Documents, the Contractor and/or Subcontractors shall provide the better quality or greater quantity of work.
- 1.5 DEMOLITION: Demolition operations shall be performed under the Demolition Sections, as applicable, subject to provisions herein. Contractor shall be responsible for all shoring, bracing and other support and protection of existing construction and new work required to maintain integrity of existing structure and work in progress during all demolition operations. Include all platforms, barriers, weather protection, lighting, warning signs, and all other means necessary for proper protection of property, personnel, the public and other construction. Designate individuals responsible for the supervision and coordination of this protective work who have appropriate training and experience to whom the Owner, Program Manager and Architect make no objection. Plan and carry out demolition operations with utmost care to prevent excessive vibration, settlement or other structural damage, or damage to existing finish materials to remain. Protect the work against fire, including setting and enforcing safety rules in the operation of welding and cutting torches and other heat-producing equipment and activities, and maintaining fire protection equipment. Consult with the Owner and local fire officials regarding required protection and procedures.
- 1.6 PREPARATION AND CLEANING OF EXISTING SURFACES: Prepare and clean existing surfaces to remain as required for installation of new materials, equipment and finishes specified in other specification sections. For all surfaces scheduled or otherwise indicated to be refinished, clean off materials such as old paint, rust, adhesive, dirt, oil, wax, sealers and all other materials that would prevent proper adhesion of new finish materials, or would bleed through, texture or otherwise adversely affect the new finish. Clean existing surfaces to receive new finishes thoroughly, removing all soilage and applied material, of whatever nature, that would impair bond of new finish to such surface, or would show through new finishes as a different color or texture than other surfaces of the same type. Use scrapers, brushes, sanding, wire pads, detergents, chemical cleaning solutions, solvents, light sand blasting, or other materials and equipment appropriate for surfaces being cleaned. Use all materials in strict conformance to the manufacturer's instructions and recommendations. Dispose of all cleaning solutions and/or solvents in accordance with applicable law. Maintain Material Safety Data Sheets (MSDS) onsite for all products being used onsite in accordance with OSHA regulations. Surfaces to receive paint finishes shall be cleaned to meet requirements of paint materials applied, and shall be smooth and even in appearance and to touch. Sand and feather all paint edges to eliminate visible layering or chipping related to multiple coats of paint. It is not required that all adherent paint or other existing finish be removed completely, so long as surfaces are in proper condition to receive new finish to satisfaction of the Architect.



- A. Submit proposed cleaning materials, and methods proposed for their use, to Architect for review before proceeding. Clean test areas for Architect's review before proceeding with complete cleaning operations.
- B. After cleaning is completed, brush or rinse surfaces to remove cleaning agents or residue, and leave surfaces ready for installation of new finishes.
- C. In addition to preparation work specified above, clean existing finished surfaces that will remain exposed-to-view and unaltered in the finished work.

**PART 2 - PRODUCTS**

2.1 NOT APPLICABLE

**PART 3 - EXECUTION**

3.1 NOT APPLICABLE

## 02 41 19 - SELECTIVE DEMOLITION

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUMMARY: This Section includes the following:
  - A. Demolition and removal of selected portions of a building.
  - B. Demolition and removal of selected site elements.
  - C. Patching and repairs.
- 1.3 DEFINITIONS
  - A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.
  - B. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.
  - C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.
  - D. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.
- 1.4 MATERIALS OWNERSHIP: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.
- 1.5 SUBMITTALS
  - A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections, for information only, unless otherwise indicated.
  - B. Proposed dust-control measures.
  - C. Proposed noise-control measures.
  - D. Schedule of selective demolition activities indicating the following:
    1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
    2. Interruption of utility services.
    3. Coordination for shutoff, capping, and continuation of utility services.
    4. Use of elevator and stairs.
    5. Detailed sequence of selective demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

- 6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- 7. Locations of temporary partitions and means of egress.
- E. Inventory of items to be removed and salvaged.
- F. Inventory of items to be removed by Owner.
- G. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by selective demolition operations.

#### 1.6 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed selective demolition Work similar to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before starting selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

#### 1.7 PROJECT CONDITIONS

- A. Owner will occupy portions of the building immediately adjacent to selective demolition area. Conduct selective demolition so that Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- B. Owner assumes no responsibility for actual condition of buildings to be selectively demolished. Conditions existing at time of inspection for proposal purpose will be maintained by Owner as far as practical.
- C. Asbestos: It is not expected that asbestos will be encountered in the Work. If any materials suspected of containing asbestos are encountered, do not disturb the materials. Immediately notify the Architect and the Owner. Asbestos will be removed by Owner before start of Work.
- D. Storage or sale of removed items or materials on-site will not be permitted.

1.8 SCHEDULING: Arrange selective demolition schedule so as not to interfere with Owner's on-site operations.

1.9 WARRANTY: Existing Special Warranty: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

### PART 2 - PRODUCTS

2.1 REPAIR MATERIALS: use repair materials identical to existing materials.

- A. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
- B. Use materials whose installed performance equals or surpasses that of existing materials.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect.
- E. Survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition.
- F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

### 3.2 UTILITY SERVICES

- A. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to governing authorities. Provide not less than 72 hours' notice to Owner if shutdown of service is required during changeover.
- B. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving building to be selectively demolished.
  - 1. Arrange to shut off indicated utilities with utility companies.
  - 2. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the building before proceeding with selective demolition.
  - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit after bypassing.

### 3.3 PREPARATION

- A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.
- B. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.
  - 1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
  - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
  - 3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

4. Provide temporary weather protection, during interval between demolition and removal of existing construction, on exterior surfaces and new construction to ensure that no water leakage or damage occurs to structure or interior areas.
  5. Protect walls, ceilings, floors, and other existing finish work that are to remain and are exposed during selective demolition operations.
  6. Cover and protect furniture, furnishings, and equipment that have not been removed.
- D. Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
- E. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of building to be selectively demolished. Strengthen or add new supports when required during progress of selective demolition.

### 3.4 SELECTIVE DEMOLITION

- A. Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition work above each floor or tier before disturbing supporting members on lower levels.
  2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
  3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  5. Maintain adequate ventilation when using cutting torches.
  6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  8. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  9. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.
  10. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.
- B. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.
- C. Remove resilient floor coverings and adhesive according to recommendations of the Resilient Floor Covering Institute's (RFCI) "Recommended Work Practices for the Removal of Resilient Floor Coverings" and Addendum.

- D. Remove air-conditioning equipment without releasing refrigerants.

3.5 PATCHING AND REPAIRS

- A. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.
- B. Patching is specified in Division 1 Section "Cutting and Patching."

3.6 CLEANING

- A. Sweep the building broom clean on completion of selective demolition operation.
- B. Change filters on air-handling equipment on completion of selective demolition operations.

**DIVISION 03 – CONCRETE**

**03 10 00 - CONCRETE FORMING AND ACCESSORIES**

**PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for Concrete Formwork & Accessories, as shown on the Drawings, specified herein, and as needed for a complete and proper installation. Forms shall be used, wherever necessary, to confine the concrete and shape it to the required dimensions.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. All work will comply with The American Concrete Institute, ACI 301-84, "Specifications for Structural Concrete" & ACI-318, latest edition.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.

**PART 2 - PRODUCTS**

- 2.1 FORM ACCESSORIES: Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be of a commercially manufactured type.
- 2.2 CONSTRUCTION JOINTS: Joints not indicated on the contract documents shall be located and constructed to minimize the impact on the strength of the structure. Joint types and locations shall be submitted to the architect/engineer. All reinforcement shall be continued across joints. Longitudinal keys at least 1 1/2 in. deep shall be provided in all joints.
- 2.3 EXPANSION JOINTS: Reinforcement or other embedded metal items bonded to the concrete (except dowels in floors bonded on only one side of joints) shall not be permitted to extend continuously through any expansion joint. Pre-molded expansion joint filler shall be of the type required by the contract documents and shall conform to ASTM D 994, ASTM D 1751 or ASTM D 1752.
- 2.4 OTHER EMBEDDED ITEMS: All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting. All contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.

**PART 3 - EXECUTION**

- 3.1 DESIGN AND INSTALLATION OF FORMWORK: The design and engineering of the formwork, as well as its construction, shall be the responsibility of the contractor. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall have sufficient rigidity to maintain specified tolerances. The formwork shall be designed for loads and lateral pressure and for design considerations, wind loads, allowable stresses, and other applicable requirements of the controlling local building code. The maximum deflection of facing materials reflected in concrete surfaces exposed to view shall be 1/240 of the span between structural members. Forms shall be sufficiently tight to prevent loss of mortar from the concrete. To maintain the specified tolerances, the formwork shall be cambered to compensate for anticipated deflections in the formwork prior to hardening of the concrete. Forms shall be securely braced against lateral deflections. Earth cuts shall not be used as forms for exposed vertical location surfaces unless required or permitted. Only exposed surfaces need be formed.
- 3.2 TOLERANCES: Unless otherwise specified by the architect/engineer, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits indicated.
  - A. Variation from plumb and level: 1/4" in 20'; 1/2" max.
  - B. Variation of building lines: 1/2" in 20'; 1" max.
  - C. Variation in openings: +/- 1/4"
  - D. Variation in thickness: +/- 1/4"
  - E. Variations in footing plan dim: -1/2in. +2in.
  - F. Footing eccentricity: 2% width, 2" max.
  - G. Footing thickness:-5% + No limit

- 3.3 PREPARATION OF FORM SURFACES: All surfaces of forms and embedded materials shall be cleaned of all accumulated mortar or grout from previous concreting and of all other foreign material before concrete is placed. Before placing the reinforcing steel or the concrete, the surfaces of the forms shall be covered with an acceptable coating material that will prevent bond with the concrete, and not stain the concrete surfaces. Excess form coating material shall not stand in puddles in the forms nor shall come in contact with hardened concrete against which fresh concrete is to be placed.
- 3.4 REMOVAL OF FORMS: Formwork for columns, walls, sides of beams, and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations. Forms used to support the weight of concrete shall remain in place until the concrete has reached the minimum strength specified.
- 3.5 PLACING EMBEDDED ITEMS: Embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.



## **03 15 20 - EXPANSION AND CONTRACTION JOINTS**

### **PART 1 - GENERAL**

- 1.1 DESCRIPTION: Included under this section will be all labor, materials, tools, & equipment as required for expansion & contraction joints in concrete work, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. All work will comply with The American Concrete Institute, ACI 301-84, "Specifications for Structural Concrete" & ACI-318, latest edition.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.

### **PART 2 - PRODUCTS**

- 2.1 FIBER EXPANSION JOINTS: Fiber Expansion Joints to be manufactured commercial type meeting requirements of ASTM D 1751-73 (1978), "Specifications for Preformed Expansion Joint Fillers for Concrete Paving & Structural Construction (Non-extruding) & Resilient Bituminous Type" 1/2 inch thick unless indicated differently on Drawings.
- 2.2 OTHER MATERIALS: Furnish and install any supplementary materials, whether or not specifically indicated, required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

### **PART 3 - EXECUTION**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Place at sidewalks, at juncture of concrete & structures, as indicated on plans, & necessary for adequate expansion control. Steel reinforcement thru expansion joints to be sleeved on one end. Locate slab control joints as indicated or customarily required.

## 03 20 00 - CONCRETE REINFORCING

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Included under this section will be all labor, materials, tools, & equipment as required for structural concrete reinforcement, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. All work will comply with The American Concrete Institute, ACI 301-84, "Specifications for Structural Concrete" & ACI-318, latest edition. Words and terms used in these specifications are defined in Cement and Concrete Terminology, ACI 116R. Applicable standards of the American Society for Testing Materials referred to in these specifications are declared to be a part of these specifications, the same as if fully set forth herein, including ASTM-615.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.

### PART 2 - PRODUCTS

- 2.1 BAR MATS: Bar mats shall be of the clipped type conforming to ASTM A 184 and shall be fabricated from reinforcing bars.
- 2.2 WIRE: Wire shall be smooth or deformed wire as indicated on the contract documents. Smooth wire shall conform to ASTM A 82. Deformed wire shall conform to ASTM A 496, size D4 and larger. Spirals may be fabricated from reinforcing bars or wire.
- 2.3 WIRE BAR SUPPORTS: Provide wire supports or CSRI block supports. Unless otherwise specified or permitted, wire bar supports shall be in accordance with Class 1, maximum protection, or Class 2, moderate protection in Chapter 3 of Manual of Standard Practice by the Concrete Reinforcing Steel Institute.
- 2.4 REINFORCING BARS: All but No. 2 bars shall be deformed type. Rebars #4 & above to have grade identification marks and conform to ASTM A 615-82, "Specifications for Deformed & Plain Billet-Steel Bars for Concrete Reinforcing", Grade 60.

### PART 3 - EXECUTION

- 3.1 GENERAL: Fabricate and place reinforcing steel according to latest edition of ACI "Manual of Standard Practice for Detailing Reinforced Concrete Structures", The American Concrete Institute ACI 301-84, "Specifications for Structural Concrete", and details on Drawings.
- 3.2 WELDING: When required or permitted, all welding of reinforcing bars shall conform to AWS D1.4. Unless otherwise accepted, welding of crossing bars (tack welding) for assembly of reinforcement is prohibited.
- 3.3 FABRICATION: All reinforcement shall be bent cold unless otherwise permitted. Reinforcing bars shall be fabricated in accordance with the standard of fabricating tolerances ACI 315. When it is necessary to move bars to avoid interference with other reinforcement, conduits, or embedded items exceeding the specified placing tolerances, the resulting arrangement of bars shall be subject to acceptance. Reinforcement shall be placed to the following tolerance:
 

Bar to surface	+ or - 1/4"
Bar to bar	+ or - 2"
Stirrups	+ or - 1"
- 3.4 PLACING: All reinforcement, at the time concrete is placed, shall be free of mud, oil, or other materials that may adversely affect or reduce the bond. Reinforcement with rust, mill scale, or a combination of both shall be considered satisfactory provided the minimum dimensions, weight, and height of deformations of a hand-wire-brushed test specimen are not less than the applicable ASTM specification requirements.
- 3.5 SUPPORT: All reinforcement shall be supported and fastened before concrete is placed and shall be secured against displacement within tolerances. Unless otherwise indicated in the contract documents reinforcement supported from the ground or mud mat shall rest on precast concrete blocks no less than 4 sq. in. and having a compressive strength equal to or greater than the specified compressive strength of the concrete being placed. Other means of support may be used if accepted.

Reinforcement supported from formwork shall rest on bar supports made of concrete, metal, plastic, or other acceptable materials. Where the concrete surface will be exposed to the weather in the finished structure, the portions of all bar supports within 1/2in. of the concrete surface shall be noncorrosive or protected against corrosion.

- 3.6 BENDING: Bending or straightening of bars partially embedded in concrete shall not be permitted except when specifically accepted. The minimum inside bend diameters shall conform to the following unless otherwise permitted. In addition, the beginning of the bend shall not be closer to the concrete surface than the minimum diameter of bend. No. 4 through No. 5 bars may be cold bent the first time if temperature is above 32 degrees F; Preheating is required for subsequent straightening or bending. For No. 6 and larger preheating is required. Preheating prior to bending or straightening, when required, shall be in accordance with ACI requirements.

A. Minimum Diameter of Bends

Bar size	Minimum diameter
# 3 - 8	6 bar diameters
# 9, 10, & 11	8 bar diameters
# 14 & 18	10 bar diameters

### 03 30 00 - CAST-IN-PLACE CONCRETE

#### PART 1 - GENERAL

- 1.1 DESCRIPTION: Included under this section will be all labor, materials, tools, & equipment as required for CAST-IN-PLACE CONCRETE, as shown on the Drawings, specified herein, and as needed for a complete and proper installation. Concrete for all parts of the work shall be of the specified quality and capable of being placed without excessive segregation. When hardened, concrete shall develop all characteristics required by the contract documents.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 REFERENCE STANDARDS: The standards of the American Society for Testing Materials referred to in these specifications are declared to be a part of these specifications, the same as if fully set forth herein. All work will comply with The American Concrete Institute, ACI 301-84, "Specifications for Structural Concrete" & by reference is a part of this specification. Words and terms used in these specifications are defined in Cement and Concrete Terminology, ACI 116R.
- 1.5 TESTING: Concrete materials and operations will be tested and inspected as the work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the architect-engineer for final acceptance. Testing agency shall meet the requirements of ASTM E 329. The agency shall report all test and inspection results to the architect or engineer and the contractor immediately after they are performed. Make at least one strength test for each 50 cu. yd. or fraction thereof, of each mixture design of concrete placed in any 1 day. When the total quantity of concrete with a given mixture design is less than 50 cu. yd, the strength tests may be waived by the architect/engineer. Mold and cure three specimens from each sample in accordance with ASTM C 341. One specimen shall be tested at 28 days for acceptance, one shall be tested at 7 days for information, & one shall be held for record. The following testing services shall be performed by the designated agency:
  - A. Review the contractor's proposed materials & mix for compliance with the specification.
  - B. Conduct strength tests of the concrete during construction in accordance with ASTM procedures.
  - C. Determine slump of the concrete sample for each strength test and whenever consistency of concrete appears to vary, using ASTM C 143.
  - D. Additional testing and inspection required because of changes in materials or proportions requested by the contractor, or by their failure by test or inspection to meet specification requirements.

#### PART 2 - PRODUCTS

- 2.1 CEMENTS: Cement shall Portland cements, ASTM C 150, type I. Use one brand of cement throughout, unless approved otherwise by the Engineer.
- 2.2 ADMIXTURES: Admixtures to be used in concrete, when required or permitted, shall conform to the following appropriate specifications: Air-entraining admixtures, ASTM C 260; Water-reducing, retarding, and accelerating admixtures, ASTM C 494; Pozzolanic admixtures, ASTM C 618. Admixtures used in the work shall be of the same composition as those used in establishing the concrete proportions. All admixtures shall be used in accordance with the manufacturer's instructions except as otherwise specified. Flyash may be used as approved by the structural engineer.
- 2.3 WATER: Mixing water for concrete shall meet requirements of ASTM C 94.
- 2.4 AGGREGATES: Aggregates for normal weight concrete shall meet the requirements of ASTM C 33. Aggregates for lightweight concrete shall meet the requirements of ASTM C 330. Fine and coarse aggregates shall be regarded as separate ingredients. Each size of coarse aggregate, as well as the combination of sizes when two or more are used, shall meet the appropriate grading requirements of the applicable ASTM specifications.
- 2.5 STORAGE OF MATERIALS: Cement shall be stored in weather-tight containers. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of like aggregates. Stockpiles of natural or manufactured sand shall be allowed to drain to insure relatively uniform moisture content

throughout the stockpile. Admixtures shall be stored in a manner that will avoid contamination, evaporation, or damage. Agitating equipment shall be provided as required. Liquid admixtures shall be protected from temperature which would adversely affect their characteristics.

- 2.6 SLUMP: Unless otherwise permitted or specified, the concrete shall be proportioned and produced to have a slump of 4 in. or less if consolidation is to be by vibration, and 5 in. or less if consolidation is to be by methods other than vibration. A tolerance of up to 1 in. above the maximum indicated shall be allowed for one batch in any five consecutive batches tested. Concrete of lower than usual slump may be used provided it is properly placed and consolidated. The slump shall be determined by ASTM C 143.
- 2.7 MAXIMUM SIZE OF COARSE AGGREGATE: The nominal maximum size of the aggregate shall not be more than one-fifth of the narrowest dimension between sides of forms, one-third of the depth of slabs, nor three-fourths of the minimum clear spacing between reinforcing bars. These limitations may be waived if, in the judgment of the architect/ engineer, workability and methods of consolidation are such that the concrete can be placed without honeycomb or voids. See ASTM C 33 for tolerances on oversize for various nominal maximum size designations.
- 2.8 DURABILITY: Concrete of normal weight which will be subject to potentially destructive exposure (other than wear or loading) such as freezing and thawing, severe weathering or deicer chemicals shall be air-entrained per ACI requirements. Measurement of air content shall meet the requirements of ASTM C 231, C 173, or C 138. The water-cement ratio shall not exceed 0.47 by weight. Proportions shall be selected to provide a specified strength of 3000 psi or more.
- 2.9 VAPOR BARRIER: Provide under-slab vapor barrier as indicated in Section 07260, as approved by Architect.

### PART 3 - EXECUTION

- 3.1 PROPORTIONING: Proposed concrete proportions shall be subject to acceptance by the architect/engineer based on demonstrated ability to produce concrete meeting all requirements of the specification. Proportions of materials for concrete shall be established to provide: (a) Adequate workability and proper consistency to permit concrete to be worked readily into the forms and around reinforcement without excessive segregation or bleeding under conditions of placement to be employed, (b) Resistance to freezing and thawing and other aggressive actions, (c) Conformance with ACI strength test requirements. Concrete proportions shall be established on the basis of previous field experience or laboratory trial batches per ACI requirements. Maximum permissible water cement ratio by weight shall be 0.47 for slab-on-grade. Proportions shall be selected to provide 3000 psi 28 day strength and provide a minimum of 5 sacks of cement per cubic yard of concrete; the required compressive strength at 3 days shall be 2250 psi.
- 3.2 PREPARATION BEFORE PLACING: Formwork shall be completed; snow, ice and water shall be removed; reinforcement shall be secured in place; expansion joint material, anchors, and other embedded items shall be positioned; and the entire preparation shall be accepted. Semiporous subgrades shall be sprinkled sufficiently to eliminate suction and porous subgrades shall be sealed in an acceptable manner.
- 3.3 VAPOR BARRIER: In building, vapor barrier to be in place with any penetrations or tears sealed watertight; lap min 6" & pin. At any wood flooring areas, provide double strength material.
- 3.4 PREPARATION OF SUBGRADE FOR SLABS ON GROUND: The subgrade shall be well drained and of adequate and uniform loadbearing capacity. The minimum in-place density of the subgrade soils shall be as required in the specifications. The bottom of an undrained granular base course shall not be lower than the adjacent finished grade. The subgrade shall be moist, but there shall be no standing water nor any muddy or soft spots when the concrete is placed. Concrete shall not be placed on frozen ground.
- 3.5 EDGE FORMS AND SCREEDS: Edge forms and intermediate screed strips shall be set accurately to produce the designated elevations and contours of the finished surface, and shall be sufficiently strong to support vibrating screeds or roller pipe screeds if the nature of the such equipment. The concrete surface shall be aligned to the contours of screed strips by the use of strike-off templates or acceptable compacting type screeds.
- 3.6 CONVEYING: Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by the methods which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained.

- 3.7 DEPOSITING: Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located as indicated on the contractor documents or as permitted. Placing shall be carried on at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed which the concrete placing has reached an elevation rendering their service unnecessary.
- 3.8 SEGREGATION: Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to any procedure which will cause segregation.
- 3.9 CONSOLIDATION: All concrete shall be consolidated by vibration, spading, rodding or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honey-combing, pitting, or planes of weakness. Internal vibrators used shall be the largest size and the most powerful that can be properly used in the work, as described in Table 5.1.4 of ACI 309. They shall be operated by competent workmen. Use of vibrators to transport concrete within forms shall not be points approximately 18 in. apart. At each insertion, the duration shall be sufficient to cause segregation, generally from 5 to 15 sec.
- 3.10 JOINTING: Joints in slabs on grade shall be located and detailed as indicated in the contract documents. If saw-cut joints are required or permitted, cutting shall be timed properly with the set of the concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregates being dislodged by the saw. Cutting shall be completed before shrinkage stresses become sufficient to produce means.
- 3.11 FINISHES:
- A. Floated finish - After the concrete has been placed, consolidated, struck off, and leveled the concrete shall not be worked further until ready for floating. Floating with a hand float or with a bladed power trowel equipped with float shoes, or with a powered disc float shall begin when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation. During or after the first floating, planeness of surface shall be checked with a 10-ft straightedge applied at not less than two different angles. All high spots shall be cut down and all low spots filled during this procedure to produce a surface within Class B tolerance throughout. The slab shall then be refloated immediately to a uniform sandy texture. Unless noted otherwise provide at: interior exposed concrete flooring at damp locations.
  - B. Troweled finish - The surface shall first be float-finished as specified. It shall next be power troweled, and finally hand troweled. The first troweling after power floating shall produce smooth surface which relatively free of defects but which show some trowel marks. Additional trowelings shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done when the ringing sound is produced as the trowel is moved over the surface. The surface shall be thoroughly consolidated by the hand troweling operations. The finished surface shall be essentially free of trowel marks, uniform in texture and appearance and shall be plane to a Class A tolerance, except tolerance for concrete on metal deck shall be Class B. On surfaces intended to support floor coverings, any defects of sufficient magnitude to show through the floor covering shall be removed by grinding. Unless noted otherwise provide at: all interior floor areas except as required in (a).
- 3.12 FINISHING TOLERANCES: Per ACI 117, interior finishes (except as noted otherwise) to have Flatness (FF) of 20 & Levelness (FL) of 17, with no more than 0.31" deviation in 10'-0", as determined by a 10-ft straightedge placed anywhere on the slab in any direction. At wood gym floor areas provide FF of 35 and an FL of 30.
- 3.13 PROTECTION: Unless adequate protection is provided and acceptance is obtained, concrete shall not be placed during rain, sleet, or snow. Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish. When the temperature of the surrounding air is expected to be below 40 degrees F during placing or within 24 hr thereafter, the temperature of the plastic concrete, as placed, shall be no lower than 55 degrees F for sections less than 12 in. in any dimension not 50 degrees F for any other sections. The temperature of the concrete as placed shall not be so high as to cause difficulty from loss of slump, flash set, or cold joints and should not exceed 90 degrees F. When the temperature of the concrete exceeds 90 degrees F, precautionary measures acceptable to the architect/engineer shall be put into effect. When the temperature of the steel is greater than 120 degrees F steel forms and reinforcement shall be sprayed with water just prior to placing the concrete.
- 3.14 BONDING: The hardened concrete of construction joints shall be dampened immediately prior to placing of fresh concrete. The hardened concrete of horizontal construction joints shall be dampened (but not saturated) and then thoroughly covered with a coat

of cement grout of similar proportions to the mortar in the concrete. The fresh concrete shall be placed before the grout has attained its initial set. Joints receiving an adhesive or retarder shall be prepared and applied in accordance with the manufacturer's recommendations.

- 3.15 REPAIR OF DEFECTIVE AREAS: All honeycombed and other defective concrete shall be removed down to sound concrete. If chipping is necessary the edges shall be perpendicular to the surface or slightly undercut. No feathered edges will be permitted. The area to be patched shall be dampened & a bonding grout shall be applied. Produce a color matching color of the surrounding concrete. Keep damp for 7 days.
- 3.16 FINISHING OF FORMED SURFACES: For all concrete surfaces exposed to public view smooth rubbed finish is to be applied. Surfaces shall be wetted and rubbed with carborundum brick or other abrasive until uniform color and texture are produced.
- 3.17 CURING AND PROTECTION: Beginning immediately after placement, concrete shall be protected from premature drying, excessively hot or cold temperatures, and mechanical injury, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing shall be subject to acceptance. If used, curing compound to conform to ASTM C 309. Curing shall be continued for at least 7 days except high-early-strength concrete (3 days). The temperature of the concrete shall be maintained above 50 degrees. During the curing period, the concrete shall be protected from damaging mechanical disturbances.
- 3.18 ACCEPTANCE OF STRUCTURE: Acceptance of structure will be in accordance to ACI requirements.

## **03 35 19 - STAINED CONCRETE FLOOR FINISH**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Concrete floor stain system

#### **1.2 RELATED SECTIONS**

- A. 03 30 00 - CAST-IN-PLACE CONCRETE
- B. 09 91 00 - PAINTING

#### **1.3 SUBMITTALS**

- A. Comply with Section 01 33 23 - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including surface preparation and application instructions.
- C. Color Samples: Submit manufacturer's standard color chart.
- D. Installer's Project References: Submit list of successfully completed projects, including project name and location, name of architect, and type and quantity of concrete floor stain applied.
- E. Maintenance Instructions: Submit manufacturer's maintenance and cleaning instructions.

#### **1.4 QUALITY ASSURANCE**

- A. Single Source Responsibility: Concrete floor stain materials shall be products of a single manufacturer.
- B. Installer's Qualifications:
  - 1. Successful experience in application of similar concrete floor stains.
  - 2. Employ persons trained for application of concrete floor stains.

- 1.5 PRE-INSTALLATION MEETING: Convene a pre-installation meeting before start of application of concrete floor stain. Require attendance of parties directly affecting work of this section, including Contractor, Architect, and applicator. Review surface preparation, application, protection, and coordination with other work.

#### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying manufacturer, product name, and concrete floor stain color.
- B. Storage: Store materials in a clean, dry area indoors in accordance with manufacturer's instructions. Keep containers sealed until ready for use.
  - 1. Concrete Floor Wax or Sealer: Keep away from ignition sources. Do not allow to freeze.
- C. Handling: Protect materials during handling and application to prevent damage or contamination.



1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply concrete floor stain when air or surface temperature is below 40 degrees F.
- B. Concrete Floor Wax or Sealer: Do not apply when air or surface temperature is below 55 degrees F.
- C. Exterior Surfaces: Do not apply materials in wet weather.

1.8 SEQUENCING

- A. Prepare surface and apply concrete floor stain after other interior finish work is completed and before baseboards are installed.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Kemiko Concrete Products, PO Box 1109, Leonard, Texas 75452. Phone (903) 587-3708. Fax (903) 587-9038. Web Site [www.kemiko.com](http://www.kemiko.com). E-Mail [sales@kemiko.com](mailto:sales@kemiko.com).

2.2 CONCRETE FLOOR STAIN

- A. Concrete Floor Stain: Kemiko Stone Tone Stain.
  - 1. Description: Combination of acid solution, wetting agents, and metallic ions. When mixed with water, chemically combines with portland cement to form permanent colors.
  - 2. Color: As selected by Architect & approved by Owner.

2.3 ACCESSORIES

- A. Concrete Floor Wax: Kemiko Stone Tone Wax. (BASE BID)
  - 1. Aliphatic petroleum wax.
  - 2. Non-yellowing.
  - 3. Fast drying.
- B. Concrete Floor Sealer: Kemiko Stone Tone Sealer. (ALTERNATE BID)
  - 1. Acrylic water-based urethane clear sealer.
  - 2. Solids Content: 30 percent.
  - 3. Non-yellowing.
  - 4. Resistant to blush.
  - 5. Satin finish.
  - 6. VOC compliant.
  - 7. Quick drying.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive concrete floor stain. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

### 3.2 SURFACE PREPARATION

- A. Protection:
  - 1. Protect walls and surrounding surfaces not to receive concrete floor stain.
  - 2. Do not allow stain to come in contact with wood or metal surfaces.
- B. Prepare concrete surface in accordance with manufacturer's instructions.
- C. Concrete shall be as specified in Section 03300. Ensure concrete is a minimum of 28 days old.
- D. Ensure concrete surface is clean, dry, structurally sound, and free from dirt, dust, oil, grease, solvents, paint, wax, asphalt, concrete curing compounds, sealing compounds, surface hardeners, bond breakers, adhesive residue, and other surface contaminants.
- E. Do not acid wash or use heavy alkali cleaners.

### 3.3 APPLICATION

- A. Apply concrete floor stain in accordance with manufacturer's instructions at locations indicated on the drawings.
- B. Control depth of color by adjusting volume of stain applied to floor.
- C. Apply 2 coats of concrete floor stain. Allow floor to completely dry after each coat. Do not scrub clean between coats.
- D. After floor has completely dried, scrub off stain residue in accordance with manufacturer's instructions. Allow floor to completely dry.
- E. Concrete Floor Wax: Apply concrete floor wax over interior concrete floor stain in accordance with manufacturer's instructions.
- F. Concrete Floor Sealer: Apply concrete floor sealer over concrete floor stain in accordance with manufacturer's instructions.
- G. Keep material containers closed when not in use to avoid contamination.

### 3.4 PROTECTION

- A. Protect stained concrete floor from damage during construction.
- B. Protect concrete surfaces from foot traffic for a minimum of 24 hours
- C. Avoid washing concrete surfaces for a minimum of 48 hours.

## 03 35 20 - INTEGRALLY COLORED CONCRETE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to Work of this Section.
- B. Section Includes:
  - 1. Integrally colored concrete slabs-on-grade.
  - 2. Curing of integrally colored concrete.
- C. Related Sections:
  - 1. Division 3 Section "Cast-In-Place Concrete" for general applications of concrete and coordination of sample submittal and color selection.
  - 2. Division 7 Section "Joint Sealants" for colored sealant for joints.

#### 1.2 REFERENCES

- A. American Concrete Institute (ACI):
  - 1. ACI 301 "Specification for Structural Concrete for Buildings."
  - 2. ACI 302 IR "Recommended Practice for Concrete Floor and Slab Construction."
  - 3. ACI 303.1 "Standard Specification for Cast-In-Place Architectural Concrete."
  - 4. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing of Concrete."
  - 5. ACI 305R "Recommended Practice for Hot Weather Concreting."
  - 6. ACI 306R "Recommended Practice for Cold Weather Concreting."
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM C309 "Liquid Membrane-Forming Compounds for Curing Concrete."
  - 2. ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."
  - 3. ASTM C979 "Standard Specification for Pigments for Integrally Colored Concrete."
- C. American Association of State Highway and Transportation Officials (AASHTO):
  - 1. AASHTO M194 "Chemical Admixtures."

#### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's complete technical data sheets for the following:

1. Colored admixture.
2. Curing compound.
- B. Design Mixes: For each type of integrally colored concrete.
- C. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available.
- D. Qualification Data: For firms indicated in "Quality Assurance" Article, including list of completed projects.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer with 10-years experience in the production of specified products.
- B. Installer Qualifications: An installer with 5-years experience with work of similar scope and quality.
- C. Comply with the requirements of ACI 301.
- D. Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.
- E. Notification of manufacturer's authorized representative shall be given at least 1-week before start of Work.
- F. Integrally Colored Concrete Mockups:
- G. Provide under provisions of Division 1
  1. At location on Project selected by Architect, place and finish 4' x 4' area.
  2. For accurate color, the quantity of concrete mixed to produce the sample should not be less than 3 cubic yards (or not less than 1/3 the capacity of the mixing drum on the ready-mix truck) and should always be in full cubic yard increments. Excess material shall be discarded according to local regulations.
  3. Construct mockup using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control, construction, and expansion joints in sample panels. Mockup shall be produced by the individual workers who will perform the work for the Project.
  4. Retain samples of cements, sands, aggregates and color additives used in mockup for comparison with materials used in remaining work.
  5. Accepted mockup provides visual standard for work of Section.
  6. Mockup shall remain through completion of work for use as a quality standard for finished work.
  7. Remove mockup when directed.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Colored Admixture: Comply with manufacturer's instructions. Deliver colored admixtures in original, unopened packaging. Store in dry conditions.

#### 1.6 PROJECT CONDITIONS

- A. Integrally Colored Concrete Environmental Requirements:
  - 1. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.
  - 2. Avoid placing concrete if rain, snow, or frost is forecast within 24-hours. Protect fresh concrete from moisture and freezing.
  - 3. Comply with professional practices described in ACI 305R and ACI 306R.
- B. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer's written recommendations.

#### 1.7 PRE-JOB CONFERENCE

- A. One week prior to placement of integrally colored concrete a meeting will be held to discuss the Project and application materials.
- B. It is suggested that the Architect, General Contractor, Subcontractor, Ready-Mix Concrete Representative, and a Manufacturer's Representative be present.

### PART 2 - PRODUCTS

#### 2.1 BASIS OF DESIGN

- A. L. M. SCOFIELD COMPANY, Douglasville, Georgia (800) 800-9900 or the appropriate local contact: Eastern Division – 201-672-9050; Western Division – 714-568-1870; Central Division Office – 630-377-5959.

#### 2.2 MATERIALS

- A. Colored Admixture for Integrally Colored Concrete: CHROMIX® Admixtures for Color-Conditioned Concrete including CHROMIX P® Admixtures, CHROMIX ML® Admixtures or CHROMIX L® Admixtures; L. M. SCOFIELD COMPANY.
  - 1. Admixture shall be a colored, water-reducing, admixture containing no calcium chloride with coloring agents that are limeproof and ultra-violet resistant.
  - 2. Colored admixture shall conform to the requirements of ACI 303.1, ASTM C979, ASTM C494 and ASSHTO M194.
  - 3. Raw pigments are not an equivalent and may not be substituted.
- B. Curing Compound for Integrally Colored Concrete: Curing compound shall comply with ASTM C309 and be of same manufacturer as colored admixture, for use with integrally colored concrete.
  - 1. Exterior Integrally Colored Concrete: LITHOCHROME® Colorwax?; L. M. SCOFIELD COMPANY. Use to cure exterior flatwork that will be allowed to cure naturally with only occasional maintenance.
  - 2. Interior Integrally Colored Concrete: COLORCURE® Concrete Sealer (Pigmented) or CEMENTONE® Clear Sealer (Clear); L. M. SCOFIELD COMPANY. Use to cure interior flatwork that will receive regular maintenance.

- C. Curing and Sealing Compound: SCOFIELD® Cureseal-W? Semi-gloss and SCOFIELD® Cureseal-S? Matte; L. M. SCOFIELD COMPANY. Curing and sealing compound shall comply with ASTM C309 and be of same manufacturer as colored admixture, for use with integrally colored concrete.
- D. SUBSTITUTIONS: The use of products other than those specified will be considered providing that the Contractor requests its use in writing within 14-days prior to bid date. This request shall be accompanied by the following:
  - 1. A certificate of compliance from material manufacturer stating that proposed products meet or exceed requirements of this Section, including standards ACI 303.1, ASTM C979, ASTM C494 and AASHTO M194.
  - 2. Documented proof that proposed materials have a 10-year proven record of performance, confirmed by at least 5 local projects that Architect can examine.

## 2.3 COLORS

- A. Concrete Color[s]:
  - 1. Sand: Color shall be locally available natural sand.
  - 2. Aggregate: Concrete producer's standard aggregate complying with specifications.
  - 3. Colored Admixture: As selected by Architect from Scofield Color Chart A-312.
- B. Concrete Color[s]: Provide cement, sand, aggregate and colored admixture as required to match Architect's sample.
- C. Curing Compound: Color to match integrally colored concrete.

## 2.4 CONCRETE MIX DESIGN

- A. Slump of concrete shall be consistent throughout Project at 4-inches or less. At no time shall slump exceed 5-inches. [If super plasticizers or mid-range water reducers are allowed, slump shall not exceed 8-inches.]
- B. Do not add calcium chloride to mix as it causes mottling and surface discoloration.
- C. Supplemental admixtures shall not be used unless approved by manufacturer.
- D. Do not add water to the mix in the field.
- E. Add colored admixture to concrete mix according to manufacturer's written instructions.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install concrete according to requirements of Division 3 Section "Cast-In-Place Concrete."
- B. Do not add water to concrete mix in the field.
- C. Surfaces shall be finished uniformly with the following finish:
  - 1. Broomed: Pull broom across freshly troweled concrete to produce fine texture in straight lines perpendicular to main line of traffic. Do not dampen brooms.

2.

### 3.2 CURING

- A. Integrally Colored Concrete: Apply [curing] [curing and sealing] compound for integrally colored concrete according to manufacturer's instructions using manufacturer's recommended application techniques. Apply [curing] [curing and sealing] compound at consistent time for each pour to maintain close color consistency.
- B. Curing compound shall be same color as the colored concrete and supplied by same manufacturer of the colored admixture.
- C. Precautions shall be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at surface as described in CIP 5 Plastic Shrinkage Cracking published by the National Ready Mixed Concrete Association.
- D. Do not cover concrete with plastic sheeting.

### 3.3 TOLERANCES

- A. Minor variations in appearance of integrally colored concrete, which are similar to natural variations in color and appearance of uncolored concrete, are acceptable.

## 03 47 13 - TILT-UP PRECAST CONCRETE

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section. Requirements of Section "Cast-In-Place Concrete" apply to this Section.
- 1.2 SUMMARY: This Section includes tilt-up concrete panels that are cast, finished, and erected at the site. Extent of tilt-up precast concrete construction is shown on drawings.
- 1.3 SUBMITTALS: Submit the following in accordance with Conditions of Contract and Division 1 Specifications Sections, and in addition to requirements of Section "Cast-In-Place Concrete." Samples approximately 12 inches (300 mm) square and 2 inches (50 mm) thick, representative of full range of colors and textures of panel finishes. Shop Drawings indicating panel dimensions, openings, reinforcement and connection details, locations of items cast into panels, lifting devices, and other pertinent information. Furnish information concerning method and sequence of erection.
- 1.4 QUALITY ASSURANCE: The following are in addition to "Quality Assurance" provisions of Section "Cast-In-Place Concrete." Erector Qualifications: At least 2 years of successful experience in erection of tilt-up wall panels similar in size and amount as required for this Project. After acceptance of material samples, construct full-size panel to include representative items encountered in work. Cast, finish, cure, and erect job mock-up panel in same manner as will be employed in Project. Job mock-up panel may be incorporated in structure when acceptable to Architect. Design and fabricate tilt-up wall panels to withstand construction loads which may occur during lifting, bracing, and impact by adjoining panels.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Tilt-up precast concrete construction materials are specified in Section "Cast-In-Place Concrete."
- B. The following are in addition to requirements specified in Section "Cast-In-Place Concrete."
- C. Facing Concrete: Use selected cement and aggregates to match Architect's sample.
- D. Bond Breaker: Polymerized solution containing no oils, waxes, paraffins, or other material which could affect bond of subsequent finishes or natural appearance of exposed concrete surfaces.
- E. Anchors and Inserts: Provide inserts, dowels, bolts, nuts, washers, and other items shown to be cast in panels or required for connecting panels to adjacent work, including inserts required for lifting.
  1. Structural Steel Shapes: ASTM A 36 (ASTM A 36M).
  2. Malleable Iron Castings: ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010).
  3. Carbon Steel Castings: ASTM A 27 Grade 60-30 (ASTM A 27M Grade 415-205), grade 60-30.
  4. Stainless Steel Anchors: ASTM A 167, type 301, mill finish.
  5. Hot-Dip Galvanized iron and steel anchors, inserts, and connecting devices: ASTM A 153.
- F. Flashing Reglets: Open type having continuous groove not less than 1-1/8 inches (28 mm) deep x 3/16 inch (5 mm) wide at opening and sloped upwards to 45 degrees. Furnish with easily removed, temporary filler strip.
  1. Stainless Steel: ASTM A 167, type 302/304 soft temper, minimum 0.018 inch (0.5 mm) thick.
  2. Copper Strip: ASTM B 370, cold-rolled temper, minimum 0.0216 inch (0.55 mm) thick (16 oz./sq. ft (4.9 kg/sq. m)).



3. Hot-Dip Galvanized Sheet Steel: ASTM A 526 (ASTM A 526M), with ASTM A 525 G90 (ASTM A 525M Z275) zinc coating, minimum 0.0217 inch (0.55 mm) thick.
- G. Forms: Wood, metal, or other substantial material to maintain forms in good alignment and produce required finish. Provide external bracing to prevent form displacement during casting operations.
- H. Form Liners: As required to produce panel finish matching Architect's control sample.

## 2.2 CONCRETE MIX DESIGN

- A. Comply with requirements of Section "Cast-In-Place Concrete."
- B. Facing Concrete: Selected aggregates, cement, and additives to produce the following properties:
  1. Design compressive strength at 28 days: 5000 psi (34.5 MPa) minimum.
  2. Total air content: 3 percent to 6 percent.

## 2.3 FABRICATION TOLERANCES

- A. Casting Tolerances: Over-all height and width measured at face adjacent to mold when cast:
  1. Panels 10 feet (3 m) or under: plus or minus 1/8 inch (3 mm).
  2. Panels 10 to 20 feet (3 to 6 m): plus 1/8 inch (3 mm), minus 3/16 inch (5 mm).
  3. Panels 20 to 30 feet (6 to 9 m): plus 1/8 inch (3 mm), minus 1/4 inch (6 mm).
  4. Each additional 120 inches: plus or minus 1/16 inch per 10 ft (1.5 mm per 3 m).
  5. Panel thickness: plus 1/4 inch (6 mm), minus 1/8 inch (3 mm).
  6. Openings (cast within one member): plus or minus 1/4 inch (6 mm).
  7. Out of square (diagonal): 1/8 inch per 72 inches (3 mm per 1800 mm) or 1/4 inch (6 mm) total.
- B. Location Tolerances: Cast-in items:
  1. Inserts, pipe sleeves, bolts, etc.: plus or minus 3/8 inch (9 mm).
  2. Flashing reglets, at edge of panel: plus or minus 1/4 inch (6 mm).
  3. Reglets for glazing gasket: plus or minus 1/8 inch (3 mm).
  4. Groove width for glazing gaskets: plus or minus 1/16 inch (1.5 mm).
  5. Electrical outlets, hose bibs, etc.: plus or minus 1/2 inch (13 mm).
  6. Reveals across panels: plus or minus 1/8 inch (3 mm).

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. General: Coordinate installation of inserts and anchorages required to be set into concrete slabs prior to casting panels.
- B. Curing Base Casting Slabs: Cure concrete surfaces upon which wall panels are to be cast in same manner specified under Section "Cast-In-Place Concrete," except do not use paper or other curing sheet. At completion of 48-hour fog spray curing, use varnish base type of "curing compound" certified to have qualities of a "bond breaker" (parting compound), applied in accordance with manufacturer's instructions.

### 3.2 CASTING PANELS

- A. Forms: Place forms to minimize damage to casting slab surfaces. Erect and brace forms to receive reinforcing steel anchors, inserts, and other items to be cast into wall panels.

1. Place form liners accurately to provide finished surface texture to match Architect's sample.
- B. Reinforcing and Inserts: Set and tie reinforcing steel as specified in Section "Cast-In-Place Concrete." Locate and secure anchorages and inserts and other cast-in items.
  1. Extend reinforcing as required for later connections to other concrete structures.
  2. After placing reinforcing steel for panels, check casting slab surfaces for continuity of bond breaker film. Touch up or recoat worn or damaged areas, taking particular care to prevent application of coating on reinforcing steel and inserts.
- C. Casting: Cast panels individually on building floor slab, or temporary casting platform as required by project conditions. Comply with applicable requirements of Section "Cast-In-Place Concrete."
- D. Consolidate concrete thoroughly to produce maximum density throughout entire panel thickness without voids. Take care not to displace reinforcement or inserts, or to score forms, liners, or casting slab.
- E. Finish: Match Architect's sample for color and texture. Cracks, voids, protrusions, spalls, or nonuniform color or texture will not be acceptable.
- F. Curing: As specified in Section "Cast-In-Place Concrete." Curing may be completed with panels in vertical position when sufficient strength has been attained for lifting without damage.

### 3.3 ERECTION AND INSTALLATION

- A. General: Use erection equipment with care to prevent damage to floor slabs. Repair damage as directed.
- B. Erection: Do not erect panels until at least 75 percent of specified 28-day compressive strength has been verified.
- C. Raise and lift panels from casting slab and erect plumb in accurate location and alignment. Anchor in place as shown. Use wedges where required to correctly position panels. Provide concrete mortar, grout, or dry pack to fill joints between panels and foundation system.
- D. After placing, provide temporary braces and supports to securely hold panels in position. Maintain braces and supports in place, undisturbed, until closures, columns, or other supporting structures have been installed and are capable of receiving panels.
- E. Weld panels to supports where indicated on drawings. Comply with requirements of AWS D1.1 for welded steel connections and D1.4 for welded reinforcing bars.
- F. Installation Tolerances: 1/4 inch (6 mm) maximum offset in alignment with adjacent panel facings at any point.

### 3.4 PATCHING

- A. Patch holes in panel surfaces created by lifting and bracing devices. Comply with concrete surface repair requirements of Section "Cast-In-Place Concrete."
- B. Repair of other defective or damaged surfaces will be permitted only upon acceptance by Architect. Remove and replace panels that are not acceptable for surface repairs.

### 3.5 FIELD QUALITY CONTROL: Comply with requirements of Section "Cast-In-Place Concrete."

**03 48 00 - PRECAST CONCRETE SPECIALTES**

**PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for Misc. Sitework Items, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 GEOTECHNICAL REPORT: At a minimum, comply with all requirements of the geotechnical report.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

**PART 2 - PRODUCTS**

- 2.1 SPLASH BLOCKS: Pre-cast concrete splash blocks extending 4' from building perimeter. Located at each downspout to grade & slope away from building so as to direct water away from foundation. Accepted manufacturer's are as follows:
  - A. H & R Concrete Co., Inc.
  - B. Fort Collins Pre-Cast, Inc.
  - C. Copeland Enterprises, Inc.
- 2.2 PRECAST WHEEL STOPS: 6'x6"x6" precast concrete wheel stop, anchored with 2-36" steel stakes. Provide one at at each new parking space.

**PART 3 - EXECUTION**

- 3.1 PREPARATION: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Install this work in strict accordance with the original design, and the manufacturer's recommendations as accepted by the Architect. Protect work during storage, installation & until final acceptance, replacing any damaged material.
- 3.3 SPLASH BLOCKS: Place splash blocks on compacted gravel base with a 5% slope away from building. Install 8 SF minimum of Bermuda sod at outflow of each splash block, securely attach & maintain until established.

## 03 51 13 - CEMENTITIOUS WOOD FIBER DECKS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Cementitious wood fiber plank roof deck and form system, including subpurlins.
- B. Related Sections:
  - 1. Division 5 Sections: Steel Framing.
  - 2. Division 6 Sections: Wood Framing.
  - 3. Division 7 Sections: Roofing.

#### 1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
  - 2. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
  - 3. ASTM C578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
  - 4. ASTM D1621 Standard Test Method for Compressive Properties Of Rigid Cellular Plastics.
  - 5. ASTM D2842 Standard Test Method for Water Absorption of Rigid Cellular Plastics.
  - 6. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
- B. Underwriters Laboratories, Inc. (UL):
  - 1. UL Fire Resistance Directory.
  - 2. UL 580 Standard for Safety for Tests for Uplift Resistance of Roof Assemblies.

#### 1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Provide roof deck assembly designed and tested according to the following:
  - 1. Underwriters Laboratories Fire Resistance Directory.
  - 2. Underwriters Laboratories UL 580 (UL Class 90 Design).
- B. Performance Requirements:
  - 1. Provide a roof deck system which has been manufactured, fabricated and installed to provide deflection of Less than L/240 at design load.
  - 2. [Comply with requirements of Factory Mutual Class I Roof Deck.](#)

#### 1.4 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- B. Product Data: Submit manufacturer's product data and installation instructions.
- C. Shop Drawings: Provide drawings indicating locations and spacing of planks and purlins.
- D. Samples: Submit selection and verification samples as follows:
  - 1. Set of 12" (305 mm) square samples for each wood fiber deck unit required, showing full range of exposed texture to be expected in completed work.
  - 2. Labeled set of all accessories required for a complete installation.
- E. Quality Assurance/Control Submittals: Submit the following:
  - 1. Test Reports: Upon request, submit certified test reports from recognized test laboratories.
- F. Certificates: Submit manufacturer's certificate that products meet or exceed specified requirements.
- G. Closeout Submittals: Submit the following:
- H. Warranty documents specified herein.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity.
- B. Regulatory Requirements and Approvals:
- C. International Conference of Building Officials (ICBO):
  - 1. ICBO Research Report No. 1116.

#### 1.6 DELIVERY, STORAGE & HANDLING

- A. General: Comply with Division 1 Product Requirement Section.
- B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Provide labels indicating brand name, deck style, plank size and plank thickness.
- D. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
- E. Prevent soiling, physical damage or wetting.
- F. Store cartons open at each end to stabilize moisture content and temperature.

#### 1.7 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under contract documents.

PART 2 - PRODUCTS

2.1 ROOF DECK AND FORM SYSTEMS

- A. Manufacturer: Tectum Inc.
- B. Proprietary Systems. Cementitious deck formboard systems, including the following configurations:
  - 1. Tectum Roof Deck Plank.
  - 2. Tectum Concealed Tee Deck.

2.2 ROOF DECK PANEL COMPONENTS

- A. Proprietary Products. Cementitious deck formboard products, including the following:
  - 1. Tectum E Roof Deck Panels:
  - 2. Material: Aspen wood fibers bonded with inorganic hydraulic cement.
  - 3. Nominal Panel Thickness: 6" / R19.

2.3 ACCESSORIES

- A. Provide accessories as follows:
  - 1. Bulb-Tee Subpurlins:
    - a. Material: Steel.
    - b. Style: As indicated on drawings.
    - c. Manufacturer: Chicago Heights Steel.
  - 2. Tectum Grout:
    - a. Material: Gypsum cement grout, ready for mixing with potable water.
  - 3. Tectum Screws
  - 4. Roofing Nails
  - 5. Construction Adhesive:
    - a. Manufacturer: Miracle Construction Adhesive.
    - b. Type: Adhesive SFS-66.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Comply with the instructions and recommendations of the roof deck panel manufacturer.

3.2 EXAMINATION

- A. Site Verification of Conditions:

- B. Verify that site conditions are acceptable for installation of roof deck panel system.
- C. Do not proceed with installation of roof deck panel system until unacceptable conditions are corrected.

### 3.3 INSTALLATION

- A. Roof Deck Tile Installation:
  - 1. Furnish subpurlins in lengths to span 3 purlins.
  - 2. Position subpurlins within plus or minus 1/16" (1.6 mm) of manufacturer's recommended spacing and securely position by means of templates during welding.
  - 3. Weld tees at every crossing point over support members with a 3/4" (19.1 mm) long fillet weld on alternate sides of the flange. Weld both sides of flange at all tee ends.
  - 4. Mix and place grout in accordance with manufacturer's printed instructions. Remove excess grout once initial set has been achieved.
  - 5. Do not allow foot traffic on tile panels until after grout has set.
- B. Roof Deck Plank Installation:
  - 1. Place planks on joists with square cut ends butted tightly together.
  - 2. Stagger end joints.
  - 3. Place end joints over joists with a minimum 1" (25.4 mm) bearing.
  - 4. Secure planks to joists with screws and spacing recommended by plank manufacturer.
  - 5. Do not allow foot traffic on planks until after screws are installed.
  - 6. Apply adhesive recommended by manufacturer to ensure diaphragm performance as designed.
- C. Roof Deck Long Span Plank Installation:
  - 1. Cut plank neatly to abut parapets, around openings and penetrations.
  - 2. Apply adhesive recommended by manufacturer to ensure diaphragm performance as designed.
- D. Roof Deck Formboard Installation:
  - 1. Cut plank neatly to abut parapets, around openings and penetrations.
  - 2. Apply adhesive recommended by manufacturer to ensure diaphragm performance as designed.
- E. Roof Deck Composite Plank:
  - 1. Cut plank neatly to abut parapets, around openings and penetrations.
  - 2. Apply adhesive recommended by manufacturer to ensure diaphragm performance as designed.

- 3.4 CLEANING: Clean exposed surfaces of all deck surfaces. Remove and replace work which cannot be successfully repaired to permanently eliminate evidence of structural damage.

- 3.5 PROTECTION: Protect installed work from damage due to subsequent construction activity on the site so that the work will be without damage and deterioration at the time of acceptance by the Owner.



**DIVISION 04 – MASONRY****04 01 21 – UNIT MASONRY RESTORATION & CLEANING****PART 1 - GENERAL**

- 1.1 GENERAL REQUIREMENTS: Work under this section includes cleaning exterior masonry & cementitious material from light atmospheric soiling, mold, mildew and soil / clay staining.
- 1.2 SCOPE
- A. The following buildings shall be included under this scope
1. asdfadfs
- 1.3 QUALITY ASSURANCE: Work under this section must be performed by a firm which has been in the everyday business of Building Restoration Cleaning for a minimum of five years successful operation. Such experience must include projects of comparable scope and extent to this project.
- 1.4 WARRANTIES: Warrant for a period of two years that cleaning procedures will not harm substrate or adjacent materials including, but not limited to: Discoloration of substrate from improper product usage; Chemical damage from inadequate rinse procedures; Abrasive damage from improper procedures. Warrant for a period of two years the repointing and masonry repairs against: Discoloration or mismatch of new mortar to adjacent old mortar; Discoloration or damage to masonry units from improper mortar clean-up; Loss of bond between mortar and masonry work; Fracturing of masonry units edges from improper mortar joint preparation procedures or improper mortar formulation; Occurrence of efflorescence.
- 1.5 SUBMITTALS: Proof of experience requirements for firm doing the actual work, or designation and qualifications for the Restoration Specialist. Product Manufacturer's Product Literature. Perform test cleaning to demonstrate/select appropriate cleaning materials, mixes, and methods. Provide sample area of repointing to establish quality of work, color and profile of joints.

**PART 2 - PRODUCTS**

- 2.1 RESTORATION CLEANING PRODUCT: Restoration cleaning products by Diedrich Technologies, Prosoco, Chemical Products Industries, or other product determined by the Architect to be equal & receiving his prior approval, which has a sufficient range of products to determine the "gentlest means possible".
- A. Basis of Design: Sure Klean Light Duty Restoration Cleaner by Prosoco
- 2.2 BIOLOGICAL SOILING REMOVER PRODUCT: Biological soiling remover that targets mold and mildew growth by Diedrich Technologies, Prosoco, Chemical Products Industries, or other product determined by the Architect to be equal & receiving his prior approval, which has a sufficient range of products to determine the "gentlest means possible".
- A. Basis of Design: ReVive by Prosoco
- 2.3 REPOINTING MORTARS: An approved material compatible with the existing material meeting applicable ASTM standards. Obtain materials from one source to maintain color/texture/quality consistency.

**PART 3 - EXECUTION**

- 3.1 PROJECT CONDITIONS: Protect persons and property from injury and damage from cleaning operations. Do no work when winds prevent control of cleaners or rinse water. Dispose of run-off in a legal manner. For chemical cleaning, clean only when ambient 40 degrees F temperature and above will be maintained during cleaning and seven days after.
- 3.2 WORK SEQUENCE:
  - A. For areas with biological growth (mold and mildew) use a light powerwash to remove active growth. Clean masonry with biological soiling remover as per manufacturer instructions. Continue with restoration cleaning.
  - B. Clean masonry with restoration procedures as per restoration cleaning product manufacturer.
  - C. Inspect and document surface conditions.
  - D. Review surface with architect.
  - E. Re-address any areas identified as insufficiently cleaned.
- 3.3 TEST PANELS: Test panels shall be prepared under the technical supervision of the Restoration Specialist. Clean 1 test panel of at least 9 square feet for each different material & technique, using the specified products and techniques demonstrating the required level of cleaning for the architect's approval. Architect shall specify location of test panels.
- 3.4 TESTING CLEANING METHODS. In order to determine the gentlest means possible, several cleaning methods or materials may have to be tested prior to selecting the best one to use on the building. Testing should always begin with the gentlest and least invasive method proceeding gradually, if necessary, to more complicated methods, or a combination of methods. Simple methods, such as a low-pressure water wash, shall be the starting point of determining the gentlest means possible.
- 3.5 CLEANING: Clean exterior masonry surfaces with the gentlest means possible to restore the surfaces to as near original appearance as possible consistent with safety for the substrate. Comply with cleaning chemical manufacturer's instructions, recommendations, and precautions. Protect adjacent surfaces. Clean surfaces in strict conformance with approved field tests and match mock-up panels. Provide uniform final appearance.
- 3.6 PERFORMANCE: The actual work performed is to be done using the products and techniques established in the accepted test panels. Any proposed change of product usage must be submitted with the product manufacturer's recommendation, and written approval must be issued by the architect before being undertaken.
- 3.7 PERIODIC RE-EVALUATION OF METHODS AND RESULTS: As the work proceeds, the procedures being used and the results being obtained must be continually re-evaluated by the contractor in terms of the actual substrate conditions being found as the job proceeds. As a condition of the project, the contractor is responsible for reporting changing conditions to the Project Architect and for interrupting the work as needed to allow for the architect's review without request for additional compensation. After the report and pause for changing conditions as noted above, the jobsite testing procedures will be repeated until an acceptable new procedure is established. Contractor is responsible for damages or inadequate work when conditions change and the work is continued without notice to the Architect.
- 3.8 INSPECTION DOCUMENTATION: At the end of the cleaning, repointing, and other masonry repair phases, the work is to be inspected and documented by the contractor for the architect's consideration.

## 04 01 21 – UNIT MASONRY RESTORATION & CLEANING (HISTORICAL)

### PART 4 - GENERAL

- 4.1 GENERAL REQUIREMENTS: Work under this section includes cleaning exterior masonry & cementitious material, & repairing defective masonry joints. All work is to be done in conformance with the Secretary of the Interior's Standards for Historic Preservation Projects, its accompanying guidelines, Preservation Brief No. 1 "The Cleaning and Waterproofing of Historic Masonry Buildings" and Preservation Brief No. 2 "Repointing Mortar Joints in Historic Brick Buildings".
- 4.2 QUALITY ASSURANCE: Work under this section must be performed by a firm which has been in the everyday business of Building Restoration Cleaning for a minimum of five years successful operation. Such experience must include projects of comparable scope and extent to this project.
- 4.3 WARRANTIES: Warrant for a period of two years that cleaning procedures will not harm substrate or adjacent materials including, but not limited to: Discoloration of substrate from improper product usage; Chemical damage from inadequate rinse procedures; Abrasive damage from improper procedures. Warrant for a period of two years the repointing and masonry repairs against: Discoloration or mismatch of new mortar to adjacent old mortar; Discoloration or damage to masonry units from improper mortar clean-up; Loss of bond between mortar and masonry work; Fracturing of masonry units edges from improper mortar joint preparation procedures or improper mortar formulation; Occurrence of efflorescence.
- 4.4 SUBMITTALS: Proof of experience requirements for firm doing the actual work, or designation and qualifications for the Restoration Specialist. Product Manufacturer's Product Literature. Perform test cleaning to demonstrate/select appropriate cleaning materials, mixes, and methods. Provide sample area of repointing to establish quality of work, color and profile of joints.

### PART 5 - PRODUCTS

- 5.1 RESTORATION CLEANING PRODUCTS: Restoration cleaning products by Diedrich Technologies, Prosoco, Chemical Products Industries, or other product determined by the Architect to be equal & receiving his prior approval, which has a sufficient range of products to determine the "gentlest means possible".
- 5.2 PAINT REMOVAL PRODUCTS: Paint removal to be accomplished with alkaline paint removers, organic solvent paint removers, or other cleaning compounds.
  - A. Alkaline Paint Removers. These are usually of much the same composition as other alkaline cleaners, containing potassium or ammonium hydroxide, or trisodium phosphate. They are used to remove oil, latex and acrylic paints, and are effective for removing multiple layers of paint. Alkaline cleaners may also remove some acrylic water-repellent coatings. As with other alkaline cleaners, both an acidic neutralizing wash and a final water rinse are generally required following the use of alkaline paint removers.
  - B. Organic Solvent Paint Removers. The formulation of organic solvent paint removers varies and may include a combination of solvents, including methylene chloride, methanol, acetone, xylene and toluene.
  - C. Other Paint Removers and Cleaners. Other cleaning compounds that can be used to remove paint and some painted graffiti from historic masonry include paint removers based on N-methyl-2-pyrrolidone (NMP), or on petroleum-based compounds. Removing stains, whether they are industrial (smoke, soot, grease or tar), metallic (iron or copper), or biological (plant and fungal) in origin, depends on carefully matching the type of remover to the type of stain. Successful removal of stains from historic masonry often requires the application of a number of different removers before the right one is found. The removal of layers of paint from a masonry surface is usually accomplished by applying the remover either by brush, roller or spraying, followed by a thorough water wash.

- 5.3 REPOINTING MORTARS: An approved material compatible with the existing material meeting applicable ASTM standards & recommendations of Preservation Brief #2. Obtain materials from one source to maintain color/texture/quality consistency.

**PART 6 - EXECUTION**

- 6.1 PROJECT CONDITIONS: Protect persons and property from injury and damage from cleaning operations. Do no work when winds prevent control of cleaners or rinse water. Dispose of run-off in a legal manner. For chemical cleaning, clean only when ambient 40 degrees F temperature and above will be maintained during cleaning and seven days after.
- 6.2 WORK SEQUENCE:
- A. Clean masonry with restoration procedures.
  - B. Inspect and document surface conditions.
  - C. Review surface with architect.
  - D. Prepare mortar joints to be repointed.
  - E. Repoint and repair.
  - F. Mortar residue clean-up.
- 6.3 TEST PANELS: Test panels shall be prepared under the technical supervision of the Restoration Specialist. Clean 1 test panel of at least 9 square feet for each different material & technique, using the specified products and techniques demonstrating the required level of cleaning for the architect's approval. Architect shall specify location of test panels. All work to be performed in accordance with Preservation Briefs.
- 6.4 TESTING CLEANING METHODS. In order to determine the gentlest means possible, several cleaning methods or materials may have to be tested prior to selecting the best one to use on the building. Testing should always begin with the gentlest and least invasive method proceeding gradually, if necessary, to more complicated methods, or a combination of methods. All too often simple methods, such as a low-pressure water wash, are not even considered, yet they frequently are effective, safe, and not expensive. Water of slightly higher pressure or with a non-ionic detergent additive also may be effective. It is worth repeating that these methods should always be tested prior to considering harsher methods; they are safer for the building and the environment, often safer for the applicator, and relatively inexpensive.
- 6.5 PAINT REMOVAL: Remove in-situ layers of paint from masonry surface by applying the remover either by brush, roller or spraying, followed by a thorough water wash. Follow the manufacturer's recommendations regarding application procedures should always be tested before beginning work.
- 6.6 CLEANING: Clean exterior masonry surfaces with the gentlest means possible to restore the surfaces to as near original appearance as possible consistent with safety for the substrate. Comply with cleaning chemical manufacturer's instructions, recommendations, and precautions. Protect adjacent surfaces. Clean surfaces in strict conformance with approved field tests and match mock-up panels. Provide uniform final appearance.
- 6.7 REPOINTING: Repair or replace defective masonry units and repoint defective mortar joints comparable to existing sound materials as to structural composition, tooling, texture, color, and appearance. Remove old mortar by hand chisel and mallet, unless Contractor can demonstrate how power tools will not damage masonry. Rake-out old mortar to depth equal to 2-1/2 times joint width and in no case less than 1/2" or depth required to expose sound mortar. Do not damage masonry units. Rinse joints and install pointing mortar in 1/2" deep layers. Tool joints to match existing and cure mortar for not less than 72 hours. After pointing, clean masonry using Tampico fiber brushes and running water.

- 6.8 PERFORMANCE: The actual work performed is to be done using the products and techniques established in the accepted test panels. Any proposed change of product usage must be submitted with the product manufacturer's recommendation, and written approval must be issued by the architect before being undertaken.
  
- 6.9 PERIODIC RE-EVALUATION OF METHODS AND RESULTS: As the work proceeds, the procedures being used and the results being obtained must be continually re-evaluated by the contractor in terms of the actual substrate conditions being found as the job proceeds. As a condition of the project, the contractor is responsible for reporting changing conditions to the Project Architect and for interrupting the work as needed to allow for the architect's review without request for additional compensation. After the report and pause for changing conditions as noted above, the jobsite testing procedures will be repeated until an acceptable new procedure is established. Contractor is responsible for damages or inadequate work when conditions change and the work is continued without notice to the architect.
  
- 6.10 INSPECTION DOCUMENTATION: At the end of the cleaning, repointing, and other masonry repair phases, the work is to be inspected and documented by the RS for the architect's consideration.
  
- 6.11 SCAFFOLDING: If used, scaffolding to comply with OSHA standards.
  
- 6.12 PROTECTION: Protect completed work against stain & damage until final acceptance. Do not apply water proofing agents to historic stonework; protect from overspray when treating any adjacent work.

**04 05 16 - MASONRY GROUTING**

PART 1 - GENERAL

- 1.1 DESCRIPTION: This section covers the furnishings and placing of grout for masonry construction. ACI 531.1-76-1983 Specification for Concrete Masonry Construction, & ASTM C 476-71 Specification for Mortar and Grout for Masonry, by reference are part of this specification as if attached hereto.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.

PART 2 - PRODUCTS

- 2.1 GROUT: Use grout conforming with ASTM C 476. Mix grout with sufficient water to give a fluid pouring consistency without segregation of materials.
- 2.2 ADMIXTURES - Admixtures may be used when accepted by Architect.
- 2.3 WATER - Use potable water.
- 2.4 COLOR - As selected by Architect.

PART 3 - EXECUTION

- 3.1 PREPARATION: Set reinforcing steel and anchors in required position and secure against displacement before grouting is started. Mix all cementitious materials and aggregates for a minimum period of 5 min after all materials are placed in the mixer, with the amount of water required to produce the desired consistency.
- 3.2 GROUT PLACEMENT: Place in cores and/or collar joints while fluid and before initial set has taken place. Puddle or vibrate grout into place. Place grout in such a way as to prevent segregation of materials. Pour grout fluid enough to flow into all crevices of grout spaces leaving no voids. Grout beams over openings in one continuous operation. Grout vertical cores in maximum of 5 ft lifts. Stop grout pours 1 1/2 in. below a mortar joint, except at top of wall. Where bond beams are used stop grout pour 1/2 in. below top. Use metal lath, mortar, or special units to confine grout to area required.
- 3.3 PRECAUTIONS: Do not use materials which may inhibit bond or are combustible. Use acceptable cold weather precautions in placing and curing of grout when temperature is less than 32 degrees F. In hollow unit masonry construction, limit low-lift grouting to maximum wall height of 5 ft per lift. Vertical cores to be grouted shall have minimum clear dimension between sides of of the core of 2 in. and clear area of 8 sq in. Do not permit water or foreign material to fall in grout space while grout is being placed and curing. Remove misplaced grout immediately & clean affected areas.

## 04 05 19 - MASONRY ANCHORAGE AND REINFORCING

### PART 1 - GENERAL

- 1.1 DESCRIPTION: This section covers the furnishing and placing of reinforcement, anchors, ties, and metal accessories for masonry construction. Protect reinforcement, anchors, and ties from contact with soil and from distortion.
- 1.2 RELATED DOCUMENTS: ACI 531.1-76, 1983, Specification for Concrete Masonry Construction, by reference is a part of this specification as if attached hereto. The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.

### PART 2 - PRODUCTS

- 2.1 GENERAL: As applicable, pre-fabricated items shall be manufactured by Dur-O-Wall, or other products determined by the Architect to be equal & receiving his prior approval.
- 2.2 JOINT REINFORCEMENT: Use cold-drawn steel wire, ASTM A 82 cold-drawn steel wire may be deformed in the process of manufacturing joint reinforcement, or Deformed steel wire, ASTM A 496. ASTM A1064 covers both ASTM A82 and A496
- 2.3 METAL COATING: Coat joint reinforcement, anchors, ties with either: galvanized coating for wire conforming to ASTM A 641, class 1 for wire entirely embedded in mortar or grout, Class 3 for all other wire; Copper cladding of wire conforming to the requirements as specified for Grade 30 HS wire ASTM B 227; or Zinc coating conforming to ASTM A 153.
- 2.4 FABRICATION: Fabricate bars without damaging the materials. Bars larger than #5 shall not be field bent unless acceptable. The diameter of bend measured on the inside of the bar, other than for stirrups, for Grade 40 bars in sizes #3 to #11 inclusive, with turns not exceeding 180 deg, the minimum diameter shall be five bar diameters. Inside diameter of bend for stirrups shall not be less than four bar diameters. Standard hooks use a 180 deg turn plus extension of at least four bar diameters but not less than 2 1/2 in. at free end of bar.
- 2.5 JOINT REINFORCEMENT: Reinforcement of two or more deformed longitudinal wires weld connected with cross wires, forming a truss or ladder design. Use wire not less than D-2 or W-2 nor greater than one-half the mortar joint thickness. Make out-to-cut spacing of longitudinal wires 2 in. less than the nominal width of the wall or wythe. Space welded contacts or cross wires with each longitudinal wire not more than 16 in. Provide joint reinforcement in flat sections 10 to 20 ft long, except that factory-formed corner reinforcements and other special shapes may be shorter.
- 2.6 ADJUSTABLE WALL ANCHORS: Equal to Durawall DA213, set in, & anchored thru, mastic or approved waterproof membrane material.
- 2.7 MISC. ANCHORS AND TIES: Fabricate anchors and ties in one of the following ways: Wire mesh ties shall be No. 16 gage minimum 1/2 in. mesh steel wire, 12 in. minimum length and 1 1/2 in. less than the nominal width of wall; Rigid steel anchors at intersecting walls shall be 1 1/2 x 24 in. minimum length, formed in rectangular shape 4 in. wide for hollow units placed with cells vertical and U or Z shape for solid units. End of ties shall be bent at 90 deg with at least 2-in. extension. Material shall conform to ASTM A112 with Class C coating or A82 or A496 with equivalent coating; Corrugated or crimped metal ties shall be sheet 0.03 in. minimum thickness, 1 in. wide, and turned up 1/4 in. at outer end.
- 2.8 REINFORCING BARS: Use required grade of deformed bars conforming to one of the following, except bars larger than number 11 shall not be used. Billet Steel Bars: ASTM A615 plus supplement #1. Low-Alloy-bars: ASTM A706.

### PART 3 - EXECUTION

- 3.1 PREPARATION: Place all reinforcement for masonry in accordance with project documents. Use metal reinforcement at time of placement which is free of mud, oil, or other coatings that adversely affect bonding capacity. Metal reinforcement with rust, mill scale, or a combination of both may be used provided the minimum dimensions, including height of deformations, and weight of wire brushed specimens are not less than required by applicable ASTM specification. Do not use metal reinforcement with kinks or un-required bends. Do not straighten nor repair bars in a manner that will damage the bar or adjacent construction.

- 3.2 PLACING REINFORCING BARS: Make splices in bars as shown on project drawings unless otherwise accepted. Provide clear distance between horizontal bars in a layer not less than the diameter of the bars, nor 1 in. except that they may be bundled in pairs. Provide clear distance between vertical bars not less than one and one-half times the bar diameter, not 1 1/2 in. except that they may be bundled in pairs. Lay horizontal bars as work progresses. Hold vertical bars in hollow unit masonry in place at 192 bar diameters or 10 ft maximum on center whichever is lesser. Embed bars in grout and provide a minimum masonry cover not less than the following:
  - A. Minimum 3 in. from the bottom of masonry footings.
  - B. Minimum 2 in. where exposed to earth or weather.
  - C. Minimum 1 1/2 in. where not exposed to earth or weather.
- 3.3 PLACING JOINT REINFORCEMENT: Place masonry joint reinforcement so the longitudinal wires are located over face-shell mortar beds and are embedded in mortar or grout for their entire length with minimum cover of 5/8 in. when exposed to weather or earth and 1/2 in. at other locations. Place factory-fabricated sections at corners and wall intersections, unless other wise accepted. Extend joint reinforcement at openings not less than 24 in. beyond the end of the sills or lintels or to the end of the panel is less than 24 in. Joint reinforcement shall not be continuous through a control joint or an expansion joint. Lap the ends of joint reinforcement 6 in. for deformed wire and 12 in. for plain wire when spliced. In multi-wythe high lift grouted construction make horizontal wire ties as stirrups 4 in. wide minimum and 2 in. shorter than the overall wall thickness with the wire ends meeting in the center of one embedded end of the stirrup, unless otherwise accepted.
- 3.4 PLACING ANCHORS, TIES, AND METAL ACCESSORIES: Install required anchors, ties, and metal accessories as the masonry construction progresses. Install mastic or approved waterproof membrane material between anchor & wall to provide a waterproof barrier at penetrations. Set bolts and inserts vertically in the top of walls, pilasters, beams or columns 3 in. minimum from face in masonry 7 in. or more in thickness, and at the center line in thinner masonry sections. Adjust shelf angles as required to keep the masonry level and at required elevation. Provide anchorage as detailed in the project documents or as required for structural performance. Hold all metal accessories to masonry by firmly embedding anchorage into grout or mortar 3 in. minimum. Place pipe sleeves as specified or shown on drawings and solidly grout or mortar in place.
- 3.5 SPACING: As a minimum, typical vertical reinforcement in CMU to be either #4 at 4'OC or #5 at 6'OC; also locate at all corners & beside all openings. Bond beams to be located at the top of all walls & be #5 bar minimum. Provide any additional reinforcement shown on drawings.



## 04 05 23 - MASONRY CAVITY DRAINAGE, WEEPHOLES, AND VENTS

### PART 1 - GENERAL

- 1.1 DESCRIPTION: This section covers the furnishing and placing of moisture weeps and mortar dropping protection for masonry construction.
- 1.2 RELATED DOCUMENTS: ACI 531.1-76, 1983, Specification for Concrete Masonry Construction, by reference is a part of this specification as if attached hereto. The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.

### PART 2 - PRODUCTS

- 2.1 WEEP PROTECTION: Non-woven mesh weep vents, equal to Mortar Net Solutions "WeepVent" or Weep Vents by CavClear, for masonry cavity walls. Color to be selected by Architect to match mortar.
- 2.2 MORTAR DROPPINGS PROTECTION: Provide high density polyethylene or nylon mesh designed to allow moisture to flow downward in the cavity or collar joint to masonry flashing and weeps and hence to the exterior. Drainage system to be continuous at the base of the wall. 1", 0.875", & 0.4" thick x 10" height x 50' length (nominal sizes). Equal to Equal to "Mortar Net" by Mortar Net Solutions or "MortarStop" by Polytite Manufacturing Corporation.

### PART 3 - EXECUTION

- 3.1 WEEP PROTECTION: Provide Weep Vents at head and base of wall at 24" O.C. to ensure cavity ventilation. Leave the side of the masonry units forming the vent space unbuttered and clear of mortar. Slide vent material into joint as the two masonry units forming the weep vent are placed.
- 3.2 MORTAR DROPPINGS PROTECTION:
  - A. Manufacturer's Instructions: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.
  - B. Examination:
    1. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
    2. Match product size to cavity size. Cavity should be no more than 0.25" (6.4 mm) wider than 1" (25.4 mm) thick material and 2" (51 mm) thick material, and 0.4" (10.2 mm) thick material should touch both the outer wythe and the inner wall. For cavities larger than 2" (51 mm), place rigid insulation of sufficient height to extend at least 6" (152 mm) above the top of the Mortar Net® with Insect Barrier against the outside of the inner wythe and of appropriate thickness to reduce the cavity to the appropriate size or add additional layers of mortar net to fill width of cavity.
    3. Inspect for and repair holes in flashing immediately prior to installing.
  - C. Preparation: Clean flashing and weep holes so they are free of mortar droppings and debris immediately prior to installing mortar net. If wicks are used (not recommended), prevent mortar from coating or covering wicks inside the cavity. Washing flashing with water or chemicals prior to installation is not necessary.
  - D. Installation:
    1. For most walls, install one continuous row of trapezoidal shaped mortar net at base of wall and over all wall openings directly on flashing.

2. To prevent mortar bridging between the outer wythe and inner wall, install flashing extending from the bottom of the mortar net to at least 6" above the top of the mortar net.
3. Multiple thicknesses of The mortar net may be installed to match cavity widths and if excessive droppings are expected. Inspection, preparation and installation procedure for multiple thicknesses is the same as for single thickness. When installing multiple thicknesses, align the trapezoidal shaped sections with each other.
4. Lay the first 1 or 2 courses of brick at flashing level, then install mortar net continuously by placing it against the inside of the openings. Install mortar net with fabric facing to the exterior of the wall. No fasteners or adhesives are required, and mortar need not have set.
5. If mortar net coming into contact with wall ties it may be cut or torn to accommodate wall ties, conduit, plumbing or other materials that bridge or intrude into cavity between inner and outer walls.

## 04 21 13 - BRICK MASONRY

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for unit masonry construction, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 STANDARDS: The following standards apply to work under this section: ASTM C62 "Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)"; ASTM C67 "Standard Methods of Sampling and Testing Brick and Structural Clay Tile"; ASTM C216 "Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)"; BIA Technical Notes on Brick and Tile Construction; National Concrete Masonry Association "Concrete Masonry Details".
- 1.4 CONSTRUCTION TOLERANCES - Construct masonry within tolerances established in ACI 531.1-76, 1983, Specification for Concrete Masonry Construction.
- 1.5 SUBMITTALS:
  - A. Product Data: Submit manufacturer's product data.
  - B. Product Samples: Submit sample for each type of masonry showing extremes of variation in color and texture; Manufacturer's board for each type of brick showing extremes of variation in color and texture; Certificate attesting that masonry meet specified qualities and standards.
- 1.6 MOCK-UP:
  - A. Construct a sample panel, including but not limited to:
    1. Decorative Masonry Units: Proposed color range, texture and bond.
    2. Mortar.
    3. Structural Backing.
    4. Veneer Anchors.
    5. Flashings and sealing the top of the termination bar.
    6. Weep Vents.
    7. Wall Insulation.
    8. Air Barrier.
    9. Joint Reinforcement.
    10. Vertical Expansion Joint with Sealant and Backer Rod.
  - B. Locate where directed by the Architect.
  - C. Mock-up may not remain as part of the work.
  - D. Do not start work until Architect has accepted sample panel.
  - E. Use panel as standard of comparison for all masonry work built of the same material.
  - F. Do not destroy or move panel until work is completed and accepted by the Owner.
- 1.7 QUALITY ASSURANCE: Perform Work in accordance with Technical Notes on Brick and Tile Construction, by Brick Institute of America (BIA), except as more stringently required in the Contract Document. Before starting masonry work, erect sample masonry walls for each brick type and pattern, as described above. Walls shall face southeast to southwest. Incorporate brick, and all other components of each wall. Do not start masonry work until Architect approves one of the sample walls. Keep and protect approved sample wall on site as standard of masonry work until masonry work is complete, then remove wall.
- 1.8 STORAGE AND PROTECTION: Store masonry off ground, under cover, to prevent wetting and contamination by weather, mud, dust and materials likely to cause staining.

- 1.9 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

## PART 2 - PRODUCTS

### 2.1 FIRED CLAY MASONRY

- A. Face brick: As manufactured by Interstate Brick; match existing color, plus one accent color as selected by Architect.

1. Acme Brick Company
2. D'Harris Clay Products
3. Elgin Butler Brick Company

- 2.2 MORTAR: Make mortar conforming to proportion requirements of ASTM C 270 or C 476. Mortar color to be selected by Architect. For job site pigmented mortar use mineral pigments 5% by weight of cement content. Use potable water. Use liquid water-repellent mortar admixture containing integral water repellent equal to Other admixtures as acceptable to the Architect.

- 2.3 DETERGENT CLEANING AGENT: Qualities: 1/2 cup trisodium phosphate (such as Calgon) plus 1/2 cup powdered household detergent (such as All), dissolved in 1 gal water.

- 2.4 MODIFIED ACID CLEANING AGENT: Buffered inorganic acid, such as HC1, with wetting agent. Dissolve in water according to manufacturer's recommendations. Do not use unbuffered, unmodified muriatic acid (HCl). In cleaning light colored brick, increase amount of mixing water 50%, or more as recommended by masonry manufacturer. Approved products are Sure Kleen 600, by Process Solvent Co., Quick Masonry Cleaner, Brick Cleaner 22, by DeltaPlastics, Deox, by National Chemsearch Corp, or Architect-approved substitution.

## PART 3 - EXECUTION

- 3.1 PREPARATION: Examine other construction which supports or connects with masonry work. Where such construction as footings and shelves is not sound or level, where anchorage devices have not been installed, where interferences exist, or where there are other conditions unsuitable for proper installation or performance of the masonry, do not start masonry work until defective earlier construction has been completed or corrected.

- 3.2 COURSING AND BOND: Course masonry as shown on Drawings. Lay up Exterior Brick in running bond with concave joint. Lay up masonry with approximately 3/8 in. bed joints, uniformly adjusted to produce the specified coursing. Make head joints the same width as bed joints. Lay up masonry in stretcher, header, rowlock, bull header (stretcher rowlock), soldier, or sailor position with only good faces and good ends showing. Cut brick to make headers in veneer and show good end only. Fill voids behind bull headers and sailors with mortars. In brick veneer work over cold formed steel framing, install anchors. Provide shapes as indicated on Drawings, with finished faces at all locations where they will be visible in the Work. Do not cut masonry to make shapes. Finish visible masonry joints using non-rusting tools to form hard impervious surface by hard tooling to a concave profile using jointer slightly larger than joint width. Compress joints and cut flush in unexposed work except at joints below grade. Hard-tool joints below grade to a concave profile.

- 3.3 INSTALLATION: Lay masonry plumb and true to lines, with level courses. Line up head joints vertically. Use no more than one cut closure in any length of wall. Line up closures vertically. Lay up masonry with completely filled mortar joints. Do not furrow bed joints. Butter end of masonry with sufficient mortar to fill head joint, then shove in place. Rock closures in place with head joints thrown against two adjoining masonry in place. Tap each unit to line and level as it is placed. Do not disturb any unit once in place except to completely remove and set in a fresh bed of mortar. Do not pound corners and jambs to fit stretcher units after they have been set in position. Where an adjustment must be made after mortar has started to harden, remove mortar and replace with fresh mortar. Make all cuts with a power masonry saw. Do not use saw-cut faces in exposed work. Lay up only masonry which have no

chipped, cracked or discolored exposed faces. Lay up with good face showing, lip (if any) always down, frog (if any) always up. Where flat side is shown, provide a brick with flat untorn side matching other masonry faces, without frog, or core holes. Tool joints when thumbprint hard, compressing mortar tightly against both sides of joint. Make head joints match profile of bed joints.

- 3.4 ANCHORING: Anchor exterior masonry walls facing or abutting concrete members with dovetail or wire anchors inserted in slots built into concrete. Maximum anchor spacing: 24 in. vertically, 36 in. horizontally. Maintain at least 1/2 in. space between masonry and structural concrete beam or wall faces. Keep space free of mortar and other rigid material to permit differential movement. Anchor masonry with dovetail or wire anchors 16 in. on center, inserted into dovetail slots in concrete. Maintain at least 1/2 in. space between masonry and steel or concrete columns. Place 1/2 in. semi-rigid fiberglass board over steel before laying masonry. Do not mortar space between masonry and steel or concrete columns. Where bearing walls or non-bearing partitions abut a concrete or steel column, anchor wall to column with dovetail or wire anchors 16 in. on centers, inserted into dovetail slots in concrete or welded to steel.
- 3.5 WALL INTERSECTIONS: At intersecting bearing or shear walls which are carried up separately, regularly block vertical joints 3 courses at a time, with 8 in. maximum offsets. Provide joints with rigid steel anchors. Space anchors 48 in. maximum vertically. At non-bearing partitions which abut or intersect other walls or partitions, anchor with cavity wall ties at 24 in. maximum vertical intervals. Alternative method: carry wall reinforcement through intersection, and lap at least 8 in.
- 3.6 BUILDING IN FLEXIBLE WALL FLASHING: Place wall flashing over a thin bed of mortar, always sloping flashing slightly to exterior. Place mortar over flashing to bed masonry course above it. Turn wall flashing at least 5 in. up behind masonry and anchor top edge by building into backup or by wedging into reglet. Tape, or seal with asphalt cement, all penetrations in wall flashing. Extend wall flashing around outside of structural columns. Extend wall flashing at least 4 in. beyond lintels and sills and turn up ends to form a pan which directs moisture to exterior. Lap wall flashing joints at least 4 in. Extend wall flashing to within 1/4 in. of exterior of mortar joint.
- 3.7 WEEP HOLES: Install pre-formed plastic grid vent equal to "Quattro Vent" at full height weep holes as shown in the drawings & indicated below. Install cavity mesh to maintain clear air flow & to block rodent entry. Use "mortar boards" in laying masonry units to keep air space clear of mortar droppings. Locate weep holes as follows:
  - A. 32" on center at base of wall,
  - B. 16" OC in head joints of masonry directly above wall flashing and other interruptions to downward flow of water such as steel lintels and relief angles, and
  - C. 64" OC at the top course of masonry taller than 48".
- 3.8 CAVITY WALL CONSTRUCTION: Maintain full, unobstructed cavity width as shown on Drawings. Measure cavity width exclusive of parging and board insulation thickness. Line all cavity bottoms with through-wall flashing. Weep flashing to outside through holes in face brick head joints. Do not let weep holes become obstructed.
- 3.9 BUILDING IN OTHER WORK: Build in lintels, door frames, windows, flashing, insulation, reglets, inserts, anchors, blocking, sleeves, boxes, cabinets, piping, conduit, and other items whether provided as part of masonry work, as preparation for other work, or furnished by other trades. Fill steel door frames in masonry walls with mortar. Provide passage for electrical and mechanical lines. Allow and aid placement in walls where lines would be exposed. Cut neat holes for in-wall switches and cabinets. Make provisions for passage of lines, and other chases and openings, during laying up of masonry so that later cutting is not necessary. Fill holes after lines and boxes are in place. Maintain sealant clearances at door, window, and other openings. Provide lintels at all openings in masonry work, as needed to form openings for windows, frames, in-wall equipment, through-wall ducts and piping, and as otherwise needed to support heads of all openings over 8 in. wide.
- 3.10 CONTROL OF MOVEMENT: Provide control joints constructed by using special control joint units, open end stretcher units, metal sash jamb units, and preformed gaskets, compressible material, building paper and caulking or sealants as indicated on drawings

or as required. Where expansion joints are shown, leave full width of joint free of masonry, mortar and reinforcement, ready for backup material and sealant. At control joints, insert control joint material and leave joint free of masonry and reinforcement. At a minimum, place control joints vertically not more than 24 ft on center, within 5 ft of building corners, and at lines of weakness such as at steel columns, changes in building height, and at each side of openings over 8 ft high. Do not butter masonry units to steel members, except where masonry bears on steel. Maintain 1/2 in. clearance. Fill vertical clearances with 1/2 in. semirigid fiberglass or other sort, incombustible board material. Build non-bearing partitions to a distance 3/8 to 3/4 in. from structural soffit above. When structure above has deflected from building loads placed upon it, wedge partition to structural soffit with metal or slate wedges, and fill top joint with mortar.

- 3.11 PROTECTION: Cover tops of partially completed walls with strong, non-staining, waterproof membrane, securely held in place, extending at least 24 in. down both sides of wall at start of rain, and at end of each day's work on wall. Clamp protective membrane in place using spring wire clamps. Do not apply dead, live floor, or roof loading for at least 6 hours after building masonry columns or walls. Do not apply concentrated loads for at least 3 days after building masonry columns or walls. Prevent mortar, grout, and cleaning agents from adhering to, staining or deteriorating masonry and other surfaces to be left exposed or painted. Remove mortar, grout, and cleaning agents from masonry and other surfaces daily. Remove them from sensitive surfaces such as aluminum and glass immediately. Protect sills, ledges, and projections from mortar droppings by means of taped paper guards or a layer of sand. Protect door and window frames during masonry construction. Maintain in plumb, square, true position.
- 3.12 REPAIR OF DEFECTIVE WORK: Remove stained and damaged masonry and replace with new units in fresh mortar bed, of color and tooling matching surrounding work. Repair voids and other defects in mortar joints.
- 3.13 CLEANING: Start cleaning late in the work, after mortar is thoroughly cured. Dry clean walls before wetting. Remove large particles of mortar with wood paddles and scrapers. Use chisel or wire brush only when wood implements do not work. Soak wall with copious amounts of clean water from hose, flushing off loose mortar and dirt in the process. Scrub walls with detergent cleaning agent, using stiff fiber brush. Rinse off all detergent, dirt, and mortar crumbs using clean water from hose.
- 3.14 ACID CLEANING: If all mortar is not removed by detergent cleaning, proceed as follows: 1. Soak wall again, until masonry is saturated. Protect work below from damage. 2. Scrub walls with modified acid cleaning agent, using long handled fiber brush. Dilute as specified. Test a small panel of masonry, and rinse, before doing rest of wall. 3. Keep area below soaked with water and flushed free of acid and dissolved mortar. Acid scum, if permitted to dry, can be impossible to remove. Scrub masonry, not mortar joints. Use only wood and fiber tools, never metal ones. Clean in small areas, preferably 10 to 20sq.ft at a time, or smaller if sun or wind cause rapid drying and acceleration of acid reaction. 4. Rinse off all acid, dirt, scum and mortar while wall is still wet. Neutralize areas of masonry work and sensitive surfaces adjoining or below masonry work using spray bottles of weak ammonia. Rinse again.
- 3.15 ACCEPTANCE OF MASONRY CONSTRUCTION: Completed masonry work which fails to meet requirements must be brought into compliance in an approved manner. The masonry work shall be clean and show a quality of workmanship and finish that conforms to the approved sample when viewed at a distance of 15'. Joints shall be tooled and tight showing no separation between mortar and units.

## 04 21 14 - THIN BRICK MASONRY

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes adhered masonry veneer system applied to cold-formed metal framing and sheathing.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples:
  - 1. For each masonry type indicated.
  - 2. For each color of mortar required.

#### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs experienced masons.
- B. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockups for typical exterior wall in sizes approximately 48 inches long by full height indicated high by full thickness, including face and accessories.
    - a. Include trim at top of mockup.
    - b. Include a sealant-filled joint at least 16 inches long in mockup.
    - c. Include through-wall flashing installed for a 24-inch length in corner of mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
    - d. Include wood studs, sheathing, veneer anchors, flashing, and weep holes in exterior masonry-veneer wall mockup.
  - 2. Protect accepted mockups from the elements with weather-resistant membrane.
  - 3. Approval of mockups is for color, texture, and blending of masonry; relationship of mortar and sealant colors to masonry colors; tooling of joints; and aesthetic qualities of workmanship.
    - a. Approval of mockups is also for other material and construction qualities Architect specifically approves in writing.
    - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- C. Preinstallation Conference: Conduct conference at Project site.

#### 1.4 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work.
  - B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
    - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried.
  - C. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- 1.5 APPLICABLE STANDARDS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. All work under this section is to be performed per applicable requirements of the following codes & standards:
- A. International Building Code
  - B. 2007 TCNA Handbook for Ceramic Tile Installation
- 1.6 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

## PART 2 - PRODUCTS

- 2.1 THIN BRICK: Utility size as manufactured by Endicott; color as selected by Architect.
- 2.2 MORTAR MATERIALS
- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
  - B. Hydrated Lime: ASTM C 207, Type S.
  - C. Colored Cement Product: Packaged blend made from portland cement and lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
    - 1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
    - 2. Products: Subject to compliance with requirements, provide one of the following colored portland cement-lime mixes:
      - a. Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
      - b. Lafarge North America; Eaglebond.
      - c. Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
  - D. Aggregate: ASTM C 144.



- E. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Boiardi Products Corporation.
- b. Bonsal.
- c. C-Cure.
- d. Custom Building Products.
- e. Laticrete International, Inc.
- f. MAPEI Corp.
- g. Summitville Tiles, Inc.

2. TEC Specialty Construction Brands; H. B. Fuller Company.

- F. Water: Potable.

## 2.3 EMBEDDED FLASHING MATERIALS

- A. Flexible Flashing: For flashing not exposed to the exterior, use the following unless otherwise indicated:

1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.

- a. Products: Subject to compliance with requirements, provide one of the following:

- i Advanced Building Products Inc.; Peel-N-Seal.
- ii Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
- iii Dur-O-Wal, a Dayton Superior Company; Dur-O-Barrier-44.
- iv Grace Construction Products, a unit of W. R. Grace & Co. -Conn.; Perm-A-Barrier Wall Flashing.
- v Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
- vi Hohmann & Barnard, Inc.; Textroflash.
- vii Polyguard Products, Inc.; Polyguard 300.
- viii Polytite Manufacturing Corporation; Poly-Barrier Self-Adhering Wall Flashing.
- ix Williams Products, Inc.; Everlastic MF-40.

## 2.4 MISCELLANEOUS MASONRY ACCESSORIES

- A. Weep Hole/Vent Products: Use the following unless otherwise indicated:
  - 1. Round Plastic Tubing: Medium-density polyethylene, 3/8-inch OD by thickness of masonry.
- B. Expanded Metal Lath: 3.4 lb/sq. yd., self-furring, diamond-mesh lath complying with ASTM C 847. Fabricate from structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G60.

## 2.5 MORTAR MIXES

- A. General: Do not use admixtures unless otherwise indicated.
  - 1. Do not use calcium chloride.
  - 2. Limit cementitious materials in mortar to portland cement and lime.
  - 3. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.
- B. Cement-Paste Bond Coat: Mix either neat cement and water or cement, sand, and water to a consistency similar to that of thick cream.
  - 1. For latex-modified portland cement setting-bed mortar, substitute latex admixture for part or all of water, according to latex-additive manufacturer's written instructions.
- C. Mortar for Scratch Coat over Metal Lath: 1 part portland cement, 1/2 part lime, 5 parts loose damp sand, and enough water to produce a workable consistency.
- D. Pigmented Mortar: Use colored cement product.

- 2.6 AIR BARRIER: At all weather-exposed surfaces provide a weather-resistive barrier to protect the interior wall covering. This barrier shall be equal to the strength and durability described by UBC Standard 14-1 for waterproof building paper or asphalt-saturated rag felt (tar paper).

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Accurately mark stud centerlines on face of weather-resistant sheathing paper before beginning masonry installation.

### 3.2 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.

### 3.3 INSTALLATION OF ADHERED MASONRY VENEER

- A. Install lath over air barrier by fastening through sheathing into framing to comply with ASTM C 1063.
- B. Install scratch coat over metal lath 3/8 inch thick to comply with ASTM C 926.
- C. Coat backs of masonry units and face of scratch coat with cement-paste bond coat, then butter both surfaces with setting mortar. Use sufficient setting mortar so a slight excess will be forced out the edges of masonry units as they are set. Tap units into place, completely filling space between units and scratch coat.
- D. Rake out joints for pointing with mortar to depth of not less than 1/2 inch. Rake joints to uniform depths with square bottoms and clean sides.
- E. Comply with all requirements of 2007 TCNA Handbook for Ceramic Tile Installation.
- F. Lay up only masonry which have no chipped, cracked or discolored exposed faces.

### 3.4 POINTING

- A. Prepare masonry-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch deep until a uniform depth is formed.
- B. Point masonry joints by placing and compacting pointing mortar in layers not more than 3/8 inch deep. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
- C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:
  - 1. Joint Profile: Concave unless otherwise indicated or directed.

### 3.5 ADJUSTING AND CLEANING

- A. In-Progress Cleaning: Clean masonry as work progresses. Remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes.
  - 3. Clean masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised II, using job-mixed detergent solution.

### 3.6 EXCESS MATERIALS AND WASTE

- A. Excess Masonry Waste: Remove excess clean masonry waste and other waste, and legally dispose of off Owner's property.

3.7 AIR BARRIER: Install the building paper or felt free from holes and breaks other than those created by the fasteners. Apply in horizontal strips over sheathing; the overlap for horizontal joints is a minimum of 2 inches, and for vertical joints is a minimum of 6 inches.

3.8 LATH: Attach the metal lath to the studs with a maximum horizontal spacing of 16"o.c. Overlap the metal lath at least 1" for horizontal and vertical joints. At corners, overlap the vertical joints at least 16" around the corner to avoid corner cracking. Use

barbed galvanized nails at 6"o.c. vertically for exterior work or steel wire furring nails at 4"o.c. for interior work. For steel studs, the lath must be anchored with corrosion resistant screws that have a minimum shank diameter of 0.190".

## 04 22 00 - CONCRETE UNIT MASONRY

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for unit masonry construction, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 STANDARDS: The following standards apply to work under this section: ASTM C62 "Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)"; ASTM C67 "Standard Methods of Sampling and Testing Brick and Structural Clay Tile"; ASTM C216 "Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)"; BIA Technical Notes on Brick and Tile Construction; National Concrete Masonry Association "Concrete Masonry Details".
- 1.4 CONSTRUCTION TOLERANCES - Construct masonry within tolerances established in ACI 531.1-76, 1983, Specification for Concrete Masonry Construction.
- 1.5 MOCK-UP:
  - A. Construct a sample panel as shown in the drawings, including but not limited to:
    1. Decorative Masonry Units: Proposed color range, texture and bond.
    2. Mortar.
    3. Structural Backing.
    4. Veneer Anchors.
    5. Flashings and sealing the top of the termination bar.
    6. Weep Vents.
    7. Wall Insulation.
    8. Air Barrier.
    9. Joint Reinforcement.
    10. Vertical Expansion Joint with Sealant and Backer Rod.
  - B. Locate where directed by the Architect.
  - C. Mock-up may not remain as part of the work.
  - D. Do not start work until Architect has accepted sample panel.
  - E. Use panel as standard of comparison for all masonry work built of the same material.
  - F. Do not destroy or move panel until work is completed and accepted by the Owner.
- 1.6 SUBMITTALS:
  - A. Product Data: Submit manufacturer's product data.
  - B. Product Samples: Submit sample for each type of masonry showing extremes of variation in color and texture; Manufacturer's board for each type of block showing extremes of variation in color and texture; Certificate attesting that masonry meets specified qualities and standards.
- 1.7 QUALITY ASSURANCE: Perform Work in accordance with Technical Notes on Brick and Tile Construction, by Brick Institute of America (BIA), except as more stringently required in the Contract Document. Before starting masonry work, erect sample masonry walls for each brick type and pattern, at least 4 x 4 feet, of the same color range, texture, mortar color, bond and jointing as specified for each brick type and pattern. Walls shall face southeast to southwest. Incorporate brick, and all other components of each wall. Do not start masonry work until Architect approves one of the sample walls. Keep and protect approved sample wall on site as standard of masonry work until masonry work is complete, then remove wall.
- 1.8 STORAGE AND PROTECTION: Store masonry off ground, under cover, to prevent wetting and contamination by weather, mud, dust and materials likely to cause staining.
- 1.9 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

PART 2 - PRODUCTS

- 2.1 APPROVED CONCRETE MASONRY MANUFACTURERS:
  - A. Alamo Concrete Products
  - B. Eagle Lake Concrete Products
  - C. Featherlight Building Products Corp.
- 2.2 LIGHTWEIGHT CONCRETE UNIT MASONRY: Use concrete masonry units conforming to ASTM C 90, Lightweight, Type I, moisture-controlled units. Provide units with minimum average net-area compressive strength of 1500 psi.
  - A. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
  - B. All exterior corners of interior walls to be bullnose radiused.
- 2.3 MORTAR: Make mortar conforming to proportion requirements of ASTM C 270 or C 476. Mortar color to be selected by Architect. For job site pigmented mortar use mineral pigments 5% by weight of cement content. Use potable water. Use liquid water-repellent mortar admixture containing integral water repellent equal to Dry-Block Mortar Admixture, W.R. Grace & Co. Other admixtures as acceptable to the Architect.
- 2.4 DETERGENT CLEANING AGENT: Qualities: 1/2 cup trisodium phosphate (such as Calgon) plus 1/2 cup powdered household detergent (such as All), dissolved in 1 gal water.
- 2.5 MODIFIED ACID CLEANING AGENT: Buffered inorganic acid, such as HC1, with wetting agent. Dissolve in water according to manufacturer's recommendations. Do not use unbuffered, unmodified muriatic acid (HCl). In cleaning light colored brick, increase amount of mixing water 50%, or more as recommended by masonry manufacturer. Approved products are Sure Kleen 600, by Process Solvent Co., Quick Masonry Cleaner, Brick Cleaner 22, by DeltaPlastics, Deox, by National Chemsearch Corp, or Architect-approved substitution.

PART 3 - EXECUTION

- 3.1 PREPARATION: Examine other construction which supports or connects with masonry work. Where such construction as footings and shelves is not sound or level, where anchorage devices have not been installed, where interferences exist, or where there are other conditions unsuitable for proper installation or performance of the masonry, do not start masonry work until defective earlier construction has been completed or corrected.
- 3.2 COURSING AND BOND: Course masonry as shown on Drawings. Lay up Exterior Brick in running bond with concave joint. Lay up masonry with approximately 3/8 in. bed joints, uniformly adjusted to produce the specified coursing. Make head joints the same width as bed joints. Lay up masonry in stretcher, header, rowlock, bull header (stretcher rowlock), soldier, or sailor position with only good faces and good ends showing. Cut brick to make headers in veneer and show good end only. Fill voids behind bull headers and sailors with mortars. In brick veneer work over cold formed steel framing, install anchors. Provide shapes as indicated on Drawings, with finished faces at all locations where they will be visible in the Work. Do not cut masonry to make shapes. Finish visible masonry joints using non-rusting tools to form hard impervious surface by hard tooling to a concave profile using jointer slightly larger than joint width. Compress joints and cut flush in unexposed work except at joints below grade. Hard-tool joints below grade to a concave profile.
- 3.3 INSTALLATION: Lay masonry plumb and true to lines, with level courses. Line up head joints vertically. Use no more than one cut closure in any length of wall. Line up closures vertically. Lay up masonry with completely filled mortar joints. Do not furrow bed joints. Butter end of masonry with sufficient mortar to fill head joint, then shove in place. Rock closures in place with head joints thrown against two adjoining masonry in place. Tap each unit to line and level as it is placed. Do not disturb any unit once in place except to completely remove and set in a fresh bed of mortar. Do not pound corners and jambs to fit stretcher units after they have been set in position. Where an adjustment must be made after mortar has started to harden, remove mortar and replace with fresh mortar. Make all cuts with a power masonry saw. Do not use saw-cut faces in exposed work. Lay up only masonry which have no chipped, cracked or discolored exposed faces. Lay up with good face showing, lip (if any) always down, frog (if any) always up. Where flat side is shown, provide a brick with flat un-torn side matching other masonry faces, without frog, or core holes. Tool joints when thumbprint hard, compressing mortar tightly against both sides of joint. Make head joints match profile of bed joints.
- 3.4 ANCHORING: Anchor exterior masonry walls facing or abutting concrete members with dovetail or wire anchors inserted in slots built into concrete. Maximum anchor spacing: 24 in. vertically, 36 in. horizontally. Maintain at least 1/2 in. space between masonry and structural concrete beam or wall faces. Keep space free of mortar and other rigid material to permit differential movement.

Anchor masonry with dovetail or wire anchors 16 in. on center, inserted into dovetail slots in concrete. Maintain at least 1/2 in. space between masonry and steel or concrete columns. Place 1/2 in. semi-rigid fiberglass board over steel before laying masonry. Do not mortar space between masonry and steel or concrete columns. Where bearing walls or non-bearing partitions abut a concrete or steel column, anchor wall to column with dovetail or wire anchors 16 in. on centers, inserted into dovetail slots in concrete or welded to steel.

- 3.5 WALL INTERSECTIONS: At intersecting bearing or shear walls which are carried up separately, regularly block vertical joints 3 courses at a time, with 8 in. maximum offsets. Provide joints with rigid steel anchors. Space anchors 48 in. maximum vertically. At non-bearing partitions which abut or intersect other walls or partitions, anchor with cavity wall ties at 24 in. maximum vertical intervals. Alternative method: carry wall reinforcement through intersection, and lap at least 8 in.
- 3.6 BUILDING IN FLEXIBLE WALL FLASHING: Place wall flashing over a thin bed of mortar, always sloping flashing slightly to exterior. Place mortar over flashing to bed masonry course above it. Turn wall flashing at least 5 in. up behind masonry and anchor top edge by building into backup or by wedging into reglet. Tape, or seal with asphalt cement, all penetrations in wall flashing. Extend wall flashing around outside of structural columns. Extend wall flashing at least 4 in. beyond lintels and sills and turn up ends to form a pan which directs moisture to exterior. Lap wall flashing joints at least 4 in. Extend wall flashing to within 1/4 in. of exterior of mortar joint.
- 3.7 WEEP HOLES: Install pre-formed plastic grid vent equal to "Quattro Vent" at full height weep holes as shown in the drawings & indicated below. Install cavity mesh to maintain clear air flow & to block rodent entry. Use "mortar boards" in laying masonry units to keep air space clear of mortar droppings. Locate weep holes as follows:
  - A. 32" on center at base of wall,
  - B. 16" OC in head joints of masonry directly above wall flashing and other interruptions to downward flow of water such as steel lintels and relief angles, and
  - C. 64" OC at the top course of masonry taller than 48".
- 3.8 CAVITY WALL CONSTRUCTION: Maintain full, unobstructed cavity width as shown on Drawings. Measure cavity width exclusive of parging and board insulation thickness. Line all cavity bottoms with through-wall flashing. Weep flashing to outside through holes in face brick head joints. Do not let weep holes become obstructed.
- 3.9 BUILDING IN OTHER WORK: Build in lintels, door frames, windows, flashing, insulation, reglets, inserts, anchors, blocking, sleeves, boxes, cabinets, piping, conduit, and other items whether provided as part of masonry work, as preparation for other work, or furnished by other trades. Fill steel door frames in masonry walls with mortar. Provide passage for electrical and mechanical lines. Allow and aid placement in walls where lines would be exposed. Cut neat holes for in-wall switches and cabinets. Make provisions for passage of lines, and other chases and openings, during laying up of masonry so that later cutting is not necessary. Fill holes after lines and boxes are in place. Maintain sealant clearances at door, window, and other openings. Provide lintels at all openings in masonry work, as needed to form openings for windows, frames, in-wall equipment, through-wall ducts and piping, and as otherwise needed to support heads of all openings over 8 in. wide.
- 3.10 BOND BEAMS: Provide CMU bond beams of one or more courses of load bearing units filled with concrete or grout and reinforced. Use continuous reinforcement unless otherwise required.
- 3.11 CONTROL OF MOVEMENT: Provide control joints constructed by using special control joint units, open end stretcher units, metal sash jamb units, and preformed gaskets, compressible material, building paper and caulking or sealants as indicated on drawings or as required. Where expansion joints are shown, leave full width of joint free of masonry, mortar and reinforcement, ready for backup material and sealant. At control joints, insert control joint material and leave joint free of masonry and reinforcement. At a minimum, place control joints vertically not more than 24 ft on center, within 5 ft of building corners, and at lines of weakness such as at steel columns, changes in building height, and at each side of openings over 8 ft high. Do not butter masonry units to steel members, except where masonry bears on steel. Maintain 1/2 in. clearance. Fill vertical clearances with 1/2 in. semi-rigid fiberglass or other sort, incombustible board material. Build non-bearing partitions to a distance 3/8 to 3/4 in. from structural soffit above. When structure above has deflected from building loads placed upon it, wedge partition to structural soffit with metal or slate wedges, and fill top joint with mortar. When possible, obscure control joints behind downspouts or other accessories as present.
- 3.12 PROTECTION: Cover tops of partially completed walls with strong, non-staining, waterproof membrane, securely held in place, extending at least 24 in. down both sides of wall at start of rain, and at end of each day's work on wall. Clamp protective membrane in place using spring wire-clamps. Do not apply dead, live floor, or roof loading for at least 6 hours after building masonry columns or walls. Do not apply concentrated loads for at least 3 days after building masonry columns or walls. Prevent

mortar, grout, and cleaning agents from adhering to, staining or deteriorating masonry and other surfaces to be left exposed or painted. Remove mortar, grout, and cleaning agents from masonry and other surfaces daily. Remove them from sensitive surfaces such as aluminum and glass immediately. Protect sills, ledges, and projections from mortar droppings by means of taped paper guards or a layer of sand. Protect door and window frames during masonry construction. Maintain in plumb, square, true position.

- 3.13 REPAIR OF DEFECTIVE WORK: Remove stained and damaged masonry and replace with new units in fresh mortar bed, of color and tooling matching surrounding work. Repair voids and other defects in mortar joints.
- 3.14 CLEANING: Start cleaning late in the work, after mortar is thoroughly cured. Dry clean walls before wetting. Remove large particles of mortar with wood paddles and scrapers. Use chisel or wire brush only when wood implements do not work. Soak wall with copious amounts of clean water from hose, flushing off loose mortar and dirt in the process. Scrub walls with detergent cleaning agent, using stiff fiber brush. Rinse off all detergent, dirt, and mortar crumbs using clean water from hose.
- 3.15 ACID CLEANING: If all mortar is not removed by detergent cleaning, proceed as follows:
  - A. Soak wall again, until masonry is saturated. Protect work below from damage.
  - B. Scrub walls with modified acid cleaning agent, using long handled fiber brush. Dilute as specified. Test a small panel of masonry, and rinse, before doing rest of wall.
  - C. Keep area below soaked with water and flushed free of acid and dissolved mortar. Acid scum, if permitted to dry, can be impossible to remove. Scrub masonry, not mortar joints. Use only wood and fiber tools, never metal ones. Clean in small areas, preferably 10 to 20sq.ft at a time, or smaller if sun or wind cause rapid drying and acceleration of acid reaction.
  - D. Rinse off all acid, dirt, scum and mortar while wall is still wet. Neutralize areas of masonry work and sensitive surfaces adjoining or below masonry work using spray bottles of weak ammonia. Rinse again.
- 3.16 ACCEPTANCE OF MASONRY CONSTRUCTION: Completed masonry work which fails to meet requirements must be brought into compliance in an approved manner. The masonry work shall be clean and show a quality of workmanship and finish that conforms to the approved sample when viewed at a distance of 15'. Joints shall be tooled and tight showing no separation between mortar and units.



## 04 43 14 - ADHERED STONE MASONRY VENEER

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes adhered stone masonry veneer system applied to cold-formed metal framing and sheathing.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples:
  - 1. For each stone type indicated.
  - 2. For each color of mortar required.

#### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs experienced stonemasons and stone fitters.
- B. Source Limitations for Stone: Obtain stone, from one quarry with resources to provide materials of consistent quality in appearance and physical properties.
- C. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockups for typical exterior wall in sizes approximately 48 inches long by full height indicated high by full thickness, including face and accessories.
    - a. Include stone trim at top of mockup.
    - b. Include a sealant-filled joint at least 16 inches long in mockup.
    - c. Include through-wall flashing installed for a 24-inch length in corner of mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit stone masonry above half of flashing).
    - d. Include wood studs, sheathing, veneer anchors, flashing, and weep holes in exterior masonry-veneer wall mockup.
  - 2. Protect accepted mockups from the elements with weather-resistant membrane.
  - 3. Approval of mockups is for color, texture, and blending of stone; relationship of mortar and sealant colors to stone colors; tooling of joints; and aesthetic qualities of workmanship.
    - a. Approval of mockups is also for other material and construction qualities Architect specifically approves in writing.
    - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

- D. Preinstallation Conference: Conduct conference at Project site.

#### 1.4 PROJECT CONDITIONS

- A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work.
- B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
  - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried.
- C. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

- 1.5 APPLICABLE STANDARDS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. All work under this section is to be performed per applicable requirements of the following codes & standards:

- A. International Building Code
- B. The Building Stone Institute "Natural Thin Stone Veneer Technical Information Guide".
- C. The Rocky Mountain Masonry Institute "Adhered Natural Stone Veneer Installation Guide".

- 1.6 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

### PART 2 - PRODUCTS

#### 2.1 LIMESTONE

- A. Provide "Texas Limestone" selected by the Architect from a single quarry.

#### 2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Colored Cement Product: Packaged blend made from portland cement and lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
  - 1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
  - 2. Products: Subject to compliance with requirements, provide one of the following colored portland cement-lime mixes:
    - a. Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.

- b. Lafarge North America; Eaglebond.
  - c. Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
- D. Aggregate: ASTM C 144.
- E. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Boiardi Products Corporation.
    - b. Bonsal.
    - c. C-Cure.
    - d. Custom Building Products.
    - e. Laticrete International, Inc.
    - f. MAPEI Corp.
    - g. Summitville Tiles, Inc.
    - h. TEC Specialty Construction Brands; H. B. Fuller Company.
- F. Water: Potable.

## 2.3 EMBEDDED FLASHING MATERIALS

- A. Flexible Flashing: For flashing not exposed to the exterior, use the following unless otherwise indicated:
  - 1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.
    - a. Products: Subject to compliance with requirements, provide one of the following:
      - i Advanced Building Products Inc.; Peel-N-Seal.
      - ii Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
      - iii Dur-O-Wal, a Dayton Superior Company; Dur-O-Barrier-44.
      - iv Grace Construction Products, a unit of W. R. Grace & Co. -Conn.; Perm-A-Barrier Wall Flashing.
      - v Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
      - vi Hohmann & Barnard, Inc.; Textroflash.

- vii Polyguard Products, Inc.; Polyguard 300.
- viii Polytite Manufacturing Corporation; Poly-Barrier Self-Adhering Wall Flashing.
- ix Williams Products, Inc.; Everlastic MF-40.

## 2.4 MISCELLANEOUS MASONRY ACCESSORIES

- A. Weep Hole/Vent Products: Use the following unless otherwise indicated:
  - 1. Round Plastic Tubing: Medium-density polyethylene, 3/8-inch OD by thickness of stone masonry.
- B. Expanded Metal Lath: 3.4 lb/sq. yd., self-furring, diamond-mesh lath complying with ASTM C 847. Fabricate from structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G60.

## 2.5 MORTAR MIXES

- A. General: Do not use admixtures unless otherwise indicated.
  - 1. Do not use calcium chloride.
  - 2. Limit cementitious materials in mortar to portland cement and lime.
  - 3. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.
- B. Cement-Paste Bond Coat: Mix either neat cement and water or cement, sand, and water to a consistency similar to that of thick cream.
  - 1. For latex-modified portland cement setting-bed mortar, substitute latex admixture for part or all of water, according to latex-additive manufacturer's written instructions.
- C. Mortar for Scratch Coat over Metal Lath: 1 part portland cement, 1/2 part lime, 5 parts loose damp sand, and enough water to produce a workable consistency.
- D. Pigmented Mortar: Use colored cement product.

## 2.6 FABRICATION

- A. Cut stone to produce pieces of thickness, size, and shape indicated, including details on Drawings. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated.
- B. Gage backs of stones for adhered veneer if more than 81 sq. in. in area.
- C. Shape stone for type of masonry (pattern) as indicated.
- D. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.

1. Finish: As selected by Architect.

- 2.7 AIR BARRIER: At all weather-exposed surfaces provide a weather-resistive barrier to protect the interior wall covering. This barrier shall be equal to the strength and durability described by UBC Standard 14-1 for waterproof building paper or asphalt-saturated rag felt (tar paper).

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Accurately mark stud centerlines on face of weather-resistant sheathing paper before beginning stone installation.

#### 3.2 SETTING OF STONE MASONRY, GENERAL

- A. Perform necessary field cutting and trimming as stone is set.
  1. Use power saws to cut stone that is fabricated with saw-cut surfaces.
  2. Use hammer and chisel to split stone that is fabricated with split surfaces.
- B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.
- C. Arrange stones in pattern with course heights as indicated, lengths, and uniform joint widths, with offset between vertical joints as indicated.
- D. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.
- E. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than 1/4 inch at narrowest points or more than 1/2 inch at widest points.
- F. Provide sealant joints of widths and at locations indicated.
  1. Keep sealant joints free of mortar and other rigid materials.
  2. Sealing joints is specified in Division 07 Section "Joint Sealants."
- G. Install embedded flashing and weep holes at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
  1. At stud-framed walls, extend flashing through stone masonry, up the face of sheathing at least 16 inches, and behind weather-resistant sheathing paper.
  2. At ends of head and sill flashing turn up not less than 2 inches to form end dams.
  3. Cut flexible flashing flush with face of wall after masonry wall construction is completed.
- H. Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, and at flashing.
  1. Use round plastic tubing to form weep holes.

2. Space weep holes 16 inches o.c.

### 3.3 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.

### 3.4 INSTALLATION OF ADHERED STONE MASONRY VENEER

- A. Install lath over air barrier by fastening through sheathing into framing to comply with ASTM C 1063.
- B. Install scratch coat over metal lath 3/8 inch thick to comply with ASTM C 926.
- C. Coat backs of stone units and face of scratch coat with cement-paste bond coat, then butter both surfaces with setting mortar. Use sufficient setting mortar so a slight excess will be forced out the edges of stone units as they are set. Tap units into place, completely filling space between units and scratch coat.
- D. Rake out joints for pointing with mortar to depth of not less than 1/2 inch. Rake joints to uniform depths with square bottoms and clean sides.

### 3.5 POINTING

- A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch deep until a uniform depth is formed.
- B. Point stone joints by placing and compacting pointing mortar in layers not more than 3/8 inch deep. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
- C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:
  1. Joint Profile: Concave unless otherwise indicated or directed.

### 3.6 ADJUSTING AND CLEANING

- A. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:
  1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes.
  3. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised II, using job-mixed detergent solution.

### 3.7 EXCESS MATERIALS AND WASTE

- A. Excess Masonry Waste: Remove excess clean masonry waste and other waste, and legally dispose of off Owner's property.

- 3.8 AIR BARRIER: Install the building paper or felt free from holes and breaks other than those created by the fasteners. Apply in horizontal strips over sheathing; the overlap for horizontal joints is a minimum of 2 inches, and for vertical joints is a minimum of 6 inches.
- 3.9 LATH: Attach the metal lath to the studs with a maximum horizontal spacing of 16"o.c. Overlap the metal lath at least 1" for horizontal and vertical joints. At corners, overlap the vertical joints at least 16" around the corner to avoid corner cracking. Use barbed galvanized nails at 6"o.c. vertically for exterior work or steel wire furring nails at 4"o.c. for interior work. For steel studs, the lath must be anchored with corrosion resistant screws that have a minimum shank diameter of 0.190".

## 04 43 23 - MORTAR SET LIMESTONE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
- B. Limestone veneer, mortar set.
- C. Mortar.
- D. Accessories.

#### 1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  - 1. C 97 - Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.
  - 2. C 99 - Test Method for Modulus of Rupture of Dimension Stone.
  - 3. C 144 - Specification for Aggregate for Masonry Mortar.
  - 4. C 150 - Specification for Portland Cement.
  - 5. C 170 - Test Method for Compressive Strength of Dimension Stone.
  - 6. C 207 - Specification for Hydrated Lime for Masonry Purposes.
  - 7. C 241 - Standard Test Method for Abrasion Resistance of Stone Subject to Foot Traffic.
  - 8. C 270 - Specification for Mortar for Unit Masonry.
  - 9. C 404 - Specification for Aggregates for Masonry Grout.
  - 10. C 880 - Test Method for Flexural Strength of Dimension Stone.
- B. International Masonry Industry All-Weather Council (IMIAC) - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

#### 1.3 SUBMITTALS

- A. Shop Drawings: Include location and sizes of pieces, arrangement and size of joints, and other details of installation.
- B. Samples:
  - 1. Stone: 4 x 12 inch samples showing color and finish.
  - 2. Mortar: 3 x 3 inch samples showing [each] color range.
- C. Test Reports:
  - 1. Indicating mortar and grout compliance with ASTM C 270.
  - 2. Indicating stone compliance with specified requirements.

#### 1.4 QUALITY ASSURANCE

- A. Mockup:
  - 1. Size: 4' wide x 4' high.
  - 2. Locate where directed by Architect/Engineer.



3. Show stone size, color, and finish; flashings; weeps; and joint profile.
4. Approved mockup may not remain as part of the Work.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Stack stone minimum 4 inches above ground. Provide nonstaining spacers between pieces and polyethylene or other suitable film as protective covering.
- B. Protect mortar materials from moisture absorption and damage; reject damaged containers.
- C. Store sand to prevent inclusion of foreign matter.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Requirements:
  1. Hot weather requirements: If ambient temperature is over 95 degrees F or relative humidity is less than 50 percent, protect from direct sun and wind exposure for minimum 48 hours after installation.
  2. Cold weather requirements:
    - a. Follow IMIAC guidelines.
    - b. Do not use frozen materials or build upon frozen work.
  3. Do not apply water repellent coating:
    - a. When ambient or surface temperature is below minimum temperature recommended by manufacturer.
    - b. If possibility of entrapped or frozen water exists.
    - c. When rain is expected during next 72 hours.
    - d. During high winds.

- 1.7 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Limestone:
  1. General: White Limestone that is "machine-faced" for the field and "hand-pitched" for the accent areas and quarried by Arnold Stone Co.(Blum, TX. quarry) Stone to be a mix of sizes to achieve "Random Coursed Ashlar" Pattern. Stone will be placed upon pallets for delivery to jobsite. Supplier:
    - a. Source: Deane Masonry Products Inc., 512-699-1080

2. Characteristics:
    - a. Water absorption: Maximum 3.50 percent, tested to ASTM C 97.
    - b. Specific gravity: 2.337, tested to ASTM C 97.
    - c. Density: Minimum 120 pounds per cubic foot, tested to ASTM C 97.
    - d. Modulus of rupture: Minimum 400 PSI, tested to ASTM C 99.
    - e. Compressive strength: Minimum 2000 PSI, tested to ASTM C 170.
    - f. Flexural strength: Minimum 400 psi, tested to ASTM C 880.
  3. Finish: Split & sawn face; smooth cut sides & back.
  4. Free from cracks, seams, and starts that could impair its structural integrity or function. Inherent variations characteristic to quarry from which it is obtained are acceptable.
  5. Color, texture, and finish consistent with range of samples approved by Architect/Engineer.
- B. Dimensional Limestone Masonry
1. Stone to be sawn chop, rough face, cut top and bottom, 4" nominal thickness, random lengths, heights ranging from 2" to 14"; use a mix of sizes to achieve "Random Coursed Ashlar" Pattern. Stone will be placed upon pallets for delivery to jobsite.
  2. Characteristics:
    - a. Water absorption: Maximum 3.50 percent, tested to ASTM C 97.
    - b. Specific gravity: 2.337, tested to ASTM C 97.
    - c. Density: Minimum 120 pounds per cubic foot, tested to ASTM C 97.
    - d. Modulus of rupture: Minimum 400 PSI, tested to ASTM C 99.
    - e. Compressive strength: Minimum 2000 PSI, tested to ASTM C 170.
    - f. Flexural strength: Minimum 400 psi, tested to ASTM C 880.
  3. Finish: Split & sawn face; smooth cut sides & back.
  4. Free from cracks, seams, and starts that could impair its structural integrity or function. Inherent variations characteristic to quarry from which it is obtained are acceptable.
  5. Color, texture, and finish consistent with range of samples approved by Architect/Engineer.
  6. Approved manufacturers:
    - a. Basis of Design - Lueders Antique by Apache Stone, (254) 947-3825, apache-stone.com. Distributed by Deane Masonry Products, (512) 699-1080, deanemasonryproducts.com.

b. Texas Stone Products, (254) 793-3355, [texasstoneproducts.com](http://texasstoneproducts.com).

c. As approved by Architect.

C. B. Thin Veneer Limestone

1. Basis of design: Lueders Antique by Apache Stone, sawn chop, rough face, cut top and bottom, 4" nominal thickness, random lengths, heights ranging from 2" to 14" and 1.5" to 2" thick thin stone with matching color and pattern; (254) 947-3825, [apache-stone.com](http://apache-stone.com). Distributed by Deane Masonry Products, (512) 699-1080, [deanemasonryproducts.com](http://deanemasonryproducts.com).

2. Approved Manufacturers:

a. Texas Stone Products, (254) 793-3355, [texasstoneproducts.com](http://texasstoneproducts.com).

b. As approved by Architect.

D. C. Cast stone

1. Basis of design: Builder's Cast Stone, (817) 332-2373, [builderscaststone.com](http://builderscaststone.com). Distributed by Deane Masonry Products, (512) 699-1080, [deanemasonryproducts.com](http://deanemasonryproducts.com).

2. Other Manufacturers: as approved by Architect.

E. Mortar Materials:

1. Portland cement: ASTM C 150, Type I, white, non-staining to stone. For exposed surfaces provide cement from one source throughout project.

2. Lime: ASTM C 207, Type S.

3. Aggregate: ASTM C 144, standard masonry type, limestone color. For exposed surfaces, provide aggregate from one source throughout project.

4. Color: As approved in by Architect writing from sample panel.

F. Water: Clean and potable.

2.2 ACCESSORIES

A. Joint Sealer: Specified in Section 07920.

B. Stone Cleaner: Not harmful to stone, joint materials, or adjacent surfaces. Acids not permitted.

2.3 MIXES

A. Mortar Mix: ASTM C 270, Type N.

B. Mixing:

1. Mix in accordance with ASTM C 270.

2. Provide uniformity of color in exposed mortar.
3. Thoroughly mix ingredients in quantities needed for immediate use.
4. Mix dry ingredients mechanically until uniformly distributed; add water to achieve workable consistency.
5. Discard lumpy, caked, frozen, and hardened mixes.
6. Use mortar within 2-1/2 hours after initial mixing at ambient temperatures below 80 degrees F and within 1-1/2 hours after initial mixing at ambient temperatures over 80 degrees F.
7. Do not add antifreeze compounds to lower freezing temperature of mortar or grout.

## 2.4 FABRICATION

- A. Form external stone corners to square butt joint profile.
- B. Fabricate for 3/8 inch beds and joints.
- C. Where indicated or required for water resistance, slope exposed top surfaces of stone and horizontal sill surfaces for shedding water.
- D. Provide holes and cutouts to accommodate items attached to stone.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Establish lines, levels, and coursing. Protect from disturbance.
- B. Clean stone prior to installation. Do not use wire brushes or implements that can mark or damage exposed surfaces.
- C. Wet stone in preparation for placement to minimize moisture suction from mortar.

### 3.2 INSTALLATION

- A. Install stone in accordance with approved Shop Drawings.
- B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.
- C. Arrange stone pattern to provide uniform color distribution and joint sizes throughout.
- D. Set stone plumb and level.
- E. Obtain Architect/Engineer's approval prior to cutting or fitting any item not so indicated on Shop Drawings. Do not impair appearance or strength of stone work by cutting.
- F. Set stone in full mortar setting bed to fully support stone over bearing surface.
- G. Completely fill beds and joints, then rake out for pointing.

- H. Point joints with pointing mortar; tool to slightly concave profile.
  - I. Fill control joints with sealant as specified in Section 07920; finish flush with face of stone.
- 3.3 BUILDING IN FLEXIBLE WALL FLASHING: Place wall flashing over a thin bed of mortar, always sloping flashing slightly to exterior. Place mortar over flashing to bed masonry course above it. Turn wall flashing at least 5 in. up behind masonry and anchor top edge by building into backup or by wedging into reglet. Tape, or seal with asphalt cement, all penetrations in wall flashing. Extend wall flashing around outside of structural columns. Extend wall flashing at least 4 in. beyond lintels and sills and turn up ends to form a pan which directs moisture to exterior. Lap wall flashing joints at least 4 in. Extend wall flashing to within 1/4 in. of exterior of mortar joint.
- 3.4 WEEP HOLES: Install pre-formed plastic grid vent equal to "Quattro Vent" at full height weep holes as shown in the drawings & indicated below. Install cavity mesh to maintain clear air flow & to block rodent entry. Use "mortar boards" in laying masonry units to keep air space clear of mortar droppings. Locate weep holes as follows:
- A. 32" on center at base of wall,
  - B. 16" OC in head joints of masonry directly above wall flashing and other interruptions to downward flow of water such as steel lintels and relief angles, and
  - C. 64" OC at the top course of masonry taller than 48".
- 3.5 CONTROL OF MOVEMENT: Provide control joints constructed by using special control joint units, open end stretcher units, metal sash jamb units, and preformed gaskets, compressible material, building paper and caulking or sealants as indicated on drawings or as required. Where expansion joints are shown, leave full width of joint free of masonry, mortar and reinforcement, ready for backup material and sealant. At control joints, insert control joint material and leave joint free of masonry and reinforcement. At a minimum, place control joints vertically not more than 24 ft on center, within 5 ft of building corners, and at lines of weakness such as at steel columns, changes in building height, and at each side of openings over 8 ft high. Do not butter masonry units to steel members, except where masonry bears on steel. Maintain 1/2 in. clearance. Fill vertical clearances with 1/2 in. semirigid fiberglass or other sort, incombustible board material. Build non-bearing partitions to a distance 3/8 to 3/4 in. from structural soffit above. When structure above has deflected from building loads placed upon it, wedge partition to structural soffit with metal or slate wedges, and fill top joint with mortar.
- 3.6 CLEANING
- A. Clean sample panel in location directed by Architect/Engineer. When approved, use same materials and techniques to clean remainder of stone.
  - B. Protect adjacent and underlying surfaces.
  - C. Apply masonry cleaner in accordance with manufacturer's instructions. Acids are not permitted.
  - D. Thoroughly rinse surfaces with clean water after completion of cleaning; remove all traces of cleaning solution.
- 3.7 ACCEPTANCE OF MASONRY CONSTRUCTION: Completed masonry work which fails to meet requirements must be brought into compliance in an approved manner. The masonry work shall be clean and show a quality of workmanship and finish that conforms to the approved sample when viewed at a distance of 15'. Joints shall be tooled and tight showing no separation between mortar and units.

## 04 72 00 - CAST STONE MASONRY

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES - Architectural Cast Stone.

- A. Scope - All labor, materials and equipment to provide the Cast Stone shown on architectural drawings and as described in this specification.
  - 1. Manufacturer shall furnish Cast Stone covered by this specification.
  - 2. Installing contractor shall unload, store, furnish all anchors, set, patch, clean and seal (optional) the Cast Stone as required.

#### 1.2 RELATED SECTIONS

- A. Section 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND OTHER SUBMITTALS
- B. Section 04 05 16 - MASONRY GROUTING
- C. Section 04 05 19 - MASONRY ANCHORAGE AND REINFORCING
- D. Section 04 05 23 - MASONRY ACCESSORIES
- E. Section 07 92 00 - JOINT SEALANTS

#### 1.3 REFERENCES

- A. ACI 318 – Building Code Requirements for Reinforced Concrete.
- B. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- C. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Reinforced Concrete.
- D. ASTM C 33 – Standard Specification for Concrete Aggregates.
- E. ASTM C 150 - Standard Specification for Portland Cement.
- F. ASTM C 173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volume Method.
- G. ASTM C 231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- H. ASTM C 260 - Standard Specification for Air-Entrained Admixtures for Concrete.
- I. ASTM C 270 - Standard Specification for Mortar for Unit Masonry.
- J. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.
- K. ASTM C 618 – Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
- L. ASTM C 642 - Standard Test Method for Specific Gravity, Absorption, and Voids in Hardened Concrete.
- M. ASTM C 666 – Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
- N. ASTM C 979 - Standard Specification for Coloring Pigments for Integrally Pigmented Concrete.
- O. ASTM C 989 – Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete.
- P. ASTM C 1194 - Standard Test Method for Compressive Strength of Architectural Cast Stone.
- Q. ASTM C 1195 - Standard Test Method for Absorption of Architectural Cast Stone.
- R. ASTM C 1364 - Standard Specification for Architectural Cast Stone.
- S. ASTM D 2244 – Standard Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- T. Cast Stone Institute Technical Manual (Current Edition)

#### 1.4 DEFINITIONS

- A. Cast Stone - an architectural precast concrete building unit intended to simulate natural cut stone.
  - 1. Dry Cast Concrete Products – manufactured from zero slump concrete.

- a. Vibrant Dry Tamp (VDT) casting method: Vibratory ramming of earth moist, zero-slump concrete against a rigid mould until it is densely compacted.
- 2. Wet Cast Concrete Products – manufactured from measurable slump concrete.
  - a. Wet casting method: manufactured from measurable slump concrete and vibrated into a mould until it becomes densely consolidated.

#### 1.5 SUBMITTALS

- A. Comply with Section 01 33 23 – Submittal Procedures.
- B. Samples: Submit pieces of the Cast Stone that are representative of the general range of finish and color proposed to be furnished for the project.
- C. Test results: Submit manufacturers test results of Cast Stone previously made by the manufacturer.
- D. Shop Drawings: Submit manufacturers shop drawings including profiles, cross-sections, reinforcement, exposed faces, arrangement of joints (optional for standard or semi-custom installations), anchoring methods, anchors (if required), annotation of stone types and their location.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. Manufacturer shall have sufficient plant facilities to produce the shapes, quantities and size of Cast Stone required in accordance with the project schedule.
  - 2. Manufacturer shall submit a written list of projects similar in scope and at least three (3) years of age, along with owner, architect and contractor references.
- B. Standards: Comply with the requirements of the Cast Stone Institute Technical Manual and the project specifications. Where a conflict may occur, the contract documents shall prevail.
- C. Mock-up (Optional) Provide full size unit(s) for use in construction of sample wall. The approved mock-up shall become the standard for appearance and workmanship for the project.

- 1.7 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

### PART 2 - PRODUCTS

#### 2.1 ARCHITECTURAL CAST STONE

- A. Physical properties: Provide the following:
  - 1. Compressive Strength - ASTM C 1194: 6,500 psi (45 Mpa) minimum for products at 28 days.
  - 2. Absorption - ASTM C 1195: 6% maximum by the cold water method, or 10% maximum by the boiling method for products at 28 days.

3. Air Content – ASTM C173 or C 231, for wet cast product shall be 4-6% for units used in a freeze-thaw environment.
- B. Job site testing – One (1) sample from production units may be selected at random from the field for each 500 cubic feet (14 m<sup>3</sup>) delivered to the job site.
1. Three (3) field cut cube specimens from each of these samples shall have an average minimum compressive strength of not less than 80% of design strength or as allowed by ACI 318.
  2. Three (3) field cut cube specimens from each of these samples shall have an average maximum cold-water absorption of 6%.
  3. Field specimens shall be tested in accordance with ASTM C 1194 and C 1195.

## 2.2 RAW MATERIALS

- A. Portland cement – Type I or Type III, white and/or grey, ASTM C 150.
- B. Coarse aggregates - Granite, quartz or limestone, ASTM C 33, except for gradation, and are optional for the VDT casting method.
- C. Fine aggregates - Manufactured or natural sands, ASTM C 33, except for gradation.
- D. Colors - Inorganic iron oxide pigments, ASTM C 979 except that carbon black pigments shall not be used.
- E. Admixtures- Comply with the following:
1. ASTM C 260 for air-entraining admixtures.
  2. ASTM C 494 for water reducing, retarding or accelerating admixtures.
  3. Other admixtures: integral water repellents and other chemicals for which no ASTM Standard exists, shall be previously established as suitable for use in concrete by proven field performance or through laboratory testing.
  4. ASTM C 618 mineral admixtures of dark and variable colors shall not be used in surfaces intended to be exposed to view.
  5. ASTM C 989 granulated blast furnace slag may be used to improve physical properties. Tests are required to verify these features.
- F. Water – Potable
- G. Reinforcing bars:
1. ASTM A 615/A 615M. Galvanized or epoxy coated when cover is less than 1-1/2 inches (37 mm).
  2. Welded Wire Fabric: ASTM A 82 where applicable for wet cast units.
- H. All anchors, dowels and other anchoring devices and shims shall be standard building stone anchors commercially available in a non-corrosive material such as zinc plated, galvanized steel, brass, or stainless steel Type 302 or 304.

## 2.3 COLOR AND FINISH



- A. Match sample on file in architect's office.
- B. All surfaces intended to be exposed to view shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32 in (0.8 mm) and the density of such voids shall be less than 3 occurrences per any 1 in. (25 mm<sup>2</sup>) and not obvious under direct daylight illumination at a 5 ft (1.5m) distance.
- C. Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 ft (3 m) distance.
  - 1. ASTM D 2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.
    - a. Total color difference – not greater than 6 units.
    - b. Total hue difference – not greater than 2 units.
- D. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under direct daylight illumination from a 20-ft (6 m) distance.

## 2.4 REINFORCING

- A. Reinforce the units as required by the drawings and for safe handling and structural stress.
- B. Minimum reinforcing shall be 0.25 percent of the cross section area.
- C. Panels, soffits and similar stones greater than 12 in. (300 mm) wide shall be reinforced along their length and width.
- D. Welded wire fabric reinforcing shall not be used in dry cast products.

## 2.5 CURING

- A. Cure units in a warm curing chamber at 95 percent relative humidity for approximately 18 hours, or yard cure for 350 degree-days (i.e. 7 days @ 50°F (10°C) or 5 days @ 70°F (21°C)) prior to shipping.
- B. Remove cement film from exposed surfaces prior to packaging for shipment.

## 2.6 MANUFACTURING TOLERANCES

- A. Cross section dimensions shall not deviate by more than  $\pm 1/8$  inch (3 mm) from approved dimensions.
- B. Length of units shall not deviate by more than length/ 360 or  $\pm 1/8$  inch (3 mm), whichever is greater, not to exceed  $\pm 1/4$  inch (6 mm).
  - 1. Maximum length of any unit shall not exceed 15 times the average thickness of such unit unless otherwise agreed by the manufacturer.
- C. Warp, bow or twist of units shall not exceed length/ 360 or  $\pm 1/8$  inch (3 mm), whichever is greater.
- D. Location of dowel holes, anchor slots, flashing grooves, false joints and similar features – On formed sides of unit, 1/8 inch (3 mm), on unformed sides of unit, 3/8 inch (9 mm) maximum deviation.

## 2.7 PRODUCTION QUALITY CONTROL

- A. Testing.
  - 1. Test compressive strength and absorption from specimens selected at random from plant production.
  - 2. Samples shall be taken from every 500 (14 m2) cubic feet of product produced.
  - 3. Perform tests in accordance ASTM C 1194 and C 1195.
  - 4. New and existing mix designs shall be tested for strength and absorption compliance prior to producing units.

## 2.8 DELIVERY, STORAGE AND HANDLING

- A. Mark production units with the identification marks as shown on the shop drawings.
- B. Package units and protect them from staining or damage during shipping and storage.
- C. Provide an itemized list of product to support the bill of lading.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Installing contractor shall check Cast Stone materials for fit and finish prior to installation. Do not set unacceptable units.

### 3.2 SETTING TOLERANCES

- A. Comply with Cast Stone Institute Technical Manual.
- B. Set stones 1/8 inch (3 mm) or less, within the plane of adjacent units.
- C. Joints, plus - 1/16 inch (1.5 mm), minus - 1/8 inch (3 mm).

### 3.3 JOINTING

- A. Joint size:
  - 1. At stone/brick joints 3/8 inch (9.5 cm).
  - 2. At stone/stone joints in vertical position \_ inch (6 mm) (3/8 inch (9.5 mm) optional).
  - 3. Stone/stone joints exposed on top 3/8 inch (9.5 mm).
- B. Joint materials:
  - 1. Mortar, Type N, ASTM C 270.
  - 2. Use a full bed of mortar at all bed joints.
  - 3. Flush vertical joints full with mortar.
  - 4. Leave all joints with exposed tops or under relieving angles open for sealant.
  - 5. Leave head joints in copings and projecting components open for sealant.

- C. Location of joints:
  - 1. As shown on shop drawings.
  - 2. At control and expansion joints unless otherwise shown.

### 3.4 SETTING

- A. Drench units with clean water prior to setting.
- B. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
- C. Set units in full bed of mortar, unless otherwise detailed.
- D. Rake mortar joints \_ (18 mm) inch for pointing.
- E. Remove excess mortar from unit faces immediately after setting.
- F. Tuck point unit joints to a slight concave profile.

### 3.5 JOINT SEALANT

- A. Comply with requirements of Section 07900.
- B. Prime ends of units, insert properly sized backing rod and install required sealant.

### 3.6 REPAIR AND CLEANING

- A. Repair chips with touchup materials furnished by manufacturer.
- B. Saturate units to be cleaned prior to applying an approved masonry cleaner.
- C. Consult with manufacturer for appropriate cleaners.

### 3.7 INSPECTION AND ACCEPTANCE

- A. Inspect finished installation according to Bulletin #36.
- B. Do not field apply water repellant until repair, cleaning, inspection and acceptance is completed.

**DIVISION 05 – METALS**

**05 12 00 - STRUCTURAL STEEL FRAMING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes structural steel and architecturally exposed structural steel.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 1 Section "Quality Control" for independent testing agency procedures and administrative requirements.
  - 2. Division 5 Section "Steel Deck" for field installation of shear connectors.
  - 3. Division 5 Section "Metal Fabrications" for loose steel bearing plates and miscellaneous steel framing.
  - 4. Division 9 Section "Special Coatings" for surface preparation and priming requirements.
  - 5. Division 9 Section "Painting" for surface preparation and priming requirements.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Engineer structural steel connections required by the Contract Documents to be selected or completed by the fabricator to withstand design loadings indicated.
- B. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for structural steel connections.

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.
- C. Shop Drawings detailing fabrication of structural steel components.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.

3. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.
- D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Mill test reports signed by manufacturers certifying that their products, including the following, comply with requirements.
  1. Structural steel, including chemical and physical properties.
  2. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
  3. Direct-tension indicators.
  4. Shear stud connectors.
  5. Shop primers.
  6. Nonshrink grout.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Comply with applicable provisions of the following specifications and documents:
  1. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
  2. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
  3. AISC's "Specification for Load and Resistance Factor Design of Single-Angle Members."
  4. ASTM A 6 "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."
  5. Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.
- D. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel."
  1. Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.
  - 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 2. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.7 SEQUENCING

- A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

1.8 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Structural Steel Shapes, Plates, and Bars: As follows:
  - 1. Carbon Steel: ASTM A 992 (50 KSI).
- B. Cold-Formed Structural Steel Tubing: ASTM A 500, Grade B.
- C. Hot-Formed Structural Steel Tubing: ASTM A 501.
- D. Steel Pipe: ASTM A 53, Type E or S, Grade B.
  - 1. Weight Class: Standard.
  - 2. Finish: Black, except where indicated to be galvanized.
- E. Shear Connectors: ASTM A 108, Grade 1015 through 1020, headed-stud type, cold-finished carbon steel, AWS D1.1, Type B.
- F. Anchor Rods, Bolts, Nuts, and Washers: As follows:
  - 1. Unheaded Rods: ASTM A 36.
  - 2. Anchor Bolts: ASTM A 307, Grade A; carbon-steel, hex-head bolts; and carbon-steel nuts.
  - 3. Headed Bolts: ASTM A 325, Type 1, heavy hex steel structural bolts and heavy hex carbon-steel nuts.
  - 4. Washers: ASTM A 36.

- G. Nonhigh-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A; carbon-steel, hex-head bolts; carbon-steel nuts; and flat, unhardened steel washers.
  - 1. Finish: Plain, uncoated.
  - 2. Finish: Hot-dip zinc-coating, ASTM A 153, Class C.
  - 3. Finish: Mechanically deposited zinc-coating, ASTM B 695, Class 50.
- H. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.
  - 1. Finish: Plain, uncoated.
  - 2. Finish: Hot-dip zinc-coating, ASTM A 153, Class C.

## 2.2 PRIMER

- A. Primer: SSPC-Paint 25; red iron oxide, zinc oxide, raw linseed oil and alkyd primer.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds and repair painting galvanized steel, with dry film containing not less than 93 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20.

## 2.3 GROUT

- A. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404, Size No. 2. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- B. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

## 2.4 FABRICATION

- A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.
  - 1. Camber structural steel members where indicated.
  - 2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until steel has been erected.
  - 3. Mark and match-mark materials for field assembly.
  - 4. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
  - 5. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.
  - 6. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.

- B. Fabricate architecturally exposed structural steel with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.
  - 1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating, and shop priming.
  - 2. Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  - 1. Plane thermally cut edges to be welded.
- D. Finishing: Accurately mill ends of columns and other members transmitting loads in bearing.
- E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's printed instructions.
- F. Steel Wall Framing: Select true and straight members for fabricating steel wall framing to be attached to structural steel framing. Straighten as required to provide uniform, square, and true members in completed wall framing.
- G. Welded Door Frames: Build up welded door frames attached to structural steel framing. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk, cross-recessed head machine screws, uniformly spaced not more than 10 inches o.c., unless otherwise indicated.
- H. Holes: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on Shop Drawings.
  - 1. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
  - 2. Weld threaded nuts to framing and other specialty items as indicated to receive other work.

## 2.5 SHOP CONNECTIONS

- A. Shop install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.
- B. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Shop install and tighten high-strength bolts according to RCSC's "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
  - 1. Bolts: ASTM A 325 high-strength bolts, unless otherwise indicated.
  - 2. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.
- D. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
  - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.



2. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

## 2.6 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
  1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  2. Surfaces to be field welded.
  3. Surfaces to be high-strength bolted with slip-critical connections.
  4. Surfaces to receive sprayed-on fireproofing.
  5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:
  1. SSPC-SP 2 "Hand Tool Cleaning."
  2. SSPC-SP 3 "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  2. Apply 2 coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Apply a 1-coat, nonasphaltic primer complying with SSPC's "Painting System Guide No. 7.00" to provide a dry film thickness of not less than 1.5 mils.

## 2.7 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel indicated for galvanizing according to ASTM A 123.

## 2.8 SOURCE QUALITY CONTROL

- A. Owner will engage an independent testing and inspecting agency to perform shop inspections and tests and to prepare test reports.
  1. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.

2. Provide testing agency with access to places where structural steel Work is being fabricated or produced so required inspection and testing can be accomplished.
- B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.
  - C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
  - D. Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
  - E. In addition to visual inspection, shop-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.
    1. Liquid Penetrant Inspection: ASTM E 165.
    2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    3. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
    4. Ultrasonic Inspection: ASTM E 164.
  - F. In addition to visual inspection, shop-welded shear connectors will be inspected and tested according to requirements of AWS D1.1 for stud welding and as follows:
    1. Bend tests will be performed when visual inspections reveal either less than a continuous 360-degree flash or welding repairs to any shear connector.
    2. Tests will be conducted on additional shear connectors when weld fracture occurs on shear connectors already tested, according to requirements of AWS D1.1.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.
- B. Do not proceed with erection until unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

#### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

- B. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
  - 1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
  - 3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
    - a. Comply with manufacturer's instructions for proprietary grout materials.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
  - 1. Maintain erection tolerances of architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
- E. Splice members only where indicated.
- F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- G. Do not use thermal cutting during erection.
- H. Finish sections thermally cut during erection equal to a sheared appearance.
- I. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

#### 3.4 FIELD CONNECTIONS

- A. Install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.
- B. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
  - 1. Comply with AISC specifications referenced in this Section for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.

### 3.5 FIELD QUALITY CONTROL

- A. Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports.
  1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.
- B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.
- C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- D. Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- E. In addition to visual inspection, field-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.
  1. Liquid Penetrant Inspection: ASTM E 165.
  2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  3. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
  4. Ultrasonic Inspection: ASTM E 164.
- F. In addition to visual inspection, field-welded shear connectors will be inspected and tested according to requirements of AWS D1.1 for stud welding and as follows:
  1. Bend tests will be performed when visual inspections reveal either less than a continuous 360-degree flash or welding repairs to any shear connector.
  2. Tests will be conducted on additional shear connectors when weld fracture occurs on shear connectors already tested, according to requirements of AWS D1.1.

### 3.6 CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
  1. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on structural steel are included in Division 9 Section "Painting."
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint according to ASTM A 780.

## **05 21 00 - STEEL JOIST FRAMING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. K-series open-web steel joists.
  - 2. Joist accessories.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 1 Section "Quality Control" for independent testing agency procedures and administrative requirements.
  - 2. Division 3 Section "Cast-in-Place Concrete" for installing anchors set in concrete.
  - 3. Division 4 Section "Unit Masonry" for installing anchors set in unit masonry.
  - 4. Division 5 Section "Structural Steel" for field quality-control procedures and tests.
  - 5. Division 5 Section "Metal Fabrications" for loose, steel bearing plates and miscellaneous steel framing.
  - 6. Division 5 Section "Steel Stairs"
  - 7. Division 9 Section "Special Coatings" for surface preparation and prime painting.
  - 8. Division 9 Section "Painting" for surface preparation and prime painting.

#### **1.3 PERFORMANCE REQUIREMENTS**

- A. Engineering Responsibility: Engage a joist manufacturer who utilizes a qualified professional engineer to prepare design calculations, shop drawings, and other structural data for steel joists.

#### **1.4 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of joist, accessory, and product specified.
- C. Shop Drawings showing layout, mark, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, accessories, splice and connection details, and attachments to other units of Work.
  - 1. Indicate locations and details of anchorage devices and bearing plates to be embedded in other construction.

2. For joists indicated to comply with certain design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Material certificates signed by joist manufacturer certifying that joists comply with SJI's "Specifications."
- E. Mill certificates signed by manufacturers of bolts certifying that their products comply with specified requirements.
- F. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.
- G. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- H. Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence joists' compliance with building code in effect for Project.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage a firm experienced in manufacturing joists similar to those indicated for this Project and that have a record of successful in-service performance.
  1. Manufacturer must be certified by SJI to manufacture joists conforming to SJI standard specifications and load tables.
- B. SJI Design Standard: Comply with recommendations of SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders," applicable to types of joists indicated.
- C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."
  1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- D. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of joists that are similar to those indicated for this Project in material, design, and extent.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

## 1.7 SEQUENCING

- A. Deliver steel bearing plates and other devices to be built into concrete and masonry construction.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Steel: Comply with requirements of SJI's "Specifications" for chord and web section material.
- B. Steel Bearing Plates: ASTM A 36.
- C. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
  - 1. Finish: Plain, noncoated.
- D. Welding Electrodes: Comply with AWS standards.

## 2.2 PRIMERS

- A. Primer: SSPC-Paint 15, Type I, red oxide; Federal Specification TT-P-636, red oxide; or manufacturer's standard shop primer meeting the performance requirements of either of these red-oxide primers.

## 2.3 STEEL JOISTS

- A. Manufacture joists according to SJI's "Specifications," with steel angle top and bottom chord members, of joist types, end arrangements, and top chord arrangements indicated.
- B. Manufacture joists according to SJI's "Specifications," with steel angle top and bottom chord members, and as follows:
  - 1. Joist Type: K-series steel joists.
  - 2. End Arrangement: Underslung.
  - 3. End Arrangement: Underslung with bottom chord extensions.
  - 4. Top Chord Arrangement: Parallel.
- C. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- D. Provide holes in chord members where shown for securing other work to steel joists.
- E. Extend top chords of joists with SJI Type S top chord extensions where indicated, complying with SJI's "Specifications" and load tables.
- F. Extend bearing ends of joists with SJI Type R extended ends where indicated, complying with SJI's "Specifications" and load tables.
- G. Camber K-series steel joists according to SJI's "Specifications."
- H. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes when joist slope exceeds 1/4 inch in 12 inches.

## 2.4 JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span.



- B. Bridging: Bridging is schematically indicated. Detail and fabricate bridging according to SJI requirements.
- C. Bridging: Fabricate bridging as indicated and according to SJI requirements.
  - 1. Supply additional bridging to ensure stability of structure during construction period.
- D. Fabricate steel bearing plates with integral anchorages as indicated and finish as follows:
  - 1. Finish: Shop prime paint.
  - 2. Finish: Hot-dip zinc coating, ASTM A 123.
- E. Steel bearing plates with integral anchorages are specified in Division 5 Section "Metal Fabrications."
- F. Supply ceiling extensions, either extended bottom chord elements or a separate extension unit of sufficient strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface, unless otherwise indicated.
- G. Supply miscellaneous accessories, including splice plates and bolts required by the joist manufacturer to complete the joist installation.

## 2.5 SHOP PAINTING

- A. Do not shop paint joists to receive fireproofing.
- B. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories to be primed as follows:
  - 1. Surface Preparation: Hand tool cleaning, SSPC-SP 2.
  - 2. Surface Preparation: Power tool cleaning, SSPC-SP 3.
  - 3. Surface Preparation: Either hand tool cleaning, SSPC-SP 2, or power tool cleaning, SSPC-SP 3.
- C. Apply one shop coat of primer to joists and joist accessories to be primed to provide a continuous, dry paint film thickness of not less than 1 mil.
- D. Surface preparation and painting of joists and joist accessories are included under Division 9 Section "Painting."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of joists. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's recommendations, and the requirements of this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
  2. Space, adjust, and align joists accurately in location before permanently fastening.
  3. Install temporary bracing and bridging, connections, and anchors to ensure joists are stabilized during construction.
- C. Field weld joists to supporting steel framework and steel bearing plates. Coordinate welding sequence and procedure with placing of joists.
1. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using carbon-steel bolts, unless otherwise indicated.
- E. Bolt joists to supporting steel framework using high-strength structural bolts, unless otherwise indicated.
1. Comply with the Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
  2. Comply with the Research Council on Structural Connections' (RCSC) "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
- F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

### 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: A qualified independent testing agency employed and paid by Owner will perform field quality-control testing.
- B. Testing agency will report test results promptly and in writing to Contractor and Architect.
- C. Testing and verification procedures will be required of high-strength bolted connections and field welds.
1. Bolted connections will be visually inspected.
  2. High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts."
  3. Field welds will be visually inspected.
- D. Correct deficiencies in Work that inspections and test reports have indicated are not in compliance with specified requirements.
- E. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

### 3.4 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and the manufacturer's instructions.

- B. Touch Up Painting: Following installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, accessories, bearing plates, and abutting structural steel.
  - 1. Clean and prepare surfaces by hand tool cleaning, SSPC-SP 2, or power tool cleaning, SSPC-SP 3.
  - 2. Apply a compatible primer of the same type as the shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting of field connections, rust spots, and abraded surfaces of shop-painted joists, accessories, bearing plates, and abutting structural steel are included in Division 9 Section "Painting."
- D. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at the time of Substantial Completion.

## **05 31 00 - STEEL DECKING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Steel roof deck.
  - 2. Noncomposite steel form deck.

#### **1.3 RELATED SECTIONS:** The following Sections contain requirements that relate to this Section:

- A. Division 3 Section "Cast-in-Place Concrete" for concrete fill and reinforcing steel.
- B. Division 3 Section "Insulating Concrete Decks" for lightweight insulating concrete fill.
- C. Division 5 Section "Structural Steel" for shop-welded shear connectors.
- D. Division 5 Section "Metal Fabrications" for framing openings with miscellaneous steel shapes.
- E. Division 9 Section "Painting" for touchup and repair painting of deck.
- F. Division 9 Section "Special Coatings" for touchup and repair of special deck coatings.
- G. Division 16 Section "Underfloor Raceways" for header trenches, duct fittings, preset inserts, service fittings, and outlets used with cellular metal floor deck.

#### **1.4 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each type of deck, accessory, and product specified.
- C. Shop drawings showing layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.
- D. Product certificates signed by manufacturers of steel deck certifying that their products comply with specified requirements.
- E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.
- F. Product test reports from qualified independent testing agencies evidencing compliance with requirements of the following based on comprehensive testing:

1. Mechanical fasteners.

- G. Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence steel deck's compliance with the building code in effect for the Project.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed steel deck similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."
  1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- D. Fire-Test-Response Characteristics: Where indicated, provide steel deck panels identical to those tested as part of an assembly for fire resistance per ASTM E 119 by a testing and inspection agency performing testing and follow-up services, that is acceptable to authorities having jurisdiction.
  1. Fire-Resistance Ratings: As indicated by design designations listed in UL "Fire Resistance Directory," or by Warnock Hersey or another testing and inspecting agency.
  2. Labeling: Identify steel deck with appropriate markings of applicable testing and inspecting agency.
- E. Electrical Raceway Panels: Provide UL-labeled, cellular metal floor deck panels conforming to UL 209 and listed in UL "Electrical Construction Materials Directory" as approved for use with standard header ducts and outlets for electrical distribution systems.
- F. FM Listing: Provide steel roof deck evaluated by Factory Mutual and listed in Factory Mutual "Approval Guide" for Class 1 fire rating and Class 1-60 windstorm ratings.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

## 1.7 COORDINATION

- A. Coordinate installation of sound-absorbing insulation strips in acoustic deck ribs with related units of Work specified in other Sections to ensure that the insulation is protected against damage from effects of the weather and other causes.
- B. Coordinate installation of trench headers, preset inserts, and duct fittings in cellular metal floor deck with related units of Work specified in other Sections prior to casting concrete slab.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. American Buildings Co.
  - 2. ASC Pacific Inc.
  - 3. Bowman Metal Deck Armco, Inc.
  - 4. Consolidated Systems, Inc.
  - 5. Epic Metals Corp.
  - 6. Marlyn Steel Products, Inc.
  - 7. Robertson A United Dominion Co.
  - 8. Roof Deck, Inc.
  - 9. United Steel Deck, Inc.
  - 10. Verco Manufacturing Co.
  - 11. Vulcraft Div. of Nucor Corp. (Basis of Design)
  - 12. Walker Div. of Butler Manufacturing Co.
  - 13. Wheeling Corrugating Co., Div. of Wheeling-Pittsburgh Steel Corp.

## 2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels without top-flange stiffening grooves conforming to SDI Publication No. 28 "Specifications and Commentary for Steel Roof Deck" and the following:
  - 1. Prime-Painted Steel Sheet: ASTM A 611, Grade C, shop primed as follows:
    - a. Shop Primer: Grey or white baked-on, lead- and chromate-free rust-inhibitive primer, conforming to the performance requirements of Fed. Spec. TT-P-664.
  - 2. Deck Profile: Type NR, narrow rib.
  - 3. Profile Depth: 1-1/2 inches.
  - 4. Span Condition: Triple span or more.
  - 5. Side Joints: Overlapped or interlocking seam at Contractor's option.

## 2.3 FORM DECK

- A. Noncomposite Steel Form Deck: Fabricate ribbed-steel sheet noncomposite form deck panels conforming to SDI Publication No. 28 "Specifications and Commentary for Noncomposite Steel Form Deck," the minimum section properties indicated, and the following:
  - 1. Prime-Painted Steel Sheet: ASTM A 611, Grade C, shop primed grey or white baked-on, lead- and chromate-free rust-inhibitive primer, conforming to the performance requirements of Fed. Spec. TT-P-664.
  - 2. Profile Depth: as indicated.
  - 3. Span Condition: Triple span or more.
  - 4. Side Joints: Overlapped or interlocking seam at Contractor's option.

- 2.4 CELLULAR DECK: Fabricate ribbed-steel sheet cellular deck panels conforming to SDI Publication No. 28 of the minimum section properties indicated, of Galvanized-Steel Sheet ASTM A 446, Grade E, G 90 zinc coated according to ASTM A 525. Use at all locations exposed to public view. Paint the exposed surfaces of panels prior to installation.
- 2.5 ACCESSORIES
- A. General: Provide accessory materials for steel deck that comply with requirements indicated and recommendations of the steel deck manufacturer.
  - B. Mechanical Fasteners: Manufacturer's standard, corrosion-resistant, low-velocity, powder-actuated or pneumatically driven carbon steel fasteners; or self-drilling, self-threading screws.
  - C. Side Lap Fasteners: Manufacturer's standard, corrosion-resistant, hexagonal washer head; self-drilling, carbon steel screws, No. 10 minimum diameter.
  - D. Rib Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.
  - E. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip glass fiber or mineral fiber.
  - F. Miscellaneous Roof Deck Accessories: Steel sheet, 0.0359-inch-thick minimum ridge and valley plates, finish strips, and reinforcing channels, of same material as roof deck.
  - G. Pour Stops and Girder Fillers: Steel sheet, of same material as deck panels, and of thickness and profile indicated.
  - H. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material and thickness as deck panels, unless otherwise indicated.
  - I. Hanger Tabs: Manufacturer's standard piercing steel sheet hanger attachment devices for floor deck panels.
  - J. Weld Washers: Manufacturer's standard uncoated-steel sheet weld washers, shaped to fit deck rib, 0.0598 inch thick with 3/8-inch minimum diameter prepunched hole.
  - K. Recessed Sump Pans: Manufacturer's standard size, single piece steel sheet 0.071-inch-thick minimum, of same material as deck panels, with 1-1/2-inch-minimum deep level recessed pans and 3-inch-wide flanges. Cut holes for drains in the field.
  - L. Flat Receiver Pan: Manufacturer's standard size, single-piece steel sheet, 0.071-inch-thick minimum units, of same material as deck panels. Cut holes for drains in the field.
  - M. Steel Sheet Accessories: ASTM A 446, G 60 coating class, galvanized according to ASTM A 525.
  - N. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
  - O. Preset Inserts: Manufacturer's standard, UL-labeled single-piece preset inserts, fabricated from either steel sheet galvanized according to ASTM A 525, G 60 coating class, or zinc sheet, with removable covers.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine supporting framing and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of steel deck.

### 3.2 PREPARATION

- A. Do not place deck panels on concrete supporting structure until concrete has cured and is dry.
- B. Locate decking bundles to prevent overloading of supporting members.

### 3.3 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary of SDI Publication No. 28, manufacturer's recommendations, and requirements of this Section.
- B. Install temporary shoring before placing deck panels when required to meet deflection limitations.
- C. Place deck panels on supporting framing and adjust to final position with ends accurately aligned and bearing on supporting framing before being permanently fastened. Do not stretch or contract side lap interlocks.
- D. Place deck panels flat and square and fasten to supporting framing without warp or deflection.
- E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to the decking.
- F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.
- G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
- H. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's instructions.

### 3.4 ROOF DECK INSTALLATION

- A. Fasten roof deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter, but not less than 1-1/2 inches long, and as follows:
  - 1. Weld Diameter: 3/4 inch, nominal.
  - 2. Weld Spacing: Weld edge ribs of panels at each support. Space welds an average of 12 inches apart, with a minimum of two welds per unit at each support.
  - 3. Weld Washers: Install weld washers at each weld location.
- B. Side Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding 36 inches, using one of the following methods:
  - 1. Mechanically fasten with self-drilling No. 10-diameter or larger carbon steel screws.
- C. End Bearing: Install deck ends over supporting framing with a minimum end bearing of 1-1/2 inches, with end joints as follows:



1. End Joints: Lapped 2 inches minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof decking, and weld flanges to top of deck. Space welds not more than 12 inches apart with at least one weld at each corner.
- E. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's recommendations. Weld to substrate to provide a complete deck installation.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's instructions to ensure complete closure.
- G. Sound-Absorbing Insulation: Install premolded, roll or strip sound-absorbing insulation according to deck manufacturer's instructions.

### 3.5 FLOOR DECK INSTALLATION

- A. Fasten floor deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
1. Weld Diameter: 5/8 inch, nominal.
  2. Weld Diameter: 3/4 inch, nominal.
  3. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart, but not more than 18 inches apart.
  4. Weld Spacing: Space and locate welds as indicated.
  5. Weld Washers: Install weld washers at each weld location.
- B. Side Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, or at intervals not exceeding 36 inches, using one of the following methods:
1. Mechanically fasten with self-drilling No. 10-diameter or larger carbon steel screws.
  2. Fasten with 1-1/2-inch-long minimum welds.
- C. End Bearing: Install deck ends over supporting framing with a minimum end bearing of 1-1/2 inches, with end joints as follows:
1. End Joints: Lapped.
- D. Shear Connectors: Weld shear connectors through deck to support framing according to AWS D1.1 and manufacturer's instructions. Butt end joints of deck panels; do not overlap.
- E. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- F. Floor Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck according to SDI recommendations to provide tight-fitting closures at open ends of ribs and sides of decking. Weld cover plates at changes in direction of floor deck panels, unless otherwise indicated.

- G. Maintain smooth cellular raceway interiors free of welds or mechanical fasteners.
- H. Install piercing hanger tabs not more than 14 inches apart in both directions, within 9 inches of walls at ends, and not more than 12 inches from walls at sides, unless otherwise indicated.

### 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: A qualified independent testing agency employed and paid by Owner will perform field quality-control testing.
- B. Field welds will be subject to inspection.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional testing will be performed to determine compliance of corrected work with specified requirements.

### 3.7 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces with galvanized repair paint according to ASTM A 780 and the manufacturer's instructions.
- B. Touchup Painting: Wire brush, clean, and paint scarred areas, welds, and rust spots on both surfaces of installed deck panels.
  - 1. Touch up painted surfaces with same type of shop paint used on adjacent surfaces.
  - 2. Where shop-painted surfaces are exposed in-service, apply touchup paint to blend into adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting of field welds, abraded areas, and rust spots, as required after erection and before proceeding with field painting, are included in Division 9 Section "Painting."
- D. Provide final protection and maintain conditions to ensure steel decking is without damage or deterioration at time of Substantial Completion.

## **05 31 13 - STEEL FLOOR DECK**

### **PART 1 - GENERAL**

- 1.1 RELATED DOCUMENTS: Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.
- 1.2 SUMMARY: This section pertains to composite steel floor deck. Related Sections: Division 3 Section "Cast In Place Concrete" for concrete fill and reinforcing steel.
- 1.3 SUBMITTALS: Submit each item in this Article according to the conditions of the Contract and Division 1 Specification Sections. Product Data for each type of decking specified, including dimensions of individual components, profiles, and finishes. Shop Drawings showing location of deck units, anchorage details, and other information required for a thorough review.
- 1.4 QUALITY ASSURANCE: Certify that each welder has satisfactorily passed A.W.S. qualification tests for welding processes involved, and, if applicable, has undergone recertification. Comply with applicable provisions of the following specifications:
  - A. American Iron and Steel Institute (AISI);
  - B. American Welding Society (ANSI/AWS D1.3 Structural Welding Code/Sheet Steel);
  - C. Steel Deck Institute (SDI).
- 1.5 DELIVERY, STORAGE, AND HANDLING: Protect steel deck from corrosion, deformation, and other damage during delivery, storage and handling. If ground storage is needed, the deck bundles must be stored off the ground, with one end elevated to provide drainage. Bundles must be protected against condensation with a ventilated waterproof covering. Bundles must be stacked so there is no danger of tipping, sliding, rolling, shifting or material damage. Bundles must be periodically checked for tightness, and retightened as necessary so wind cannot loosen sheets.

### **PART 2 - PRODUCTS**

- 2.1 MANUFACTURER: Vulcraft or another approved manufacturer offering deck products to be incorporated into the work must be a member of the Steel Deck Institute.
- 2.2 MATERIALS: Sheet steel for deck and accessories shall conform to ASTM A653-94 Structural Quality with minimum yield strength of 33 ksi (230 MPa). Galvanizing shall conform to ASTM A924-94 with a minimum coating class of G60 (Z180) as defined in ASTM A653-94. The deck shall be selected to provide the load capacities shown on the drawings and as determined using the Steel Deck Institute construction loading criteria.
- 2.3 ACCESSORIES: Pour stops, column closures, end closures, cover plates, and girder fillers shall be the type required by the Steel Deck Institute. Mechanical fasteners or welds are acceptable for accessory attachments.

### **PART 3 - EXECUTION**

- 3.1 GENERAL: Examine support framing and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work of this section. All O.S.H.A. rules for erection must be followed.
- 3.2 PREPARATION: Place deck in accordance with approved placement plans. Do not place deck panels on concrete support structure until concrete has cured and is dry. Locate deck bundles to prevent overloading of support members.
- 3.3 INSTALLATION

- A. General: Install deck panels and accessories according to Steel Deck Institute specifications and recommendations, and in accordance with the placement plans, and requirements of this Section. Install temporary shoring, if required, before placing deck panels. Place deck panels on structural supports and adjust to final position with ends aligned. Attach firmly to the supports immediately after placement in order to form a safe working platform. Cut and neatly fit deck units and accessories around openings and other work projecting through or adjacent to the decking. Trades that subsequently cut unscheduled openings through the deck are responsible for reinforcing the openings.
  - B. Floor Deck: Install deck ends over supports with a minimum end bearing of 1.5 inches (40 mm). Anchor floor deck units to steel supporting members by arc spot puddle welds of the following diameter and spacing or fillet welds of equal strength.
    1. Weld diameter: minimum visible 5/16 inch (15 mm).
    2. Weld spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches (300 mm) apart but not more than 18 inches (460 mm).
    3. Mechanical fasteners, either powder actuated or pneumatically driven, or screws may be used in lieu of welding to fasten deck to supporting framing, provided they have been specifically approved.
    4. Fasten side laps and perimeter edges of units between supports at intervals not exceeding 36 inches (1 m) on center.
- 3.4 REPAIRS: Before concrete placement, the deck shall be inspected for tears, dents, or other damage that may prevent the deck from acting as a tight and substantial form. The need for the repair or temporary shoring of the damaged deck shall be determined.

05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

- 1.1 GENERAL: Provide cold formed metal framing, metal studs, and accessories as needed for a complete and proper installation. Comply with pertinent recommendations contained in "Specifications for Metal Lathing and Furring" published by the Metal Lath/Steel Framing Association.
- 1.2 SUBMITTALS: Submit promptly complete product information on this section to the Architect for review. Include joist layout & sizes selected from the manufacturer's span table & actual loading conditions. Sizes indicated are minimums; manufacturer shall verify & modify per required spans. Manufacturers' recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.
- 1.3 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.4 PERFORMANCE REQUIREMENTS: Calculate structural characteristics of cold-formed metal framing according to AISI's "Load and Resistance Factor Design Specification for Cold-Formed Steel Structural Members" and the Center for Cold-Formed Steel Structures (CCFSS) Technical Bulletin, Vol. 2, No. 1, February 1993 "AISI Specification Provisions for Screw Connections." Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120 deg F.

PART 2 - PRODUCTS

- 2.1 GENERAL: The size, spacing & gauges indicated are stated as minimums & should be increased as required by the manufacturer's recommendations for the conditions shown.
- 2.2 MANUFACTURERS: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated in the Work include, but are not limited to, the following:
  - A. Dale Industries, Inc.
  - B. Dietrich Industries, Inc. (Basis of Design)
  - C. Incor Plant Dale Industries.
  - D. Unimast, Inc.
  - E. United States Steel.
- 2.3 METAL RAFTERS & JOISTS: Manufacturer's standard C-shaped steel joists of web depths indicated, with lipped flanges, & otherwise as required by structural performance. Exceed minimum requirements of Fed Spec QQ-S-698 and Fed Spec QQ-S-775d, class d, sized for the item and use intended; hot-dip galvanized or factory pre-painted. Provide from the following minimum sizes:

A. MEZZANINE JOIST

Joist Member	Description	Size	Gauge	Flange
<a href="#">10"TDW16</a>	TDW-5 TRADEREADY® JOIST-50K	10"	16	2"

- 2.4 METAL STUDS: Meet or exceed minimum requirements of manufacturer & Fed Spec QQ-S-698 and Fed Spec QQ-S-775d, class d, for the item and use intended. Studs either hot-dip galvanized or factory pre-painted. Use only one manufacturer throughout the Work, unless otherwise shown on the Drawings or specifically approved in advance by the Architect. Provide from the following minimum sizes:

A. INTERIOR DRYWALL PARTITIONS

Product Code	SSMA Code	Gauge	KSI	Width	Length	Punched/Unpunched	Spacing
<a href="#">STN</a>	600S125-18	25	33	6"	9-4	Punched	16"
<a href="#">STE</a>	600S125-33	20	33	6"	9-4	Punched	16"

B. TALL PARTITION

Product Code	SSMA Code	Gauge	KSI	Width	MaxLength	Punched/Unpunched	Spacing
<a href="#">STE</a>	600S125-33	20	33	6"	16-6	Unpunched	16"

C. MEZZANINE SUPPORTING PARTITIONS (16" OC)

Product Code	SSMA Code	Gauge	KSI	Width	MaxLength
<a href="#">CSJ3</a>	600S162-33	20	33	6"	9' 4"
<a href="#">CSW3</a>	600S200-33	20	33	6"	9' 4"

D. EXTERIOR BACKUP WALL

Product Code	SSMA Code	Gauge	KSI	Width	MaxLength	Product Code	SSMA Code
<a href="#">CSJ3</a>	600S162-33	20	33	6"	9' 4"	<a href="#">CSJ3</a>	600S162-33
CSW3	600S200-33	20	33	6"	9' 4"	CSW3	600S200-33

- 2.5 FURRING - Minimum 1" wide 25 ga (.019) "Z", resilient channel or hat channel at 24" OC maximum spacing.
- 2.6 FRAMING ACCESSORIES: Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi. Provide accessories of manufacturer's standard thickness and configuration.
- 2.7 ACCESSORIES: Provide all accessories including, but not necessarily limited to, tracks, clips, anchors, fastening devices, sound attenuation pencil rods and resilient clips, and other accessories required for a complete and proper installation, and as recommended by the manufacturer of the steel studs used.

PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Accurately layout partition and wall lines from the dimensions shown on the Drawings. Install metal studs and accessories in strict accordance with the manufacturer's recommendations as approved by the Architect, anchoring all components firmly into position. Align partition and wall assemblies to a tolerance of one in 200 horizontally and one in 500 vertically.
- 3.3 BRACING: Provide diagonal bracing & supports to structure as necessary to control movement & deflection.
- 3.4 COORDINATION: Space members as required for compliance with pertinent regulations, to give proper support for the covering material, and as indicated on the Drawings. Coordinate and provide required backing and other support for items to be mounted on the finished covering. Coordinate requirements for pipes, structure and other items designed to be housed within the partition and wall systems.
- 3.5 LEVELING: By use of the specified grout, or by other means approved by the Architect, provide continuous solid bearing under floor runner members of steel stud partitions and walls. Level in a manner to provide uniform interface with ceilings and other overhead construction.

## 05 50 00 - METAL FABRICATIONS

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Included under this section will be all labor, materials, tools, & equipment as required for Metal Fabrications & Accessories, as shown on the Drawings, specified herein, and as needed for a complete and proper installation. Work under this section includes:
  - A. Steel ladders not specified in other sections.
  - B. Loose bearing and leveling plates.
  - C. Loose steel lintels & shelf angles.
  - D. Steel framing and supports not specified in other sections.
  - E. Metal edgings.
  - F. Miscellaneous metal trim.
  - G. Pipe bollards.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. All work will comply with requirements of the American Welding Society. Meet applicable ASTM or Fed Spec standards for all metal fabrications & components.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

### PART 2 - PRODUCTS

- 2.1 MATERIALS: In fabricating items which will be expressed to view, limit materials to those which are free from surface blemishes, pitting, rolled trade names, and roughness. Provide any materials, not specifically described but required for a complete & proper installation.
- 2.2 FERROUS METALS: Provide metal free from pitting, seam marks, roller marks, and other imperfections where exposed to view on finished units. Do not use steel sheet with variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet. Steel Plates, Shapes, and Bars complying with ASTM A 36/A 36M. Cold-formed steel tubing complying with ASTM A 500.
  - A. All exterior exposed ferrous metals to be galvanized and painted.
- 2.3 FASTENERS: For exterior use and where built into exterior walls, provide zinc-coated fasteners. Provide fasteners of type, grade, and class required for the particular use.
- 2.4 GALVANIZING: Hot-dip galvanize items as indicated to comply with ASTM A 123, for galvanizing steel and iron products & ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- 2.5 SHOP PRIMING: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements of SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Stripe paint corners, crevices, bolts, welds, and sharp edges.
- 2.6 FABRICATIONS: Except as otherwise shown on the Drawings or the approved Shop Drawings, use materials of size, thickness, and type required to produce reasonable strength and durability.
- 2.7 PIPE BOLLARDS: Fabricate pipe bollards from Schedule 80 steel pipe. Cap bollards with 1/4-inch-minimum steel plate. Fabricate bollards with 3/8-inch-thick steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch anchor bolts.

- 2.8 LOOSE STEEL LINTELS: Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches, unless otherwise indicated. Members supporting masonry, such as lintels, shall have a maximum deflection of  $L/600$ .

**PART 3 - EXECUTION**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 COORDINATION: Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- 3.3 WELDING: Perform shop and/or field welding required in connection with the work of this Section in strict accordance with pertinent recommendations of the American Welding Society.
- 3.4 FABRICATION: Fabricate with accurate angles and surfaces which are true to the required lines and levels, grinding exposed welds smooth and flush, forming exposed connections with hairline joints, and using concealed fasteners wherever possible. Prior to shop painting or priming, properly clean metal surfaces as required for the applied finish and for the proposed use of the item. On surfaces inaccessible after assembly or erection, apply two coats of the primer.
- 3.5 INSTALLATION: Set work accurately into position, plumb, level, true, and free from rack. Anchor firmly into position. Where field welding is required, comply with AWS recommended procedures of manual-shielded metal-arc welding for appearance and quality of weld and for methods to be used in correcting welding work. Grind exposed welds smooth, and touch-up shop prime coats. Do not cut, weld, or abrade surfaces which have been hot-dip galvanized after fabrication and which are intended for bolted or screwed field connections.
- 3.6 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any. Anchor supports for operable partitions securely to and rigidly brace from building structure. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified above for setting and grouting bearing and leveling plates.
- 3.7 CLEANING: Immediately after installation, clean field welds, bolted connections, and abraded areas of shop priming. Paint the exposed areas with same material used for shop priming.



## 05 51 13 - METAL PAN STAIRS

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 PERFORMANCE REQUIREMENTS: Provide handrails and railings complying with requirements in ASTM E 985 for structural performance, based on testing performed according to ASTM E 894 and ASTM E 935. Provide metal stairs capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component of metal stairs. Treads and platforms of metal stairs to be capable of withstanding a uniform load of 100 lbf/sq. ft. or a concentrated load of 300 lbf on an area of 4 sq. in., whichever produces the greater stress. Stair framing to be capable of withstanding stresses resulting from loads specified above in addition to stresses resulting from railing system loads. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.
- 1.3 SUBMITTALS: Show fabrication and installation details for metal stairs. Include plans, elevations, sections, and details of metal stairs and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified Texas registered professional engineer responsible for their preparation.
- 1.4 QUALITY ASSURANCE: Arrange for metal stairs specified in this Section to be fabricated and installed by the same firm. Fabricator to be experienced in producing metal stairs similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. Comply with quality procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- 1.5 COORDINATION: Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

### PART 2 - PRODUCTS

- 2.1 FERROUS METALS: Provide metal free from pitting, seam marks, roller marks, and other imperfections where exposed to view on finished units. Do not use steel sheet with variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet. Steel Plates, Shapes, and Bars complying with ASTM A 36/A 36M. Cold-formed steel tubing complying with ASTM A 500.
- 2.2 FASTENERS: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- 2.3 PAINT: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- 2.4 EXTRUDED ABRASIVE NOSINGS: Fabricate units in sizes and configurations indicated and in lengths necessary to accurately fit openings or conditions. Provide extruded-aluminum units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer. Apply clear lacquer to concealed bottoms, sides, and edges of units set into concrete.

- 2.5 GROUT: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- 2.6 CONCRETE FILL AND REINFORCING MATERIALS: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 3000 psi, unless higher strengths are indicated. Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and nonglazing; unaffected by freezing, moisture, or cleaning materials.
- 2.7 FABRICATION, GENERAL: Provide complete stair assemblies, including metal framing, hangers, struts, handrails, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure. Join components by welding, unless otherwise indicated. Use connections that maintain structural value of joined pieces. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain. Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated; Commercial class, unless otherwise indicated. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Shear and punch metals cleanly and accurately. Remove sharp or rough areas on exposed surfaces. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.
- 2.8 STEEL-FRAMED STAIRS: Fabricate stringers of structural-steel channels, plates, or a combination of both, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural-steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to stringers; bolt or weld framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces. Metal Risers, Subtread Pans, and Subplatforms to be formed to configurations shown from steel sheet of thickness necessary to support indicated loads, but not less than 0.0677 inch. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting. Attach extruded abrasive nosings to risers. Make nosings full width of tread, with noses flush with riser faces and level with tread surfaces.
- 2.9 STEEL TUBE HANDRAILS AND RAILINGS: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads. Configuration: 1-1/2-inch-square top and bottom rails, 1-1/2-inch-square posts, and 1/2-inch-square pickets spaced not more than 4 inches clear. Interconnect members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated. At tee and cross intersections, cope ends of intersecting members to fit contour of tube to which end is joined, and weld all around. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components. Close exposed ends of handrail and railing members with prefabricated end fittings. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch or less. Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting railings and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work. Connect railing posts to stair framing by direct welding, unless otherwise indicated. Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports.
- 2.10 FINISHES: Comply with NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Finish metal stairs after assembly. Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed products. Apply shop primer to prepared surfaces of metal stair components, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors. Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free from rack. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- 3.2 INSTALLING STEEL TUBE RAILINGS AND HANDRAILS: Adjust handrails and railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and railing ends to building construction by welding directly to steel supporting members or with steel round flanges welded to rail ends and anchored with postinstalled anchors and bolts.
- 3.3 ADJUSTING AND CLEANING: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."

## 05 51 33 - METAL LADDERS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Prefabricated mezzanine access ladders.
- B. Prefabricated roof access ladders.

#### 1.2 RELATED SECTIONS

- A. Section 06 10 00 - ROUGH CARPENTRY: Blocking in metal wall studs and partitions for anchorage of access ladders

#### 1.3 REFERENCES

- A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 1992.
- B. OSHA 29 CFR Standard 1910.27 - Fixed ladders; Occupational Safety and Health Standards; current edition

#### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 23.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Shop Drawings: Detailed drawings showing complete dimensions, all materials, mounting attachments, and fabrication details.

#### 1.5 WARRANTY: Manufacturer's 5 year limited warranty.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the engineering and manufacturing of metal ladders.

### PART 2 - PRODUCTS

#### 2.1 PREFABRICATED MEZZANINE ACCESS LADDERS

- A. BASIS OF DESIGN: ALACO Ladder Co., Model MP80° – 80 (485) ladder for mezzanine access. They are extendible, then can be folded away when not in use. These ladders are available standard with extended handrail configurations, with non-marking, solid rubber feet for secure floor contact when extended. This model can be ordered without handrails, or with flush handrails.
- B. CONSTRUCTION & MATERIALS: Aluminum ladders and their components to be fabricated from 6061-T6 aluminum alloy for added safety, strength and long-lasting durability, with no painting required; 3" (76mm) wide steps mounted on 12" (305mm) centers; mounting bracket-slide assemblies for flat storage against the wall. Non-marking solid rubber feet extend 3/4" (19.1mm) from the rail ends for secure installation at a 80 degree angle. Handrails 1-1/4" (32mm) round serrated aluminum tubing with cast aluminum fittings.
- C. SIZES: Height- up to 14' (4.2 m); Width- 24" (610mm)

- D. FINISHES & COATINGS: Mill finish standard on aluminum ladders.
- E. APPLICABLE STANDARDS: American National Standards Institute (ANSI) - ANSI A14.3 American National Standard for Ladders - Fixed - Safety Requirements
- F. APPROVALS: U.S. Occupational Safety and Health Administration (OSHA); ALACO aluminum ladders are certified to meet OSHA/ANSI A14.3 standards for fixed wall ladders.
- G. WARRANTY: limited warranty of 5 years.

## 2.2 PREFABRICATED ROOF ACCESS LADDERS

- A. BASIS OF DESIGN: ALACO Ladder Co. Model HP80°-80° (480) ladders for roof hatch access, extendible with flush handrails; to be folded away when not in use. Provide standard with non-marking, solid rubber feet for secure floor contact when extended.
- B. CONSTRUCTION & MATERIALS: Aluminum ladders and their components to be fabricated from 6061-T6 aluminum alloy for added safety, strength and long-lasting durability, with no painting required; 3" (76 mm) wide flat steps with nonslip ridges, mounted on 12" (305 mm) centers. Provide mounting bracket-slide assemblies for flat storage against the wall; non-marking solid rubber feet extend 3/4" (19.1mm) from the rail ends for secure installation at an 80 degree angle; flush handrails of 1-1/4" (32 mm) round serrated aluminum tubing with cast aluminum fittings.
- C. SIZES: Height- Up to 14' (4.2 m); Width- 20" (508 mm)
- D. FINISHES & COATINGS: Mill finish is standard on aluminum ladders.
- E. APPLICABLE STANDARDS: American National Standards Institute (ANSI) - ANSI A14.3 American National Standard for Ladders - Fixed - Safety Requirements
- F. APPROVALS: U.S. Occupational Safety and Health Administration (OSHA); ALACO aluminum ladders are certified to meet OSHA/ANSI A14.3 standards for fixed wall ladders.
- G. WARRANTY: limited warranty of 5 years.

## PART 3 - EXECUTION

- 3.1 EXAMINATION: Do not begin installation until substrates have been properly prepared. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- 3.2 INSTALLATION: Install in accordance with manufacturer's instructions and approved shop drawings, and in compliance with ANSI A14.3 and OSHA 1910.27.
- 3.3 PROTECTION: Protect installed products until completion of project. Touch-up, repair or replace damaged products before Substantial Completion.

**05 51 36 - MODULAR METAL STAIRS & RAMPS**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Design, fabrication, and installation of modular aluminum stairs and ramps.
  - 1. Understructure: aluminum (standard) or galvanized steel (optional).

**1.2 SUBMITTALS**

- A. Shop Drawings: Submit shop drawings sealed by a registered professional engineer indicating location, size, details, and quantity of all concrete, steel, aluminum components and accessories.
- B. Color Chart: Submit for selection if applicable.
- C. Product Sample: Submit if applicable
- D. Manufacturer's product data. Submit if applicable.
- E. Certificates: Submit if applicable.

**1.3 QUALITY ASSURANCE**

- A. Codes and Standards: Design, fabrication, and installation shall be in accordance with applicable codes, regulations, and accessibility requirements (ADA). Owner will furnish local code requirements.
- B. Manufacturer Qualifications: Minimum 5 years experience in the design and manufacture of modular metal equipment.
- C. Installer Qualifications: Employ persons trained and experienced in the installation of modular metal equipment.
- D. Welders: AWS certified.

**1.4 PROJECT CONDITIONS**

- A. Owner will verify site location.
- B. Owner will locate all underground utilities and obstructions.
- C. Owner will furnish geotechnical report indicating soil conditions and allowable soil bearing pressure.
- D. Owner will verify location and benchmark dimensions and elevation.

**1.5 WARRANTY**

- A. Warranty modular metal stairs and ramps to be satisfactory as to design, workmanship, and materials for 3 year beginning after completion of project.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURER**

- A. American Access, Inc.
- B. Express Ramps, LLC
- C. Redd Team / Sapa Extrusions LLC
- D. As approved by Architect

## 2.2 MATERIALS

- A. Extruded aluminum Bars, Rods, Wire, Shapes and Tubes shall be 6063-T6 alloy and temper with a minimum ultimate tensile strength of 22,000 psi. Comply with ASTM B 221.
- B. Sheet and Plate Aluminum: ASTM B 209; 5005 alloy.
- C. Extruded Aluminum-Alloy Structural Pipe and Tube. Comply with ASTM B 429.
- D. Mechanical Fasteners: Aluminum, stainless steel or other non-corrosive materials compatible with aluminum members, trim, hardware, anchors and other components of the modular system.

## 2.3 MODULAR RAMPS AND STAIRS

- A. Height, Size & Layout – See drawings
- B. Design: Design shall be in accordance with American Institute of Steel Construction , AA-94 – Aluminum Design Manual, and ACI.
- C. Design Loads:
  - 1. Live Load: 100 pounds per square foot (psf) gross horizontal projection.
  - 2. Perpendicular Sway Load: 10 per linear foot (plf) of seat plank.
  - 3. Lateral Sway Load: 24 plf of seat plank.
  - 4. Wind Load: Per local building code requirements.
  - 5. Live Load for Seat and Tread Planks: 120 plf.
  - 6. Guardrail and Handrail Loads: A single 200 pounds concentrated or 50 plf distributed load applied in any direction, at any location.
- D. Landings: Walking surface of the landing shall be continuous, without gaps, knurled or cross-hatched, aluminum deck with extruded slip resistant surface.
- E. Legs: Fabricated of aluminum shapes and plate.
  - 1. Lengths as required to fit site conditions.
  - 2. Provide with 4 inch by 4 inch foot pads.

3. Design to be independent each side, perpendicular to the ground and allow for adjustment without additional foundation systems.
  4. Legs shall not protrude outside the footprint of the walking surface, eliminating tripping hazards.
- F. Handrail and Guardrail: Fabricated of aluminum tubing and fittings.
1. Handrail shall have outside diameter of 1.5 inches.
  2. Handrail gripping surface shall be smooth and continuous throughout ramp sections, steps and landings.
  3. Guardrails shall form a protective barrier of a minimum of 42 inches high and designed such that a 4 inch sphere can not pass through any opening.
  4. Pickets, balusters will be minimum aluminum 3/4 inch by 3/4 inch, 4 inches o.c.
  5. Inside handrail to be attached to guardrail 34 inches to 38 inches above walking surface.
- G. Steps: Fabricated of aluminum shapes and deck.
1. Step threads 12 inches deep typical
  2. Step riser heights 7 inches typical.
  3. Walking surface of the step fabricated of extruded aluminum decking with a slip resistant surface and provided with riser closures
- H. Ramps: Fabricated of aluminum shapes and deck.
1. Slope to be no greater than 1:12.
  2. Walking surface of the ramp fabricated of extruded aluminum decking with a slip resistant surface and provided with riser closures
- I. FINISHES
1. Shop finish system components as follows:
    - a. Preparation: Brush Off Blast
      - i Remove all oil, grease, dirt, mill scale, corrosion products, oxides or other foreign from the surface by abrasive blasting, except for very light shadows, very slight streaks or slight discolorations caused by mill scale oxides.
      - ii At least 95 percent of each square inch of surface area shall be free of all visible residues, and the remainder shall be limited to the light discolorations. Final blast profile should not exceed 0.7mils.
    - b. Powder Coat:
      - i Electrostatically applied Thermosetting Powder Coating, Polyester Powder Coating, meeting performance requirements of AAMA 2603.



J. FABRICATION

1. Fit and shop assemble components in largest practical sizes for delivery to site.
2. Fabricate components with joints tightly fitted and secured. Furnish spigots and sleeves to accommodate site assembly and installation.
3. Exposed Mechanical Fastenings: Screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
4. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, and flush. Ease exposed edges to small uniform radius.
5. Accurately form components to suit stairs and landings, to each other and to building structure as applicable.

- K. Accessibility Provision: Design and construct entire system in accordance with local code requirements, TAS and ADA.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify field conditions are acceptable and are ready to receive work
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. Conceal bolts and screws whenever possible.
- D. All legs should land on a solid surface or a concrete paver. Minimum dimensions of paver must be equal to or greater than 2 inches H by 6 inches W by 9 inches.
- E. Anchor assembly using anchors provided as specified in Section 05500.

3.4 PROTECTION

- A. Protect installed products until completion of project.

- B. Touch-up, repair or replace damaged products before Substantial Completion.

## 05 52 13 - PIPE AND TUBE RAILINGS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Galvanized steel pipe and tube handrails and railings.
- B. Related Sections include the following:
  - 1. Division 5 Section "Metal Stairs" for steel pipe handrails and railings included with metal stairs.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. General: In engineering handrails and railings to withstand structural loads indicated, determine allowable design working stresses of handrail and railing materials based on the following:
  - 1. Structural Steel: AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."
  - 2. Cold-Formed Structural Steel: AISI SG-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."
- B. Structural Performance of Handrails and Railings: Provide handrails and railings complying with requirements of ASTM E 985 for structural performance, based on testing performed according to ASTM E 894 and ASTM E 935.
- C. Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

#### 1.4 SUBMITTALS

- A. Product Data: For the following:
  - 1. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.
  - 1. For installed handrails and railings indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

- D. Product Test Reports: From a qualified testing agency indicating handrails and railings comply with ASTM E 985, based on comprehensive testing of current products.
- 1.5 QUALITY ASSURANCE: Source Limitations: Obtain each type of handrail and railing through one source from a single manufacturer.
- 1.6 STORAGE: Store handrails and railings in a dry, well-ventilated, weathertight place.
- 1.7 PROJECT CONDITIONS: Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- 1.8 COORDINATION: Coordinate installation of anchorages for handrails and railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- 1.9 SCHEDULING: Schedule installation so handrails and railings are mounted only on completed walls. Do not support temporarily by any means that does not satisfy structural performance requirements.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Steel Pipe and Tube Railings:
    - a. Humane Equipment Co.
    - b. Wagner: R & B Wagner, Inc.
    - c. Local Manufacture

### 2.2 METALS

- A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.
- B. Steel and Iron: Provide steel and iron in the form indicated, complying with the following requirements:
  - 1. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:
    - a. Black finish, unless otherwise indicated.
    - b. Type F, or Type S, Grade A, standard weight (Schedule 40), unless another grade and weight are required by structural loads.
  - 2. Steel Tubing: Cold-formed steel tubing, ASTM A 500, Grade A, unless another grade is required by structural loads.
  - 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
  - 4. Iron Castings: Malleable iron complying with ASTM A 47, Grade 32510.
- C. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

### 2.3 WELDING MATERIALS, FASTENERS, AND ANCHORS

- A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.
  - 1. For steel handrails, railings, and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
- C. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
  - 1. Provide concealed fasteners for interconnecting handrail and railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for handrails and railings indicated.
  - 2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.
- D. Cast-in-Place and Postinstalled Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
  - 1. Cast-in-place anchors.
  - 2. Chemical anchors.
  - 3. Expansion anchors.

## 2.4 PAINT

- A. Bituminous Paint: For below grade locations, cold-applied asphalt emulsion complying with ASTM D 1187.
- B. Shop Primers: Provide primers to comply with applicable requirements in Division 9 Section "Painting."

## 2.5 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

## 2.6 FABRICATION

- A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble handrails and railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Form changes in direction of railing members as follows:

1. By bending.
  2. By inserting prefabricated flush-elbow fittings.
  3. By any method indicated above, applicable to change in direction involved.
- D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- E. Welded Connections: Fabricate handrails and railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections continuously to comply with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove flux immediately.
  4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- F. Nonwelded Connections: Fabricate handrails and railings by connecting members with concealed mechanical fasteners and fittings, unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
1. Fabricate splice joints for field connection using an epoxy structural adhesive where this is manufacturer's standard splicing method.
- G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.
- H. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.
- I. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, and steel plate forming bottom closure.
- J. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- K. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- L. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.
- M. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.
- N. Fabricate joints that will be exposed to weather in a watertight manner.
- O. Close exposed ends of handrail and railing members with prefabricated end fittings.
- P. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch or less.

- Q. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

## 2.7 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

## 2.8 STEEL FINISHES

- A. Exterior locations:

- 1. Hot-dip galvanize items as indicated to comply with ASTM A 123, for galvanizing steel and iron products & ASTM A 153/A 153M, for galvanizing steel and iron hardware.

- B. Interior locations:

- 1. For nongalvanized steel handrails and railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
- 2. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed handrails and railings: SSPC-SP 7, "Brush-off Blast Cleaning."
- 3. Apply shop primer to prepared surfaces of handrail and railing components, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.
- C. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
- D. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
- E. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- F. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.
- G. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

### 3.2 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of handrails and railings.

- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

### 3.3 ANCHORING POSTS

- A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:
  - 1. Nonshrink, nonmetallic grout or anchoring cement.
- B. Cover anchorage joint with flange of same metal as post, attached to post as follows:
  - 1. Welded to post after placing anchoring material.
- C. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch build-up, sloped away from post.
- D. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
  - 1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

### 3.4 ANCHORING RAILING ENDS

- A. Anchor railing ends into concrete and masonry with round flanges connected to railing ends and anchored into wall construction with postinstalled anchors and bolts.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces.
- C. Weld flanges to railing ends.

### 3.5 ATTACHING HANDRAILS TO WALLS

- A. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface.
- B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- C. Secure wall brackets to building construction as follows:
  - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
- D. For hollow masonry anchorage, use toggle bolts.
- E. For steel-framed gypsum board assemblies, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.

### 3.6 CLEANING

- A. Touchup: Immediately after erection, clean field welds, bolted connections, and abraded finish and apply exposed areas with same material.

### 3.7 PROTECTION

- A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.



- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

## 05 73 13 - DECORATIVE METAL RAILINGS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes stainless-steel ornamental railings.
- B. Related Sections include Division 05 Section "Pipe and Tube Railings" for railings fabricated from pipe and tube components.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails:
    - a. Uniform load of 50 lbf/ ft. applied in any direction.
    - b. Concentrated load of 200 lbf applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Top Rails of Guards:
    - a. Uniform load of 50 lbf/ ft. applied in any direction.
    - b. Concentrated load of 200 lbf applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 3. Infill of Guards:
    - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
    - b. Infill load and other loads need not be assumed to act concurrently.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

#### 1.3 SUBMITTALS

- A. Product Data: For railings assembled from standard components, grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.
  - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples: For each exposed finish required.

#### 1.4 QUALITY ASSURANCE

- A. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis of Design: Design is based on HDI Railing Systems Circum series. Subject to compliance with requirements, provide named product or comparable product approved by the Architect.

### 2.2 METALS

- A. Brackets, Flanges, and Anchors: Same metal and finish as supported rails, unless otherwise indicated.
- B. Stainless Steel:
  - 1. Tubing: ASTM A 554, Grade MT 304.
  - 2. Pipe: ASTM A 312/A 312M, Grade TP 304.
  - 3. Castings: ASTM A 743/A 743M, Grade CF 8 or CF 20.
  - 4. Plate and Sheet: ASTM A 666, Type 304.

### 2.3 MISCELLANEOUS MATERIALS

- A. Fasteners: Provide concealed fasteners, unless exposed fasteners are standard for railings indicated.
  - 1. Stainless-Steel Components: Type 304 stainless-steel fasteners.
  - 2. Dissimilar Metals: Type 304 stainless-steel fasteners.
- B. Anchors: Provide chemical or torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488.

### 2.4 FABRICATION

- A. General: Fabricate railings to comply with design, dimensions, and details indicated, but not less than that required to support structural loads.
- B. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
- C. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings.
- D. Form changes in direction by bending or by inserting prefabricated elbow fittings.
- E. Form curves by bending in jigs to produce uniform curvature; maintain cross section of member throughout bend without cracking or otherwise deforming exposed surfaces.

- F. Close exposed ends of hollow railing members with prefabricated end fittings.
- G. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.
- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.

## 2.5 FINISHES

- A. Stainless Steel: Directional Satin No. 4 Finish.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation.
  - 1. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
  - 2. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- B. Anchor posts to metal surfaces as indicated using fittings designed and engineered for this purpose.
- C. Attach handrails to wall with wall brackets.
  - 1. For steel-framed partitions, fasten brackets to steel framing or concealed steel reinforcements using self-tapping screws of size and type required to support structural loads.

**DIVISION 06 – WOODS, PLASTIC AND COMPOSITES**

**06 10 00 - ROUGH CARPENTRY**

**PART 1 - GENERAL**

- 1.1 GENERAL REQUIREMENTS: Rough carpentry includes carpentry work not specified as part of other sections and which is generally not exposed, except as otherwise indicated. Drawings, General and Supplementary Conditions apply to work of this section.
- 1.2 PRODUCT HANDLING: Protect against exposure to weather and contact with damp or wet surfaces, providing air good circulation.
- 1.3 COORDINATION: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow proper attachment of other work.

**PART 2 - PRODUCTS**

- 2.1 LUMBER GENERAL: Manufacture lumber to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review. Inspection agencies and the abbreviations used include: NLGA - National Lumber Grades Authority, SPIB - Southern Pine Inspection Bureau, WCLIB - West Coast Lumber Inspection Bureau, WWPA - Western Wood Products Association. Factory-mark each piece of lumber with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill. Nominal sizes are indicated, except as shown by detail dimensions. Provide dressed lumber, S4S, unless otherwise indicated. Provide seasoned lumber with 19% maximum moisture content at time of dressing and shipment for sizes 2" or less in nominal thickness.
- 2.2 DIMENSION LUMBER: For light framing (2" to 4" thick, 2" to 4" wide) provide Construction grade; any species graded under WWPA or WCLIB rules, Southern Pine graded under SPIB rules, or Spruce-Pine-Fir graded under NLGA rules. For structural framing (2" to 4" thick, 5" and wider), provide No. 2 grade; Douglas Fir graded under WCLIB or WWPA rules, Hem-Fir graded under WWPA rules, or Southern Pine graded under SPIB rules.
- 2.3 BOARDS: Where boards will be concealed by other work, provide lumber of 19% maximum moisture content (S-DRY) and of Southern Pine No. 2 Boards per SPIB rules, or any species graded Contraction Boards per WCLIB or WWPA rules. Provide sizes indicated.
- 2.4 MISCELLANEOUS LUMBER: Provide wood for support or attachment of other work of size shown. Moisture content 19% maximum for lumber items not specified to receive wood preservative treatment. Use Standard Grade light framing lumber of any species or size required.
- 2.5 CONSTRUCTION PANELS: Comply with PS 1 "U.S. Product Standard for Construction and Industrial Plywood" for plywood panels or American Plywood Association (APA) "Performance Standard and Policies for Structural-Use Panels", Form No. E445. To be fire retardant treated and shall conform to DOC PS 1.
  - A. Subflooring & Roof Sheathing: APA rated exposure 1 sheathing. Span rating as required to suit joist spacing indicated. Thickness 5/8" minimum, or as indicated.
  - B. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant treated plywood APA C-D PLUGGED INT with exterior glue, not less than 1/2".
  - C. Plywood Underlayment: Provide plywood panels in thickness indicated and complying with APA UNDERLAYMENT INT with exterior glue & fully sanded face. Thickness 5/8" minimum, or as indicated.
  - D. Exterior Wall Sheathing: APA rated exposure 1 sheathing. Span ratings as required for stud spacing. Thickness 1/2" minimum, or as indicated.

2.6 MISCELLANEOUS MATERIALS:

- A. Fasteners and Anchorages: Provide size, type, material and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.
- B. Where rough carpentry work is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners and anchorages with a hot-dip zinc coating (ASTM A 153).
- C. Building Paper: ASTM D 226, Type I; asphalt saturated felt, non-perforated, 15-lb. type.

2.7 WOOD TREATMENT: Unless indicated otherwise, treated lumber to be pressure wolmanized #1 YP, conforming to AWPA standards, with retention of .25 for weather contact & .40 for ground contact. Treat indicated items and the following: Wood cants, nailers, curbs, blocking, stripping, sheathing and similar members in connection with roofing, flashing, vapor barriers and waterproofing, wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete. Treated plywood to be pressure wolmanized conforming to AWPA standards.

PART 3 - EXECUTION

- 3.1 INSTALLATION GENERAL: Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement. Set carpentry work to required levels and lines, with members plumb and true and cut and fitted. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads on exposed carpentry work and fill holes. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required.
- 3.2 WOOD GROUNDS, NAILERS, BLOCKING AND SLEEPERS: Provide wherever shown and where required for screeding or attachment of other work. Coordinate location with other work involved. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise show.
- 3.3 WOOD FRAMING, GENERAL: Provide framing members of sizes and on spacing shown, and frame openings as shown, comply with recommendations of "Manual for House Framing", "Recommended Nailing Schedule" and "National Design Specifications for Wood Construction" of National Forest Products Association (N.F.P.A.). Do not splice structural members between supports. Firestop concealed spaces where firestops are not automatically provided by the framing system used.
- 3.4 TREATED WOOD: Construct all exterior exposed framing & sole plates on slab of treated wood.
- 3.5 INSTALLATION OF CONSTRUCTION PANELS: Comply with applicable recommendations contained in Form No. 30D. "APA Design/Construction Guide - Residential & Commercial," for types of construction panels and applications indicated. Fasten panels as indicated below:
  - A. Subflooring: Glue-nail to framing.
  - B. Underlayment: Nail to subflooring. Fill and sand edge joints of underlayment receiving resilient flooring.
  - C. Plywood Backing Panels: Nail to supports.

## 06 17 53 - SHOP FABRICATED WOOD TRUSSES

### PART 1 - GENERAL

#### 1.1 WORK INCLUDED

- A. Fabricate, supply and erect wood trusses as shown on the drawings and as specified. Work to include anchorage, blocking, curbing, miscellaneous framing and bracing.

#### 1.2 DEFINITIONS

- A. TRUSS: The terms "truss" and "wood truss component" refer to open web load carrying assemblies suitable for support of roof decks or floors in buildings.
- B. MANUFACTURER: A manufacturer who is regularly engaged in design and fabrication of wood truss components.
- C. TRUSS INSTALLER: Builder, contractor or sub-contractor who is responsible for the field storage, handling and installation of trusses.

#### 1.3 DESIGN

- A. Trusses shall be designed in accordance with these specifications and where any applicable design feature is not specified herein, design shall be in accordance with applicable provisions of latest edition of National Design Specifications for Wood Construction (NDS) American Forest and Paper Association (AFPA), and Design Specifications for Metal Plate Connected Wood Trusses (ANSI/TPI 1), Truss Plate Institute (TPI), and code of jurisdiction.
- B. Manufacturer shall furnish design drawings bearing seal and registration number of an engineer licensed in state where trusses are to be installed. Drawings shall be approved by Architect prior to fabrication.
- C. Truss design drawings shall include as minimum information:
  - 1. span, depth or slope and spacing of trusses;
  - 2. required bearing width;
  - 3. design loads, as applicable:
    - a. top chord live load;
    - b. top chord dead load;
    - c. bottom chord live load;
    - d. bottom chord dead load;
    - e. concentrated loads and their points of application; and
    - f. wind and seismic criteria;
  - 4. adjustment to lumber and plate design loads for condition of use;
  - 5. reactive forces, their points of occurrence and direction;
  - 6. plate type, gage, size and location of plate at each joint;
  - 7. lumber size, species and grade for each member;
  - 8. location of any required continuous later bracing;
  - 9. calculated deflection ratio and/or maximum deflection for live and total load;
  - 10. maximum axial compressive forces in truss members;
  - 11. location of joints;
  - 12. connection requirements for:
    - a. truss to truss girders;
    - b. truss ply to ply; and

- c. field splices.

## PART 2 - MATERIALS

### 2.1 MATERIALS

#### A. Lumber:

1. Lumber used for truss members shall be in accordance with published Values of lumber rules writing agencies approved by board of review of American Lumber Standards Committee. Lumber shall be identified by Grade mark of a lumber inspection bureau or agency approved by that Board, and shall be as shown on design drawings.
2. Moisture content of lumber shall be no less than 7 percent nor greater than 19 percent at time of fabrication.
3. Adjustment of values for duration of load or conditions of use shall be in accordance with National Design Specifications for Wood Construction (NDS).
4. Fire retardant treated lumber, if applicable, shall meet specifications of truss design and ANSI/TPI 1-2002, par 6.4.9.1 and shall be redried after treatment in accordance with AWPAs Standard C20. Allowable values must be adjusted in accordance with NDS par 2.3.4. Lumber treater shall supply certificate of compliance.

#### B. Metal connector plates:

1. Metal connector plates shall be not less than .0356 inches in thickness (20 gage) and shall meet or exceed ASTM A653-94 grade 37, and shall be hot dipped galvanized according to ASTM A653-94, coating designation G60. Working stresses in steel are to be applied to effective ratios for plates as determined by test in accordance with Sections 5.3 and 5.4 of ANSI/TPI 1-2002.
2. In highly corrosive environments, special applied coatings or stainless steel may be required.
3. At the request of Architect, manufacturer shall furnish a certified record that materials comply with steel specifications.

### 2.2 FABRICATION

- #### A.
- Trusses shall be fabricated in a properly equipped manufacturing facility of a permanent nature. Trusses shall be manufactured by experienced workmen, using precision cutting, jiggling and pressing equipment meeting requirements of ANSI/TPI 1-2002, Section 4. Truss members shall be accurately cut to length angle and true to line to assure proper fitting joints within tolerances set forth in ANSI/TPI 1-2002, Chapter4, and proper fit with other work.

## PART 3 - EXECUTION

### 3.1 HANDLING, INSTALLATION AND BRACING

- #### A.
- Trusses shall be handled during fabrication, delivery and at jobsite so as not to be subjected to excessive bending.
- #### B.
- Trusses shall be unloaded on smooth ground to avoid lateral strain. Trusses shall be protected from damage that might result from on-site activities and environmental conditions. Prevent toppling when banding is removed.



- C. Handle during installation in accordance with Building Component Safety Information (BCSI 1-03), TPI, and ANSI/TPI 1-2002. Installation shall be consistent with good workmanship and good building practices and shall be responsibility of Truss Installer.
- D. Apparent damage to trusses, if any, shall be reported to Manufacturer prior to installation.
- E. Trusses shall be set and secured level and plumb, and in correct location. Trusses shall be held in correct alignment until specified permanent bracing is installed.
- F. Cutting and altering of trusses is not permitted.
- G. Concentrated loads shall not be placed atop trusses until all specified bracing has been installed and decking is permanently nailed in place. Specifically avoid stacking full bundles of decking or other heavy materials onto unsheathed trusses.
- H. Erection bracing is always required. Professional advice should always be sought to prevent toppling or domino-ing of trusses during installation.
- I. The Contractor is responsible for obtaining and furnishing the materials used for installation and permanent bracing.

## **06 20 23 - FINISH CARPENTRY**

### **PART 1 - GENERAL**

- 1.1 SCOPE: Furnish all finish carpentry shown on drawings and specified herein. Architectural woodwork includes all exterior and interior woodwork exposed to view in finished building.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 SUBMITTALS: Submit shop drawings on all items of architectural woodwork. Submit manufacturer's descriptive literature of specialty items not manufactured by the architectural woodworker, as requested by the architect. Submit samples of each wood spec which is to receive transparent finish at job site, as requested by the architect. Submit finished samples of each finish to be applied at factory.
- 1.4 FIELD DIMENSIONS: The woodwork manufacturer is responsible for details and dimensions not controlled by job conditions and shall show on his shop drawings all required field measurements beyond his control. The general contractor and the woodwork manufacturer shall cooperate to establish and maintain these field dimensions.
- 1.5 PRODUCT HANDLING: The woodwork manufacturer and the contractor shall be jointly responsible to make certain that woodwork is not delivered until the building and storage areas are sufficiently dry so that the woodwork will not be damaged by excessive changes in moisture content.
- 1.6 QUALITY ASSURANCE: The latest edition "Quality Standards" of the Architectural Woodwork Institute shall apply and by reference are hereby made a part of this specification. Any item not given a specific quality shall be Custom grade as defined in the latest edition of the AWI "Quality Standards". The approved woodwork manufacturer must have a reputation for doing satisfactory work on time and shall have successfully completed comparable work.

### **PART 2 - PRODUCTS:**

- 2.1 STANDING AND RUNNING TRIM: Exterior - AWI custom grade Red Cedar. Interior for Opaque Finish - AWI custom grade white pine.
- 2.2 CLOSET & STORAGE SHELVING: Unless noted otherwise, AWI standard grade painted plywood.
- 2.3 COUNTER & LAVATORY TOPS: Unless noted otherwise, high pressure plastic laminate on 3/4" exterior grade plywood with 4" splash to wall.
- 2.4 PLASTIC LAMINATE: 1/16" thick, color selected by Owner, by Formica or Wilsonart.
- 2.5 OTHER MATERIALS: Furnish and install any supplementary materials, weather or not specifically indicated, required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

### **PART 3 - EXECUTION**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 CONSTRUCTION: Install the work of this Section in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position. Attach finish carpentry with fine finishing nails, countersink & fill holes; blind nail where possible.

- 3.3 CABINETS: Shop assemble all cabinets. Plastic laminate to be placed in one piece up to 12'. Provide wood blocking in new walls to support all cabinets & mount securely. Provide 4" toespace on all cabinets.
- 3.4 PROTECTION: Protect work during construction; damaged, stained or split material will be replaced. Protect cabinets during storage, installation & until final acceptance; replace any damaged material.

## 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUMMARY: This Section includes the following:
  - A. Interior standing and running trim.
  - B. Wood shelving.
  - C. Plastic-laminate countertops not included in other sections.
- 1.3 DEFINITIONS: Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction prior to woodwork installation. Rough carriages for stairs are a part of interior architectural woodwork. Platform framing, headers, partition framing, and other rough framing associated with stair-work are specified in Division 6 Section "Rough Carpentry."
- 1.4 SUBMITTALS: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections. Product data for each type of product and process specified and incorporated into items of architectural woodwork during fabrication, finishing, and installation. Shop drawings showing location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- 1.5 QUALITY ASSURANCE: Firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work. Arrange for interior architectural woodwork installation by a firm that can demonstrate successful experience in installing architectural woodwork items similar in type and quality to those required for this Project. Except as otherwise indicated, comply with the AWI Quality Standard: "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute for grades of interior architectural woodwork, construction, finishes, and other requirements.
- 1.6 DELIVERY, STORAGE, AND HANDLING: Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration. Do not deliver woodwork until painting and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in "Project Conditions."
- 1.7 PROJECT CONDITIONS: Do not deliver or install woodwork until building is enclosed, wet-work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period. Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work. Verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork by accurate field measurements before being enclosed. Record measurements on final shop drawings.
- 1.8 COORDINATION: Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

### PART 2 - PRODUCTS

- 2.1 MATERIALS: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade indicated and, where the following products are part of interior woodwork, with requirements of the referenced product standards that apply. Comply with requirements of NPA 9.
- 2.2 HIGH-PRESSURE DECORATIVE LAMINATE: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard. Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following: Formica Corporation, Pioneer Plastics Corp., Ralph Wilson Plastics Co. Chemical-Resistant, High-Pressure Decorative Laminate: NEMA LD 3, Grade PF-42.

A. LAMINATE MANUFACTURER COORDINATION: Laminate manufacturer to be same for following systems:

1. 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK
2. 06 41 16 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS
3. 06 41 17 - PLASTIC-LAMINATE-CLAD ADJUSTABLE SHELVEING
4. 08 14 23 - PLASTIC-LAMINATE-FACED WOOD DOORS
5. 10 12 00 - STOREFRONT DISPLAY CASES

2.3 SPECIALTY LAMINATE

- A. Chalk Board Laminate/ Basis of Design: Wilsonart 4627-38 or 4623-38
- B. Marker Board Laminate/ Basis of Design: Wilsonart 1573-09 or 1572-09

2.4 INSTALLATION MATERIALS: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors.

2.5 FABRICATION, GENERAL: Provide interior woodwork complying with the referenced quality standard and of Custom Grade. Comply with requirements of referenced quality standard for wood moisture content in relation to relative humidity conditions existing during time of fabrication and in installation areas. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius. Complete fabrication, including assembly, finishing, and hardware application, before shipment to Project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting. Install glass to comply with applicable requirements of Division 8 Section "Glazing" and of FGMA "Glazing Manual." For glass in wood frames, secure glass with removable stops.

2.6 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH: Comply with AWI Section 300. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work. Assemble casings in plant except where limitations of access to place of installation require field assembly. Wood Species: Red oak, rift sawn (In existing buildings, match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building, unless otherwise indicated).

2.7 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH: Comply with AWI Section 300. Any closed-grain hardwood listed in referenced woodworking standard.

2.8 COUNTERTOPS

- A. Laminate: High-pressure decorative laminate complying with Grade PF-42, 0.042-inch nominal thickness. Provide materials and products from manufacturer's full range of colors and finishes in solid colors. Substrate to be plywood; provide post-formed at damp locations.
- B. Stainless Steel: Sheet material to be 18-8, Type 302, polished to 180 grit No. 4 finish; joints and seams heli-arc welded, free of pits and flaws, ground smooth and polished to No. 4 finish. The "grain" direction of horizontal stainless steel surfaces to be longitudinal, including the splashback. The polishing procedure at right-angle corners of fixtures shall provide a mitered appearance.

2.9 INTERIOR ORNAMENTAL WORK FOR TRANSPARENT FINISH: Comply with AWI Section 700. Red oak, rift sawn (In existing buildings, match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building, unless otherwise indicated).

2.10 ACCESSORIES:

- A. Adjustable Shelf Standards: B04071.
- B. Shelf Rests: B04013.
- C. Grommets for cable passage through countertops: 1 inch OD brown, molded-plastic grommets with 3/4-inch hole and brown plastic cap with slot for wire passage.

PART 3 - EXECUTION

- 3.1 PREPARATION: Condition woodwork to average prevailing humidity conditions in installation areas before installing. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including back priming and removal of packing.
- 3.2 INSTALLATION: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 96 inches. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork and matching final finish where transparent finish is indicated. Complete the finishing work specified in this Section to the extent not completed at shop or before installation of woodwork. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in the shop.
- 3.3 STANDING AND RUNNING TRIM INSTALLATION: Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints, if required. Match color and grain pattern across joints. Install trim after gypsum board joint finishing operations are completed. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes. Fit exterior joints to exclude water. Apply flat grain lumber with bark side exposed to weather.
- 3.4 COUNTERS: Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line. Anchor tops securely to support systems as indicated. Caulk space between backsplash and wall with specified sealant.
- 3.5 ADJUSTING AND CLEANING: Repair damaged and defective woodwork where possible to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance. Clean, lubricate, and adjust hardware. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.
- 3.6 PROTECTION: Provide final protection and maintain conditions in a manner acceptable to fabricator and Installer that ensures that woodwork is without damage or deterioration at the time of Substantial Completion.

## 06 41 16 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Plastic laminate surfaced casework required for this work is scheduled on the drawings. Cabinet bodies at sink base units & all counter tops to be exterior grade plywood core.
- 1.2 QUALITY ASSURANCE: It is the intent of this specification to establish minimum standards for materials, construction, workmanship and finished product of the work to be performed under this section.
- 1.3 SUBMITTALS:
  - A. Shop Drawings: Submit shop drawings for all work furnished under this section. Drawings shall show size, arrangement, type of material, construction and relationship to adjacent work.
  - B. Product Data: Submit product data on plastic laminate and hardware.
  - C. Product Samples: Submit samples of plastic laminate to Architect for selection.
  - D. Close-out Documents: Upon completion of installation, and as a condition of its acceptance, submit copies of warranties, operating instructions and maintenance instructions, if applicable.
- 1.4 PRODUCT INSTALLATION: Furnish, deliver and install all casework, countertops, fillers and accessory items indicated on the drawings or equipment schedule as part of this section.
- 1.5 WORK BY OTHER TRADES: Furnishing, installation and connection of all piping, wiring, conduit, junction boxes and related items required to provide services from building rough-ins to service fixtures within casework and equipment. Sinks and service fixtures other than those scheduled as part of Science Casework unless specifically indicated as work to be supplied under this section. Furnishing, installation and connection of traps, drainlines and vents, including required supports, straps and hangers. Furnishing and installation of wood blocking, framing or reinforcement within building walls to adequately support casework. Furnishing and installation of rubber, vinyl or other special base.

### PART 2 - PRODUCTS

- 2.1 MATERIALS:
  - A. Particle board shall be a minimum 45 # density, balanced construction with moisture content not to exceed eight (8) percent and shall meet or exceed Commercial Standard CS236-66 Type 1, Density B, Class 2.
  - B. Plastic Laminate:
    1. Plastic laminate 1/16" thick, color selected by Architect & approved by Owner, by Formica, Wilsonart, or another manufacturer approved by the Architect.
    2. Exposed exteriors of cabinets and casework shall be vertical surface type high pressure plastic laminate .032" thick meeting or exceeding NEMA Standards LD3-1985 CL20. Color shall be selected by Owner.
    3. Interior face of cabinets and casework shall be .020" thick high pressure plastic laminate cabinet liner meeting or exceeding NEMA Standards LD3-1985 CL20. Color shall be selected by Owner. Concealed face(s) of cabinet and casework end, back and concealed face(s) of tops and bottoms for base cabinets and tall cabinets shall be faced with backer sheet.
    4. High pressure laminate for plastic laminate sufficed countertops shall be general purpose grade .050" meeting or exceeding NEMA Standards LD3-1985 GP50. Selection from manufacturer's standard domestic patterns. Underside faced with backer sheet.

5. Laminates for acid-resistant plastic laminate surfaced countertops shall be CHEMSURF as manufactured by Ralph Wilson Plastics Company, Temple, Texas. Selection from manufacturer's standard patterns. Underside faced with backer sheet.
6. LAMINATE MANUFACTURER COORDINATION: Laminate manufacturer to be same for following systems:
  - a. 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK
  - b. 06 41 16 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS
  - c. 06 41 17 - PLASTIC-LAMINATE-CLAD ADJUSTABLE SHELVING
  - d. 08 14 23 - PLASTIC-LAMINATE-FACED WOOD DOORS
  - e. 10 12 00 - STOREFRONT DISPLAY CASES
- C. Casework Edging: Edges of all casework, cabinet doors, drawer fronts & shelves shall be banded with shop-applied, underlapped, high pressure 3 mil plastic laminate edgeband, the same color as exterior face.

## 2.2 HARDWARE:

- A. Pulls shall be solid brass with a satin chrome finish (U.S.26D) 4" x 5/16". Hinges shall be five knuckle 2 3/4" overlay type hospital tip, >0.095" thick steel with U.S.26D dull chrome finish. Doors less than 42" in height have two hinges, doors 42" to 72" in height have three hinges and doors over 72" in height have four hinges.
- B. Drawers: Drawers are to be a four-sided box constructed of 1/2" thick premium grade 9-ply Baltic birch plywood. All exposed edge of the plywood to be edgebanded. Drawer bottoms are to be 1/4" thick birch plywood. Drawer end shall be fastened to the drawer front and back with chuck and bore joinery. All drawers to receive a 7-level polyester super finish. Drawer slides for standard drawers to be heavy duty 100# test white epoxy coated with a ball bearing slide system, KV-1284 or equal. Drawer slides for file drawers to be heavy duty 100# test, precision full extension type with an anochrome finish, KV-8400 or equal.
- C. All hinged doors shall be equipped with magnetic type door catches having a minimum ten (10) pound pull, attached with screws and slotted for adjustment. Doors for tall cabinets shall have two catches. Catches to have a metal housing.
- D. Adjustable shelf supports shall be Knappe and Vogt 348 Series metal shelf supports designed for installation in holes pre-drilled on 1 1/4" centers in cabinet ends and vertical partitions. Shelf supports have resilient black plastic coating to prevent shelf forward motion.
- E. Lock for casework drawers and hinged doors shall be provided at all locations indicated on drawings or as required by function. Lock shall be five (5) tumbler dead bolt. Each lock shall be furnished with two (2) keys. Locks indicated for sliding glass doors shall be ratchet type sliding showcase locks not subject to masterkey. Include locks at all Teacher's Cabinets and Full Height Storage Cabinets. Key all cabinet locks in a room the same & each room differently.
- F. Coat rods shall be 1" diameter chrome plated steel with molded tan color plastic flanges
- G. Elbow catches shall be used on inactive door when lock is used on pair of doors.
- H. Coat hooks to be heavy-duty, cast, double ended.

- 2.3 CABINET AND CASEWORK CONSTRUCTION: All casework shall be flush overlap type construction. All parts shall be machined for accurate fit and assembled in case clamps under pressure using wood dowels and glue to ensure secure joints and cabinet squareness without exposed fasteners. All dowels shall be minimum eight (8) millimeter diameter, laterally fluted with chamfered ends. Modified or custom units shall be fabricated using similar joinery. All base cabinets and tall cabinets shall have integral bases with unfinished toeboard for application of rubber or vinyl base by "Other Trades". Horizontal rails shall be provided at the top of base cabinets (front and rear), above double doors or drawer/cupboard units and above all drawers and single doors having locks. All horizontal rails shall be 17/16" x 5 1/2". All cabinet ends, tops, bottoms, vertical partitions, fixed intermediates, cabinet doors and drawer fronts shall be 3/4" particle board core (except wet locations), surfaced and edged with the appropriate laminate. Cabinet bodies at sink base units & all counter tops to be exterior grade plywood core. All adjustable shelves in cabinets shall be 3/4" plywood with any exposed edges banded. Shelves shall be surfaced on both faces and edged with the appropriate laminate



indicated previously under "Materials". All cabinet and casework backs shall be 3/8"kv particle board core. Interior faces not normally exposed to view shall be surface with frosty white color melamine roll laminated to core in line with a hydraulic hot press with concealed back face surfaced with backer. The grade designation is general purpose (GP20) surface. Applied finished back shall be 3/4" particle board core surfaces with the appropriate laminate indicated previously under "Materials". Cabinet doors and drawer fronts shall be 3/4" particle board with .032" vertical surface type plastic laminates on exterior surfaces and .020" frosty white color cabinet liner on interior surfaces with doors and drawer fronts edge banded as indicated previously under "Materials".

- 2.4 CASEWORK COUNTERTOPS: Countertops shall be high pressure plastic laminate surfaced; at damp locations provide one piece post-formed, on exterior grade plywood core. Cores shall be 1" thick with 3/4" cores at backsplashes and end splashes. Face and edges shall be surfaced with 1/16" General Purpose grade high pressure laminate. Unexposed surfaces shall be faced with backer. Standard backsplashes shall be 4" high unless otherwise shown or indicated. Return walls and tall cabinets. Return splashes shall be mounted to the edge of countertops with screws and shall be sealed before installed.

### PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS: Prior to installation, verify that equipment may be installed in accordance with manufacturer's recommendations. In the event of a discrepancy, do not proceed with installation until such discrepancy has been resolved.
- 3.2 INSTALLATION: Installation shall be performed by manufacturer's authorized representatives unless otherwise designated by contract documents. Installation work shall conform to manufacturer's standard procedures. Casework and equipment is to be set accurately in place, scribed and permanently secured to the building walls and/or floors. Installation of edgebanding on Item 2.1.4 will be put on after the plastic laminate surfaced countertops. The edgebanding will be put on last.
- 3.3 ADJUSTMENT AND CLEANING: Verify that all equipment is properly installed and operational. All debris resulting from this installation shall be removed and casework interiors and exteriors cleaned at completion.
- 3.4 PROTECTION: Protect work during storage, installation & until final acceptance, replacing any damaged material.

## 06 41 17 - PLASTIC-LAMINATE-CLAD ADJUSTABLE SHELVING

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Plastic laminate surfaced adjustable shelving required for this work is scheduled on the drawings.
- 1.2 QUALITY ASSURANCE: It is the intent of this specification to establish minimum standards for materials, construction, workmanship and finished product of the work to be performed under this section.
- 1.3 SUBMITTALS: Submit shop drawings for all work furnished under this section. Drawings shall show size, arrangement, type of material, construction and relationship to adjacent work. Upon completion of installation, and as a condition of its acceptance, submit copies of warranties, operating instructions and maintenance instructions, if applicable.
- 1.4 PRODUCT INSTALLATION: Furnish, deliver and install all adjustable shelving and accessory items indicated on the drawings or equipment schedule as part of this section.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS:

- A. Particle board shall be a minimum 45 # density, balanced construction with moisture content not to exceed eight (8) percent and shall meet or exceed Commercial Standard CS236-66 Type 1, Density B, Class 2.
- B. Plastic Laminate:
  1. Plastic laminate 1/16" thick, color selected by Architect & approved by Owner, by Formica, Wilsonart, or another manufacturer approved by the Architect.
  2. Exposed exteriors of cabinets and casework shall be vertical surface type high pressure plastic laminate .032" thick meeting or exceeding NEMA Standards LD#-1985 CL20. Color shall be selected by Owner.
  3. LAMINATE MANUFACTURER COORDINATION: Laminate manufacturer to be same for following systems:
    - a. 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK
    - b. 06 41 16 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS
    - c. 06 41 17 - PLASTIC-LAMINATE-CLAD ADJUSTABLE SHELVING
    - d. 08 14 23 - PLASTIC-LAMINATE-FACED WOOD DOORS
    - e. 10 12 00 - STOREFRONT DISPLAY CASES
- C. Shelf Edging: Edges of all casework, cabinet doors, drawer fronts & shelves shall be banded with shop-applied, underlapped, high pressure 3 mil plastic laminate edgeband, the same color as exterior face.

#### 2.2 HARDWARE:

- A. Standards: Basis of design to be Knap & Vogt KV-82 Series Heavy-Duty Designer Standards.
  1. Load: 450 lbs. per pair, minimum.
  2. Double slot design.
  3. 14-gauge steel
  4. 1" wide.
  5. Color to be selected by Architect.
- B. Brackets: Basis of design to be Knap & Vogt KV-182 Series Heavy-Duty Designer Brackets.

1. Load: 450 lbs. per pair, minimum.
2. Double slot design.
3. 16-gauge steel.
4. Vertical adjustment: 1-1/4" increments.
5. Color to be selected by Architect.

2.3 SHELF CONSTRUCTION: All adjustable shelves shall be 3/4" plywood with edges banded. Shelves shall be surfaced on both faces and edged with the appropriate laminate indicated previously under "Materials".

### PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS: Prior to installation, verify that equipment may be installed in accordance with manufacturer's recommendations. In the event of a discrepancy, do not proceed with installation until such discrepancy has been resolved.
- 3.2 INSTALLATION: Installation shall be performed by manufacturer's authorized representatives unless otherwise designated by contract documents. Installation work shall conform to manufacturer's standard procedures.
- 3.3 ADJUSTMENT AND CLEANING: Verify that all equipment is properly installed and operational. All debris resulting from this installation shall be removed and casework interiors and exteriors cleaned at completion.
- 3.4 PROTECTION: Protect work during storage, installation & until final acceptance, replacing any damaged material.



## **06 74 13 - FIBERGLASS REINFORCED GRATINGS**

### **PART 1 - GENERAL**

#### **1.1 SCOPE OF WORK**

- A. The CONTRACTOR shall furnish, fabricate (where necessary), and install all fiberglass reinforced plastic (FRP) items, with all appurtenances, accessories and incidentals necessary to produce a complete, operable and serviceable installation as shown on the Contract Drawings and as specified herein, and in accordance with the requirements of the Contract Documents.

#### **1.2 REFERENCES**

- A. The publications listed below (latest revision applicable) form a part of this specification to the extent referenced herein. The publications are referred to within the text by the designation only.
  - 1. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) Test Methods:
  - 2. ASTM D 635 Rate of Burning and/or Extent and Time of Burning of Self Supporting Plastics in a Horizontal Position
  - 3. ASTM E 84: Surface Burning Characteristics of Building Materials
  - 4. NSF/ANSI STANDARD 61

#### **1.3 CONTRACTOR SUBMITTALS**

- A. The CONTRACTOR shall furnish shop drawings of all fabricated gratings and accessories in accordance with the provisions of this Section.
- B. The CONTRACTOR shall furnish manufacturer's shop drawings clearly showing material sizes, types, styles, part or catalog numbers, complete details for the fabrication and erection of components including, but not limited to, location, lengths, type and sizes of fasteners, clip angles, member sizes, and connection details.
- C. The CONTRACTOR shall submit the manufacturer's published literature including structural design data, structural properties data, grating load/deflection tables, corrosion resistance tables, certificates of compliance, test reports as applicable, concrete anchor systems and their allowable load tables, and design calculations for systems not sized or designed in the contract documents.
- D. The CONTRACTOR may be requested to submit sample pieces of each item specified herein for acceptance by the Architect as to quality and color. Sample pieces shall be manufactured by the method to be used in the WORK.

#### **1.4 QUALITY ASSURANCE**

- A. All items to be provided under this Section shall be furnished only by manufacturers having a minimum of ten (10) years experience in the design and manufacture of similar products and systems. Additionally, if requested, a record of at least five (5) previous, separate, similar successful installations in the last five (5) years shall be provided.
- B. Manufacturer shall offer a 3 year limited warranty on all FRP products against defects in materials and workmanship.

- C. Manufacturer shall be certified to the ISO 9001-2000 standard.
- D. Manufacturer shall provide proof of certification from at least two other quality assurance programs for its facilities or products (UL, DNV, ABS, USCG, AARR).
- E. Manufacturer shall provide proof, via independent testing less than six months old, that materials proposed as a solution do not contain heavy metals in amounts greater than that allowed by current EPA requirements.

## 1.5 PRODUCT DELIVERY AND STORAGE

- A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Adhesives, resins and their catalysts and hardeners shall be crated or boxed separately and noted as such to facilitate their movement to a dry indoor storage facility.
- B. Storage of Products: All materials shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, other deformations, and other types of damage. Adhesives, resins and their catalysts are to be stored in dry indoor storage facilities between 70 and 85 degrees Fahrenheit (21 to 29 degrees Celsius) until they are required.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Basis of Design:
  - 1. Fibergrate Composite Structures Inc., Dallas, Texas. (800) 527 4043, fibergrate.com

### 2.2 GENERAL

- A. All FRP items furnished under this Section shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet the design requirements and dimensions as specified in the Contract Documents.
- B. Fiberglass reinforcement shall be continuous roving in sufficient quantities as needed by the application and/or physical properties required.
- C. Resin shall be {Vinyl Ester, Isophthalic Polyester, Polyester, Vinyl Ester used to produce NSF Standard 61 certified grating, Isophthalic Polyester used to produce NSF Standard 61 certified grating or Modified Acrylic - choose one}, with chemical formulations as necessary to provide the corrosion resistance, strength and other physical properties as required.
- D. All finished surfaces of FRP items and fabrications shall be smooth, resin rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.
- E. All grating products shall have a tested flame spread rating of 25 or less per ASTM E 84 Tunnel Test. Gratings shall also have tested burn time of less than 30 seconds and an extent of burn rate of less than or equal to 10 millimeters per ASTM D635.
- F. All grating products shall be certified to NSF/ANSI Standard 61 {use only if choosing a resin system that can be used to produce gratings to the NSF Standard 61 in sections 2.2 C & 2.3 E}
- G. All mechanical grating clips shall be manufactured of Type 316SS (stainless steel).

## 2.3 MOLDED FRP GRATING

- A. Manufacture: Grating shall be of a one piece molded construction with tops and bottoms of bearing bars and cross bars in the same plane. Grating shall have (a square mesh pattern providing bidirectional strength or a rectangular mesh pattern providing unidirectional strength - choose one). Grating shall be reinforced with continuous rovings of equal number of layers in each direction. The top layer of reinforcement shall be no more than 1/8" below the top surface of the grating so as to provide maximum stiffness and prevent resin chipping of unreinforced surfaces. Percentage of glass (by weight) shall not exceed 35% so as to achieve maximum corrosion resistance, and as required to maintain the structural requirements of the CONTRACT.
  - 1. After molding, no dry glass fibers shall be visible on any surface of bearing bars or cross bars. All bars shall be smooth and uniform with no evidence of fiber orientation irregularities, interlaminar voids, porosity, resin rich or resin starved areas.
- B. Non-slip surfacing: Grating shall be manufactured with a concave, meniscus profile on the top of each bar providing maximum slip resistance.
- C. Grating bar intersections are to be filleted to a minimum radius of 1/16" to eliminate local stress concentrations and the possibility of resin cracking at these locations.
- D. Fire rating: Grating shall be fire retardant with a tested flame spread rating of 25 or less when tested in accordance with ASTM E 84. Data performed only on the resin shall not be acceptable.
- E. Resin system: The resin system used in the manufacture of the grating shall be {Vi-Corr®, VEFG, IFR, FGI, Corvex®, ELS, XFR or Super Vi-Corr - choose one, use VEFG or IFR for NSF Standard 61 certified products}.
- F. Manufacturer may be required to submit corrosion data from tests performed on actual grating products in standard chemical environments. Corrosion resistance data of the base resin from the manufacturer is not a true indicator of grating product corrosion resistance and shall not be accepted. IFR products shall be U.L. listed if available for the grid configuration and surface specified.
- G. Color: Grey or Black.
- H. Depth: 1" with a tolerance of plus or minus 1/16".
- I. Mesh Configuration: 3/4"x3/4" with a tolerance of plus or minus 1/16" mesh centerline to centerline
- J. The manufacturer shall certify that the stiffness of all panels manufactured are never more than 2.5% below the published load-deflection values.
- K. Substitutions: Other products of equal strength, stiffness, corrosion resistance and overall quality may be submitted with the proper supporting data to the engineer for approval.

## 2.4 GRATING FABRICATION

- A. Measurements: Grating supplied shall meet the dimensional requirements and tolerances as shown or specified. The Contractor shall provide and/or verify measurements in field for work fabricated to fit field conditions as required by grating manufacturer to complete the work. When field dimensions are not required, contractor shall determine correct size and locations of required holes or cutouts from field dimensions before grating fabrication.
- B. Layout: Each grating section shall be readily removable, except where indicated on drawings. Manufacturer to provide openings and holes where located on the contract drawings. Grating openings which fit around protrusions (pipes,

cables, machinery, etc.) shall be discontinuous at approximately the centerline of opening so each section of grating is readily removable.

- C. Sealing: All shop fabricated grating cuts shall be coated with vinyl ester resin to provide maximum corrosion resistance. All field fabricated grating cuts shall be coated similarly by the contractor in accordance with the manufacturer's instructions.
- D. Hardware: Type 316 stainless steel hold down clips shall be provided and spaced at maximum of four feet apart with a minimum of four per piece of grating, or as recommended by the manufacturer.

### PART 3 - EXECUTION

- 3.1 INSPECTION: Shop inspection is authorized as required by the Owner and shall be at Owner's expense. The fabricator shall give ample notice to Contractor prior to the beginning of any fabrication work so that inspection may be provided. The grating shall be as free, as commercially possible, from visual defects such as foreign inclusions, delamination, blisters, resin burns, air bubbles and pits. The surface shall have a smooth finish (except for grit top surfaces).
- 3.2 INSTALLATION: Contractor shall install gratings in accordance with manufacturer's assembly drawings. Fasten grating panels securely in place with hold down fasteners as specified herein. Field cut and drill fiberglass reinforced plastic products with carbide or diamond tipped bits and blades. Seal cut or drilled surfaces in accordance with manufacturer's instructions. Follow manufacturer's instructions when cutting or drilling fiberglass products or using resin products; provide adequate ventilation.



## DIVISION 07 – THERMAL AND MOISTURE PROTECTION

### 07 11 13 - BITUMINOUS DAMPPROOFING

#### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUMMARY: This Section includes Cold-applied, asphalt emulsion dampproofing.
- 1.3 SUBMITTALS: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections. Product data for each type of product specified, including data substantiating that materials comply with requirements for each dampproofing material specified. Include recommended method of application, recommended primer, number of coats, coverage or thickness, and recommended protection course. Certification by dampproofing manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
- 1.4 QUALITY ASSURANCE: Engage an experienced Installer who has completed bituminous dampproofing similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance. Obtain primary dampproofing materials and primers from one source and by a single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.
- 1.5 PROJECT CONDITIONS: Proceed with dampproofing only after substrate construction and penetrating work have been completed. Proceed with dampproofing only when existing and forecasted weather conditions will permit work to be performed according to manufacturer's recommendations and warranty requirements.
- 1.6 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

#### PART 2 - PRODUCTS

- 2.1 MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to: Sonneborn Building Products; Karnak Chemical Corporation; Koppers Industries, Inc.; W.R. Meadows, Inc; Henry Brand.
- 2.2 BITUMINOUS DAMPPROOFING: Provide products recommended by manufacturer for designated application. Asphalt-based emulsions recommended by the manufacturer for dampproofing use when applied according to the manufacturer's instructions.
  - A. Trowel Grade: Emulsified asphalt mastic, prepared with mineral- colloid emulsifying agents suitable for application in a relatively thick film, complying with ASTM D 1187, Type I.
  - B. Spray Grade: Emulsified asphalt, prepared with mineral-colloid emulsifying agents without fibrous reinforcement, complying with ASTM D 1227, Type III.
- 2.3 GLASS FABRIC: Woven glass fabric, treated with asphalt, complying with ASTM D 1668, Type I.
- 2.4 THRU WALL AND LINTEL FLASHING: Provide copper fabric (3 oz) at these locations.

#### PART 3 - EXECUTION

- 3.1 PREPARATION: Clean substrate of projections and substances detrimental to work; comply with recommendations of prime materials manufacturer. Install cant strips and similar accessories as shown and as recommended by prime materials manufacturer even though not shown. Fill voids, seal joints, and apply bond breakers, if any, as recommended by prime materials manufacturer, with particular attention at construction joints. Install separate flashings and corner protection stripping, as

recommended by prime materials manufacturer, where indicated to precede application of dampproofing. Comply with details shown and with manufacturer's recommendations. Pay particular attention to requirements at building expansion joints, if any. Do not allow liquid and mastic compounds to enter and clog drains and conductors. Prevent spillage and migration onto other surfaces of work by masking or otherwise protecting adjoining work.

- 3.2 INSTALLATION: Comply with manufacturer's recommendations except where more stringent requirements are indicated and where Project conditions require extra precautions to ensure satisfactory performance of work.
  - A. Apply dampproofing to the following surfaces.
    1. Back side of concrete or masonry retaining walls and stone facing to prevent percolating of water through the wall or facing.
    2. Exterior surface of inside wythe of double-wythe, exterior masonry walls above grade, to prevent water-vapor penetration through the wall.
    3. Joints & penetrations of exterior wall sheathing, to prevent water-vapor penetration through the wall.
  - B. Reinforcement: At changes in plane or where otherwise shown as "reinforced," install lapped course of glass fabric in first coat of dampproofing compound before it thickens.
  - C. Bituminous Cant Strips: Install 2-by-2-inch cant strip of bituminous grout at base of vertical dampproofing where it meets horizontal surface.
  - D. Apply vertical dampproofing down walls from finished-grade line to top of footing, extend over top of footing, and down a minimum of 6 inches over outside face of footing. Extend 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when the Project is completed.
- 3.3 COLD-APPLIED, ASPHALT EMULSION DAMPPROOFING: Brush or spray apply a coat of asphalt emulsion dampproofing at a rate of 1.5 to 2.5 gal./100 sq. ft., depending on substrate texture, to produce a uniform, dry-film thickness of not less than 15 mils. Apply in 2 coats, if necessary, to obtain required thickness, allowing time for complete drying between coats. For Trowel Grade, Trowel apply a coat of mastic asphalt emulsion dampproofing onto substrate at a minimum rate of 7 gal./100 sq. ft., to produce an average, dry-film thickness of 60 mils but not less than 30 mils at any point.
- 3.4 DAMP-PROOFING MEMBRANE: Install membrane base-flashing up backup wall behind & under bottom course of masonry veneer. Install membrane strip over all expansion joints in exterior backup wall & at window perimeter.
- 3.5 MANUFACTURER'S INSPECTION: Have product manufacturer perform inspection for proper installation before the installation of any finish or covering materials.
- 3.6 PROTECTION AND CLEANING: Protect exterior, below-grade dampproofing membrane from damage until backfill is completed. Remove overspray and spilled materials from surfaces not intended to receive dampproofing.

## 07 19 00 - WATER REPELLENTS

### PART 1 - GENERAL

- 1.1 SUMMARY: This section includes water repellent treatments applied to all exterior exposed unpainted cementitious surfaces, including plaster, concrete tilt-wall panels & concrete masonry units. The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. Submit manufacturer's product data, application instructions, and sample warranty.
- 1.2 QUALITY ASSURANCE: Company specializing in applying water repellents with 3 years minimum experience.
- 1.3 DELIVERY, STORAGE, AND HANDLING: Deliver products to site with containers unopened and with manufacturer's seal intact.
- 1.4 PROJECT CONDITIONS: Do not apply water repellent when following conditions are present, except with written instructions from manufacturer: 1. Ambient or surface temperature less than 40 degrees F or predicted to fall below 40 degrees F within 24 hours following application. 2. Rain within 72 hours prior to application or predicted within four hours after application. 3. Wet or frozen substrates. 4. High winds which could cause excessive overspray.
- 1.5 SCHEDULING: Apply water repellent as early as practical to protect substrates during construction. Do not apply to walls until wall cap, flashings, & roof are in place and water trapped in structure has been drained.
- 1.6 SUBMITTALS: Submit manufacturer's product data and installation instructions.
- 1.7 WARRANTY: Provide manufacturer's limited five year warranty. Warrant that water repellent is free from defects in material and manufacture and that surfaces treated with water repellent will exhibit a water repellent effect when applied according to the manufacturer's instructions.

### PART 2 - PRODUCTS

- 2.1 MANUFACTURER: Chemical Products Limited Partnership or equal products of other manufacturers when approved by the Architect.
- 2.2 MATERIALS: CP-250 containing approximately 2.5% modified polysiloxane. Solvent Base as recommended by manufacturer. Comply with applicable regulations for volatile organic compound emissions. Do not dilute or alter water repellent; apply as supplied.
- 2.3 EQUIPMENT: Spray Equipment to be airless type, 150 psi maximum. Equipment and hoses shall be clean and free of foreign material which could be dissolved by solvent and deposited on surfaces to be treated.

### PART 3 - EXECUTION

- 3.1 SCHEDULE: Apply water repellent to exterior concrete masonry. Coordinate with other trades & Owner's scheduled usage of adjacent facilities.
- 3.2 EXAMINATION: Verify that substrates and conditions under which water repellent is to be applied are ready to receive work. Notify Architect in writing of unsatisfactory substrates and conditions. Do not proceed until unsatisfactory substrates and conditions have been corrected in a manner acceptable to applicator.
- 3.3 PREPARATION: Clean substrates. Remove laitance, dirt, oil, asphalt, form release and curing compounds, efflorescence, coatings and other foreign materials. Allow wet surfaces to air dry 72 hours before application. Use cleaning methods compatible with substrates and required appearance including, as applicable: 1. Sweeping and compressed air blasting. 2. Sandblasting. Sweep or air blast to remove dust. 3. Chemical cleaners which are residual free and do not interfere with water repellent. Rinse with water and allow to dry. 4. Water blasting. Allow surfaces to dry. 5. Detergent scrubbing. Rinse with water and allow to dry.

- 3.4 PROTECTION: Protect against overspray of water repellent onto glass and other dense non-porous surfaces, plants, plastic and asphaltic surfaces, painted or coated surfaces, and other surfaces not requiring water repellent treatment. Prevent entry of water repellent into building ventilation system.
- 3.5 JOINT SEALERS: When practical, install joint sealers as specified in other Sections and allow to cure before application of water repellent. If joint sealers are installed after application of water repellent, verify adhesion of joint sealer to treated surfaces. If required, protect joint sealer adhesion surfaces against overspray.
- 3.6 SAFETY: Provide adequate fresh air and ventilation in compliance with OSHA and other authorities having jurisdiction. Observe manufacturer's safety instructions. Read Material Safety Data Sheets and product labels before using. Notify Architect/Engineer two days in advance of scheduled water repellent application.
- 3.7 APPLICATION: Spray water repellent to saturate the surface. On vertical surfaces treat from bottom up. Apply enough material so that excess water repellent runs six to eight inches below the spray pattern before penetrating surface which has just been sprayed. If application is stopped before work is completed, clearly mark location and resume work without any gaps in coverage.
- 3.8 CLEANING: Clean spillage and overspray immediately, before evaporation of solvent. Wipe dry with clean, dry cloth.

## **07 21 16 - BLANKET INSULATION**

### **PART 1 - GENERAL**

- 1.1 GENERAL DESCRIPTION: Provide building insulation where shown on the Drawings, as specified herein, and as needed for a complete and proper installation. Documents affecting work of this Section include, but are not limited to General & Supplementary Conditions.
- 1.2 QUALITY ASSURANCE: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section. Upon completion of this portion of the Work, complete and post a certificate of insulation compliance in accordance with pertinent requirements of governmental agencies having jurisdiction.
- 1.3 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

### **PART 2 - PRODUCTS**

- 2.1 MATERIALS: Provide the following building insulation where shown on the Drawings or otherwise needed to achieve an insulated envelope around conditioned spaces, & as required under pertinent regulations of governmental agencies having jurisdiction. Insulation material to have a flame spread of 10 & smoke developed of 10, meeting requirements of SBCCI 719.
- 2.2 EXTERIOR STUD WALL: Cavity thick unfaced glass fiber batts with suspension device.
- 2.3 INTERIOR STUD WALL: Cavity thick unfaced glass fiber sound isolating batt with suspension device.
- 2.4 ACOUSTICAL CEILING INSULATION: 4" thick unfaced glass fiber sound isolating batt. Except as noted otherwise, place 24" on either side above walls separating classrooms, hallways & offices.
- 2.5 OTHER MATERIALS: Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

### **PART 3 - EXECUTION**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Remove, or protect against, projections in construction framing which may damage or prevent proper insulation.
- 3.2 INSTALLATION: Install the work of this Section in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position. Insulation will be installed at building envelope enclosing conditioned space (walls, ceiling) & as indicated on the drawings. Do not place attic insulation above, or within 3" of any recessed light fixture. Install exposed building insulation tight with reverse stapled seams, to give a consistent finished appearance.
- 3.3 EXPOSED INSULATION: If wallboard is not present on interior of exterior wall: Insulation Straps at 4'-0" O.C., Chicken Wire or Fast-R Insulation Hangers.

## 07 21 29 - SPRAYED INSULATION

### PART 1 - GENERAL

- 1.1 SUBMITTALS: Provide data on materials, describing insulation properties, surface burning characteristics. Indicate special procedures, perimeter conditions requiring special treatment. Certify that products meet or exceed specified requirements.
- 1.2 QUALIFICATIONS: Manufacturer & Applicator to be companies specializing in manufacturing the products specified in this section with minimum 3 years experience.
- 1.3 REGULATORY REQUIREMENTS: Conform to applicable code for flame and smoke ratings.
- 1.4 ENVIRONMENTAL REQUIREMENTS: Products containing urea-formaldehyde will not be permitted. Products and equipment requiring or using CFCs or HCFCs during the manufacturing process will not be permitted.
- 1.5 DELIVERY, STORAGE, AND HANDLING: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material. Store materials in an area protected from freezing and overheating damage and in accordance with manufacturer's instructions. Protect materials during handling and application to prevent damage and contamination.

### PART 2 - PRODUCTS

- 2.1 MANUFACTURER: Icynene, Inc., 5805 White Road, Suite 110, Mississauga, Ontario L4Z 2J1 Canada.
- 2.2 OPEN CELL FOAM: Polyicynene Spray Insulation, hydrophobic, low-density, open-cell modified polyicynene; conforming to the following:
  - A. Thickness: 3-1/2"
  - B. Thermal Resistance (R-Value/inch): ASTM C518; 3.6 hr/sq ft/degree F/BTU. In.
  - C. Air Permeance (for 5.25 inches of material): ASTM E283; 0.0049 l/m<sup>2</sup>/second.
  - D. Water Vapor Transmission (for 5 inches of material): ASTM E96; 10 perms.
  - E. Sound Transmission Class (STC): ASTM E90; STC 37 in wood stud wall.
  - F. Noise Reduction Coefficient (NRC): ASTM E90; NRC-0.7 in wood stud wall.
  - G. Corrosion: No significant corrosion when in contact with steel under 85 percent relative humidity.
  - H. Bacterial or Fungal Growth: No growth; no material deterioration.
  - I. Flame Spread and Smoke Developed Rating: ASTM E84; <20/<400.
  - J. Fuel Contribution: ASTM E84; 0.
  - K. Oxygen Index: ASTM D2863; average value 23.1 percent.
- 2.3 CLOSED CELL FOAM: Provide a two-component closed cell spray foam with a zero-ozone-depleting blowing agent. Medium-density closed cell foam to have an in-place core density of nominal 2.0 pcf. Apply in thickness shown, but in no case less than the R-value required by code.
  - A. APPLICABLE STANDARDS
    1. ASTM C1029, Type I and Type II
    2. ICC-ES, AC-377 (ESR-3758)
    3. 2012 International Residential Code (IRC) Section R316
    4. 2012 International Building Code (IBC) Section 2603
    5. 2012 International Energy Conservation Code (IECC) Section R 303
    6. NFPA 285 (2012 IBC Types I & II Construction)

### PART 3 - EXECUTION

- 3.1 EXAMINATION: Verify existing conditions before starting work. Verify that substrate is free of any foreign material that will impede application. Verify that other work on and within spaces to be insulated is complete prior to application. Notify Architect of conditions that would adversely affect the application. Beginning of installation means applicator accepts existing conditions.

- 3.2      PREPARATION: Comply with manufacturer's written installation instructions for preparing substrates indicated to receive insulation. Mask and protect adjacent surfaces from overspray or damage. Remove foreign materials, dirt, grease, oil, paint, laitance, efflorescence, and other substances that will affect application.
- 3.3      APPLICATION: Apply insulation in accordance with manufacturer's written application instructions. Apply insulation to a reasonably uniform monolithic density without voids. Apply insulation to fill all voids around accessible service and equipment penetrations.
- 3.4      PROTECTION OF FINISHED WORK: Do not permit subsequent work to disturb applied insulation.

## 07 22 00 - ROOF AND DECK INSULATION

### PART 1 - GENERAL

- 1.1 SECTION INCLUDES: Roof and Deck Insulation
- 1.2 RELATED WORK
  - A. Section pertaining to Rough Carpentry Section
  - B. Section pertaining to Modified Bituminous Sheet Roofing
  - C. Section pertaining to Flashing and Sheet Metal
- 1.3 SYSTEM DESCRIPTION: Install board insulation as required to achieve a complete and proper substrate for the roof membrane system.
- 1.4 SUBMITTALS
  - A. Submit manufacturer's installation instructions, samples and product data, in accordance with the provisions of Section pertaining to Submittals.
  - B. Submit two full size samples of each insulation board type and thickness.
  - C. Submit manufacturer's certificate, in accordance with the provisions of Section pertaining to Submittals, that products meet or exceed specified requirements.
  - D. Submit certification from roof membrane manufacturer that board insulation materials are acceptable for use with roof membrane materials.
- 1.5 REGULATORY REQUIREMENTS: Conform to applicable local building codes for roof assembly requirements.
- 1.6 DELIVERY, STORAGE AND HANDLING: Deliver and store products in accordance with the provisions of Section pertaining to Codes, Delivery, Storage, and Handling of Materials, and Section pertaining to Material and Equipment.
- 1.7 SEQUENCING AND SCHEDULING:
  - A. Coordinate work under provisions of Section pertaining to Coordination.
  - B. Coordinate the work of installing roof membrane and flashing as the work of this Section proceeds.

### PART 2 - PRODUCTS

- 2.1 INSULATION MATERIALS
  - A. Insulation Board: Size 4-feet by 8-feet: Insulation shall consist of polyisocyanurate insulation board and shall comply with Federal Specification No. F.S.H.H.-I-1972/GEN/2. Thickness of 3 ¾ inches to provide "R" value of 24.
  - B. Insulation Board: Size not more than 4-feet by 4-feet. Insulation board shall consist of 3/4-inch perlite insulation, in accordance with ASTM C728.
  - C. Thickness of insulation board system: To meet "R" value as specified.
  - D. Tapered Perlite Insulation: Minimum 1/4 inch per foot, tapered insulation, in accordance with ASTM C728 and Federal Specification No. F.S.H.H. I - 529 b.



- E. Fiber Cant: Fiber cant shall have a 5-3/8-inch face, with the same characteristics as insulation board. Fiber cant shall comply with ASTM C728.
- F. Batt Insulation For Expansion Joint: Glass fiber unfaced batt insulation.

## 2.2 BITUMINOUS MATERIALS

- A. Asphalt Roof Cement: ASTM D 4586, non-asbestos, Type I for horizontal applications, Type II for vertical applications.
- B. Asphalt Primer: ASTM D 41.
- C. Asphalt Bitumen: ASTM D 312, Type IV.

## 2.3 FASTENERS

- A. Insulation fastener: No. 12 hex-head fastener with coating which exceeds F.M. Specification No. 4470; with Galvalume metal plates, minimum 3-inch by 3-inch, as recommended by insulation board manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Contractor shall repair deck as necessary to achieve a suitable substrate for installation of new insulation board. Replace deteriorated decking and wood framing as required.
- B. Lay first layer of polyisocyanurate insulation board in staggered pattern as recommended by manufacturer.
- C. Mechanically fasten insulation board to deck in the pattern recommended by the manufacturer to achieve an F.M. IA-90 rating.
- D. Apply second layer of perlite insulation board in solid bitumen mopping at rate recommended by insulation manufacturer. Do not allow the hot mopping to precede the board placement by more than three (3) board lengths. Firmly press each insulation board into hot asphalt by "walking-in" each board immediately after placement.
- E. Stagger end joints in adjacent boards. Butt edges for snug contact.

## 07 26 18 - UNDER-SLAB VAPOR BARRIER

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Products supplied under this section:
  - 1. Vapor barrier and installation accessories for installation under concrete slabs.
- B. Related sections:
  - 1. Section 03 30 00 Cast-in-Place Concrete
  - 2. Section 07 26 18 Vapor Retarders

#### 1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM E1745- 11Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
  - 2. ASTM E1643- 11Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- B. Technical Reference - American Concrete Institute (ACI):
  - 1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

#### 1.3 SUBMITTALS

- A. Quality control/assurance:
  - 1. Summary of test results per paragraph 9.3 of ASTM E1745.
  - 2. Manufacturer's samples and literature.
  - 3. Manufacturer's installation instructions for placement, seaming, penetration repair, and perimeter seal per ASTM E1643.
  - 4. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Vapor barrier shall have all of the following qualities:
  - 1. Maintain permeance of less than 0.01 Perms [grains/(ft<sup>2</sup> · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
  - 2. Other performance criteria:
    - a. Strength: ASTM E1745 Class A.

- b. Thickness: 15 mils minimum
  - c. Provide documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1
- B. Vapor barrier products:
  - 1. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 [www.stegoindustries.com](http://www.stegoindustries.com).
  - 2. Approved Alternate: Vaporguard by Reef Industries, 713-507-4250. [www.reefindustries.com](http://www.reefindustries.com).
  - 3. Approved Alternate: Sundance 15 mil Vapor Barrier by Sundance Inc., (855) 300-7156 [www.sundancepolymertech.com](http://www.sundancepolymertech.com).
  - 4. Approved Alternate: Perminator 15 mil Underslab Vapor Barrier by W.R. Meadows, (800) 342-5976 [www.wrmeadows.com](http://www.wrmeadows.com).
  - 5. Or others equal as approved by Architect.

## 2.2 ACCESSORIES

- A. Seams :
  - 1. Stego Tape by Stego Industries LLC, (877) 464-7834 [www.stegoindustries.com](http://www.stegoindustries.com).
- B. Penetrations of Vapor barrier:
  - 1. Stego Mastic by Stego Industries LLC, (877) 464-7834 [www.stegoindustries.com](http://www.stegoindustries.com).
  - 2. Stego Tape by Stego Industries LLC, (877) 464-7834 [www.stegoindustries.com](http://www.stegoindustries.com).
- C. Perimeter/edge seal:
  - 1. Stego Crete Claw by Stego Industries LLC, (887) 464-7834 [www.stegoindustries.com](http://www.stegoindustries.com).
  - 2. Stego Term Bar by Stego Industries LLC, (877) 464-7834 [www.stegoindustries.com](http://www.stegoindustries.com).
  - 3. StegoTack Tape (double sided) by Stego Industries LLC, (877) 464-7834 [www.stegoindustries.com](http://www.stegoindustries.com).

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Ensure that subsoil is approved by Architect or Geotechnical Engineer.
  - 1. Level and compact base material.

### 3.2 INSTALLATION

- A. Install vapor barrier in accordance ASTM E1643.
  - 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
  - 2. Extend vapor barrier over footings and grade beams to a distance acceptable to the structural engineer or stop at impediments such as dowels and waterstops.

3. Seal vapor barrier to slab perimeter/edge using Stego Crete Claw and remove dirt, debris, and mud from Crete Claw prior to concrete placement.
4. Overlap joints 6 inches and seal with manufacturer's tape.
5. Apply tape/Crete Claw to a clean and dry vapor barrier.
6. Seal all penetrations (including pipes) per manufacturer's instructions.
7. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
8. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all sides with tape.

**07 30 60 - SLOPED METAL ROOF RETROFIT SYSTEM**

**PART 1 - GENERAL**

- 1.1 **WORK INCLUDED:** The pre-engineered sloped metal roof retrofit system shall be design-build, to include the design of all structure and facade required for the system and construction of system as designed.
- 1.2 **EXAMINATION OF PREMISES:** Before submitting proposals for this work, each bidder is responsible for having examined the premises, including grades, utilities and obstructions (if any) to be moved, etc. and shall have satisfied himself concerning the existing conditions under which he will be obligated to operate.
- 1.3 **MEASUREMENTS:** Before ordering any materials or doing any work, each Contractor shall verify all measurements at the building and shall be responsible for the correctness of same. No extra charge or compensation will be allowed on account of difference between actual dimensions and the measurement indicated on the drawings; any difference between which may be found shall be submitted to the Owner for consideration before proceeding with the work. Each Contractor shall consult other trades so that his work and the other trades' work will come together properly.
- 1.4 **APPROVAL OF MATERIALS:** Within seven (7) days prior to the receipt of bids, the Contractor shall make a written request to the Owner to obtain his approval for the use of any materials, construction, etc., other than those mentioned as standard in the specifications or so indicated on the drawings. The Contractor shall obtain the Owner's approved materials, construction, etc., proposed for use when "approved" materials or work are specified without mentioning any standard by name.
- 1.5 **SHOP DRAWINGS AND SUBMITTALS:** The Contractor shall thoroughly check all shop drawings, submittals and schedules regarding quantities, measurements, sizes of members, details and coordination with adjacent equipment, structural members or Architectural features before submitting same for approval. He shall then submit a minimum of (5) sets of all shop drawings, schedules and equipment submittals. The owner will retain (2) approved sets, returning the remainder to the Contractor. Samples and finish of materials as requested shall be furnished with promptness and will be accepted or rejected under the same conditions as stated above. Shop drawings shall show dimensioning, construction details, methods of anchorage and installation. Shop drawings shall be stamped by a structural engineer, licensed to practice in the state where the project is to be completed.
- 1.6 **WARRANTY:** Metal roofing system warranty shall meet or exceed in all respects the "Twenty Year Standing Seam Roof System Watertight Limited Warranty" as issued by the manufacturer.
- 1.7 **ENGINEERING AND LAYOUT SERVICE:** The Contractor shall furnish any engineering and layout services necessary to provide all lines and grade in accordance with the drawings and specifications.
- 1.8 **STORAGE AND TEMPORARY FACILITIES:** The Contractor shall consult with the Owner as to areas available for storage of material and equipment. The Contractor agrees that all materials, equipment and temporary facilities (if required), will be located in the areas designated by the Owner and such locations as will not interfere with access.
- 1.9 **PROJECT SAFETY REQUIREMENTS AND RESPONSIBILITY:** The Contractor shall be responsible for enforcing and compliance of all Local, State or Federal Safety Programs and/or precaution in connection with this construction project.
- 1.10 **QUALIFICATION:** All bidders shall have a minimum of five (5) years of experience installing roofing systems similar to the system required for this project. Submit Contractor Qualification statement provided by owner/architect. Metal roofing system shall include secondary metal framing and anchors, metal roofing panels, anchor clips, fascia panels, flashings, gutters, downspouts, roof flashings and other companion accessories as required for complete and proper installation.

**PART 2 - PRODUCTS**

- 2.1 Roof Panels shall be 24 gauge aluminum-zinc alloy seated steel equal to "Galvalume" as manufactured by Bethlehem Steel Corporation. Panels shall be roll-formed continuous from eave to ridge. No end laps of roof panels will be allowed. Panels shall be of same material and configuration as set forth by the UL90 construction number for that respective manufacturer. Material deviations from the UL90 construction number will not be permitted. Panels shall be identical to new roof panel installation. All panels shall have a mechanically applied sealant in the female rib continuous from eave to ridge.
- 2.2 Fasteners shall be Buildex Climaseal or approved equal and comply with the following:

- A. Eave - #18 - 9x1 self drillers with neoprene washer.
- B. Ridge - #18 - 9x1 self drillers with neoprene washer.
- C. Clips - #12 x 3/4 self drillers
- D. Curbing - #12 x 3/4" self drillers with neoprene washer.
- E. Pipe Flashing - #18 - 9x1 self drillers with neoprene washer.
- F. Vent Flashing - #18 - 9x1 self drillers with neoprene washer.
- G. Ventilators - #18 - 9x1 self drillers with neoprene washer.
- H. Sub & Frame - 1/4-14 x 3/4" self drillers.

- 2.3 Panel Clips shall be two-part assembly to allow for expansion and contraction. Height of clips shall match rib height. Stationary Panel Clips shall be one-part assembly and placed at one per panel at the ridge end of the roof panel. NO FASTENERS THROUGH THE ROOF PANELS SHALL BE PERMITTED.
- 2.4 Sealants which are field applied shall be S-M 5522 Acryl-R acrylic sealant or approved equal. Field applied sealants in conjunction with TC95 modified isobutylene, triopolymer mastic tape shall be used at all end laps, curbs, roof jacks, ventilators and gutters.
- 2.5 Curbs shall be custom fabricated from 1/8" aluminum sheet material with a 6" wide base and a 6" high vertical leg. Corners and other joints shall be welded. NO LIGHT GAUGE STEEL CURBS WILL BE ALLOWED.
- 2.6 Fascia/Wall Panels shall be job-site, roll-formed 24 gauge galvalume (standing seam panel) sheet metal with Kynar 500 finish or approved equal.
- 2.7 Flashing at the rake and high eave shall be fabricated from 24 gauge galvalume sheet metal with Kynar 500 finish or approved equal. Flashing installation shall not inhibit movement due to thermal expansion and contraction. Trim members shall be fabricated from 24 gauge galvalume sheet metal with Kynar 500 finish or approved equal. Gutters shall be fabricated from 24 gauge galvalume sheet metal with Kynar 500 finish or approved equal. Minimum lengths will be 20'-0" o.c. with expansion joints at 60'-0" o.c. Downspouts & Elbows shall be 26 gauge sheet metal pre-painted to match gutters. Downspouts will be placed to accommodate 150 square foot of roof area per inch circumference of downspout.
- 2.8 Companion Roof Jacks shall be provided at all round roof penetrations complete with storm collars. Ventilators shall be equal to Lomanco Model No. BIB 12, wind driven turbine ventilators. Install ventilators as required by code.
- 2.9 Sloped Framing System shall be designed and constructed of materials in type and gauge as set forth by the UL90 construction number for that respective manufacturer. No light gauge framing systems or material deviations from the ul90 construction number will be permitted.
- 2.10 WALL AND ROOF INSULATION: Manufacturer's standard noncombustible fiberglass blanket. Metal panel wall insulation to be R19 minimum, FSK faced. Roof insulation in concealed areas to be R30 minimum, FSK faced, two-layer R19+R11 system, first layer installed parallel with the purlins, second layer positioned above and perpendicular to the purlins, with 1" minimum foam spacers installed at purlins to minimizing conductive heat transfer from the purlins to the roof panels. In areas where the roof insulation would be exposed to view as the finished ceiling, use R30 minimum, two-layer R19+R11, "Energy Saver FP" system by Guardian Building Products, or another product determined to be equal by the Architect & approved in writing prior to submission of proposal.

### PART 3 - EXECUTION

- 3.1 EXISTING ROOF SYSTEM SURVEY AND TESTING:

- A. Before design work begins by the retrofit system manufacturer, the installation contractor shall perform a rooftop survey to collect critical information about the existing roof and its support system. This information shall be provided to the retrofit system manufacturer and will include the following:
  1. Perimeter dimensions in plan view.
  2. Dimensions of existing exterior and interior parapet walls including height above existing roof, width of coping and slope if applicable.
  3. Existing gravel stop or fascia dimensions including vertical exterior face dimension for concealing by new perimeter flashing.
  4. Existing perimeter gutters that will not be removed per the drawings.
  5. Existing roof support joist type, spacing and span orientation.
  6. Depth and type of existing decking and thickness of thermal insulation.
  7. Type of existing weatherproofing membrane.
  8. Existing roof elevation changes and slope to interior and/or perimeter roof drainage.
  9. Wall construction type at any areas requiring new roof counterflashing.
  10. Exact locations of existing HVAC equipment relative to the roof's edge including height and physical size of units. For units that are to be elevated above the new roof plane and supported by framing provided by the retrofit system manufacturer, the weight of each unit and the required curb size shall be provided.
- B. The contractor shall obtain pullout values on proposed anchors for attaching the retrofit roof system base members to the existing roof's structural system. This testing shall be conducted atop the existing roof at multiple areas using a calibrated pull-out tester. All anchors are to penetrate the existing roof assembly and substrate and attach directly to a structural member. The contractor shall then have the anchorage connection designed to satisfy the minimum wind uplift reactions supplied by the retrofit roof system manufacturer multiplied by a safety factor of 2.50. This design analysis shall be submitted to the Architect for review accompanied by the jobsite pull-out testing report along with technical product information on the proposed anchors to be used for attachment of the retrofit roof framing.
- C. The contractor shall determine the compressive strength of the existing roof substrate assembly. These values shall be recorded in pounds per square inch (PSI) obtained from field testing atop the existing roof at multiple areas. The testing results shall be provided to the retrofit roof system manufacturer for conducting an analysis to ensure the retrofit base members will provide sufficient bearing surface area to satisfy the impending loads. Any values determined to exceed the limitations and physical size of the manufacturer's standard base member based on bearing surface area shall require the contractor to remove the existing membrane and insulation at each affected location. Base members will then be attached at the decking to a structural member. Details of this revised attachment condition shall be submitted to the Architect accompanied by the testing report before work commences.
- D. The contractor shall evaluate the existing roof substrate for moisture content and report to the architect any areas that will require removal. Upon evaluation, the Architect will direct the contractor on remedial work to be performed.

### 3.2 DEMOLITION OF EXISTING ROOF MATERIALS:

- A. The contractor shall remove any loose or semi-loose aggregate from the existing roof by carefully spudding the material from built-up roof asphalt or bitumen. Removal of the aggregate shall be performed at each retrofit roof framing base member location to provide a suitable bearing surface and to promote adhesion of temporary protective sealing at penetrating anchors. The removed materials shall be disposed of properly in accordance with local ordinances and regulations.

- B. The contractor shall remove the existing built-up roofing aggregate by means of a power broom. Care shall be exercised to prevent aggregate from entering roof drains and clogging the existing drainage system during the installation of the retrofit roof framing and metal roof systems. The removed materials shall be disposed of properly in accordance with local ordinances and regulations.

### 3.3 FRAMING SYSTEM INSTALLATION

#### A. General

1. The contractor shall install the retrofit roof framing system as specified and in accordance with the retrofit systems manufacturer's approved installation documents and erection drawings.
2. Install the retrofit purlins to prevent waves, warpage, buckles, fastening stresses or other distortion. Extreme care should be taken when installing the retrofit roof framing purlins and other roof plane components to minimize oil canning in the metal roof panel system.
3. Field cutting of framing members shall be accomplished by power tools and will be done in a safe manner to prevent damage to the existing roof and adjacent materials. The contractor shall practice good material utilization of members to minimize scrap and to not jeopardize the construction schedule due to unnecessary shortages of framing components
4. Retrofit roof framing base members that are continuous shall be shimmed to prevent rainwater damming that may occur during erection of the retrofit roof framing and metal roof systems. Material used for shims shall be of non-deteriorating composition having a minimum thickness of 3/8 inch and providing solid bearing for the impending loads.

#### B. Erection Tolerances

1. Variation of vertical members from plumb: 1/8 inch, maximum
2. Variation of horizontal members from level: 1/8 inch, maximum over length of member
3. Variation of purlins from true roof plane: 1/4 inch in 20'-0" and 3/8" maximum in 40'-0"
4. Variation in purlin runs at ridge and panel end laps: 1/4 inch maximum in 20'-0"

### 3.4 EXISTING ROOFTOP COMPONENTS AND EQUIPMENT

- A. When mechanical equipment locations conflict with retrofit roof framing components as shown on the manufacturer's drawings, the contractor will provide additional framing that spans over the equipment. Prior to doing this, the contractor shall notify the manufacturer for proper installation and design of spanning members. Manufacturer shall submit construction details for this condition, if deemed necessary by the Architect. In addition, base members and their anchorage must be re-evaluated to ensure that the increased loading condition is satisfied and compliant with Section 1.04, paragraph D.
- B. Electrical Service Extension: For electrical operated equipment that is to be removed and reinstalled at the new metal roof system, the contractor shall extend the wiring in accordance with the specified building and electrical code. Junction boxes shall be provided at splices in wire or conduits and secured to the retrofit roof framing.
- C. Existing Plumbing Extension: Existing sanitary plumbing vents shall be extended to new roof jacks located at the new metal roof plane. Extension of piping shall be accomplished with materials matching the existing piping composition subject to local building and plumbing code requirements. Penetrations and their new roof jacks shall not interrupt any metal roof panel side seam unless approved by the manufacturer and installed in accordance with their installation instructions. Use elbow fittings to redirect the pipe to locate the penetration between the metal roof panel side seams. For gas piping that is located at the existing roof elevation, refer to the drawings for requirements on relocating. If the piping is not to be relocated, adjustments may be necessary to avoid attachment and anchorage of retrofit roof framing base members that conflict with the piping. Submit any changes in to the manufacturer and Architect for approval prior to commencing re-work.



- D. Existing Flue Stacks for High Temperature Apparatus: Existing hot flue stacks shall be extended to the new metal roof plane and protected with a high temperature jack or curb. The contractor shall install the new equipment 3 feet higher than the elevation of any roof within a 10-foot radius. Materials beneath the new roof shall be adequately braced as necessary.
  - E. Existing Ventilation Equipment Extension: Existing gravity vents, power vents, fresh air make-up, and other vents are to be installed on new metal curbs at the new metal roof plane. The contractor shall construct new ductwork from the existing roof penetration to the new roof curb. Ductwork joints shall be sealed tight to provide a leak-proof assembly and shall be made with material of like composition and gage of the ductwork being extended.
- 3.5 ROOFING AND SIDING PANELS: Install roof and canopy panels in such a manner to permit drainage to eaves of building, with panel ends square to eave. Install wall panels with vertical edges plumb. Arrange and nest sidelap joints away from prevailing winds when possible. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to grid lines. Protect factory finishes from mechanical damage or abrasions. Install approved type closures to exclude weather. Install weather seal under ridge cap. Flash and seal roof panels at eave, gable and perimeter of all openings through roof and elsewhere as required or shown on drawings. Flash and/or seal wall and liner panels at perimeter of all openings, under eaves and gable trims, along lower panel edges, and elsewhere as required or shown on drawings, as applicable. Remove all fastener or cutting shavings from roof and wall as erection is completed.
- 3.6 STANDING SEAM ROOF PANELS: Install panels with positive interlock between installation clips and standing seams in manner that will allow panels to support erection loads prior to closing of seams. Install concealed panel clips over top of roofing insulation along each standing seam at location and spacing determined by metal building manufacturer. Where panel end splices occur, nest panels with 3" end laps and install interlocking clamping plates and sealant. Make splice independent of structure to allow for free expansion and contraction movement of panels without stress on splice. Close standing seams to assure complete sealant engagement and to assure structural integrity of panel-to-panel and panel-to-clip connections. Use fasteners penetrating roof panel only at eaves and end splices. At these conditions, use fasteners in conjunction with clamping plates (with factory-punched holes to assure correct fastener placement) and approved type butyl sealant to assure positive watertight seals. Install ridge cover units of approved expansion joint design to accommodate expansion and contraction movement of roof panels without ponding at end splices.
- 3.7 WALL PANELS: Install wall panels on exterior side of metal framing with liner panels installed on building interior in locations shown on drawings. Align bottoms of panels to proper coverage and fasten with manufacturer's recommended and supplied fasteners. Cut and fasten flashing and trims with approved type fasteners. Install all fasteners with power tool having adequate torque and proper r.p.m. adjusted to seat fastener without damage to heads, washers or panels. Install panel sidelap away from prevailing wind or view direction when possible, maintaining proper lap without fastener dimpling or excessive overlap.
- 3.8 ACCESSORIES: Install gutters, downspouts, flashings, trim, ridge covers, roof curbs, pipe flashings, closure strips, roof jacks, and other accessories and sheet metal items in accordance with manufacturer's recommendations for positive attachment to building and provide a weathertight mounting.
- 3.9 THERMAL INSULATION: Install in accordance with manufacturer's recommended procedure, performed concurrently with installation of wall and roof panels. Install blankets straight and true. Fasten tabs together or lap and glue to provide complete vapor barrier. Place insulation with facing exposed to interior of building unless shown otherwise.
- 3.10 EXISTING COMPONENTS REINSTALLATION: All equipment being relocated to the new metal roof plane shall be installed securely to prevent displacement and to provide a watertight installation.
- 3.11 CLEAN UP: The contractor will protect installed framing from damage by subsequent construction activities until final acceptance. All framing system cuttings and debris including unused anchors, framing fasteners, sealant and associated materials shall be collected and disposed of from the jobsite.

## 07 40 00 - ROOFING AND SIDING PANELS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Preformed, prefinished metal panel and flashings.
- B. Miscellaneous trim, flashing, closures, drip flashing, and accessories.
- C. Fastening devices.
- D. Waterproofing membrane.

#### 1.2 RELATED SECTIONS

- A. Light Gauge Metal Framing.
- B. Miscellaneous metal fabrication.
- C. Rough Carpentry.
- D. Ice & Water Shield

#### 1.3 REFERENCES

- A. American Iron & Steel Institute (AISI) Specification for the Design of Coldformed Steel Structural Members.
- B. ASTM A-653 & ASTM A924 Steel Sheet, Zinc-Coated (Galvanized)
- C. SMACNA - Architectural Sheet Metal Manual.

#### 1.4 ASSEMBLY DESCRIPTION: The assembly includes preformed sheet metal panels, related accessories, flashing and attaching devices.

#### 1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions.
- B. Detail Drawings: Submit detailed drawings showing layout of panels, anchoring details, joint details, trim, flashing, and accessories. Show details of weatherproofing, terminations, and penetrations of metal work.
- C. Product Samples: Submit a sample of each type of panel, complete with factory finish.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in Architectural Sheet Metal Products with ten (10) years minimum experience.
- B. No product substitutions shall be permitted without meeting specifications.
- C. Substitutions shall be submitted 10 Days prior to Bid Date and acceptance put forth in an addendum.
- D. No substitutions shall be made after the Bid Date.

#### 1.7 DELIVERY, STORAGE AND HANDLING

- A. Upon receipt of panels and other materials, installer shall examine the shipment for damage and completeness.
- B. Panels should be stored in a clean, dry place. One end should be elevated to allow moisture to run off.
- C. Panels with strippable film must not be stored in the open, exposed to the sun.
- D. Stack all materials to prevent damage and to allow for adequate ventilation.

#### 1.8 WARRANTY

- A. Paint finish shall have a twenty year guarantee against cracking, peeling and fade (not to exceed 5 N.B.S. units).
- B. Galvalume material shall have a twenty year guarantee against failure due to corrosion, rupture or perforation.
- C. Applicator shall furnish warranty covering watertightness of the wall system for the period of two (2) years from the date of substantial completion.

1.9 MANUFACTURER DETAILS: Refer to <http://www.berridge.com/downloads/> for manufacturer details for wall and soffit panels in this section.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

A. Berridge Manufacturing Company, Houston, Texas.

- B. MCBI, Houston, Texas
- C. Fabral, Lancaster, Pennsylvania
- D. Substitutions shall fully comply with specified requirements.

### 2.2 SHEET MATERIALS

- A. Prefinished Metal shall be Hot-Dipped Galvanized - ASTM A446-85 Grade C G90 Coating A525-86 24 Gauge core steel or prefinished Galvalume - ASTM 792-86 AZ-55.
- B. Unfinished Metal shall be Grade C Galvalume ASTM 792-86, AZ 55, "Satin Finish".
- C. Finish shall be [full strength Kynar 500 Fluoropolymer coating] [Copper-Cote][Lead-Cote] [Champagne] coating, applied by the manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.70 to 0.90 mil over 0.25 to 0.35 mil prime coat, to provide a total dry film thickness of 0.95 to 1.25 mil. Bottom side shall be coated with primer with a dry film thickness of 0.25 mil. Finish shall conform to all tests for adhesion, flexibility, and longevity as specified by the Kynar 500 finish supplier.
- D. Strippable film shall be applied to the top side of the painted coil to protect the finish during fabrication, shipping and field handling. This strippable film must be removed before installation.
- E. Trim & Flashing: Provide and install trim, flashing and closure pieces to prevent intrusion of water, wind, vermin and bats.

### 2.3 ACCESSORY MATERIALS

- A. Fasteners: Galvanized Steel with washers where required.

### 2.4 FABRICATION

- A. All exposed adjacent flashing shall be of the same material and finish as the wall panels.
- B. Hem all exposed edges of flashing on underside, 1/2 inch.

2.5 WALL PANELS: Provide wall & soffit panels of profile noted in the drawings. Fastener spacing and type to be determined by manufacturer's standard offering. Panels shall be longest length possible to minimize endlaps. Panel end splices (when required) shall be over a structural member and shall be a 4" minimum lap. Corner trim, base trim and transition flashings shall be provided as required to complete the wall assembly. Closures and fasteners shall be provided as required for a weathertight installation. Panel types are as follows:

- 2.6 CONCEALED FASTENER FLAT PANEL: Berridge Manufacturing FW12, 24 gauge. Manufacturer's standard G-90 galvanized coating with standard color Dexter 850 premium thermoset silicon polyester finish, color selected by Architect. Approved alternate products; FW-120 by MBCI, & Select Series 12 by Fabral
- 2.7 EXPOSED FASTENER WALL PANEL: The ribbed wall panel shall be precision roll-formed to provide 36" net coverage from 26-gauge, 50,000 PSI minimum yield steel. The panels shall have symmetrically spaced ribs; "R" panel profile. Panel sidelaps shall be formed by lapping major ribs at the panel edges. The underlapping rib shall have full bearing legs to support the sidelap. Manufacturer's standard G-90 galvanized coating with standard color Dexter 850 premium thermoset silicon polyester finish, color selected by Architect.
- 2.8 SOFFIT PANELS: The ribbed wall panel shall be Berridge Manufacturing Co Vee-Panel., McElroy Metals shall be an approved manufacturer for products within this specifications section, or equal as approved by Architect prior to bidding. Panel coverage width to be 12.75", with a panel depth of 3/8". Ribs to be spaced 4.25" on center. Panels to be of interlocking design with concealed fasteners. Color selected by Architect from all color options including metallic colors.
- 2.9 FOAM CLOSURE: Install foam closures at all open ends of ribbed panels per manufacturer details as referenced in 1.9 MANUFACTURER DETAILS.

### PART 3 - EXECUTION

#### 3.1 INSPECTION

- A. Substrate:
  - 1. Examine substrate to ensure proper attachment to framing.
  - 2. Inspect substrate to verify it is clean and smooth, free of depressions, waves or projections, level to +/- 1/4" in 20'.

#### 3.2 INSTALLATION

- A. Comply with manufacturers standard instructions and conform to standards set forth in the Architectural Sheet Metal Manual published by SMACNA, in order to achieve a watertight installation.
- B. Install panels & waterproof membrane in such a manner that horizontal lines are true and level and vertical lines are plumb.
- C. Install starter and edge trim before installing panels.
- D. Remove protective strippable film prior to installation of panels.
- E. Attach panels using manufacturer's standard clips and fasteners, spaced in accordance with approved shop drawings.
- F. Do not allow panels or trim to come into contact with dissimilar materials.
- G. Protect installed panels and trim from damage caused by adjacent construction until completion of installation.
- H. Remove and replace any panels or components which are damaged beyond successful repair.

#### 3.3 CLEANING

- A. Clean any grease, finger marks or stains from the panels per manufacturer's recommendations.
- B. Remove all scrap and construction debris from the site.

#### 3.4 FINAL INSPECTION

- A. Final inspection & approval of installation will be performed by manufacturer's representative.

## 07 41 14 – ELASTOMERIC COATING FOR METAL PANEL ROOF

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Furnish all labor, material, tools, equipment and services for all preformed roofing as indicated, in accord with provisions of Contract Documents.
- B. System for coating to restore and protect metal panel roofs for leak repair or to extend the useful life of the roof.

#### 1.2 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Furnish and apply all roofing materials in accordance with all regulatory agencies and applicable building codes.
- B. Manufacturer Qualifications: Manufacturer shall have a minimum 10 years experience manufacturing roof coatings.
- C. Installer Qualifications: Installer shall have a minimum 5 years experience coating roofs.

#### 1.3 SUBMITTALS: Submit each item in this Article according to the Conditions of the Contract and Division 1 - Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified material and fabricated product. System warranties.

#### 1.4 PRODUCT STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original unopened containers bearing manufacturer's original label.
- B. Store and handle products in a manner ensuring no possibility of contamination.
- C. Store materials at a minimum 50° F prior to use.

#### 1.5 JOB CONDITION

- A. Environmental Requirements
  - 1. Do not begin work if rain is expected within 24 hours of application. Do not apply if weather does not permit 4 to 6 hours dry time prior to rain, fog or temperatures below 50° F.
  - 2. All surfaces to be coated must not pond water and be clean, dry and structurally sound.

#### 1.6 WARRANTY:

- A. Manufacturer shall provide minimum 10-year no-leak warranty.
- B. Manufacturer shall provide minimum 10-year no-peel warranty.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. This specification is based around a system (Basis of design) to coat metal roof system to protect and extend expected useful life span, and eliminate leaks.
- B. Other manufacturer's systems, as approved by the Architect, are acceptable inasmuch that the finished product provides equivalent protection as the basis of design system.

- C. A single manufacturer's system shall be used and warranted by the manufacturer.

## 2.2 GENERAL SYSTEM REQUIREMENTS

- A. Initial Reflectivity (SR): 0.85 minimum
- B. Initial Thermal Emittance (TE): 0.90 minimum
- C. Elongation: 400% minimum, per ASTM D-412
- D. Tensile Strength: 140 psi minimum, per ASTM D-412

## 2.3 BASIS OF DESIGN: Metal Roof Sealant & Coating system by Ames Research Laboratories.

- A. Seam Tape: Peel & Stick Steam Tape by Ames Research Laboratories
- B. Primer: Super Primer Acrylic Primer by Ames Research Laboratories
- C. Finish Coating: Maximum-Stretch Liquid Rubber Roof Sealant & Coating by Ames Research Laboratories
- D. Approved alternative system manufacturers:
  - 1. The Karnak Corporation
  - 2. Uniflex Fluid Applied Roofing Systems

## PART 3 - EXECUTION

### 3.1 GENERAL: Follow the application instructions of the product manufacturer.

### 3.2 INSPECTION

- A. General Requirements: Inspect roof surface prior to application. Surface must be:
  - 1. Clean, dry and structurally sound.
  - 2. Free of ponding water.
- B. Contaminants
  - 1. Any discharge of fumes or possible contaminants must be noted. Contact manufacturer to determine if fumes or exhausted matter will interfere with application.
- C. Pre-Finish Metal
  - 1. If roof is Kynar or otherwise pre-finished, conduct adhesion test on 2' x 2' area and contact manufacturer to determine if finish will interfere with application.

### 3.3 SURFACE PREPARATION

- A. Clean roof with pressure washer or water and broom to remove dirt, dust, loose rust and any organic growth.
- B. Allow roof to dry completely. Apply air pressure at seams if coating needs to begin before seams are fully dry.
- C. Prime all rusted areas.
  - 1. Project Specific Note: No rust areas have been noted on the roofs for this project.

- D. Replace any loos or missing fasteners with oversize "repair type" fasteners.
- E. Apply seam tape at any flashing or seams with a gap greater than 1/8".

### 3.4 APPLICATION

- A. Inspect preliminary work relating to substrate for problem areas to ensure all preparatory work is completed properly.
- B. Apply finish coating using airless spray equipment, soft brushes or mechanical tank spreader, as per the manufacturer's instructions.
- C. Apply two (2) coats of finish coating.

### 3.5 JOB COMPLETION

- A. Inspect completed application and correct any defects.
- B. Clean up all debris, excess materials, and equipment.
- C. Restrict traffic to only essential personnel. Provide appropriate protection against traffic and construction activities on completed roofs.

## **07 41 43 - COMPOSITE ROOF SYSTEM**

### **PART 1 - GENERAL:**

- 1.1 SUMMARY: This section includes composition shingle roofing. The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. Submit manufacturer's product data, application instructions, and sample warranty.
- 1.2 QUALITY ASSURANCE: Company specializing in applying water repellents with 3 years minimum experience.
- 1.3 SUBMITTALS: Within 45 days after commencement date submit to architect for review, manufacturer's technical product data, installation instructions, warranty, color chart & recommendations of each type of roofing product required.
- 1.4 MEASUREMENT: Contractor is responsible for verifying all quantities of roofing materials required & existing site conditions.
- 1.5 DELIVERY, STORAGE, AND HANDLING: Deliver products to site with containers unopened and with manufacturer's seal intact.
- 1.6 PROJECT CONDITIONS: Do not schedule roofing when following conditions are present, except with written instructions from manufacturer: 1. Ambient or surface temperature predicted to fall below 40 degrees F within 24 hours following application. 2. Rain within 24 hours prior to application or predicted within 24 hours after application. 3. Wet or frozen substrates. 4. High winds.
- 1.7 SCHEDULING: Reroof as early as practical to protect substrates during construction. Do not apply until wall cap, flashings, & roof are in place and water trapped in structure has been drained.
- 1.8 WARRANTY: Provide manufacturer's 40-year warranty. Warrant that system is free from defects in material and manufacture and that surfaces treated will exhibit a water repellent effect when applied according to the manufacturer's instructions.

### **PART 2 - MATERIALS:**

- 2.1 SHINGLES: Basis of design is GAF "Lifetime" self sealing fiberglass composition, class A, shingle with minimum 40- year manufacturer's guarantee, & U.L. wind resistance label. Color as selected by Owner.
- 2.2 UNDERLAYMENT: 36", 15# organic, unperforated asphalt saturated roofing felt, ASTM A 307-80.
- 2.3 FASTENERS: 1" hot dip galvanized nail with 3/8" head.
- 2.4 MASTIC: Bituminous plastic cement, FS SS-C-153 B, Type 1.
- 2.5 OTHER MATERIALS: Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to Owner or his Representative's approval.

### **PART 3 - EXECUTION:**

- 3.1 REVIEW: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 WEATHER: Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including possibility of temporary roofing
- 3.3 INSTALLATION: Use unpainted 26 ga. galvanized roof edge at all eave & rake. Apply underlayment to entire roof surface with a minimum 2" head & 4" side laps. Apply in accordance to manufacturer's recommendations & Johns-Manville "Shingle Guide Specifications". Provide complete flashings at roof penetrations set in mastic & lapped into roof.



## **07 46 46 - FIBER-CEMENT SIDING**

### **PART 1 - GENERAL**

- 1.1 Work under this section is subject to the provisions of the contract documents which in any way affect the work specified herein.
- 1.2 SCOPE
  - A. Furnish and install products equal to Hardiplank, Hardipanel and Hardie Shingleside fiber-cement siding, Harditrim fascia and moulding and accessories where shown on drawings or as specified herein.
  - B. Coordinate this section with interfacing and adjoining work for proper sequence of installation.
- 1.3 QUALITY ASSURANCE
  - A. Submittals: within sixty (60) days of owner's notice
    1. Submit three 6 inch x 6 inch pieces of Hardiplank / Hardipanel / Hardie Shingleside claddings in texture and widths shown and specified herein.
  - B. Submit three copies of specifications, installation data and other pertinent manufacturer's literature.
- 1.4 PRODUCT HANDLING
  - A. Stack Hardiplank / Hardipanel / Hardie Shingleside claddings on edge or lay flat on a smooth, level surface. Protect edges and corners from chipping. Store sheet under cover and keep dry prior to installing.
- 1.5 JOB CONDITIONS
  - A. WOOD STUD FRAMING
    1. Nominal 2 inch x 4 wood framing selected for minimal shrinkage and complying with local building codes, including the use of weather-resistive barriers and/or vapor barriers where required. Minimum 1 1/2 inch face and straight, true, of uniform dimensions and properly aligned.
    2. Install weather-resistive barriers and claddings to dry surfaces.
    3. Repair any puncture or tear in the weather-resistive barrier prior to installation of the siding.
    4. Protect siding from other trades.
  - B. METAL STUD FRAMING
    1. Minimum 20 gauge 3 5/8 inch C-Stud 16 inch maximum on center 16 gauge 3 5/8 inch C-Stud 24 inch maximum on center metal framing complying with local building codes, including the use of weather-resistive barriers and/or vapor barriers where required. Minimum 1 1/2 inch face and straight, true, of uniform dimensions and properly aligned.
    2. Install weather-resistive barriers and claddings to dry surfaces.
    3. Repair any puncture or tear in the weather-resistive barrier prior to installation of the siding.

4. Protect siding from other trades.

## 1.6 WARRANTY

- A. James Hardie's limited product warranty against manufacturing defects in Hardiplank lap and Hardipanel vertical siding for 50 years, Hardie Shingleside for 30 years and HardiTrim for 10 years.

## PART 2 - PRODUCTS

### 2.1 PANEL TYPE: Hardiplank / Hardipanel / Hardie Shingleside Cladding / HardiTrim Fascia and Moulding

- A. Non-asbestos fiber-cement siding to comply with ASTM Standard Specification C1186 Grade II, Type A.
- B. Siding to meet the following building code compliance National Evaluation Report No. NER 405 (BOCA, ICBO, SBCC); City of Los Angeles, Research Report No. 24862; Metro Dade County, Florida Acceptance No. 94-1234.04; US Department of Housing and Urban Development Materials Release 1263a; California DSA PS-019; and City of New York MEA 223-93-M. Non asbestos fiber-cement siding to be non-combustible when tested in accordance with ASTM test method E136.
- C. Type: Cedarmill 8 1/4"W / 7" EXP

### 2.2 FASTENERS: Fasteners to meet applicable local building code for maximum basic wind speed exposure category and/or applicable shear values.

## PART 3 - EXECUTION

### 3.1 SURFACE CONDITIONS

- A. Correct conditions detrimental to timely and proper completion of work.

### 3.2 INSTALLATION - HARDITRIM FASCIA AND MOULDING

- A. Install flashing around all wall openings.
- B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.
- C. Place fasteners no closer than 1 inch from end. Fasten maximum 16 inch on center.
- D. Maintain clearance between trim and adjacent finished grade.
- E. Overlay siding with Harditrim moulding at windows, doors and inside corners.
- F. Fasten through overlapping boards. Do not nail between lap joints.
- G. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten Harditrim board to Harditrim boards.
- H. Shim frieze board as required to align with corner trim.
- I. Install Harditrim fascia over structural subfascia.

### 3.3 INSTALLATION - HARDIPLANK SIDING

- A. Starting: Install a minimum 1/4 inch thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1 1/4 inch wide laps at the top. The bottom edge of the first plank overlaps the starter strip.
- B. Allow minimum 1 inch vertical clearance between roofing and bottom edge of siding.
- C. Face nail to sheathing.
- D. Locate splices at least 12 inches away from window and door openings.
- E. Wind Resistance: Where a specified level of wind resistance is required Hardiplank lap siding is installed to framing members and secured with fasteners described in Table No. 2 in National Evaluation Service Report No. NER-405.

### 3.4 INSTALLATION - HARDIPANEL SIDING

- A. Block framing between studs where Hardipanel siding horizontal joints occur.
- B. Place fasteners no closer the 3/8 inch from panel edges and 2 inch from panel corners.
- C. Allow minimum 1 inch vertical clearance between roofing and bottom edge of siding.
- D. Maintain clearance between siding and adjacent finished grade.
- E. Specific framing and fastener requirements refer to Tables 2 and 3 in National Evaluation Service Report No. NER-405.

### 3.5 FINISHING

- A. Finish unprimed siding with minimum one coat high quality, alkali-resistant primer and one coat of either 100% acrylic or latex or oil based, exterior grade topcoat or two coats high quality, alkali-resistant, 100% acrylic or latex, exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

## 07 52 00 - MODIFIED BITUMINOUS MEMBRANE ROOFING

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK:

- A. Provide all labor, equipment, and materials to install modified bitumen roof system and base flashings over the previously installed insulation assembly.

#### 1.2 The modified bitumen assembly consists of the following:

- A. Two plies of GMX type IV, fiberglass ply sheets bonded to the previously installed insulation assembly with type IV bitumen. One ply of SBS/SIS rubber modified, polyester and fiberglass reinforced modified membrane applied to interplay sheets with type IV bitumen. The surface will be ASTM D-1863 #4 or #5 roofing gravel in type IV asphalt.
- B. All flashings will consist of one ply of 40 mil SBS base flashing ply covered by an additional layer of mineral surfaced, fire rated, SBS/SIS, polyester and fiberglass reinforced modified membrane in type IV asphalt. The laps of the mineral surfaced sheet shall be covered with an additional 6" wide strip of the specified mineral surfaced membrane.

#### 1.3 RELATED SECTIONS:

- A. Drawings and general provisions of the Contract, including General Supplementary Conditions and Division 1 Specification Sections apply to this section.

#### 1.4 RELATED WORK SPECIFIED ELSEWHERE:

- A. Division 7 Section "Preparation for Re-roofing."
- B. Division 7 Section "Roof Insulation."
- C. Division 7 Section "Flashing and Sheet Metal."
- D. Division 7 Section "Manufactured Metal Wall Panels."

#### 1.5 REFERENCES:

- A. ASTM D - 41 Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
- B. ASTM D - 312 Specification for Asphalt Used in Roofing
- C. ASTM D - 451 Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products
- D. ASTM D - 1079 Terminology Relating to Roofing, Waterproofing, and Bituminous Materials
- E. ASTM D - 1227 Specification for Emulsified Asphalt Used as a Protective Coating for Roofing
- F. ASTM D - 1863 Specification for Mineral Aggregate Used on built-up Roofs
- G. ASTM D - 2178 Specification for Asphalt Glass Felt Used in Roofing and Waterproofing
- H. ASTM D - 2822 Specification for Asphalt Roof Cement
- I. ASTM D - 2824 Specification for Aluminum-Pigmented Asphalt Roof Coating
- J. ASTM D - 4601 Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
- K. ASTM D - 5147 1991 Test Method for Sampling and Testing Modified Bituminous Sheet Materials
- L. ASTM E - 108 Test Methods for Fire Test of Roof Coverings
- M. [FM](#) [Factory Mutual - 4470 Class I.](#)
- N. NRCA National Roofing Contractors Association
- O. UL Underwriters Laboratories

1.6 SUBMITTALS:

- A. Manufacturer's Certification: (Use form attached to end of this Section) The Manufacturer's Certification Form must be signed by a corporate officer of the roofing system manufacturer with the Corporate Seal affixed thereto.
- B. [Submit certification that the roof system furnished has been approved by Factory Mutual Standard No. 4470 Class 1-90.](#)
- C. Product Data for each type of product specified include manufacturer's technical product data, installation instructions, and recommendations for each type of roofing product required. Include data substantiating that materials comply with specified requirements.
- D. For all modified bituminous sheet roofing include independent test data according to ASTM designation D-5147-91 "Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material" and ASTM D 6163-98 Category III, substantiating that the materials comply with specified physical requirements.
- E. Show evidence that the modified membrane products are manufactured in the United States. Provide evidence that the manufacturer has at least ten years of experience in manufacturing modified membranes in the United States. Provide evidence that the modified membranes are manufactured by the manufacturer providing the long-term warranty.
- F. Show evidence that the Installer specializes in modified bituminous roof application with a minimum (5) five years experience and whom the roofing system manufacturer certifies as qualified to install the manufacturer's roofing materials.
- G. Provide samples (for Owner's representative) of each product specified.
- H. Provide an Unexecuted Manufacturer's 30 year warranty, including the complete assembly, all flashings and metal wall panels.
- I. Roofing Manufacturer's certified copy of ISO 9001 compliance.

1.7 REGULATORY REQUIREMENTS:

- A. [Fire and Wind Uplift Rating: Provide modified bitumen roof system and component materials that have been tested to comply with Factory Mutual Corporation standard No.4470 Approval requirements for Class One assembly including Class A Fire, 1-90 Windstorm classification.](#)
- B. [Provide roof-covering materials bearing Factory Mutual Classification Marking on bundle, package, or container indicating that materials have been produced under Factory Mutual's Classification and Follow-up Service.](#)

1.8 QUALITY ASSURANCE:

- A. Manufacturer Qualifications: Roofing system manufacturer shall have a minimum of 10 years experience in manufacturing modified bitumen membrane roofing products in the United States and be ISO 9001certified. Manufacturer shall submit affidavit signed by an officer of the company who is authorized to sign on behalf of the manufacturer stating that they do manufacture the modified membranes submitted for this project.
- B. Manufacturer Inspections: As part of the cost of the roofing assembly the roofing system manufacturer shall provide job site quality control inspections at least three times per week. The inspections shall be performed by a full time, factory trained representative with the authority to make application decisions on behalf of the manufacturer. Part-time or independent inspectors are not acceptable. The inspections shall be provided to the Owner at no additional cost.

- C. Installer Qualifications: Installer (Roofing Contractor) shall be specializing in modified bituminous roof application with minimum 5 years experience and who is certified by the roofing system manufacturer as qualified to install manufacturer's roofing materials.
- D. Installer's Field Supervision: Contractor to maintain an English speaking, full-time Supervisor/Forman on the job site during all phases of the project. A legible copy of the roof plans, details and specifications shall be in the possession of the Supervisor/Foremen and on the roof at all times.
- E. It shall be the Contractor's responsibility to respond immediately to correction of roof leakage during construction.
- F. Disqualification of Bidders: A Bidder can be disqualified by the Owner or Architect for any of the following reasons, but not limited to:
  - 1. The failure to inspect the job site prior to bidding or attend meetings as designated.
  - 2. Incorrect use of the "Proposal Form" as provided by the Architect. Any changes in said format shall be accepted by the Architect only when requested and approved in writing prior to the bid opening. Changes in the Proposal after the opening of the bids will not be accepted.
  - 3. Lack of proficiency as shown by past work or incomplete work under other contracts which, in the judgment of the Owner/Architect, might hinder or prevent the prompt successful completion of this work if so awarded, or any involvement in any legal actions which relate to past or present performance. This includes, but is not limited to, law suits, court appointed actions, and/or ongoing litigation.

1.9 INSURANCE CERTIFICATION:

- A. Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.10 PRE-APPLICATION ROOFING CONFERENCE:

- A. Approximately 2 weeks before scheduled commencement of project and associated work, meet at Project site with Installer, installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing that must precede or follow roofing work, (including mechanical work if any), Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, test agencies, and governing authorities.
  - 1. Objectives to include:
    - a. Review foreseeable methods and procedures related to roofing work.
    - b. Tour representative areas of roofing substrates(decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations, and other preparatory work performed by other trades.
    - c. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
    - d. Review roofing systems requirements (drawings, specifications, and other contract documents).
    - e. Review required submittals, both completed and yet to be completed.

- f. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- g. Review required inspection, testing, certifying, and material usage accounting procedures.
- h. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not a mandatory requirement).
- i. The contractor shall record discussion of conference, including decisions and agreements (or disagreements) reached, and furnish a copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
- j. Review notification procedures for weather or non-working days.
- k. Review Owner's documentation requirements and time lines.

1.11 DELIVERY STORAGE & HANDLING:

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.
- B. Store and handle roofing sheets in a dry, well-ventilated, weather-tight place to ensure no possibility of significant moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end. Cover roll-goods with a canvas tarpaulin or other breathable material (not polyethylene).
- C. Do not leave unused rolled goods on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.
- D. Handle and store materials or equipment in a manner to avoid significant or permanent deflection of deck.

1.12 MANUFACTURERS INSPECTIONS:

- A. When the project is in progress, the Roofing System Manufacturer will provide the following:
  - 1. Keep the Architect informed as to the progress and quality of the work as observed in writing and photographs after each job visit. Provide job site inspections a minimum of two days a week.
  - 2. Report to the Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
  - 3. Confirm, after completion of the project and based on manufacturer's observations and tests, that manufacturer has observed no applications procedures in conflict with the specifications or warranty requirements other than those that may have been previously reported in writing and corrected.

1.13 PROJECT CONDITIONS:

- A. Weather Condition Limitations: Do not apply roofing membrane during inclement weather or when a 40% or higher chance of precipitation is expected.
- B. Do not apply roofing insulation or membrane to damp deck surface.

- C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
- D. Proceed with roofing work only when existing and forecasted weather conditions will permit unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.

1.14 FIRE WATCH:

- A. Torch applied materials are not specified and are not allowed on this project. In the event a torch has to be utilized a written fire watch approval must be obtained prior to use. When torch applied materials are installed the Contractor shall provide a fire watch for a minimum 2 hours after the torch is extinguished, with fire extinguishers at the ready, and notify the Owner and Owner's representative when the procedure is being performed.
- B. Provide fire watch during torch application and continue for two hours after torch work has been completed. All roof areas worked on should be checked for hot spots and signs of smoldering. If available, infrared roof scanners should be used. The inside of the building should also be inspected for signs of fire and smoke.
- C. Provide at least two 20 lb., multipurpose dry chemical portable extinguisher within 20 ft. of horizontal travel distance of torch-applied roofing equipment at all times.
- D. No full-time torch shall be used under any circumstances.

1.15 SEQUENCING AND SCHEDULING:

- A. Sequence installation of modified bituminous sheet roofing with related units of work specified in other sections to ensure that roof assemblies, including roof accessories, flashings, trim, and joint sealers, are protected against damage from effects of weather, corrosion, and adjacent construction activity.
- B. All work must be fully completed on each day. Phased construction will not be accepted.

1.16 WARRANTY:

- A. Membrane Manufacturer upon completion of installation and acceptance by the Owner's representative and Owner, and prior to final payment, will supply the Owner's representative a Thirty (30) year partnership warranty. The warranty shall be signed by a corporate officer of the corporation of the modified bitumen sheet roofing and metal wall panel manufacturer. The single warranty shall include the complete assembly, including membrane assembly, base flashings and metal wall panels.
- B. Contractor will submit a minimum of a two-year warranty to the membrane manufacturer with a copy directly to Owner prior to final payment.

**PART 2 - PRODUCTS**

2.1 GENERAL

- A. When a particular performance standard is specified it shall be indicative of a minimum standard required.
- B. Provide as specified or obtain pre-approval of substitution. Use only substitution request form at the end of this section. Only materials and systems that obtain approval prior to bidding will be considered. No substitutions will be considered past the pre-approval date ten (10) days prior to bidding. In the event a substitution request is accepted a formal addenda will be generated prior to bid date thus giving all bidders an equal opportunity to bid on the approved system.



- C. Provide all roofing materials from primary roofing system manufacturer.

## 2.2 BITUMINOUS MATERIALS:

- A. All materials shall not contain asbestos.
- B. Asphalt Primer: V.O.C. compliant, ASTM D-41.
- C. Asphalt Roofing Mastic: V.O.C. compliant, ASTM D-2822, Type II.
- D. Asphalt: Inter-Ply ASTM Specification D-312 Type IV, Special Steep.

## 2.3 SHEET MATERIALS:

- A. Inter-ply sheets: Fiberglass Felt: ASTM D-2178, TYPE IV manufactured by modified membrane manufacturer.
- B. Base Flashing Ply SBS Membrane (1st Ply): 40 mil SBS (styrene-butadiene-styrene) rubber modified membrane with woven fiberglass scrim reinforcement with the following minimum performance requirements according to ASTM-D-5147 @ 77°:

	Machine Direction	Cross Machine Direction
Tensile Strength	200.lbf/in.	200.lbf/in.
Elongation	5.0%	5.0%
Tear Strength	275.lbf	275.lbf
Low Temp. Flex.	Passes -30° F	
Thickness	40 mils	

- C. Modified Bitumen Sheet Membrane: Cap Sheet in field: ASTM D6162, Type III, Grade G, SBS/SIS rubber modified (styrene-butadiene-styrene, styrene-isoprene-styrene) modified membrane reinforced with a dual polyester/fiberglass scrim conforming to the following minimum performance requirements according to ASTM D-5147 @ 77° F:

Tensile Strength (ASTM D-5147) @ 2 in/min. @ 73.4 3.6°C  
MD 700 lbf/in CMD 750 lbf/in

Tear Strength (ASTM D-5147) @ 2 in/min. @ 73.4 3.6°C  
MD 1,300 lbf CMD 1,400 lbf

Elongation at Maximum Tensile (ASTM D-5147) @2 in/min. @ 73.4 3.6°C

MD 6.0% CMD 6.0%

Low Temperature Flexibility (ASTM D-5147) Passes -30°F

- D. Modified Bitumen Sheet Membrane: Mineral surfaced base flashing: ASTM D6162, Type III, Grade S, Mineral Surfaced, Fire Rated, SBS/SIS rubber modified (styrene-butadiene-styrene, styrene-isoprene-styrene), membrane reinforced with a dual polyester/fiberglass scrim conforming to the following minimum performance requirements according to ASTM D-5147 @ 77°F:

Tensile Strength (ASTM D-5147) @2 in/min. @ 73.4 3.6°C  
MD 700 lbf/in CMD 750 lbf/in

Tear Strength (ASTM D-5147) @ 2 in/min. @ 73.4 3.6°C  
MD 1300 lbf CMD 1400 lbf

Elongation at Maximum Tensile (ASTM D-5147) @ 2 in/min. @ 73.4 3.6°C  
MD 6.0% CMD 6.0%

Low Temperature Flexibility (ASTM D-5147) Passes -30°F

## 2.4 MISCELLANEOUS MATERIALS:

- A. Fasteners for masonry walls and vertical surfaces: Provide hardened steel nails with flat heads, diamond shaped points, and mechanically deformed shanks not less one inch long for securing felts, modified bitumen sheets, and metal items to masonry or concrete walls and vertical surfaces. Use power-driven fasteners only when approved in writing.
- B. Sealant: Silicone as supplied by membrane manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION:

- A. Examine substrate surfaces to receive insulation and modified bitumen sheet roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to manufacturer, architect and Owner.

### 3.2 GENERAL INSTALLATION REQUIREMENTS:

- A. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing modified bitumen roofing system.

### 3.3 INSURANCE/CODE COMPLIANCE:

- A. Where required, install and test modified bitumen roofing system to comply with governing regulations and specified insurance requirements.
- B. Protect other work from spillage of modified bitumen roofing materials, and prevent liquid materials from entering or clogging drains and conductors. Replace or restore other work damaged by installations of modified bituminous roofing system work.
- C. Coordinate installing roofing system components so that insulation and roofing plies are not exposed to precipitation or left exposed overnight. Provide cut-offs at end of each day's work to cover exposed ply sheets and insulation with two (2) plies of #15 organic felt set in full mopping of bitumen and or flashing mastic and with joints and edges sealed with roofing cement. Remove cut-offs immediately and completely before resuming work.
- D. Substrate Joint Penetrations: Prevent bitumen from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- E. Apply roofing materials as specified herein unless recommended otherwise by manufacturer's instructions. Keep roofing materials dry before and during application. Do not permit phased construction. Complete application of roofing plies, modified sheet and flashing in a continuous operation. Begin and apply only as much roofing in one day as can be completed that same day.

- F. Cut-Offs: At end of each day's roofing installation, protect exposed edge of incomplete work, including ply sheets and insulation. Provide temporary covering of two (2) plies of #15 organic roofing felt set in full mopping's of asphalt and or flashing mastic with joints and edges sealed.

### 3.4 INTER-PLY APPLICATION:

- A. Type IV Fiberglass Felts
- B. Install (2) two ply sheets in 25 lbs. per square of bitumen, shingled uniformly to achieve two plies throughout and over the insulation. Shingle in proper direction to shed water on each area of roof.
- C. Lap ply sheet ends eight inches. Stagger end laps twelve inches minimum.
- D. Extend plies two inches beyond top edges of cants at walls and projection bases.
- E. Felts shall be free of wrinkles, fish-mouths and dry laps.
- F. Two ply felts and modified cap sheet shall be installed the same day. No phase construction is allowed.

### 3.5 MODIFIED MEMBRANE APPLICATION:

- A. The modified membrane shall then be solidly bonded to the base layers with specified asphalt at the rate of 35 lbs. per 100 square feet.
- B. The roll must push a puddle of asphalt in front of it with asphalt slightly visible at all side laps. Care should be taken to eliminate air entrapment under the membrane.
- C. Apply pressure to all seams to ensure that the laps are solidly bonded to substrate.
- D. Subsequent rolls of modified membrane shall be installed across the roof as above with a minimum of 4" side laps and 8" end laps. The end laps shall be staggered or an additional layer of cap sheet can be installed at the end lap if several rolls end at the same point. The membrane shall be laid in the same direction as the under-layers, but the laps shall not coincide with the laps of the base layers.
- E. Apply asphalt no more then five feet ahead of each roll being embedded.
- F. Extend membrane 2" beyond top edge of all cants in full moppings of the specified asphalt as shown on the drawings.
- G. All roofing plies (two ply and cap sheet) shall be installed the same day. No phase construction is allowed. Should unforeseen circumstances occur that prevent the cap sheet installation the same day as the type IV felts, than the type IV felts shall be glaze coated with a layer of type IV bitumen.
- H. After all plies are installed and prior to gravel surface installation the system shall be inspected by the roofing manufacturer and all blemishes in the system shall be marked and repaired. Obtain written approval from manufacturer's representative that the system is acceptable to add the gravel surface.
- I. The surface shall receive clean, river washed roofing gravel in a solid flood coat (60 # per one hundred square feet) of steep, type IV asphalt. Gravel must be clean and dry. Excessively wet or dirty gravel will be rejected. Gravel will be swept even throughout the surface with a stiff nylon bristled broom.
- J. Provide gravel sample and obtain approval from Owner's representative of gravel sample prior to purchasing and delivering gravel.

- K. Apply gravel into solid pouring of asphalt at the rate of 500# per one hundred square feet

### 3.6 FLASHING MEMBRANE INSTALLATION:

- A. The membrane flashing assembly shall consist of one ply of 40 mil SBS membrane and a final ply of the SBS/SIS, mineral surfaced fire rated membrane with white reflective ceramic granules. All membrane flashings shall be sealed with a three course, (mastic/membrane/mastic) at the top of the plies on a daily basis. No condition should exist that will permit moisture entering behind, around, or under the roof or flashing membrane.
- B. Prepare all walls, penetrations and expansion joints to be flashed and where shown on the drawings, with asphalt primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
- C. All plies will be adhered with Type IV asphalt. The base ply shall extend up the wall, over wood Nailer's and extend onto the roof surface a minimum of 6". The entire sheet of flashing membrane must be solidly adhered to the substrate.
- D. The mineral surfaced flashing ply shall extend onto the roof a minimum 10".
- E. Both plies shall be secured to the wall via termination bar and mechanical fasteners spaced no more than 8" on center. At raised walls t receive metal wall panels the bottom closure flashing may substitute as the termination bar. The metal wall panels shall extend over the top of the membrane base flashings a minimum 4"
- F. Seal all vertical laps of flashing membrane with an additional 6" wide layer of mineral surfaced membrane. (Mastic and Membrane over the laps is not acceptable.) The cover strip pf membrane may be applied in the roofing manufacturers flashing grade adhesive.
- G. Add new counter flashing at all curb type flashings. Counter flashing to be made from 24 gauge, pre-painted sheet metal as supplied by roofing manufacturer. Counter flashing, expansion joints, and similar work to be coordinated with modified bitumen roofing work are specified in other sections.
- H. Roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices to be coordinated with modified bituminous roofing system work are in other sections.

### 3.7 PLUMBING STACK:

- A. Minimum stack height is 12".
- B. Run roof system over the primed lead flange. Seal the base of the stack with Urethane sealant.
- C. Wire brush and prime flange of new sleeve. Install properly sized sleeves set in a 1/4" base of Urethane sealant.
- D. Install base flashing ply in Flashing Bond Mastic.
- E. Install modified membrane in Flashing Bond Mastic.
- F. Caulk the intersection of the membrane and lead flashing with Urethane sealant.
- G. Turn sleeve a minimum of 1" down inside of stack.

### 3.8 CLEANING:

- A. Remove drippage of bitumen from all walls, windows, floors, ladders, and finished surfaces. In areas where finished surfaces are soiled by asphalt or any other sources of soiling caused by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their instructions.

**3.9 FINAL INSPECTION:**

- A. At completion of roofing installation and associated work, meet with Installer, installer of associated work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with the performance of the roofing system.
- B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party attending.
- C. The Roofing System Manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the Roofing Contractor at a negotiated price. Should the scan indicate wet or defective installation, the scan shall be at the Contractors expense.
- D. If core cuts verify the presence of damp or wet materials, the Roofing Contractor shall be required to replace the damaged areas at his own expense.
- E. Repair or replace (as required) deteriorated or defective work found at the time of above inspection to condition free of damage and deterioration at the time of substantial completion and according to warranty requirements.
- F. The Contractor is to notify the Architect and Owner upon completion of corrections.
- G. Following the final inspection, the material manufacturer will make acceptance in writing.

## 07 54 23 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes adhered TPO membrane roofing system.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI
  - 1. Corner Uplift Pressure: 90 lbf/sq. ft.
  - 2. Perimeter Uplift Pressure: 60 lbf/sq. ft.
  - 3. Field-of-Roof Uplift Pressure: 35 lbf/sq. ft.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Verification: For sheet roofing, of color specified.
- D. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
  - 1. Submit evidence of compliance with performance requirements.
- E. Field quality-control reports.
- F. Maintenance data.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product.
- B. Source Limitations: Obtain components including adhesives, roof insulation, cover board, fasteners for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.

- C. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
- D. Preinstallation Roofing Conference: Conduct conference at Project site.

## 1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
  - 1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, roofing accessories, and other components of membrane roofing system.
  - 2. Warranty Period: 20 years from date of Substantial Completion.

- 1.6 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section.

## PART 2 - PRODUCTS

### 2.1 TPO MEMBRANE ROOFING

- A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible TPO sheet.
  - 1. Basis of Design: Design is based on Firestone Building Products Company UltraPly/ Subject to compliance with requirements, provide named product or comparable products approved by the Architect by one of the following:
    - a. Carlisle SynTec Incorporated.
    - b. GAF Materials Corporation.
    - c. Johns Manville.
  - 2. Thickness: 60 mils, nominal.

### 2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
  - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 55 mils thick, minimum, of same color as sheet membrane.
- C. Bonding Adhesive: Manufacturer's standard.
- D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

- E. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- F. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

### 2.3 ROOF INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, felt or glass-fiber mat facer on both major surfaces.
- B. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

### 2.4 INSULATION ACCESSORIES

- A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.
- B. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch thick.

### 2.5 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads, approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer.

## PART 3 - EXECUTION

### 3.1 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- D. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
  - 1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
- E. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
  - 1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

### 3.2 ADHERED MEMBRANE ROOFING INSTALLATION



- A. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.
- B. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- C. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.
- D. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.
- E. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
- F. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
  - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
  - 2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
  - 3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

### 3.3 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

### 3.4 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

- C. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

## 07 56 33 - SMOOTH AND MINERAL SURFACE RESTORATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Conditions of the Contract and Division 01 Specification Sections apply to this Section.

#### 1.2 SUMMARY

- A. Restoration system over the properly prepared mineral surfaced asphalt roof system.
- B. Section 07 62 00 - Section Sheet Metal Flashing and Trim.
- C. Section 00 10 10 - Summary of Work
- D. Quality Assurance: Section 01 43 33

#### 1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
- B. ASTM D41 Standard Specification for Asphalt Primer Used in Roofing, Damp-proofing and Waterproofing.
- C. ASTM D451 Standard Test Method for Sieve Analysis of Granular Mineral Surfacing For Asphalt Roofing Products.
- D. ASTM D1079 Terminology Relating to Roofing and Waterproofing.
- E. ASTM D1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.
- F. ASTM D1863 Standard Specification for Mineral Aggregate Used on Built-Up Roofs.
- G. ASTM D4586 Standard Specification for Asphalt Roof Cement.
- H. ASTM D2824 Standard Specification for Aluminum-Pigmented Asphalt Roof Coatings, Non-fibered, Asbestos Fibered, and Fibered without Asbestos
- I. ASTM D4601 Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
- J. ASTM D5147 Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
- K. ASTM D6162 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
- L. ASTM D6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
- M. ASTM E108 Standard Test Methods for Fire Tests of Roof Coverings.
- N. National Roofing Contractors Association (NRCA):
- O. Roofing and Waterproofing Manual.

1.4 SUBMITTALS FOR REVIEW

- A. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements.
- B. Samples: Submit [two (2)] samples of the following:
  - 1. 1 lb. sample of roofing aggregate for review.
  - 2. 1 quart of each bituminous material
  - 3. 12" x 12" sample of each roll membrane
- C. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner. The existing Garland Company, Inc. roofing system warranty will be extended.

1.5 SUBMITTALS FOR INFORMATION

- A. Manufacturer's Installation Instructions: Submit installation instructions and recommendations indicating special precautions required for installing the membrane.
- B. Manufacturer's Certificate: Certify that the roof system is adhered properly to meet or exceed the requirements of FM [1-90] and IBC code.
- C. Manufacturer's Certificate: Certify that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.
- D. Manufacturer's Certificate: Submit a certified copy of the roofing manufacturer's ISO 9001 compliance certificate.
- E. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147.
- F. Written certification from the roofing system manufacturer certifying the applicator is currently authorized for the installation of the specified roof system.
- G. Qualification data for firms and individuals identified in Quality Assurance Article below.

1.6 CONTRACT CLOSEOUT SUBMITTALS

- A. General: Comply with Requirements of Division 01 Section - Closeout Submittals.
- B. Special Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.
- C. Roofing Maintenance Instructions. Provide a manual of manufacturer's recommendations for maintenance of installed roofing systems.
- D. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

- E. Demonstration and Training Schedule: Provide a schedule of proposed dates and times for instruction of Owner's personnel in the maintenance requirements for completed roofing work. Refer to Part 3 for additional requirements.

#### 1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with not less than 10 years documented experience and have ISO 9001 certification.
- B. Installer Qualifications: Company specializing in modified bituminous roofing installation with not less than 5 years experience and authorized by roofing system manufacturer as qualified to install manufacturer's roofing materials.
- C. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress. Maintain proper supervision of workmen.
- D. Maintain a copy of the Contract Documents in the possession of the Supervisor/Foreman and on the roof at all times.
- E. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer.
  - 1. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.
- F. Source Quality Control: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001.

#### 1.8 PRE-INSTALLATION CONFERENCE

- A. Pre-Installation Roofing Conference: Convene a pre-roofing conference approximately two (2) weeks before scheduled commencement of modified bituminous roofing system installation and associated work.
- B. Require attendance of installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing that must precede or follow roofing work (including mechanical work if any), Architect, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, testing agencies and governing authorities. Objectives of conference include:
  - 1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
  - 2. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by others.
  - 3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
  - 4. Review roofing system requirements (drawings, specifications and other contract documents).
  - 5. Review required submittals both completed and yet to be completed.
  - 6. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
  - 7. Review required inspection, testing, certifying and material usage accounting procedures.

8. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not mandatory requirement).
  9. Record discussion of conference including decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
  10. Review notification procedures for weather or non-working days.
- C. The Owner's Representative will designate one of the conference participants to record the proceedings and promptly distribute them to the participants for record.
  - D. The intent of the conference is to resolve issues affecting the installation and performance of roofing work. Do not proceed with roofing work until such issues are resolved to the satisfaction of the Owner and [Architect or Engineer] of Record. This shall not be construed as interference with the progress of Work on the part of the Owner or [Architect or Engineer] of Record.

#### 1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.
- B. Store and handle roofing sheets in a dry, well-ventilated, weather-tight place to prevent moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).
- C. Do not leave unused materials on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.
- D. Secure all material and equipment on the job site. If any material or equipment is stored on the roof, assure that the integrity of the deck is not compromised at any time. Damage to the deck caused by the Contractor's actions will be the sole responsibility of the Contractor, and the deck will be repaired or replaced at his expense.

#### 1.10 MANUFACTURER'S INSPECTIONS

- A. When the Project is in progress, the roofing system manufacturer will provide the following:
  1. Report progress and quality of the work as observed.
  2. Provide periodic job site inspections.
  3. Report to the Architect [and/or Owner] in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
  4. Confirm after completion that manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.

#### 1.11 PROJECT CONDITIONS

- A. Proceed with roofing work only when existing and forecasted weather conditions will permit a unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.
- B. Do not apply roofing insulation or membrane to damp deck surface.

- C. Do not expose materials subject to water or solar damage in quantities greater than can be weatherproofed during same day.
- D. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank one (1) inch cap nails, or screws and plates at a rate of one (1) fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and four (4) ft o.c. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install four (4) additional fasteners at the upper edge of the membrane when strapping the plies.

#### 1.12 SEQUENCING AND SCHEDULING

- A. Sequence installation of roofing with related units of work specified in other Sections to ensure that roof assemblies, including roof accessories, flashing, trim and joint sealers, are protected against damage from effects of weather, corrosion and adjacent construction activity.
- B. Complete all roofing field assembly work each day. Phased construction will not be accepted.

#### 1.13 WARRANTY

- A. Upon completion of installation, and acceptance by the Owner and Architect, the Manufacturer will supply to the Owner the appropriate warranty. The existing roofing system warranty will be extended 10 years.
- B. Installer will submit a [two (2)]-year warranty to the membrane manufacturer with a copy directly to Owner.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Refer to Division 01 Section "Common Product Requirements."
- B. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1.
- C. Substitutions: Products proposed as equal to the products specified in this Section shall be submitted in accordance with Bidding Requirements and Division 01 provisions.
  - 1. Include a list of three (3) projects of similar type and extent, located within a one hundred mile radius from the location of the project.
  - 2. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance.
  - 3. The Owner's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.

#### 2.2 ACCEPTABLE MANUFACTURERS

- A. The design is based upon roofing systems engineered and manufactured by:

1. The Garland Company, 3800 East 91st Street, Cleveland, Ohio 44105, Telephone: (800) 762-8225, Website: [www.garlandco.com](http://www.garlandco.com)

## 2.3 DESCRIPTION

### A. Maintenance work including but not limited to:

1. Energizer K Plus FR: A liquid applied membrane with Kevlar fibers for restoration of smooth or granulated asphalt or modified membrane surfaces. Used in slopes up to 3:12 inches.

### B. Reinforcement including but not limited to:

1. Polyester Firm: A Polyester mat used as reinforcement for a cold applied restoration system over a smooth BUR.

### C. Base Flashing Base Ply:

1. Base Flashing Ply: One (1) ply of 40 mil SBS base flashing ply covered by an additional layer of modified bitumen membrane and set in bitumen.

### D. Base Flashing Cap Sheet:

1. Modified Membrane: STRESSPLY PLUS FR MINERAL - Environmentally Friendly; 145 mil SBS (Styrene-Butylene-Styrene) mineral surfaced, rubber modified roofing membrane incorporating recycled rubber, fire retardant characteristics and reinforced with a fiberglass and polyester composite scrim.

## 2.4 BITUMINOUS MATERIALS

### A. Asphalt Primer: V.O.C. compliant, ASTM D41.

### B. Asphalt Roofing Mastic: V.O.C. compliant, ASTM D4586, Type II

### C. Base Flashing Adhesive: ASTM D312, Type IV.

## 2.5 SHEET MATERIALS

### A. Base Ply:

1. Polyester-Fiberglass-Polyester Base Sheet: ASTM D-5147

### B. Base Flashing Ply: 40 mil SBS modified membrane with woven fiberglass scrim reinforcement with the following minimum performance requirements according to ASTM D5147. Properties (Finished Membrane):

1. Tensile Strength (ASTM D5147):
  - a. 2 in/min. @ 73.4 ± 3.6°F: MD 215 lbf/in CMD 215 lbf/in
  - b. 50mm/min. @ 23 ± 3°C MD 37.5 kN/m CMD 37.5 kN/m
2. Tear Strength (ASTM D5147)
  - a. 2 in/min. @ 73.4 ± 3.6°F MD 275 lbf CMD 275 lbf



- b. 50mm/min. @ 23 ± 3°C MD 1223 N CMD 1223 N
  - 3. Elongation at Maximum Tensile (ASTM D5147)
    - a. 2 in/min. @ 73.4 ± 3.6°F MD 4.5% CMD 4.5%
    - b. 50mm/min. @ 23 ± 3°C MD 4.5% CMD 4.5%
- C. Base Flashing Cap Sheet:
  - 1. Stressply Plus FR Mineral
- D. Modified Membrane Properties (Finished Membranes): STRESSPLY PLUS FR MINERAL; ASTM D6162, Type III Grade G
  - 1. Tensile Strength (ASTM D5147)
    - a. 2 in/min. @ 73.4 ± 3.6°F MD 310 lbf/in CMD 310 lbf/in
    - b. 50 mm/min. @ 23 ± 3°C MD 54.2 kN/m CMD 54.2 kN/m
  - 2. Tear Strength (ASTM D5147)
    - a. 2 in/min. @ 73.4 ± 3.6°F MD 500 lbf CMD 500 lbf
    - b. 50 mm/min. @ 23 ± 3°C MD 2224 N CMD 2224 N
  - 3. Elongation at Maximum Tensile (ASTM D5147)
    - a. 2 in/min. @ 73.4 ± 3.6°F MD 3.5% CMD 3.5%
    - b. 50 mm/min. @ 23 ± 3°C MD 3.5% CMD 3.5%
  - 4. Low Temperature Flexibility (ASTM D5147): Passes -30°F (-34°C)

## 2.6 SURFACING MATERIALS

- A. Loose Roofing Granules: ASTM D451; as recommended by the membrane manufacturer. Match color of granulated membrane sheet. Match size of granules on the membrane.

## 2.7 RELATED MATERIALS

- A. Urethane Sealant: One part, non-sag sealant as recommended and furnished by the membrane manufacturer for moving joints.
  - 1. Tensile Strength (ASTM D412) 250 psi
  - 2. Elongation (ASTM D412) 950%
  - 3. Hardness, Shore A (ASTM C920) 35
  - 4. Adhesion-in-Peel (ASTM C920) 30 pli

- B. Butyl Tape: 100% solids, asbestos free and compressive tape designed to seal as recommended and furnished by the membrane manufacturer.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Comply with requirements of Division 01 Section "Common Execution Requirements."

### 3.2 EXAMINATION

- A. Examine substrate surfaces to receive coating and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

### 3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.
- B. Insurance/Code Compliance: Where required by code, install and test the roofing system to comply with governing regulation and specified insurance requirements.
- C. Protect other work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore other work damaged by installation of the modified bituminous roofing system.
- D. Coating shall be applied per manufacturer's application instructions for the type of coating used.
- E. Apply roofing materials as specified herein unless recommended otherwise by manufacture's instructions. Keep roofing materials dry during application. Do not permit phased construction.

### 3.4 CLEANING AND SURFACE PREPARATION

- A. All defects such as deteriorated roof decks, saturated insulation board, etc. must be repaired or replaced per Garland specifications prior to application of the restoration materials.
- B. Remove all loose roofing granules, dirt and foreign debris from the roof surface.
- C. Do not damage roof membrane in cleaning process.
- D. All surface defects (cracks, blisters, tears) must be repaired:
- E. Blister Repair
  - 1. Clean and prime the area.
  - 2. All blisters must be cut and opened down to the solidly adhered plies of the existing roof system. Use a roofer's knife to open the blister with an "X" or "H" cut. Fold the flaps and remove any existing moisture. Permit the area to dry before applying repair materials.
  - 3. Apply a liberal coating of bituminous material into the blister. Firmly press the flaps into the bituminous material and trim the edges to ensure proper fit.

F. Edge Detail Repair

1. Remove all loose dirt and debris along the edge detail and prime with an asphalt primer.
2. Secure all loose metal to the wood nailer.
3. Install a bond breaker at moving joints.
4. Apply a liberal coat of mastic over the prepared area and embed fabric into the mastic.
5. Apply a liberal coat of mastic over the fabric. Sufficiently cover the fabric to obliterate the weave from sight.
6. Apply surfacing to the repair.

3.5 FLASHING INSTALLATION

- A. Prepare all walls, penetrations and expansion joints to be flashed and where shown on the drawings, with asphalt primer at the rate of one hundred (100) square feet per gallon. Allow primer to dry tack free.
- B. All plies will be adhered with one of the following:
  1. With Type IV asphalt. The modified membrane will be used as the flashing and nailed off 8" O.C. at all vertical surfaces.
- C. The entire sheet of flashing membrane must be solidly adhered to the substrate and nailed off using a termination bar.
- D. Seal all vertical laps of flashing membrane with a three-course application of Siverflash and fiberglass mesh and aluminize.
- E. Seal junction of flashing membrane and roof with a three-course application of Siverflash and mesh.
- F. Coping Cap and similar work to be coordinated with roofing work are specified in other sections.
- G. Roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices to be coordinate with the roofing work are in other sections.

3.6 COATING APPLICATION

- A. Apply primer to roof surface at a rate of one (1) gallon per one hundred (100) square feet.
- B. Brush, spray or squeegee the coating onto the roof surface at a rate of:
  1. Three and one-half (3.5) gallons of Energizer K Plus FR per one hundred (100) square feet for the base coat when using polyester reinforcement.
- C. Install polyester beginning at the low end of the roof. Embed a full roll of the polyester fabric into the wet resurfacer and brush firmly into place. All wrinkles should be broomed out immediately.
- D. Apply a second coat of the coating at a rate of:
  1. Three and one-half (3.5) gallons of Energizer K Plus FR one hundred (100) square feet.

- E. Continue across the roof in similar fashion lapping each successive full width roll of polyester a minimum of four (4) inches on sides and six (6) inches at ends.
- F. Allow the system to cure a minimum of thirty (30) days until it is tack free and will support foot traffic without deformation.
- G. Prior to installing aluminum or white coating, allow all materials to completely cure (minimum of 30 days). Painting these surfaces prior to full cure will cause the reflective coating to appear dull or brown.
- H. Apply selected surfacing:
  - 1. Broadcast granules approximately ten (10) minutes after the final coat has been applied at a rate of sixty (60) pounds per one hundred (100) square feet.

### 3.7 FIELD QUALITY CONTROL

- A. Perform field inspection and [and testing] as required [under provisions of Division 01].
- B. Correct defects or irregularities discovered during field inspection.
- C. Require attendance of roofing [and insulation] materials manufacturers' representatives at site during installation of the roofing system.

### 3.8 CLEANING

- A. Remove bitumen adhesive drippings from all walls, windows, floors, ladders and finished surfaces.
- B. In areas where finished surfaces are soiled by asphalt or any other sources of soiling caused by work of this section, consult manufacturer of surfaces for cleaning instructions and conform to their instructions.
- C. Repair or replace defaced or disfigured finishes caused by work of this section.

### 3.9 FINAL INSPECTION

- A. At completion of roofing installation and associated work, meet with General Contractor, Architect, installer, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.
- B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
- C. If core cuts verify the presence of damp or wet materials, the Roofing Contractor shall be required to replace the damaged areas at his own expense.
- D. Repair or replace deteriorated or defective work found at time above inspection as required to produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- E. Notify the General Contractor, Architect, and Owner upon completion of corrections.
- F. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

## **07 57 13 - SPRAYED POLYURETHANE FOAM ROOFING**

### **PART 1 - GENERAL**

- 1.1 SUBMITTALS: The following shall be submitted for review by the project architect prior to the start of any contract roof work.
  - A. Data
    1. Submittals which provide descriptions or documentation regarding the work and descriptive information regarding products, materials, equipment, or components to be used in the work.
  - B. Instructions
    1. Preprinted material describing installation of a product, system or material, including special notices and material safety data sheets, if any, concerning impedances, hazards, and safety precautions.
  - C. Certificates
    1. Statement signed by an official authorized to certify on behalf of the manufacturer of a product, system or material, attesting that the product, system or material meets specified requirements. The statement must be dated after the award of the contract, must state the Contractor's name and address, must name the project and location, and must list the specific requirements which are being certified.
- 1.2 SCOPE
  - A. This section specifies polyurethane foam roof systems.
  - B. Packaging: Materials are to be received in sealed containers of the approved manufacturer; shipped from the factory with legible manufacturers labels and underwriters labels thereon where applicable.
  - C. Batch Date: Age of packaged materials shall be evidenced by the date of batch clearly stamped on the container.
  - D. All material shall be new and to be applied within six (6) months from time manufactured as evidenced by the batch date.
- 1.3 WARRANTY
  - A. Roofing System: The Contractor shall provide written warranty covering failure of the Foam Roof System against defects in manufacturing, materials, and/or workmanship. Failure is defined to include, but is not necessarily limited to, defects or deterioration of the system resulting in material discoloration, delamination, peeling, or cracking. Warranty period is ten (10) years after the date of substantial completion.
  - B. Guarantee Inspections: On expiration of the first year and at least every other year thereafter of the guarantee period, the Coating Manufacturer Accompanied by the Owner shall inspect the urethane foam and coating system to determine the condition of the roof.
    1. Any repairs that are necessary shall be accomplished as stated in the guarantee.
    2. The Coating Manufacturer shall submit to the Owner a report stating the results of each inspection as it affects the remaining period of the guarantee.

### **PART 2 - PRODUCTS**

2.1 SPRAY APPLIED MEMBRANE MATERIALS

- A. Primers: As required by Materials Manufacturer for the following items or conditions:
  - 1. Non-ferrous metals.
  - 2. Ferrous metals.
- B. All applications shall be applied with the appropriate mil thicknesses as recommended by the approved manufacturer.
- C. Polyurethane Foam: Provide 3 PCF Density, two Component System, 1:1 ratio formulated for use on roofs where smooth surface characteristics are desired.
- D. Approved manufacturers: If it meets the criteria of this specification, the following manufacturers will be acceptable;
  - 1. PSI S200-30, Poly-Thane System, Inc., Houston, Texas
  - 2. Stepan 9300 3 lb. density by Stepan
  - 3. RT-2031, Resin Technology, Ontario, California
  - 4. Premium 241-30 by Premium Polymers, Austin, Texas
    - a. Foam manufacturer shall provide manufacturing date of foam components. Foam shall be applied within six months of date of manufacture.

2.2 SILICONE COATING SYSTEM

- A. Silicone coating shall consist of a two-coat system, fluid applied elastomeric membrane with granules for protection of polyurethane foam.
- B. Approved manufacturers: If it meets the criteria of this specification, the following manufacturers will be acceptable:
  - 1. DOW Silicone Coating System 3-7000
  - 2. Everest Silicone Coating - Eversil 580
  - 3. G.E. Silicone Coating - SCM 3308 Base Coat and SCM 3304 Top Coat
  - 4. Neogard RTV Silicone #7850
    - a. Coating manufacturer shall provide manufacturing date of coating components. Coating shall be applied within six months of date of manufacture.
- C. Granules: Shall be #1 grit blasting sand. Color to be selected from manufacturer's standard colors.

2.3 ACCESSORIES

- A. Roof Jacks: As recommended by the roof system manufacturer, high temperature vents shall have insulation sleeve and storm collar.

PART 3 - EXECUTION

### 3.1 SURFACE PREPARATION

- A. Inspect existing roof system and parapet prior to starting any work. Make note and notify Owner of conditions unfavorable to beginning work.
- B. All ferrous metal flashing, trim, vent stacks, cants, etc. will be cleaned dust and grease free prior to priming with specified primer.
- C. All non-ferrous metals will be cleaned and chromate etched prior to applying specified primer.
- D. No primer will be installed over metals, ferrous or non-ferrous, without a visual inspection by the Owner's representative of all preparation. Failure of inspection may constitute removal of work and work re-attempted until accomplished correctly without any additional cost to the Owner.

### 3.2 APPLICATION OF SPRAY FOAM

- A. Prior to spraying foam the following criteria must be met: Contractor shall give Owner 48 hours notice prior to spraying any material, including primer, foam or coating.
- B. The Contractor shall provide all necessary barricades, signs, warning of spray area as determined in the preconstruction conference. The Contractor shall set these signs out the night before spraying begins.
- C. The Contractor shall be responsible for the removal of signs and barricades at the completion of the job.
- D. The Contractor shall protect any automobile, bicycle, vehicle or other property which is located in a warning area where contact with the Owner has not been made. The Contractor shall secure the property with a polyethylene cover and maintain as necessary during spray operations.
- E. The Contractor shall employ approved wind screens for all foam applications. The Contractor is responsible for all overspray and shall have sole liability where damage occurs as a result of this work.
- F. Spray foam applicator shall be approved by the materials manufacturer. Spray foam operations shall be performed only during adequate period of calm, open weather, roof surface and ambient temperature above 50 degrees F., winds not exceeding 15 miles per hour. Protect all property from overspray or other damage.
- G. Roof surfaces to receive spray foam shall be dry and free of dew or frost. Primer shall be dried free of solvent. One gallon per 100 square feet of surface minimum coverage. Any areas where primer is ponding shall be removed down to existing surface and re-primed with one thin coat of primer.
- H. In areas where total tear off of existing built-up roofing is indicated, apply two inches of new urethane foam roof system as needed to ensure positive drainage.
- I. In areas where partial removal of existing foam roofing is indicated, remove one-half inch to one inch of existing foam and apply one of new urethane foam to ensure positive drainage. Spray foam shall be applied in smooth uniform thickness over the entire area except those areas where greater thickness is required for proper drainage, and where other thicknesses are called for on the drawings. Foam shall be coved onto the walls, projections and feathered smoothly into drains, as indicated by the drawings. Grind foam smooth and trough around drains for proper drainage.
- J. Low areas, which form puddles, shall be no longer than 18 inches in longest dimension and no deeper than ½ inch. Contractor shall perform a water test 48 hours prior to final inspection, to identify low areas and insure all roof drains are functioning properly.

- K. The quantity of spray foam installed per day shall be regulated by the applicator's capacity to apply protective coating during the same day. Any foam left exposed overnight, to include tie-ins, shall be dried and thoroughly primed prior to continuing with the application of new foam or coating.
- L. Finished Surfaces: The finished surface texture of the applied spray foam shall be free of excessive ridges, bumps and pinholes, etc. "Popcorn" or "Tree Bark" surfaces as defined by the UFCA coating committee are not acceptable. The finished surface shall be in acceptable condition, without water, dew or excessive moisture prior to application of the specified coating system.

### 3.3 PROTECTIVE COATING

- A. The coating applicator shall be approved by the material manufacturer. Protect all property from overspray or other damage.
- B. Protective Coating: Silicone coat shall be applied the same day the foam is applied. NO EXCEPTIONS ALLOWED! Coating shall not be applied later than one hour prior to sundown. Any late spraying of coating can only be done with Architect's approval.
- C. Equipment: Shall be as required by approved coating manufacturer. Contractor shall submit data on the equipment as specified by the coating manufacturer. Data shall identify, pump ratio, components, pressure ratings and performance criteria.
- D. Silicone Coating, Base Coat: Apply to all horizontal surfaces to yield an average of 8 dry mils thickness on horizontal surfaces and 8 dry mils on vertical surfaces. The base coat shall be applied in a single coat using airless spray equipment. Coating to be sprayed using crosshatch method making sure the entire surface is coated evenly without pinholes, sags or curtains.
  - 1. NOTE TO APPLICATOR: Backroll basecoat to ensure adequate seal of existing surface.
- E. Intermediate Coat: Apply to all horizontal surfaces to yield an average of 8 dry mils thickness on horizontal surfaces and 8 dry mils on vertical surfaces. Coating to be sprayed using crosshatch method making sure the entire surface is coated evenly without areas of pinholes or sags.
  - 1. NOTE TO APPLICATOR: The above quantities should yield a minimum of 16 dry mils must be achieved prior to top coat and granule application. Upon the satisfaction of proper foam texture requirements, these minimum requirements can be achieved. A wet mil gauge should be used to check thickness. Verify application thicknesses by taking sample slits to ensure minimums. Granules cannot be applied until Owner can verify that the manufacturer's required minimum thicknesses have been achieved.
- F. Silicone Coating, Top Coat: Apply to all horizontal surfaces to yield an average of 8 dry mils thickness and 8 dry mils of vertical surfaces. Coating to be sprayed using crosshatch method making sure the entire surface is coated evenly without areas of pinholes or sage.
- G. Granules: Immediately upon completion of topcoat application, granules shall be uniformly broadcast over the wet silicone, at the rate of 50# per 100 square feet, totally covering all the silicone roof surface.
- H. Details: Apply an extra heavy coating in each application around all projections, parapet wall, junctions and drains. Coating shall be applied beyond the foam in a double lap coat 4 inches or as far as possible.
- I. Batch Mixing: Shall be as recommended by the approved coating manufacturer. Contractor shall submit for approval all documentation regarding the proper mixing and batching of elastomeric coating material. Identify procedure, process of mixing, equipment required, components and sequencing solvents required.



### 3.4 INSPECTION

- A. The Contractor shall maintain a daily project log containing the following information:
  - 1. Temperature and relative humidity at start time, midday and end of day (sling psychrometer permitted)
  - 2. Wind velocity (speed and direction)
  - 3. Sky conditions (overcast, partly cloudy, etc.)
  - 4. Amount of coated foam or coating installed
  - 5. General remarks
  - 6. A log shall be submitted to the Architect at the end of each day or as directed by project inspector.
- B. The Contractor shall flood the roof with water 48 hours prior to final inspection. This procedure shall be coordinated with and in the presence of the Owner. Flooding will provide a means for checking roof drains, low areas and cleaning of roof prior to final inspection.
- C. The coating manufacturer shall make an on-site inspection, accompanied by the Owner upon completion of the project. The manufacturer shall submit a report to the Owner stating the final results of the on-site inspection and approval of the application of the materials.
- D. The inspection shall include, but not be limited to the following: A slit sample, each 2,000 s.f., 2 inches long x ½ inch wide x 3/4 inch deep. Slits shall be closed by the Contractor using an approved silicone caulk. Depth of foam shall be measured adjacent to slit area.
- E. Film thickness shall be measured. Overall thickness shall average 24 mils, with top coat of 8 mils.
  - 1. Thickness shall not vary over .5 mils.
- F. The Architect shall periodically inspect the project for compliance with the specification requirements.

### 3.5 CLEANUP

- A. Limited equipment cleanup, such as nozzles, on the roof will be allowed, and only with a suitable nonflammable solvent such as methylene chloride. Major cleaning of equipment shall be confined to the ground.

### 3.6 GUARANTEE

- A. The Contractor shall certify that the foam and coatings were applied in accordance with the manufacturer's recommended procedures. The Contractor shall submit an executed copy of the Guarantee before final payment.
- B. The Contractor shall furnish to the Owner a manufacturer's written guarantee, guaranteeing all materials and workmanship for a period not less than ten (10) years from date of final acceptance.
- C. The urethane foam and silicone coating system shall be guaranteed against failures of workmanship and materials. Repair of the system, including materials and labor, shall be at no cost to the Owner.

- D. On expiration of the first year of the guarantee, the COATING MANUFACTURER, FOAM MANUFACTURER AND CONTRACTOR accompanied by the Owner, shall inspect the urethane foam and coating system to determine the condition of the roof.
- E. Any repairs that are necessary shall be accomplished as stated in the guarantee. Any defects and corrections necessary, but not covered under the guarantee, shall be at the Owner's expense.
- F. The coating manufacturer shall submit to the Owner a report stating the results of each inspection for the remaining period of the guarantee.
- G. Reference following pages for copy of sample warranty.

## 07 61 13 - STANDING SEAM SHEET METAL ROOFING

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

##### A. General:

1. Furnish all labor, material, tools, equipment and services for all preformed roofing as indicated, in accord with provisions of Contract Documents.
2. Completely coordinate with work of all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
4. See Division 1 for General Requirements.

##### B. Related Work Specified Elsewhere:

1. 07 62 00 - SHEET METAL FLASHING AND TRIM
2. 13 34 19 - METAL BUILDING SYSTEM

#### 1.2 QUALITY ASSURANCE

##### A. Applicable Standards:

1. SMACNA: "Architectural Sheet Metal Manual", Sheet Metal and Air Conditioning Contractors National Association, Inc.
2. LSGI: "Light Gage Structural Institute"
3. AISC: "Steel Construction Manual", American Institute of Steel Construction.
4. AISI: "Cold Form Steel Design Manual", American Iron and Steel Institute (1996 Edition).
5. UL580: "Tests for Uplift Resistance of Roof Assemblies", Underwriters Laboratories, Inc.
6. UL2218: Class 4 Impact Resistance Rating
7. ICBO: Evaluation Report No. ER-5409, ICBO Evaluation Service, Inc.
8. ASTM E 1680-95: "Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems, American Society for Testing and Materials.
9. ASTM E 1646-95: "Standard Test Method for Water Penetration Through Exterior Metal Roof Panel Systems, American Society for Testing and Materials.
10. ASTM A 792-83-AZ50 (Painted) & ASTM A792-83-AZ55 (Bare Galvalume Plus®): "Specifications for Steel Sheet, Aluminum-Zinc Alloy Coated by the Hot Dip Process, General Requirements (Galvalume®)", American Society for Testing and Materials.

11. ASTM E 1514-93: "Standard Specification for Structural Standing Seam Steel Roof Panel Systems", American Society for Testing and Materials.
  12. ASTM E 408-71: Standard Test Method for Total Normal Emittance of Surfaces Using Inspection- Meter Techniques. (Energy Star® for Roof Products).
  13. ASTM E 903-96 Standard Test Method for Solar Absorptance, Using Integrating Spheres. (Energy Star® for Roof Products)
- B. Manufacturer's Qualifications:
1. Manufacturer has a minimum of five years experience in manufacturing metal roof systems of this nature. Panels specified in this section shall be produced in a factory environment (not with a portable roll former) with fixed-base roll forming equipment and in line leveling, assuring the highest level of quality control. A letter from the manufacturer certifying compliance will accompany the product material submittals.
- C. Installation Contractor's Qualifications:
1. Installation contractor shall be an approved installer, certified by the manufacturer before the beginning of installation of the metal roof system, specifically for MBCI's BattenLok® metal roof system, Certification by manufacturer must include the following:
    - a. Maintain \$250,000 minimum general liability insurance coverage.
    - b. Maintain statutory limits of worker's compensation coverage as mandated by law.
    - c. Have no viable claims pending regarding negligent acts or defective workmanship on previously performed or current projects.
    - d. Has not filed for protection from creditors under any state or federal insolvency or debtor relief statutes or codes.
    - e. Project foreman is the person having received certification by the manufacturer specific training in the proper installation of the selected metal roof system and will be present to supervise whenever material is being installed. Specific certified installer program shall include the following:
      - i The instructor must have a minimum of 10 years' experience in the application of metal roof systems.
      - ii A formal syllabus for the classroom and hands-on training.
      - iii Classroom instruction with review and thorough understanding of the specific product's technical manual.
      - iv Hands-on mock-up instruction with a review and thorough understanding of the specific product's details.
      - v The installation contractor must pass a written and oral exam.
    - f. Provide five references from five different architects or building owners for projects that have been in service for a minimum of two years, stating satisfactory performance by the installation contractor.

- g. Provide certification letter that installation contractor has a minimum of three years' of metal product installation experience immediately preceding the date upon which work is to commence.

### 1.3 SYSTEM PERFORMANCE REQUIREMENTS

#### A. Performance Testing:

1. Metal roof system must be tested in accordance with Underwriters Laboratories, Inc. (UL) Test Method 580 "Tests for Uplift Resistance of Roof Assemblies".
2. Metal roof system must be installed in accordance with UL Construction
3. Metal roof system must be tested in accordance with ASTM E 1592-95 for negative loading. Determine panel bending and clip-to-panel strength by testing in accordance with ASTM E 1592-95 procedures. Capacity for gauge, span or loading other than those tested may be determined by interpolating between test values only.
4. Metal roof system must meet the air infiltration requirements of ASTM E 1680-95 when tested with a 6.24 PSF pressure differential.
5. Metal roof system must meet the water penetration requirements of ASTM E 1646-95 when tested with a 12.00 PSF pressure differential with no uncontrollable water leakage when five gallons per hour of water is sprayed per square foot of roof area.
6. Metal Roof Panels shall be high reflectance and high remittance in accordance with Energy Star<sup>®</sup>. Initial Reflectance (Galvalume Only) shall be at least 0.68 when tested with ASTM E- 903. The three year aged reflectance shall be at least 0.57, when tested in accordance with ASTM E-1918 (Measured As Solar Reflectivity, Not Visible Reflectance).

### 1.4 DESIGN REQUIREMENTS

#### A. Roof Design Loads:

1. Design criteria shall be in accordance with the most current version of IBC.
2. Dead Loads
  - a. The dead load shall be the weight of the SSMR system. Collateral loads, such as sprinklers, mechanical and electrical systems, and ceilings shall not be attached to the panels.
3. Live Loads
  - a. The panels and concealed anchor clips shall be capable of supporting a minimum uniform live load of 20 psf.
4. Roof Snow Loads
  - a. The design roof snow loads shall be as shown on the contract drawings.
5. Wind Loads
  - a. The design wind uplift pressure for the roof system shall be as shown on the contract drawings. The design uplift force for each connection assembly shall be that pressure given for the area under

consideration, multiplied by the tributary load area of the connection assembly. The safety factor listed below shall be applied to the design force and compared against the ultimate capacity. Prying shall be considered when calculating fastener design loads.

6. Thermal Loads

- a. Roof panels shall be free to move in response to the expansion and contraction forces resulting from temperature differentials during the life of the structure.

B. Framing Members Supporting the SSMR System

1. Any additions/revisions to framing members supporting the SSMR system to accommodate the manufacturer/fabricator's design shall be the Contractor's responsibility and shall be submitted for review and approval. New or revised framing members and their connections shall be designed in accordance with AISC design specifications. Maximum deflection under applied live load, snow or wind load shall not exceed  $L/240$  of the span length.

1.5 SUBMITTALS

A. Shop drawings:

1. Submit complete shop drawings and erection details, approved by the metal roofing manufacturer, to the architect for review. Do not proceed with manufacture of roofing materials prior to review of shop drawings and field verification of all dimensions. Do not use drawings prepared by the architect (owner) for shop or erection drawings.
2. Shop drawings show methods of erection, roof and wall panel layout, sections and details, anticipated loads, flashings, sealants, interfaces with all materials not supplied and proposed identification of component parts and their finishes.

B. Performance Tests:

1. Submit certified test results by a recognized testing laboratory or manufacturer's lab (witnessed by a professional engineer) in accordance with specified test methods for each panel system.

C. Calculations:

1. Submit engineering calculations defining all cladding loads for all roof areas based on design criteria listed in Paragraph 1.04 Design Requirements, allowable clip loads and required number of fasteners to secure the panel clips to the designated substructure.
2. Compute uplift loads on clip fasteners with full recognition of prying forces and eccentric clip loading.
3. Calculate holding strength of fasteners in accordance with submitted test data provided by the fastener manufacturer based on length of embedment and properties of materials.
4. Submit thermal calculations and details of floating clip, flashing attachments, and accessories certifying the free movement in response to the expansion/ contraction forces resulting from a total temperature differential of 110 degrees F.

D. Samples:

1. Submit samples and color chips for all proposed finishes.
  - a. Submit one 8-inch long sample of panel, including clips.
  - b. Submit two 3 inches x 5 inch color chip samples in color selected by the architect (owner).
- E. Warranties: Metal roof system manufacturer shall submit a specimen copy of the warranty upon final acceptance of the project. Provide one of the following warranties.
  1. Finish Warranty:
    - a. Covering bare metal against rupture, structural failure and perforation due to normal atmospheric corrosion exposure for a period of 20 years.
    - b. Covering panel finish against cracking, checking, blistering, peeling, flaking, chipping, chalking and fading for a period of twenty (20) years.
  2. Weathertightness Warranty: Metal roof system manufacturer shall submit a specimen copy of manufacturer's Weathertightness Warranty, including evidence of application for warranty and manufacturer's acceptance of the applicator and warranty conditions.
- F. Test Reports:
  1. Submit Test Reports showing that metal panels have been tested in accordance with the Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference of ASTM E 1592-95.
  2. Submit Test Reports showing that metal panels meet the water penetration requirements of ASTM E 1646-95 when tested with a 12.00 PSF pressure differential with no uncontrollable water leakage when five gallons per hour of water is sprayed per square foot of roof area.
  3. Submit Evaluation Report No. ER-5409 showing that metal panel system details, engineering calculations, computer printouts, and data have been approved by the ICBO Evaluation Service, Inc. and have been found to comply with the 1997 Uniform Building Code.
- G. Metal Roof System Fabrication Certification: Submit a letter from the metal roof system manufacturer certifying the BattenLok® panels have been produced in a factory environment (not job site roll formed) with fixed-base roll forming equipment and in line leveling
- H. Certified Installers Qualifications:
  1. Submit certificate from manufacturer certifying that installer of the metal roof system has met all of the criteria outlined in "1.02 C. Installer's qualifications" and is an authorized installer certified by the manufacturer.
  2. Submit the formal syllabus for the classroom and hands-on training.
  3. Submit five references from five different architects or building owners for projects that have been in service for a minimum of two years, stating satisfactory performance by the installation contractor.

## 1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver metal roof system to job site properly packaged to provide protection against transportation damage.

- B. Handling: Exercise extreme care in unloading, storing and erecting metal roof system to prevent bending, warping, twisting and surface damage.
- C. Storage: Store bundled sheets off the ground sufficiently high enough to allow air circulation beneath bundle and to prevent rising water from entering bundle. Slightly elevate one end of bundle. Prevent rain from entering bundle by covering with tarpaulin, making provision for air circulation between draped edges of tarpaulin and the ground. Prolonged Storage of sheets in a bundle is not recommended. If conditions do not permit immediate erection, extra care should be taken to protect sheets from staining or water marks.

## 1.7 WEATHERTIGHTNESS WARRANTY

- A. The Contractor shall provide to the Owner, a warranty signed by the roofing manufacturer of the Standing Seam Roof System as outlined below:
  - 1. For a period of twenty (20) years from the date of substantial completion, the roofing manufacturer WARRANTS to the Building Owner ("Owner"): that the roofing manufacturer's furnished roof panels, flashing, and related items used to fasten the roof panels and flashing to the roof structure ("Roof System") will not allow intrusion of water from the exterior of the roofing manufacturer's Roof System into the building envelope, when exposed to ordinary weather conditions and ordinary wear and usage. The Date of substantial completion is the date that is certified by the Architect, Owner, or Owner's Representative, when the roofing manufacturer's Roofing System is completed and accepted by or on behalf of the Owner.
  - 2. The Roofing Installer shall have the sole and exclusive obligation for all warranty work commencing on the date of substantial completion up to and until the roof system has performed leak free for (24) consecutive months.

## PART 2 - PRODUCTS

### 2.1 METAL ROOFING MATERIALS

- A. Metal roof system profile: 2 inch high x 3/4" inch wide rib 16" wide, striated panel.
- B. Metal roof system style: Vertical leg, concealed fastener, standing seam, utilizing male and female rib configurations, with factory applied hot-melt mastic in female rib, continuously locked together by an electrically powered mechanical seaming device during installation.
- C. Gauge: (24 gauge) (UL90 rated - Underwriters Laboratories)
- D. Substrate: Galvalume® steel sheet, minimum yield of 50,000 PSI.
- E. Clip: One piece fixed clip, 22 gauge, with factory-applied mastic (# UL-90 rated - Underwriters Laboratories).
- F. Texture: Smooth with striations
- G. Finish: 0.5 oz. per sq. ft. aluminum-zinc alloy-coating "Galvalume" with Kynar 500 premium thermoset silicon polyester coating; color as selected by Architect.

### 2.2 MISCELLANEOUS MATERIALS

- A. Fasteners:
  - 1. All self-tapping/self-drilling fasteners, bolts, nuts, self-locking rivets and other suitable fasteners shall be designed to withstand specified design loads.



2. Use long life fasteners for all interior and exterior metal roof system applications.
3. Provide fasteners with a factory applied coating in a color to match metal roof system application.
4. Provide neoprene washers under heads of exposed fasteners.
5. Locate and space all exposed fasteners in a true vertical and horizontal alignment. Use proper torque settings to obtain controlled uniform compression for a positive seal without rupturing the neoprene washer.

B. Accessories:

1. Provide all components required per the metal roof system manufacturer's approved shop drawings for a complete metal roof system to include panels, panel clips, trim/flashing, fascias, ridge, closures, sealants, fillers and any other required items.
  - a. All outside closures will be fabricated from Galvalume Plus® or Pre-Painted Galvalume® sheet steel of the same gauge, finish and color as the panels.
  - b. All tape seal is to be a pressure sensitive, 100 percent solids, polyisobutylene compound sealing tape with a release paper backing. Provide permanently elastic, non-sagging, non-toxic, non-staining tape seal approved by the metal roof system manufacturer.
  - c. All tube sealant is to be a one-part elastomeric polyurethane sealant approved by the metal roof system manufacturer.

2.3 FABRICATION: Material shall be in-line leveled prior to roll forming the panel profile. Where possible, roll form panels in continuous lengths, full length of detailed runs. Standard panel length shall be no more than 50 feet long. Fabricate trim/flashing and accessories to detailed profiles. Fabricate trim/flashing from same material as panel.

2.4 PREFABRICATED CURBS AND EQUIPMENT SUPPORTS

- A. Comply with loading and strength requirements as indicated where units support work of other trades. Coordinate dimensions of curbs and supports with equipment supplier/manufacturer.
- B. Fabricate curbs of structural quality aluminum (Min. .080 in. thickness for mechanical gear up to 1000 lbs; .125 in. thickness for mechanical gear between 1000 lbs. and 2000 lbs.; use a two curb system per the manufacturer above 2000 lbs.), factory primed and prepared for painting with mitered and welded corner joints. Provide integral cap cells and water diverter crickets. The upper flange of the curb must be a minimum of 18" above the water diverter. (This allows 12" of free area after the panel is lapped over the flange on the high side.) Curbs shall be designed to install under metal roof system on the high side and over metal roof system on the low side.
- C. Minimum height of prefabricated curb will be 8 inches above the finished metal roof system.
- D. Curbs shall be constructed to match the slope of the roof and provide a level top surface for mounting equipment.
- E. Curb flanges must be constructed to match the configuration of the metal roof panels and extend to a panel rib on each side. Minimum distance between curb wall and panel rib is 6".
- F. Curb manufacturer will provide their own curb structural support system that can be installed between the purlins that will allow proper thermal movement of the curb with the roofing system.

- G. Submit roof curb manufacturer's shop drawings to metal roof system manufacturer for review prior to fabrication (refer to metal roof system manufacturer's standard installation details). Metal roof system manufacturer will review roof curb manufacturer's shop drawings for compatibility with metal roof system.
- 2.5 PREFABRICATED ROOF JACKS: Pipe flashings shall be a one piece EPDM (ethylene propylene diene monomer) molded rubber boot having a serviceable temperature range of -65°F to 212°F (for standard applications) or silicone molded rubber boot having a serviceable temperature range of -100°F to 437°F (for high temperature applications) and shall be resistant to ozone and ultraviolet rays. Units shall have an aluminum flanged base ring. Do not install pipe flashings through any panel seams - install ONLY in the flat portion of the panel.
- 2.6 ICE & WATER SHEILD: Cold applied, self-adhering membrane composed of a high strength polyethylene film coated on one side with a layer of butyl rubber adhesive and inter-wound with a disposable release sheet; provide an embossed, slip resistant surface on the polyethylene. Provide materials equal to Grace Construction Products "Grace Ice & Water Shield" system.

### PART 3 - EXECUTION

#### 3.1 SURFACE CONDITIONS

- A. Examination:
  - 1. Inspect installed work of other trades and verify that such work is complete to a point where this work may continue.
  - 2. Verify that installation may be made in accordance with approved shop drawings and manufacturer's instructions. This specifically includes verifying that secondary structural members and/or decking are installed to meet UL and building code requirements. Coordinate with metal roof system manufacturer to insure that reduced clip spacings at eave, rake, ridge and corner areas are accommodated.
- B. Discrepancies:
  - 1. Do not proceed with installation until discrepancies have been resolved.

#### 3.2 INSTALLATION

- A. Install metal roof system so that it is weathertight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.
- B. Install metal roof system in accordance with manufacturer's instructions and shop drawings.
- C. Provide concealed anchors at all panel attachment locations.
- D. Install panels plumb, level and straight with seams and ribs parallel, conforming to design as indicated.
- 3.3 ROOF CURB INSTALLATION: Comply with metal roof system manufacturer's shop drawings, instructions and recommendations for installation of roof curbs. Refer to metal roof system manufacturer's standard installation details. Anchor curbs securely in place with provisions for thermal and structural movement.
- 3.4 CLEANING, PROTECTION: Dispose of excess materials and remove debris from site. Clean work in accordance with manufacturer's recommendations. Protect work against damage until final acceptance. Replace or repair to the satisfaction of the architect (owner), any work that becomes damaged prior to final acceptance. Touch up minor scratches and abrasions with touch up paint supplied by the metal roof system manufacturer. Do not allow panels or trim to come in contact with dissimilar metals such

as copper, lead or graphite. Water run-off from these materials is also prohibited. This specifically includes condensate from roof top units. A/C units.

## 07 62 00 - SHEET METAL FLASHING AND TRIM

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUMMARY: This Section includes sheet metal flashing and trim in the following categories:
  - A. Exposed trim, gravel stops, and fasciae (other than that under Division 13).
  - B. Copings.
  - C. Metal flashing.
  - D. Reglets.
- 1.3 PERFORMANCE REQUIREMENTS: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing. Fabricate and install flashings at roof edges to comply with recommendations of FM Loss Prevention Data Sheet 1-49 for the local wind zone.
- 1.4 SUBMITTALS: Submit each item in this Article according to the Conditions of the Contract and Division 1 - Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.
- 1.5 QUALITY ASSURANCE: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- 1.6 PROJECT CONDITIONS: Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

### PART 2 - PRODUCTS

- 2.1 METALS
  - A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability of Mill-Finish Alclad Aluminum Sheet: ASTM B 209Alclad 3003-H14, with a minimum thickness of 0.040 inch unless otherwise indicated.
  - B. Stainless-Steel Sheet: ASTM A 167, Type 304, soft annealed, with No. 2D finish, except where harder temper is required for forming or performance; minimum 0.0187 inch thick, unless otherwise indicated.
  - C. Galvanized Steel Sheet: ASTM A 526, G 90 commercial quality, or ASTM A 527, G 90 lock-forming quality, hot-dip galvanized steel sheet with 0.20 percent copper, mill phosphatized where indicated for painting; not less than 0.0396 inch thick, unless otherwise indicated.
  - D. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792, Class AZ-50 coating, Grade 40 or to suit project conditions, with 55 percent aluminum, not less than 0.0396 inch thick, unless otherwise indicated.
- 2.2 CONCEALED THROUGH-WALL SHEET METAL FLASHING: Fabricate from Stainless Steel 0.0156 inch thick. Fabricate through-wall metal flashings embedded in masonry with ribs formed in dovetail pattern at 3-inch intervals along length of flashing to provide a 3-way integral mortar bond and weep-hole drainage.
- 2.3 REGLETS: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.
  - A. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
  - B. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.

- C. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
- D. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
- E. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
- F. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing lower edge.
- G. Thickness: Material: Stainless steel, 0.0187 inch thick.
- H. Material: Aluminum, 0.024 inch thick.
- I. Material: Galvanized steel, 0.0217 inch thick.

2.4 FABRICATION, GENERAL: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints). Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer. Size as recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.5 SHEET METAL FABRICATIONS: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.

- A. Exposed Trim, Gravel Stops, and Fasciae: Fabricate from Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick.
- B. Copings: Fabricate from Aluminum-Zinc Alloy-Coated Steel: 0.0396 inch thick.
- C. Base Flashing: Base flashing equal to 30 ml Nervastral.
- D. Counterflashing: Fabricate from Aluminum-Zinc Alloy-Coated Steel: 0.0217 inch thick.
- E. Flashing Receivers: Fabricate from Aluminum-Zinc Alloy-Coated Steel: 0.0217 inch thick.
- F. Valley Flashing: Fabricate from Coil-Coated Galvanized Steel: 0.0276 inch thick.
- G. Drip Edges: Fabricate from Aluminum-Zinc Alloy-Coated Steel: 0.0217 inch thick.
- H. Eave Flashing: Fabricate from Aluminum-Zinc Alloy-Coated Steel: 0.0217 inch thick.
- I. Equipment Support Flashing: Fabricate from Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick.
- J. Roof-Penetration Flashing: Fabricate from Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick.

- K. Roof Expansion-Joint Cover: Fabricate from Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick.
- L. Roof-to-Wall Expansion-Joint Cover: Fabricate from Aluminum-Zinc Alloy-Coated Steel: 0.0336 inch thick.

2.6 COIL-COATED GALVANIZED STEEL SHEET FINISH: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2. Color and gloss as selected by Architect from manufacturer's full range of choices for color and gloss.

### PART 3 - EXECUTION

3.1 EXAMINATION: Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.
- B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- D. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Prein edges of sheets to be soldered to a width of 1-1/2 inches, except where pretinned surface would show in finished Work. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- E. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant. Use joint adhesive for nonmoving joints specified not to be soldered.
- F. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder. For aluminum, fabricate nonmoving seams in aluminum with flat-lock seams; Form seams and seal with epoxy seam sealer; Rivet joints for additional strength.
- G. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer. Where installing stainless steel or aluminum directly on cementitious or wood substrates, install a slip sheet of red-rosin paper and a course of polyethylene underlayment. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.
- H. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seam, or blind rivets and sealant. Lap counterflashing joints a minimum of 2 inches and bed with sealant. Coordinate installation of reglets in substrate to receive counterflashing.

- I. Equipment Support Flashing: Coordinate equipment support flashing installation with roofing and equipment installation. Weld or seal flashing to equipment support member.
  - J. Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Install flashing as follows: Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing; Seal and clamp flashing to pipes penetrating roof, other than lead flashing on vent piping.
- 3.3 CLEANING AND PROTECTION: Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

## 07 65 26 - SELF ADHERING SHEET WATERPROOFING & FLASHING

### PART 1 - GENERAL

#### 1.1 GENERAL COMMENTS

- A. The general and special conditions of these specifications shall both be considered as a part of this section insofar as they may be termed applicable whether attached or not.
- B. Cooperation by the contractor for work of this section of the specifications with all other trades is mandatory, so that all phases of the work may be properly coordinated without delays or damage to any parts of any work.
- C. The contractor shall provide all items, materials, operations listed or scheduled on the drawings and/or herein, including all labor, materials, equipment and incidentals necessary for their completion.

#### 1.2 SUMMARY

- A. As indicated in the drawings, provide membrane flashing for wall panel & roofing applications including valleys, base/wall conditions, eaves and gables.
- B. As dampproofing at all metal panel on plywood or gypsum sheathing.
- C. As dampproofing at exterior thin brick veneer.

#### 1.3 SUBMITTALS

- A. Submit for approval samples, product data, mock-ups, warranty, extra stock.

#### 1.4 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Membrane flashing:
  - 1. Basis of Design: Grace Construction Products
- B. Physical properties
  - 1. Meet the physical properties and performance characteristics indicated in table below:



PHYSICAL PROPERTIES OF GRACE UNDERLAYMENTS	
Property and Test Method	Grace Ice & Water Shield
Color	Gray – Black
Thickness membrane, ASTM D3757, Method A	1.02 mm (40 Mil)
Tensile strength, membrane ASTM D412 (Die C Modified)	1720 kPa (250 psi)
Elongation, membrane ASTM D412 (Die C modified)	250%
Low temperature flexibility, ASTM D 1970	Unaffected at -29°
Adhesion to plywood, ASTM D903	525 N/m (3lb/in width)
Permeance (max), ASTM E96	
Material weight installed (max), ASTM D461	1.3 kg/m <sup>2</sup> (0.3 lb/ft <sup>2</sup> max)

C. Fire rating

1. Underwriters Laboratories, Inc. (UL)
  - a. UL R13399 Class A fire classification under fiberglass shingles and Class C under organic felt shingles for Grace Ice and Water Shield.
  - b. UL Classified Sheathing Material Fire Resistance Classification Design Numbers P225, P227, P230, P237, P259, P508, P510, P512, P514, P701, P711, P717, P722, P723, P722, P723, P734, P736, P742, P803, P814, P818 and P824 for Grace Ice & Water Shield.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Surface Preparation: Install underlayments directly on a clean, dry, continuous substrate. Remove dust, dirt, loose nails and extraneous materials. Protrusions from the substrate area must be removed. Substrates shall have no voids, damaged or unsupported areas. Repair substrate areas before installing the membrane.
- B. Membrane Installation
  1. Apply Grace underlayments only in fair weather when the air, substrate and membrane are at temperatures of 5 degrees C (40 degrees F) or higher. Apply covering material at temperatures of 5 degrees C (40 degrees F) or higher.
  2. Consistent with good construction practice, install the membrane so that all laps shed water. Always work from the low point to the high point of the assembly. At roof applications apply the membrane in valleys before the membrane is applied to the eaves; following placement along the eaves, continue application of the membrane up the roof. The membrane may be installed either vertically or horizontally.
  3. Use smooth shank, electroplated galvanized nails for fastening shingles. Hand nailing will provide a better seal than power activated nailing. If nailing of the membrane is necessary on steep slopes during hot weather, backnail and cover the nails by overlapping with the next sheet.
  4. Extend the membrane on the substrate above the highest expected level of water back-up from ice dams and above the highest expected level of snow and ice on the wall sheathing on vertical side walls (dormers) and vertical front walls for ice dam protection. Consider a double layer of membrane in critical areas, such as along the eaves or in valleys, in climates where severe ice dams are anticipated. Apply the membrane to the entire substrate for wind driven rain protection. Apply a new layer of Grace underlayment directly over the old Grace

underlayment in retrofit applications following the standard membrane application procedure. Place metal drip edges or wood starter shingles over the membrane.

## 07 71 00 - ROOF SPECIALTIES

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

##### A. General:

1. Furnish all labor, material, tools, equipment and services for all gutter and downspout systems as indicated, in accord with provisions of Contract Documents.
2. Completely coordinate with work of all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
4. See Division 1 for General Requirements.

##### B. Related Work Specified Elsewhere:

1. 05 12 00 - STRUCTURAL STEEL FRAMING
2. 05 21 00 - STEEL JOIST FRAMING
3. 07 62 00 - SHEET METAL FLASHING AND TRIM

##### C. Applicable Standards:

1. SMACNA: "Architectural Sheet Metal Manual", Sheet Metal and Air Conditioning Contractors National Association, Inc.
2. LGS: "Light Gauge Structural Institute"
3. AISC: "Steel Construction Manual", American Institute of Steel Construction.

#### 1.2 SUBMITTALS

##### A. Submit under provisions of Section 01 33 23.

##### B. Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

##### C. Shop Drawings: Submit shop drawings of assemblies and systems components installed in the field.

##### D. Color Selection Samples: For each application specified, two complete sets of color chips representing manufacturer's full range of available colors.

#### 1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. Roof accessories manufacturer to have minimum 5 years documented experience in the design and fabrication of roofing specialties and accessories.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Finish areas designated by Architect.
  - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
  - 3. Refinish mock-up area as required to produce acceptable work.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

#### 1.5 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

#### 1.6 WARRANTY

- A. Warrant products installed under this section of work to be free of defects in materials and/or manufacture and condensation for a period of 20 years when installed in accordance with the manufacturer's written instructions.

### PART 2 - PRODUCTS

#### 2.1 GUTTER AND DOWNSPOUT SYSTEMS

- A. Conductor Heads:
  - 1. Universal Conductor Heads Custom sheet metal fabrication
  - 2. Downspouts/Conductors Round Downspouts.
    - a. Plain.
- B. Gutter Profiles:
  - 1. Size: Refer to drawings.
  - 2. Roof Drainage Accessories:
    - a. Miters, HR Accessories, Hangers, Downspout / Eave Accessories.
  - 3. Roof Edge:
    - a. Painted Galvanized Steel.
  - 4. Drip Edge: C-Styles:
    - a. Painted galvanized steel.
  - 5. W & V Valley:
    - a. Galvanized steel.
  - 6. Gutter Covers:
    - a. Galvanized steel mesh gutter guard.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Do not begin installation until the metal roofing system has been completely installed.
- B. If metal roof system installation is the responsibility of another installer, notify Architect of unsatisfactory conditions before proceeding.

**3.2 INSTALLATION**

- A. Install materials in accordance with manufacturer's printed instructions.

**3.3 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

## 07 71 29 - MANUFACTURED ROOF EXPANSION JOINTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes metal-flanged, bellows-type roof expansion assemblies.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, joints, splices, and attachments to other work.
- C. Warranties.

#### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Installer of roof membrane.
- B. Source Limitations: Obtain roof expansion assemblies approved by roofing membrane manufacturer and that are part of roofing membrane warranty.
- C. Fire-Test-Response Characteristics: Provide assemblies with fire-test-response characteristics not less than that of adjacent construction, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Fire-Resistance Ratings: UL 2079.
  - 2. Fire-Resistance Ratings: ASTM E 119.

#### 1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace roof expansion assemblies that leak, deteriorate, or otherwise fail to perform within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 METALS

- A. Galvanized Steel Sheet: ASTM A 653/A 653M, hot-dip zinc-coating designation G90, stretcher-leveled standard of flatness and either commercial or forming steel, minimum 0.019 inch thick.

#### 2.2 MISCELLANEOUS MATERIALS

- A. Elastomeric Sealant: ASTM C 920, of type, grade, class, and use classifications required.
- B. Mineral-Fiber Blanket: ASTM C 665.
- C. Fasteners: Manufacturer's recommended fasteners.

2.3 FIRE BARRIERS

- A. Fire Barriers: Provide assemblies with manufacturer's continuous fire-barrier seals to provide fire-resistance rating not less than rating of adjacent construction.

2.4 EXPANSION ASSEMBLIES

- A. Exterior Expansion joint cover systems shall be Balco, Inc. 9WC Series, or approved equal.
  - 1. Aluminum:
    - a. ASTM B221, alloy 6063-T5 for extrusions; alloy 6063-T5 or alloy 6061-T6 for bar
    - b. ASTM B209, alloy 6061-T6 for plate
    - c. ASTM B209, alloy 5052-H32 for sheet
  - 2. Stainless Steel: ASTM A666, alloy 304 for sheet and plate
  - 3. Centering Bars:
    - a. Shall be spring steel, alloy 1074, and shall have thermoplastic elastomer spheres which engage with the base members' tracks (joints up to 8" width)
    - b. Fabricated of square steel tubing, spring steel bar, alloy 1074, and thermoplastic elastomer spheres which engage with the base members' tracks (8" joints and wider)
  - 4. Water Barrier: Flexible EPDM, Class I, ASTM D4637, 45 mils thick (minimum) sheet
  - 5. Fasteners, accessories, sealant and other materials required for complete installation in accordance with the manufacturer's written installation instructions.
- B. Interior Expansion joint cover systems shall be Balco, Inc. 6000 Series, or approved equal. Interior Expansion joints cover at doors shall be Balco, Inc. Clip-in Series, or approved equal.
  - 1. Floor Expansion Joint basis of design: Balco model 6FS-1-2M.
  - 2. Interior Partition Expansion Joint basis of design: Balco model 6GW-1.
  - 3. Door Expansion Joint basis of design: Balco model 2C2. (Couldn't Find)
  - 4. Aluminum:
    - a. ASTM B221, alloy 6063-T5 for extrusions
    - b. ASTM B209, alloy 6061-T6 for plate
    - c. ASTM B209, alloy 5052-H32 for sheet
  - 5. Bronze:
    - a. ASTM B455, alloy CDA 385 for extrusion

- b. ASTM B36, alloy 280 for sheet and plate
  - 6. Stainless Steel: ASTM A666, alloy 304 for sheet and plate
  - 7. Abrasive: Two (2) part Epoxy combined with aluminum oxide grit.
  - 8. Water Barrier: Flexible EPDM, Class I, ASTM D4637, 45 mils thick (minimum) sheet
  - 9. Fasteners, accessories, sealant and other materials required for complete installation in accordance with the manufacturer's written installation instructions.
- C. Floor Expansion Joint Threshold cover shall be Construction Specialties, Inc. PC series, or approved equal.
  - 1. Floor Expansion Joint Threshold covers basis of design: Construction Specialties, Inc. Model PC-600.
  - 2. Aluminum: ASTM B 221, Alloy 6005A-T61, 6063-T5, 6061-T5, 6105-T5 for extrusions; ASTM B 209, Alloy 6061-T6, 3003-H14, 5005-H34 for sheet and plate.
  - 3. Stainless Steel: ASTM A 666, Type 304 for plates, sheet, and strips.
  - 4. Type: Glide Plate.
    - a. Exposed Metal: Aluminum.
    - b. Finish: Class II, clear anodic.
  - 5. Attachment Method: Mechanical anchors.
  - 6. Load Capacity: Standard duty.
  - 7. Fire-Resistance Rating: Provide joint system and fire-barrier assembly with a rating not less than that of adjacent construction.
  - 8. Moisture Barrier: Manufacturer's standard.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with manufacturer's written instructions unless more stringent requirements are indicated.
- B. Install fire barriers to provide uninterrupted fire resistance throughout length of roof expansion assembly, including transitions and end joints.
- C. Extend roof expansion assemblies over parapets, and other elements in the construction profile, with factory-fabricated intersections and transitions.
  - 1. Install factory-fabricated transitions between roof expansion assemblies and building architectural joint systems.
- D. Splice roof expansion assemblies with materials provided by manufacturer, according to manufacturer's written instructions.



- E. Anchor roof expansion assemblies complying with manufacturer's written instructions.
- F. On single-ply roofing, install roof expansion assemblies complying with manufacturer's written instructions. Anchor to cants or curbs and seal to membrane. Cover flanges with stripping or flashing according to requirements in Division 07 Section "Thermoplastic Polyolefin (TPO Roofing)."

### 3.2 PROTECTION

- A. Provide final protection and maintain in a manner that ensures that roof expansion assemblies are without damage or deterioration at time of Substantial Completion.

## **07 72 00 - ROOF ACCESSORIES**

### **PART 1 - GENERAL**

- 1.1 SECTION INCLUDES: The work of this contract consists of the furnishing of all labor, equipment, materials and devices required in conjunction with the installation of supports for all Mechanical piping, Electrical conduit, HVAC Air Ducts and HVAC Equipment, access hatches.
- 1.2 REFERENCES: Applicable sections of the following apply:
  - A. American Society for Testing and Materials (ASTM):
  - B. Manufacturer's Standardization Society of the Valve and Fittings Industry, Inc. (MSS)
  - C. National Roofing Contractor's Association (NRCA): NRCA Roofing and Waterproofing Manual, Fourth Edition, 1987.
- 1.3 SUBMITTALS: Submit manufacturer's product data sheets. Including installation instructions for each fabricated unit.
- 1.4 QUALITY CONTROL: The Manufacturer or his representative on request will inspect the completed installation and report in writing that the design requirements meet the Manufacturer's approval.
- 1.5 WARRANTY: The Product Manufacturer shall provide a full system material warranty necessary to cover all cost of repairs and/or replacement of all components of the system against defects in manufacturing for a period of five years.

### **PART 2 - PRODUCTS**

- 2.1 RUBBER WALK PADS: Pad shall conform to the existing roof manufacturer's system, equal to GMX 1/2" rubber walk pads. Locate at perimeter of mechanical units.
- 2.2 PIPE SUPPORTS: Type: RS-9008, Roller Support, 8" x 8" Base, Adjustable from 3 1/2" to height required with telescoping tubing, Unistrut top bar, roller assembly, for light weight conduit pipe subject to expansion and contraction; sizes 1/2" through 4". The support system shall be manufactured by CSS, Inc. Company, Inc. or approved equal to provide the Owner a single source warranty for the roofing system and the pipe supports.
- 2.3 ROOF CURBS: Provide manufacturer's standard roof curb units for roof mounted equipment as indicated or is not indicated as required to adequately support equipment. Roof curbs shall be galvanized metal or stainless steel as design loads will allow and shall provide for a weather tight seal with standing seam roof system. Crickets shall be provided on high side of curbs for proper drainage as an integral part of roof curb design. All curbs shall be seamed in place.

### **PART 3 - EXECUTION**

- 3.1 PREPARATION: Verify that substrates are smooth and clean to extent needed to receive work. Review drawing for locations of support system. Clean surfaces to receive support system bases.
- 3.2 INSTALLATION, GENERAL
  - A. General: Comply with manufacturer's written instructions. Coordinate installation of roof accessories with installation of roof deck, roof insulation, flashing, roofing membranes, penetrations, equipment, and other construction involving roof accessories to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight. Anchor roof accessories securely to supporting structural substrates so they are capable of withstanding lateral and thermal stresses, and inward and outward loading pressures.

- B. Install roof accessory items according to construction details of NRCA's "Roofing and Waterproofing Manual," unless otherwise indicated,
- C. Separation: Separate metal from incompatible metal or corrosive substrates, including wood, by coating concealed surfaces, at locations of contact, with bituminous coating or providing other permanent separation.
- D. Flange Seals: Unless otherwise indicated, set flanges of accessory units in a thick bed of roofing cement to form a seal.
- E. Cap Flashing: Where required as component of accessory, install cap flashing to provide waterproof overlap with roofing or roof flashing (as counterflashing). Seal overlap with thick bead of mastic sealant.
- F. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

3.3 SUPPORT INSTALLATION: Field customize to fit existing condition or as specified herein. Set bases and support framing on approved isolation pads in locations specified or required herein as per drawings and site conditions but not to exceed 10' spacing. Adjust all telescoping frame structure to required height and weight, insert bolt through strut, tighten with nut. Adjust each required hanger to its desired height, check each support for equal weight disbursement.

## **07 72 33 - ROOF ACCESS HATCHES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Work included: Furnishing and installing factory fabricated roof hatches

- 1. Related Work: 05 51 33 - METAL LADDERS

#### **1.2 SUBMITTALS**

- A. Product Data: Provide manufacturer's product data for all materials in this specification.
- B. Shop Drawings: Show profiles, accessories, location, and dimensions.
- C. Samples: Manufacturer to provide upon request; sized to represent material adequately.
- D. Contract Closeout: Roof hatch manufacturer shall provide the manufacturer's Warranty prior to the contract closeout .

#### **1.3 PRODUCT HANDLING**

- A. All materials shall be delivered in manufacturer's original packaging.
- B. Store materials in a dry, protected, well-vented area. The contractor shall thoroughly inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.
- C. Remove protective wrapping immediately after installation.

#### **1.4 SUBSTITUTIONS**

- A. Proposals for substitution products shall be accepted only from bidding contractors and not less than (10) working days before bid due date. Contractor guarantees that proposed substitution shall meet the performance and quality standards of this specification.

#### **1.5 JOB CONDITIONS**

- A. Verify that other trades with related work are complete before installing roof hatch(s).
- B. Mounting surfaces shall be straight and secure; substrates shall be of proper width.
- C. Refer to the construction documents, shop drawings, and manufacturer's installation instructions.
- D. Coordinate installation with roof membrane and roof insulation manufacturer's instructions before starting.
- E. Observe all appropriate OSHA safety guidelines for this work.

#### **1.6 WARRANTY/GUARANTEE**

- A. Manufacturer's standard warranty: Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish

a new part at no charge. Electrical motors, special finishes, and other special equipment (if applicable) shall be warranted separately by the manufacturers of those products.

- B. Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. The BILCO Company, Fax: 1-203-933-8478, Web: [www.bilco.com](http://www.bilco.com)
- B. Other manufacturers as approved by Architect.

### 2.2 ROOF HATCH

- A. Basis of Design: Bilco Type E Metal Roof Hatch
- B. Product Characteristics: Size: width: 3'0" (914mm) x length: 3'0" (914mm). Length denotes hinge side. The roof hatch shall be single leaf.
- C. Performance characteristics:
  - 1. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m2) with a maximum deflection of 1/150th of the span or 20 psf (97 kg/m2) wind uplift.
  - 2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
  - 3. Operation of the cover shall not be affected by temperature.
  - 4. Entire hatch shall be weathertight with fully welded corner joints on cover and curb.
- D. Cover: Shall be 14 gauge paint bond G-90 galvanized steel with a 3" (76mm) beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
- E. Cover insulation: Shall be fiberglass of 1" (25.4mm) thickness, fully covered and protected by a metal liner 22 gauge paint bond G-90 galvanized steel.
- F. Curb: Shall be 12" (305mm) in height and of 14 gauge paint bond G-90 galvanized steel. The curb shall be formed with a 3-1/2" (89mm) flange with 7/16" (11.1mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6" (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.
- G. Curb insulation: Shall be rigid, high-density fiberboard of 1" (25.4mm) thickness on outside of curb.
- H. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe through bolted to the curb assembly.

I. Hardware

1. Heavy pintle hinges shall be provided
2. Cover shall be equipped with a spring latch with interior and exterior turn handles
3. Roof hatch shall be equipped with interior and exterior padlock hasps.
4. The latch strike shall be a stamped component bolted to the curb assembly.
5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" (25.4mm) diameter red vinyl grip handle to permit easy release for closing.
6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed.
7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

J. Finishes: Factory finish shall be alkyd based red oxide primed steel.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify that roof hatch installation will not disrupt other trades. Verify that the substrate is dry, clean, and free of foreign matter. Report and correct defects prior to any installation.

3.2 INSTALLATION

- A. Submit product design drawings for review and approval to the architect or specifier before fabrication.
- B. The installer shall check as-built conditions and verify the manufacturer's roof hatch details for accuracy to fit the application prior to fabrication. The installer shall comply with the roof hatch Manufacturer's installation instructions.
- C. The installer shall furnish mechanical fasteners consistent with the roof requirements.

## 07 81 16 - APPLIED FIREPROOFING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes SFRMs applied to surfaces that are concealed from view behind other construction when the Work is completed.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show extent of sprayed fire-resistive material for each construction and fire-resistance rating, applicable fire-resistive design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction, and minimum thicknesses.
- C. Field quality-control test reports.

#### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer approved by SFRM manufacturer to install manufacturer's products. A manufacturer's willingness to sell its SFRM to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.
- B. SFRM Testing: By a qualified testing and inspecting agency engaged by Contractor or manufacturer to test for compliance with specified requirements for performance and test methods.
  - 1. SFRMs are randomly selected for testing from bags bearing the applicable classification marking of UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
  - 2. Testing is performed on specimens of SFRMs that comply with laboratory testing requirements specified in Part 2 and are otherwise identical to installed fire-resistive materials, including application of accelerant, sealers, topcoats, tamping, troweling, rolling, and water overspray, if any of these are used in final application.
  - 3. Testing is performed on specimens whose application the independent testing and inspecting agency witnessed during preparation and conditioning. Include in test reports a full description of preparation and conditioning of laboratory test specimens.
- C. Compatibility and Adhesion Testing: Engage a qualified testing and inspecting agency to test for compliance with requirements for specified performance and test methods.
  - 1. Test for bond per ASTM E 736 and requirements in UL's "Fire Resistance Directory" for coating materials. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
  - 2. Verify that manufacturer, through its own laboratory testing or field experience, has not found primers or coatings to be incompatible with SFRM.
- D. Fire-Test-Response Characteristics: Where indicated, provide products identical to those tested for fire resistance per ASTM E 119 by a testing agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
  2. Identify products with appropriate markings of applicable testing and inspecting agency.
- E. Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."
- F. Preinstallation Conference: Conduct conference at Project site.

#### 1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply SFRM when ambient or substrate temperature is 40 deg For lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of SFRM. Use natural means or, if they are inadequate, forced-air circulation until fire-resistive material dries thoroughly.
- C. Sequence and coordinate application of SFRM with other related work specified in other Sections to comply with the following requirements:
1. Provide temporary enclosure as required to confine spraying operations and protect the environment.
  2. Provide temporary enclosures for applications to prevent deterioration of fire-resistive material due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.
  3. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
  4. Do not apply fire-resistive material to metal roof deck substrates until concrete topping, if any, has been completed. For metal roof decks without concrete topping, do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material.
  5. Do not apply fire-resistive material to metal floor deck substrates until concrete topping has been completed.
  6. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
  7. Defer installing ducts, piping, and other items that would interfere with applying fire-resistive material until application of fire protection is completed.
  8. Do not install enclosing or concealing construction until after fire-resistive material has been applied, inspected, and tested and corrections have been made to defective applications.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Contractor and by Installer, in which manufacturer agrees to repair or replace SFRMs that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:



- a. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of SFRM from substrates.
  - b. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.
2. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 CONCEALED SFRM

- A. Basis of Design: Design is based on manufacturers listed in UL Design Nos. indicated on the Drawings. Subject to compliance with requirements, provide indicated products or products with comparable performance approved by the Architect by one of the following:
  1. Concealed Cementitious SFRM:
    - a. Carbolite Co.
    - b. Grace, W. R. & Co. -Conn., Construction Products Div.
    - c. Isolatek International Corp.
    - d. Southwest Vermiculite Co., Inc.
- B. Material Composition: Manufacturer's standard product,:
  1. Concealed Cementitious SFRM: Factory-mixed, dry formulation of gypsum or portland cement binders, additives, and lightweight mineral or synthetic aggregates mixed with water at Project site to form a slurry or mortar for conveyance and application.
- C. Physical Properties: Minimum values, unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, measured per standard test methods referenced with each property as follows:
  1. Dry Density: 15 lb/cu. ft. for average and individual densities, or greater if required to attain fire-resistance ratings indicated, per ASTM E 605 or AWCI Technical Manual 12-A, Section 5.4.5, "Displacement Method."
  2. Thickness: Minimum average thickness required for fire-resistance design indicated according to the following criteria, but not less than 0.375 inch, per ASTM E 605:
    - a. Where the referenced fire-resistance design lists a thickness of 1 inch or more, the minimum allowable individual thickness of SFRM is the design thickness minus 0.25 inch.
    - b. Where the referenced fire-resistance design lists a thickness of less than 1 inch but more than 0.375 inch, the minimum allowable individual thickness of SFRM is the greater of 0.375 inch or 75 percent of the design thickness.
    - c. No reduction in average thickness is permitted for those fire-resistance designs whose fire-resistance ratings were established at densities of less than 15 lb/cu. ft.
  3. Bond Strength: 150 lbf/sq. ft. minimum per ASTM E 736 based on laboratory testing of 0.75-inch minimum thickness of SFRM.

4. Compressive Strength: 5.21 lbf/sq. in. minimum per ASTM E 761. Minimum thickness of SFRM tested shall be 0.75 inch and minimum dry density shall be as specified but not less than 15 lb/cu. ft.
5. Corrosion Resistance: No evidence of corrosion per ASTM E 937.
6. Deflection: No cracking, spalling, or delamination per ASTM E 759.
7. Effect of Impact on Bonding: No cracking, spalling, or delamination per ASTM E 760.
8. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours per ASTM E 859. For laboratory tests, minimum thickness of SFRM is 0.75 inch, maximum dry density is 15 lb/cu. ft., test specimens are not prepurged by mechanically induced air velocities, and tests are terminated after 24 hours.
9. Fire-Test-Response Characteristics: Provide SFRM with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  - a. Flame-Spread Index: 10 or less.
  - b. Smoke-Developed Index: 0.

## 2.2 AUXILIARY FIRE-RESISTIVE MATERIALS

- A. General: Provide auxiliary fire-resistive materials that are compatible with SFRM and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: For use on each substrate and with each sprayed fire-resistive product, provide primer that complies with one or more of the following requirements:
  1. Primer's bond strength complies with requirements specified in UL's "Fire Resistance Directory" for coating materials based on a series of bond tests per ASTM E 736.
  2. Primer is identical to those used in assemblies tested for fire-test-response characteristics of SFRM per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Adhesive for Bonding Fire-Resistive Material: Product approved by manufacturer of SFRM.
- D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required to comply with fire-resistance designs indicated and fire-resistive material manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive SFRM.
- E. Reinforcing Fabric: Glass-or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by manufacturer of SFRM.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of work. A substrate is in satisfactory condition if it complies with the following:

1. Substrates comply with requirements in the Section where the substrate and related materials and construction are specified.
  2. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, incompatible paints, incompatible encapsulants, or other foreign substances capable of impairing bond of fire-resistive materials with substrates under conditions of normal use or fire exposure.
  3. Objects penetrating fire-resistive material, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
  4. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive material.
  5. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify that concrete work on steel deck has been completed.
- C. Verify that roof construction, installation of roof-top HVAC equipment, and other related work are completed.
- D. Conduct tests according to fire-resistive material manufacturer's written recommendations to verify that substrates are free of substances capable of interfering with bond.
- E. Cover other work subject to damage from fallout or overspray of fire-resistive materials during application.
- F. Clean substrates of substances that could impair bond of fire-resistive material, including dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, and incompatible primers, paints, and encapsulants.
- G. Prime substrates where recommended in writing by SFRM manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive SFRM.
- H. Install metal lath and reinforcing fabric, as required, to comply with fire-resistance ratings and fire-resistive material manufacturer's written recommendations for conditions of exposure and intended use. Securely attach lath and fabric to substrate in position required for support and reinforcement of fire-resistive material. Use anchorage devices of type recommended in writing by SFRM manufacturer. Attach accessories where indicated or required for secure attachment of lath and fabric to substrate.
- I. Coat substrates with bonding adhesive before applying fire-resistive material where required to achieve fire-resistance rating or as recommended in writing by SFRM manufacturer for material and application indicated.
- J. Extend fire-resistive material in full thickness over entire area of each substrate to be protected. Unless otherwise recommended in writing by SFRM manufacturer, install body of fire-resistive covering in a single course.
- K. Spray apply fire-resistive materials to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by SFRM manufacturer.
- L. Where sealers are used, apply products that are tinted to differentiate them from SFRM over which they are applied.
- M. Apply concealed SFRM in thicknesses and densities not less than those required to achieve fire-resistance ratings designated for each condition, but apply in greater thicknesses and densities if specified in Part 2 "Concealed SFRM" Article.

- N. Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
- O. Repair or replace work that has not successfully protected steel.

### 3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.
  - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Tests and Inspections: Testing and inspecting of completed applications of SFRM shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with application of SFRM for the next area until test results for previously completed applications of SFRM show compliance with requirements. Tested values must equal or exceed values indicated and required for approved fire-resistance design.
  - 1. Thickness for Floor, Roof, and Wall Assemblies: For each 1000-sq. ft. area, or partial area, on each floor, from the average of 4 measurements from a 144-sq. in. sample area, with sample width of not less than 6 inches per ASTM E 605.
  - 2. Thickness for Structural Frame Members: From a sample of 25 percent of structural members per floor, taking 9 measurements at a single cross section for structural frame beams or girders, 7 measurements of a single cross section for joists and trusses, and 12 measurements of a single cross section for columns per ASTM E 605.
  - 3. Density for Floors, Roofs, Walls, and Structural Frame Members: At frequency and from sample size indicated for determining thickness of each type of construction and structural framing member, per ASTM E 605 or AWCI Technical Manual 12-A, Section 5.4.5, "Displacement Method."
  - 4. Bond Strength for Floors, Roofs, Walls, and Structural Framing Members: For each 10,000-sq. ft. area, or partial area, on each floor, cohesion and adhesion from one sample of size indicated for determining thickness of each type of construction and structural framing member, per ASTM E 736.
    - a. Field test SFRM that is applied to flanges of wide-flange, structural-steel members on surfaces matching those that will exist for remainder of steel receiving fire-resistive material.
    - b. If surfaces of structural steel receiving SFRM are primed or otherwise painted for coating materials, perform series of bond tests specified in UL's "Fire Resistance Directory." Provide bond strength indicated in referenced UL fire-resistance criteria, but not less than 150 lbf/sq. ft. minimum per ASTM E 736.
  - 5. If testing finds applications of SFRM are not in compliance with requirements, testing and inspecting agency will perform additional random testing to determine extent of noncompliance.
- C. Remove and replace applications of SFRM that do not pass tests and inspections for cohesion and adhesion, for density, or for both and retest as specified above.
- D. Apply additional SFRM, per manufacturer's written instructions, where test results indicate that thickness does not comply with specified requirements, and retest as specified above.

**07 81 33 - MINERAL-FIBER FIREPROOFING**

**PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required to provide sprayed-on fireproofing at steel columns & beams above fire rated walls, as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. The requirements of other sections may effect the work under this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture, providing air good circulation.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review

**PART 2 - MATERIAL:**

- 2.1 APPROVED PRODUCTS: Grace Construction Products, "Monokote" Type MK-6 or an alternative product, determined by the Architect to be equal prior to bid.
- 2.2 SPRAYED-ON FIREPROOFING: Sprayable, bonded insulation consisting of a homogeneous mixture of mineral fibers, binder & adhesive, containing no asbestos. Material to be incombustible per Fed Spec SS-A-118a, with a minimum rating of: smoke-10, flame-0, fuel-0. Applied thickness as required to receive 1 hour fire rating.

**PART 3 - EXECUTION**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 APPLICATION: Apply to all all surfaces of primary steel framing above approximately 9'-0" (at top of wall wrapping columns which provides 1 hour protection) & below 20'-0" above finished floor. Mechanically spray material in a uniform layer to achieve 1 hour fire protection, in a neat manner, taking care to control overspray or splattering onto adjacent surfaces.
- 3.3 PROTECTION: Metal is not to be damaged by installation procedure. Protect work against damage until final acceptance. Replace or repair to the satisfaction of the Architect, any work that becomes damaged prior to final acceptance. Touch up scratches and abrasions. Follow all EPA regulations & otherwise protect building inhabitants.

## 07 84 13 - PENETRATION FIRESTOPPING

### PART 1 - GENERAL

- 1.1 SUMMARY: Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
- 1.2 PERFORMANCE REQUIREMENTS
  - A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
  - B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814:
    1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
    2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
      - a. Penetrations located outside wall cavities.
      - b. Penetrations located outside fire-resistance-rated shaft enclosures.
  - C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
    1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
    2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
    3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
  - D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- 1.3 SUBMITTALS
  - A. Product Data: For each type of product indicated.
  - B. Shop Drawings: For each through-penetration firestop system, submit documentation, including illustrations, from a qualified testing and inspecting agency, showing each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item.
  - C. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
  - D. Qualification Data: For Installer.

#### 1.4 QUALITY ASSURANCE

- A. Installation Responsibility: Assign installation of through-penetration firestop systems in Project to a single qualified installer.
- B. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
  - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
  - 2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems bearing classification marking of qualified testing and inspecting agency.
- C. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency, if required by authorities having jurisdiction.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems indicated that are produced by one of the following manufacturers:
  - 1. Grace, W. R. & Co. -Conn.
  - 2. Hilti, Inc.
  - 3. Johns Manville.
  - 4. RectorSeal Corporation (The).
  - 5. Tremco; Sealant/Weatherproofing Division.
  - 6. USG Corporation.

#### 2.2 FIRESTOPPING

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

### PART 3 - EXECUTION

#### 3.1 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- D. Identification: Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. Include the following information on labels:
  - 1. The words "Warning -Through-Penetration Firestop System -Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
  - 4. Date of installation.
  - 5. Through-penetration firestop system manufacturer's name.
  - 6. Installer's name.

### 3.2 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage an independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
- C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.



## 07 92 00 - JOINT SEALANTS

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUMMARY: This Section includes sealants for the following applications, including those specified by reference to this Section:
  - A. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
    1. Control and expansion joints in cast-in-place concrete.
    2. Joints between architectural precast concrete units.
    3. Control and expansion joints in unit masonry.
    4. Joints between metal panels.
    5. Joints between different materials listed above.
    6. Perimeter joints between materials listed above and frames of doors and windows.
    7. Control and expansion joints in ceiling and overhead surfaces.
    8. Other joints as indicated.
  - B. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
    1. Control and expansion joints on exposed interior surfaces of exterior walls.
    2. Perimeter joints of exterior openings where indicated.
    3. Tile control and expansion joints.
    4. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
    5. Joints on underside of precast beams and planks.
    6. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
    7. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    8. Other joints as indicated.
  - C. Interior joints in the following horizontal traffic surfaces:
    1. Control and expansion joints in cast-in-place concrete slabs.
    2. Control and expansion joints in tile flooring.
    3. Other joints as indicated.
- 1.3 PERFORMANCE REQUIREMENTS: Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.
- 1.4 SUBMITTALS: Product Data for each joint-sealant product. Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view. For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.
- 1.5 QUALITY ASSURANCE: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance. Obtain each type of joint sealant through one source from a single manufacturer. Before installing elastomeric sealants, field test their adhesion to joint substrates.
- 1.6 DELIVERY, STORAGE, AND HANDLING: Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.
- 1.7 PROJECT CONDITIONS: Do not proceed with installation of joint sealants when ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer, or when joint substrates are wet. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

PART 2 - PRODUCTS

- 2.1 MATERIALS, GENERAL: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience. Colors of exposed joint sealants as selected by Architect from manufacturer's full range for this characteristic.
- 2.2 ELASTOMERIC JOINT SEALANTS: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant, including those referencing ASTM C 920 classifications for type, grade, class, and uses. Where elastomeric sealants are specified in the Elastomeric Joint-Sealant Schedule to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project. Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
  - A. Multicomponent Nonsag Polysulfide Sealant: Provide products equal to Thiokol 2P; Morton International, Inc. or Two-Part Sealant; Sonneborn Building Products Div., ChemRex Inc.
  - B. Multicomponent Pourable Polysulfide Sealant: Provide products equal to Deck-O-Seal by W.R. Meadows, Inc.
  - C. Medium-Modulus Neutral-Curing Silicone Sealant: Provide products equal to Dow Corning or Tremsil 600 Tremco.
  - D. Single-Component Nonsag Urethane Sealant: Provide products equal to Sikaflex 1A by Sika Corporation or NP 1 by Sonneborn Building Products Div., ChemRex Inc.
  - E. Single-Component Pourable Urethane Sealant: Provide products equal to Vulkem by Mameco International, or SL 1 by Sonneborn Building Products Div., ChemRex Inc.
- 2.3 SOLVENT-RELEASE JOINT SEALANTS: Comply with ASTM C 1311.
- 2.4 PIGMENTED NARROW JOINT SEALANT: Provide manufacturer's standard, solvent-release-curing, pigmented, synthetic-rubber sealant complying with AAMA 803.3 and formulated for sealing joints 3/16 inch or smaller in width.
- 2.5 LATEX JOINT SEALANTS: Comply with ASTM C 834 for each product of this description. Provide products equal to Sonolac by Sonneborn Building Products Div., ChemRex, Inc., or Tremflex 834 by Tremco.
- 2.6 ACOUSTICAL JOINT SEALANTS: For each product of this description, provide manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90. Provide products equal to AC-20 FTR Acoustical and Insulation Sealant; Pecora Corporation, or SHEETROCK Acoustical Sealant; USG Corp., United States Gypsum Co.
- 2.7 JOINT-SEALANT BACKING: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- 2.8 MISCELLANEOUS MATERIALS: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests. Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

PART 3 - EXECUTION

- 3.1 EXAMINATION: Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance. Proceed with installation only after unsatisfactory conditions have been corrected.

- 3.2 PREPARATION: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces. Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.
- 3.3 INSTALLATION OF JOINT SEALANTS: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply. Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated. Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints. Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
- 3.4 CLEANING: Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- 3.5 PROTECTION: Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

## 07 95 13 – EXPANSION JOINT COVER ASSEMBLIES

### PART 1 - GENERAL

- 1.1 WORK INCLUDED: Furnish and install complete expansion joint cover systems for:
  - A. Interior Floor expansion joint covers.
  - B. Interior Wall expansion joint covers.
  - C. Interior Ceiling expansion joint covers.
- 1.2 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.3 QUALITY ASSURANCE: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- 1.4 JOB CONDITIONS: Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.
- 1.6 DELIVERY, STORAGE AND HANDLING:
  - A. Provide temporary protective cover on finished surfaces.
  - B. Deliver joint covers to jobsite in new, clean, unopened crates of sufficient size and strength to protect materials during transit.
  - C. Store components in original containers in a clean, dry location.
- 1.7 WARRANTY: Submit manufacturer's warranty that materials furnished will perform as specified for a period of not less than one (1) year when installed in accordance with manufacturer's recommendations.

### PART 2 - PRODUCTS

- 2.1 EXTERIOR EXPANSION JOINT COVERS:
  - A. Basis of design shall be Balco, Inc. 9W or 9WC Series, or approved equal.
    1. Aluminum:
      - a. ASTM B221, alloy 6063-T5 for extrusions; alloy 6063-T5 or alloy 6061-T6 for bar
      - b. ASTM B209, alloy 6061-T6 for plate
      - c. ASTM B209, alloy 5052-H32 for sheet
    2. Stainless Steel: ASTM A666, alloy 304 for sheet and plate
    3. Centering Bars:
      - a. Shall be spring steel, alloy 1074, and shall have thermoplastic elastomer spheres which engage with the base members' tracks (joints up to 8" width)

- b. Fabricated of square steel tubing, spring steel bar, alloy 1074, and thermoplastic elastomer spheres which engage with the base members' tracks (8" joints and wider)
- 4. Water Barrier: Flexible EPDM, Class I, ASTM D4637, 45 mils thick (minimum) sheet
- 5. Fasteners, accessories, sealant and other materials required for complete installation in accordance with the manufacturer's written installation instructions.

## 2.2 INTERIOR FLOOR EXPANSION JOINT COVERS:

- A. Basis of design shall be Balco, Inc. 6000 series, embedded joint covers.
- B. Aluminum:
  - 1. ASTM B221, alloy 6063-T5 for extrusions
  - 2. ASTM B209, alloy 6061-T6 for plate
  - 3. ASTM B209, alloy 5052-H32 for sheet
- C. Abrasive: Two (2) part Epoxy combined with aluminum oxide grit.
- D. Water Barrier: Flexible EPDM, Class I, ASTM D4637, 45 mils thick (minimum) sheet
- E. Fasteners, accessories, sealant and other materials required for complete installation in accordance with the manufacturer's written installation instructions.

## 2.3 INTERIOR WALL AND CEILING EXPANSION JOINT COVERS:

- A. Basis of design shall be Balco, Inc. WD/WDC series, surface mounted interior joint covers.
  - 1. Aluminum: ASTM B221, alloy 6063-T5 for extrusions.
  - 2. Water Barrier: Flexible EPDM, Class I, ASTM D4637, 45 mils thick (minimum) sheet.
  - 3. Fasteners, accessories, sealant and other materials required for complete installation in accordance with the manufacturer's written installation instructions.

## 2.4 FIRE RATED JOINT COVER SYSTEMS: Expansion joint cover systems in fire rated assemblies shall be as specified above and fire rated per assembly.

## 2.5 EXECUTION

### PART 3 - EXAMINATION

- A. Verify that field measurements and blockout dimensions are as shown on shop drawings prior to releasing materials for fabrication by the manufacturer.
- B. Installer shall examine conditions under which work is to be performed and shall notify the contractor in writing of unsatisfactory conditions. Installer shall not proceed until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

## 3.2 INSTALLATION

- A. Install expansion joint covers in accordance with the manufacturer's instructions. Align work plumb, level, and flush with adjacent surfaces. Rigidly anchor to substrate. Make allowances for change in joint size due to difference between installation and building operating temperatures.

- B. Set centering bars diagonally at 20 inches on center maximum (or 10 inches on center for heavy-duty models). Centering bars shall be fully engaged with the base members.
- C. Fire Rated Joint Covers: Install fire rated covers to requirements of applicable fire rated design. Install fire barriers and flame sealant as required.
- D. Water Barrier: Provide water barriers at exterior joints and where called for on Drawings. Provide drainage fittings where called for on Drawings.

### 3.3 ADJUSTING AND PROTECTION

- A. Adjust joint cover to freely accommodate joint movement.
- B. Protect the installation from damage by work of other Sections. Where required, remove and store cover plates and install temporary protection over joints. Re-install cover plates prior to Substantial Completion of work.

**DIVISION 08 – OPENINGS****08 11 13 - HOLLOW METAL DOORS AND FRAMES****PART 1 - GENERAL**

- 1.1 DESCRIPTION: Provide metal doors, and metal door and window frames, which are not specifically described in other Sections of these Specifications, where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.3 QUALITY ASSURANCE: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- 1.4 JOB CONDITIONS: Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

**PART 2 - PRODUCTS**

- 2.1 METAL DOORS: Provide full-flush design, in dimensions and types shown on the Drawings, labeled or non-labeled as indicated on the Drawings, in 18 gage for interior doors and 16 gage for exterior doors, properly reinforced for the finish hardware described. Pre-clean and shop prime each door for finish painting which will be performed at the job site. Acceptable manufacturers are Steelcraft Manufacturing Company, Amweld Division of American Welding and Manufacturing Company, Ceko Corporation, or other manufacturers when approved in advance by the Architect.
- 2.2 METAL FRAMES: Provide frames of the types and dimensions shown on the Drawings, labeled or non-labeled as indicated on the Door Schedule in the Drawings, in 18 gage for interior doors and 16 gage for exterior doors, fully-welded, properly reinforced for the finish hardware described. Pre-clean and shop prime each frame for finish painting which will be performed at the job site. Manufacturer to be same as door.
- 2.3 FINISH HARDWARE: Secure templates from the finish hardware supplier, and accurately install, or make provision for, all finish hardware at the factory. Refer to section 08 71 00.

**PART 3 - EXECUTION**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Where practicable, place frames prior to construction of enclosing walls and ceilings. Set frames accurately into position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged. At in-place construction, set frames and secure to adjacent construction with machine screws and suitable anchorage devices. Provide "Z" fillers at each screw location.
- 3.3 ADJUST AND CLEAN: Check and readjust operating finish hardware items in hollow metal work just prior to final inspection. Leave work in complete and proper operating condition. Remove defective work and replace with work complying with the specified requirements. Immediately after erection, sand smooth all rusted and damaged areas of prime coat, and apply touchup of compatible air-drying primer.

**08 13 16 - ALUMINUM CLAD WOOD COMMERCIAL DOOR**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Aluminum clad wood commercial door and frame, complete with hardware, glazing, weather strip, removable grille, simulated divided lite, stationary sidelite, stationary transom, jamb extension, and standard or specified anchors, trim, and attachments.

**1.2 REFERENCES**

- A. WDMA I.S.4: Industry Standard for Water Repellent Preservative Treatment for Millwork.
- B. Sealed Insulating Glass Manufacturers Association / Insulating Glass Certification Council (SIGMA / IGCC).
- C. American Architectural Manufacturers Association (AAMA): 2605: Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
- D. National Fenestration Rating Council (NFRC): 101: Procedure for Determining Fenestration Product Thermal Properties.

**1.3 SUBMITTALS**

- A. Shop Drawings: Submit shop drawings under provisions of Section 01 33 23.
- B. Product Data: Submit catalog data under provisions of Section 01 33 23.
- C. Samples:
  - 1. Submit corner section under provisions of Section 01 33 23.
  - 2. Include glazing system, quality of construction, and specified finish.
- D. Quality Control Submittals: Certificates: Submit manufacturers certifications indicating compliance with specified performance and design requirements under provisions of Section 01 33 23.

**1.4 DELIVERY**

- A. Comply with provisions of Section 01 65 00.
- B. Deliver in original packaging and protect from weather.

**1.5 QUALITY ASSURANCE**

- A. Regulatory Requirements: Emergency Egress or Rescue: Comply with requirements for sleeping units of IBC International Building Code.

**1.6 STORAGE AND HANDLING**

- A. Prime or seal wood surfaces, including surface to be concealed by wall construction, if more than thirty (30) days will expire between delivery and installation.



- B. Store door panels flat on a level surface in a clean and dry storage area under provisions of Section 01 66 00. Seal unfinished top and bottom edges of door panels if door panels are stored at the job site more than one (1) week.
- C. Condition doors to local average humidity before hanging.

## 1.7 WARRANTY

- A. Doors shall be warranted to be free from defects in manufacturing, materials, and workmanship for a period of ten (10) years from purchase date.
- B. Insulating glass shall be warranted against visible obstruction through the glass caused by a failure of the insulating glass air seal for a period of twenty (20) years from the date of original purchase.
- C. Please see separate manufacturer warranties for Commercial Door hardware components, sills and steel frames.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURED UNITS

- A. Description: Factory assembled aluminum clad Commercial Door, as manufactured by Marvin Windows and Doors, Ripley, Tennessee.

### 2.2 FRAME DESCRIPTION

- A. Finger jointed, edge-glued pine core with clear pine veneer; finger jointed Douglas fir core with clear Douglas fir veneer, finger jointed, edge-glued white oak core with clear white oak veneer; finger jointed, edge-glued cherry core with clear cherry veneer; finger jointed, edge-glued mahogany core with clear mahogany veneer; finger jointed, edge-glued vertical grain Douglas fir core with clear vertical grain Douglas fir veneer.
  - 1. Kiln dried to a moisture content no greater than twelve (12) percent at the time of fabrication.
  - 2. Water repellent, preservative treated in accordance with WDMA I.S.4.
- B. Frame width: 4-9/16 inches (116 mm); 6-9/16 inches (167 mm).
- C. Frame thickness: 1-1/16 inches (27 mm).
- D. Exterior extruded aluminum clad 0.050 inch (1.3 mm) thick.
- E. Low profile sill (No sill – sill supplied and applied by others. Jambs extended 7/8 inch (22 mm) beyond panel bottom). (Steel frame with unequal rabbet 16 gauge: 4 3/4" (121), 5 3/4"(146), 6 3/4"(171) or 7 3/4" (197) frame width. Specify wood stud, wire masonry anchor or existing opening anchor.).

### 2.3 PANEL DESCRIPTION

- A. Stiles: finger jointed, edge-glued LVL. Rails: finger jointed, edge-glued pine, Douglas fir, white oak, cherry, mahogany, vertical grain Douglas fir cores with clear pine, white oak, cherry, mahogany, vertical grain Douglas fir veneer.
  - 1. Kiln dried to a moisture content no greater than twelve (12) percent at time of fabrication.
  - 2. Water repellent, preservative treated in accordance with WDMA I.S.4.

- B. Stiles contain laminated veneer lumber (LVL) core, solid wood top and bottom rail, with clear pine, Douglas fir, white oak, cherry, mahogany, vertical grain Douglas fir veneers.
- C. Composite panel thickness: 1-3/4 inches (44mm); 2 1/4 inches (57mm).
- D. Exterior extruded aluminum clad 0.055 inch (1.4 mm) thick.
- E. Top rail width: 1 3/4 inch panel 6 inches (152 mm); 2 1/4 inch panel 8 1/8 inches (206 mm).
- F. Stile width: 6 inches (152 mm).
- G. Bottom rail height: 11-3/8 inches (289 mm).
- H. Panel corners glued and fastened with 5/8 X 4 inch (16 mm X 102 mm) fluted hardwood dowels. Removable interior vinyl glazing stops with clear wood covers; 1 3/4 inch panel - no visible fastener holes (2 1/4 inch panel – nailed on glazing stops).

## 2.4 GLAZING

- A. Select quality complying with ASTM C 1036. Comply with 16 CFR 1201 Safety Standard for Architectural Glazing Materials. Tempered insulating glass IGMA/IGCC certified to performance level CBA when tested in accordance with ASTM E 774.
- B. Glazing Method: Tempered Insulating Glass (Altitude Adjusted).
- C. Glass Type: Clear; Bronze; Gray; Reflective Bronze; Low E II—Argon Gas; Obscure; Laminated.
- D. Glazing Seal: Silicone bedding, exterior.

## 2.5 FINISH

- A. Exterior: Aluminum clad. Fluoropolymer modified acrylic topcoat applied over primer. Meets or exceeds AAMA 2605 requirements.
  - 1. Standard Color: Stone White; Bahama Brown; Bronze; Pebble Gray; Evergreen.
  - 2. Select Color: Sierra White; Coconut Cream; French Vanilla; Cashmere; Desert Beige; Cumulus Gray; Cadet Gray; Ebony; Arctic White; Cascade Blue; Cobalt Blue; Hampton Sage; Sherwood Green; Wineberry; Custom color – contact your Marvin representative.
- B. Interior: Treated bare wood; Latex prime coat, white – available for pine only.

## 2.6 HARDWARE

- A. Hinges: 4 1/2" X 4 1/2" square corner ball bearing hinges. Finish: Satin Chrome; Bronze; Brass; Stainless Steel.
- B. Locking System: No lock/no bore (Von Duprin 98 L) ( Von Dupirn 98 EO) Schlage L series entrance) Schlage L series corridor) (head and foot bolt on inactive panel).

## 2.7 WEATHER STRIP

- A. Head jamb and side jambs to have two sets of bulb weather strip, locking stiles have pile weather strip maintaining contact with door panels.

## 2.8 JAMB EXTENSION

- A. Factory installed (loose), for wall thickness indicated or required.
- B. Finish: Match interior frame wood species and finish.

## 2.9 REMOVABLE GRILLES

- A. 3/4 X 15/32 inch (19 mm X 12 mm); 1-1/8 X 15/32 inch (29 mm X 12 mm) Pine only.
  - 1. Pattern: Rectangular; Custom lite layout.
  - 2. Finish: Match interior panel finish.

## 2.10 SIMULATED DIVIDED LITES (SDL)

- A. 7/8 inch (22 mm) wide; 1 1/8 inch (29 mm) wide (Internal spacer bars).
  - 1. Exterior muntins: Extruded aluminum 0.055 inch (1.4 mm) thick.
  - 2. Interior muntins: Pine; Douglas fir; white oak; cherry; mahogany; vertical grain Douglas fir. SDL adhered to glass with closed-cell copolymer acrylic foam tape.
  - 3. Pattern: Rectangular; Custom lite layout.
  - 4. Finish: Match panel finish.

## 2.11 GRILLES-BETWEEN-THE-GLASS (GBG)

- A. 11/16" (17 mm) white contoured aluminum bar. Optional flat aluminum spacer bar, contact your Marvin representative.
- B. Various types of sills are available.

## 2.12 ACCESSORIES AND TRIM

- A. Installation and Hardware Accessories:
  - 1. Factory installed vinyl nailing fin/drip cap.
  - 2. Installation brackets: 6-3/8 inches (162 mm); 9-3/8 inches (238 mm); 15-3/8 inches (390 mm).
  - 3. Masonry brackets: 6 inches (152 mm); 10 inches (254 mm).
- B. Aluminum Extrusions:
  - 1. Profile: Brick mould casing; Flat casing; Frame expander; Jamb extender; Mullion cover; Mullion expander as indicated on drawings.

2. Finish: Fluoropolymer modified acrylic topcoat applied over primer. Meets or exceeds AAMA 2605 requirements. Standard Color: Stone White; Bahama Brown; Bronze; Pebble Gray; Evergreen.
  - a. Select Color: Sierra White; Coconut Cream; French Vanilla; Cashmere; Desert Beige; Cumulus Gray; Cadet Gray; Ebony; Arctic White; Cascade Blue; Cobalt Blue; Hampton Sage; Sherwood Green; Wineberry; Custom color – contact your Marvin representative.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification of Conditions: Before Installation, verify openings are plumb, square, and of proper dimension.
- B. Acceptance of Conditions: Beginning of installation confirms acceptance of existing conditions.

#### 3.2 INSTALLATION

- A. Assemble and install doors and frames according to manufacturer's instructions and reviewed shop drawings.
- B. Install frames and stationary panels as required.
- C. Install accessory items as required.
- D. Use finish nails to apply wood trim and mouldings.

#### 3.3 STARTING AND ADJUSTING

- A. Adjust door to work freely with hardware functioning properly.

#### 3.4 CLEANING

- A. Remove visible labels and adhesive residue according to manufacturer's instructions.
- B. Leave doors and glass in a clean condition. Final cleaning as required in Section 01 74 00.

#### 3.5 PROTECTING INSTALLED CONSTRUCTION

- A. Comply with Section 01 76 00.
- B. Cover doors and frames during painting or other construction operations that may cause damage.

## **08 14 16 - FLUSH WOOD DOORS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes:
  - 1. Solid-core doors with wood-veneer faces.
  - 2. Factory finishing flush wood doors.
  - 3. Factory fitting flush wood doors to frames and factory machining for hardware.

#### **1.2 SUBMITTALS**

- A. Product Data: For each type of door indicated. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
  - 1. Indicate dimensions and locations of mortises and holes for hardware.
  - 2. Indicate dimensions and locations of cutouts.
  - 3. Indicate doors to be factory finished and finish requirements.
  - 4. Indicate fire-protection ratings for fire-rated doors.
- C. Samples: For factory-finished doors.

#### **1.3 QUALITY ASSURANCE**

- A. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."
- B. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Algoma Hardwoods, Inc.
  - 2. Eggers Industries.
  - 3. Graham; an Assa Abloy Group company.
  - 4. Haley Brothers, Inc.

5. Marshfield Door Systems, Inc.

6. VT Industries Inc.

## 2.2 DOOR CONSTRUCTION, GENERAL

A. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.

2. Screw Withdrawal, Face: 700 lbf.

3. Screw Withdrawal, Edge: 400 lbf.

B. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

## 2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade AA faces.

2. Species: Cherry.

3. Cut: Plain sliced (flat sliced).

4. Match between Veneer Leaves: Slip match.

5. Assembly of Veneer Leaves on Door Faces: Balance match.

6. Core: Structural composite lumber.

7. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.

## 2.4 LOUVERS AND LIGHT FRAMES

A. Wood Beads for Light Openings and Louver Frames: Unless otherwise indicated, provide manufacturer's standard beads and frames for openings in species matching veneer face.

B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch-thick, cold-rolled steel sheet; with baked-enamel-or powder-coated finish; and approved for use in doors of fire-protection rating indicated.

## 2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

- C. Openings: Cut and trim openings through doors in factory.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.
  - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."
  - 3. Louvers: Factory install louvers in prepared openings.

## 2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
- B. Transparent Finish:
  - 1. Grade: Premium.
  - 2. Finish: AWI catalyzed polyurethane system.
  - 3. Staining: Match Architect's sample.
  - 4. Sheen: Satin.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
  - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
  - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
    - a. Comply with NFPA 80 for fire-rated doors.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

## 08 14 23 - PLASTIC-LAMINATE-FACED WOOD DOORS

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all PLASTIC LAMINATED WOOD DOORS, as shown on the Drawings, specified herein, and as needed for a complete and proper installation. Conform to Industry Standard ANSI/NWMA IS 1-80 and additional requirements given below.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. The requirements of other sections may affect the work under this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture, providing air good circulation.
- 1.5 QUALITY ASSURANCE: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years.
- 1.6 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.
- 1.7 WARRANTY: Interior doors shall be warranted for five years. Warranty shall include finishing, hanging, and installing hardware if defect was discovered after door was finished and installed.

### PART 2 - PRODUCTS

- 2.1 INTERIOR DOORS: Interior Doors to be solid core plastic laminated, AWI Spec Symbol PC-5, Flush. 1-3/4 inch doors shall have hardwood edge & 5 ply, 28 to 32 lb density cores meeting requirements of ANSI A 208.1 "Mat Formed Wood Particle Board" grade 1-L-1. Face & exposed edges to be high pressure applied plastic laminate.
- 2.2 PLASTIC LAMINATE: Plastic laminate to be .05" thick, by Wilsonart or Formica. Color selected by Architect.
  - A. LAMINATE MANUFACTURER COORDINATION: Laminate manufacturer to be same for following systems:
    1. 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK
    2. 06 41 16 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS
    3. 06 41 17 - PLASTIC-LAMINATE-CLAD ADJUSTABLE SHELVEING
    4. 08 14 23 - PLASTIC-LAMINATE-FACED WOOD DOORS
    5. 10 12 00 - STOREFRONT DISPLAY CASES
- 2.3 VISION PANELS: Painted steel framed glazed panel. Provide fire glass at doors to corridor and other fire rated assemblies; no wired glass allowed.
- 2.4 FIRE RATING: Doors at fire rated assemblies to be rated per the wall assembly. For example, at 1-hour rated corridor walls, door assembly to be labeled 20 minute.
- 2.5 FINISH HARDWARE: Secure templates from the finish hardware supplier, and accurately install, or make provision for, all finish hardware at the factory. Refer to section 08700. Hardware at fire rated assemblies to be rated per the wall assembly.

### PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate



this work with interfacing work to ensure proper sequencing. Inspect installed work of other trades and verify its completion to a point where this work may continue.

- 3.2      INSTALLATION: Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Securely install plumb, level, without racking.

## **08 31 16 - ACCESS PANELS AND FRAMES**

### **PART 1 - GENERAL**

- 1.1 SUMMARY: Provide access doors for access to valves, controls, and concealed items requiring maintenance.
- 1.2 SUBMITTALS: Submit for approval shop drawings, product data.
- 1.3 QUALITY ASSURANCE: Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

### **PART 2 - PRODUCTS**

- 2.1 DOORS: 20 gage for non-fire-rated units, 14 gage for fire-rated units; recessed steel panel doors to accept field finish of drywall or ceramic tile.
- 2.2 FRAMES: 16 gage with concealed flanges for drywall and ceramic tile; and 1" exposed flanges for installation into concrete or masonry.
- 2.3 FINISH: Baked enamel.
- 2.4 FIRE RATING: Match requirement of assembly & jurisdictional requirements in effect.

### **PART 3 - EXECUTION**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed & correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Comply with manufacturer's installation instructions. Install plumb, level and square. Install fire-rated units to comply with fire-resistance rating required. Coordinate installation and field finishing with work of other trades. Adjust hardware and operation. Repair or replace damaged units.

## 08 33 13 - COILING COUNTER DOORS

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: All of the Contract Documents, including General and Supplementary Conditions, and Division 1 General Requirements, apply to the work of this Section.
- 1.2 SUMMARY: The work of this Section includes rolling counter doors. Other specification sections directly relate to the work of this Section.
- 1.3 SUBMITTALS: Submit manufacturer's product data and installation instructions for each type of rolling counter door. Include both published data and any specific data prepared for this project. Submit shop drawing for approval prior to fabrication. Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent materials.
- 1.4 QUALITY ASSURANCE: Rolling counter doors shall be manufactured by a firm with a minimum of five years experience in the fabrication and installation of rolling counter doors. Manufacturers proposed for use, which are not named in these specifications, shall submit evidence of ability to meet performance and fabrication requirements specified, and include a list of five projects of similar design and complexity completed within the past five years. Installation of rolling counter doors shall be performed by the authorized representative of the manufacturer. Provide doors, guides, motors, and related primary components from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components. Schedule and convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.
- 1.5 DELIVERY, STORAGE, AND HANDLING: Deliver materials and products in labeled protective packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage from weather, excessive temperatures and construction operations.

### PART 2 - PRODUCTS

- 2.1 MANUFACTURE
  - A. Basis of Design: Provide rolling counter doors equal to Overhead Door Corporation.
  - B. Cornell Iron Works, Inc., Mountaintop, PA
  - C. Amarr by Entrematic Group AB, Winston-Salem, NC
  - D. Requests for substitutions will be considered in accordance with provisions of Section 01600.
- 2.2 COUNTER DOORS: 650 Series Counter Doors by Overhead Door Corporation. Interlocking slats, Type F-128 Aluminum (652 Series). Endlocks shall be attached to alternate slats to maintain curtain alignment and prevent lateral slat movement. Slats and hood shall be galvanized steel in accordance with ASTM A 525 and receive rust-inhibitive, roll coating process, including bonderizing, 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester (powder coated) top coat. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Helical torsion spring type housed in a steel tube or pipe barrel. Manual push up operation.
- 2.3 CURTAIN JAMB GUIDES (COUNTER DOORS): Fabricate curtain jamb guides of angles, or channels and angles of material and finish to match curtain slats, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Provide continuous integral wear strips to prevent metal-to-metal contact and minimize noise of travel and removable stops on guides to prevent overtravel of curtain.
- 2.4 FIRE RATED ROLLING COUNTER DOORS: To be similar to Overhead Doors Model 660, push-up operation, smoke seals, interior slide bolt lock.

### PART 3 - EXECUTION

- 3.1 PREPARATION: Take field dimension and examine conditions of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Strictly comply with manufacturer's installation instructions and recommendations. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance. Instruct Owners personnel in proper operating procedures and maintenance schedule.
- 3.3 ADJUSTING AND CLEANING: Test rolling counter doors for proper operation and adjust as necessary to provide proper operation without binding or distortion. Touch-up damaged coatings and finishes and repair minor damage. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned.

## 08 33 23 - OVERHEAD COILING DOORS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Overhead coiling sheet doors.

#### 1.2 RELATED SECTIONS

- A. Section 05 50 00 - METAL FABRICATIONS.
- B. Section 06 10 00 - ROUGH CARPENTRY
- C. Section 08 71 00 - DOOR HARDWARE: Product Requirements for cylinder core and keys.
- D. Section 09 91 00 - PAINTING: Field applied finish.

#### 1.3 REFERENCES

- A. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- C. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- D. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- F. NEMA MG 1 - Motors and Generators.

#### 1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Overhead coiling sheet doors:
  - 1. Operation: Design door assembly, including operator, to operate for not less than 10,000 cycles.
- B. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Section 01 33 23.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Details of construction and fabrication.

4. Installation instructions.

- C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6 OPERATION AND MAINTENANCE DATA: Submit lubrication requirements and frequency, and periodic adjustments required.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
- C. Store materials in a dry, warm, ventilated weathertight location.

1.9 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 COORDINATION

- A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: [www.overheaddoor.com](http://www.overheaddoor.com). E-mail: [info@overheaddoor.com](mailto:info@overheaddoor.com).
- B. Cornell Iron Works, Inc., Mountaintop, PA
- C. Amarr by Entrematic Group AB, Winston-Salem, NC
- D. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 OVERHEAD COILING SHEET DOORS

- A. Overhead Coiling Commercial Sheet Doors: Overhead Door Corporation 780 Series.

1. Curtain: Roll formed, 26 gauge galvanized steel, per ASTM A 653 SQ Grade 80, Galvanized G-30. Sections interlocked and permanently seamed together to form a continuous curtain. Provided with a PVC edge strip stapled on the edge of curtain's exterior side to minimize steel-to-steel contact, enhance door operation, and minimize curtain nesting and scratching.
2. Finish:
  - a. Curtain slats shall receive rust-inhibitive, roll coating process, including 0.2 mils thick baked-on prime paint, and 0.6 mils thick baked-on polyester top coat.
  - b. Top Coat Color: As selected by the Architect from the manufacturers standard colors.
  - c. Guides, angles, bottom bar stops, headplates and rings galvanized. Aluminum bottom bar clear anodized.
3. Bottom Bar: Extruded aluminum reinforced with 1-1/2 inch by 2 inch (38 mm by 51 mm) roll formed steel angle and provided with a flexible PVC bulb type astragal to ensure a consistent seal along the floor. Extrusion designed to interlock with door curtain.
4. Bottom Bar Stops: Bottom bar stops of "quick connect" design that allows the curtain to be inserted into the "universal" guide and lock into place with one fastener. Bottom bar stops shall be 12 gauge.
5. Guides: Guides roll-formed from 18-gauge steel. Guides 3 inches (76 mm) wide with UHMW polypropylene rub strips on each edge of the guide. Through hole, universal design shall allow easy access from the front of the guide for fastener attachment to the door jamb material. Guides of universal design for use in concrete, wood, steel or masonry jambs Guides pre-punched to accept "quick connect" attachment of the bottom bar stops.
6. Heavy Duty Headplates: 0.187 inch (4.76 mm) thick welded steel, mounted directly to the wall to support the door shaft and ensure smooth door roll operation.
7. Counterbalance: Counterbalance assembly with "stepped" steel rings designed to ensure a tight and uniform curtain wrap. Rings include steel roller bearings for enhanced door operation and cycle life. 3-3/8 inch (86 mm) I.D. springs lubricated at factory to enhance long life and door operation. Shaft 1-5/16 inch (35 mm) diameter to minimize door deflection. Counterbalance assembly design to allow quick assembly of "non-handed" chain hoist on either side of door on the job site.
8. Operation:
  - a. Manual push up.
  - b. Chain hoist with 6:1 reduced drive.
  - c. If time to manually open door is estimated by manufacturer to exceed 40 seconds, provide motorized operation.

## 2.3 UNCOILING SECURITY GRILLES

### A. Overhead Coiling Aluminum Grilles: Overhead Door Corporation 670 Series.

1. Curtain: Horizontal 5/16 inch (7.8 mm) diameter rods with network of vertically interlocking links to form a pattern. Bottom bar extruded aluminum tubular shape.
  - a. Material: Aluminum.
  - b. Vertical Rod Spacing: 2 inches (51 mm) on center.
  - c. Pattern: Straight lattice; horizontal spacing 6 inches (152 mm) on center.

2. Finish: Aluminum clear anodized.
3. Guides:
  - a. Extruded aluminum shapes with retainer grooves and continuous silicone treated wool-pile strips or PVC inserts to reduce noise and assist operation.
  - b. Guides face mounted on adjacent construction.
4. Brackets: Minimum 3/16 inch (4.8 mm) steel to support barrel, counterbalance and hood as applicable.
5. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with maximum deflection of 0.03 inches per foot of span. Counterbalance adjustable by means of an adjusting tension wheel.
6. Hood: Aluminum with intermediate supports as required.
7. Electric Motor Operation: Provide UL listed electric operator, size as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
  - a. Sensing Edge Protection: Pneumatic sensing edge.
  - b. Operator Controls: Control stations with open, close, and stop functions.
    - i Key operation.
    - ii Flush mounting.
    - iii For interior location.
  - c. Emergency Egress: Provide code compliant emergency egress operator system with self-locking mechanism that automatically unlocks, automatically releases, and opens grille fully to permit passage if power is not available.
  - d. Special Operation: 670 series UL listed egress electric operator.
8. Locking: Cylinder lock for electric operation with interlock switch.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify opening sizes, tolerances and conditions are acceptable.
- B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

#### 3.3 INSTALLATION



- A. Install in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.
- F. Install perimeter trim and closures.
- G. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

#### 3.4 ADJUSTING

- A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B. Adjust hardware and operating assemblies for smooth and noiseless operation.

#### 3.5 CLEANING

- A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
- B. Remove labels and visible markings.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

#### 3.6 PROTECTION

- A. Protect installed products until completion of project.

## 08 33 24 - OVERHEAD SECTIONAL DOORS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Overhead coiling sheet doors.

#### 1.2 RELATED SECTIONS

- A. Section 05 50 00 - METAL FABRICATIONS.
- B. Section 06 10 00 - ROUGH CARPENTRY
- C. Section 08 71 00 - DOOR HARDWARE: Product Requirements for cylinder core and keys.
- D. Section 09 91 00 - PAINTING: Field applied finish.

#### 1.3 REFERENCES

- A. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- C. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- D. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- F. NEMA MG 1 - Motors and Generators.

#### 1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Overhead coiling sheet doors:
  - 1. Operation: Design door assembly, including operator, to operate for not less than 10,000 cycles.
- B. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Section 01 33 23.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Details of construction and fabrication.

4. Installation instructions.

- C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6 OPERATION AND MAINTENANCE DATA: Submit lubrication requirements and frequency, and periodic adjustments required.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
- C. Store materials in a dry, warm, ventilated weathertight location.

1.9 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 COORDINATION

- A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: [www.overheaddoor.com](http://www.overheaddoor.com). E-mail: [info@overheaddoor.com](mailto:info@overheaddoor.com).
- B. Cornell Iron Works, Inc., Mountaintop, PA
- C. Amarr by Entrematic Group AB, Winston-Salem, NC
- D. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 INSULATED SECTIONAL OVERHEAD DOORS

- A. Overhead Coiling Commercial Sheet Doors: Overhead Door Corporation 426 Series.

1. Door Assembly: Insulated steel door assembly with rabbeted meeting rails to form weathertight joints and provide full-width interlocking structural rigidity.
  - a. Panel Thickness: 2 inches (51 mm).
  - b. Exterior Surface: Ribbed.
  - c. Exterior Steel: 24 gauge, hot-dip galvanized.
  - d. Back Cover:
    - i 26 gauge steel.
    - ii Poly-Backed.
    - iii High Impact Polystyrene Backcover.
  - e. Center and End Stiles: 16 gauge steel.
  - f. Springs:
    - i 25,000 cycles.
  - g. Insulation: Polystyrene.
  - h. Thermal Values:
    - i Polystyrene - R-value of 7.35; U-value of 0.136.
  - i. Finish and Color: Two coat baked-on polyester with white exterior and white interior color.
  - j. Windload Design: Provide to meet the Design/Performance requirements specified.
  - k. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
  - l. Lock:
    - i Interior mounted slide lock. (Where manual operation)
    - ii Interior mounted slide lock with interlock switch for automatic operator. (where motorized operation)
  - m. Weatherstripping:
    - i Flexible bulb-type strip at bottom section.
    - ii Flexible Jamb seals.
    - iii Flexible Header seal.
  - n. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
  - o. Operation: [Manual or electric motor operation as per door schedule.](#)
    - i Manual operation: Chain Hoist.

- ii Electric motor operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.
  - Entrapment Protection: Required for momentary contact, includes radio control operation.
    - Pneumatic sensing edge up to 18 feet (5.5 m) wide. Constant contact only complying with UL 325/2010.
    - Electric sensing edge monitored to meet UL 325/2010.
    - Photoelectric sensors monitored to meet UL 325/2010.
  - Operator Controls:
    - Push-button operated control stations with open, close, and stop buttons.
    - Surface mounting.
    - Interior location.
    - If time to manually open door is estimated by manufacturer to exceed 40 seconds, provide motorized operation.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify opening sizes, tolerances and conditions are acceptable.
- B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

#### 3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.
- F. Install perimeter trim and closures.

- G. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

#### 3.4 ADJUSTING

- A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B. Adjust hardware and operating assemblies for smooth and noiseless operation.

#### 3.5 CLEANING

- A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
- B. Remove labels and visible markings.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

#### 3.6 PROTECTION

- A. Protect installed products until completion of project.

## 08 34 73 - SOUND CONTROL DOOR ASSEMBLIES

### PART 1 - GENERAL

- 1.1 SECTION INCLUDES: Integrated sound transmission class (STC)-rated sound control door, frame, and hardware assemblies.
- 1.2 PERFORMANCE REQUIREMENTS: Provide sound-control door assemblies with STC ratings per ASTM E 90 and ASTM E 413 as specified.
- 1.3 SUBMITTALS
  - A. Product Data: Manufacturer's data sheets, installation instructions, and maintenance recommendations.
  - B. Product Test Reports: Indicating compliance of comparable manufactured assembly with performance requirements, from a qualified independent testing agency.
  - C. Shop Drawings: Provide schedule coordinated with project drawing notation indicating door design, jamb, head, and threshold conditions, rough opening, glazing sizes and types, and hardware reinforcement and preparations.
  - D. Operation and Maintenance Data.
  - E. Warranty: Submit document meeting warranty requirements of this Section.
- 1.4 QUALITY ASSURANCE
  - A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum [5] years experience in manufacturing sound-control door assemblies.
    1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time period allowed for substitution review:
      - a. Product data, including test reports from a qualified independent testing agency indicating products meet performance requirements of this section.
      - b. Project references: Minimum of 5 similar installations in place not less than [3] years old, with owner contact information.
      - c. Sample warranty.
  - B. Installer Qualifications: Engage an experienced Installer with a record of successful installations for installation of sound control door assemblies and related door hardware.
- 1.5 DELIVERY, STORAGE, AND HANDLING: Deliver, store, and handle sound-control door assemblies in accordance with manufacturer's recommendations. Ship to jobsite only after roughing-in, painting work, and other related finish work has been completed and installation areas are ready to accept units and recommended temperature and humidity levels will be maintained during the remainder of construction.
- 1.6 WARRANTY: Manufacturer's written warranty indicating manufacturer's intent to repair or replace components of sound-control door assemblies that fail in materials or workmanship within [5] years from date of Substantial Completion. Failures are defined to include, but are not limited to, the following:
  - A. Fracturing or breaking of unit components including doors and hardware resulting from normal use other than vandalism.

- B. Warping or deterioration of components not resulting from leaks, flooding, or other uncontrolled moisture or humidity.
- C. Failure of acoustical gaskets and seals.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS:**

- A. Overly Door Company, 800-979-7300; 574 West Otterman Street, Greensburg, PA 15601.
- B. Other manufacturers to be approved by Architect before bidding.

**2.2 DOOR ASSEMBLY:** Basis of design to be Acoustical Metal Door Assembly Model 5592175 as manufactured by Overly Door Company with a minimum STC rating of 55, to include door leaf and frame.

- A. Components: Assemblies to be complete with metal frame, door(s), sealing system (based on model specified), and Cam-Lift hinges (when required for model specified). If vision lights are specified for doors, metal loose stops (type based on model specified), glass and glazing shipped loose to be field installed.
- B. Finishes: Factory primed for field-applied painted finish.

**2.3 FABRICATION:**

- A. Materials: Sound Retardant Metal Swinging Doors and Frames to be constructed from formed sheet steel or structural shapes and bars. Sheet steel shall be commercial quality, level, cold rolled steel conforming to ASTM A366 or hot rolled, pickled and oiled steel conforming to ASTM A1011. Steel shapes shall comply with ASTM A36 and steel bars with ASTM A108, Grade 1018. Exterior units shall be fabricated from Galvannealed material conforming to ASTM A653 (A60) with a coating weight of not less than 0.60 ounces per square foot.
- B. Door Design: Sound Retardant Metal Swinging Doors shall be a 1-3/4" nominal minimum thickness construction with sizes as indicated on Architect approved shop drawings. No visible seams shall be permitted on door faces. Face gauges, internal sound retardant core and perimeter door edge construction to be manufacturer's standard for the specified model. No lead or asbestos shall be permitted in door construction to achieve STC performance.
- C. Frame Design: Sound Retardant Metal Frames shall be 14 gauge minimum welded units with integral trim and shipped with temporary spreader. Knock-down frames are not acceptable, unless sizes of frames exceed shipping limitations. After installation, field splices required because of shipping limitations must be field welded by certified welders per manufacturer's instructions and in accordance with AWS D1.1/D1.3.
- D. Cam Lift Hinges: When required to achieve STC, manufacturer to furnish laboratory test data certifying hinges have been cycled a minimum of 1,000,000 while supporting a minimum door weight of 350 pounds.
- E. Hardware Reinforcements: Factory mortise, reinforce, drill and tap and doors and frames for all mortise hardware as required by hardware manufacturer's template. Provide necessary reinforcement plates as required for surface mounted hardware; all drilling and tapping to be done in field by installer. Provide dust cover boxes on all frame mortises.
- F. Anchors: Provide suitable anchors to properly install frames in partition types shown on Architects drawings.
- G. Painting & Cleaning: After fabrication of frames, all tool marks and surface imperfections shall be removed and exposed faces of all welded joints dressed smooth. Chemically treat all surfaces to insure maximum paint adhesion and coat with a water-based rust-inhibitive primer.



**PART 3 - EXECUTION**

- 3.1 EXAMINATION: Examine condition of openings and substrates with Installer for compliance with requirements for installation tolerances and other existing conditions affecting installation and performance of sound-control door assemblies. Proceed with unit installation upon correction of unsatisfactory conditions.
- 3.2 PREPARATION
  - A. Adjustment: Prior to installation, adjust sound-control door frames to within tolerances recommended by manufacturer.
  - B. Prepare doors and frames to accept field-applied door hardware specified in other sections. Apply bituminous coating to inside surfaces of frames to be filled with mortar or grout. Do not otherwise modify doors and frames in the field.
- 3.3 INSTALLATION
  - A. Install units plumb, square, in proper alignment and secured to opening, within manufacturer's recommended tolerances. Comply with manufacturer's installation instructions and approved submittals.
    - 1. Masonry and Concrete Walls: Where indicated, fill space between frames and adjacent wall construction with mortar or grout. Where required, pump frames full after installation; plug and fill grout access holes.
  - B. Install hardware uniformly and precisely, using supplied shims. Apply sealant to threshold and both sides of frame cross member under threshold. Allow for final adjustment of hardware following installation.
  - C. Adjust units and hardware so doors operate smoothly without warp or bind and close with uniform frame alignment and seal compression.
- 3.4 Fire-Rated Openings: Comply with NFPA 80.
- 3.5 CLEANING AND PROTECTING
  - A. Repair or replace defective work as directed by Architect upon inspection.
  - B. Clean unit surfaces. Touch up, refinish, or replace damaged components in a manner acceptable to Architect.
  - C. Turn over keys, tools, and operating and maintenance instructions to Owner.

## 08 34 73 - SOUND CONTROL DOOR ASSEMBLIES

### PART 1 - GENERAL

- 1.1 SECTION INCLUDES: Integrated sound transmission class (STC)-rated sound control door, frame, and hardware assemblies.
- 1.2 PERFORMANCE REQUIREMENTS: Provide sound-control door assemblies identical to assemblies tested by an independent testing agency per ASTM E 90 with the specified minimum certified STC rating per ASTM E 413 for the configurations indicated.
- 1.3 SUBMITTALS
  - A. Product Data: Manufacturer's data sheets, installation instructions, and maintenance recommendations.
  - B. Product Test Reports: Indicating compliance of comparable manufactured assembly with performance requirements, from a qualified independent testing agency.
  - C. Shop Drawings: Provide schedule coordinated with project drawing notation indicating door design, jamb, head, and threshold conditions, rough opening, glazing sizes and types, and hardware reinforcement and preparations.
  - D. Operation and Maintenance Data.
  - E. Warranty: Submit document meeting warranty requirements of this Section.
- 1.4 QUALITY ASSURANCE
  - A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum [5] years experience in manufacturing sound-control door assemblies.
    1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time period allowed for substitution review:
      - a. Product data, including test reports from a qualified independent testing agency indicating products meet performance requirements of this section.
      - b. Project references: Minimum of 5 similar installations in place not less than [3] years old, with owner contact information.
      - c. Sample warranty.
  - B. Installer Qualifications: Engage an experienced Installer with a record of successful installations for installation of sound control door assemblies and related door hardware.
- 1.5 DELIVERY, STORAGE, AND HANDLING: Deliver, store, and handle sound-control door assemblies in accordance with manufacturer's recommendations. Ship to jobsite only after roughing-in, painting work, and other related finish work has been completed and installation areas are ready to accept units and recommended temperature and humidity levels will be maintained during the remainder of construction.
- 1.6 WARRANTY: Manufacturer's written warranty indicating manufacturer's intent to repair or replace components of sound-control door assemblies that fail in materials or workmanship within [5] years from date of Substantial Completion. Failures are defined to include, but are not limited to, the following:
  - A. Fracturing or breaking of unit components including doors and hardware resulting from normal use other than vandalism.

- B. Warping or deterioration of components not resulting from leaks, flooding, or other uncontrolled moisture or humidity.
- C. Failure of acoustical gaskets and seals.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis of Design: Sound-control door assembly design is based upon products of the manufacturer listed below. Provide basis of design product or approved comparable product. Comply with requirements of Part 1 Quality Assurance Article and Division 01 General Requirements for approval of products not named below.
  - 1. Wenger Corporation, Owatonna, MN; Telephone: (800)4WENGER (800-493-6437); Email: info@wengercorp.com; Website: www.wengercorp.com.

### 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel, Type B.
- B. Sound Insulation: Manufacturer's standard door and frame insulation as required to meet sound rating requirements.
- C. Glazing: As required to meet sound rating requirements and the following: Category II safety glass

### 2.3 SOUND-CONTROL DOOR ASSEMBLIES

- A. Sound-Control Door Assembly :Provide sound-control door assemblies consisting of acoustically engineered door and frame combination with engineered sound seals, with the following characteristics:
  - 1. Door Configuration: Single leaf.
  - 2. Door Leaf Size: 36 inch (91 mm)
  - 3. Glazing Lite Size, per Door: 1296 sq. in. (8361 sq. cm.).
  - 4. Fire Rating: None
  - 5. Assembly Sound Transmission Class (STC): 51.

### 2.4 SOUND-CONTROL DOORS

- A. General: Provide flush-type steel sound-control doors minimum 2-1/2 inch (64 mm) thick, with split, crimped, and gasketed isolation construction with harmonically unbalanced steel face thicknesses and window lite thicknesses. Fabricate without visible seams on exposed faces.
  - 1. Core: Manufacturer's standard meeting specified STC rating.
  - 2. Door Face Sheets: 14-gauge/0.067 inch- (1.7 mm-) and 12 gauge/0.093 inch (2.3 mm) cold-rolled steel sheet, on opposing faces.
- B. Hardware Reinforcement: Reinforcement for hinges, lock face, flush bolts, closers, and concealed holders: Hot- or cold-rolled steel sheet, minimum 0.067 inch (1.7 mm).

- C. Acoustic Vision Lite Assembly: Metal-framed unit consisting of harmonic vibration-resistant 1/4 and 3/8 inch (6.0 and 9.0 mm) thick laminated glazing with 2.81 inch (71 mm) interspace.

## 2.5 SOUND-CONTROL DOOR FRAMES

- A. General: Fabricate sound-control door frames from 14-gauge/0.067 inch- (1.7 mm-) cold-rolled steel sheet with full-welded unit construction, with split frame design and integrated frame support for metal threshold. Miter and reinforce corners.
- B. Hardware Reinforcement: Reinforcement where required for hinges, lock face, and closers: Minimum 0.067 inch (1.7 mm).

## 2.6 DOOR HARDWARE

- A. General: Provide manufacturer's standard acoustical seals, threshold, and hinges required to achieve sound control performance requirements specified.
- B. Acoustical Seals:
  - 1. Head and Jambs, Non-Fire-Rated Doors: Extruded flexible vinyl with dual magnetic seals, uninterrupted at hinge and latch.
  - 2. Door Bottom: Fixed in place foam and fiberglass-backed, teflon-coated sweep seal, field-adjustable, providing sound control seal without mechanical drop operation.
- C. Hinge: Cam-lift wrap-around continuous barrel-type hinge.
- D. Metal Threshold: Flat, smooth plate stainless steel, 5/16 inch (7.9 mm) high, profiled to provide sound control seal with door bottom seal.
- E. Lockset: Provide door manufacturer's standard mortise lockset
- F. Specifier: Coordinate hardware specification with manufacturer. Special attention to door closer for fire-rated door, due to requirement to overcome forces resulting from acoustic gaskets and threshold.
- G. Other Door Hardware: Refer to requirements of Division 08 door hardware section.
- H. Fasteners: Refer to Division 06 Rough Carpentry section for fasteners required to attach door frame to substrate.

## 2.7 FABRICATION

- A. General: Fabricate sound-control door assemblies to same tolerances as tested units meeting performance requirements. Form surfaces smooth and flush with invisible joints when doors are closed. Factory-assemble doors, frames, manufacturer-provided hardware, and glazed lites.
- B. Doors: Form metal doors to required sizes with minimum radius. Join door faces at vertical edges by welding or crimping method identical to manufacturer's tested units.
- C. Frames: Form metal frames to required sizes with minimum radius. Weld joints continuously. Make joints smooth, flush, and invisible. Provide plaster guards where required to contain grout or mortar.

- D. Hardware Preparation: Factory-prepare assemblies to received hardware. Comply with ANSI A115.1. Prepare for hardware mounting as recommended by manufacturer in accordance with manufacturer's acoustically tested assemblies.

2.8 FINISHES: Factory primed for field-applied painted finish: Manufacturer's standard, lead- and chromate-free primer, ANSI A250.10, minimum 0.7 mils (0.018 mm) thick.

### PART 3 - EXECUTION

3.1 EXAMINATION: Examine condition of openings and substrates with Installer for compliance with requirements for installation tolerances and other existing conditions affecting installation and performance of sound-control door assemblies. Proceed with unit installation upon correction of unsatisfactory conditions.

#### 3.2 PREPARATION

- A. Adjustment: Prior to installation, adjust sound-control door frames to within tolerances recommended by manufacturer.
- B. Prepare doors and frames to accept field-applied door hardware specified in other sections. Apply bituminous coating to inside surfaces of frames to be filled with mortar or grout. Do not otherwise modify doors and frames in the field.

#### 3.3 INSTALLATION

- A. Install units plumb, square, in proper alignment and secured to opening, within manufacturer's recommended tolerances. Comply with manufacturer's installation instructions and approved submittals.
  - 1. Masonry and Concrete Walls: Where indicated, fill space between frames and adjacent wall construction with mortar or grout. Where required, pump frames full after installation; plug and fill grout access holes.
- B. Install hardware uniformly and precisely, using supplied shims. Apply sealant to threshold and both sides of frame cross member under threshold. Allow for final adjustment of hardware following installation.
- C. Adjust units and hardware so doors operate smoothly without warp or bind and close with uniform frame alignment and seal compression.

3.4 Fire-Rated Openings: Comply with NFPA 80.

#### 3.5 CLEANING AND PROTECTING

- A. Repair or replace defective work as directed by Architect upon inspection.
- B. Clean unit surfaces. Touch up, refinish, or replace damaged components in a manner acceptable to Architect.
- C. Turn over keys, tools, and operating and maintenance instructions to Owner.

# 08 34 90 - FIRE-RATED CEILING ACCESS DOOR WITH FOLDING STAIRS

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. 2 hour fire-rated ceiling access system including access panel and attached disappearing stairway. Assembly shall meet ASTM E-119 and UBC 43-7 requirements and carry a 2 hour Warnoc-Hersey label or equivalent UL label. Unit shall also comply with the requirements of A.N.S.I. A14.9-2004.
- B. Products Required, But Not Supplied Under This Section.
  - 1. Required fasteners.

- 1.2 SYSTEM DESCRIPTION: The system requires a ceiling opening per the following: Ceilings Heights up to 9'-9" require opening size of 30" X 54"; Ceiling Heights 9'-10" - 12'-0" require opening size of 30" X 64"; Ceiling Heights of 12'-1" – 13'-6" require opening size of 22-1/2" X 72".

### 1.3 DELIVERY, STORAGE AND HANDLING

- A. Examine stairway when it arrives on site. Notify the carrier and manufacturer of any damage.
- B. Store stairway until installation under roof, if possible; or, if stored outside, under a tarp or suitable cover.

- 1.4 WARRANTY: The unit shall carry a limited warranty of 1 year against defective material and workmanship covering parts only, no labor or freight. Defective parts, if deemed so by the manufacturer, will be replaced no charge, freight excluded, upon inspection at manufacturer's plant which warrants same.

### 1.5 MAINTENANCE

- A. Under normal usage, the stairway shall require no preventive maintenance.
- B. No spare Parts shall be required.

## PART 2 - PRODUCTS

- 2.1 MANUFACTURER: Any who meet the other requirements of this specification.

### 2.2 MATERIALS

- A. Door - 20 gauge steel door attached to frame with continuous piano hinge, flush with the bottom of the frame when in the closed position.
- B. Stairway
  - 1. Stringers
    - a. 6005-T5 Extruded aluminum channel 5" X 1" X 1/8"
    - b. Tri-fold design
    - c. Steel blade type hinges
    - d. Adjustable foot with plastic Mar-guard.
    - e. Pitch 63ø (standard). Other pitches optional.
  - 2. Treads
    - a. 6005-T5 Extruded aluminum channel 5 3/16" X 1 1/4" X 1/8".
    - b. Length 21 1/4" is standard for ceilings 12' 0" & less (lengths to 30 1/4" available). For ceilings 12' 1" & up (to max of 13' 6"), treads shall be 13 3/4" long.

- c. Deeply serrated top surface.
- d. 9 1/2" riser height (standard).
- e. 500 lbs load rating on units for ceiling heights of 12' or less; 300lbs load rating for ceiling heights of 12' 1" and above.

C. FRAME: 1/8" Steel, formed channel, 6" deep, 90° both ends. If ceiling to floor above is greater than 12", 1/8" steel formed channel, 63° on hinge end, 90° on the other end, custom depth to fill the distance from finished ceiling below to finished floor above. This frame shall have stationary, built-in steps to continue the climb at the same angle as the folding portion of the stair.

## 2.3 HARDWARE

- A. Steel blade type hinge connecting stringer sections, zinc plated & chromate sealed, bolted to stringers.
- B. Steel operating arms, cadmium plated & chromate sealed, both sides.
- C. Double acting steel springs and cables, both sides.
- D. Rivets rating at 1100# shear strength each.

## 2.4 SAFETY

- A. Aluminum handrail riveted to stringers, upper section, both sides standard.
- B. Steel section alignment clips at stringer section joints.

## 2.5 ACCESSORIES

- A. Steel pole to aid opening and closing stairway. The pole is equipped with a hook on one end and bicycle grip on the other (supplied).
- B. Keyed lock for door (supplied).

2.6 FABRICATION: The stairway shall be completely fabricated ready for installation before shipment to the site.

## 2.7 FINISHES

- A. Mill finish on aluminum stairway components.
- B. Prime coat on frame and door panel.
- C. Mill finish handrail.

2.8 SOURCE QUALITY CONTROL: All products tested in factory test jig for proper operation before shipment.

## PART 3 - EXECUTION

- 3.1 EXAMINATION: Examine rough opening in ceiling for opening size and squareness.
- 3.2 INSTALLATION: Install per the manufacturer's installation instructions.

## 08 35 13 – ACCORDION FOLDING FIRE DOORS

### PART 1 - PART 1 – GENERAL

#### 1.1 SUMMARY OF WORK

- A. Division 0 and 1, as indexed, apply to this section.
- B. Furnish and install all horizontal sliding, accordion folding fire doors shown on the drawings and specified herein.

#### 1.2 RELATED SECTIONS

- A. All headers, support structures, surrounding insulation, jambs, storage pockets, pocket doors, access doors, blocking and trim shall be furnished and installed by other sections.
- B. All electrical wire, wiring, conduit and electrical boxes shall be furnished and installed by electrical section including connections to smoke detectors and building fire alarm panels.
- C. Drilling/placement of anchorage points into pre or post tensioned decks, welding/punching/drilling steel members and all drywall work.
- D. All track, soffit, chain guide and wall mounted striker posts shall be painted by Section 09900. Color shall be selected by the architect.

- E. Remote Operation and Monitoring, is selected as an option, the following paragraph should be included: Interface to the fire doors shall be accomplished using a MODBUS gateway (by others) configured for RS485 communications. Use 18-gauge single twisted pair communication wire from the MODBUS gateway and daisy chain connections to each fire door (maximum of 32 doors per gateway). Terminate the end-of-line with a load resistor as specified by the MODBUS gateway manufacturer.

Communication lines are daisy chained from the MODBUS gateway to each fire door. The communications line is connected to a USOC RJ11, 6 Position, 4 Contact wall plate at each door. The [COM+]/[COM-] wires are connected to the center pins (Red and Green wires respectively). The plate is then mounted to a j-box centrally located on the back wall of the fire door pocket. All wiring, conduit, j-boxes and wall plates are provided by the Electrical Contractor. Connection from the wall plate to the fire door controller is accomplished by a modular plug data cable provided by the manufacturer.

#### 1.3 QUALITY ASSURANCE

- A. Installation shall be performed by factory trained and certified installers with a minimum of three years' experience installing electrically operated accordion folding fire doors.
- B. Fire doors shall be listed by Underwriters Laboratories for ratings as indicated, when tested in accordance with the requirements of UL 10B and NFPA 252.
- C. Automatic closing system shall be listed by Underwriters Laboratories in accordance with the requirements of UL 864 and be listed for use with assembly in compliance with NFPA 80, Chapter 9. Motor operator shall be rated for continuous use with unlimited cycle duty.
- D. Fire doors used for smoke and draft control shall bear the "S" mark on the fire door label and shall have an air leakage of less than 3 ft<sup>3</sup>/ft<sup>2</sup> at 0.1 inch of water column pressure when tested in accordance with UL 1784 with an artificial bottom seal.
- E. Fire doors used at the point of access to an elevator shall bear the "SE" mark on the fire door label and shall have an air leakage of less than 3 ft<sup>3</sup>/ft<sup>2</sup> at 0.1 inch of water column pressure when tested in accordance with UL 1784 without an artificial bottom seal.



- F. Fire Door shall be capable of resisting an air pressure differential up to 0.05 inches of water column. Optional air pressure resistance to 0.15 inches of water column available. (See Section **Error! Reference source not found.** G)

#### 1.4 SUBMITTALS

- A. Refer to Section 01 30 00 – Administrative requirements for shop drawings and submittals.
- B. Product Data: Provide manufacturer's technical literature; include UL listing data.
- C. Shop Drawings: Indicate construction and installation details and dimensions, including layout, electrical requirements, required stacking depth, height of header above finished floor, and requirements for anchorage and support of each door.
- D. Operation and Maintenance Data: Operating manual, troubleshooting and repair methods, and wiring diagrams shall be provided as part of project close out procedure.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver to the job site in manufacturer's original, unopened package.

#### 1.6 COORDINATION BY GENERAL CONTRACTOR

- A. Coordinate with the following:
  - 1. Fire Alarm System.
  - 2. Electrical.
  - 3. Pocket cover door (if required).
  - 4. Floor and ceiling finish.
- B. Assure accurate installation of header, jamb, and trim. Provide "As-Built" dimensions for opening and storage pocket. Supervise unloading and handling of materials.
- C. Permanent power shall be in-place and ready for final connection when fire doors are erected. Assure access to and proper clearance for motor operators.
- D. After testing the fire alarm system, automatic-closing fire doors shall be re-set to the original position.
- E. Store boxes flat (not more than three high) in a dry area and protect from elements that may damage materials. Replace damaged materials at no cost to the owner.

#### 1.7 WARRANTY

- A. Materials and installation shall be warranted against defects in workmanship for a period of one (1) year from the date of substantial completion.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURER AND MODEL

- A. Horizontal sliding accordion folding fire doors shall be Won-Door FireGuard model FG\_\_\_\_(select one: 20, 60, 90, or 180 - number designates minutes of fire rating) as manufactured by Won-Door Corporation, Salt Lake City, Utah. (Note: Add suffix "S" for smoke and draft OR suffix "SE" if door is used at the point of access to an elevator OR suffix "TR" for temperature rise of 450° F at 30 minutes. When specifying "TR" doors, contact the manufacturer for pocket depths, hanging weight and size limitations.)

- B. Products of other manufacturers demonstrating complete compliance with each of the fire rating and performance criteria of the product specified will be considered for approval. Written requests for substitutions will be considered by the architect up to ten days prior to the bid date.

## 2.2 ACCORDION FIRE DOORS - GENERAL

- A. Provide power operated self-closing fire doors of configurations indicated on the drawings.
  - 1. Fire rating as required.
- B. Fire Rating: Fire Doors shall be listed by Underwriters Laboratory as special purpose fire doors having a [select one: 20, 60, 90, or 180] minute fire protection rating in accordance with the requirements of UL 10B and NFPA 252.
- C. Closing and Opening Operation: Automatic Closing System including motor operator and releasing devices shall be a Microprocessor-based system rated to UL864 (Releasing Device Control Unit) and shall commence closing upon activation by fire alarm system and/or by low battery charge.
  - 1. Obstruction Detection: Contact with an obstruction shall cause the door to stop, reverse enough to remove pressure on the leading edge, pause, and then re-close when in an alarm condition.
  - 2. While the door is opening under motor power, constant pressure to the leading edge in the direction of opening shall cause the door to continue to open until the leading edge is released. This is termed motor-assisted opening.
  - 3. Constant pressure to the leading edge while not under motor power shall prevent motor operation and allow the door to be opened manually.
- D. Exit Hardware Operation: Provide fire exit hardware on both sides of door.
  - 1. In emergency mode, a slight pressure on the hardware will cause the door to open a minimum of 32 inches, pause for 3 seconds, and then automatically close.
  - 2. The open distance shall be field programmable, up to the entire opening width.
  - 3. The pause before re-close shall be field programmable up to 30 seconds.
  - 4. The exit hardware shall have the ability when not in the emergency (fire) mode to be used to open the door and move it back into the storage pocket.

## 2.3 COMPONENTS

- A. Door Construction: Two parallel, accordion-type walls of panels independently suspended with no floor tracks, pantographs, or interconnections except at the lead-post.
  - 1. Panels shall be formed of 24-gauge enamel coated steel V-grooved for strength and resilience. Panels shall be connected by full height 24-gauge enamel coated steel hinges. Panels shall be modular in design and capable of in-place repair-ability.
  - 2. Perimeter Seals: shall consist of continuous extruded vinyl sweeps attached to the top and bottom of the fire door to form a smoke and draft seal.
  - 3. Hanging weight shall be 5.5 pounds per square foot (6.5 lbs. per sq. ft. for TR models) when extended across the opening.
  - 4. Finish: All steel parts factory applied enamel.
  - 5. Color: Manufacturer's standard platinum.

- B. Suspension System: Two tracks, on 8 inch centers, attached to overhead structural support.
  1. Tracks: 14 gauge cold rolled steel or .125 aluminum.
  2. Panel hangers: Panels supported from a steel hanger pin and a ball bearing roller.
  3. Lead Post hangers: 8 wheel ball bearing trolley.
- C. Power Supply: 120 volt power source to power supply for main power. On loss of AC power, the 12v/24v battery back-up system shall provide full operation capability.
- D. Automatic Closing System shall be listed to UL864 including capability to send and receive signals from the Fire Control Panel and shall consist of the following:
  1. Microprocessor based Electronic Control box with these features:
    - a. Ability to monitor dual power sources continually for peak performance including:
      - i Detect a missing battery, bad battery, or low battery condition.
      - ii Detect if the charging circuit is bad.
      - iii Detect fuse failures.
      - iv Detect high or low AC conditions.
    - b. Ability to monitor the health of the drive train.
    - c. Ability to monitor inputs including: Sticky door block, exit hardware, and patron hardware.
    - d. Ability to run a "watch dog" monitoring circuit which will force a software restart in the event the software hangs, including the ability to track the number of resets that occur for diagnostic purposes.
    - e. Ability to withstand voltages up to 120 volts AC on the fire alarm input circuit without damage including the ability to indicate that the alarm circuit has not been wired as a dry contact, "no voltage" circuit when errant voltages are applied to the circuit.
    - f. Ability to communicate with other microprocessors in the assembly via an internal buss system.
    - g. Ability to indicate trouble or supervised information both locally and at a remote location.
  2. Motor Operator Assembly including: A DC gear-motor, drive sprocket, clutch, and position sensors. The motor shall drive the fire door by means of a chain attached to a stabilizer bar.
  3. If optional key switch (Section **Error! Reference source not found.** I) is NOT used, a door control momentary rocker switch shall be mounted on one side of the door near the lead post and shall function as follows:
    - a. Pressing the upper portion of the switch shall close the door and/or clear fault conditions.
    - b. Pressing the lower portion of the switch shall open the door and/or temporarily mute the local horn.
  4. Leading Edge Obstruction Detector: shall be pressure sensitive such that each contact with an obstruction shall cause the door to stop, reverse enough to remove pressure on the leading edge, pause, and then re-close when in an alarm condition. The leading edge obstruction detector shall be fully functional at all times, including during the initial closing cycle.
  5. Exit Hardware will be located on both sides of the fire door.

- E. An infrared light beam shall be provided on non-curved doors to monitor the opening path. In the event that an object is placed in the path of the door for more than 4 minutes, the beam shall cause the door to sound an alarm indicating a path obstruction.
- F. **OPTION: A key switch module shall be provided.**
- G. **OPTION: Level 1 Access Control: The Exit Hardware shall not respond when pressed until activated/over-ridden by signal from smoke detector or fire alarm. A rigid jamb stop and key switch shall be provided for authorized operation of the door assembly. A signal from the smoke detector or fire alarm will automatically override the access control feature. (Note: at least one key-switch required.)**
- H. **OPTION: Level 2 Access Control. The door(s) shall be programmable such that when in the access control mode, the exit hardware shall not respond when pressed until activated/over-ridden by a signal from the smoke detector or fire alarm. Door(s) shall also include a steel sliding jamb, rigid jamb stops, and 10 gauge steel vertical reinforcement to the lead post. An electromagnetic locking brake shall be added to the motor operator assembly to provide 400-500 pounds of resistance to manual opening. Key switch/alarm module shall be provided to open/close/reset the doors. (Note: Level 1 and Level 2 Access Control options are independent systems and may not be specified in conjunction with each other)**
- I. **OPTION: Remote Operation and Monitoring. Fire doors shall be remotely monitored and controlled through a building monitoring system (BMS) and interface with the BMS using MODBUS communication.**

**MODBUS Door Controls shall Include: Open, Close, Set Fire Mode for Testing, Reset, Lock (with Access Control Option), Unlock (with Access Control Option).**

**MODBUS Monitor Status: Door position across opening width, Door Status (OPEN, CLOSED, OPENING, CLOSING), Errors, Battery Voltage, AC Voltage.**

## 2.4 RELATED CONSTRUCTION

- A. **Track Support Construction:** Provide supports attached to structure and mounting surface for tracks; comply with door manufacturer's instructions and recommendations. Headers, if furnished & installed by the general contractor or other sections, shall be parallel with the finished floor within +/- 1/8" tolerance over the entire length of the opening.
- B. **Pocket Construction:** Provide pocket for concealment of accordion folding fire door when open; comply with door manufacturer's instructions and recommendations to ensure pocket and soffit are built to the dimensions specified, plumb and level.
- C. **Pocket Door:** Maintain full pocket clear width when pocket door is open.
- D. **Striker Recess:** mount 16 gauge steel striker in wall recess deep enough to prevent striker from protruding beyond face of wall; construct recess to maintain fire rating of wall.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that adjacent construction is suitable for installation of door.
- B. Verify that electrical utilities have been installed and are accessible.
- C. Verify that door opening is plumb and header is level and of correct dimensions.
- D. Notify Architect of any unacceptable conditions or varying dimensions.

### 3.2 INSTALLATION

- A. Install fire doors in accordance with manufacturer's instructions, shop drawings, and NFPA 80.

- B. Install fire doors plumb and level.
- C. Installation shall be performed by factory trained and certified installers with a minimum of three years' experience installing electrically operated accordion folding fire doors.

### 3.3 ADJUSTING

- A. Adjust door installation to provide uniform clearances and smooth, quiet, non-binding operation.
- B. Test that all operations are functional and meet the requirements of local codes.

### 3.4 CLEANING

- A. Clean surfaces using manufacturer's recommended means and methods.

### 3.5 PROTECTION

- A. Protect installed work from damage.

### 3.6 STORAGE OF WASTE AND RECYCLING

- A. Store and recycle waste in accordance with Section 01 74 19 Construction Waste Management and Disposal.

## 08 36 00 - SECTIONAL OVERHEAD DOORS

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Provide insulated sectional overhead doors for commercial applications. Submit for approval shop drawings, product data. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. Comply with governing codes and regulations.
- 1.3 SUBMITTALS: Submit promptly complete product information on this section to the A/E for review. Provide a copy of the manufacturer's standard warranty.

### PART 2 - PRODUCTS

#### 2.1 INSULATED SECTIONAL OVERHEAD DOORS

- A. Overhead Coiling Commercial Sheet Doors: Overhead Door Corporation 426 Series.
  1. Door Assembly: Insulated steel door assembly with rabbeted meeting rails to form weathertight joints and provide full-width interlocking structural rigidity.
    - a. Panel Thickness: 2 inches (51 mm).
    - b. Exterior Surface: Ribbed.
    - c. Exterior Steel: 24 gauge, hot-dip galvanized.
    - d. Back Cover:
      - i 26 gauge steel.
      - ii Poly-Backed.
      - iii High Impact Polystyrene Backcover.
    - e. Center and End Stiles: 16 gauge steel.
    - f. Springs:
      - i 25,000 cycles.
    - g. Insulation: Polystyrene.
    - h. Thermal Values:
      - i Polystyrene - R-value of 7.35; U-value of 0.136.
    - i. Finish and Color: Two coat baked-on polyester with white exterior and white interior color.
    - j. Windload Design: Provide to meet the Design/Performance requirements specified.
    - k. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
    - l. Lock:

- i Interior mounted slide lock. (Where manual operation)
  - ii Interior mounted slide lock with interlock switch for automatic operator. (where motorized operation)
- m. Weatherstripping:
  - i Flexible bulb-type strip at bottom section.
  - ii Flexible Jamb seals.
  - iii Flexible Header seal.
- n. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
- o. Operation:
  - i Door 509C and 509E to be manual operation: Chain Hoist.
  - ii Doors 509B and 509D to be electric motor operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.
    - Entrapment Protection: Required for momentary contact, includes radio control operation.
      - Pneumatic sensing edge up to 18 feet (5.5 m) wide. Constant contact only complying with UL 325/2010.
      - Electric sensing edge monitored to meet UL 325/2010.
      - Photoelectric sensors monitored to meet UL 325/2010.
    - Operator Controls:
      - Push-button operated control stations with open, close, and stop buttons.
      - Surface mounting.
      - Interior location.

2.2 GLAZING: Provide glazing panels as indicated.

2.3 ACCESSORIES: Provide each door with lock, to be pin tumbler single-unit mechanism, & PVC bottom & side weatherseal held in place by retainer.

### PART 3 - EXECUTION

3.1 PREPARATION: Examine the areas and conditions under which work of this Section will be performed & correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Take field measurements before fabrication where possible; do not delay job progress.

3.2 INSTALLATION: Deliver, handle, and store materials in accordance with manufacturer's instructions. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation

with adjacent construction and with uniform appearance. Securely mount to structure, plumb & level. Coordinate with work of other sections. Install assemblies complete with all hardware, anchors, inserts, supports and accessories. Restore damaged finishes and test for proper operation. Clean and protect work from damage.



# 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes: Kawneer Architectural Aluminum Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.

#### 1. Types of Kawneer Aluminum Storefront Systems include:

- a. Trifab® VG 451 Storefront System – 2" x 4-1/2" (50.8 mm x 114.3 mm) nominal dimension; Non-Thermal; Front, Center, Back, Multi-Plane, Structural Silicone or Weatherseal Glazed (Type B); Screw Spline, Shear Block, Stick or Punched Opening Fabrication.
- b. Trifab® VG 451T Storefront System – 2" x 4-1/2" (50.8 mm x 114.3 mm) nominal dimension; Thermal; Front, Center, Back, Multi-Plane, Structural Silicone or Weatherseal Glazed (Type B); Screw Spline, Shear Block, Stick or Punched Opening Fabrication.

### 1.3 DEFINITIONS

- A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) – AAMA Glossary (AAMA AG).

### 1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Aluminum-framed storefront system shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
  - 1. Design Wind Loads: Determine design wind loads applicable to the Project from basic wind speed indicated in miles per hour, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
- B. Storefront System Performance Requirements:
  - 1. Wind loads: Per local IBC requirements.
  - 2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft<sup>2</sup> (0.3 l/s • m<sup>2</sup>) at a static air pressure differential of 6.24 psf (300 Pa).
  - 3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf (383 Pa) as defined in AAMA 501.
  - 4. Uniform Load: A static air design load of 20 psf (958 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
  - 5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:

- a. Glass to Exterior – 0.47 (low-e) or 0.61 (clear)
- b. Glass to Center – 0.44 (low-e) or 0.61 (clear)
- c. Glass to Interior – 0.41 (low-e) or 0.56 (clear)
- 6. Windborne-Debris-Impact-Resistance Performance: Shall be tested in accordance with ASTM E 1886 and information in ASTM E 1996 and /or AAMA 506.
  - a. Large-Missile Impact: For aluminum-framed systems located within 30 feet (9.1 m) of grade.
  - b. Small-Missile Impact: For aluminum-framed systems located more than 30 feet (9.1 m) above grade.

## 1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum frame storefront system indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.
- C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.
- D. Samples for Verification: For aluminum framed storefront system and components required.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed storefront.
- F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12" (300 mm) lengths of full-size components and showing details of the following:
  - 1. Joinery, including concealed welds.
  - 2. Anchorage.
  - 3. Expansion provisions.
  - 4. Glazing.
  - 5. Flashing and drainage.
- G. Other Action Submittals:
  - 1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.

- B. Manufacturer Qualifications: A manufacturer capable of providing aluminum framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.
- C. Source Limitations: Obtain aluminum framed storefront system through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum framed storefront system and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.
  - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockup for type(s) of storefront elevation(s) indicated, in location(s) shown on Drawings.
- F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
- G. Structural-Sealant Glazing: Comply with ASTM C 1401, "Guide for Structural Sealant Glazing" for design and installation of structural-sealant-glazed systems.
- H. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

## 1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of aluminum framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

## 1.8 MANUFACTURER'S WARRANTY: Submit, for Owner's acceptance, manufacturer's standard warranty. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product:
  - 1. Kawneer Company Inc.
  - 2. Interior: Trifab® VG 451 (non-Thermal) Storefront System
  - 3. Exterior: Trifab® 451T (thermal) Storefront System
  - 4. Glass: Center
- B. Substitutions: Refer to Substitutions Section for procedures and submission requirements
  - 1. Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to bid date.
  - 2. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.

3. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for storefront system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum storefronts for a period of not less than ten (10) years. (Company Name)
  4. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
  5. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.
- C. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.
- D. Approved Manufacturers:
1. Oldcastle BuildingEnvelope
  2. Tubelite, Inc.

## 2.2 MATERIALS

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.
- B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
- D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
- E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
- F. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

## 2.3 STOREFRONT FRAMING SYSTEM

- A. Thermal Barrier (Trifab® VG 451T):
  1. Kawneer IsoLock® Thermal Break with a 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
    - a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposes shall be stainless steel.

- D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action
- E. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- F. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

## 2.4 GLAZING SYSTEMS

- A. Glazing: As specified in Division 08 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
- D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
  - 1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
    - a. Color: Black
  - 2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
    - a. Color: Matching structural sealant.

## 2.5 ALUMINUM ENTRANCES

- A. Exterior Aluminum Entrances: Basis of Design: Kawneer 560 Insulclad Wide Stile Thermal Entrances
- B. Interior Aluminum Entrances: Basis of Design: Kawneer 500 Standard Wide Stile Entrances
- C. Aluminum Entrance Hardware: Provide heavy-duty hardware units indicated in sizes, number, and type recommended by manufacturer for entrances indicated. Finish exposed parts to match door finish, unless otherwise indicated. Hardware to be supplied by Division 08710 and installed by this division.
  - 1. Offset Pivots: ANSI/BHMA A156.4, Grade 1 with exposed parts of cast-aluminum alloy. Provide top, bottom and intermediate pivots at each door leaf.
  - 2. Closers, General: Comply with manufacturer's recommendations for closer size, depending on door size, exposure to weather and anticipated frequency of use.
    - a. Closing Cycle: Comply with requirements of authorities having jurisdiction or the Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)", "whichever are more stringent.

- b. Opening Force: Comply with the following maximum opening-force requirements for locations indicated:
      - i Exterior Doors: 15 lbf (67 N).
      - ii Interior Doors: 5 lbf (22.2N).
- 3. Surface-Mounted Overhead Closers: ANSI/BHMA A156.4, Grade 1. Provide cover and the following:
  - a. Mounting: Push side.
  - b. Hold Open: Automatic, at angle selected by Architect from manufacturer's standard options (when indicated on door schedule).
  - c. LCN, Norton, Dorma.
- 4. Door Stops: ANSI/BHMA A156.16, Grade 1, floor- or wall-mounted door stop, as appropriate for door location indicated, with integral rubber bumper.
- 5. Cylinders: As specified in Division 8 Section "Door Hardware".
- 6. Cylinder Guard: Manufacturer's standard hardened-steel security ring with retainer plate for inside stile wall that protects lock cylinder from removal by wrenches, prying, or sawing.
- 7. Vertical-Rod Exit Devices: Concealed, vertical-rod exit device complying with UL305 requirements, with 2-point top and bottom latching that is released by a full-width panel line exit device or when locked down (dogged) by retracting screws beneath housing. Provide electrified option for card access requirements.
  - a. Von Duprin, Monarch.
- 8. Removable Mullions: Manufacturer's standard aluminum or aluminum-clad-steel removable mullion with mullion stabilizers located below latch strikes.
  - a. Von Duprin, Monarch.
- 9. Pull Handles: As selected by Architect from manufacturer's full range of pull handles and plates.
- 10. Push Bars: As selected by Architect from manufacturer's full range of full-door-width, single-bar push bars.
- 11. Thresholds: At exterior doors, provide manufacturer's standard threshold with cut-outs coordinated for operating hardware, with anchors and jamb clips, and not more than 1-2-inch- (12.7-mm-) high, with beveled edges providing a floor level change with a slope of not more than 1:2, and in Aluminum, mill finish or bronze mill finish to match entrance finish.
  - a. National Guard Products, Pemko, Zero.
- 12. Weather Sweeps: Manufacturer's standard weather sweep for application to exterior door bottoms and with concealed fasteners on mounting strips.
- 13. Verify with Architect: interior aluminum doors to have panics and/or deadlocks & push/pulls.

## 2.6 ACCESSORY MATERIALS

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."

- B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil (0.762 mm) thickness per coat.

## 2.7 FABRICATION

- A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fit joints; make joints flush, hairline and weatherproof.
  - 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
  - 4. Physical and thermal isolation of glazing from framing members.
  - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 6. Provisions for field replacement of glazing.
  - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- B. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- C. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- D. Storefront Framing: Fabricate components for assembly using manufactures standard installation instructions.
- E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.8 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Factory Finishing:
  - 1. Kawnear Permanodic® AA-M12C22A31, AAMA 611, Architectural Class II Clear Anodized Coating (Color #17 Clear)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight framed aluminum storefront system installation.
  - 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
  - 2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.

3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum framed storefront system, accessories, and other components.
- B. Install aluminum framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
- D. Install aluminum framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within sliding door to the exterior.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

### 3.3 FIELD QUALITY CONTROL

- A. Field Tests: Architect shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.
  1. Testing: Testing shall be performed by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements. Testing Standard per AAMA 503, including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 Water Infiltration Test.
    - a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft<sup>2</sup>, whichever is greater.
    - b. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 6.24 psf (300 Pa).
- B. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

### 3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Clean aluminum surfaces immediately after installing aluminum framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.



## 08 42 29 - AUTOMATIC ENTRANCES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes exterior, sliding, power-operated automatic entrances.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Opening-Force Requirements:
  - 1. Power-Operated Doors: Not more than 50 lbf required to manually set door in motion if power fails, and not more than 15 lbf required to open door to minimum required width.
  - 2. Breakaway Device for Power-Operated Doors: Not more than 50 lbf required for a breakaway door or panel to open.
- B. Entrapment Force Requirements for Power-Operated Sliding Doors: Not more than 30 lbf required to prevent stopped door from closing.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For automatic entrances. Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work.
  - 1. Wiring Diagrams: For power, signal, and control wiring.
  - 2. Activation and safety devices.
  - 3. Include hardware schedule and indicate hardware types, functions, quantities, and locations.
- C. Sample: For each exposed product and for each color and texture specified.
- D. Field quality-control reports.
- E. Maintenance data.
- F. Warranties: Sample of special warranties.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation and maintenance of units required for this Project and who employs a certified inspector.
- B. Certified Inspector Qualifications: Certified by AAADM.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- D. Power-Operated Door Standard: BHMA A156.10.
- E. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrances serving as a required means of egress.
- F. Preinstallation Conference: Conduct conference at Project site.

## 1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of automatic entrances that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  - 1. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
  - 2. Sheet and Plate: ASTM B 209.
- B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
  - 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
  - 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
  - 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.
- C. Glazing: As specified in Division 08 Section "Glazing."
- D. Sealants and Joint Fillers: As specified in Division 07 Section "Joint Sealants."
- E. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil thickness per coat.
- F. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

### 2.2 SLIDING AUTOMATIC ENTRANCES

- A. General: Provide manufacturer's standard automatic entrances including doors, sidelites, framing, headers, carrier assemblies, roller tracks, door operators, activation and safety devices, and accessories required for a complete installation.
- B. Sliding Automatic Entrance:

1. Basis-of-Design Product: Design is based on products indicated on the Drawings manufactured by DORMA Automatics; Div. of DORMA Group North America. Subject to compliance with requirements, provide named products or comparable product approved by the Architect by one of the following:
  - a. Single-and Biparting-Sliding Units:
    - i Besam Automated Entrance Systems, Inc.; an ASSA ABLOY Group company.
    - ii Horton Automatics; Div. of Overhead Door Corporation.
    - iii Stanley Access Technologies; Div. of The Stanley Works.
2. Configuration: Single-and Biparting-sliding door(s), with transom sidelite(s).
  - a. Traffic Pattern: Two way.
  - b. Emergency Breakaway Capability: As indicated on Drawings.
  - c. Mounting: Between jambs.
3. Operator Features:
  - a. Power opening and closing.
  - b. Drive System: Manufacturer's standard.
  - c. Adjustable opening and closing speeds.
  - d. Adjustable hold-open time between 0 and 30 seconds.
  - e. Obstruction recycle.
  - f. On-off/hold-open switch to control electric power to operator, key operated.
4. Sliding Door Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon-or delrin-covered, ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon-or delrin-covered, continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.
  - a. Rollers: Minimum of two ball-bearing roller wheels and two antirise rollers for each active leaf.
5. Combination Activation and Safety Device: Combination motion/presence sensor.
6. Safety Devices: Two photoelectric beams mounted in sidelite jambs to detect pedestrians in presence zone and to prevent door from closing.
7. Finish: Finish framing, door(s), sidelite(s), and header with finish matching adjacent curtain wall or adjacent storefront framing.

## 2.3 ENTRANCE COMPONENTS

- A. Framing and Transom Members: Manufacturer's standard extruded aluminum, minimum 0.125 inch thick and reinforced as required to support imposed loads.
  - 1. Nominal Size: 1-3/4 by 4-1/2 inches.
  - 2. Extruded Glazing Stops and Applied Trim: Minimum 0.062-inch wall thickness.
- B. Stile and Rail Doors: Manufacturer's standard 1-3/4-inch-thick, glazed doors with minimum 0.125-inch-thick, extruded-aluminum tubular stile and rail members. Mechanically fasten corners with reinforcing brackets that are welded, or incorporate concealed tie-rods that span full length of top and bottom rails.
  - 1. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and manufacturer's standard preformed gaskets.
  - 2. Stile Design: Thin stile, less than 1-3/4-inch nominal width.
  - 3. Rail Design: As indicated on Drawings.
- C. Sidelite(s) and Transom: Manufacturer's standard 1-3/4-inch-deep sidelite(s) and transom with minimum 0.125-inch-thick, extruded-aluminum tubular stile and rail members matching door design and finish.
  - 1. Glazing Stops and Gaskets: Same materials and design as for stile and rail door.
- D. Headers: Fabricated from minimum 0.125-inch-thick, extruded aluminum and extending full width of automatic entrance units to conceal door operators and controls. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.
  - 1. Mounting: Concealed, with one side of header flush with framing.
  - 2. Capacity: Capable of supporting doors up to 175 lb per leaf over spans up to 14 feet without intermediate supports.
- E. Signage: Affixed to both sides of each door as required by BHMA A156.10 for type of door and its operation.
  - 1. Application Process: Door manufacturer's standard process.

## 2.4 DOOR OPERATORS AND ACTIVATION AND SAFETY DEVICES

- A. Door Operators: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
  - 1. Door Operator Performance: Provide door operators that will open and close doors and maintain them in fully closed position when subjected to Project's design wind loads.
  - 2. Electromechanical Operators: Concealed, self-contained, overhead unit powered by fractional-horsepower, permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor; with solid-state microprocessor controller; UL 325; and with manual operation with power off.
- B. Combination Motion/Presence Sensors: Self-contained units; consisting of both motion and presence sensors in a single metal or plastic housing; adjustable to provide detection field sizes and functions required by BHMA A156.10.

1. Motion Sensor: K-band-frequency, microwave-scanner units; with relay hold time of not less than 2 to 10 seconds.
    - a. Provide capability for switching between bidirectional and unidirectional detection.
    - b. For one-way-traffic entrances, sensor on egress side shall not be active when doors are fully closed.
  2. Presence Sensor: Infrared-scanner units; with relay hold time of not less than 2 to 10 seconds. Sensors shall remain active at all times.
- C. Photoelectric Beams: Pulsed infrared, sender-receiver assembly for recessed mounting. Beams shall not be active when doors are fully closed.
- D. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

## 2.5 HARDWARE

- A. General: Provide units in sizes and types recommended by automatic entrance and hardware manufacturers for entrances and uses indicated. Finish exposed parts to match door finish.
- B. Manual Opening for Power-Operated Swinging Doors: Provide hardware that in a power failure allows door to open with a manual force not to exceed 30 lbf according to BHMA A156.10.
- C. Breakaway Device for Power-Operated Doors: Provide breakaway device that allows door to swing out in direction of egress to full 90 degrees from any operating position. Maximum force to open door shall be 50 lbf according to BHMA A156.10. Interrupt powered operation of door operator while in breakaway mode.
- D. Center-Pivot Sets: BHMA A156.4, Grade 1, with exposed parts of cast-aluminum alloy.
- E. Weather Stripping: Manufacturer's standard replaceable components.
- F. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with

## 2.6 FABRICATION

- A. General: Factory fabricate automatic entrance components to designs, sizes, and thicknesses indicated and to comply with indicated standards.
- B. Framing: Provide automatic entrances as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.
- C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.
- D. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.
- E. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated, according to GANA's "Glazing Manual."
- F. Hardware: Factory install hardware to greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site. Cut, drill, and tap for factory-installed hardware before applying finishes.

1. Provide sliding-type weather stripping, mortised into door, at perimeter of doors.
- G. Activation and Safety Devices:
1. General: Factory install devices in doors and headers as required by BHMA A156.10 for type of door and direction of travel.
  2. Install photoelectric beams in vertical jambs of sidelites, with dimension above finished floor as follows:
    - a. Top Beam: 48 inches.
    - b. Bottom Beam: 24 inches.
  3. Install photoelectric beams in sides of guide rails, with dimension above finished floor not less than 24 inches.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. General: Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
  2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
  2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
  3. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within system to exterior.
- C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections.
- D. Activation and Safety Devices: Install and adjust devices to provide detection field and functions indicated.
- E. Glazing: Install glazing as specified in Division 08 Section "Glazing."
- F. Sealants: Comply with requirements specified in Division 07 Section "Joint Sealants" to provide weathertight installation.
1. Set bottom-guide track system, framing members and flashings in full sealant bed.
  2. Seal perimeter of framing members with sealant.
- G. Signage: Apply signage on both sides of each door as required by referenced door standards.

- H. Wiring within Automatic Entrance Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's written limitations on bending radii. Provide and use lacing bars and distribution spools.
- I. Inspection: Engage Installer's certified inspector to test and inspect automatic entrances and prepare test and inspection reports.
  - 1. Certified inspector shall test and inspect each automatic entrance to determine compliance of installed systems with applicable BHMA standards.
  - 2. Field Quality-Control Report: Certified inspector shall submit report in writing to Architect and Contractor within 24 hours after inspection.
  - 3. Work will be considered defective if it does not pass tests and inspections.
- J. Adjusting: Adjust door operators, controls, and hardware for smooth and safe operation and for weathertight closure; comply with requirements in BHMA A156.10.
  - 1. Readjust door operators and controls after repeated operation of completed installation equivalent to 3 days' use by normal traffic (100 to 300 cycles). Lubricate hardware, operating equipment, and other moving parts.
- K. Demonstration: Engage a certified inspector to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrances.

## 08 44 13 – GLAZED ALUMINUM CURTAIN WALLS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes conventionally glazed aluminum curtain walls installed as stick assemblies.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of manufacturer's standard glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  - 1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  - 2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
- B. Delegated Design: Design glazed aluminum curtain walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Wind Loads: As indicated on Drawings.
- D. Structural-Test Performance: Test according to ASTM E 330 as follows:
  - 1. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
  - 2. Test Durations: 10 seconds.
- E. Deflection of Framing Members: At design wind pressure, as follows:
  - 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
  - 2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller.
- F. Water Penetration under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft.



### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
  - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
  - 2. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
    - a. Joinery, including concealed welds.
    - b. Anchorage.
    - c. Expansion provisions.
    - d. Glazing.
    - e. Flashing and drainage.
- C. Samples: For each type of exposed finish required.
- D. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Qualification Data: For qualified Installer.
- F. Field quality-control reports.
- G. Maintenance data.
- H. Warranties: Sample of special warranties.

### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
- C. Preinstallation Conference: Conduct conference at Project site.

### 1.5 WARRANTY

- A. Special Assembly Warranty: Standard form in which manufacturer agrees to repair or replace components of glazed aluminum curtain walls that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. Arch Aluminum & Glass Co., Inc.
  - 2. EFCO Corporation.
  - 3. Kawneer North America; an Alcoa company.
  - 4. TRACO.
  - 5. United States Aluminum.
  - 6. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.
  - 7. Wausau Window and Wall Systems.
  - 8. YKK AP America Inc.

### 2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

- 1. Sheet and Plate: ASTM B 209.
  - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
  - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
  - 4. Structural Profiles: ASTM B 308/B 308M.
  - 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

- B. Steel Reinforcement: With manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

- 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
  - 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
  - 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

## 2.3 FRAMING

- A. Framing Members: Manufacturer's standard extruded-or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1. Construction: Thermally broken.
  - 2. Glazing System: Retained mechanically with gaskets on four sides.
  - 3. Glazing Plane: Front.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
  - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  - 2. Reinforce members as required to receive fastener threads.
  - 3. Use exposed fasteners with countersunk Phillips screw heads, fabricated from 300 series stainless steel.
- D. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
- E. Concealed Flashing: Dead-soft, 0.018-inch-thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.
- F. Framing Sealants: Manufacturer's standard sealants.

## 2.4 GLAZING

- A. Glazing: Comply with Division 08 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.

## 2.5 ACCESSORY MATERIALS

- A. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

## 2.6 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Fabricate components that, when assembled, have the following characteristics:
  - 1. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.
- E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.7 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General:
  - 1. Comply with manufacturer's written instructions.
  - 2. Do not install damaged components.
  - 3. Fit joints to produce hairline joints free of burrs and distortion.
  - 4. Rigidly secure nonmovement joints.
  - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
  - 6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
  - 7. Seal joints watertight unless otherwise indicated.
- B. Metal Protection:
  - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.

2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install glazing as specified in Division 08 Section "Glazing."

### 3.2 ERECTION TOLERANCES

- A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:
  1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
  2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
  3. Alignment:
    - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
  4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

### 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing and inspecting of representative areas of glazed aluminum curtain walls shall take place as installation proceeds to determine compliance of installed assemblies with specified requirements.
  1. Water Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
- C. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

## 08 45 23 – INSULATED TRANSLUCENT PANEL ASSEMBLIES

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: The General Conditions of the Contract, including Supplementary Conditions and Division 1 - General Requirements, apply to the work of this Section.
- 1.2 WORK INCLUDED: Design, manufacture and installation of translucent insulating system. A complete assembly of translucent panels incorporated into a complete system tested and warranted by the manufacturer as a single source system. All anchors, brackets, and hardware attachments necessary to complete the specified structural assembly, weatherability and water-tightness performance requirements. All flashings up to but not penetrating adjoining work are also required as part of the system and shall be included. Trained and factory authorized labor with supervision to complete the entire panel installation.
- 1.3 QUALITY ASSURANCE: Wall-light system must be evaluated and listed by the recognized building code authorities: International Conference of Building Officials (ICBO) and SBCCI - Public Safety Testing and Evaluation Services Inc. Materials and Products shall be manufactured by a company continuously and regularly employed in the manufacture of wall-lights using polycarbonate panel systems or fiberglass sandwich panels for a period of at least ten (10) years. Manufacturers shall provide a list of at least ten (10) projects having been in place a minimum of five (5) years, with similar size, scope, climate and type. Erection shall be by a factory-approved installer which has been in the business of erecting similar material for at least five (5) consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type. The manufacturer shall be responsible for the configuration and fabrication of the complete panel system, and will ensure that it fully meets all requirements of this specification.
- 1.4 SUBMITTALS: Submit shop drawings and color samples. The manufacturer shall submit written guarantee accompanied by substantiating data, stating that the products to be furnished are in accordance with or exceed these specifications. The manufacturer shall submit certified test reports made by an independent organization for each type and class of panel system. Reports shall verify that the material will meet all performance requirements of this specification. Previously completed test reports will be acceptable if they are current and indicative of products used on this project.
- 1.5 WARRANTY: Certify that wall-light frame is free of defects in design, material and manufacturing for a period of five (5) years from the date of wall-light completion. Provide manufacturer standard 10 year limited warranty to include: Change in light transmission of no more than 6% per ASTM D-1003, and in color (yellowness index) in excess of 10 points, in comparison with the original value. No delamination of panel affecting appearance, performance or structural integrity of the panel or the system. Thermal aging - the light transmission and the color shall not change after exposure to heat of 300°F for 25 minutes. (When measured per ASTM D-1003 and ASTM D-2244 respectively).

### PART 2 - PRODUCTS

- 2.1 MANUFACTURER: The design and performance criteria of this job are equal to products of the following:
  - A. Major Industries, Post Office Box 306, Wausau, Wisconsin 54402, 888-759-2678, majorskylights.com
  - B. Kalwall Corporation, 1111 Candia Road, Manchester, NH 03105, 800-258-9777, kalwall.com
  - C. Extech Exterior Technologies, Inc., 200 Bridge Street, Pittsburgh, PA 15223, 800-500-8083, extechinc.com
- 2.2 TRANSLUCENT PANEL PERFORMANCE
  - A. Thermal performance of panels shall have a U-factor of 0.15
  - B. Flammability
    1. The exterior and interior faces shall be an approved light transmitting panel with a CC1 fire rating classification per ASTM D-635. Smoke density no greater than 70 per ASTM D2843 and self ignition temperature of 1058°F per ASTM 1929.
    2. Interior flame spread classification of Class I per ASTM E84.

- C. Weatherability: The exterior and interior faces shall not change color more than 3.0 units (DELTA-E by ASTM D2244) after 60 months outdoor weathering in Arizona determined by an average of at least two samples. The exterior and interior faces shall be tested by recognized laboratory for weathering evaluation per ASTM D4364-84 (EMMAQUA, UNBACKED), after exposure to minimum concentrated natural sunlight radiation of 56000 MJ/M (1540 MJ/M of UV, 200 – 385 N.M). The exterior and interior faces shall not change:
1. Color more than 3.0 units Delta E, 5.0 units Delta L and Delta B
  2. Yellowing index more than 10 units Delta Y per ASTM D1925.
  3. The light transmission as measured by ASTM D1003, shall not decrease more than 6% over 10 years, or after exposure to temperature of 300°F for 25 minutes (thermal aging).
  4. Thermal aging - the interior and exterior faces shall not change color in excess of 0.75 Delta E by ASTM D2244 and shall not darken more than 0.3 units (Delta L by ASTM D2244) and 0.2 units Delta Y (YI) by ASTM D1925 and shall not show cracking or crazing when exposed to 300°F for 25 minutes.
  5. The faces shall not become readily detached when exposed to temp of 300°F and 0°F for 25 minutes.
- D. Appearance, Panel Construction and Longevity - Resistance to Buckling Bending and Pressure for Polycarbonate Panels Only.
1. The panels shall be uniform in color, with an integral cellular core. In a cross section, the core shall be constructed from small square cells not to exceed 0.16" x 0.16". and ridged-line texture for even light diffusion. The appearance should be equal to CPI's Quadwall Panel.
  2. Panels shall consist of a polycarbonate resin with a permanent, co-extruded, ultra-violet protective layer. This layer shall be co-extruded by a manufacturer during the original extrusion of the panel and shall be a permanent part of the exterior layer. Post-applied coating or films of dissimilar materials are unacceptable.
  3. The panel assemblies thickness shall 4" with concealed interlocking H battens of aluminum.
  4. Panel Width: Shall not exceed 2' to ensure best performance for wind uplift, vibration, oil canning and visual appearance.
  5. Panel shall be extruded in one single formable length. Transverse connections are not acceptable. The panels should be manufactured with upstands which are integral to the unit, and the upstands shall be 90 degrees to the panel face (standing seam dry glazed concept). Welding or gluing of upstands or standing seam is not acceptable.
  6. Mullions to be dry glazed profiles, using no sealant, welding, adhesives or gaskets.
  7. Mullions to be thermally broken and continuous for panel length.
  8. Concealed fasteners to be used for panel mullion joint.
  9. For structural performance, the use of adhesives, plastic welding or sealant is not allowed.
  10. Free movement of the panels shall be allowed to occur without damage to the weather tightness of the completed system.
  11. Resistance to buckling, bending and pressure: The extruded panel shall include integral extruded multi-cells, and a truss-like structural core. The panel's exterior skins shall be interconnected and spaced apart by supporting continuous ribs, perpendicular to the skins, at a spacing not to exceed 0.16" (truss-like construction). In addition, the space between the two exterior skins in a cross section shall be divided by multiple parallel intermediate surfaces, at a spacing not to exceed 0.16".

- E. Appearance, Panel Construction & Longevity for Fiberglass Panels Only. Fiberglass panels shall have a thickness of 4". Panels shall be a true sandwich panel of flat fiberglass sheet bonded to a grid core of mechanically interlocking aluminum I-beams and shall be laminated under a controlled process of heat and pressure. The I beams shall be thermally broken. The adhesive bonding line shall be straight, cover the entire width of the I-beam and have a neat, sharp edge. To ensure bonding strength, white spots at intersections of muntins / mullions shall not exceed four (4) for each 40 square feet of panel, nor shall they be more than 3/64" in width. The face sheet shall be uniform in color to prevent splotchy appearance. Faces shall be completely free of ridges and wrinkles which prevent proper surface contact in bonding to the aluminum core. Clusters of air bubbles or pinholes which collect moisture and dirt are not acceptable. Exterior face sheet shall be .070" thick. Interior face sheets shall be .045" thick. Faces shall not vary more than 10% more or less in thickness. The aluminum I-beams shall be 6063-T6 with provision for mechanical interlocking of muntin-mullion and the perimeter to prevent high and low intersections which do not allow full bonding surface to contact with face material. Width of I-beam shall be no less than 7/16". The I-beam grid shall be machined to tolerances of not greater than .002" plus or minus for flat panels. The laminate adhesive shall be heat and pressure type engineered for structural sandwich panel use. Adhesive shall pass testing requirements specified by the International Conference of Building Officials "Acceptance Criteria for Sandwich Panel Adhesive". The minimum strength shall be 750 PSI tensile strength by ASTM C 297 after two (2) exposures to six (6) cycles each of the aging conditions according to ASTM D 1002. 500 PSI shear strength average of five (5) exposures by ASTM D 1002:
1. 50% relative humidity at 73 degrees F.
  2. Accelerated aging by ASTM D 1183.
  3. 182 degree F.
  4. Full cycle soak.
  5. 500 hour oxygen bomb.
- F. Impact Resistance: The panels shall pass the following tests: ASTM D-3841/SPI - Impact and Shatter Resistance of 200 ft. lbs. SFBC – PA 201-94 - Impact resistance of 350 ft. lbs.
- G. Air Infiltration: ASTM D-283 at test pressures of 15.0 PSF - 0.042 SCFM/ft. of dry glazing joint length.
- H. Water Penetration: No water penetration - ASTM E-331 at test pressure of 15.0 PSF.
- I. UV Maintenance: The system shall require no scheduled recoating to maintain its performance or for UV.

2.3 STRUCTURE: Minimum design criteria shall be Wind Load 20 lb/ft, or greater as required by code.

2.4 METAL MATERIALS: Extruded aluminum shall be ANSI/ASTM B221; 6063-T6 and 6063-T5. All fasteners to be stainless steel or Cadmium plated steel. All exposed aluminum finish shall be standard color Baked Enamel with 1 year warranty for adhesion & meets AAMA 2604 spec.

### PART 3 - EXECUTION

- 3.1 EXAMINATION: General Contractor to verify when structural support is ready to receive all work in this section and to convene a Pre-Installation Conference at least one week prior to commencing work of this Section. Attendance required of General Contractor, installer and all parties directly affecting and effected by the work of this section. All submitted opening sizes, dimensions and tolerances are to be field verified by general contractor. Installer to examine area of installation to verify readiness of site conditions. Notify general contractor about any defects requiring correction. Do not work until conditions are satisfactory.
- 3.2 INSTALLATION: Install components in strict accordance with manufacturer's instructions and approved shop drawings. Use proper fasteners and hardware for material attachments as specified. Use methods of attachment to structure allowing sufficient adjustment to accommodate tolerances. Remove all protective coverings on panels immediately after installation.
- 3.3 CLEANING: Follow manufacturer's instructions when washing down exposed panel surfaces using a solution of mild detergent in warm water that is applied with soft, clean wiping cloths. Follow strict panel manufacturer guidelines when removing foreign





## 08 51 13 - ALUMINUM WINDOWS

### PART 1 - GENERAL

- 1.1 WORK INCLUDED: Furnish and install aluminum architectural windows complete with hardware and related components as shown on drawings and specified in this section. Window assemblies are to be glazed by the window manufacturer. Window units shall be furnished with necessary sub-frames to provide a complete and weatherproof installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. Conform with all requirements of Architectural Aluminum Manufacturers Association.
- 1.3 TESTING AND PERFORMANCE REQUIREMENTS: Air, water and structural test unit sized and configuration shall conform to requirements set forth in ANSI/AAMA 101-88.
- 1.4 QUALITY ASSURANCE: Provide test reports from AAMA accredited laboratories certifying the performance as specified. Test reports shall be accompanied by the window manufacturer's letter of certification stating that the tested window meets or exceeds the referenced criteria for the appropriate ANSI/AAMA 101-93 window type.
- 1.5 SUBMITTALS: Contractor shall submit shop drawings, finish samples, test reports, and warranties. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.
- 1.6 WARRANTIES: The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total window installation which includes that of the windows, hardware, glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc. as it relates to air, water and structural adequacy as called for in the specifications and approved shop drawings. Any deficiencies due to such elements not meeting the specifications shall be corrected by the Contractor at his expense during the warranty period.

### PART 2 - PRODUCTS

- 2.1 MANUFACTURE - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
  - A. Alenco Commercial Division.
  - B. Columbia Commercial Products
  - C. Don Young Co., Inc.
  - D. EFCO Corporation.
  - E. Peerless Products, Inc.
- 2.2 MATERIALS:
  - A. Aluminum: Extruded aluminum shall be 6063-T5 alloy and temper.
  - B. Hardware: Locking handles shall be cam type sweep manufactured from white bronze.
  - C. Balances: Concealed heavy duty spiral.
  - D. Weather-strip: All weather-strip shall be Schlegel Q-LON2 or equal.
  - E. Glass: Meet or exceed AAMA wind zone requirements. Window units shall be designed to receive minimum 1/4" single glazing, tinted at exterior locations. See "Glazing" section for other requirements.
- 2.3 WINDOW TYPES:

- A. SINGLE-HUNG WINDOWS: Comply with requirements of AAMA Grade and Performance Class SH-C35.
  - B. FIXED WINDOWS: Comply with requirements of AAMA Grade and Performance Class F-C35.
- 2.4 FABRICATION: Provide subframes on all window units & end-dams on all window sills. Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength and not less than 0.062 inch thick at any location for main frame and sash members. Provide aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components of window units. Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with requirements of ASTM B 633; provide sufficient strength to withstand design pressure indicated. Provide woven-pile weatherstripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric; Comply with AAMA 701.2. For sealants required within fabricated window units, provide type recommended by manufacturer for joint size and movement; Sealant shall remain permanently elastic, nonshrinking, and nonmigrating.
- 2.5 SCREENS: Provide full size solar screens at all exterior units. Screen frames shall be extruded aluminum.
- 2.6 GLAZING: All glazed units shall be glazed with prime glazing sealant, extruded aluminum glazing bead, and a rigid vinyl drive in wedge
- 2.7 FINISH: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes. Finish all exposed areas of aluminum windows and components with clear anodized, color selected by Architect.

**PART 3 - EXECUTION**

- 3.1 INSPECTION: Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface and are in accordance with approved shop drawings.
- 3.2 INSTALLATION: Use only skilled tradesman with work done in accordance with approved shop drawings and specifications. Plumb and align window faces in a single plane for each wall plane and erect windows and materials square and true adequately anchored to maintain positions permanently when subjected to normal thermal and building movement and specified wind loads. Adjust windows for proper operation after installation.
- 3.3 SEALING: Furnish and apply sealant to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.
- 3.4 ADJUSTING AND CLEANING: After completion of window installation, windows shall be inspected, adjusted, put into working order and left clean, free of labels, dirt, etc.

## 08 51 14 - ALUMINUM CLAD WOOD DOBULE HUNG WINDOWS

### PART 1 - GENERAL

- 1.1 SECTION INCLUDES: Aluminum clad wood ultimate—double hung, single hung, transom, picture—window complete with hardware, glazing, weather strip, insect screen, removable grille, Grille Between Glass, simulated divided lite, jamb extension, combination storm/screen, and standard or specified anchors, trim, attachments, and accessories.
- 1.2 REFERENCES
  - A. American Society for Testing and Materials (ASTM):
    1. E 283: Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.
    2. E 330: Standard Test Method for Structural Performance of Exterior Windows, Curtains Walls, and Doors by Uniform Static Air Pressure Difference.
    3. E 547: Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
    4. E 774: Specification for Sealed Insulated Glass Units.
    5. C 1036: Standard Specification for Flat Glass.
  - B. WDMA I.S.4: Industry Standard for Water Repellent Preservative Treatment for Millwork.
  - C. American Architectural Manufactures Association / Window and Door Manufactures Association (AAMA / WDMA): ANSI / AAMA / NWWDA 101 / I.S.2-97 Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors. and 101 / I.S.2 / NAFS-02 Voluntary Performance Specification for Windows, Skylights and Glass Doors.
  - D. Window and Door Manufacturers Association (WMDA): 101 / I.S.2 WDMA Hallmark Certification Program.
  - E. Sealed Insulating Glass Manufactures Association / Insulating Glass Certification Council (SIGMA / IGCC).
  - F. American Architectural Manufacturers Association (AAMA): 2605: Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
  - G. National Fenestration Rating Council (NFRC): 101: Procedure for Determining Fenestration Product Thermal Properties.
- 1.3 SYSTEM DESCRIPTION
  - A. Design and Performance Requirements:
    1. Window units shall be designed to comply with ANSI / AAMA / NWWDA 101 / I.S.2-97 and 101 / I.S. 2/ NAFS-02
      - a. Double Hung / Single Hung: (H-LC40 rating up to CN 3036, CN 4026) (H-LC30 Rating up to CN4036)
      - b. Transom: (TR-C40 rating up to CN 7420)
      - c. Picture: (F-C40 rating up to CN 6878)

2. Air leakage shall not exceed the following when tested at 1.57 according to ASTM E 283: .30 cfm per square foot of frame.
3. No water penetration shall occur when units are tested at the following pressure according to ASTM E 547: (H-LC40 - 6.0) (H-LC30 - 4.5) (F-C40-6.0) (TR-C40-6.0) psf.
4. Window assembly shall withstand the following positive or negative uniform static air pressure difference without damage when tested according to ASTM E 330: (H-LC40 – 60) (H-LC30 – 45) (F-C40-60) (TR-C40-60) psf.

#### 1.4 SUBMITTALS

- A. Shop Drawings: Submit shop drawings under provisions of Section 01 33 23.
- B. Product Data: Submit catalog data under provisions of Section 01 33 23.
- C. Samples:
  1. Submit corner section under provisions of Section 01 33 23.
  2. Include glazing system, quality of construction, and specified finish.
- D. Quality Control Submittals: Certificates: Submit manufacture's certifications indicating compliance with specified performance and design requirements under provisions of Section 01 33 23.

1.5 QUALITY ASSURANCE: Comply with requirements of IBC International Building Code.

1.6 DELIVERY: Deliver in original packaging and protect from weather.

1.7 STORAGE AND HANDLING: Prime or seal wood surfaces, including surface to be concealed by wall construction, if more than thirty (30) days will expire between delivery and installation. Store window units in an upright position in a clean and dry storage area above ground and protect from weather under provisions of Section 01 66 00.

1.8 WARRANTY: Windows shall be warranted to be free from defects in manufacturing, materials, and workmanship for a period of ten (10) years from purchase date. Insulating glass shall be warranted against visible obstruction through the glass caused by a failure of the insulating glass air seal for a period of twenty (20) years from the date of original purchase.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURED UNITS

- A. Description: Clad Ultimate Double Hung (and related stationary units) as manufactured by Marvin Windows and Doors, Warroad, Minnesota.
- B. Substitutions: Comply with requirements of Section 01 25 00.

2.2 FRAME DESCRIPTION: Finger jointed edge-glued pine head and side jambs with interior clear veneer; Douglas fir finger jointed core with clear Douglas fir veneer; clear white oak or finger jointed core with clear white oak veneer; clear cherry or finger jointed core with clear cherry veneer; clear mahogany or finger jointed core with clear mahogany veneer; clear vertical grain Douglas fir or finger jointed core with clear vertical grain Douglas fir veneer. Kiln dried to a moisture content no greater than twelve (12) percent at the time of fabrication. Water repellent preservative treated in accordance with WDMA I.S.4.

- A. Frame thickness: 11/16 inch (17 mm) head jamb, 1-11/32 inch (34 mm) composite side jamb, 1-7/16 inches (37 mm) sill, 8 degree bevel.
- B. Frame width: 4-9/16 inches (116 mm). Exterior extruded aluminum clad 0.050 inch (1.3 mm) thick.

## 2.3 SASH DESCRIPTION

- A. Clear pine; Douglas fir; white oak; cherry; mahogany; vertical grain Douglas fir.
  - 1. Kiln dried to a moisture content no greater than twelve (12) percent at the time of fabrication.
  - 2. Water repellent preservative treated in accordance with WDMA I.S.4.
- B. Composite sash thickness: 1-9/16 inches (40 mm) for operating units, 1-7/8 inches (48 mm) for stationary units. Corners slot and tenoned.
- C. Sash exterior extruded aluminum clad 0.045 inch (1.1 mm) thick.
- D. Operable sash tilt to interior for cleaning or removal.

## 2.4 GLAZING

- A. Select quality complying with ASTM C 1036. Insulating glass SIGMA/IGCC certified to performance level CBA when tested in accordance with ASTM E 774.
- B. Glazing method: Insulated glass; (Altitude adjusted)
- C. Glass type: Clear; Bronze; Gray; Reflective bronze; Low E II—Argon gas; Tempered; Obscure; Laminated.
- D. Glazing seal: Silicone bedding on interior; acrylic foam adhesive tape on exterior.

## 2.5 FINISH

- A. Exterior: Fluoropolymer modified acrylic topcoat applied over fluoropolymer primer. Meets or exceeds AAMA 2605 requirements.
  - 1. Standard Color: Stone White; Bahama Brown; Bronze; Pebble Gray; Evergreen.
  - 2. Select Color: Sierra White; Coconut Cream; French Vanilla; Cashmere; Desert Beige; Cumulus Gray; Cadet Gray; Ebony; Arctic White; Cascade Blue; Cobalt Blue; Hampton Sage; Sherwood Green; Wineberry; Custom color – contact your Marvin representative.
- B. Interior: Treated bare wood; Latex prime coat, white.

## 2.6 HARDWARE

- A. Balance system: Coil spring block and tackle with nylon cord and fiber filled nylon clutch.
- B. Jamb carrier: Vinyl extrusion with wood and aluminum inserts. Color: Beige.
- C. Lock: High pressure zinc die-cast cam lock and keeper.

- D. Finish: Phosphate coated and electrostatically painted Satin Taupe; Bronze; White; baked enamel; Plated Brass; Solid Brass.
- E. Check rail guide.

## 2.7 WEATHER STRIP

- A. Operating units: Continuous, leaf weather strip at head jamb parting stop; dual durometer bulb at check rail; foam bulb type dual durometer weather strip on vertical sash edge; dual durometer bulb weather-strip at bottom rail. Color: Beige.
- B. Stationary units: Continuous, bulb weather strip at perimeter of sash, concealed slotted bulb weather strip on exterior of sash, pile weather strip on interior of blind stop, dual durometer bulb weather strip at bottom rail. Color: Beige.

## 2.8 JAMB EXTENSION

- A. Factory installed jamb extension for wall thickness indicated or required.
- B. Finish: Match interior finish.

## 2.9 INSECT SCREENS

- A. Factory installed (half screen) (full screen). Half screen covers bottom sash opening. Screen cloth, 18 by 16 mesh: Charcoal fiberglass; Charcoal aluminum wire; Black aluminum wire; Bright aluminum wire; Bright bronze wire, HI-Tran fiberglass mesh.
- B. Aluminum frame finish:
  - 1. Standard Color: Stone White; Bahama Brown; Bronze; Pebble Gray; Evergreen.
  - 2. Select Color: Sierra White; Coconut Cream; French Vanilla; Cashmere; Desert Beige; Cumulus Gray; Cadet Gray; Ebony; Arctic White; Cascade Blue; Cobalt Blue; Hampton Sage; Sherwood Green; Wineberry; Custom color – contact your Marvin representative.

## 2.10 COMBINATION STORM SASH AND SCREEN

- A. Frame: Exterior extruded aluminum 0.045 inch (1.1 mm) thick.
- B. Finish: Fluoropolymer modified acrylic topcoat applied over fluoropolymer primer. Meets or exceeds AAMA 2605 requirements.
  - 1. Standard color: Stone White; Bahama Brown; Bronze; Evergreen; Pebble Gray; Arctic White.
- C. Hardware: Spring loaded locking pins to hold movable storm panel in position. Heavy metal clips to lock upper and lower storm panels together.
- D. Weather strip: Dual durometer weather strip on center cross rail seals against operating panel in closed position.
- E. Storm panel: Select quality glass in aluminum frame.
  - 1. Frame finish: Standard color: Stone White; Bahama Brown; Bronze; Evergreen; Pebble Gray.

- F. Insect screen panel: Screen cloth, 18 by 16 mesh: Charcoal fiberglass; Charcoal aluminum wire; Black aluminum wire; Bright aluminum wire; Bright bronze wire, HI-Tran fiberglass mesh.
  - 1. Aluminum frame finish: Bronze; White.

#### 2.11 REMOVABLE GRILLES

- A. 3/4 by 15/32 inch (19 mm by 12 mm); 1-1/8 by 15/32 inch (29 mm by 12 mm); Pine only.
- B. Pattern: Rectangular; Custom lite layout.
- C. Finish: Match interior sash finish.

#### 2.12 SIMULATED DIVIDED LITES (SDL)

- A. 7/8 inch (22 mm) wide; 1-1/8 inch (29 mm) wide; (with internal spacer bars).
- B. Exterior muntins: 0.055 inch (1.4 mm) thick extruded aluminum.
- C. Interior muntins: Pine. Muntins adhered to glass with double coated acrylic foam tape.
- D. Pattern: Rectangular; Custom lite layout.
- E. Finish: Match sash finish.

#### 2.13 ACCESSORIES AND TRIM

- A. Installation Accessories:
  - 1. Factory installed vinyl nailing fin/drip cap.
  - 2. Optional Installation brackets: 6-3/8 inches (162 mm); 9-3/8 inches (238 mm); 15-3/8 inches (390 mm).
  - 3. Optional Masonry brackets: 6 inch (152 mm); 10 inch (254 mm).
  - 4. Optional Sash lifts: High pressure zinc die-cast. Color: Satin Taupe; Bronze; White; baked enamel; Plated brass; Solid Brass.
- B. Aluminum Extrusions:
  - 1. Profile: Brick mould casing; Flat casing; Various Special Casings; Frame expander; Jamb extender; Simulated thick sill adapter; Mullion cover; Mullion expander; as indicated on drawings.
  - 2. Finish: Fluoropolymer modified acrylic topcoat applied over primer. Meets or exceeds AAMA 2605 requirements. Standard Color: Stone White; Bahama Brown; Bronze; Pebble Gray; Evergreen.
    - a. Select Color: Sierra White; Coconut Cream; French Vanilla; Cashmere; Desert Beige; Cumulus Gray; Cadet Gray; Ebony; Arctic White; Cascade Blue; Cobalt Blue; Hampton Sage; Sherwood Green; Wineberry; Custom color – contact your Marvin representative.

#### PART 3 - EXECUTION



- 3.1 EXAMINATION: Before Installation, verify openings are plumb, square, and of proper dimension. Report frame defects or unsuitable conditions to the General Contractor before proceeding. Beginning of installation confirms acceptance of existing conditions.
- 3.2 INSTALLATION: Assemble and install window unit according to manufacturer's instructions and reviewed shop drawings. Install sealant and related backing materials at perimeter of unit or assembly in accordance with Section 07920 Joint Sealants. Do not use expansive foam sealant. Install accessory items as required.
- 3.3 CLEANING: Remove visible labels and adhesive residue from glass according to manufacture's instructions. Leave windows and glass in a clean condition. Final cleaning as required in Section 01 74 00.
- 3.4 PROTECTING INSTALLED CONSTRUCTION: Protect windows from damage by chemicals, solvents, paint, or other construction operations that may cause damage.

## 08 56 56 - SECURITY WINDOW SCREENS

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Included under this section will be all labor, materials, tools, & equipment as required for Security Window Screens, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. All work will comply with requirements of the American Welding Society. Meet applicable ASTM or Fed Spec standards for all metal fabrications & components.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

### PART 2 - PRODUCTS

- 2.1 MATERIALS: In fabricating items which will be expressed to view, limit materials to those which are free from surface blemishes, pitting, rolled trade names, and roughness. Provide any materials, not specifically described but required for a complete & proper installation.
- 2.2 WINDOW SECURITY SCREENS:
  - A. All exterior exposed ferrous metals to be galvanized and painted.
  - B. Mesh: 6ga. (.192) steel wire triple crimped and woven into a 2" diamond mesh, passed through and securely clinched to frame members.
  - C. Frame: 1 1/2" x 3/4" x 1/8" steel channel
  - D. Intermediate Horizontal Stiffeners: Two 1" x 1/2" x 1/8" steel channels
  - E. Panel frames mortised and tenoned at corners.
  - F. Sub-Frame: 2" x 2" x 1/8" steel angle full height at each jamb with 2" x 2" x 1/8" angle clips 2'-0" on center, bolted to subframe and attached to wall with a minimum of 3/8" diameter anchors.
  - G. Finish: Painted
- 2.3 FASTENERS: For exterior use and where built into exterior walls, provide zinc-coated fasteners. Provide fasteners of type, grade, and class required for the particular use.
- 2.4 GALVANIZING: Hot-dip galvanize items as indicated to comply with ASTM A 123, for galvanizing steel and iron products & ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- 2.5 SHOP PRIMING: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements of SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Stripe paint corners, crevices, bolts, welds, and sharp edges.
- 2.6 FABRICATIONS: Except as otherwise shown on the Drawings or the approved Shop Drawings, use materials of size, thickness, and type required to produce reasonable strength and durability.

### PART 3 - EXECUTION

- 3.1 WELDING: Perform shop and/or field welding required in connection with the work of this Section in strict accordance with pertinent recommendations of the American Welding Society.
- 3.2 FABRICATION: Fabricate with accurate angles and surfaces which are true to the required lines and levels, grinding exposed welds smooth and flush, forming exposed connections with hairline joints, and using concealed fasteners wherever possible. Prior to shop painting or priming, properly clean metal surfaces as required for the applied finish and for the proposed use of the item. On surfaces inaccessible after assembly or erection, apply two coats of the primer.
- 3.3 SURFACE CONDITIONS: Examine the surrounding metal panel to ensure it is free from blemishes or holes. If holes are present, seal.
- 3.4 INSTALLATION: Mount to channels at sides of windows.
- 3.5 CLEANING: Immediately after installation, clean field welds, bolted connections, and abraded areas of shop priming. Paint the exposed areas with same material used for shop priming.

## **08 56 59 - SERVICE AND TELLER WINDOW UNITS**

### **PART 1 - GENERAL**

- 1.1 SUMMARY: This section includes aluminum cashier windows as indicated in drawings and in sections.
- 1.2 SUBMITTALS
  - A. Product Data: Submit Manufacturer's technical product data substantiating that products comply.
  - B. Shop drawings: Submit for fabrication and installation of windows. Include details, elevations and installation requirement of finish hardware and cleaning.
  - C. Certification: Provide printed data in sufficient detail to indicate compliance with the contract documents.
- 1.3 DELIVERY, STORAGE, AND HANDLING
  - A. Deliver windows crated to provide protection during transit and job storage
  - B. Inspect windows upon delivery for damage. Unless minor defects can be made to meet the Architect's specifications and satisfaction, damaged parts should be removed and replaced.
  - C. Store windows at building site under cover in dry location.
- 1.4 PROJECT CONDITIONS: Field measurements: Check opening by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.
- 1.5 WARRANTY: All material and workmanship shall be warranted against defects for a period of one (1) year from the original date of purchase.

### **PART 2 - PRODUCTS**

- 2.1 ACCEPTABLE MANUFACTURER: Basis of design: Design is based on Aluminum Cashier Window, catalog number SCW103N, manufactured by C.R. Laurence Co., Inc. (800) 421-6144
- 2.2 MATERIALS
  - A. Frames: Aluminum cashier window frame to be 1.390" x .625" extruded aluminum. Overall size as per drawings.
    1. Finish: All aluminum to be clear anodized.
  - B. Glazing: 1/4" Clear tempered Glass.
  - C. Shelf: Provide a shelf not less than 2" thick with recessed deal tray. The shelf is to be the full width of the window and 18" deep centered under the glazing.
  - D. Voice Transmission: Communication permitted by 834A no draft speak-thru centered in glazing.

### **PART 3 - EXECUTION**

- 3.1 INSTALLATION: Install frames and glazing in accordance with manufacturer's printed instructions and recommendations. Repair damaged units as directed (if approved by the manufacturer and the architect) or replace with new units.

- 3.2 CLEANING: Clean frame and glazing surfaces after installation, complying with requirements contained in the manufacturer's instructions. Remove excess glazing sealant compounds, dirt or other substances.
- 3.3 PROTECTION: Institute protective measures required throughout the remainder of the construction period to ensure that all the windows do not incur any damage or deterioration, other than normal weathering, at the time of acceptance.

## 08 56 73 - SOUND CONTROL FIXED WINDOW ASSEMBLIES

### PART 1 - GENERAL

- 1.1 SECTION INCLUDES: Integrated sound transmission class (STC)-rated sound control glazing and frame assemblies.
- 1.2 PERFORMANCE REQUIREMENTS: Provide sound-control fixed window assemblies with STC ratings per ASTM E 90 and ASTM E 413 as specified.
- 1.3 SUBMITTALS
  - A. Product Data: Manufacturer's data sheets, installation instructions, and maintenance recommendations.
  - B. Product Test Reports: Indicating compliance of comparable manufactured assembly with performance requirements, from a qualified independent testing agency.
  - C. Shop Drawings: Provide schedule coordinated with project drawing notation indicating door design, jamb, head, and threshold conditions, rough opening, glazing sizes and types, and hardware reinforcement and preparations.
  - D. Operation and Maintenance Data.
  - E. Warranty: Submit document meeting warranty requirements of this Section.
- 1.4 QUALITY ASSURANCE
  - A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum [5] years experience in manufacturing sound-control door assemblies.
    1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time period allowed for substitution review:
      - a. Product data, including test reports from a qualified independent testing agency indicating products meet performance requirements of this section.
      - b. Project references: Minimum of 5 similar installations in place not less than [3] years old, with owner contact information.
      - c. Sample warranty.
  - B. Installer Qualifications: Engage an experienced Installer with a record of successful installations for installation of sound control door assemblies and related door hardware.
- 1.5 DELIVERY, STORAGE, AND HANDLING: Deliver, store, and handle sound-control door assemblies in accordance with manufacturer's recommendations. Ship to jobsite only after roughing-in, painting work, and other related finish work has been completed and installation areas are ready to accept units and recommended temperature and humidity levels will be maintained during the remainder of construction.
- 1.6 WARRANTY: Manufacturer's written warranty indicating manufacturer's intent to repair or replace components of sound-control door assemblies that fail in materials or workmanship within [5] years from date of Substantial Completion. Failures are defined to include, but are not limited to, the following:
  - A. Fracturing or breaking of unit components including doors and hardware resulting from normal use other than vandalism.

- B. Warping or deterioration of components not resulting from leaks, flooding, or other uncontrolled moisture or humidity.
- C. Failure of acoustical gaskets and seals.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS:

- A. Overly Door Company, 800-979-7300; 574 West Otterman Street, Greensburg, PA 15601.
- B. Other manufacturers to be approved by Architect before bidding.

### 2.2 FIXED WINDOW ASSEMBLY: Basis of design to be Acoustical Metal Fixed Window Assembly Model 549226 as manufactured by Overly Door Company with a minimum STC rating of 54, to include glazing and frame.

- A. Components: Assemblies to be complete with metal frame, glass, and glazing. Glass, and glazing shipped loose to be field installed.
- B. Finishes: Frame to be factory primed for field-applied painted finish.

### 2.3 FABRICATION:

- A. Materials: Sound Retardant Metal Fixed Window Frames to be constructed from formed sheet steel or structural shapes and bars. Sheet steel shall be commercial quality, level, cold rolled steel conforming to ASTM A1008 or hot rolled, pickled and oiled steel conforming to ASTM A1011. Steel shapes shall comply with ASTM A36 and steel bars with ASTM A108, Grade 1018. Exterior units shall be fabricated from Galvannealed material conforming to ASTM A653 (A60) with a coating weight of not less than 0.60 ounces per square foot.
- B. Frame Design: Sound Retardant Metal Fixed Window Frames shall be 14 gauge minimum welded units with integral trim and shipped with temporary spreader. Knock-down frames are not acceptable, unless sizes of frames exceed shipping limitations. After installation, field splices required because of shipping limitations must be field welded by certified welders per manufacturer's instructions and in accordance with AWS D1.1/D1.3.
- C. Anchors: Provide suitable anchors to properly install frames in partition types shown on Architects drawings.
- D. Painting and Cleaning: After fabrication of frames, all tool marks and surface imperfections shall be removed and exposed faces of all welded joints dressed smooth. Chemically treat all surfaces to insure maximum paint adhesion and coat with manufacturer's standard water-based rust-inhibitive primer. EXECUTION

## PART 3 - EXECUTION

### 3.1 EXAMINATION: Examine condition of openings and substrates with Installer for compliance with requirements for installation tolerances and other existing conditions affecting installation and performance of sound-control door assemblies. Proceed with unit installation upon correction of unsatisfactory conditions.

### 3.2 PREPARATION

- A. Adjustment: Prior to installation, adjust sound-control frames to within tolerances recommended by manufacturer.

### 3.3 INSTALLATION

- A. Install units plumb, square, in proper alignment and secured to opening, within manufacturer's recommended tolerances. Comply with manufacturer's installation instructions and approved submittals.

- 1. Masonry and Concrete Walls: Where indicated, fill space between frames and adjacent wall construction with mortar or grout. Where required, pump frames full after installation; plug and fill grout access holes.

3.4 Fire-Rated Openings: Comply with NFPA 80.

3.5 CLEANING AND PROTECTING

- A. Repair or replace defective work as directed by Architect upon inspection.
- B. Clean unit surfaces. Touch up, refinish, or replace damaged components in a manner acceptable to Architect.



## 08 62 00 - UNIT SKYLIGHTS

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 PERFORMANCE REQUIREMENTS: Provide skylights capable of withstanding loads and thermal and structural movements indicated without failure. Deflection of the entire length of framing members in direction normal to glazing plane is limited to 1/180 of clear span or 3/4 inch, whichever is smaller, unless otherwise indicated. Deflection of framing members in a direction parallel to glazing plane, when carrying full dead load, is limited to an amount not exceeding that which reduces glazing bite below 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch. Verify loading requirements of authorities having jurisdiction. Provide skylights that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, sealant failure, and other detrimental effects.
- 1.3 SUBMITTALS: Include construction details, material descriptions, dimensions and profiles of components, and finishes. Manufacturer's color charts consisting of sections of units showing the full range of colors available for factory-finished aluminum.
- 1.4 QUALITY ASSURANCE: Installation to be by an experienced installer to assume engineering responsibility who has specialized in installing metal-framed skylights similar to those indicated for this Project and who is acceptable to manufacturer.
- 1.5 PROJECT CONDITIONS: Where skylights are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- 1.6 WARRANTY: Written warranty, executed by manufacturer agreeing to repair or replace components of metal-framed skylights that fail in materials or workmanship within specified warranty period. Warrant against water leakage; defined as uncontrolled water appearing on normally exposed interior surfaces of skylights from sources other than condensation. Water controlled by flashing and gutters and drained back to the exterior and that cannot damage adjacent materials or finishes is not water leakage. Warranty Period: Five years from date of Substantial Completion.

### PART 2 - PRODUCTS

- 2.1 METAL FRAMED SKYLIGHT: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - A. Acralight Skylights.
  - B. Architectural Skylight Co., Inc.
  - C. Fisher Skylights, Inc.
  - D. Gammans Industries, Inc.
  - E. Lynbrook Glass and Architectural Metals Corp.
  - F. Major Industries; Auburn Skylights Division.
  - G. Plasticrafts/Faulkner.
  - H. Regal Manufacturing Co.
  - I. Skyline Products, Inc.
  - J. Skytech Systems.
  - K. Super Sky Products, Inc.
  - L. Wasco Products, Inc.
- 2.2 TUBULAR SKYLIGHT: Provide a 16" diameter sun tunnel w/ integral skylight and roof flashing system, by Sun Tunnel, or equal.

PART 3 - EXECUTION

- 3.1 EXAMINATION: Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting skylight performance. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.2 PREPARATION: Furnish anchor bolts and inserts for setting in concrete formwork or masonry indicated to support skylights. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- 3.3 INSTALLATION: Comply with manufacturer's written instructions for protecting, handling, and installing skylight components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Accommodate thermal and mechanical movements. Install framing components to drain water passing joints and to drain condensation and moisture occurring or migrating within skylight system to the exterior. Coordinate installation of insulation and flashings at skylight perimeters to maintain continuity of thermal and water barriers. Set continuous curbs and flashings in a full sealant bed, unless otherwise indicated.
- 3.4 CLEANING: Clean skylights inside and outside, immediately after installation and after sealants have cured, according to manufacturer's written recommendations. Remove temporary protective coverings and strippable coatings from prefinished metal surfaces. Remove labels and markings from all components. Remove excess sealant according to sealant manufacturer's written recommendations.

## 08 71 00 - DOOR HARDWARE

### PART 1 - GENERAL

#### 1.1 SUMMARY:

- A. Section includes Finish Hardware. Hardware at fire rated assemblies to be rated per the wall assembly.

#### 1.2 RELATED SECTIONS:

- A. Metal Doors and Frames – Division 8
- B. Wood and Plastic Laminate Doors – Division 8
- C. Aluminum Storefront – Division 8
- D. Electrical – Division 16

#### 1.3 REFERENCES

- A. Documents and Institutes that shall be used in estimating, detailing and installing the items specified:
  1. ICC/ANSI A117.1 – 1998 Accessible and Usable Building and Facilities
  2. NFPA80 – 1999 Standards for Fire Doors and Fire Windows
  3. NFPA101 – 2000 Life Safety Code
  4. NFPA105 – 1993 Installation of Smoke-Control Door Assemblies
  5. Local and State Building Codes
  6. UL Labeled for Rated Doors
  7. DHI – Door and Hardware Institute
  8. SDI – Steel Door Institute
  9. AWI – Architectural Woodwork Institute
  10. Texas Accessibility Standards

#### 1.4 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 23.
- B. Finish Hardware Schedule to be in vertical format to include:
  1. Heading number / hardware set.
  2. Door number, location, hand, degree of opening, door size and type, frame size and type, fire rating.
  3. Quantity, product, product number, size, fasteners, finish and manufacturer of each hardware item.
  4. Keying schedule.
  5. Title sheet, index, abbreviations, manufacturers list, template list and templates.
  6. System diagrams: provide complete systems diagrams, including elevation drawings for each opening requiring electrified hardware.
  7. Operational descriptions: provide complete operational descriptions of electronic components listed by opening in the hardware submittals. Operational descriptions (electronic hardware and systems) to detail how each electrical component functions within the opening, incorporating all conditions of ingress and egress.
  8. Mounting locations for hardware.

- C. Product Date: Product date shall be provided, in the form of a binder, manufacturer's technical product fact sheets for each item of hardware. Include whatever information may be necessary to show compliance with requirements, including instructions for installation and for maintenance of operating parts and finish.
- D. Samples: Samples shall be provided as requested by the Owner or Architects with heading number and door number marked on boxes. All samples shall be returned to the Contractor and used on doors for which they were marked.
- E. Templates: Templates of finish hardware items to be supplied are to be furnished to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware.
- F. Keying Schedule: A keying schedule shall be submitted using keyset symbols referenced in DHI manual "Keying Systems and Nomenclature". The keying schedule shall be indexed by door number, keyset, hardware heading number, cross keying instructions and special key stamping instructions.
- G. Wiring Diagrams: Submit wiring diagrams in accordance with Section 01 33 23 as follows:
  - 1. Elevation drawing with finish hardware schedule.
  - 2. Riser diagram with approved and revised finish hardware schedule.
  - 3. Point to point wiring diagrams after low voltage meeting.
- H. Operations and Maintenance Data: At the completion of the job, furnish to the Owner two (2) copies of an Owner's Operation and Maintenance Manual. The manual shall consist of a labeled hardcover three-ring binder with the following technical information:
  - 1. Title page containing project name, address and phone numbers. The Supplier's name, address and phone numbers.
  - 2. Table of contents.
  - 3. Copy of final finish hardware schedule and keying schedule.
  - 4. Maintenance instruction for each item of hardware.
  - 5. Catalog pages for each product.
  - 6. Installation instruction and parts list for all locks, exit devices and door closers.

#### 1.5 QUALITY ASSURANCES

- A. Substitution: Request for substitutions shall not be accepted within this project. The Architect, Owner and Hardware Consultant have selected manufacturers acceptable and listed hereinafter in the hardware schedule. If any specified product is listed as a "No Substitution" product, the product will be supplied as specified, with no alteration or request of substitution. The reason for this is to comply with the uniformity established at this project. Parts and supplies are inventoried for these particular products for ease and standardization of replacement.
- B. Supplier Qualifications: Supplier shall be recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware in the project vicinity for a period of not less than two (2) years and who is or employs a DHI Certified AHC or person with a minimum of ten (10) years of experience as a hardware supplier. This person shall be available at reasonable times during the course of the work for consultation about products hardware requirements, to the Owner, Architect and Contractor.
- C. Installer Qualifications:

1. Installer for mechanical hardware shall have a minimum of two (2) years of experience of installing architectural finish hardware and attend a pre-installation meeting with the manufacturer's representative of locks, exit devices and closers.
2. Installer for electrified hardware shall have a minimum of two (2) years of experience of installing electrified architectural finish hardware and attend a low voltage and pre-installation meeting with the manufacturer's representative of the electrified architectural finish hardware.
3. Electrical / fire alarm contractor shall have a minimum of one (1) year in hooking up electrified architectural finish hardware and attend a low voltage meeting with the manufacturer's representative of the electrified architectural finish hardware.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Marking and Packaging: Mark each item or package separately, with identification related to hardware set number, door number and keyset symbol.
- B. Delivery:
  1. Deliver individually packaged and properly marked finish hardware at the proper time and location to avoid any delays in construction or installation.
  2. At time of delivery, inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
- C. Storage: Store hardware in enclosed, dry and locked area.

#### 1.7 WARRANTY

- A. All finish hardware products shall be covered by a one (1) year factory warranty from the date of substantial completion of the project.
- B. Supply warranty verification to the Owner for products that provide factory warranties for periods longer the one (1) year. Mechanical door closers shall carry a ten (10) year warranty.

#### 1.8 MAINTENANCE

- A. Maintenance Service: None
- B. Extra Materials:
  1. Furnish three (3) dozen extra screws and other fasteners of each size, type and finish used with the hardware items provided. These screws and fasteners are to be delivered to the Hardware Installer for use during installation. All extra screws and fasteners shall be turned over to the Owner at the completion of the job.
  2. All special installation tools furnished with the hardware and provided by the manufacturers shall be turned over to the Owner at the completion of the job.

- 1.9 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. List of manufactures represented in this section:  
Adams-Rite – Pomona, CA

[www.adamsrite.com](http://www.adamsrite.com)

Best Access Systems – Indianapolis, IN	www.bestaccess.com
Dor-o-matic – Princeton, IL	800/815-1517
Falcon Lock Company – Security, CO	www.newmantonks.com
Glynn-Johnson – Indianapolis, IN	800/525-0336
Hager Hinge Company – St. Louis, MO	www.hagerhinge.com
Ives – Indianapolis, IN	877/613-8766
Markar – Lancaster, NY	716/685-4104
McKinney Hinge Company – Scranton, PA	www.mckinneyhinge.com
National Guard – Memphis, TN	www.ngpinc.com
Norton – Monroe, NC	www.yalesecurity.com
Pemko- Ventura, CA	www.pemko.com
Power Access	www.power-access.com
Rockwood – Rockwood, PA	www.rockwoodmfg.com
Schlage – Security, CO	www.schlage.com
Stanley Hinge Company – New Britain, CT	www.stanleyworks.com
Trimco/BBW/Quality – Los Angeles, CA	www.trimcobbw.com
Von Duprin – Indianapolis, IN	www.vonduprin.com

## 2.2 MATERIALS

### A. Screws and Fasteners:

1. Closers and exit devices provided for wood doors and exterior doors shall be provided with thru-bolts.
2. All finish hardware shall be installed to manufacturers recommendations, using screws, attachments and installation tools provided with the hardware. No others screws or attachments are acceptable.
3. All other products to meet door and frame conditions.

### B. Hinges:

1. Templates: Provide templated units only.
2. Exterior: All exterior hinges shall be heavy weight (.180 or .190 ga), five (5) knuckle, four (4) ball bearing, full mortise type with a stainless steel non-removable pin.
3. Interior: All interior hinges shall be standard weight (.134 or .146 ga) five (5) knuckle, two (2) ball bearing, and full mortise type. Provide heavy weight hinges on openings with high frequency usage as indicated in the hardware sets.
4. Size: Provide 4-1/2 x 4-1/2 hinges on door up to 3'0" in width. Provide two pair 4-1/2 x 4-1/2 hinges on doors from 3'2" to 4'0" in width. Reference manufacturers catalog for all other sizes.
5. Number of Hinges: Provide number of hinges indicated but not less than three (3) hinges for door leaf for doors 90" or less in height and one (1) additional hinge for each 30" of additional height.
6. The width of hinge shall be sufficient to clear all trim.
7. Supply from the following list of manufacturers: Hager, McKinney, Stanley, Ives.

### C. Continuous Hinge:

1. Provide continuous hinges as indicated in the drawings and hardware sets.
2. Provide continuous hinge that is edge-mounted pin and barrel type. Material to be heavy-duty 14-gauge 304, stainless steel. Cycle testing for 1,500,000 repetitions and exceed ASTM standard 156.

3. Supply from the following manufacturers: Markar, Ives
- D. Pivots:
1. Provide pivots as indicated in the drawings and hardware sets and provided by the floor closer manufacturer.
  2. All pivots and/or pivot sets shall be the product of one manufacturer. Sets as noted in the hardware groups shall be matching in design for both labeled fire doors, lead-lined doors and regular doors. Pivots for 20-minute fire doors shall be non-ferrous and match the finish of the adjacent hardware. All pivot sets are required to meet ANSI Grade 1 standard as listed in ANSI 156.4 1980. Caps shall be hex type to increase security.
  3. Supply from the following manufacturers: Rixson.
- E. Floor Closers:
1. Provide floor closers where indicated in the drawings and hardware sets.
  2. Floor closers shall be available for labeled fire doors and lead-lined doors (offset hung). Closers to have independent and adjustable valves for closing speed, latch speed and back-check. Closer to have built-in dead stop to prevent door from swinging beyond required opening degree.
  3. Supply from the following manufacturer: Rixson.
- F. Flushbolts:
1. As codes and conditions permit, provide on the inactive door of pairs, extension flushbolts at top and bottom of doors. Provide all necessary strikes, shim and guides to insure proper installation. Supply 12" length or as scheduled in the hardware sets.
  2. Dust proof strikes: As conditions allow, provide dust proof strikes with each bottom flushbolt.
  3. Supply from the following manufacturers: Ives, Trimco, Rockwood.
- G. Coordinators:
1. Provide non-handed fully automatic coordinating devices for sequential closing of pairs doors with an astragal.
  2. All coordinators shall be provided with enough filler piece to close the header area for an architecturally clean line.
  3. Supply from the following manufacturers: Ives, Trimco, Rockwood.
- H. Locks / Latches:
1. All locks shall be heavy-duty mortise levers with 7-pin interchangeable core.
  2. Where indicated in the hardware sets, provide locks and latch sets that conform to ANSI Spec A156.2, Series 1000, Grade 1.
  3. Supply from the following list of manufacturers: Schlage 9000 Series, Falcon LM500 Series, Best 35K Series.
- I. Lock Trim:
1. All mortise trim shall have thru-bolted installation and meet the guidelines for ADA and requirements for ANSI 117.1 which require ease of accessibility for the handicapped and disabled.
  2. Supply from the following list of manufacturers:

- a. Schlage – 03A
- b. Falcon - Sutro
- c. Best – 3H

J. Exit Devices:

- 1. All exit devices are to be architectural grade touch bar type. Mechanism case to be smooth.
- 2. All exit devices to meet ANSI A156.3 1994, Grade 1. All exit devices are UL listed for Accident Hazard or Fire Exit Hardware.
- 3. All lever trim to match lock trim in design and finish.
- 4. Dogging: All non-rated devices are to be provided with hex key or cylinder dogging.
- 5. All devices are to be supplied and installed with thru-bolts.
- 6. Function and type as listed in hardware sets. Pairs of doors shall be provided with key removable mullion and two (2) rim exit devices. No vertical rod exit devices allowed.
- 7. Supply from the following list of manufacturers: Von Duprin – No Substitution.
- 8. Provide for card access as indicated.

K. Hospital Latches:

- 1. All hospital latches to be Grade 1 with minimum 2-3/4" backset, engraved Push/Pull.
- 2. Provide function as shown in hardware sets.
- 3. Supply from the following list of manufacturers. Glynn-Johnson, Trimco, Hager.

L. Pull Plates:

- 1. Pull plates to meet ANSI 156.6 for .050" thickness. Plate size to be 4" x 16" with 1" round on pull plate.
- 2. Supply from the following list of manufacturers: Ives, Trimco, Rockwood.

M. Push Plates:

- 1. Push plates to meet ANSI 156.6 for .050" thickness. Plate size to be 4" x 16".
- 2. Supply from the following list of manufacturers: Ives, Trimco, Rockwood.

N. Door Closers:

- 1. Door closers shall meet the minimum requirements of the 1990 ADA Act, in lieu of the ANSI Standard A156.4 and ANSI, Grade 1.
- 2. Door closers shall be furnished with full cover. Sized in accordance with the manufacturers recommendations for door size and condition.
- 3. Door closers shall be furnished with back-check, delayed action, hold-open and advanced back-check as listed in the hardware schedule.



4. Door closers shall be mounted out of the line of sight wherever possible (i.e., room side of corridor doors, etc.) with parallel arm mounting on out swinging doors. Mount closer top jamb or on brackets and/or drop plates, where special conditions call for it. All closer installation on wood doors shall include sex nut bolts.
  5. Supply from the following list of manufacturers: Norton, Dor-o-matic, LCN.
- O. Automatic / Power Operators:
1. Automatic / power operators shall meet ANSI Standard A156.19.
  2. Full closing force shall be provided when the power or assist cycle ends.
  3. Supply from the following list of manufacturers: Dor-o-matic, Power Access.
- P. Fire / Life Safety Closer:
1. Fire / life safety closer to meet ANSI Standard A156.15 and conform to Life Safety Code NFPA 101.
  2. Supply from the following list of manufacturers: LCN, Norton.
- Q. Door Protection Plates:
1. Protective plates shall meet ANSI A156.6 requirements for .050 thickness.
  2. Kickplates shall be 8" x 2" less than door width on single door and 1" less than door width on pair of doors or as indicated in hardware sets. Beveled three edges.
  3. Armor plates shall be 34" x 2" less than door width or as indicated in hardware sets. Beveled four-edges.
  4. Supply from the following list of manufacturers: Ives, Rockwood, Trimco.
- R. Door Stops and Holders:
1. Wall and Floor Stops: Supply wall stops where needed to protect doors or door hardware. When wall conditions do no permit use of wall stop provide floor stops with risers as needed to adjust for floor condition.
  2. Overhead Stops: Where wall or floor stops are not applicable provide surface overhead stops.
  3. Supply from the following list of manufacturers: Ives, Glynn-Johnson, Trimco.
- S. Silencers:
1. Provide silencers on all doors without smoke seal or weatherstrip. Three (3) for single doors and four (4) for pairs of doors
  2. Provide silencers as require for frame conditions.
  3. Supply from the following list of manufacturers: Ives, Rockwood, Trimco.
- T. Thresholds / Weatherstrip:
1. All thresholds shall conform to state and local handicap codes.
  2. Smoke seal shall be teardrop design bulb seal.
  3. Perimeter seal shall be vinyl.

4. Drip strips shall protrude 2-1/2".
5. Provide door sweeps with drip cap.
6. Provide UL meeting stile gasketing for fire rated doors.
7. Supply from the following list of manufacturers: National Guard, Hager, Pemko.

2.3 FINISHES:

CATEGORY	FINISH	BASE
Butts		
Interior non-labeled	626	brass / bronze
Interior labeled	652	steel
Interior corrosive area	630	stainless steel
Exterior	630	stainless steel
Continuous Hinges	628 / 630	stainless steel / aluminum
Pivots	626	brass / bronze
Floor Closers	626	brass / bronze
Flushbolts / Dust Proof Strikes	626	brass / bronze
Coordinators	626	brass / bronze
Locks / Latches	626	brass / bronze
Hospital Latches	626	brass
Cylinders	626	brass
Exit Devices	626 / 628	stainless steel / aluminum
Door Closers	689	any
Power Operators	689	any
Fire / Life Safety Closers	689	any
Push Plates	630	stainless steel
Pull Plates	630	stainless steel
Protective Plates	630	stainless steel
Door Stops / Holders	626	brass / bronze
Overhead Stops / Holders	630 / 626	stainless steel / dull chrome
Weatherstrips / Thresholds	689	aluminum
Power Supply	n/a	n/a

2.4 KEYING

- A. General: Supplier will meet with the Owner to finalize keying requirements.
- B. Keys: Provide nickel silver keys only. Furnish four (4) change keys for each lock, five (5) control keys, five (5) master keys for each master system and five (5) grand master keys for each grand master key system. Deliver all keys to owners' representative.

2.5 KEY CONTROL

- A. Key Management: Key control shall be provided by supplying a complete key storage and management system. Each key shall be fully cut, indexed, tagged and installed on cabinet hooks by the lock supplier and shipped with the locks. Key cabinet provided shall be wall-mounted type with capacity plus fifty-percent (50%).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors, frames and related items for conditions that would prevent the proper application of any finish hardware item. Do not proceed with installation until all defects are corrected.

### 3.2 INSTALLATION

- A. Follow Door and Hardware Institute Publication for:
  - 1. Recommended Location for Architectural Hardware for Standard Steel Doors and Frames.
  - 2. Recommended Location for Builders' Hardware for Custom Steel Doors and Frames.
  - 3. Recommended Locations for Architectural Hardware for Wood Flush Doors.
- B. Follow ANSI A117.1 1998 Accessible and Usable Building and Facilities.
- C. Review mounting locations with the Architect.
- D. Pre-installation meeting required with attendees to include the Architect, Contractor, Carpenter, Supplier and Manufacturers' Representative for exit devices, locks and closers before installation begins.
- E. Low voltage meeting required with attendees to include the Architect, Contractor, Carpenter, Electrical Contractor, Supplier and Manufacturers' Representative for electrified hardware before installation begins.
- F. Provide wood blocking at drywall partitions where necessary for mounting of hardware.

### 3.3 FIELD QUALITY CONTROL

- A. After installation has been completed, obtain the services of a qualified hardware consultant to check for proper application of finish hardware, according to the finish hardware schedule and keying schedule. In addition, check all hardware for adjustments and proper operation.

### 3.4 ADJUST AND CLEAR

- A. Adjust, clean and inspect all hardware to ensure proper operation and function of every opening. Replace items, which cannot be adjusted to operate freely and smoothly as intended for the application made.

### 3.5 PROTECTION

- A. The Contractor shall use all means at his disposal to protect all finish hardware items from abuse, corrosion and other damage until the Owner accepts the project as complete.

### 3.6 [HARDWARE SCHEDULE:](#)

## 08 80 00 - GLAZING

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all Glazing work, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. The requirements of other sections may affect the work under this section. In addition, comply with pertinent recommendations contained in the Flat Glass Marketing Association "Glazing Sealing Systems Manual" & "Glazing Manual."
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 STORAGE: During storage and handling of glass, provide cushions at edges to prevent impact damage.
- 1.5 Submittals:
  - A. Product Data: Submit manufacturer's product data.
  - B. Product Samples: Submit samples to Architect illustrating color and tint options for selection.

### PART 2 - PRODUCTS

- 2.1 GENERAL: For all glass, provide the type and thickness shown on the Drawings or specified herein. Where type or thickness, or both, are not shown on the Drawings or specified herein, provide type and thickness directed by the Architect. Provide clear interior glazing and tinted exterior glazing unless indicated otherwise.
- 2.2 GLASS: Plate or float glass to comply with Fed Spec DD-D-451, type I, Class I, quality q3.2. Sheet glass to be type II, class 1, quality q5. Provide tempered or heat-strengthened glass where indicated or as required by governmental agencies having jurisdiction.
- 2.3 EXTERIOR GLAZING:
  - A. 1" Insulated Low-E Tinted glazing thermally broken frames
  - B. U-Value 0.27
  - C. Visible Light Transmittance 54%
  - D. Solar heat gain coefficient 0.27
  - E. Shading coefficient 0.31
  - F. Outdoor Visible Light Reflectance 8%.
  - G. Color as approved by architect.
- 2.4 INTERIOR GLAZING: All interior glazing to be 1/4" minimum. Provide safety or rated glass as required by code or as shown.
- 2.5 SAFETY GLASS: All glazing in doors, adjacent to doors, below 60" AFF & as shown, to be tempered or laminated safety type. All glass at gymnasiums, weight rooms and locker rooms to be safety glass.
  - A. Exceptions: Glazing at fire rated assemblies
- 2.6 MIRRORS: 1/4" plate glass mirrors with ground edges, in sizes indicated, complete with all attachment hardware. Refer to Mirror specification 08 83 00
- 2.7 GLAZING IN FIRE RATED ASSEMBLIES: Meet all code requirements. Refer to fire-resistant glazing specification 08 88 13
- 2.8 FROSTED GLASS: Provide translucent window film on glass at locations indicated.
- 2.9 IMPACT RESISTANT GLAZING:

2.10 BULLET RESISTANT GLAZING:

2.11 OTHER MATERIALS: Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

**PART 3 - EXECUTION**

3.1 SURFACE CONDITIONS: Examine & prepare areas and conditions under which work of this Section will be performed. Do not proceed until unsatisfactory conditions are corrected. Clean glazing channels, stops, and rabbets to receive the glazing materials, making free from obstructions and deleterious substances which might impair the work. Remove protective coatings which might fail in adhesion or interfere with bond of sealants. Comply with manufacturer's instructions for final wiping of surfaces immediately prior to application of primer and glazing compounds or tapes. Prime surfaces to receive glazing compounds in accordance with manufacturer's recommendations.

3.2 INSTALLATION: Do not install items which are improperly sized, have damaged edges, or are scratched, or damaged in any other manner. Do not remove labels from glass until so directed by the Architect. Install glass so distortion waves are consistent with existing. Use blocks of proper size & spacing to support the glass in accordance with the manufacturer's recommendations. Make bite of spacer on glass 1/4" or more. Set glass in a manner which produces the greatest possible degree of uniformity in appearance. Do not use two different glazing materials in the same joint system unless the joint use is approved in advance by the Architect. Mask, or otherwise protect, surfaces adjacent to installation of sealants.

3.3 PROTECTION: Protect glass from breakage after installation by promptly installing streamers or ribbons, suitably attached to the framing and held free from glass. Do not apply warning markings, streamers, ribbons, or other items directly to the glass except as specifically directed by the Architect.

## 08 83 00 - MIRRORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes annealed monolithic glass mirrors.

#### 1.2 SUBMITTALS

- A. Product Data: For mirror hardware and mastic.
- B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.
- C. Samples: For each type of mirror product required, in the form indicated below:
  - 1. Mirrors, 12 inches square, including edge treatment on 2 adjoining edges.
  - 2. Mirror clips.
  - 3. Mirror trim, 12 inches long.

#### 1.3 QUALITY ASSURANCE

- A. Glazing Publications: Comply with GANA's "Glazing Manual" and GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors" unless more stringent requirements are indicated

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form, made out to Owner and signed by mirror manufacturer agreeing to replace mirrors that deteriorate, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated in second subparagraph below.
- B. Deterioration of Mirrors: Defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning mirrors contrary to mirror manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
- C. Warranty Period: Five years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 SILVERED FLAT GLASS MIRROR MATERIALS

- A. Clear Glass Mirrors: ASTM C 1503, Mirror Select Quality.
  - 1. Nominal Thickness: 6.0 mm.

## 2.2 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
- B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.
- C. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

## 2.3 MIRROR HARDWARE

- A. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
  - 1. Bottom Trim: J-channels formed with front leg and back leg not less than 5/16 and 3/4 inch in height, respectively.
  - 2. Top Trim: Formed with front leg with a height of 5/16 inch and back leg designed to fit into the pocket created by wall-mounted aluminum cleat.
  - 3. Product: Subject to compliance with requirements, provide the following:
    - a. Bottom Trim: C. R. Laurence Co., Inc.; D638 FHA Type "J" Channel.
    - b. Top Trim: C. R. Laurence Co., Inc.; D 1638 Top Channel.
    - c. Cleat: C. R. Laurence Co., Inc.; D 1637M Mirror Mount System Cleat.
- B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors.
- D. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

## 2.4 FABRICATION

- A. Mirror Sizes: To suit Project conditions, cut mirrors to final sizes and shapes.
- B. Cutouts: Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size Cutouts so they fit closely around penetrations in mirrors.
- C. Mirror Edge Treatment: Flat polished edge.
  - 1. Seal edges of mirrors after edge treatment to prevent chemical or atmospheric penetration of glass coating.
  - 2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
- B. Provide a minimum air space of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
- C. For wall-mounted mirrors, install with mastic and mirror hardware.
  - 1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
  - 2. For mirror hardware in the form of a continuous J-channel at bottom and continuous top trim at top, fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.
  - 3. Install mastic as follows:
    - a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
  - 4. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
  - 5. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch between back of mirrors and mounting surface.
- D. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- E. Do not permit edges of mirrors to be exposed to standing water.
- F. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.



## 08 88 13 - FIRE-RESISTANT GLAZING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Fire-rated glazing materials installed as vision lights in fire-rated doors.
2. Fire-rated glazing materials installed in fire-rated frames and 2-HOUR wall applications.

#### 1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM E 119: Fire Tests of Building Construction and Materials.
2. ASTM E2074-00: Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
3. ASTM E2010-01: Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.

B. American National Standards Institute (ANSI):

1. ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings

C. Consumer Product Safety Commission (CPSC):

1. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials

D. Glass Association of North America (GANA):

1. GANA – Glazing Manual.
2. FGMA – Sealant Manual.

E. National Fire Protection Association (NFPA):

1. NFPA 80: Fire Doors and Windows.

F. Underwriters Laboratories, Inc. (UL):

1. UL 263: Fire tests of Building Construction and Materials

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Fire-rated, clear and wireless glazing material for use in locations such as doors, sidelites, transoms, borrowed lites, and wall applications with fire rating requirements ranging from 45 minutes to 2 hours with hose stream test; for use in interior and exterior applications.
- B. Provides protection by reducing the radiant and conductive heat transfer

#### 1.4 SUBMITTALS

- A. Note: Specify submittal requirements for fire-rated doors and fire-rated frames, including glass stops in the appropriate Sections.
- B. Comply with specified requirements.
- C. Product data: Submit manufacturer's technical data for each glazing material required, including installation and maintenance instructions.
- D. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.
- E. Product Test Listings: From UL indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.
- F. Samples: Submit, for verification purposes, approx. 8-inch by 10-inch sample for each type of glass indicated.

#### 1.5 QUALITY ASSURANCE

- A. Glazing Standards: FGMA Glazing Manual and Sealant Manual.
- B. Fire Resistance Rated Glass: Each lite shall bear permanent, nonremovable label of UL certifying it for use in tested and rated fire resistive assemblies.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to specified destination in manufacturer's or distributor's packaging, undamaged, complete with installation instructions.
- B. Do not expose Pyrostop to temperatures greater than 120 degrees or less than minimum 40 degrees F during storage and transportation.
- C. Store off ground, under cover, protected from weather and construction activities.
- D. Do not expose the non-PVB side of glass to UV light.
- E. Store sheets of glass vertically. DO NOT lean.

#### 1.7 WARRANTY

- A. Warranty period: Five years from date of shipment by manufacturer.

### PART 2 - PRODUCTS

#### 2.1 FIRE-RATED GLAZING MATERIALS

- A. Manufacturer: Pyrostop™ as manufactured by the Pilkington Group and distributed by Technical Glass Products, Kirkland, Washington, voice 1-800-426-0279, fax 1-800-451-9857, e-mail [sales@fireglass.com](mailto:sales@fireglass.com), web site [www.fireglass.com](http://www.fireglass.com).
  - 1. GLAZING IN FIRE RATED ASSEMBLIES: Fireglass 20; meet all code requirements.
- B. Composition: Composed of multiple sheets of "Optiwhite" high visible light transmission glass laminated with an intumescent interlayer.
- C. Properties:
  - 1. Thickness: For Interior Use: [3/4", #45-200], [15/16", #60-101], [1-7/16", #90-102], [2-1/8", #120-204].
  - 2. For Exterior Use, Single Glazing: [3/4", #45-200], [1 1/16", #60-201], [1 9/16", #120-202].
  - 3. For Exterior Use, Insulated Glass Unit: [1 5/16", #45-250], [1 5/8", #60-251], [1 9/16", #120-202], [2 1/8", #120-262]
  - 4. Weight: Varies with thickness (approximate range 9 to 22 lbs./sq. ft.).
  - 5. Approximate Visible Transmission: Varies with thickness (approximate range 88 to 75 percent).
  - 6. Fire-rating: Up to 2 hours.
  - 7. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
  - 8. STC Rating: Up to 46 Db
- D. Permanently label each piece of Pyrostop with the appropriate marking.
- E. Fire Rating – 60 Minutes and Greater: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with ASTM E 119 and UL 263.

## 2.2 GLAZING COMPOUND FOR FIRE-RATED GLAZING MATERIALS

- A. Glazing Tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to affect an air and vapor seal.
- B. Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:
  - 1. Dow Corning 795 - Dow Corning Corp.
  - 2. Silglaze-II 2800 - General Electric Co.
  - 3. Spectrem 2 - Tremco Inc.
- C. Setting Blocks: Hardwood or calcium silicate; glass width by 4 inches by 3/16 inch thick.
- D. Spacers: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesive-backed on one face only, tested for compatibility with specified glazing compound.

- E. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

## 2.3 FABRICATION

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine glass framing, with glazier present, for compliance with the following:
- B. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
- C. Minimum required face or edge clearances.
- D. Observable edge damage or face imperfections.
- E. Do not proceed with glazing until unsatisfactory conditions have been corrected.
- F. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

### 3.2 INSTALLATION (GLAZING)

- A. Comply with referenced GANA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.
- B. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.
- C. Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.
- D. Place setting blocks located at quarter points of glass with edge block no more than 6-inches from corners.
- E. Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.
- F. Place glazing tape on free perimeter of glazing in same manner described above.
- G. Do not remove protective edge tape.
- H. Install removable stop and secure without displacement of tape.
- I. Do not pressure glaze.
- J. Glaze exterior openings with PVB layer toward the exterior of the building.
- K. Knife trim protruding tape.

- L. Apply cap bead of silicone sealant along void between the stop and the glazing, to uniform line, with bevel to form watershed away from glass. Tool or wipe sealant surface smooth.
- M. Provide minimum 3/16 inch edge clearance.
- N. Install in vision panels in fire-rated doors to requirements of NFPA 80.
- O. Install so that appropriate UL & Pyrostop markings remain permanently visible.

### 3.3 PROTECTION AND CLEANING

- A. Protect glass from contact with contaminating substances resulting from construction operations. Remove any such substances by method approved by glass manufacturer.
- B. Wash glass on both faces not more than four days prior to date scheduled for inspections intended to establish date of substantial completion. Wash glass by method recommended by glass manufacturer.

## **08 88 55 – DECORATIVE INFILL PANELS**

### **PART 1 - GENERAL**

#### **1.1 SCOPE**

- A. Requirements of the general conditions and special conditions apply to the work in this section.
- B. Provide all labor, materials, etc. necessary for the completion of the work of this section as specified or shown on the drawings.
- C. Work of this section consists of, but is not limited to the following:
  - 1. Exterior, insulated, weather resistant decorative infill panels. To be located at exterior storefront conditions as a decorative accent.
  - 2. Interior decorative infill panels. To be located at interior storefront conditions as a decorative accent.

#### **1.2 SUBMITTALS**

- A. Comply with requirements of Section regarding submittals.
- B. Manufacturer's Data
  - 1. Provide required number copies of:
    - a. Product data sheets.
    - b. Installation instructions.
    - c. Replacement parts information.
- C. Shop Drawings
  - 1. Provide required number of copies of all shop drawings.
  - 2. Show fabrication and erection of compartment assemblies, to extent not fully described by manufacturer's data sheets.
  - 3. Show anchorage, accessory items and finishes.
  - 4. Provide location drawings for bolt hole locations in supporting members for attachment of compartments.
- D. Samples
  - 1. Furnish scale model of compartments, including stile, shoe, door, door hardware, divider panel, and mounting brackets.
  - 2. Furnish sections showing stile anchoring and leveling devices, concealed threaded inserts, panel and stile construction and edge construction.

### **PART 2 - PRODUCTS**

#### **2.1 EXTERIOR DECORATIVE INFILL PANELS**

- A. 1" Omega Foam-Ply by Laminators Inc., or equal as approved by Architect, with designer series, natural series or Kynar 500 finish, as selected by Architect, both sides.
- B. Finish width to be 1".

## 2.2 INTERIOR DECORATIVE INFILL PANELS

- A. Solid phenolic material constructed of solidly fused plastic laminate with matte finish melamine surfaces, patterned face sheets, and black phenolic-resin core that are integrally bonded.
  - 1. Approved product: Compact Laminate Product Type 569 by Wilsonart
- B. Finish width to be 1/4".
- C. Plastic Laminate face finish to match material provided in 06 41 16 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

## PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS: Examine & prepare areas and conditions under which work of this Section will be performed. Do not proceed until unsatisfactory conditions are corrected. Clean glazing channels, stops, and rabbets to receive the infill panel, making free from obstructions and deleterious substances which might impair the work. Remove protective coatings which might fail in adhesion or interfere with bond of sealants. Comply with manufacturer's instructions for final wiping of surfaces immediately prior to application of primer and glazing compounds or tapes. Prime surfaces to receive glazing compounds in accordance with manufacturer's recommendations.
- 3.2 INSTALLATION: Do not install items which are improperly sized, have damaged edges, or are scratched, or damaged in any other manner. Do not remove labels from panels until so directed by the Architect. Install panels so patterns are consistent with existing or as instructed by Architect. Use blocks of proper size & spacing to support the panels in accordance with the manufacturer's recommendations. Make bite of spacer on panels 1/4" or more. Set panels in a manner which produces the greatest possible degree of uniformity in appearance. Do not use two different panels in the same joint system unless the joint use is approved in advance by the Architect. Mask, or otherwise protect, surfaces adjacent to installation of sealants.
- 3.3 PROTECTION: Protect panels from breakage after installation by promptly installing streamers or ribbons, suitably attached to the framing and held free from panels. Do not apply warning markings, streamers, ribbons, or other items directly to the panels except as specifically directed by the Architect.

## **08 91 00 - LOUVERS**

### **PART 1 - GENERAL**

- 1.1 WORK INCLUDED: Provide all labor, materials, tools, & equipment as required for architectural galvanized steel louver(s), as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 SUBMITTALS: Shop Drawings for overall sizes and details of fabrication and erection, relationship to adjacent construction, showing anchorage, hardware, accessories, and finishes. Submit manufacturer's technical data, including descriptive data for louver(s) & installation instructions.

### **PART 2 - PRODUCTS**

- 2.1 MATERIALS: All louver(s) for this Project shall be manufactured by a single manufacturer. All louver components shall be of same manufacturer, and shall be factory assembled, except where field assembly is required and Architect's written authorization of field assembly is obtained. Louver components shall include the following, where any of the following is indicated or required: heads, jambs, sills, blades, mullions, hardware.
- 2.2 MANUFACTURE: Provide units equal to the following or another product determined by the Architect to be equal & receiving his prior approval.
  - A. Airline Louvers
  - B. Arrow Louvers
  - C. Pottorff Louvers
  - D. Ruskin Louvers
- 2.3 FIXED LOUVERS: Provide galvanized steel horizontal line, non- drainable fixed blade louver(s), with 45 degree blade angle spaced 6" on center, Model No. L6811, as manufactured by Ruskin, or an architect approved equal.
- 2.4 DESIGN CRITERIA: Allow for wind loads, thermal movements, expansion control, and minimum deflections. Provide percent free air per published data for specified unit(s).
- 2.5 STEEL FABRICATION: Steel for louver fabrication shall be ASTM A-446, with galvanic coating per ASTM A-525, hot dip method. Steel frame construction shall be 18 ga. Steel Louver fixed blades shall be 20 ga. Steel Louver Fasteners shall be Stainless Steel. Cleaning and pretreatment shall include complete submersion in an acid cleaner, and an alkali cleaner, followed by acid deoxidation and an acidulated final rinse. Thoroughly dry all surfaces before application of primer coat.
- 2.6 PRIMER: Steel Louver Primer coat shall be suitable for "flash-bake" or "mono-bake" application of primer and finish coats.
- 2.7 FINISH: Fluoropolymer coating (70% polyvinylidene fluoride), spray-applied using electrostatic ("ESP") type application. Total dry film thickness: 1.2 mil minimum after baking at 450 degrees F. for 10 minutes, cooled at room temperature for no less than 1 hour. Color shall be as selected by Architect, and shall match, in color and gloss, finish of Architect's approved sample and portions of wall assembly indicated to receive similar finish. All Kynar finish work shall be performed by a licensed applicator.
- 2.8 INSECT SCREENS: Provide insect screen for each louver unit, including unit(s) indicated or required to be used for access. Insect screen(s) shall be 1/2" mesh x 19 gauge galvanized in aluminum frame(s) with mitred corners and secured to louver frame(s). Screens shall be replaceable for future maintenance. For Steel Louvers screen frames shall receive coating to prevent corrosion due to galvanic action when in place against steel louver frames, to match louver.

### **PART 3 - EXECUTION**

- 3.1 INSPECTION: Verify openings to assure that dimensions conform to Shop Drawings and louver requirements. Assure that openings are free of irregularities which would interfere with installation.



- 3.2 INSTALLATION: Install louvers, including screens, as shown on Drawings, coordinated with related work and in accordance with manufacturer's recommended installation instructions. Install louvers without scratching, denting, gouging, marring or staining louver finish surface.
- 3.3 FINISH: Field touch-up prime & finish coats where coat has been required to be removed, or has been removed unavoidably, for installation purposes. Thoroughly cover all welds, bolts, washers and other anchoring devices with approved prime & finish coats.

**DIVISION 09 – FINISHES**

**09 03 66 – TERRAZZO RESTORATION & CLEANING**

**PART 7 - GENERAL**

- 7.1 GENERAL REQUIREMENTS: Work under this section includes cleaning and restoring terrazzo flooring and base.
- 7.2 QUALITY ASSURANCE: Work under this section must be performed by a firm which has a minimum five years experience restoring terrazzo flooring.
- 7.3 WARRANTIES: Warrant for a period of two years that restoration procedures will not harm substrate or adjacent materials including, but not limited to: Discoloration of substrate from improper product usage; Chemical damage from inadequate rinse procedures; Abrasive damage from improper procedures; Discoloration or damage to terrazzo flooring.
- 7.4 SUBMITTALS: Proof of experience requirements for firm doing the actual work, or designation and qualifications for the restoration contractor. Product Manufacturer's Product Literature. Description of workplan.

**PART 8 - PRODUCTS**

- 8.1 STRIPPER
  - A. Basis of Design: Pro Strip PURE Non-Corrosive Floor Stripper by Diversey
  - B. Neutral pH, between 7 to 10, when used on Portland cement binder terrazzo.
- 8.2 SEALER:
  - A. Basis of Design: Fortify® Hard Surface Floor Sealer by Diversey
  - B. Neutral pH, between 7 to 10.
  - C. Water based acrylic.
  - D. Slip resistance coefficient of friction rating of minimum 0.5
  - E. Three (3) coats

**PART 9 - EXECUTION**

- 9.1 PROJECT CONDITIONS: Protect persons and property from injury and damage from cleaning operations.
- 9.2 WORK SEQUENCE:
  - A. Strip terrazzo flooring
  - B. Inspect and document surface conditions. Report any damaged areas to Architect and patch.
  - C. Seal terrazzo flooring.
  - D. Finish terrazzo flooring.

- E. Review surface with architect.
- 9.3 TEST AREAS: Conduct a test on one test area of at least 9 square feet for each step, using the specified products and techniques to ensure no long-term damage is done before proceeding. Architect and contractor shall select location of test areas.
- 9.4 STRIPPING: • Blockade areas to be stripped. Strip terrazzo with stripper per manufacturer instructions. Hand or machine scrub thoroughly using appropriate stripping pads or stripping brush. Let floor dry completely. Grind down all coatings to provide a uniform appearance.
- 9.5 SEALING: • Blockade areas to be sealed. Apply three (3) coats per manufacturer's instructions. Allow recommended drying time between coats. Buff to a high sheen. Provide uniform final appearance.
- 9.6 PERFORMANCE: The actual work performed is to be done using the products and techniques established in the accepted test areas. Any proposed change of product usage must be submitted with the product manufacturer's recommendation, and written approval must be issued by the architect before being undertaken.
- 9.7 INSPECTION DOCUMENTATION: At the end of the stripping, cleaning, sealing and finishing, the work is to be inspected and documented by the contractor for the architect's consideration.
- 9.8 PROTECTION: Contractor shall protect the finished work from the time the restoration work is finished.

## 09 21 16 - GYPSUM BOARD ASSEMBLIES

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Provide Gypsum Wallboard Systems where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 NOTIFICATION FOR INSPECTION: Schedule an inspection with Architect prior to work on scope addressed in this section.
- 1.4 Submittals: Submit manufacturer's product data and installation instructions.

### PART 2 - PRODUCTS

- 2.1 GYPSUM WALLBOARD: Provide gypsum wallboard complying with Fed Spec SS-L-30D, in 48" widths and in such lengths as will result in a minimum of joints. Use type III, grade X, class 1, 5/8" thick on all interior applications unless indicated otherwise.

#### 2.2 HIGH IMPACT GYPSUM BOARD

- A. Basis of Design: Gold Bond BRAND Hi-Impact® XP® Gypsum Board
- B. Panel Physical Characteristics
  1. Core: Fire-resistance rated gypsum core, with additives to enhance mold/mildew resistance, surface indentation resistance, impact resistance and moisture and mold resistant
  2. Surface paper: Abrasion resistant, 100 percent recycled content moisture/mold/mildew resistant paper on front, back and long edges
  3. Embedded fiberglass mesh
  4. Long Edges: Tapered
  5. Overall thickness: 5/8 inch
  6. Panel complies with Type X requirements of ASTM C 1396
  7. Surface Abrasion Resistance: Classification Level 3 in accordance with ASTM C 1629
  8. Indentation Resistance: Classification Level 1 in accordance with ASTM C 1629.
  9. Soft Body Impact Resistance: Classification Level 3 in accordance with ASTM C 1629
  10. Hard Body Impact Resistance: Classification Level 3 in accordance with ASTM C 1629.
  11. Mold/Mildew Resistance: 10 when tested in accordance with ASTM D 3273.
- C. Usage: Locate this material at Gymnasium & Cafeteria below 12'-0" AFF; Corridors, Lobbies, Vestibules, Custodial, Maintenance, Vocational Shops, Stages, Weight Rooms and Exercise Rooms below 8'-0" AFF; and all other spaces as noted in the Room Finish Schedule. Unless specified otherwise, use Standard Gypsum Board per 2.1 above.

#### 2.3 HIGH IMPACT MOISTURE RESISTANT GYPSUM BOARD

- A. Basis of Design: Gold Bond BRAND eXP® Interior Extreme® IR Gypsum Board

B. Panel Physical Characteristics:

1. Core: Regular gypsum core
2. Thickness: 1/2 inch
3. Long Edges: Tapered. Wrapped with coated fiberglass mat
4. Mold Resistance: 10 when tested in accordance with ASTM D 3273
5. Flexural Strength - Parallel: 80 lbs, when tested in accordance with ASTM C 473
6. Humidified Deflection: less than 1/4 inch when tested in accordance with ASTM C 473
7. Nail pull resistance: 80 lbs, when tested in accordance with ASTM C 473
8. Water Absorption: less than 5 percent when tested in accordance with ASTM C 473
9. Permeance: greater than 10 perms, when tested in accordance with ASTM E 96
10. Combustibility: Noncombustible when tested in accordance with ASTM E 136
11. Flame spread/Smoke Developed: 0/0 when tested in accordance with ASTM E 84
12. Environmental Requirements: Provide products that comply with testing and product requirements for low emitting materials

C. Usage: Locker Rooms

2.4 ACOUSTICALLY ENHANCED GYPSUM BOARD

A. Basis of Design: QuietRock ES, manufactured by Serious Energy

B. Panel Physical Characteristics.

1. Thickness: 5/8 inch (15.9 mm).
2. Tolerance: +/- 0.050" on thickness.
3. Weight: 2.6 lbs/sqft.
4. Materials: Paper faced gypsum, sound damping viscoelastic polymer core.
5. STC Rating: 51-60 ( ASTM E90)
6. Fire-rated: 1 hour (ASTM E119)
7. Surface flame: Class A (ASTM E84)

C. Performance Criteria: Wall Assembly STC 55 unless noted higher in drawings.

D. Accessories

1. Acoustical Sealant: QuietSeal Pro: Standard Specification for Latex Sealants (ASTM C834): Grade -18°C
  - a. Extrudability (ASTM C1183 Method B): ≥2.1 g/s Extrusion Rate

- b. Artificial Weathering (ASTM C732 500 Hours): No wash-out, slump, or cracking. Also  $\leq 25\%$  total bond area loss.
  - c. Volume Shrinkage (ASTM C1241 Type OP):  $\leq 30\%$  volume shrinkage.
  - d. Low Temperature Flexibility (ASTM C734): No adhesion loss or cracking through to substrate after 500 hours.
  - e. Recovery and Adhesion Loss (ASTM C736):  $\geq 75\%$  recovery and  $\leq 25\%$  total bond area loss.
  - f. Slump (ASTM D2202): No slump observed.
  - g. Stain Index (ASTM D2203): Maximum allowable stain index of 1.
  - h. Surface Burning Characteristics (ASTM E84): Meets NFPA Class A Fire-Rating
2. QuietPutty: Physical Characteristics:
- a. Color: Blue/Green
  - b. Thickness: 1/8"
  - c. Weight: 6 oz/pad
  - d. Size: 7 x 7 in/pad
  - e. Density: 1oz/in<sup>3</sup>
  - f. Unit size: 10 pads/box
  - g. STC-rated: 47–63 (ASTM E90)
- 2.5 METAL TRIM: Form from zinc-coated steel not lighter than 26 gage, complying with Fed spec QQ-S-775, type I, class d or e. Casing beads to be channel-shapes with an exposed wing, and with a concealed wing not less than 7/8" wide. Corner beads to be angle shapes with wings not less than 7/8" wide and not perforated for nailing and joint treatment, or with combination metal and paper wings bonded together, not less than 1-1/4" wide and suitable for joint treatment. Expansion joint to be pre-taped & have wings not less than 7/8" wide.
- 2.6 JOINTING SYSTEM: Provide a jointing system, including reinforcing tape and compound, designed as a system to be used together and as recommended for this use by the manufacturer of the gypsum wallboard approved for use on this Work. Jointing compound may be used for finishing if so recommended by its manufacturer.
- 2.7 FASTENING DEVICES: For fastening gypsum wallboard in place on metal studs and metal channels, use flat-head screws, shouldered, specially designed for use with power-driven tools, not less than 1" long, with self-tapping threads and self drilling points. For fastening gypsum wallboard in place on wood, use 1-1/4" type W bugle-head screws, or use annular ring type nails complying with ASTM C514 and of the length required by governmental agencies having jurisdiction.

### PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Install the gypsum wallboard with the separate boards in moderate contact but not forced into place. At internal and external corners, conceal the cut edges of the boards by the overlapping covered edges of the abutting boards. Stagger the boards so that corners of any four boards will not meet at a common point except in vertical corners. Install the gypsum wallboard with the long dimension of the wallboard at right angles to the supporting members. Make end joints, where required, over framing or furring members.

- 3.3 ATTACHING: Drive the specified screws with clutch-controlled power screwdrivers, spacing the screws 12" on centers at ceilings and 16" on centers at walls. Where framing members are spaced 24" apart on walls, space screws 12" on centers. Attach double layers in accordance with the pertinent codes and the manufacturer's recommendations as approved by the Architect. Attach to wood as required by governmental agencies having jurisdiction.
- 3.4 JOINT TREATMENT: Inspect areas to be joint treated, verifying that the gypsum wallboard fits snugly against supporting framework. In areas where joint treatment and compound finishing will be performed, maintain a temperature of not less than 55 degrees for 24 hours prior to commencing the treatment, and until joint and finishing compounds have dried. Apply the joint treatment and finishing compound by machine or hand tool. Provide a minimum drying time of 24 hours between coats, with additional drying time in poorly ventilated areas.
- 3.5 EMBEDDING COMPOUNDS: Apply to gypsum wallboard joints and fastener heads in a thin uniform layer. Spread the compound not less than 3" wide at joints, center the reinforcing tape in the joint, and embed the tape in the compound. Then spread a thin layer of compound over the tape. After this treatment has dried, apply a second coat of embedding compound to joints and fastener heads, spreading in a thin uniform coat to not less than 6" wide at joints, and feather edged. Sandpaper between coats as required. When thoroughly dry, sandbag to eliminate ridges and high points.
- 3.6 FINISHING COMPOUNDS: After embedding compound is thoroughly dry and has been completely sanded, apply a coat of finishing compound to joints, fastener heads and as required to produce a uniformly smooth surface. Feather the finishing compound to not less than 12" wide. When thoroughly dry, sandpaper to obtain a uniformly smooth surface, taking care not to scuff the paper surface of the wallboard, to meet ASTM C 840 Level 5 Finish.
- 3.7 CORNER TREATMENT: At external corners, install the specified corner bead, fitting neatly over the corner and securing with the same type fasteners used for installing the wallboard. Space the fasteners approximately 6" on centers, and drive through the wallboard into the framing or furring member. After the corner bead has been secured into position, treat the corner with joint compound and reinforcing tape as specified for joints, feathering the joint compound out from 8" to 10" on each side of the corner. At internal corners, treat as specified for joints, except fold the reinforcing tape lengthwise through the middle and fit neatly into the corner.
- 3.8 EXPANSION JOINTS: In addition to those shown, locate at a minimum as follows: Place vertically at the strike side of each corridor door head, on both sides of wall. Place vertically at the side of each window. Place otherwise as required to have no unjointed section of wall greater than 24'.
- 3.9 ACOUSTICALLY ENHANCED GYPSUM BOARD INSTALLATION
  - A. Install gypsum board in accordance with GA-201, GA-216, GA-600, ASTM E-90, and manufacturer's instructions.
  - B. Install in accordance with reference standards and manufacturer's instructions, product technical bulletins, product catalog and product carton instructions for installation [and as required to comply with seismic requirements].
  - C. Install framing to comply with ASTM C840 requirements that apply to framing installation.
- 3.10 OTHER METAL TRIM: The Drawings do not purport to show all locations and requirements for metal trim. Carefully study the Drawings and the installations, and provide all metal trim normally recommended by the manufacturer of the gypsum wallboard approved for use of this Work.
- 3.11 CLEANING UP: In addition to other requirements for cleaning, use necessary care to prevent scattering gypsum wallboard scraps and dust, and to prevent tracking gypsum and joint finishing compound onto floor surfaces. At completion of each segment of installation in a room or space, promptly pick up and remove from the working area all scraps, debris, and surplus material of this Section.

## 09 21 17 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes:
  - 1. Shaft-wall enclosures.
  - 2. Chase enclosures.
  - 3. Horizontal enclosures.

#### 1.2 SUBMITTALS

- A. Product Data: For each gypsum board shaft-wall assembly indicated.

#### 1.3 QUALITY ASSURANCE

- A. Fire-Resistance Ratings: Provide materials and construction identical to those of assemblies with fire-resistance ratings determined according to ASTM E 119 by a testing and inspecting agency.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. CertainTeed
- C. G-P Gypsum.
- D. National Gypsum Company.
- E. USG Corporation.

#### 2.2 GYPSUM BOARD SHAFT-WALL ASSEMBLIES, GENERAL

- A. Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.
  - 1. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
  - 2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.

#### 2.3 PANEL PRODUCTS

- A. Shaftliner Physical Characteristics
  - 1. Core: Type X, gypsum core, with additives to enhance fire-resistance, moisture and mold resistant.
  - 2. Facing: Water-resistant glass mat on front, back, and long edges.
  - 3. Long Edges: Double Beveled
  - 4. Overall Thickness: 1 inch
  - 5. Complies with requirements of ASTM C 1396 – Standard Specification for Gypsum Board and ASTM C 1658 – Standard Specification for Glass Mat Gypsum Panels



6. Comply with ASTM C 442/C 442M.
7. Mold/Mildew Resistance: 10 when tested in accordance with ASTM D 3273.

## 2.4 NON-LOAD-BEARING STEEL FRAMING

- A. Framing Members: Comply with ASTM C 754 for conditions indicated.
- B. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
  1. Protective Coating: ASTM A 653/A 653M, G60, hot-dip galvanized, unless otherwise indicated.

## 2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced product standards and manufacturer's written recommendations.
- B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 09 Section "Gypsum Board" that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.
- C. Gypsum Board Joint-Treatment Materials: As specified in Division 09 Section "Gypsum Board."
- D. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- E. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
  1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
  2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- F. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing), produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
  1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- G. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

## 2.6 GYPSUM BOARD SHAFT-WALL ASSEMBLIES

- A. Fire-Resistance Rating: As indicated.
- B. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
  1. Depth: As indicated.

2. Minimum Base-Metal Thickness: 0.0179 inch.
- C. Runner Tracks: Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches long and in depth matching studs.
1. Minimum Base-Metal Thickness: Matching steel studs.
- D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dietrich Metal Framing; The System by Metal-Lite, Inc.
    - b. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
- E. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches, in depth matching studs, and not less than 0.0329 inch thick.
- F. Room-Side Finish: As indicated.
- G. Shaft-Side Finish: As indicated by fire-resistance-rated assembly design designation.
- H. Insulation: Sound attenuation blankets.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft-wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft-wall assemblies to comply with requirements specified in Division 07 Section "Applied Fireproofing."
1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runner tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
- B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft-wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

#### 3.2 INSTALLATION

- A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:
1. ASTM C 754 for installing steel framing except comply with framing spacing indicated.
  2. Division 09 Section "Gypsum Board" for applying and finishing panels.

- B. Do not bridge architectural or building expansion joints with shaft-wall assemblies; frame both sides of expansion joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.
  - 1. At elevator hoistway entrance door frames, provide jamb struts on each side of door frame.
  - 2. Where handrails directly attach to gypsum board shaft-wall assemblies, provide galvanized steel reinforcing strip with 0.0312-inch minimum thickness of base (uncoated) metal, accurately positioned and secured behind at least 1 gypsum board face-layer panel.
- D. Integrate stair hanger rods with gypsum board shaft-wall assemblies by locating cavity of assemblies where required to enclose rods.
- E. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- F. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.
- G. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- H. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with ASTM C 919 requirements or with manufacturer's written instructions, whichever are more stringent.
- I. In elevator shafts where gypsum board shaft-wall assemblies cannot be positioned within 4 inches of the shaft face of structural beams, floor edges, and similar projections into shaft, install 1/2-or 5/8-inch-thick, gypsum board cants covering tops of projections. No recesses allowed (at steel beams especially).
  - 1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches o.c. with screws fastened to shaft-wall framing.
  - 2. Where steel framing is required to support gypsum board cants, install framing at 24 inches o.c. and extend studs from the projection to shaft-wall framing.
- J. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

### 3.3 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## 09 22 16 - NON-STRUCTURAL METAL FRAMING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes non-load-bearing steel framing members for the following applications:
  - 1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
  - 2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

### PART 2 - PRODUCTS

#### 2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
  - 2. Protective Coating: ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating, unless otherwise indicated.

#### 2.2 SUSPENSION SYSTEM COMPONENTS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.
- B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.
- C. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.
  - 1. Depth: 2-1/2 inches.
- E. Furring Channels (Furring Members):
  - 1. Cold-Rolled Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
  - 2. Steel Studs: ASTM C 645.
    - a. Minimum Base-Metal Thickness: 0.0179 inch.

- b. Depth: As indicated on Drawings.
  - 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
    - a. Minimum Base Metal Thickness: 0.0179 inch.
  - 4. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.
    - a. Configuration: Asymmetrical or hat shaped.
- F. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Armstrong World Industries, Inc.; Drywall Grid Systems.
    - b. Chicago Metallic Corporation; 640-C or 660-C Drywall Furring System.
    - c. USG Corporation; Drywall Suspension System.

## 2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A. Steel Studs and Runners: ASTM C 645.
  - 1. Minimum Base-Metal Thickness: 0.0179 inch.
- B. Slip-Type Head Joints: Where indicated, provide one of the following:
  - 1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch-deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
  - 2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
  - 3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
    - a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      - i Steel Network Inc. (The); VertiTrack VTD Series.
      - ii Superior Metal Trim; Superior Flex Track System (SFT).
- C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
  - 1. Minimum Base-Metal Thickness: 0.0179 inch.

- D. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges.
  - 1. Depth: As indicated on Drawings.
  - 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.
- E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
  - 1. Minimum Base Metal Thickness: 0.0179 inch.
  - 2. Depth: As indicated on Drawings.
- F. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
  - 1. Configuration: Asymmetrical or hat shaped.
- G. Cold-Rolled Furring Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges.
  - 1. Depth: As indicated on Drawings.
  - 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312 inch.
  - 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.

## 2.4 AUXILIARY MATERIALS

- A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Foam Gasket Isolation Strip at Exterior Walls: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

### 3.2 INSTALLING SUSPENSION SYSTEMS

- A. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- B. Suspend hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

- a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
- 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
  - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
- 3. Do not attach hangers to steel roof deck.
- 4. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
- 5. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
- 6. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- C. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- D. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

### 3.3 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb, unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.



4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
5. Curved Partitions:
  - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
  - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches o.c.
- C. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

## 09 24 23 - PORTLAND CEMENT PLASTER

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUBMITTALS: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections. Product Data for each product specified. Submit certificate signed by manufacturer for each kind of plaster aggregate certifying that materials comply with requirements.
- 1.3 QUALITY ASSURANCE: Prior to installing plaster work, construct panels for each type of finish and application required to verify selections made under Sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.
- 1.4 DELIVERY, STORAGE, AND HANDLING: Deliver cementitious materials to Project site in original packages, containers, or bundles, labeled with manufacturer's name, product brand name, and lot number. Store materials inside, under cover, and dry, protected from weather, direct sunlight, surface contamination, aging, corrosion, and damage from construction traffic and other causes.
- 1.5 PROJECT CONDITIONS: Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after plaster application. Provide heat and protection, temporary or permanent, as required to protect each coat of plaster from freezing for at least 24 hours after application. Distribute heat uniformly to prevent concentration of heat on plaster near heat sources; provide deflection or protective screens. Protect plaster against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial. Apply and cure plaster as required by climatic and job conditions to prevent dry out during cure period. Provide suitable coverings, moist curing, barriers to deflect sunlight and wind, or combinations of these, as required. Do not apply plaster when ambient temperature is below 40 deg F. Protect contiguous work from soiling and moisture deterioration caused by plastering. Provide temporary covering and other provisions necessary to minimize harmful spattering of plaster on other work.

### PART 2 - PRODUCTS

- 2.1 MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - A. Expanded-Metal Lath & Metal Accessories:
    1. Alabama Metal Industries Corp. (AMICO).
    2. Dale//Incor Industries, Inc.
    3. Dietrich Industries, Inc.
    4. National Gypsum Co.
    5. United States Gypsum Co.
  - B. Stucco:
    1. California Stucco Products Corp.
    2. Florida Stucco Corp.
    3. Highland Stucco.
    4. IPA Systems, Inc.
    5. United States Gypsum Co.

- 2.2 LATH: Comply with ASTM C 847 for material, type, configuration, and other characteristics indicated. Fabricate expanded-metal lath from commercial-quality, cold-rolled carbon-steel sheet complying with ASTM A 366, coated with asphalt or non-reemulsifiable water-base paint. Diamond-Mesh Lath to be self-furring, 3.4 lb/sq. yd. Where paper-backed lath is indicated, provide the following material factory bonded to back of lath. Comply with FS UU-B-790, Type I, Grade D, Style 2.
- 2.3 ACCESSORIES: Comply with material provisions of ASTM C 1063; coordinate depth of accessories with thicknesses and number of plaster coats required. Fabricated from zinc-coated (galvanized) steel sheet complying with ASTM A 653, G40 minimum coating designation. Metal Corner Reinforcement to be expanded, large-mesh, diamond-metal lath fabricated from zinc-alloy or welded-wire mesh fabricated from 0.0475-inch-diameter, zinc-coated (galvanized) wire and specially formed to reinforce external corners of portland cement plaster on exterior exposures while allowing full plaster encasement. Casing Beads (square-edged style, with expanded flanges) & Cornerbeads (small nose) to be fabricated from galvanized steel, minimum 0.0172 inch thick, with expanded flanges of large-mesh diamond-metal lath allowing full plaster encasement. Control Joints to be Galvanized Steel, minimum 0.0172 inch thick, folded pair of nonperforated screeds in M-shaped configuration, with expanded or perforated flanges; provide removable protective tape on plaster face of control joints. Lath Attachment Devices as required by ASTM C 1063 for installations indicated.
- 2.4 PLASTER MATERIALS
  - A. Base-Coat Cements: Portland cement, ASTM C 150, Type I.
  - B. Job-Mixed Finish-Coat Cement: Portland cement, ASTM C 150, Type I.
  - C. Cement Color: White.
  - D. Stucco Finish Coat: Manufacturer's standard factory-packaged stucco, including portland cement, aggregate, coloring agent, and other proprietary ingredients. Provide color selected by Architect from manufacturer's full range of colors.
  - E. Lime: Special hydrated lime for finishing purposes, ASTM C 206, Type S; or special hydrated lime for masonry purposes, ASTM C 207, Type S.
  - F. Sand Aggregate for Base Coats: ASTM C 897.
  - G. Aggregate for Finish Coats: ASTM C 897 system, manufactured or natural sand, white in color.
- 2.5 MISCELLANEOUS MATERIALS
  - A. Water for Mixing and Finishing Plaster: Potable.
  - B. Bonding Agent: ASTM C 932.
  - C. Dash-Coat Material: 2 parts portland cement to 3 parts fine sand, mixed with water to a mushy-paste consistency.
  - D. Asphalt-Saturated Felt: ASTM D 226, Type I (No. 15), nonperforated.
  - E. Steel drill screws complying with ASTM C 1002 for fastening metal lath to wood or steel members less than 0.033 inch thick.
- 2.6 PLASTER MIXES AND COMPOSITIONS: Comply with ASTM C 926 for base- and finish-coat mixes as applicable to plaster bases, materials, and other requirements indicated. Proportion materials for respective base coats in parts by volume per sum of cementitious materials for aggregates to comply with the following requirements for each method of application and plaster base indicated. Adjust mix proportions below within limits specified to attain workability. Add fiber to base coats after ingredients have mixed at least 2 minutes; do not exceed 1 lb/cu. ft. of cementitious materials. Scratch Coat to be 1 part portland cement, 0 to 3/4

parts lime, 2-1/2 to 4 parts aggregate. Brown Coat to be 1 part portland cement, 0 to 3/4 parts lime, 3 to 5 parts aggregate. Finish coats to be 1 part portland cement, 3/4 to 1-1/2 parts lime, 3 parts sand.

- 2.7 MIXING: Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

### PART 3 - EXECUTION

- 3.1 INSTALLATION OF LATH AND FURRING, GENERAL: Comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and with requirements of ASTM C 1063. Install supplementary framing, blocking, and bracing at terminations in work and for support of fixtures, equipment services, heavy trim, grab bars, handrails, furnishings, and similar work to comply with details indicated or, if not otherwise indicated, to comply with applicable written instructions of lath and furring manufacturer. Where lathing and metal support system abuts building structure horizontally and where partition or wall abuts overhead structure, sufficiently isolate from structural movement to prevent transfer of loading from building structure. Install slip- or cushion-type joints to absorb deflections but maintain lateral support. Frame both sides of control joints independently and do not bridge joints with furring and lathing or accessories. Install additional framing, furring, runners, lath, and beads, as required to form openings and frames for other work as indicated. Coordinate support system for proper support of framed work that is not indicated to be supported independently of metal furring and lathing system.
- 3.2 LATHING: Install metal lath for the following applications where plaster base coats are required. Provide appropriate type, configuration, and weight of metal lath selected from materials indicated that comply with referenced ML/SFA specifications and ASTM lathing installation standards. Vertical metal framing and furring using 3.4-lb/sq. yd. minimum weight, diamond-mesh lath and cold-rolled channel stud framing. Exterior sheathed wall surfaces using 3.4-lb/sq. yd. minimum weight, self-furring, diamond-mesh lath. Monolithic surfaces using 3.4-lb/sq. yd. minimum weight, self-furring, diamond-mesh lath or vertical metal framing and furring as required for plaster thickness.
- 3.3 PREPARATIONS FOR PLASTERING: Clean plaster bases and substrates for direct application of plaster, removing loose material and substances that may impair the Work. Apply dash coat on concrete surfaces indicated for direct plaster application. Moist-cure dash coat for at least 24 hours after application and before plastering. Install temporary grounds and screeds to ensure accurate rodding of plaster to true surfaces; coordinate with scratch-coat work. Immediately before plastering, dampen concrete and concrete unit masonry surfaces that are indicated for direct plaster application, except where a bonding agent has been applied. Determine and apply amount of moisture and degree of saturation that will result in optimum suction for plastering.
- 3.4 INSTALLATION OF PLASTERING ACCESSORIES: Comply with referenced lathing and furring installation standards for provision and location of plaster accessories of type indicated. Miter or cope accessories at corners; install with tight joints and in alignment. Attach accessories securely to plaster bases to hold accessories in place and in alignment during plastering. Install corner reinforcement at external corners. Install casing beads at terminations of plaster. Install control joints where an expansion or contraction joint occurs in surface of construction directly behind plaster membrane; at a distance not to exceed 18 feet in either direction or a length-to-width ratio of 2-1/2 to 1; where plaster panel sizes or dimensions change, extend joints full width or height of plaster membrane.
- 3.5 PLASTER APPLICATION: Apply plaster materials, composition, and mixes to comply with ASTM C 926. Do not use materials that are frozen, caked, lumpy, dirty, or contaminated by foreign materials. Do not use excessive water in mixing and applying plaster materials. Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed at any location on surface. Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, and before lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least 6 inches at each jamb anchor. Sequence plaster application with installation and protection of other work so that neither will be damaged by installation of other. Plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where interior plaster is not terminated at metal frame by casing beads, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal. Make internal corners and angles square; finish external corners flush with cornerbeads on interior work, square and true with plaster faces on

exterior work. Apply plaster in three coats over metal lath, & in two coats over concrete unit masonry & concrete. Apply finish coat to a minimum thickness of 1/8 inch to completely cover base coat, uniformly floated to a true even plane with fine-textured finish matching Architect's sample. Moist-cure plaster base and finish coats to comply with ASTM C 926, including written instructions for time between coats and curing in "Annex A2 Design Considerations."

- 3.6 CUTTING AND PATCHING: Cut, patch, replace, repair, and point up plaster as necessary to accommodate other work. Repair cracks and indented surfaces. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects. Repair or replace work as necessary to comply with required visual effects.
- 3.7 CLEANING AND PROTECTING: Remove temporary covering and other provisions made to minimize spattering of plaster on other work. Promptly remove plaster from door frames, windows, and other surfaces not to be plastered. Repair surfaces stained, marred or otherwise damaged during plastering work. When plastering work is completed, remove unused materials, containers, equipment, and plaster debris. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure plaster work is without damage or deterioration at the time of Substantial Completion.

## 09 29 62 - WATER RESISTANT GYPSUM BOARD

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Work in this section includes, but is not limited to wall, ceiling and soffit sheathing. Specific applications include:
  - A. Exterior sheathing at all stud backup walls.
  - B. Wallboard at all showers & toilet rooms.
  - C. Ceilings at all showers.
  - D. Bottom 3" at all drywall partitions.
  - E. Exterior soffits at drywall construction indicated.
  - F. As a backer board behind ceramic tile.
  - G. Wallboard behind fiberglass wall panels.
  - H. As noted elsewhere.
- 1.2 SUBMITTALS: Submit manufacturer's descriptive literature indicating material composition, thickness, sizes and fire resistance. Submit manufacturer's written certification that product meets specified requirements.
- 1.3 QUALITY ASSURANCE: Where applicable, provide materials and construction that are identical to those of assemblies whose fire-resistance ratings are indicated.
- 1.4 DELIVERY, STORAGE AND HANDLING: Deliver materials to the job site in manufacturer's original packaging, containers and bundles with manufacturer's brand name and identification intact and legible. Storage and handling: Store level and handle materials to protect against contact with damp and wet surfaces, exposure to weather, breakage and damage to edges. Provide air circulation under covering and around stacks of materials.
- 1.5 SPECIAL CONSIDERATIONS: Avoid any condition that will create moisture in the air and condensation on the exterior walls during periods when the exterior temperature is lower than the interior. Exposed wall ends such as may be found in parapets must be covered to prevent water from infiltrating the cavity. For all installations, design details such as fasteners, sealants and control joints per system specifications must be properly installed per system specifications. Openings and penetrations must be properly flashed and sealed.
- 1.6 WARRANTY: Provide sheathing manufacturer's standard warranty covering sheathing materials for five years commencing on date of purchase. Provide sheathing manufacturer's standard warranty covering in-place exposure damage to sheathing for six months commencing on date of purchase by contractor.

### PART 2 - PRODUCTS

- 2.1 BOARD: Gypsum sheathing manufactured in accordance with ASTM C 1177 with glass mats both sides and long edges, water-resistant treated core; 1/2" or 5/8" thick by 4' by 8', 9' or 10'. Noncombustible when tested in accordance with ASTM E 136. Products include those listed at the locations indicated, equal to DensGuard products by GP Gypsum Co:
  - A. Densglass Gold Exterior Guard, 1/2" thick (exterior sheathing, ceiling board in wet areas)
  - B. Densglass Gold Exterior Guard, 5/8" thick (bottom 3" of drywall partitions.)
  - C. Densarmour Abuse Guard, 5/8" thick (high-impact conditions for walls in wet areas.)
  - D. Densshield Tile Guard, 5/8" (behind ceramic tile, walls in restrooms & other wet areas.)

2.2 ACCESSORIES

- A. Nails, wood framing: Hot dip, 11-gauge galvanized nails with  $\frac{3}{8}$ " head, 1H" min. length.
- B. Screws, metal framing: Type S-12, bugle head, self-tapping, rust-resistant, fine thread for heavy-steel gauge (12 to 22). Type S, bugle head, rust-resistant sharp point, fine thread for light-gauge metal framing or furring.
- C. Screws, metal or wood framing: Wafer head, rust-resistant, Type S-12 drill or Hi-Lo, min. 1" length. Or Type W rust-resistant, bugle head, coarse thread, sharp point for wood.

PART 3 - EXECUTION

- 3.1 PREPARATION: Examine subframing; verify that surface of framing and furring members to receive sheathing does not vary more than recommended by manufacturer.
- 3.2 SHEATHING: Provide exterior sheathing where indicated on drawings. Install sheathing in accordance with manufacturer's instructions and applicable instructions in GA-253 and ASTM C 1280. Install sheathing per manufacturer's recommendations. Use maximum lengths possible to minimize number of joints. Attach sheathing to wood framing with nails spaced 4" o.c. at perimeter for racking shear resistance; 8" o.c. at perimeter where there are framing supports and where racking shear resistance is not required; and 8" o.c. along intermediate framing in field for both conditions. Attach sheathing to metal framing with screws spaced 8" o.c. at perimeter where there are framing supports; and 8" o.c. along intermediate framing in field. Drive fasteners to bear tight against and flush with surface of sheathing. Do not countersink. If required, install building paper or equal with flashing around openings.
- 3.3 FINISHING: Provide mastic damp-proofing on sheathing as specified in Section 07160.
- 3.4 CEILINGS, SOFFITS & INTERIOR WALLS: Apply joint tape over joints and embed in setting-type joint compound specified. Skim coat surface with setting-type joint compound for smooth finish. Prime & paint as specified.

## 09 30 13 - CERAMIC TILING

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUMMARY: This Section includes the following:
  - A. Ceramic mosaic tile.
  - B. Quarry tile.
  - C. Glazed wall tile.
  - D. Waterproof membrane for thin-set tile installations.
- 1.3 SUBMITTALS: Product Data for each type of tile, mortar, grout, and other products specified. Tile samples for initial selection submit manufacturer's color charts consisting of actual tiles or sections of tiles showing the full range of colors, textures, and patterns available for each type and composition of tile indicated. Include Samples of accessories involving color selection. Grout samples for initial selection, submit manufacturer's color charts consisting of actual sections of grout showing the full range of colors available for each type of grout indicated.
- 1.4 QUALITY ASSURANCE: Engage an experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance. Obtain each color, grade, finish, type, composition, and variety of tile from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties without delaying the Work. Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- 1.5 DELIVERY, STORAGE, AND HANDLING: Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.
- 1.6 PROJECT CONDITIONS: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.
- 1.7 EXTRA MATERIALS: Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents. Furnish quantity of full-size units equal to 50 SF of amount installed, for each type, composition, color, pattern, and size indicated.
- 1.8 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

### PART 2 - PRODUCTS

- 2.1 MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - A. American Marrazzi Tile, Inc.
  - B. American Olean Tile Company.
  - C. Buchtal Corporation USA.
- 2.2 PRODUCTS, GENERAL: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated. Provide tile complying with Standard Grade requirements, unless otherwise indicated. Provide materials complying with ANSI standards referenced in "Setting Materials" and "Grouting Materials" articles. Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements. Provide Architect's selections from manufacturer's full range of colors, textures, and patterns for products of type indicated. Provide wall tile in two field colors; provide 10% glazed accent tile to be in manufacturer's "designer" series.
- 2.3 TILE PRODUCTS



- A. Floor Tile: American Olean "infusion" 12x12 porcelain ceramic floor tile, or equal approved by architect prior to bidding.
    1. Approved Equal: Daltile "P'zazz" 12x24 Colorbody Porcelain floor tile.
  - B. Wall Tile: American Olean "bright & matte" Group 1 with 10% Group 4, 4x4 glazed wall tile, or equal approved by architect prior to bidding.
    1. Approved Alternate: Daltile "Semigloss / Matte" Group 1 with 10% Group 4, 4x4 glazed wall tile.
  - C. Accent Tile: American Olean, Legacy Glass "Arctic Blend Random Linear Mosaics", as shown in drawings or continuous 8" band.
  - D. Tile at desk
    1. American Olean Garden Oasis series glass tiles, 3/4" x 1-1/2" mosaic.
    2. For the stone portion: Dry-stacked stone, basis of design: Coronado Strip Stone
      - a. Size: Stone sizes range from 1½" to 2" in height and up to 23" in length (nominal).
      - b. Thickness: 1¼" to 2"
      - c. Weight: 7 to 10 lbs. per square foot.
  - E. Trim Units: Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:
    1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.
    2. Shapes: As follows, selected from manufacturer's standard shapes:
      - a. Base for Thin-Set Mortar Installations: Straight. Floor Tile type.
      - b. Internal Corners: Field-buttet square corners, except with coved base and cap angle pieces designed to member with stretcher shapes.
      - c. Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor and adjoining floor finishes of different thickness, tapered to provide a reduction in thickness from 1/2 to 1/4 inch across nominal 4-inch dimension.
- 2.4 WATERPROOFING FOR THIN-SET TILE INSTALLATIONS: Provide products that comply with ANSI A118.10 and the descriptions in this Article. Manufacturer's standard proprietary product consisting of 1-part liquid-applied urethane in a consistency suitable for trowel application and intended for use as both waterproofing and tile-setting adhesive in a 2-step process.
- 2.5 SETTING MATERIALS: Mixture of Dry-Mortar Mix and Latex Additive: Mixture of prepackaged dry-mortar mix and liquid-latex additive. For wall applications, provide nonsagging, latex-portland cement mortar complying with ANSI A118.4 for mortar of this type defined in Section F-2.1.2.
- 2.6 GROUTING MATERIALS
- A. FOR USE ON WALLS ONLY - Latex-Portland Cement Grout: ANSI A118.6 for materials described in Section H-2.4, composed as follows:
    1. Mixture of Dry-Grout Mix and Latex Additive: Mixture of factory-prepared, dry-grout mix and latex additive complying with the following requirements:

- a. Unsanded Dry-Grout Mix: Dry-set grout complying with ANSI A118.6 for materials described in Section H-2.3, for joints 1/8 inch and narrower.
- b. Sanded Dry-Grout Mix: Commercial portland cement grout complying with ANSI A118.6 for materials described in Section H-2.1, for joints 1/8 inch and wider.
- c. Latex Additive: Styrene butadiene rubber.
- d. Latex Additive: Acrylic resin.

B. EPOXY GROUT FOR USE ON RESTROOM & KITCHEN FLOORS

1. Epoxy Grout for Restroom Floors:

- a. Basis of Design: Laticrete SpectraLOCK PRO Grout: High performance grout for use with ceramic, glass and stone tile for residential or commercial applications.
- b. Water cleanability: Up to 80 minutes.
- c. Initial set: 2 hours.
- d. Service strength: 24 hours.
- e. Shrinkage: 0.25 percent.
- f. Quarry/quarry bond strength: 1,000 psi (6.9 MPa) - Failure at tile.
- g. Compressive strength 3,500 psi (24 MPa) - 7 days.
- h. Tensile strength 1,100 psi (7.6 MPa) - 7 days.
- i. Thermal shock 510 psi (3.5 MPa).
- j. Water absorption: Less than 0.50 percent.

2. Epoxy Grout for Kitchen Floors:

- a. Basis of Design: Latapoxy 2000 Industrial Grout: 100 percent solids stain resistant, acid- and chemical-resistant, water cleanable.
- b. Compressive Strength: 10,000 psi (69 MPa), min., in accordance with ANSI A118.5.
- c. Bond Strength: 620 psi (4.3 MPa), min., in accordance with ANSI A118.5.
- d. Thermal Shock Resistance: Complies with ANSI A118.3.
- e. Shrinkage and Sag Resistance: Complies with ANSI A118.5.
- f. Initial Set and Service Set Time: Complies with ANSI A118.5.
- g. Service Rating: Passing ASTM C 627 cycles 1-14 (TCA "Extra Heavy").
- h. Color: As selected by Architect from manufacturer's full range.

2.7 MISCELLANEOUS MATERIALS: Trowelable Underlayments and Patching Compounds - Latex-modified, portland-cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated. Tile Cleaner - A neutral

cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

- 2.8 MIXING MORTARS AND GROUT: Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions. Add materials, water, and additives in accurate proportions. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.
- 2.9 Aluminum Trim: Aluminum trim is to be used at all head terminations and corners.
  - A. Head trim: Basis of design to be Schluter QUADEC or Blanke CUBELINE.
  - B. Corners: Basis of design to be Schluter QUADEC or Blanke CUBELINE.
  - C. Edge Trim: Basis of design to be Schluter QUADEC or Blanke CUBELINE.
  - D. EWC Tile Edges & Head Trim: Basis of design to be Schluter DIADEC, miter cut corners to match.
  - E. Finish: Anodized aluminum
- 2.10 THRESHOLDS & TRANSITIONS
  - A. Ceramic Floor Tile to Resilient Tile or Sealed Concrete: Provide ½" tall, anodized aluminum reducer, similar to "Reducer Trim" by Blanke or RENO-U by Schluter.
  - B. Ceramic Floor Tile to Carpet: Provide anodized aluminum trim, similar to "Carpet Trim" by Blanke or RENO-T by Schluter.
  - C. Ceramic Floor Tile to finished Concrete or Thin Film: Provide ½" tall, 3" wide anodized aluminum transition, similar to "Drive" by Blanke or RENO-RAMP by Schluter.
  - D. Handicap Accessible Showers: Provide ½" tall bullnosed marble or Corian thresholds at the entry.

### PART 3 - EXECUTION

- 3.1 EXAMINATION: Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile. Verify that substrates for setting tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 series of tile installation standards for installations indicated. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust latter in consultation with Architect. Do not proceed with installation until unsatisfactory conditions have been corrected.
- 3.2 PREPARATION: Remove coatings, including curing compounds, and other substances that contain soap, wax, oil, or silicone and are incompatible with tile-setting materials by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush. Provide concrete substrates for tile floors installed with dry-set or latex-portland cement mortars that comply with flatness tolerances specified in referenced ANSI A108 series of tile installation standards for installations indicated. Use trowelable leveling and patching compounds per tile-setting material manufacturer's written instructions to fill cracks, holes, and depressions. Remove protrusions, bumps, and ridges by sanding or grinding.
- 3.3 INSTALLATION, GENERAL
  - A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
  - C. Do not install tile that is cracked, chipped or otherwise unsuitable for intended purpose.
  - D. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
  - E. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
  - F. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
  - G. Lay out tile wainscots to next full tile beyond dimensions indicated.
  - H. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
    1. Locate joints in tile surfaces directly above joints in concrete substrates.
    2. Prepare joints and apply sealants to comply with requirements of Division 7 Section "Joint Sealants."
  - I. Grout tile to comply with the requirements of the following tile installation standards:
    1. For ceramic tile grouts (sand-portland cement, dry-set, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.
  - J. At showers, tubs, and where indicated, install cementitious backer units and treat joints to comply with ANSI A108.11 and manufacturer's written instructions for type of application indicated.
- 3.4 WATERPROOFING INSTALLATION: Install waterproofing to comply with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.
- 3.5 FLOOR TILE INSTALLATION: Install tile to comply with requirements in the Ceramic Tile Floor Installation Schedule, including those referencing TCA installation methods and ANSI A108 series of tile installation standards. Install tile on floors with the following joint widths:
- A. Ceramic Mosaic Tile: 1/16 inch.
  - B. Quarry Tile: 1/4 inch.
  - C. Back Buttering: For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
  - D. Tile floors in wet areas, including showers, tub enclosures, laundries, and swimming pools.
  - E. Tile floors composed of tiles 8 by 8 inches or larger.
  - F. Tile floors composed of rib-backed tiles.

- 3.6 WALL TILE INSTALLATION: Install types of tile designated for wall installations to comply with requirements in the Ceramic Tile Wall Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards. Install tile on walls with 1/16" joint widths.
- 3.7 STONE TILE INSTALLATION:
  - A. Pattern: Do not install stones vertically. Blend the stone on the wall from several different boxes to ensure proper color and size variation. See catalog photos for recommended installation pattern.
  - B. Chalk Lines: Should be used by installer to ensure a straight and level pattern.
  - C. Vertical Joints: Should be no higher than 4" on average.
  - D. Drystack: A polymer modified mortar should be used for all drystack applications.
  - E. Installation Info: Download Coronado's latest installation instructions at [www.coronado.com](http://www.coronado.com) for information on mortar and installation recommendations.
- 3.8 CLEANING AND PROTECTING: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter. Remove latex-portland cement grout residue from tile as soon as possible. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains. Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure tile is without damage or deterioration at the time of Substantial Completion. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

## 09 30 33 - LIMESTONE TILING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. 09 30 13 - CERAMIC TILING

#### 1.2 REFERENCES

- A. ASTM A82/185: Reinforcing Welded Galvanized Wire Fabric/Mesh.
- B. ANSI A108-1999: American National Standard Specifications for the Installation of Ceramic Tile
- C. ANSI A118.1-1999: Dry-Set Portland Cement.
- D. ANSI A118.2-1999: Conductive Dry-Set Portland Cement Mortar.
- E. ANSI A118.3-1999: Water Cleanable Tile Setting and Grouting Epoxy.
- F. ANSI A118.4-1999: Latex-Portland Cement Mortar.
- G. ANSI A118.5-1999: Furan Mortars and Grouts.
- H. ANSI A118.6-1999: Ceramic Tile Grouts.
- I. ANSI A118.7-1999: Polymer Modified Cement Grouts
- J. ANSI A118.8-1999: Modified Epoxy Emulsion Mortar/Grout.
- K. ANSI A118.9-1999: Cementitious Backer Units (CBU).
- L. ANSI A118.10-1993: Load Bearing, Bonded, Waterproof Membrane for Thin-set Ceramic Tile and Dimensional Stone Installations.
- M. ANSI A136.1-1999: Organic Adhesive.
- N. ASTM C144-99: Standard Specification for Masonry Aggregates.
- O. ASTM C207-91 (1992): Standard Specification for Hydrated Lime.
- P. ASTM C568-99: Standard Specification for Limestone Dimension Stone.
- Q. ASTM C847-95: Standard Specification for Reinforcing Metal Lath.
- R. ASTM C1178-96: Glass Mat Water Resistant Gypsum Backing Board.

#### 1.3 PERFORMANCE STANDARDS

- A. Static Coefficient of Friction: Tile installed on walkway surfaces shall have the following values as determined by testing identical products per ASTM C1028.
  - 1. Level Surfaces: Minimum 0.5 dry.

2. Step Treads: Minimum 0.6 dry.

3. Ramp Surfaces: Minimum 0.6 dry.

B. Exterior tiles provided for Work in this Section to be frost resistant in accordance with CAN/CGSB 75.1 and shall have a moisture absorption rating of 3.0% or less.

#### 1.4 SAMPLES

A. Submit samples to requirements of Section 01 33 23.

#### 1.5 SHOP DRAWINGS

A. Submit shop drawings to requirements of Section 01 33 23.

B. Shop Drawings: indicate swim lines, terminal, targets, pool markings, and special patterns. Include locations and details for all proposed control joints.

#### 1.6 SUBMITTALS

A. Submit four copies of TTMAC Maintenance Guide for inclusion in the operations and maintenance manual. Give specific warning of any maintenance practice or materials that may damage or disfigure the finished work.

B. Where more than one manufacturer's products are part of a single tile assembly, arrange for each manufacturer to submit a written statement of compatibility with respect to the other manufacturers' materials.

#### 1.7 QUALITY ASSURANCE

A. Installer: Employ skilled mechanics trained and experienced in tile work. If requested by Consultant, submit a listing of at least three previously completed projects of similar size and scope.

#### 1.8 ENVIRONMENTAL CONDITIONS

A. Do not install tiles at temperatures less than 55 degrees F or above 100 degrees F

B. Maintain temperatures at or above 55 degrees F until cementitious materials have fully cured.

C. Do not apply epoxy mortar and grouts at temperatures below 65 degrees F or above 95 degrees F.

#### 1.9 DELIVERY STORAGE AND HANDLING

A. Store materials in a dry area, protected from freezing, staining and damage.

B. Store cementitious materials on a dry surface.

#### 1.10 EXTRA MATERIALS

A. Provide extra stock to requirements of Section 01 78 46.

B. Extra Stock: 2 percent, whichever is the greater, of each type and color of tile; clearly marked to identify:

1. Manufacturer's name

- 2. Product's name
- 3. Product color and pattern
- C. Package tile products neatly in original containers, to prevent damage.

1.11 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers of limestone tile having Product considered acceptable for use:
  - 1. Texas Quarries
  - 2. Arnold Stone Co
- B. Substitutions: refer to Instructions to Bidders and Section 01600.

### 2.2 TILE MATERIALS

- A. Limestone Tile: Cordova Cream or Lueders; ASTM C568, Class III - High Density; color as selected by Consultant.
- B. Size: The stone shall be #1 grade, ½" thick with face dimensions indicated in drawings.

### 2.3 MORTAR, ADHESIVE AND GROUT MATERIALS

- A. Portland Cement: to CAN/CSA-A5, Type 10.
- B. Hydrated Lime: to ASTM C207, Type [N] [NA] [S] [SA].
- C. Sand: to ASTM C144, passing 16 mesh.
- D. Dry-Set Portland Cement Mortar: to ANSI A118.1.
- E. Latex-Portland Cement Mortar: to ANSI A118.4.
- F. Commercial Portland Cement Grout: to ANSI A118.6.
- G. Latex-Portland Cement Grout: to ANSI A118.6.
- H. Polymer Modified Grout: to ANSI A118.7
- I. Epoxy Adhesive and Grout: to ANSI A118.3.
- J. Modified Epoxy Emulsion Mortar: to ANSI A118.8
- K. Furan Mortars and Grout: to ANSI A118.5.
- L. Exterior Grade Plywood (EGP) Latex-Portland Cement Mortar: to ANSI A118.11.



- M. Organic Adhesive: to ANSI A136.1

## 2.4 ACCESSORIES

- A. Metal Lath: galvanized type, 1.4 kg/m<sup>3</sup> to ASTM C847.
- B. Reinforcing Mesh: [51 x 51 mm] [2" x 2"] mesh size, fabricated from 1.6 mm thick galvanized steel wire; welded fabric design.
- C. Latex Additive: formulated for use in Portland cement mortars and grouts.
- D. Organic Adhesive: to ANSI A136.1, Type [1] [2].
- E. Water: potable, clean and free of chemicals and contaminants detrimental to mortar or grout mixes.
- F. Prefabricated Movement Joints: purpose made, having a Shore A Hardness not less than 60 and elasticity of plus or minus 40 percent when used in accordance to TTMAC Detail 301MJ-2002.

## 2.5 MIXES

- A. Scratch Coat (by volume): 1 part Portland cement, 4 parts sand, and latex additive where required by TTMAC Detail. Premixed mortar may be used per manufacturer's instructions. Adjust water volume depending on moisture content of sand to obtain consistency and workability.
- B. Slurry Bond Coat: mix Portland cement and water to a creamy paste consistency. Include latex additive where required by TTMAC Detail.
- C. Mortar Bed for Walls (by volume): 1 part Portland cement, 4 parts sand, and latex additive where required by TTMAC Detail. Premixed mortar may be used per manufacturer's instructions. Adjust water volume depending on moisture content of sand to obtain consistency and workability.
- D. Leveling Coat (by volume): 1 part Portland cement, 4 parts sand, and latex additive where required by TTMAC Detail. Premixed mortar may be used per manufacturer's instructions.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify existing conditions are ready to receive work.
- B. Ensure substrate surfaces are clean, dimensionally stable, cured and free of contaminants such as oil, sealers and curing compounds.
- C. Ensure that concrete has been allowed to cure for a minimum of 28 days (preferably 90 days or longer).
- D. Ensure substrates to receive thin-set applied tile are steel trowelled to a fine finish with a maximum permissible variation of 6 mm in 3049 mm from the required plane and not more than 2 mm in 305 mm when measured from high points in the surface.
- E. Notify Consultant in writing of unacceptable substrate conditions. Beginning of installation implies acceptance of existing conditions.

### 3.2 PREPARATION

- A. Protect surrounding work from damage or disfiguration.
- B. Thoroughly clean existing surfaces that are to receive tile finish to ensure the removal of all grease, oil or dust film.

### 3.3 APPLICATION

- A. Install materials to requirements of TTMAC Tile Specification Guide, as scheduled below.
- B. Fit tile units around corners, fitments, fixtures, drains and other built-in objects to maintain uniform joint appearance.
- C. Make cut edges smooth, even and free from chipping. Do not split tile.
- D. Lay out tiles according to drawings and patterns so that perimeter and all cut tiles are no less than half size.
- E. Prior to installation ensure that the back of each tile is free of contaminants.
- F. Do not install tile that is cracked, chipped or otherwise unsuitable for intended purpose.
- G. For tile with raised or textured backs, bonding material must be evenly dispersed and pressed into the back of the tile to ensure a minimum of 95% coverage. Set tile in place while bond coat is wet and tacky, prior to skinning over. Notch bond coat in horizontal straight lines and set on the freshly set bonding material while moving (sliding) tile back and forth at 90° to the notches. Ensure corner and edges are fully supported by bonding material. Avoid lippage.
- H. Clean excess bonding material from surface prior to final set.
- I. Sound tiles after setting materials have cured and replace hollow sounding tile before grouting.
- J. Use sufficient bond coat to ensure minimum 80% contact. Bonding material must be evenly dispersed and pressed into the back of the tile.
- K. Bond coverage of 95% evenly dispersed is required for tile larger than 305 mm x 305 mm, tile used in wet areas or exterior, and for tile used in areas rated Heavy or Extra Heavy Duty.
- L. Keep two-thirds of the depth of grout joints free of setting material.
- M. Protect exposed edges of floor tile with appropriately sized transition strips. Provide reducer strips where uneven transitions between 6 mm and 12.5 mm occur.

### 3.4 CONTROL JOINTS: Use the following table to determine placement of control and expansion joints

Environment	Minimum	Maximum	Joint Width
Interior	4878 mm	6098 mm	6 mm minimum
Interior/Sunlight	3659 mm	4878 mm	6 mm minimum
Exterior – Normal	2439 mm	3659 mm	10 mm minimum
Exterior – Excessive	2439 mm	3049 mm	13 mm minimum

- A. Install control joints and expansion joints in tile work in accordance with TTMAC Detail 301MJ-2002.
- B. Keep all control and expansion joints free of setting materials.

**3.5 GROUTING**

- A. Allow proper setting time prior to grouting.
- B. Pre-seal tiles requiring protection from grout staining.
- C. Force grout into joints to ensure dense finish.
- D. Remove excess and polish with clean cloths.

3.6 FIELD QUALITY CONTROL: Inspect completed work and replace broken, cracked, hollow sounding or damaged tile.

3.7 TOLERANCES: Set and level tile flush with adjacent tile (lippage 1 mm tolerance over a 3 mm joint).

3.8 CLEANING: Apply floor sealer in accordance with manufacturer's instructions.

3.9 PROTECTION: Protect wall tiles and bases from impact, vibration, heavy hammering on adjacent and opposite walls for at least 14 days after installation.

## 09 51 23 - ACOUSTICAL TILE CEILINGS

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Provide acoustical ceilings where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.
- 1.4 EXTRA STOCK: Deliver to the Owner for his use in future modifications, an extra stock of approximately 100 SF of each type of acoustical material installed, packaging each type of material separately, distinctly marked, and adequately protected against deterioration.
- 1.5 QUALITY ASSURANCE: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- 1.6 NOTIFICATION FOR INSPECTION: Schedule an inspection with Architect prior to work on scope addressed in this section.

### PART 2 - PRODUCTS

- 2.1 METAL "T" GRID SYSTEM: All grid to be intermediate duty 15/16" - 2'x2' unless noted otherwise. Provide a complete system of supporting members, anchors, wall cornices, adapters for light fixtures and grilles, and accessories of every type required for a complete suspended "T" grid system of the arrangements shown on the Drawings, in white, and complying with pertinent requirements of Underwriters Laboratories, Inc., and the governmental agencies having jurisdiction. Acceptable products:
  - A. Chicago Metallic Corp., "Snap Grid 500".
  - B. Armstrong
  - C. Products of other manufacturers when approved in advance by the Architect will be considered.
- 2.2 EDGE GRID AT "CLOUD APPLICATIONS": Armstrong "AXIOM Knife Edge" or equal approved by Architect prior to bidding.
- 2.3 ACOUSTICAL CEILING PANELS: Panel size 24"x 24"x 5/8", square edge. Surface flame spread to be 25 or less, smoke developed 50 or less & be UL listed. NRC 0.55 or greater, CAC 33 or better, Light Reflectance 0.85. Acceptable products:
  - A. Armstrong Fine Fissured HumiGuard Plus #1728.
  - B. Comparable product by USG
  - C. Comparable product by Certain-Teed
  - D. Products of other manufacturers when approved in advance by the Architect will be considered.
- 2.4 ACOUSTICAL CEILING PANELS AT INSTRUCTIONAL SPACES: Panel size 24"x 24"x 3/4", square edge. Surface flame spread to be 25 or less, smoke developed 50 or less & be UL listed. NRC 0.70 or greater, CAC 40 or better, Light Reflectance 0.85. Acceptable products:
  - A. Armstrong School Zone Fine Fissured HumiGuard Plus #1810.
  - B. Comparable product by USG

- C. Comparable product by Certain-Teed
- D. Products of other manufacturers when approved in advance by the Architect will be considered.

**2.5 DAMP LOCATION SYSTEM (cheaper): At damp locations such as restrooms & kitchens, & as indicated in the drawings, use:**

- A. Tile: Basis of design to be Kitchen Zone 673 by Armstrong, or products of other manufacturers when approved in advance by the Architect.
- B. Grid System: Stainless steel capped or aluminum grid system, rated for damp location.

**2.6 DAMP LOCATION SYSTEM: At damp locations such as restrooms & kitchens, & as indicated in the drawings, use vinyl covered 1/2" gypsum panels in a stainless steel capped or aluminum grid system, rated for damp location.**

**2.7 FIRE RATED SYSTEM: As indicated in the drawings, provide one hour rated system assembly. Acceptable products: Chicago Metallic Corp., "Snap Grid 500; USG "Fire Front 850" grid; USG Interiors "Auratone" 5/8" Fissured Firecode panels; Celotex "Protectone". Other products determined by the Architect to be equal & receiving his prior approval may be considered.**

**2.8 STAGE ACOUSTIC TILES:**

- A. Basis of design: CertainTeed Performa Theater Black F.
- B. NRC: 0.75
- C. CAC: 20
- D. LR: 0.03
- E. Fire Rating: Class A
- F. Foil Backing: No
- G. Sag Resistant
- H. Mold Resistant

**2.9 ROUND ACOUSTIC CLOUD CEILING UNITS**

**A. TYPE 1:**

1. Basis of Design: Ecophon Solo by CertainTeed Ceilings.
2. Shape & Size: 48" Circle at Small Clouds; 63" Circle XL at Large Clouds.
3. Edge Detail: Fully Painted, Square
4. Finished Surface: Akutex FT
5. Finished Surface Color: 90% White 0500; 10% Misty Rose 1010
6. Core Composition: Glasswool
7. NRC per ASTM C423: 0.95
8. LR per ASTM E1477: 0.85
9. Light Diffusion per DIN 5036: 99%
10. Humidity Resistance per ISO 4611: Warranted to withstand relative humidity of up to 95% at 104°F without sagging, warping or delaminating for 10-years
11. Mold Resistant
12. Scratch Resistant
13. Fire Rating: Class A
14. Suspension System:
  - a. Basis of Design: Ecophon Solo adjustable wire suspension components
  - b. Connect Adjustable wire hanger assembly 2174
  - c. Adjustable attachment clip
  - d. Connect Spiral Anchor 0194
  - e. CertainTeed Classic main runner (for Circle XL only)
  - f. Connect Hanger Clip (for Circle XL only)
  - g. 1/2" Self-tapping Screws (for Circle XL only)

**B. TYPE 2:**

1. Armstrong Axiom Formations, or approved equal.
  - a. Small Cloud: 6' Circle, 6" Axiom for Trim C6VES0606C Kit # 3970

- b. Large Cloud: 8' Circle, 6" Axiom for Trim C6VES0808C Kit # 3973
- c. Clouds to use 2' by 2' Optima style acoustic ceiling tiles.

**2.10 WOOD CEILING: Basis of design - Armstrong WoodWorks Channeled Plank (5901CW7) system.**

- 2.11 OTHER MATERIALS: Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

**PART 3 - EXECUTION**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed & correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Except as modified by requirements of governmental agencies having jurisdiction, recommendations of the manufacturer as approved by the Architect, or specific directions of the Architect, install in accordance with ASTM C636 and the pertinent UL design requirements. Provide lateral bracing as required by pertinent codes and regulations. Secure lateral bracing to structural members at right angles to the direction of the partition and four ways in large ceiling areas. Provide hold-down clips for ceiling boards at fiberglass ceiling, when required by governmental agencies having jurisdiction & as indicated on drawings. Make all grid level within a tolerance of one in 1000 and straight within a tolerance of one in 1000. Install acoustical ceiling boards so linearity of facing is as directed by the Architect.
- 3.3 CLEANING UP: In addition to other stipulated requirements for cleaning, completely remove finger prints and traces of soil from the surfaces of grid and acoustical materials, using only those cleaning materials recommended for the purpose by the manufacturer of the material being cleaned.

## **09 64 04 - WOOD FLOOR REFINISHING**

### **PART 1 - GENERAL**

#### **1.1 SUBMITTALS**

- A. Specification - Submit Manufacturer specification sheets and shop drawings as required.
- B. Maintenance Guidelines - Upon completion of floor, send the Manufacturer's Floor Maintenance Guide to the owner. This guide will explain the proper HVAC and building maintenance requirements as well as floor cleaning and servicing guidelines to assure proper floor performance and longevity.

#### **1.2 WORKING CONDITIONS**

- A. The wood floor refinishing shall not be performed until all wet trades and overhead work is completed. This includes all masonry, painting, plaster, tile, marble, and terrazzo, as well as all overhead mechanical trades. The building shall be fully enclosed and weather tight and all permanent windows and doorways shall be installed. Permanent heating and air conditioning shall be installed and working in accordance with building occupation requirements.
- B. During and after installation, building HVAC systems shall maintain a temperature and humidity range compatible with the expected high and low moisture content range of the flooring. The floor installer, based on the building's HVAC control and geographical situation, shall determine this range.

#### **1.3 WARRANTY AND DISCLAIMER**

- A. Manufacturer shall warrant the materials it has supplied to be free from manufacturing defects for a period of one year.

#### **1.4 PREINSTALLATION CONFERENCE:** Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- A. Finish Materials – Any seal and finish approved by the MFMA
- B. Game Lines – Compatible with finish and as specified by layout design

### **PART 3 - EXECUTION**

#### **3.1 PRE-INSTALLATION INSPECTION**

- A. Room shall be broom cleaned and free of any foreign debris.
- B. Floor installer shall document site and working conditions prior to and during installation. This documentation shall become a part of any warranty and may or may not affect fulfillment of any warranty.

#### **3.2 FINISHING**

##### **A. FLOOR SANDING**

- 1. Machine sand entire floor with multiple grit papers to a smooth and uniform surface, free from edger marks and drum drops.

2. Remove all sanding dust and lint from entire surface by vacuum and/or tack.

**B. FINISHING AND GAME LINES**

1. Inspect entire floor to be sure surface is ready to accept seal and finish. Floor should be free from dust and debris.
2. Apply (2) coats of approved seal and (2) coats of approved finish per manufacturer's label instructions.
3. Floor shall be buffed, cleaned and tacked between coats.
4. Apply game lines and logos as indicated by drawings between seal and finish coats. Paint shall be compatible with finish.

**3.3 CLEANUP**

- A. Remove excess debris and waste material from the work area.
- B. General Contractor shall lock floor area after floor is finished to allow proper curing time. If general contractor or owner requires use of gym before proper curing time, they shall protect the floor by covering with non-marring Kraft paper.



**09 64 66 - WOOD PLYWOOD ATHLETIC FLOORING, PLYWOOD SUBFLOOR**

**PART 1 - GENERAL**

- 1.1 DESCRIPTION: Provide wood gymnasium flooring system and base where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- 1.2 WORK IN OTHER SECTIONS: The contractor shall furnish and install the concrete subfloors depressing the slab sufficiently to accommodate the floor system. The slab shall be steel trowelled and finished smooth to a tolerance of 1/8" in any 10' radius by the contractor. High spots shall be ground level, and low spots filled in with approved leveling compound by the contractor. Concrete subfloors on or below grade shall be adequately waterproofed beneath and at the perimeter of the slab and on the earth side of below grade walls.
- 1.3 QUALITY ASSURANCE: Manufacturer of resilient flooring shall be a firm specializing in manufacturing products specified in this section. The complete installation of the flooring system, as described in the scope of these specifications, shall be carried out by an experienced Flooring Contractor and the work shall be performed in accordance with most recent installation instructions of the manufacturer.
- 1.4 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review. Submit certificates attesting that materials furnished will meet specifications for grade, quality, dryness and treatment. Submit specification sheets, one sample of specified system, and maintenance instructions including temperature and humidity ranges for areas where flooring is installed.
  - A. Game Lines and Graphics: Submit shop drawings of court striping and graphics and set-up coordination meeting for final selection of court striping colors and graphics. Submit color card for game lines.
- 1.5 WORKING CONDITIONS: The wood flooring specified herein shall not be installed until all masonry, painting, & tile work is completed, and overhead mechanical trades and painters have finished in the wood floor areas. The building shall be enclosed and weathertight. The concrete subfloors shall be dry by industry standard testing procedures, free of foreign materials, and broom clean. Moderate room temperature of 65 degrees or more shall be maintained a week preceding and throughout the duration of the work. Humidity conditions within the building shall approximate the humidity conditions which will prevail when the building is occupied. Permanent heat, light and ventilation shall be installed and operating during and after installation, maintaining a temperature range compatible with the expected low and high moisture content of the flooring. Flooring must be stored in a dry, well-ventilated area, not in contact with the masonry, to acclimate to building conditions and shall be installed at a moisture content compatible with the normally expected environmental range of temperature and relative humidity achieved while the facility is occupied. After floors are finished, area to be kept locked by general contractor to allow curing time for finish. If after required curing time general contractor or owner requires use of gym, he shall protect the floor by covering with non-marring kraft paper or red rosin paper with taped joints until acceptance by owner of complete gymnasium floor.
- 1.6 HUMIDITY CONTROL: Since all wood flooring will expand and contract as relative humidity varies, it is important to minimize extremes between low and high. Hardwood flooring is manufactured at a moisture content most compatible with a 35%-50% relative humidity range. Geographical regions and available mechanicals determine the typical range of temperature and humidity for each facility. Maintaining a 15% fluctuation between highest and lowest average indoor relative humidity provides limited shrinkage and growth. Make use of available HVAC systems to prevent excessive tightening and shrinkage of flooring.
- 1.7 WARRANTY: Manufacturer to warrant that the materials supplied are free from manufacturing defects for a period of one year. Flooring Contractor shall be liable for all matters related to installation for a period of one year after the floor has been substantially installed and completed.

**PART 2 - PRODUCTS**

- 2.1 ACCEPTABLE MANUFACTURERS: Subject to compliance with the requirements, provide wood gymnasium flooring system by one of the following: Connor Neo-Shok or Robbins Bio-Cushion. Other systems meeting these specifications will be considered if approved by Architect.
- 2.2 MATERIALS:
  - A. Vapor barrier - 6 mil polyethylene.
  - B. Resilient pads - 3/4" thick, hemispherical, two stage, polyurethane, 70D durometer or
  - C. Subfloor - 2 layers of 15/32" APA rated plywood sheeting, Exposure 1.
  - D. Flooring - 25/32" X 2-1/4", random length, Second & Better Grade, Northern Hard Maple Flooring, TGEM, MFMA Grade marked and stamped.
  - E. Flooring fasteners - 2" barbed cleats or coated staples.
  - F. Subfloor fasteners - 1" staples or equivalent.
  - G. Finish materials - oil modified polyurethane seal and finish; Gameline paint shall be compatible with finish.
  - H. Wall Base - 3" X 4", heavy duty, molded, vented cove base with pre-molded outside corners.
  - I. Joint Cover - Ventilated, extruded aluminum saddle.
- 2.3 OTHER MATERIAL: Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.
- 2.4 GAME LINES AND GRAPHICS: To be per drawings and to meet UIL requirements. Architect to select colors.

### PART 3 - EXECUTION

- 3.1 PREPARATION: Coordinate the slab recess with the wood floor system thickness. Inspect concrete slab for proper tolerance and dryness & report any discrepancies in writing. Concrete slab shall be broom cleaned by general contractor. Installer (Flooring Contractor) shall document all working conditions provided in General Specifications prior to commencement of installation.
- 3.2 INSTALLATION : Cover concrete with poly sealing and lapping joints a minimum of 6". Install lower layer of subfloor perpendicular to finish maple flooring spacing all edges 1/4" and breaking joints 4'. Provide 1-1/2" expansion voids at perimeter and at all vertical obstructions. The underside of first layer shall have Neo-Shok pads attached 12" on center (32 per sheet) and 6" from edges on all sides. Install solid blocking at doorways, under bleachers in the stacked position and below portable goals. The second layer of subfloor shall be layed at a 45 degree angle over the first layer, 1/4" spacing at all edges and breaking joints 4'. Provide 1-1/2" expansion voids at perimeter and at all vertical obstructions. Attach second layer of subfloor with fasteners 12" on center. Install maple flooring by power nailing or stapling approximately 12" on center with end joints properly driven up. If required, size joints between flooring strips to allow for intermediate expansion in accordance with local humidity conditions. Provide 1-1/2" expansion voids at perimeter and at all vertical obstructions.
- 3.3 FINISHING: Machine sand with course, medium, and fine paper to a smooth, even and uniform surface. Remove sanding dust from entire surface by tack or vacuum. Inspect entire area of floor to insure that surface is acceptable for finishing, clean and completely free from sanding dust. Apply two (2) coats of approved seal and two (2) coats of approved finish per manufacturer's instructions. Buff and clean floor between coats. Apply game lines as indicated on drawings, between seal and first coat of finish.

- 3.4 BASE & TRIM INSTALLATION: Install vent cove base to walls with base cement or screws. Use pre-molded outside corners and mitered inside corners. Install transition strips as required to dissimilar floorings.
- 3.5 CLEANING: Clean up all unused materials and debris and remove them from the premises. Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer. Demonstrate maintenance procedures to Owner upon completion.

# 09 64 67 - WOOD ATHLETIC FLOORING, SLEEPER SUBFLOOR

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. Related work specified under other sections.

#### 1. CONCRETE SUBFLOORS

a. Slab depression is:

i 2-1/2" for 25/32" flooring (with 1/4" foam)

ii 2-3/4" for 33/32" flooring (with 1/4" foam)

iii Adjust slab depression accordingly when using other than 1/4" foam.

b. The general contractor shall furnish and install the concrete subfloor depressing the slab sufficiently to accommodate the floor system. The slab shall be steel troweled smooth to a tolerance of 1/8" in any 10' radius by the general contractor. High spots shall be ground level, and low spots filled in with approved leveling compound by the general contractor to the full approval of the installer.

#### 2. MEMBRANE WATERPROOFING

a. Concrete subfloors on or below grade shall be adequately waterproofed beneath the slab and at the perimeter walls and on earth side of below grade walls by general contractor using suitable type membrane.

### 1.2 REFERENCES

A. DIN – Performance Standard 18032 Part 2

B. EN – Performance Standard 14904 World Standard

C. FSC – Forest Stewardship Council

D. LEED – Leadership in Energy and Environmental Design

E. MFMA – Maple Flooring Manufacturers Association

F. PUR- Performance Uniformity Rating Standards

### 1.3 QUALITY ASSURANCE

A. Manufacturer

1. Manufacturer of resilient flooring shall be a firm specializing in manufacturing products specified in this section.

2. Basis of design shall be "ScissorLoc I" sports floor system as provided by Acer Flooring. (877) 582-1181, [www.Acerflooring.com](http://www.Acerflooring.com).

3. Materials other than those listed must be approved 10 days prior by written addendum.

4. Materials from non-approved manufacturers will not be accepted.

B. Installer

1. The installation of the floor system described in these specifications shall be completed by a firm familiar with the requirements of the system specified and fully experienced in procedures required for installing athletic flooring.
2. Installer shall be liable for all matters related to installation for a period of one year after the floor has been substantially installed and completed.
3. Installer must have manufacturer installation accreditation.

C. Performance Testing

1. Flooring system shall have been independently tested to the International Standards: DIN 18032, Part 2 or EN 14904.
2. Independent DIN testing laboratory must be recognized by the MFMA and test to all the required standards of the DIN testing methodologies.
3. Independent DIN testing laboratory shall have Scientific Body Membership in the International Association of Sports Surface Sciences (ISSS).

1.4 SUBMITTALS

- A. Specification - Submit Manufacturer Flooring specification sheets and shop drawings as required.
- B. Sample - Submit required number of samples of the specified system as requested by the owner/architect.
- C. Game Lines and Graphics: Submit shop drawings of court striping and graphics and set-up coordination meeting for final selection of court striping colors and graphics. Submit color card for game lines.
- D. Maintenance Guidelines - Upon completion of floor, send the Manufacturer's Floor Maintenance Guide to the owner. This guide will explain the proper HVAC and building maintenance requirements as well as floor cleaning and servicing guidelines to assure proper floor performance and longevity.

1.5 WORKING CONDITIONS

- A. The wood flooring and its components specified herein shall not be delivered or installed until all wet trades and overhead work is completed. This includes all masonry, painting, plaster, tile, marble, and terrazzo, as well as all overhead mechanical trades. The building shall be fully enclosed and weather tight and all permanent windows and doorways shall be installed. Permanent heating and air conditioning shall be installed and working in accordance with building occupation requirements.
- B. The concrete substrate shall be determined fully cured by industry standards. It shall be free of all foreign materials and broom cleaned when turned over to the floor installer. Permanent HVAC units for the building shall have been operating a minimum of one week prior to the floor installation start up.
- C. During and after installation, building HVAC systems shall maintain a temperature and humidity range compatible with the expected high and low moisture content range of the flooring. The floor installer, based on the building's HVAC control and geographical situation, shall determine this range.
- D. Flooring must be stored on site in a dry, well ventilated area while acclimating to site conditions. Moisture content of wood shall be consistent with the ambient conditions of the building as it will be maintained when occupied.

1.6 WARRANTY AND DISCLAIMER

- A. Manufacturer shall warrant the materials it has supplied to be free from manufacturing defects for a period of one year.

- B. Flooring contractor shall warrant the install of the floor systems to be free from defects in materials and workmanship for a period of one year.
- C. During the warranty period, the floor shall not be recoated without the approval of the flooring contractor.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Vapor Barrier – 6 mil polyethylene
- B. Resilient Foam-
  - 1. 1/4" multicellular, closed cell, polyethylene foam, nominal 2.0 PCF density.
  - 2. Optional Resilient Foam(Specify or Delete)
    - a. 1/2" multicellular, closed cell, polyethylene foam, nominal 2.0 PCF density.
- C. Subfloor –
  - 1. 1" X 6" (nominal) Spruce, Pine, Fir, Hemlock, S4S, random length.
  - 2. FSC® Certified (Specify or Delete) Subfloor must be certified by the Forest Stewardship Council®
- D. Flooring –
  - 1. 25/32" x 2-1/4" 2nd and Better grade northern Hard Maple flooring, TGEM, MFMA grade marked and stamped.
- E. Fasteners –
  - 1. Flooring - 2" barbed cleats..
  - 2. Subfloor – 1-1/2" coated staples.
- F. Finish Materials – Any seal and finish approved by the MFMA
- G. Game Lines – Compatible with finish and as specified by layout design
- H. Wall Base - Heavy duty, molded, vented cove base with pre-molded outside corners.

2.2 GAME LINES AND GRAPHICS: To be per drawings and to meet UIL requirements. Colors to be selected by Architect.

## PART 3 - EXECUTION

### 3.1 PRE-INSTALLATION INSPECTION

- A. Floor installer shall verify slab tolerance of concrete and report any corrections to general contractor.
- B. Room shall be broom cleaned and free of any foreign debris.
- C. Floor installer shall document site and working conditions prior to and during installation. This documentation shall become a part of any warranty and may or may not affect fulfillment of any warranty.

### 3.2 INSTALLATION

A. SUBFLOOR –

1. Cover entire slab with 6 mil polyethylene, sealing and lapping joints a minimum of 6".
2. Lay foam perpendicular to the long dimension of the room. Butt all end and side joints tight. Tape all seams.
3. Install first layer of 1 x 6 pine at 22-1/2 degrees to the finished flooring direction. Butt end joints and provide 2" for spacing alongside edges. Provide 1-1/2" expansion voids at perimeter and all vertical obstructions. Install solid blocking at doorways, under bleachers in the stacked position, and below portable goals.
4. The second layer of 1 x 6 pine shall be laid in the opposite direction of the first layer, at a 22-1/2 degree angle to the finished flooring direction. Butt end joints and provide 2" spacing alongside edges and secure to first layer with staples at each intersection. Provide 1-1/2" expansion voids at perimeter and all vertical obstructions.

B. MAPLE FLOORING

1. Install maple flooring parallel with the long dimension of room. Flooring shall be power nailed every 10" to 12" O.C. with all end joints properly driven tight.
2. Expansion joints may be required between flooring strips intermittently throughout the floor. Requirements will be determined by site and geographical conditions.
3. Provide a minimum 1-1/2" expansion void at all walls and permanent obstructions.

3.3 FINISHING

A. FLOOR SANDING

1. Machine sand entire floor with multiple grit papers to a smooth and uniform surface, free from edger marks and drum drops.
2. Remove all sanding dust and lint from entire surface by vacuum and/or tack.

B. FINISHING AND GAME LINES

1. Inspect entire floor to be sure surface is ready to accept seal and finish. Floor should be free from dust and debris.
2. Apply (2) coats of approved seal and (2) coats of approved finish per manufacturer's label instructions.
3. Floor shall be buffed, cleaned and tacked between coats.
4. Apply game lines and logos as indicated by drawings between seal and finish coats. Paint shall be compatible with finish.

C. BASE INSTALLATION

1. Install vent cove base with cove base adhesive and/or mechanical attachment to wall. Use pre-molded outside corners and mitered inside corners.

3.4 CLEANUP

A. Remove excess debris and waste material from the work area.

B. General Contractor shall lock floor area after floor is finished to allow proper curing time. If general contractor or owner requires use of gym before proper curing time, they shall protect the floor by covering with non-marring Kraft paper.

**09 65 13 - RESILIENT BASE**

**PART 1 - GENERAL**

- 1.1 DESCRIPTION: Provide resilient tile base where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 EXTRA STOCK: Deliver to the Owner for his use in future modifications an extra stock of approximately 20 LF of each color and pattern in each material installed under this Section, packing each type of material separately, distinctly marked, and adequately protected against deterioration.
- 1.4 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

**PART 2 - PRODUCTS**

- 2.1 GENERAL: Provide colors and patterns as selected by the Architect from standard colors and patterns of the approved manufacturer in the specified type. Products of other manufacturers when approved in advance by the Architect will be considered.
- 2.2 COLOR: Color selected by Architect from manufacturer's standard.
- 2.3 VINYL BASE: 4" high x .080 thk x 100' roll, by Roppe Rubber Co. or another manufacturer approved in writing by the Architect prior to bidding. Use mitered inside corners. Color selected by Architect from manufacturer's standard.
- 2.4 ADHESIVES: Provide waterproof and stabilized typed adhesive as recommended by the manufacturer of the material being installed. Asphalt emulsions and other non-waterproof adhesives will not be acceptable.
- 2.5 OTHER MATERIAL: Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

**PART 3 - EXECUTION**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 PREPARATION: Verify that substrate is smooth, level, at required finish elevation, and without more than 1/8" in 10'-0" variation from level or slopes shown on the Drawings. Prior to laying materials, broom clean or vacuum the surfaces to be covered, and inspect the subfloors.
- 3.3 PRIMING: Apply concrete slab primer if so recommended by the resilient flooring manufacturer. Apply in accordance with the manufacturer's recommendations as approved by the Architect.
- 3.4 INSTALLING BASE: Install base at the juncture of walls to all new flooring & where shown on the Drawings. Use factory-performed exterior corners, and factory-performed or job-mitered interior corners.
- 3.5 CLEANING AND PROTECTING: Remove excess adhesive and other blemishes from exposed surfaces, using neutral cleaner recommended by the manufacturer of the resilient materials.



## 09 65 19 - RESILIENT TILE FLOORING

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Provide resilient tile flooring and base where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 EXTRA STOCK: Deliver to the Owner for his use in future modifications an extra stock of approximately 100 SF of each color and pattern in each material installed under this Section, packing each type of material separately, distinctly marked, and adequately protected against deterioration.
- 1.4 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.
- 1.5 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

### PART 2 - PRODUCTS

- 2.1 GENERAL: Provide colors and patterns as selected by the Architect from standard colors and patterns of the approved manufacturer in the specified type. Products of other manufacturers when approved in advance by the Architect will be considered.
  - 2.2 STANDARD VINYL TILE (VCT): 12"x 12"x 1/8" vinyl composition floor tile, meeting requirements of Fed Spec SS-T-312B Type IV & NFPA Class 1. Material to be Armstrong "Standard EXCELON" or equal as approved by Architect prior to bidding.
  - 2.3 LUXURY VINYL TILE (LVT): 24" x 24", 20 mil wear layer with quartz enhanced urethane finish. Material to be Patcraft "Letterpress" or Timbergrove" or equal as approved by Architect prior to bidding.
  - 2.4 MODULAR RESILIENT TILE (MRT): Basis of Design J+J Kinetex "Flash" & "Pop", or equal as approved by Architect.
    - A. Construction: Loop
    - B. Wear Layer: 100% Solution Dyed Polyester - Universal Fibers
    - C. Standard Backing: Polyester Felt Cushion
    - D. Dye Method: Solution Dyed
    - E. Pattern Repeat: N/A
    - F. Total Weight (nominal average): 4.5 oz - 5.2 oz/ square foot
    - G. Total Thickness (nominal average): 0.205 inches
    - H. Dimensions: 24" x 24" modules
    - I. Special Treatments: Kinetex ProTex®
  - 2.5 COLOR: Color selected by Architect from manufacturer's standard, installed in a 3 color pattern in hallways & lobbies, & with an accent border in other rooms, per the Architect's instructions. Up to 20% of flooring to be from the manufacturer's "premium patterns" group.
  - 2.6 ADHESIVES: Provide waterproof and stabilized typed adhesive as recommended by the manufacturer of the material being installed. Asphalt emulsions and other non-waterproof adhesives will not be acceptable.
  - 2.7 CONCRETE SLAB PRIMER: Provide non-staining type as required and as recommended by the manufacturer of the material being installed.
- [DISCUSS WITH OWNER IF THEY WOULD PREFER TO DO INITIAL WAX OF VCT FLOORS THEMSELVES.]**
- 2.8 VCT FINISH: Similar to Hard As Nails by Betco Corporation, self-leveling, self-sealing floor finish with Gloss of 85 minimum (ASTM D1455-87) after two coats, sliip resistance 0.5 minimum (ASTM D 2047-04).

- 2.9 OTHER MATERIAL: Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 PREPARATION: Verify that substrate is smooth, level, at required finish elevation, and without more than 1/8" in 10'-0" variation from level or slopes shown on the Drawings. Prior to laying materials, broom clean or vacuum the surfaces to be covered, and inspect the subfloors.
- 3.3 PRIMING: Apply concrete slab primer if so recommended by the resilient flooring manufacturer. Apply in accordance with the manufacturer's recommendations as approved by the Architect.
- 3.4 LAYOUT: Install materials only after finishing operations, including painting, have been completed and after permanent heating system is operating. Verify that moisture content of concrete slabs, building air temperature, and relative humidity are within the limits recommended by the manufacturers of the materials used. Maintain reference markers, holes, and openings that are in place or plainly marked for future cutting by repeating on the finish surface as marked in the subfloor. Use chalk or other non-permanent marking device.
- 3.5 INSTALLING RESILIENT TILES: Place units with adhesive cement in strict compliance with the manufacturer's recommendations as approved by the Architect. Butt units tightly to vertical surfaces, nosings, edgings, and thresholds. Scribe as necessary around obstructions and to produce neat joints. Place tiles tightly laid, even, and in straight parallel lines. Extend units into toe spaces, door reveals, and in closets and similar spaces. Lay units from center marks established with principal walls, discounting minor offset, so that units at opposite edges of the room are of equal width. Adjust as necessary to avoid use of cut widths less than 3" wide at room perimeters. Lay units square to axes of the room or space. Match units for color and pattern by using materials from cartons in the same sequence as manufactured and packaged. Lay in a grid pattern with grain at 90-degree turns, unless otherwise directed by the Architect. Place resilient edge strips tightly butted to units and secured with adhesive, providing at all unprotected edges unless otherwise shown.
- 3.6 INSTALLING BASE: Install base at the juncture of walls to all new flooring & where shown on the Drawings. Use factory-performed exterior corners, and factory-performed or job-mitered interior corners.

**[DISCUSS WITH OWNER IF THEY WOULD PREFER TO DO INITIAL WAX OF VCT FLOORS THEMSELVES.]**

- 3.7 VCT FINISH: Follow manufacturer instructions for installation. Installed thickness: 0.08 mil per coat or 2,000 square feet per gallon. At corridors, library / media center, cafeteria and band hall apply 5 coats; all other locations apply 3 coats. If any finish is splashed onto the baseboards or surrounding objects, remove / clean immediately. Burnish final layer after 72-hour curing period.
- 3.8 CLEANING AND PROTECTING: Remove excess adhesive and other blemishes from exposed surfaces, using neutral cleaner recommended by the manufacturer of the resilient materials.

## 09 65 66 - RESILLIENT ATHLETIC FLOORING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Supply and installation of the indoor resilient multipurpose surfacing
- B. Application of the game lines
- C. References for the correct construction and preparation of concrete slabs to receive resilient flooring.

#### 1.2 SUBMITTALS

- A. Product Data: Manufacturer's promotional brochures, specifications and installation instructions
- B. Samples: Submit for selection and approval three (3) sets of brochures, samples or sample boards. Submit color samples of all the available game line paint colors for selection and approval.
- C. Closeout Submittals:
- D. Submit three (3) copies of manufacturer's maintenance instructions.
- E. Submit three (3) copies of the material and installation warranties as specified.

#### 1.3 QUALITY ASSURANCE

- A. Qualifications:
  - 1. The indoor resilient multipurpose surfacing shall have been actively marketed for a minimum of ten (10) years.
  - 2. The indoor resilient multipurpose surfacing shall be manufactured in an ISO 9001 certified plant.
  - 3. The indoor resilient multipurpose surfacing shall be manufactured in an ISO 14001 certified plant.
  - 4. The indoor resilient multipurpose surfacing supplier shall be an established firm experienced in the field and appointed as a distributor by the manufacturer of the indoor resilient multipurpose surfacing.
  - 5. The installer of the indoor resilient multipurpose surfacing shall have a minimum of five (5) years experience in the field installing indoor resilient multipurpose surfacing and have worked on at least five (5) projects of similar size, type and complexity.
- B. Certifications:
  - 1. Installer to submit the indoor resilient athletic surfacing manufacturer's or distributor's certification attesting that they are an approved installer of the indoor resilient multipurpose surfacing.
  - 2. The indoor resilient multipurpose surfacing manufacturer to submit official ISO 9001 certification for the facility in which the indoor resilient multipurpose surfacing is manufactured.
  - 3. The indoor resilient multipurpose surfacing manufacturer to submit official ISO 14001 certification for the facility in which the indoor resilient multipurpose surfacing is manufactured.

- C. Testing: Tests shall be relative for multi-purpose use with certificates from independent testing resources to be made available upon request. Test results shall be no more than 5 years old and performed according to ASTM and/or EN standard testing procedures.

#### 1.4 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
  - 1. Material shall not be delivered until all related work is in place and finished and/or proper storage facilities and conditions can be provided and guaranteed stable according to FieldTurf USA, Inc. recommendations.
- B. Storage:
  - 1. Store the material in a secure, clean and dry location. Maintain temperature between 55° and 85° Fahrenheit. Store the indoor resilient athletic surfacing rolls in an upright position on a smooth flat surface immediately upon delivery to jobsite. Rolls shipped in rigid protective cardboard containers can be laid horizontally prior to unpacking and installation.

#### 1.5 PROJECT/SITE CONDITIONS

- A. It is the responsibility of the general contractor/construction manager to maintain project/site conditions acceptable for the installation of the indoor resilient multipurpose flooring. The area in which the indoor resilient multipurpose surfacing will be installed shall be dry and weather tight. Permanent heat, light and ventilation shall be installed and operable. All other trades shall have completed their work prior to the installation of the resilient athletic flooring. The general contractor or Construction Manager shall maintain a secure and clean working environment before, during and after the installation. Suspension of other trades' work may be authorized providing their work will not damage the new flooring. Maintain a stable room temperature of at least 65°F for a minimum of one (1) week prior to, during and thereafter installation. An effective low-permeance vapor barrier is placed directly beneath the concrete subfloor. For "on" or "below grade" installations, it is recommended to provide a permanent vapor barrier resistant to long term hydrostatic pressure/moisture exposure. Protrusions should be sealed to prevent moisture migration into the slab. Moisture should not be allowed to enter the slab after the completed construction. Concrete subfloor surface pH level within the 7 to 10 range dependent upon installation type. Concrete subfloor should be no greater than 1/8" within a 10 ft diameter. This tolerance can be measured in accordance with ASTM E1155. A specified (FF ) of 50 and an (FL ) of 30 should reach this degree of floor flatness and floor level. There is no numerical correlation between F numbers and the deviation from the straight edge, however the above specified numbers should achieve a flat floor with minimal deviation in the slab. Reference ACI 117 and ACI 302.1R. The general contractor should provide a certificate of compliance with the above recommendations. Concrete subfloor must be clean and free of all foreign materials or objects including, but not limited to, curing compounds and sealers. Fill cracks, grooves, voids, depressions, and other minor imperfections with Ardex (or equal) cement-based patching/leveling compounds. Follow the manufacturer's directions. Moveable joints must be treated utilizing specific transitioning joint devices depending upon the architect's recommendations. Follow current ASTM F710 guidelines for the preparation of concrete slabs to receive resilient flooring. Refer to ACI 302.2R "Guidelines for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials" for concrete design and construction. Concrete slab shall be fortified with continual steel reinforcement. Fiber reinforcement alone shall not be considered adequate fortification.

#### 1.6 WARRANTY

- A. Materials:

1. The indoor resilient athletic surfacing shall be covered by the manufacturer against product defects for 8 years. A 3rd party limited warranty shall also be provided as reinforcement. The manufacturer of the indoor resilient multipurpose surfacing must provide this warranty upon request.

**B. Installation:**

1. The installation of the indoor resilient multipurpose surfacing shall be covered against poor workmanship and faulty installation by a two (2) year written, limited warranty provided by the contractor performing/overseeing the installation.

**C. The Synthetic Flooring Manufacturer's Warranty must be supported by an insured warranty policy. A copy of the Warranty policy must be provided with the Bid Submittal and include the following features:**

1. The policy must be pre-paid.
2. The policy shall be provided by a third-party insurer with an A.M. Best financial strength rating of A or better.
3. The policy shall not be a re-insurance or off-shore policy or a letter of credit.
4. Insured warranty coverage shall be for the full 100% replacement value of the total square footage installed.
5. Insured warranty coverage shall apply to the full 8-year period from substantial completion date of project with no uninsured periods or periods of self-insurance.
6. The policy must have a zero deductible.
7. Insured warranty coverage shall specifically provide for reimbursement to the warranty holder (i.e., the Participating Public Agency) in the event of a bankruptcy of the synthetic flooring provider.
8. Insured warranty coverage shall offer a minimum limit of \$13,000,000 per claim and aggregate per annum.

**1.7 ADDITIONAL MATERIALS**

- A. Furnish to the owner additional materials containing a total of at least 1% of each different color or design of the indoor resilient athletic surfacing used on the project.

**1.8 RELATED STANDARDS AND GUIDELINES**

- A. ASTM F1869 "Standard Test Method for Measuring Moisture Evaporation
- B. Rate of Concrete Subfloor Using Anhydrous Calcium Chloride"
- C. ASTM F2170 "Standard Test Method for Determining Relative Humidity In Concrete Floor Slabs Using In-Situ Probes"
- D. ASTM F710 "Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring"
- E. ACI 302.2R-06 "Guideline for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials"

**PART 2 - PRODUCTS**

- 2.1 **MANUFACTURERS:** The basis of the design for the indoor resilient multipurpose surfacing is Omnisports 6.5mm GreenLay™ as manufactured by FieldTurf USA, Inc under Tarkett Sports. All other installation accessories and related components must be either

made or approved by the indoor resilient athletic surfacing manufacturer. Other products may be approved as equal if deemed qualified and submitted in accordance with the General Conditions. Test reports confirming compliance from an Independent Sports Laboratory must be provided along with samples, technical data, installation, maintenance, and warranty prior to acceptance as an alternative product.

- 2.2 MATERIALS: Omnisports 6.5 - Prefabricated sport surface 6.5mm (1/4") with wood flooring design and slightly textured embossed surface as supplied by FieldTurf USA, Inc. Embossing of wood design and solid colors must be the same; varying embossing or surface textures will not be allowed. Printing of wood design shall closely resemble standard wood strip flooring in size, color, board length, and grain appearance. The wood design shall be protected by a clear layer of pure PVC (Polyvinyl Chloride) and Top Clean, a factory applied UV cured urethane treatment. Intermediate layers shall be fortified with a non-woven fiberglass grid for increased dimensional stability. The foam force reduction layer shall be high-density closed cell PVC foam with honeycomb embossing, and is applied in one continuous manufacturing process. Laminated or adhered foam layers will not be allowed. Field constructed products will not be accepted.

- A. Physical properties of the indoor resilient athletic surfacing shall conform to the following minimums:

Width	.....	6'6" (2 m)
Length	.....	85' (25.9m) approx.
Total Thickness	.....	6.5 mm
Vertical Deformation	PASSED	ASTM F2772
Rolling Load	PASSED	0.30 (EN 1569 {11/1999})
Surface Finish Effect	PASSED	ASTM F2772 (80 – 110)
Allergy and Asthma Friendly	ASP: 05-01/101	Certified Compliant
Abrasion Resistance	PASSED	0.10 (EN ISO 5470-1 {06/1999})
Sound Insulation	Excellent	+/- 19 dB (ISO 717/2)
In Room Sound Insulation	Excellent	61dB (NF S31-074)
Ball Rebound	PASSED	ASTM F2772 > 90%
Shock Absorption	PASSED	ASTM F2772 Category 2

- B. Color: As available from the indoor resilient athletic surfacing manufacturer's standard range.
- C. Hardwood Design Series: A wood look design as available from the indoor resilient athletic surfacing manufacturer's standard range.
- D. Texture: Texture to remain consistent between solid colors and wood design when blending colors.
- E. Welding Rod:
- As supplied by the indoor resilient athletic surfacing manufacturer or supplier. Color to blend with the indoor resilient athletic surfacing color or design. All seams shall be welded to create a monolithic and impermeable surface.
- F. Adhesive:
- As approved by the indoor resilient athletic surfacing manufacturer.

- G. Game Line Paint Primer:
  - 1. As approved by the indoor resilient athletic surfacing manufacturer.
- H. Game Line Paint:
  - 1. As approved by the indoor resilient athletic surfacing manufacturer. Colors are to be selected from the manufacturer's standard range.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. It is the responsibility of the general contractor/construction manager to ensure that project/site conditions are acceptable for the installation of the indoor resilient athletic flooring.
- B. Verify that the area in which the indoor resilient athletic surfacing will be installed is dry and weather tight. Verify that permanent heat, light and ventilation is installed and operable.
- C. Verify that all other work that could cause damage, dirt and dust or interrupt the normal pace of the indoor resilient athletic flooring installation is completed or suspended.
- D. Verify that there is a stable room temperature of at least 65°F.
- E. Verify that there are no foreign materials or objects on the subfloor and that the subfloor is clean and ready for installation.
- F. For GreenLay™ Installation to Concrete Subfloor: moisture content less than fifteen (15) pounds/1,000 sq.ft./24 hours when tested using calcium chloride per ASTM F 1869 or no more than 92 % RH when tested per ASTM F2170. Follow Fieldturf® Installation Recommendations.
- G. If both tests are performed, use the highest value. Do not average the results of the tests. Report all field test results in writing to the General Contractor, Architect, and End User prior to installation.
- H. Verify that the concrete subfloor surface pH level is within the 7 - 10 range.
- I. Document the results indicating the slab is within manufacturer's tolerances for slab deviation.

#### 3.2 PREPARATION OF SURFACES

- A. Sand the entire surface of the concrete slab.
- B. Sweep the concrete slab so as to remove all dirt and dust. If a sweeping compound is to be used it must be a sweeping compound that does not contain oil or other items that may inhibit the adhesive bond.
- C. Slab must be dust free. In the event that dust impairs adhesive bond, priming the slab prior to application of adhesive may be necessary. Follow installation guidelines.

#### 3.3 INSTALLATION

- A. The installation area shall be closed to all traffic and activity for a period to be set by the indoor resilient athletic surfacing installer. The indoor resilient athletic surfacing installation shall not begin until the installer is familiar with the existing conditions.
- B. All necessary precautions should be taken to minimize noise, smell, dust, the use of hazardous materials and any other items that may inconvenience others.
- C. Install the indoor resilient athletic surfacing in strict accordance with the indoor resilient athletic surfacing manufacturer's written instructions.
- D. Install the indoor resilient athletic surfacing minimizing cross seams. Provide a seam diagram during the submittal process for approval prior to installation.
- E. Paint game lines using approved game line paint primer and game line paint in strict accordance with the game line paint manufacturer's instructions.
- F. Install appropriate threshold plates or transition strips where necessary.

#### 3.4 CLEANING

- A. Remove all unused materials, tools, and equipment and dispose of any debris properly. Clean the indoor resilient athletic surfacing in accordance with the manufacturer's instructions.

#### 3.5 PROTECTION

- A. If required, protect the indoor resilient athletic surfacing from damage using coverings approved by the manufacturer until acceptance of work by the customer or their authorized representative.



## 09 65 68 - RECYCLED RUBBER FLOORING

### PART 1 - GENERAL

- 1.1 SUMMARY: Section includes recycled rubber resilient roll/sheet flooring.
- 1.2 REFERENCES: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
  - A. ASTM C423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
  - B. ASTM C501 Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.
  - C. ASTM C518 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
  - D. ASTM C1026-87 Standard Test Method for Measuring the Resistance of Ceramic Tile to Freeze-Thaw Cycling.
  - E. ASTM D543 Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
  - F. ASTM D624 Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
  - G. ASTM D1149 Standard Test Method for Rubber Deterioration-Surface Ozone Cracking in a Chamber.
  - H. ASTM D2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
  - I. ASTM D2240 Standard Test Method for Rubber Property-Durometer Hardness.
  - J. ASTM D3676 Standard Practice for Rubber-Measurement of Dimensions.
  - K. ASTM E196-95 Standard Practice for Gravity Load Testing of Floors and Flat Roofs.
  - L. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
  - M. ASTM E662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
  - N. ASTM F142 Standard Test Method for Indentation of Resilient Floor Tiles (McBurney Test).
  - O. ASTM F1344-93 Standard Specification for Rubber Floor Tile.
- 1.3 SYSTEM DESCRIPTION: Provide recycled rubber resilient flooring which has been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.
- 1.4 SUBMITTALS: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section. Submit product data, including manufacturer's SPEC-DATA™ product sheet, for specified products. Submit shop drawings showing layout, profiles and product components, including anchorage, accessories, finish colors, patterns and textures. Submit selection and verification samples for finishes, colors and textures. Submit the following:

- A. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
  - B. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
  - C. Manufacturer's Instructions: Manufacturer's installation instructions.
  - D. Closeout Submittals: Submit the following:
  - E. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
  - F. Warranty: Warranty documents specified herein.
- 1.5 QUALITY ASSURANCE: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project. Install at project site a job mock-up using acceptable products and manufacturer-approved installation methods. Obtain Owner's and Architect's acceptance of finish color, texture and pattern, and workmanship standard. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required. Conduct preinstallation meeting to verify project requirements, substrate conditions, manufacturer's instructions and manufacturer's warranty requirements. Obtain recycled rubber resilient flooring materials from a single manufacturer.
- 1.6 DELIVERY, STORAGE & HANDLING: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Store materials at temperature and humidity conditions recommended by manufacturer and protect from exposure to harmful weather conditions.
- 1.7 PROJECT CONDITIONS: Maintain air temperature in spaces where products will be installed for time period before, during and after installation as recommended by manufacturer. Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.
- 1.8 WARRANTY: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents. Warranty Period: 5 years commencing on Date of Substantial Completion.
- 1.9 MAINTENANCE: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Furnish quantity of recycled rubber flooring units equal to 10% of amount installed. Comply with Owner's requirements for delivery, storage and protection of extra materials.

## PART 2 - PRODUCTS

- 2.1 RECYCLED RUBBER FLOORING: Dodge-Regupol, Inc. or approved equal. Contact: P.O. Box 989, Lancaster, PA 17608-0989 (715 Fountain Ave., Lancaster, PA 17601); Telephone: (800) 322-1923, (717) 295-3400; Fax: (717) 295-3414.
- A. Proprietary Product(s): Dodge-Regupol Recycled Rubber Resilient Flooring for Indoor/Outdoor Use:
    - 1. ECOstone™ recycled rubber resilient sheet flooring.
    - 2. ECOshock™ recycled rubber underlayment.

B. Dodge-Regupol ECOstone Recycled Rubber Resilient Flooring:

1. Roll Dimension: 48" x 5/32" standard.
2. Roll Weight: 1.20 lb/sq ft.
3. Roll Length: 50 linear feet.
4. Colors: Architect to select color from manufacturer's standard colors.

C. Product Testing:

1. Density pcf (ASTM D3676): 76 (1218 kg/m3).
2. Shore A Hardness (ASTM D2240): 57.
3. Static Load, (ASTM E196-95): greater than 2000 psi (13,780 kPa).
4. Coefficient of Friction (Wet and Dry Average) (ASTM D2047): 1.05.
5. Indentation (77 Degrees F (25 Degrees C)) (ASTM F142): 0.0080" (0.203 mm).
6. Taber Abrasion (Weight Loss in GMS/KC) H-18 Wheel, 500 GM Load (ASTM C501): 0.55.
7. Stain Resistance (ASTM D543):
  - a. Ammonia: No change.
  - b. Bleach: Slight change.
  - c. Unleaded Gasoline: No change.
  - d. NaOH: Slight change.
  - e. HCl: Severe change.
  - f. H2SO4: Moderate change.
  - g. Rubbing Alcohol: No change.
  - h. Motor Oil, 10W-30: Moderate change.
  - i. Olive Oil: Moderate change.
  - j. Mechanical Grease: Severe change.
8. Critical Radiant Flux (ASTM E648): Class 1.
9. Airborne Noise (Sabin/ft Squared) (ASTM C423): 0.05.
10. Ozone Resistance (ASTM D1149): No change.
11. Smoke Density (ASTM E662): less than 450.

12. Tear Strength (Die C Tear PPI) (ASTM D624): 65.
13. NY Fire Gas Toxicity #09300 900 216-4006.
14. Freeze/Thaw (ASTM C1026-87): No change.
15. Thermal Conductivity (ASTM C518): At 0.197" (5 mm) Rv = 0.445.
16. Rubber Floor Tile Specification (ASTM F1344-93): Contact manufacturer for test results.

**PART 3 - EXECUTION**

- 3.1 MANUFACTURER'S INSTRUCTIONS: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.
- 3.2 EXAMINATION: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
- 3.3 PREPARATION: Prepare substrate in accordance with manufacturer's instructions.
- 3.4 ERECTION/INSTALLATION/APPLICATION/CONSTRUCTION: Comply with Dodge-Regupol Installation Manual for procedures and techniques for recycled rubber resilient flooring installation. Finish, color, textures, & patterns to be determined by architect.
- 3.5 FIELD QUALITY REQUIREMENTS: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.
- 3.6 CLEANING: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.
- 3.7 PROTECTION: Protect installed product and finish surfaces from damage during construction.

## 09 66 16 - TERRAZZO FLOOR TILE

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Marble terrazzo tile and accessories.
- B. Granite terrazzo tile and accessories.

#### 1.2 RELATED SECTIONS

- A. Section 03 30 00 - CAST-IN-PLACE CONCRETE.
- B. Section 07 92 00 - JOINT SEALANTS.
- C. Section 09 65 19 - RESILIENT TILE FLOORING.

#### 1.3 REFERENCES

- A. ASTM C 109/C 109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens).
- B. ASTM D 695 - Standard Test Method for Compressive Properties of Rigid Plastics.
- C. ASTM D 2047 - Standard Test Method for Static Coefficient of Polish-Coated Floor Surfaces as Measured by the James Machine.
- D. ASTM D 2240 - Standard Test Method for Rubber Property--Durometer Hardness.
- E. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- F. ASTM E 648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
- G. ASTM E 662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
- H. ASTM F 510 - Standard Test Method for Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method.
- I. ASTM F 540 - Standard Test Method for Squareness of Resilient Floor Tile by Dial Gage Method.
- J. ASTM F 925 - Standard Test Method for Resistance to Chemicals of Resilient Sheet Flooring.
- K. ASTM F 970 - Standard Test Method for Static Load Limit.
- L. ASTM F 1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- M. MIL D-3134 - Deck Covering Materials; Revision J, Addendum 1.

#### 1.4 SYSTEM DESCRIPTION

A. Performance Requirements of Terrazzo Tiles:

1. Abrasion Resistance: Maximum 0.0196 cubic centimeters volume loss, when tested in accordance with ASTM F 510, Taber abrader, S-39 wheels, at 500 cycles with 1000 gram load.
2. Compressive Strength: Between 2900 and 5000 psi (20 and 34.5 MPa), when tested in accordance with ASTM C 109/C 109M or ASTM D 695.
3. Static Load Limit: 0.0007 inch (0.012 mm) maximum indentation, when tested in accordance with ASTM F 970 at 125 pounds (57 kg).
4. Hardness: When tested in accordance with ASTM D 2240:
5. Matrix: Shore D 78, minimum.
6. Aggregate: Between Barcol 55 and 100.
7. Coefficient of Friction: Greater than 0.7, average 0.74, when tested in accordance with ASTM D 2047.
8. Flame Spread Index: 15, maximum, when tested in accordance with ASTM E 84.
9. Smoke Density: Specific optical density, when tested in accordance with ASTM E 662, of 231.76 (smoldering) and 292.05 (flaming).
10. Critical Radiant Flux: Minimum of 0.93 watt/cubic centimeter (Class 1) when tested in accordance with ASTM E 648.
11. Chemical Resistance: No change or surface attack, color change, or swelling, when tested in accordance with ASTM F 925.
12. Oil Resistance: Complying with MIL D-3134.
13. Corrosion Resistance: Complying with MIL D-3134.
14. Electrical Conductance: Nonconductive.
15. Squareness: 0.003 inch (0.076 mm) out of square, maximum, when measured in accordance with ASTM F 540.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01 33 23.
- B. Submit manufacturer's specifications and technical data for precast terrazzo tile and accessories; including manufacturer's printed installation instructions and maintenance manuals for each material specified.
- C. Samples for Selection: Submit manufacturer's samples of actual sections of tile and accessories; include manufacturer's full range of color and patterns available.
- D. Samples for Verification Prior to Installation: Submit full size samples of all types, colors, and patterns selected, indicating full range of patterning and color variations.

E. Test Reports: Submit test reports for bond and moisture tests of substrates.

F. Certificates: Submit certificates from manufacturer stating compliance with applicable requirements for materials specified.

#### 1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has at least three years of experience with the installation of precast terrazzo tile and has successfully completed installations of a similar size and scope.

B. Regulatory Requirements: Comply with requirements of local building codes and applicable regulations of other government authorities.

C. Pre-Installation Meeting: Meet with tile manufacturer's representative and Owner prior to preparation of substrate and installation of tile, to review manufacturer's instructions and requirements to ensure the tile is installed properly.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original, unopened packages, containers or bundles bearing brand name and identification of manufacturer.

B. Store materials inside, under cover in a manner to keep them dry, protected from the weather, direct sunlight, surface contamination, corrosion, and damage from construction traffic and other causes.

#### 1.8 PROJECT CONDITIONS

A. Maintain minimum temperature of 70 degrees F (21 degrees C) in spaces to receive terrazzo tile, for at least 48 hours before, during and after installation. Store materials in space where they will be installed for at least 48 hours or as required ensuring that the materials have reached 70 degrees F (21 degrees C) before starting installation.

B. Install terrazzo tile and accessories after other finishing operations, including painting, have been completed.

C. Do not install terrazzo tile on concrete slabs until they have been cured and are sufficiently dry to achieve bond with adhesives, as determined by the tile manufacturer's recommended bond and moisture test. Allow sufficient time for the slab to dry out before installation is started.

D. Provide adequate lighting to allow for proper installation.

E. Do not use portable or temporary heat.

#### 1.9 WARRANTY

A. Submit 20 year wear warranty written material warranty from tile manufacturer warranting that tile is free from defects in workmanship and material.

1. Products must be installed so as not to void the manufacturer's warranty for wear.

2. Warranty shall be in form acceptable to Owner.

#### 1.10 MAINTENANCE

- A. Extra Materials: Furnish one box of tile for each fifty boxes or fraction thereof, for each type, color, pattern and size of the tile installed, from same manufactured lot as materials installed.
  - 1. Deliver extra tile to Owner after completion of work.
  - 2. Furnish tiles in protective packaging with identifying labels.

1.11 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Fritz Industries, Inc., which is located at: 500 Sam Houston Rd. ; Mesquite, TX 75149; Toll Free Tel: 800-955-1323; Tel: 972-285-5471; Fax: 972-270-0179; Email: request info; Web: www.fritztile.com
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.
- C. Obtain all materials including terrazzo tile and recommended adhesives and leveling compounds from a single manufacturer.

### 2.2 MATERIALS

- A. Terrazzo Tile: Marble or granite chips embedded in flexible thermoset polyester resin matrix, with random distribution of chips and smooth factory applied urethane coating cured by ultra violet exposure process.
  - 1. Color/Pattern/Thickness: As selected by Architect from manufacturer's full range & as indicated on drawings.
  - 2. Color/Pattern/Thickness: Marble CL-200/1, 1/8 inch (3.2 mm) thick.
  - 3. Size: 12 by 12 inches (305 by 305 mm), nominal.
  - 4. Color Match: Obtain all tile materials from same production run.
- B. Leveling Compound for Large Areas: Self-leveling polymer modified pozzolanic formula; Fritz F10 Fast Track, for use over concrete from a featheredge to 1-1/2 inches (38 mm).
- C. Patching Compound for Small Areas:
  - 1. Fritz Poz 1, Fast Setting Underlayment, for use over concrete from a featheredge to 1-1/2 inches.
  - 2. Fritz Poz 2, Rapid Setting Underlayment, for use over wood and concrete from a featheredge to 1-1/2 inches (38 mm), for installations requiring flexural properties.
  - 3. Fritz Poz Patch 3, Skim Coating Patch, for use over wood and concrete from a featheredge to 1/8 inch (3 mm) as a skim coat for minor depressions.
- D. Floor Adhesive:
  - 1. Fritz FA-88 Powdered Multipurpose Adhesive mixed with water, for installation using 1/8 by 1/8 by 1/8 inch (3 by 3 by 3 mm) U-notched trowel.



2. Fritz FA-1100MP Pre-Mixed Wet Set Adhesive for installation using 3/32 by 3/32 by 3/32 (3 by 3 by 3 mm) U-notched trowel.
3. Fritz Premium #1 Pre-Mixed Wet Set Adhesive for installation using 3/32 by 3/32 by 3/32 (3 by 3 by 3 mm) U-notched trowel.
- E. Sealer and Finish: Two coats of Fritz FCP-102 protective sealer and two coats of Fritz Duro-Gloss Finish FCP-300, applied as recommended by manufacturer.
- F. Sealant: Silicone, as specified in Section 07900, and of type approved by tile manufacturer.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Concrete Subfloor:
  1. Inspect subfloor to verify that it is clean, flat, smooth, level and free from cracks, holes, ridges, coatings preventing adhesion, and other defects impairing performance or appearance.
  2. Notify Architect of conditions that would adversely affect flooring installation; do not proceed until defective conditions have been corrected.
  3. Perform bond and moisture tests on concrete subfloors to determine if surfaces are sufficiently cured and dry as well as to ascertain presence of curing, sealing, hardening or any other compounds.
    - a. Perform bond test in accordance with tile manufacturer's warranty requirements.
    - b. Perform moisture test in accordance with ASTM F 1869.
    - c. Do not install tile if moisture vapor transmission exceeds 7 pounds (3 kg) per 1000 square feet (93 sq m) in 24 hours using FA88 Adhesive.
    - d. Submit test results and obtain Architect's acceptance prior to beginning installation.
  4. Do not proceed until substrate preparation is complete and satisfactory, bond and moisture tests are completed and test reports submitted which indicate that bond and moisture values meet specified requirements.
- B. Coordinate work with that of other installers prior to installation so that tile work fits properly with doors, frames, saddles, floor drains, and other adjacent work.
- C. Start of work constitutes acceptance that conditions are satisfactory.
- D. Close the space and areas where flooring is being installed to traffic and other installers until flooring has set and sealing and finish of tiles are complete.

#### 3.2 PREPARATION

- A. Fill small cracks, holes and depressions in subfloors using leveling and patching compounds recommended by tile manufacturer.

- B. Remove deleterious coatings from subfloor surfaces that would prevent a positive adhesive bond; such as curing compounds incompatible with adhesives, paints, oils, adhesives, waxes and sealers.
- C. Completely remove existing solvent-based adhesives to prevent bleed through and staining.

### 3.3 INSTALLATION

- A. Comply with manufacturer's instructions for terrazzo tile installation.
- B. Scribe, cut and fit tile to permanent fixtures, built-in furniture, cabinets, pipes, outlets and permanent columns, wall, and partitions using tile cutting procedures recommended by tile manufacturer.
- C. Maintain reference markers indicated on subfloor for future cutting, by repeating on finished terrazzo tile floor.
- D. Lay tile from center marks established with principal walls discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid use of cut widths less than one half tile at perimeters. Lay tile square to room axis, unless otherwise indicated.
- E. Adhere tile flooring to substrate using full spread of adhesive.
- F. Lay tile using conventional procedures for laying resilient tile, placing tile carefully and firmly in position and as level as possible. Butt tile cleanly, evenly and snugly against adjacent tile.
- G. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged, if cartons are so numbered. Do not install broken, cracked or chipped tiles.
- H. Roll and cross roll floor with 150 pound sectional roller continuously while tile is being laid. Use hand roller in areas that cannot be reached with large roller. Cease rolling when rolling has no more effect.
- I. Do not subject floors to traffic until adhesive is dry and hard and sealers and finishes are applied.
- J. Remove and replace tiles that are not flat, including lipped, cupped, curved, or poorly adhered tile. Remove rejected tile from site.

### 3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide on-site services of tile manufacturer or authorized distributor for technical assistance during preparation and installation.

### 3.5 CLEANING AND PROTECTION

- A. Upon completion of installation and curing of adhesive, apply sealant to entire perimeter and around columns, door frames, and other joints and penetrations to prevent water penetration into the adhesive layer due to accidental or maintenance (mopping) water accumulation.
- B. Remove excess adhesives, dirt, stain and other foreign material. Clean floors in accordance with tile manufacturer's instructions.
- C. Protect finished installation at all times. Repair or replace flooring damaged prior to final acceptance of installation by Owner.

## 09 66 17 - RECYCLED GLASS TERRAZZO FLOOR TILE

### PART 1 - GENERAL

- 1.1 QUALITY ASSURANCE: Materials furnished shall meet NTMA Specifications. Epoxy Resin Supplier must be an NTMA Member. Recycled Glass Aggregate equal to EnviroGLAS Products, Inc., Plano, TX. Installer must be a contractor member of the NTMA and shall perform all work in accordance with NTMA standards.
- 1.2 SUBMITTAL: Submit a maximum of three samples, minimum 4" x 6" for each color and type of Recycled Glass Terrazzo. Submit two, 6" minimum lengths of each type and kind of divider strips. Submit two copies of maintenance recommendations of NTMA or maintenance product members of NTMA. Submit shop drawings showing layout of divider strips and Terrazzo pattern.
- 1.3 DELIVERY, STORAGE AND HANDLING: Deliver materials in a manner to prevent damage to containers and / or bags. Store materials in a clean, dry and heated (if necessary) location (50 - 90 degrees Fahrenheit) furnished by others.
- 1.4 GUARANTEE: One year from date of substantial completion installation.
- 1.5 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Primer: As recommended by Epoxy Resin Supplier.
  - B. Epoxy resin mixed according to manufactures recommendation and tested without aggregate added. All specimens cured for (7) Days @ 75 degrees plus or minus (2) degrees and 50% plus / minus 2 R.H. The product shall meet the following requirements. ASTM D-2240 using Shore D Durometer 60 - 85; ASTM D-638 run @ .2" minimum, 3,000 psi minimum. Compressive Strength ASTM D-695, 10,000 psi minimum. Chemical Resistance ASTM D-1308/7 days at room temperature by immersion method have no deleterious effects.
  - C. Epoxy Resin mixed according to manufactures recommendations and blended with 3 volumes of Recycled Glass aggregate (Combination #0, #1, #2 gradations), ground and grouted with epoxy resin according to 3.02 C-2. Finishing to a nominal ¼" thickness. All specimens cured (7) days @ (75) degrees plus or minus (2) degrees Fahrenheit and 50% plus or minus 2% R.H. The finished Recycled Glass epoxy terrazzo shall meet the following requirements. Flammability: ASTM D-635 Self-Extinguishing, extent of burning 0.25 maximum. Thermal Coefficient of Linear Expansion: ASTM D-696 25 x 10<sup>-6</sup>" per inch per 140 degrees Fahrenheit. Temperature range: 12 degrees - 140 degrees.
  - D. Aggregate: 100% Post-Consumer Recycled Glass; color selected from manufacturer's standard. Sizes To Conform With NTMA Gradation Standards: #0, #1, #2 Blended Sizes. Jobsite blend Recycled Glass to achieve overall uniformity.
  - E. Strips: Half-hard brass dividers and accessories.
  - F. Terrazzo Cleaner: Ph factor between 7 and 10, where applicable, Biodegradable and Phosphate Free.
  - G. Sealer: Ph factor between 7 and 10, where applicable, Shall not discolor or amber. Flash Point: ASTM D-56 - 80 degrees Fahrenheit minimum, where applicable. U/L listed as "Slip Resistant".
- 2.2 MIXES: 100% Post-Consumer Recycled Glass. Epoxy Resin 'Color Matrix' Selected by Architect; limit to one field color per building, plus logos as indicated. Proportion Epoxy Terrazzo Topping 100lbs pound bags per 1000 square feet coverage. Blend and Mix Aggregate, Filler and Epoxy Resin in per Manufacture Recommendations.

2.3 BASE: 1" radius cove base of same material as floor & termination trim at top.

**PART 3 - EXECUTION**

- 3.1 INSPECTION: Examine areas to receive terrazzo for defects in existing work that may affect proper execution of Recycled Glass Terrazzo System. Cracks in concrete substrate will usually be transmitted through topping to surface. Sub-floor not to vary more than (1/4") from true plane in (10) feet. Recycled Glass Terrazzo, as specified is not intended to level substrate and will only follow the contour of the concrete slab. If for any reason, the subcontractor questions the suitability for bonding, any work required to eliminate non-conformity of subsurface specifications is the responsibility of others. Any materials used to correct non-conformity must be compatible with system selected and be approved by the Terrazzo Applicator. Start work only when others have corrected all defects.
- 3.2 INSTALLATION: Shot or Bead Blast Floor. Install Control Joints directly above Control Joints in Sub-Floor. Install Divider Strips in a 10' x 10' grid. Provide one 12" diameter, four colors logo in building lobby; design to be provided by Architect.
- 3.3 PLACING TERRAZZO: Prime sub-floor in accordance with manufacture's recommendations. Place Recycled Glass Terrazzo mixture in panels formed by divider strips. Trowel mixture to top of strips. Cure Time - 24 Hours Prior to Grinding.
- 3.4 FINISHING: Grind with (24) or finer grit stones or with comparable diamond plates. Follow initial grind with (80) grit stones. Clean Terrazzo with clean water and rinse. Apply grout using identical color as used in topping (epoxy color matrix), taking care to fill voids. Polish with 120 or finer grit stones to achieve superior finish.
- 3.5 CLEANING AND SEALING: Wash all surfaces with a neutral cleaner. Rinse with clean water and allow drying. Apply sealers in accordance with manufacture recommendations
- 3.6 PROTECTION: Upon completion, work shall be ready for final inspection and acceptance by the owner or agent. General Contractor shall protect the finished work from the time the Terrazzo Contractor completes the work.

## 09 66 76 - PRECAST TERRAZZO STAIRS

### PART 1 - GENERAL

- 1.1 SUMMARY: Types of Precast Terrazzo work include Precast Terrazzo Stairs. Setting material, grouts, sealants and caulks. Installation of precast terrazzo stairs, base, sills, etc. Related work not specified under this section: Installation of steel stairs to receive precast terrazzo
- 1.2 REFERENCES: American Society for Testing and Materials (ASTM). National Terrazzo and Mosaic Association Inc. (NTMA). Federal Register Part III
- 1.3 SUBMITTALS: Submit shop drawings of all precast terrazzo items showing detail sections and profile for all precast items. Details shall show all reinforcing and special hardware for fastening. Submit maximum of 3 samples 6" x 6" size for all color. Submit two copies of NTMA maintenance literature. Performance Requirements: Compressive Strength 4000 p.s.i.; Flexural Strength 600 p.s.i. Suppliers shall furnish certification attesting that materials meet specification requirements. Manufacturer to supply a written Quality Assurance Program and Procedure manual.
- 1.4 QUALITY ASSURANCE: Comply with specified provisions and recommendations of the National Terrazzo & Mosaic Association, Inc. (NTMA). In addition to specified requirements, comply with precast terrazzo manufacturer's instructions and recommendations for substrate preparation, materials storage, mixing and application, finishing and curing. Precast Terrazzo Manufacturer and Trade Contractor must have a minimum of 5 years of successful experience on projects of similar magnitude and complexity to that indicated project. Manufacturer and contractor to be prequalified by Architect prior to bidding. Failure to prequalify will void bid.
- 1.5 DELIVERY, STORAGE AND HANDLING: Packaging and Shipping: Precast terrazzo to be palletized and shrink wrapped, delivered in original unopened packaging with legible manufacturer identification, including size, piece number, quantities, manufacturer date and inspector initials. Precast terrazzo to be stored indoors, sheltered from moisture in original packaging. Protect from damage by other trades.
- 1.6 WARRANTY: Manufacturer/Installer shall warrant installed system for a period of 1 year from date of substantial completion against failure of workmanship and materials.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Portland Cement: ASTM C-150 Specifications for Portland Cement.
- B. Aggregates: All aggregates to meet ASTM C-33 specifications, cleaned and properly graded to size. Aggregate shall be blended to meet individual project requirements.
- C. Marble chips, size to conform with NTMA gradation standards.
- D. Coloring; Pigments used shall be inorganic, resistant to alkalinity and used per manufacturer's recommendations.
- E. Reinforcement and Hardware to conform with NTMA and Manufacturer's design. Reinforce precast with deformed rods or wire mesh or both as recommended by precast terrazzo manufacturer.
- F. Abrasive Inserts: Shall consist of 2 lines of silicon carbide and black epoxy.
- G. Caulks & Sealants: Urethane or Polyurethane Sealant, color to be selected by Architect from standard color pallet.

- H. Cleaner: Liquid neutral chemical cleaner, with pH factor between 7 and 8, of formulation recommended by sealer manufacture for type of precast terrazzo used and complying with NTMA requirements.
- I. Sealer: Colorless, slip and stain-resistant penetrating sealer with pH factor between 7 and 8, that does not affect color or physical properties of precast terrazzo surface. Flash point (ASTM D56): 80 degrees F, Minimum.

2.2 MANUFACTURED UNITS: All units to conform to shop drawings with a 1/16" tolerance in dimension. All exposed edges to be ground and polished with a minimum of 1/16" bevel. All finished surfaces to be ground and polished, free of holes and to have overall uniformity in matrix and aggregate. All precast terrazzo finished surfaces to be sealed with a sealer approved by manufacturer.

### PART 3 - EXECUTION

- 3.1 INSPECTION: Examine areas to receive precast terrazzo for defects in existing work & deviations beyond allowable tolerances for the substrate. Start work only when all defects have been corrected by others.
- 3.2 INSTALLATION: Set accurately as shown on approved shop drawings. Setting methods are Mud Set or Thin Set. Alignment of precast should be straight and true to all dimensions. It may not vary more than 1/8" in length, height or width. Install anchors as shown on details. Fill joints between with manufacturer -approved caulk or as specified.
- 3.3 PROTECTION: Upon completion, the work shall be ready for final inspection and acceptance by owner or owner agent. General Contractor shall protect the finished work from the time the terrazzo contractor completes the work.
- 3.4 FINISH: All precast terrazzo finished surfaces to be sealed with a sealer approved by manufacturer.

## 09 67 16 - EPOXY-MARBLE CHIP FLOORING

### PART 1 - GENERAL

- 1.1 WORK INCLUDED: Products provided and supplied under this Section are special floor coating materials requiring applicable expertise in surface preparation, application and safety procedures. Materials, tools, equipment and scaffolding required for surface preparation and application of special floor coatings in locations scheduled.
- 1.2 SUBMITTALS:
  - A. Submit manufacturer's descriptive literature fully describing each product and solids-by-volume content.
  - B. Include manufacturer's recommendations for mixing, thinning, application and curing.
  - C. Submit manufacturer's product data sheets.
  - D. Submit special floor coating schedule indicating locations and applications by manufacturer's name and product number.
- 1.3 QUALITY ASSURANCE: Applicator shall have a minimum five years experience applying special coating materials. Applicator shall be suggested or pre-approved by the coatings manufacturer for this application. Applicator shall employ skilled mechanics to ensure highest quality workmanship. Materials to be applied by craftsmen experienced in use of specified products. Comply with applicable codes, regulations, ordinances and laws regarding use and application of coating systems that contain VOC's.
- 1.4 DELIVERY, STORAGE AND HANDLING: Deliver materials to Project site in original, factory-sealed, unopened, new containers bearing manufacturer's name and label intact and legible. Store material in protected and well-ventilated area at temperatures between 70° F. and 90° F., unless otherwise required by manufacturer.
- 1.5 ENVIRONMENTAL REQUIREMENTS: Air and surface temperature shall not exceed minimum or maximum requirements for product to be applied. Do not apply coatings to damp or wet surfaces. Relative humidity shall not be above 85% and surface temperature shall be a minimum of 5° F. above the dew point. Wind velocity must be less than 20 mph.

### PART 2 - PRODUCTS

- 2.1 MANUFACTURERS:
  - A. Basis of design: The following special floor coating products are manufactured by Tnemec Company, Inc., 6800 Corporate Drive, Kansas City, MO 64120, 800-863-6321
  - B. Approved Manufacturers:
    1. Stonhard, 1000 East Park Avenue, Maple Shade, NJ 08052, 800.257.7953
    2. Manufacturers of products of equal substance, function and performance subject to review and approval of the Architect will be considered.
- 2.2 MATERIAL SYSTEMS SCHEDULE: All work shall be done in strict accordance with manufacturer's specifications. Coatings shall not exceed the spread per gallon rate as recommended by the manufacturer. Film thicknesses where indicated are expressed in a dry film thickness. Decorative Quartz Broadcast Flooring System:
  - A. Description: Modified amine-cured epoxy broadcast, high-performance floor coating.
  - B. Surface Preparation: Mechanically abrade concrete.
  - C. Color: Custom color quartz as selected by the Architect.
  - D. Finish: Gloss - Texture to be determined by mock-up acceptance.

- E. Cove Base: 4" high Rolled Radius Cove as indicated on the Drawings.
- F. Solids by Volume:
  - 1. Prime Coat: Minimum 96%  $\pm$  2% (mixed)
  - 2. Intermediate Coats: Minimum 86%  $\pm$  2% (mixed, liquid portion)
  - 3. Finish Coat: Minimum 86%  $\pm$  2% (mixed)
  - 4. Coving Material: 86%  $\pm$  2% (mixed, liquid portion)
- G. Application Rate:
  - 1. Prime Coat: Tnemec Series 201 Epoxoprime applied at a rate of 190 to 260 square feet per gallon.
  - 2. Intermediate Coat: Tnemec Series 222 Deco-Tread applied at a rate of 80 square feet per gallon. Broadcast quartz aggregate while coating is wet.
  - 3. Finish Coat: Tnemec Series 282 Tneme-Glaze applied at a rate of 85 to 170 square feet per gallon.
  - 4. Coving Material: Tnemec Series 222 Deco-Tread mixed with aggregate as required to produce rolled radius cove.
- H. Total System Thickness: Minimum of 3/32" thickness except where noted in finish schedule. Requires one broadcast application.
- I. Coving J-Strip: J-Strip shall be a magnesium strip of dimensions of 1/8" x 1/4".
- J. Coving Sealant Bead: As manufactured by National Polymers, or equal.

2.3 MIXING AND TINTING: Mix and thin materials in strict accordance with manufacturer's latest printed instructions. Do not use material beyond manufacturer's recommended pot life. Project site tinting will not be allowed.

### PART 3 - EXECUTION

- 3.1 INSPECTION: Verify surfaces to be coated are dry, clean and ready to accept prime coat in accordance with manufacturer's recommendations. Notify Owner's Representative in writing of unacceptable conditions prior to commencing application. Do not begin work until unsatisfactory conditions have been corrected.
- 3.2 PREPARATION OF SURFACES: Perform preparation and cleaning procedures in strict accordance with floor coating manufacturer's instructions and as herein specified for each particular substrate condition. Refer to manufacturer's application and installation guide. Protect surrounding and adjacent surfaces in manner recommended by floor coating manufacturer. Dislodge dirt, mortar spatter and other dry materials by scraping or brushing. Remove dust and loose material by brushing, sweeping, vacuuming and/or blowing with high pressure air. Remove curing, sealing and coating agents, oil, grease, breaking compound residue, mildew, wax, etc. by scraping off heavy deposits and solvent cleaning. Pressure washing with hot water and detergent may be required, to be followed by a clean water rinse. After cleaning, all surfaces shall be clean and free of all contaminants.
- 3.3 APPLICATION: Do not apply initial coating until moisture content of surface is within limits recommended by coating manufacturer. Apply special flooring with application equipment as recommended by the coating manufacturer. Comply with recommendations of manufacturer for drying time between succeeding coats. Apply additional coats when primer or other conditions show through final coat, until coating film is of uniform finish, color and appearance. Recoat primed and sealed floors where there is evidence of suction spots or unsealed areas in the first coat, to ensure a finish coat with no blemishes or burn-through or other defects due to insufficient sealing. Completely cover to provide an opaque smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, or other surface imperfections will not be acceptable. Sand, dust and vacuum between each broadcast coat and after the last broadcast coat to remove defects, visible and unacceptable to manufacturer,



Architect and/or Owner. Scarify as recommended in the manufacturer's literature. Make edges of coatings adjoining other materials clean and sharp with no overlapping.

- 3.4 DECORATIVE QUARTZ BROADCAST FLOORING APPLICATION: Whenever possible, schedule work to ensure that a wet edge is maintained. Work stoppages should be scheduled so that there is no break during the application of a coat in progress, if possible. Where a break in a coat is made, that area should be sanded smooth so that no line remains. All exposed perimeter edges of the broadcast overlay, including doorways, traffic aisle sides, drains, etc. must be saw cut. Areas that cannot be reached with the saw, or are difficult to saw cut shall be chipped.
- 3.5 JOINTS: After the floor system is installed, honor existing expansion joint by saw cutting a new 1/4" X 1/4" joint over the existing. Fill all other recessed joints by first priming with Tnemec Series 201 Epoxoprime, then filling with Tnemec Series 214 Treadcrete. When filled, joint should be flush with the floor surface.
- 3.6 CLEANING: Wire brush, sand and touch-up and restore finish where damaged. Remove spilled, splashed or spattered finish material from all surfaces. Do not mar surface finish or item being cleaned. Leave storage space clean and in condition required for equivalent spaces in project. During progress of work, remove from project daily all discarded materials, rubbish, cans, rags, etc.
- 3.7 REPAINTING: Refinish all work which has become damaged or defaced during the course of construction and leave all finishing in clean, neat condition, acceptable to the Architect. Replace or repair all damaged material directly attributable to work under this Section.
- 3.8 ACCEPTANCE: Final acceptance of flooring shall be based upon inspection by the Architect. Flooring falling below specified and/or scheduled finish and shade shall be redone as required without expense to the Owner. Installer shall furnish the Owner a guarantee in writing to acceptably repair or otherwise correct any deficiencies without expense to the Owner, which develops or becomes apparent in the work within a period of one year from final acceptance.

## **09 67 66 – FLUID-APPLIED ATHLETIC FLOORING**

### **PART 1 - GENERAL**

- 1.1 DESCRIPTION: Provide Poured Urethane Gym Flooring where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 SUBMITTALS: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

### **PART 2 - PRODUCTS**

- 2.1 GENERAL: Provide colors and patterns as selected by the Architect from standard colors and patterns of the approved manufacturer in the specified type.
- 2.2 GYM FLOORING: 2 coat, 1/4" poured in place urethane full-pour floor system. Material & workmanship to have a 5 year manufacturer's warranty. Provide court lines & edge transition as required. Material to have a 10 year manufacturer's warranty.
- 2.3 APPROVED PRODUCTS:
  - A. Champco Athletic Surfaces
  - B. Chemturf/Robbins Sports Surfaces
- 2.4 STRIPING: Provide court striping as directed by architect for basketball.
- 2.5 OTHER MATERIAL: Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

### **PART 3 - EXECUTION**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 PREPARATION: Verify that substrate is smooth, level, at required finish elevation, and without more than 1/8" in 10'-0" variation from level or slopes shown on the Drawings. Prior to laying materials, broom clean or vacuum the surfaces to be covered, and inspect the subfloors.
- 3.3 LAYOUT: Install materials only after finishing operations, including painting, have been completed and after permanent heating system is operating. Maintain reference markers, holes, and openings that are in place or plainly marked for future cutting by repeating on the finish surface as marked in the subfloor. Use chalk or other non-permanent marking device.
- 3.4 INSTALLING POURED URETHANE FLOOR: Install this system in accordance to recommendations of the manufacturer as authorized by the architect.
- 3.5 CLEANING AND PROTECTING: Remove excess adhesive and other blemishes from exposed surfaces, using neutral cleaner recommended by the manufacturer of the resilient materials.

## 09 68 13 - TILE CARPETING

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUBMITTALS: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections. Product Data for each type of carpet material, carpet cushion, and installation accessory specified. Submit manufacturer's printed data on physical characteristics, durability, fade resistance, and fire-test-response characteristics. Submit methods of installation for each type of substrate. Samples for initial selection in the form of manufacturer's color charts or Samples of materials showing the full range of colors, textures, and patterns available for each type of carpet indicated. Maintenance data for carpet and cushion to include in the operation and maintenance manual specified in Division 1.
- 1.3 QUALITY ASSURANCE: Obtain each type of carpet from one source and by a single manufacturer. Provide carpet with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify carpet with appropriate markings of applicable testing and inspecting agency. Surface Flammability: Passes CPSC 16 CFR, Part 1630. Flame Spread: 25 or less per ASTM E 84. Smoke Developed: 450 or less per ASTM E 84.
- 1.4 DELIVERY, STORAGE, AND HANDLING: Comply with the Carpet and Rug Institute's CRI 104, Section 5: "Storage and Handling." Deliver materials to Project site in original factory wrappings and containers, labeled with identification of manufacturer, brand name, and lot number. Store materials on-site in original undamaged packages, inside well-ventilated area protected from weather, moisture, soilage, extreme temperatures, and humidity. Lay flat, with continuous blocking off ground.
- 1.5 PROJECT CONDITIONS: Comply with CRI 104, Section 6: "Site Conditions." Do not install carpet until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy. Subfloor Moisture Conditions - Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1, with subfloor temperatures not less than 55 deg F. Subfloor Alkalinity Conditions - A pH range of 5 to 9 when subfloor is wetted with potable water and pHydron paper is applied.
- 1.6 WARRANTY: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents. Submit a written warranty executed by carpet manufacturer and Installer agreeing to repair or replace carpet that does not meet requirements or that fails in materials or workmanship within the specified warranty period. Warranty to cover the following:
 

Wear -	Lifetime of Carpet. No more than 10% face yarn loss by weight in normal use.
Static -	Lifetime of Carpet.
Edge Ravel -	Lifetime of Carpet. Guaranteed no edge ravel in normal use (no seam sealers required).
Delamination -	Lifetime of Carpet. Guaranteed no delamination in normal use (no chair pads required).
Tuft Bind -	Lifetime of Carpet. Guaranteed not to zipper, wet or dry.
Adhesive -	Manufacturer to warrant that the Manufacturer's adhesives will bond the carpet to the properly prepared substrate for the life of the carpet. Substrate must meet Manufacturer's recommended floor preparation procedures.
Stain Resistance -	Manufacturer to provide lifetime stain warranty and a 10 year Lightfastness and Atmospheric Contaminant Warranty on all Duracolor carpets. This lifetime stain warranty covers all Duracolor carpets made by Manufacturer.
- 1.7 EXTRA STOCK: Deliver to the Owner for his use in future modifications an extra stock of approximately 100 SF of each color and pattern in each material installed under this Section, packing each type of material separately, distinctly marked, and adequately protected against deterioration.

### PART 2 - PRODUCTS

- 2.1 APPROVED MANUFACTURERS:

- A. Basis of Design: Vim by Patcraft
- B. Atlas
- C. J&J
- D. Lees
- E. Bigelow
- F. Milliken
- G. Other products that have been submitted & approved by the Architect prior to the bid date. Provide complete product information in accordance to the requirements of Section 01630. Acceptance of a substitute manufacturer does not alter the requirement to meet all aspects of this specification section.

2.2 CARPET MATERIAL:

- A. Construction: Microweave
- B. Gauge: 1/12 Patterned Loop
- C. Yarn Content: Antron Legacy nylon 6, 6 (an Environmentally Preferable Product)
- D. Density: 5454
- E. Tile Size: 50.0 cm x 50.0 cm
- F. Backing: Polyurethane Cushion-Carpet Tile System
- G. Tufted Yarn Weight: 20 oz / sq yd
- H. Total Finished Weight: 50 oz / sq yd
- I. Average Finished Pile Height: 0.132"
- J. Soil Retardant: DuraTech
- K. Recycled Content: 24% Post Industrial
- L. Indoor Air Quality: CRI Green Label Plus

2.3 **PATTERN:** The pattern for carpet tile shall match: Atlas – Satara, J&J – Revibe, Patcraft – Vim, Lees - Analogue, Bigelow – X-factor.

2.4 **PATTERN (LOW COST):** The pattern for carpet tile shall match: J&J – Energy or Transit; Milliken – Fixate.

2.5 INSTALLATION ACCESSORIES:

- A. Concrete-Slab Primer: Nonstaining type as recommended by the carpet manufacturer.
- B. Trowelable Underlayments and Patching Compounds: As recommended by the carpet manufacturer.
- C. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated and to comply with flammability requirements for installed carpet as recommended by the carpet manufacturer.
- D. Transition strip: Schluter 1.7 RENO-V

PART 3 - EXECUTION

- 3.1 **EXAMINATION:** Examine subfloors and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting performance of carpet. Do not proceed with installation until unsatisfactory conditions have been corrected. Verify that subfloors and conditions are satisfactory for carpet installation and comply with requirements specified in this Section and those of the carpet manufacturer.
- 3.2 **PREPARATION:** Comply with carpet manufacturer's installation recommendations to prepare substrates indicated to receive carpet installation. Level subfloor within 1/4 inch in 10 feet, noncumulative, in all directions. Sand or grind protrusions, bumps, and ridges. Patch and repair cracks and rough areas. Fill depressions. Use leveling and patching compounds to fill cracks, holes, and depressions in subfloor as recommended by the carpet manufacturer. Remove subfloor coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone. Broom or vacuum clean subfloors to be covered with carpet. Following cleaning, examine subfloors for moisture, alkaline salts, carbonation, or dust. Apply concrete-slab primer, according to manufacturer's directions, where recommended by the carpet manufacturer.
- 3.3 **INSTALLATION:** Direct Glue-Down Installation to comply with CRI 104, Section 8: "Direct Glue-Down." Comply with carpet manufacturer's recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile.

At doorways, center seams under door in closed position. Do not bridge building expansion joints with continuous carpet. Where demountable partitions or other items are indicated for installation on top of finished carpet floor, install carpet before installation of these items. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings. Install pattern parallel to walls and borders. Eliminate seams to the greatest extent possible considering the material width. Do not install head seams within any room unless the dimension exceeds 40'.

- 3.4 CLEANING: Perform the following operations immediately after completing installation. Remove visible adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer. Remove protruding yarns from carpet surface. Vacuum carpet using commercial machine with face-beater element.
- 3.5 PROTECTION: Comply with CRI 104, Section 15: "Protection of Indoor Installation." Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure carpet is without damage or deterioration at the time of Substantial Completion.

09 68 16 - SHEET CARPETING

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUBMITTALS: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections. Product Data for each type of carpet material, carpet cushion, and installation accessory specified. Submit manufacturer's printed data on physical characteristics, durability, fade resistance, and fire-test-response characteristics. Submit methods of installation for each type of substrate. Samples for initial selection in the form of manufacturer's color charts or Samples of materials showing the full range of colors, textures, and patterns available for each type of carpet indicated. Maintenance data for carpet and cushion to include in the operation and maintenance manual specified in Division 1.
- 1.3 QUALITY ASSURANCE: Obtain each type of carpet from one source and by a single manufacturer. Provide carpet with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify carpet with appropriate markings of applicable testing and inspecting agency. Surface Flammability: Passes CPSC 16 CFR, Part 1630. Flame Spread: 25 or less per ASTM E 84. Smoke Developed: 450 or less per ASTM E 84.
- 1.4 DELIVERY, STORAGE, AND HANDLING: Comply with the Carpet and Rug Institute's CRI 104, Section 5: "Storage and Handling." Deliver materials to Project site in original factory wrappings and containers, labeled with identification of manufacturer, brand name, and lot number. Store materials on-site in original undamaged packages, inside well-ventilated area protected from weather, moisture, soilage, extreme temperatures, and humidity. Lay flat, with continuous blocking off ground.
- 1.5 PROJECT CONDITIONS: Comply with CRI 104, Section 6: "Site Conditions." Do not install carpet until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy. Subfloor Moisture Conditions - Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1, with subfloor temperatures not less than 55 deg F. Subfloor Alkalinity Conditions - A pH range of 5 to 9 when subfloor is wetted with potable water and pHydriion paper is applied.
- 1.6 WARRANTY: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents. Submit a written warranty executed by carpet manufacturer and Installer agreeing to repair or replace carpet that does not meet requirements or that fails in materials or workmanship within the specified warranty period. Warranty to cover the following:
  - A. Wear - Lifetime of Carpet. No more than 10% face yarn loss by weight in normal use.
  - B. Static - Lifetime of Carpet.
  - C. Edge Ravel - Lifetime of Carpet. Guaranteed no edge ravel in normal use (no seam sealers required).
  - D. Delamination - Lifetime of Carpet. Guaranteed no delamination in normal use (no chair pads required).
  - E. Tuft Bind - Lifetime of Carpet. Guaranteed not to zipper, wet or dry.
  - F. Adhesive - Manufacturer to warrant that the Manufacturer's adhesives will bond the carpet to the properly prepared substrate for the life of the carpet. Substrate must meet Manufacturer's recommended floor preparation procedures.

- G. Stain Resistance - Manufacturer to provide lifetime stain warranty and a 10 year Lightfastness and Atmospheric Contaminant Warranty on all Duracolor carpets. This lifetime stain warranty covers all Duracolor carpets made by Manufacturer.
- 1.7 EXTRA STOCK: Deliver to the Owner for his use in future modifications an extra stock of approximately 200 SF of each color and pattern in each material installed under this Section, packing each type of material separately, distinctly marked, and adequately protected against deterioration.
- 1.8 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

PART 2 - PRODUCTS

- 2.1 APPROVED MANUFACTURERS:
  - A. J&J
  - B. Lees
  - C. Milliken
  - D. Mohawk
  - E. Patcraft
  - F. Other products that have been submitted & approved by the Architect prior to the bid date. Provide complete product information in accordance to the requirements of Section 01630. Acceptance of a substitute manufacturer does not alter the requirement to meet all aspects of this specification section.
- 2.2 BROADLOOM CARPET MATERIAL:
  - A. Construction- Tufted
  - B. Surface Texture- Multiple Yarn Infusion
  - C. Stitches Per Inch- 98 Tufts per Square Inch (Gauge x Stitch Rate x Tufts/Stitch)
  - D. Finished Pile Thickness- .156
  - E. Dye Method- Continuous Dye
  - F. Backing Material- 5.5 oz Multi layered woven and non woven composite for enhanced straightness, tuftbind and edge ravel; Endura Loc™ High Performance Backing System with 18x8 Lino Woven ActionBac®
  - G. Face Yarn- 100% Ultron® Type 6,6 Nylon
  - H. Fiber Technology- Permanent Static Control, Commercial Carpet Protector & Stainguard Protection
  - I. Size/Width- 13'6" (4m)
  - J. Static- Permanent Static Control
  - K. Flammability- Passes Class 2 (ASTM E-648) Radiant Panel; Critical Radiant Flux > .50 W/cm^2
  - L. Flooring Radiant Panel Test- Passes Class 2 (ASTM E-648) Radiant Panel; Critical Radiant Flux > .50 W/cm^2
  - M. Smoke Density- Smoke Density (ASTM E-662) < 450

N. CRI Green Label Plus Certified- Yes

## 2.3 INSTALLATION ACCESSORIES:

- A. Concrete-Slab Primer: Nonstaining type as recommended by the carpet manufacturer.
- B. Trowelable Underlayments and Patching Compounds: As recommended by the carpet manufacturer.
- C. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated and to comply with flammability requirements for installed carpet as recommended by the carpet manufacturer.
- D. Tackless Carpet Stripping: Water-resistant plywood in strips as required to match cushion thickness and in compliance with CRI 104, 11.3.
- E. Seaming Cement: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.
- F. Transition strip: Schluter 1.7 RENO-V

## PART 3 - EXECUTION

- 3.1 EXAMINATION: Examine subfloors and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting performance of carpet. Do not proceed with installation until unsatisfactory conditions have been corrected. Verify that subfloors and conditions are satisfactory for carpet installation and comply with requirements specified in this Section and those of the carpet manufacturer.
- 3.2 PREPARATION: Comply with carpet manufacturer's installation recommendations to prepare substrates indicated to receive carpet installation. Level subfloor within 1/4 inch in 10 feet, noncumulative, in all directions. Sand or grind protrusions, bumps, and ridges. Patch and repair cracks and rough areas. Fill depressions. Use leveling and patching compounds to fill cracks, holes, and depressions in subfloor as recommended by the carpet manufacturer. Remove subfloor coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone. Broom or vacuum clean subfloors to be covered with carpet. Following cleaning, examine subfloors for moisture, alkaline salts, carbonation, or dust. Apply concrete-slab primer, according to manufacturer's directions, where recommended by the carpet manufacturer.
- 3.3 INSTALLATION: Direct Glue-Down Installation to comply with CRI 104, Section 8: "Direct Glue-Down." Comply with carpet manufacturer's recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position. Do not bridge building expansion joints with continuous carpet. Where demountable partitions or other items are indicated for installation on top of finished carpet floor, install carpet before installation of these items. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings. Install pattern parallel to walls and borders. Eliminate seams to the greatest extent possible considering the material width. Do not install head seams within any room unless the dimension exceeds 40'.
- 3.4 CLEANING: Perform the following operations immediately after completing installation. Remove visible adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer. Remove protruding yarns from carpet surface. Vacuum carpet using commercial machine with face-beater element.
- 3.5 PROTECTION: Comply with CRI 104, Section 15: "Protection of Indoor Installation." Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure carpet is without damage or deterioration at the time of Substantial Completion.



## 09 69 13 - RIGID-GRID ACCESS FLOORING

### PART 1 - GENERAL

- 1.1 WORK INCLUDED: Access floor contractor shall provide submittals, materials and installation of the access floor system as shown on the contract drawings and as specified in this document.
- 1.2 RELATED WORK NOT INCLUDED
  - A. General contractor shall provide clear access, dry secure storage, and a clean subfloor area which is free of construction debris and other trades during installation of the access floor system. Area to receive the access floor shall be enclosed and maintained at a temperature range of 40 degrees to 90 degrees F and a humidity range of 20% to 70% relative.
  - B. Concrete sealer shall be compatible with access floor pedestal adhesive, see Division 3.
  - C. Electrical contractor shall provide necessary material and labor to electrically connect the access floor to the building, see Division 16.
- 1.3 SYSTEM DESCRIPTION: Access floor system shall consist of interchangeable square panels selected to meet specific load requirements. Panels shall be supported by adjustable pedestal assemblies which positively locate, engage and secure panels and which accommodate horizontal grid members when specified. Finished floor height of the system above the subfloor shall be 12".
- 1.4 SHOP DRAWINGS AND PRODUCT DATA: Submit drawings showing complete access floor system including floor panel layout and all accessories that are a part of the system. Submit details and descriptive notes for finishes of components, anchoring, edge details, and interfaces with adjoining work.
- 1.5 SAMPLES: Submit for approval one full size floor panel with finished surface and understructure components for each type of access floor being supplied.
- 1.6 QUALITY ASSURANCE: Submit certified laboratory test data for approval which indicates that the supplied system complies with the performance indicated herein.
  - A. Test methods for concentrated, ultimate, rolling, overturning movement, and axial loads shall be in accordance with the "Recommended Test Procedures for Access Floors" as published by Cisca, the Ceilings and Interiors Systems Construction Association.
  - B. Test Method for Impact Load: Panel without floor covering shall be supported on actual understructure. An impact load is applied to the panel via a one square inch indenter which is struck by a predetermined load dropped from a height of 36". The panel shall be loaded at its weakest point. Weakest point to be determined by an independent test lab.
  - C. Test Method for Electrical Resistance: The electrical resistance of the access floor system shall be tested in accordance with NFPA 99. The test is modified for access floors where one electrode is placed on the floor surface covering and the other electrode is attached to the understructure.

### PART 2 - PRODUCTS

- 2.1 ACCEPTABLE MANUFACTURERS : Access floor system shall be manufactured by Tate Access Floors, Inc. Alternative products shall meet or exceed design criteria.
- 2.2 FLOOR PANELS: Shall consist of either 24" or 60 cm steel top sheet welded to a formed steel bottom pan and a painted finish. (All Steel.)

2.3 UNDERSTRUCTURE SYSTEM:

A. PEDESTAL ASSEMBLY

1. A 30" FFH assembly shall provide a 8000 lb. axial load without permanent deformation.
2. Assembly shall provide a range of adjustment from 1" to 2" total.
3. Provide a means of leveling and locking the assembly at a selected height which requires deliberate action to change height setting and which prevents vibrating displacement.

B. PEDESTAL BASES - Fabricated of a square base with not less than 16 square inches of bearing area and assembled to a stud or tube which is designed to engage the pedestal head assembly; secure to subfloor in accordance with manufacturer's instructions.

C. PEDESTAL HEADS - Fabricated of a head plate with a corresponding stud or tube which is designed to engage the pedestal base assembly. The head must be the proper type to positively locate the floor panel or to receive a stringer system. When specified, the head shall provide a means to fasten the floor panel or stringer directly to the head.

D. STRINGER SYSTEM - Stringer system shall be all steel construction, designed and fabricated to interlock with pedestal head and to form a modular grid pattern with members under edges of all field floor panels. Stringer to be snapped on the pedestal head.

2.4 SYSTEM PERFORMANCE

System Type Panel Understructure	System Weight*	Static Loads			Rolling Loads		Ultimate Impact Load
		Concentrated Load	Uniform Load	Ultimate Load	10 Passes	10,000 Passes	
All Steel 1250 snap-on stringer	7.0 lbs.	1250 lbs.	300 lbs.	2500 lbs.	500 lbs.	500 lbs.	100 lbs.

2.5 FLOOR SURFACE COVERING

- A. Finish the surface of floor panels with floor covering material indicated on contract drawings or in this specification. Where floor coverings are by the access floor manufacturer, the type, color and pattern to be selected from manufacturer's standards.
- B. Vinyl edge trim for the tile coverings shall be mechanically locked and bonded to the panel surface and flush with the surface covering.

2.6 ACCESSORIES

- A. Service outlets to be provided in locations and as detailed on the contract drawings. Outlets to accommodate power, communications and data wiring.
- B. Air Flow Panels shall be all steel welded construction with a 25% open air perforated top sheet and shall be supplied without an adjustable damper assembly. Panels shall be capable of supporting a design load of 1000 lbs. Panels without an adjustable damper assembly shall provide 800 CFM at a static pressure of 0.1" H2O.
- C. Provide 2% spare floor panels and 2% square feet of understructure systems for each type used in the project for maintenance stock. Deliver to project in manufacturer's standard packages clearly marked with the contents.
- D. Provide 4 panel lifting devices.

**PART 3 - INSTALLATION**

- 3.1 QUALIFICATION: Floor system and accessories to be installed by the manufacturer's authorized representative to maintain the integrity of the products and acceptable performance of the completed installation.
- 3.2 INSPECTION: Examine subfloor for unevenness, irregularities and dampness that would affect the quality and execution of the work. Do not proceed with installation until subfloor surfaces are clean, dry, clear of other trades and ready to receive access flooring.
- 3.3 PREPARATION AND INSTALLATION: The access floor to be prepared and installed in accordance with the access floor manufacturer's instructions covering preparation, layout, alignment and installation. Installed access floors shall be level within plus or minus 0.060 inches in 10 feet, and plus or minus 0.10 inches over the entire area. Floor to be rigid and free of rocking panels.
- 3.4 ADJUST AND CLEAN: Remove access floor installation debris as work progresses, maintaining area under finished floor in a clean condition. The general contractor is to protect the finished access floor from damage and misuse.

## 09 71 13 - PLYWOOD PANEL WALL FINISH SYSTEM

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Provide Plywood Panel Wall Finish System where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.

### PART 2 - PRODUCTS

- 2.1 PLYWOOD WALLBOARD: Provide plywood panel wall finish, minimum half inch (1/2") thick, in 48" widths and in such lengths as will result in a minimum of joints. Use sanded plywood panels, intended for interior finish, meeting APA Veneer Grade B, to have a "solid surface. Shims, sled or router repairs, and tight knots to 1 inch across grain permitted. Wood or synthetic repairs permitted. Some minor splits permitted," as per APA K435 2011. Plywood panels to meet Class C for fire spread and flame development according to ASTM E84, unless required otherwise by construction type.
- 2.2 JOINTS, CRACKS & FASTENER HOLES: All joints and cracks to be filled with a wood or synthetic based wood filled and sanded smooth.
- 2.3 FASTENING DEVICES: For fastening plywood panels in place on metal studs and metal channels, use flat-head screws, shouldered, specially designed for use with power-driven tools, not less than 1" long, with self-tapping threads and self drilling points.

### PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Install the plywood panels with the separate boards in moderate contact but not forced into place. At internal and external corners, conceal the cut edges of the panels by the overlapping covered edges of the abutting panels. Stagger the panels so that corners of any four panels will not meet at a common point except in vertical corners. Install the plywood panels with the long dimension of the panels at right angles to the supporting members.
- 3.3 ATTACHING: Drive the specified screws with clutch-controlled power screwdrivers, spacing the screws 16" on centers at walls. Where framing members are spaced 24" apart on walls, space screws 12" on centers.
- 3.4 JOINT, CRACK & FASTENER HOLE TREATMENT: Inspect areas to be treated, verifying that the plywood panel fits snugly against supporting framework. In areas where treatment will be performed, maintain a temperature of not less than 55 degrees for 24 hours prior to commencing the treatment, and until filler compounds have dried. Apply the filler by machine or hand tool to all joints, cracks and fastener holes, to ensure a smooth and level finish. Provide a minimum drying time of 24 hours between coats, with additional drying time in poorly ventilated areas. Sand smooth for finishing.
- 3.5 CLEANING UP: In addition to other requirements for cleaning, use necessary care to prevent scattering wood and filler dust, and to prevent tracking filler onto floor surfaces. At completion of each segment of installation in a room or space, promptly pick up and remove from the working area all scraps, debris, and surplus material of this Section.

## **09 72 13 - CORK WALL COVERINGS**

### **PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all wall covering, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. Conform to all requirements of CFFA Quality Standards for Wallcoverings, CFFA-W-101-A, & Fed Spec CCC-W-408A.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture, providing air good circulation.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.
- 1.6 EXTRA STOCK: Upon completion of the work of this Section, deliver to the Owner an extra stock equaling 2% of each color, type, and gloss of paint used in the work, tightly sealing each container, and clearly labeling with contents and location where used.

### **PART 2 - MATERIALS**

- 2.1 TACKABLE WALL COVERING: MDC Meridian or another product determined by the Architect to be equal & receiving his approval prior to bidding. Color selected by Architect from manufacturers standards.
  - A. Content: Polyester/Cellulose
  - B. Width: 30"
  - C. Weight (oz/lyd): 7
  - D. Weight (oz/sqyd): 4.67
  - E. Backing: Non-woven
  - F. Fire Rating: Class A
- 2.2 CORK UNDERLAYMENT
  - A. Thickness: 6mm or ¼"
  - B. Grade: BB-14
- 2.3 ADHESIVE: Adhesive as recommended by wallcovering manufacturer.
- 2.4 EXTRUDED ALUMINUM TRIM: Trim shall be Blanke 0.375" Extruded Anodized Aluminum Reducer Trim or equal as approved by the Architect.

### **PART 3 - EXECUTION**

- 3.1 PREPARATION: Examine the areas and conditions under which work of this Section will be performed, correcting conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

- 3.2      **INSTALLATION:** Install materials only after finishing operations, including painting, have been completed and after permanent heating system is operating. See that substrate is smooth, dry & level. Prime/seal all drywall prior to application. Seams to be matched tight. Remove all air bubbles & wrinkles. Apply in accordance to manufacturer's recommendations. After hanging, clean surfaces of excess adhesive & dirt. Protect until completion.
- 3.3      **CORK UNDERLAYMENT:** Apply cork adhesive according to manufacturer's instructions. Spread cork adhesive using a 3/32" x 3/32" notched trowel. Apply adhesive only to an area the cork underlayment can be set in the adhesive while it is still wet and tacky. As soon as the placement is completed, roll down the entire surface to ensure proper contact with adhesive and remove any air bubbles.
- 3.4      **CLEANING AND PROTECTING:** Remove excess adhesive and other blemishes from exposed surfaces, using neutral cleaner recommended by the manufacturer of the resilient materials.

## 09 72 17 - RIGID WALL PANELS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This section includes the following types of wall protection systems:
  - 1. Wall Covering

#### 1.2 REFERENCES

- A. National codes (IBC, UBC, SBCCI, BOCA, Life Safety and CA 01350)
- B. American Society for Testing and Materials (ASTM)
- C. Underwriters Laboratories (UL)
- D. California 01350 specification

#### 1.3 SUBMITTALS

- A. General: Submit the following in accordance with conditions of contract and Division 1 specification section 01 33 23 "Submittal Procedures".
- B. Product data and detailed specifications for each system component and installation accessory required, including installation methods for each type of substrate.
- C. Shop drawings showing locations, extent and installation details of wall covering products.
- D. Samples for verification purposes: Submit the following samples, as proposed for this work, for verification of color, texture, pattern and thickness:
  - 1. Sample of each product specified.
- E. Product test reports from a qualified independent testing laboratory showing compliance of each component with requirements indicated.
- F. Maintenance data for wall protection system components for inclusion in the operating and maintenance manuals specified in Division 1.

#### 1.4 QUALITY ASSURANCE

- A. Installer qualifications: Engage an installer who has no less than 3 years experience in installation of systems similar in complexity to those required for this project.
- B. Manufacturer's qualifications: Not less than 5 years experience in the production of specified products and a record of successful in-service performance.
- C. Code compliance: Assemblies should conform to all applicable codes including IBC, UBC, SBCCI, BOCA, Life Safety and CA 01350.
- D. Fire performance characteristics: Provide engineered PETG wall protection system components with UL label indicating that they are identical to those tested in accordance with ASTM E84 for Class 1 characteristics listed below:
  - 1. Flame spread: 25 or less
  - 2. Smoke developed: 450 or less

- E. Impact Strength: Provide assembled wall protection units that have been tested in accordance with the applicable provisions of ASTM F476.
- F. Chemical and stain resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.
- G. Color match: Provide wall protection components that are color matched in accordance with the following:
  - 1. Delta Ecmc of no greater than 1.0 using CIELab color space. (Specifier note: Construction Specialties' colors are matched under cool white fluorescent lighting and computer controlled within manufacturing tolerances. Color may vary if alternate lighting sources are present).
- H. Single source responsibility: Provide all components of the wall protection system manufactured by the same company to ensure compatibility of color, texture and physical properties.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project site in unopened original factory packaging clearly labeled to show manufacturer.
- B. Store materials in original, undamaged packaging in a clean, dry place out of direct sunlight and exposure to the elements. A minimum room temperature of 40°F (4°C) and a maximum of 100°F (38°C) should be maintained.
- C. Materials must be stored flat.

#### 1.6 PROJECT CONDITIONS

- A. Materials must be acclimated in an environment of 65-75°F (18-24°C) for at least 24 hours prior to beginning the installation.
- B. Installation areas must be enclosed and weatherproofed before installation commences.

### PART 2 - PRODUCTS

#### 2.1 BASIS OF DESIGN

- A. Acrovyn Wall Covering interior surface protection products as manufactured by Construction Specialties, Inc.

#### 2.2 MATERIALS

- A. Engineered PETG: Rigid sheet should be high impact Acrovyn 4000 with nominal .040" (1.02mm) thickness and supplied in 4' x 8' or 10' (1.22m x 2.44m or 3.05m) sheet sizes in standard Suede texture.
- B. Provide plastic trims at joints and transitions.
  - 1. Color-matched caulk may be used at scribing between trim and object if necessary.

#### 2.3 FABRICATION

- A. General: Fabricate wall covering to comply with requirements indicated for design, dimensions, detail, finish and sizes.

#### 2.4 ACCESSORIES



- A. Wall Covering shall be furnished as a complete packaged system, containing all adhesive. Adhesive shall be water based and non-hazardous.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
  - 1. Do not proceed until unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Surface preparation: Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.
- B. Protection: Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

#### 3.3 INSTALLATION

- A. Install the work of this section in strict accordance with the manufacturer's recommendations using approved adhesive.
- B. Temperature at the time of installation must be between 65-75°F (18-24°C) and be maintained for at least 48 hours after the installation to allow for proper adhesive set up.
- C. Relative humidity shall not exceed 80%.
- D. Do not expose wall covering to direct sunlight during or after installation. This will cause the surface temperature to rise, which in turn will cause bubbles and delamination.

#### 3.4 CLEANING

- A. General: Immediately upon completion of installation, clean wall covering and accessories in accordance with manufacturer's recommended cleaning method.
- B. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

#### 3.5 PROTECTION

- A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

## **09 72 18 - FIBERGLASS WALL PANELS**

### **PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for fiberglass wall panels, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture, providing air good circulation.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.
- 1.6 EXTRA STOCK: Upon completion of the work of this Section, deliver to the Owner an extra stock equaling 50 SF of each color & type of material used in the work, neatly packaged, and clearly labeling with contents and location where used.

### **PART 2 - PRODUCTS**

- 2.1 WALL PANELS: Marlite "FRP Wall Panel", Crane Kemlite "Glasbord FRP Flat Panel", or another product determined by the Architect to be equal & receiving his prior approval. Color selected by Architect from manufacturers standards.
- 2.2 ACCESSORIES: Provide adhesive & matching trims by same manufacturer.

### **PART 3 - EXECUTION**

- 3.1 PREPARATION: Examine the areas and conditions under which work of this Section will be performed, correcting conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Install according to manufacturer's recommendations, in as large of pieces as possible using preformed fiberglass moldings at joints & exposed edges. Adhere to substrate using a uniform coating of adhesive as recommended by manufacturer.

## **09 73 23 - SISAL WALL COVERING**

### **PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all wall covering, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. Conform to all requirements of CFFA Quality Standard for Vinyl Coated Fabric Wallcoverings, 1984, CFFA-W-101-A, & Fed Spec CCC-W-408A.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture, providing air good circulation.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

### **PART 2 - MATERIALS**

- 2.1 WALL COVERING: "Wallmaster" type-1 natural fiber wall covering, by Fibreworks Corp. Class A flame spread rating. Color selected by Architect from manufacturers standards.
- 2.2 ADHESIVE: Adhesive as recommended by wallcovering manufacturer.

### **PART 3 - EXECUTION**

- 3.1 PREPARATION: Examine the areas and conditions under which work of this Section will be performed, correcting conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.  
INSTALLATION: Install materials only after finishing operations, including painting, have been completed and after permanent heating system is operating. See that substrate is smooth, dry & level. Prime/seal all drywall prior to application. Seams to be matched tight. Remove all air bubbles & wrinkles. Apply in accordance to manufacturer's recommendations. After hanging, clean surfaces of excess adhesive & dirt. Protect until completion.
- 3.2 CLEANING AND PROTECTING: Remove excess adhesive and other blemishes from exposed surfaces, using neutral cleaner recommended by the manufacturer of the resilient materials.

## 09 77 23 - FABRIC-WRAPPED PANELS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes fabric-wrapped wall panels.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of panel edge, core material, and mounting indicated.
- B. Shop Drawings: For fabric-wrapped panels. Include mounting devices and details.
- C. Field Measurements: Verify locations of fabric-wrapped panels by field measurements before fabrication and indicate measurements on Shop Drawings.
- D. Coordination Drawings: Show intersections with adjacent work.
- E. Samples: For each fabric and panel.
- F. Maintenance data.

#### 1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide fabric-wrapped panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 450 or less.
- B. Preinstallation Conference: Conduct conference at Project site.

#### 1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fabric-wrapped panels that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, fabric sagging, distorting, or releasing from panel edge; or warping of core.
  - 2. Warranty Period: Two years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 CORE MATERIALS

- A. Glass-Fiber Board: ASTM C 612, Type IA or Types IA and IB; density as specified, unfaced, dimensionally stable, molded rigid board, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

- B. Polyester Batting Core Overlay: Flame-retardant, compressible, fiberfill.

## 2.2 FABRIC-WRAPPED PANEL

- A. Facing Material: Fabric from same dye lot; color and pattern as selected by Architect from manufacturer's full range.
  - 1. Applied Treatments: Stain resistance. Apply polymer flame resistance if required to comply with specified fire test response characteristics.
- B. Panel Core:
  - 1. Glass-Fiber Board: 6-to 7-lb/cu. ft. Insert density nominal core density and 3/4-inch nominal core thickness.
- C. Core Overlay: Polyester batting; Manufacturer's standard thickness.
- D. Panel Width and Height: As indicated on Drawings.
- E. Panel Edge: Resin-hardened, glass-fiber board.
  - 1. Edge Detail: Square unless otherwise indicated.
  - 2. Corner Detail: Square unless otherwise indicated.

## 2.3 FABRICATION

- A. Fabric Facing: Stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other foreign matter. Applied with visible surfaces fully covered.
- B. Core Overlay: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, sags.
- C. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:
  - 1. Thickness.
  - 2. Edge straightness.
  - 3. Overall length and width.
  - 4. Squareness from corner to corner.
- D. Mounting Devices: Concealed on back of panel, recommended to support weight of panel, with base-support bracket system where recommended by manufacturer for additional support of panels, and as follows:
  - 1. Metal "Z" Clips: Two-part panel clips, with one part of each clip mechanically attached to back of panel and the other part to wall substrate, designed to allow for panel removal.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Wall Panels: Install fabric-wrapped panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Anchor panels securely to supporting substrate.
- C. Match and level fabric pattern and grain among adjacent panels.
- D. Installation Tolerances: As follows:
  - 1. Variation from Plumb and Level: Plus or minus 1/16 inch.
  - 2. Variation of Panel Joints from Hairline: Not more than 1/32 inch wide.
- E. Clip loose threads; remove pills and extraneous materials.
- F. Clean panels with fabric facing, on completion of installation, to remove dust and other foreign materials according to manufacturer's written instructions.
- G. Replace panels that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

**09 78 33 - LAMINATED WALL PANELS**

**PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all laminated wall panels, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture, providing air good circulation.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.
- 1.6 EXTRA STOCK: Upon completion of the work of this Section, deliver to the Owner an extra stock equaling 50 SF of each color & type of material used in the work, neatly packaged, and clearly labeling with contents and location where used.
- 1.7 WARRANTY: Manufacturer to warrant laminated panel wall systems against defects for a period of five (5) years from the time of installation.

**PART 2 - MATERIAL**

- 2.1 MANUFACTURE: Provide Wall Systems equal to 310 SYSTEM Manufactured by Panel Specialists, Inc.
- 2.2 WALL PANEL COMPOSITION: Typical panel consists of a 45 lb. density industrial grade particle board core meeting ANSI 208.1, surfaced with High Pressure Decorative Laminate and backed with a non decorative backer. Bonding is accomplished by factory applying a rigid set glue line.
- 2.3 LAMINATE: Decorative laminates and non-decorative backers used to surface Wall Systems are to meet or exceed relevant standards of the National Electrical manufacturing Association (NEMA LD3-1991) for thickness, performance properties and appearance.
- 2.4 PANEL DIMENSIONS: Panel widths are nominal 24". Panel lengths are nominal 96", 120", or 144". Special factory machine lengths will be considered upon request and subject to product yield.
- 2.5 FIRE RATING: UL Class I or "A" Fire rated panels labeled under UL File #R10434. Test values: Flame Spread 15 - Smoke Developed 20. Test values achieved in full scale astm-e84 tunnel burn conducted by underwriters laboratory. Adhesive used in bonding must be approved type.
- 2.6 ACCESSORIES: Provide adhesive & matching trims by same manufacturer.

**PART 3 - EXECUTION**

- 3.1 PREPARATION: Examine the areas and conditions under which work of this Section will be performed, correcting conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

- 3.2      INSTALLATION: Install according to manufacturer's recommendations, in as large of pieces as possible using preformed moldings at joints & exposed edges. Adhere to substrate using a uniform coating of adhesive.



## 09 84 13 - SOUND-ABSORPTIVE PANELS

### PART 1 - GENERAL

- 1.1 SUMMARY: Cementitious wood fiber plank acoustical panel system and installation accessories.
- 1.2 REFERENCES: ASTM C635 Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; ASTM E1264 Standard Classification for Acoustical Ceiling Products; Ceilings and Interior Systems Construction Association Code of Practices.
- 1.3 SUBMITTALS: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section. Submit manufacturer's product data and installation instructions. Recommended procedures for normal cleaning and removal of stains including precautions in use of cleaning materials that may be detrimental to surfaces. Submit selection and verification samples for each wood fiber wall panel unit required, showing full range of exposed texture to be expected in completed work. Submit manufacturer's certificate that products meet or exceed specified requirements.
- 1.4 QUALITY ASSURANCE: Utilize an installer having demonstrated experience on projects of similar size and complexity. Regulatory requirements and approvals of the Southern Building Code Congress International.
- 1.5 DELIVERY, STORAGE & HANDLING: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer. Prevent soiling, physical damage or wetting. Store cartons open at each end to stabilize moisture content and temperature.
- 1.6 PROJECT/SITE CONDITIONS: Do not install acoustical panels until building is closed in and HVAC system is operational. Locate materials onsite at least 24 hours before beginning installation to allow materials to reach temperature and moisture content equilibrium. Maintain the following conditions in areas where acoustical materials are to be installed 24 hours before, during and after installation: Relative Humidity 65 - 75%; Uniform Temperature 55 - 70 degrees F.
- 1.7 MAINTENANCE: Provide 100 SF additional material for use by owner in building maintenance and repair. Provide new unopened cartons of extra materials, packaged with protective covering for storage, identified with appropriate labels.

### PART 2 - PRODUCTS

- 2.1 ACOUSTICAL WALL PANEL SYSTEM: Tectum Inc. Acoustical Wall panel systems consisting of aspen wood fibers bonded with inorganic hydraulic cement; dimensions 1"x 24"x 8' & long edge beveled. Color to be Natural. Provide all fasteners, furring strips for a complete single source installation.
- 2.2 CEILING PANEL: Tectum Inc. Acoustical Cloud system consisting of aspen wood fibers bonded with inorganic hydraulic cement; size as indicated with beveled edge. Color to be Natural. Provide all fasteners, suspension system & frame for a complete single source installation.
- 2.3 ACOUSTICAL CEILING SYSTEM: Tectum Acousti-Tough Ceiling System consisting of aspen wood fibers bonded with inorganic hydraulic cement; dimensions 1" X 24" X 48". Include suspension grid system.
- 2.4 ACCESSORIES: Provide accessories as follows:
  - A. Painted Head Drywall Screws
  - B. Plastic Moulding:
  - C. Touch-Up Paint:

### PART 3 - EXECUTION

- 3.1 MANUFACTURER'S INSTRUCTIONS: Comply with the instructions and recommendations of the acoustical wall panel system manufacturer. Install materials in accordance with governing regulations, fire resistance rating requirements and industry standards applicable to work. Comply with CISCA Code of Practices.

- 3.2 EXAMINATION: Examine surfaces scheduled to receive suspended or directly attached acoustical units for unevenness, irregularities and dampness that would affect quality and execution of work. Do not proceed with installation of wall panel system until unacceptable conditions are corrected.
- 3.3 INSTALLATION: Screw head to be flush with panel surface. Securely affix wall panels by means of splines attached vertically to smooth wall or furring strips. Engage vertical kerfs on the edges of the wall panels with splines. Apply adhesive or use Velcro hook and loop fastening where necessary. Cover field cut edges by means of trim or other moldings.
- 3.4 CLEANING: Clean exposed surfaces of acoustical panel, trim, moldings and suspension members to comply with manufacturer's instructions for cleaning. Touch up any minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
- 3.5 PROTECTION: Protect installed work from damage due to subsequent construction activity, including temperature and humidity limitations and dust control, so that the work will be without damage and deterioration at the time of acceptance by the Owner.

## 09 84 14 - ACOUSTIC STRETCHED-FABRIC WALL SYSTEMS

### PART 1 - General

- 1.1 WORK INCLUDED: The work consists of furnishing all labor, materials, accessories and equipment necessary to cover all areas shown within the drawings.
- 1.2 RELATED SECTIONS:
  - A. 09 51 23 - ACOUSTICAL TILE CEILINGS
- 1.3 APPLICATION:
  - A. 4" thick acoustical panels shall be furnished within the following areas:
    1. Band Room
  - B. Fiberglass Ceiling tile to be utilized in the following areas:
    1. Band room

### PART 2 - Products

- 2.1 GENERAL:
  - A. All components utilized in the construction of these products shall meet a Class I rating, as per ASTM E-84-81a, Surface Burning Characteristics of Building Materials.
- 2.2 ACOUSTICAL WALL PANELS:
  - A. Acoustically Absorptive Wall panels may be provided by the following manufacturers:
    1. Decoustics
    2. Conwed
    3. PolyPhon
    4. Tectum Inc.
  - B. Panel or Panel construction may consist of the following:
    1. A Fabric wrapped panel with a fiberglass core of 5-7 lb. density.
    2. Any 4" panel must have an NRC of at least .85 or have the following minimum absorption coefficients:
 

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz
.45	.75	.80	.80	.80	.85
    3. The panels are NOT to be sheathed with any type of "Xorel" Fabrics.
- 2.3 ACOUSTICAL CEILING TILES
  - A. 1" Thick Fiberglass Ceiling Tiles
    1. NRC at or above .90.

- B. Ceiling tiles may be provided by Armstrong, USG or an approved equal.

2.4 ACOUSTICAL DIFFUSER PANEL

- A. Panels shall be either 4' x 4' or 2' x 4' as per RCP.
- B. Surface shall be a curved or faceted surface.
- C. NRC shall be UNDER .10, or otherwise consist of a hard, rigid surface.
- D. Acoustical Diffuser panels may be provided by Conwed, Decoustics, Wall Technology or an approved equal.

PART 3 - Execution

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Wall panels are to be mounted on clips are per manufacturer's recommendations.
- B. Ceiling Tiles are to be mounted in standard ceiling grid as per manufacturers recommendations.
- C. No Xorel Fabrics are to be applied to the surface of the acoustical wall treatment, in lieu of any other acoustically transparent fabric such as Guildford Fabrics.
- D. Work shall be performed in a workmanship like manner and care shall be taken to avoid marring the delicate surface of the fiberglass panel products.

- 3.3 PROTECTION: Protect work during storage, installation & until final acceptance, replacing any damaged material.

# 09 91 00 – PAINTING & COATINGS

## PART 1 - GENERAL

- 1.1 GENERAL REQUIREMENTS: Paint and finish the exterior and interior exposed surfaces listed on the Painting Schedule, as noted on the Drawings, as specified herein, and as needed for a complete and proper installation. Unless otherwise indicated, painting other than priming is not required on surfaces in concealed and inaccessible areas. Pre-finished metal surfaces will not require painting except as specified. Do not paint moving parts of operating units. Do not paint over required labels.
- 1.2 RELATED SECTIONS
  - A. 09 21 16 - GYPSUM BOARD ASSEMBLIES
  - B. 04 22 00 - CONCRETE UNIT MASONRY
  - C. 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK
  - D. 05 12 00 - STRUCTURAL STEEL FRAMING
  - E. 05 21 00 - STEEL JOIST FRAMING
  - F. 05 40 00 - COLD-FORMED METAL FRAMING
  - G. 05 50 00 - METAL FABRICATIONS
  - H. 05 51 13 - METAL PAN STAIRS
  - I. 05 52 13 - PIPE AND TUBE RAILINGS
  - J. 13 34 19 - METAL BUILDING SYSTEM
- 1.3 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. The requirements of other sections may affect the work under this section.
- 1.4 DEFINITIONS: "Paint," as used herein, means coating systems materials including primers, emulsions, epoxy, enamels, sealers, fillers, and other applied materials whether used as prime, intermediate, or finish coats.
- 1.5 QUALITY ASSURANCE: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section. Provide finish coats which are compatible with the prime coats actually used. Provide barrier coats over non-compatible primers, or remove the primer and reprime as required.
- 1.6 SUBMITTALS: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit materials list of items proposed to be provided under this Section & manufacturer's specifications and other data needed to prove compliance with the specified requirements.
- 1.7 JOB CONDITIONS: Do not apply solvent-thinned paints when the temperature of surfaces to be painted and the surrounding air temperatures are below 45 degree F, unless otherwise permitted by the manufacturer's printed instructions as approved by the Architect. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted by the manufacturers' printed instructions as approved by the Architect. Applications may be continued during inclement weather only within the temperature limits specified by the paint manufacturer as being suitable for use during application & drying periods.
- 1.8 EXTRA STOCK: Upon completion of the work of this Section, deliver to the Owner an extra stock equaling 2 gallons of each color, type, and gloss of paint used in the work, tightly sealing each container, and clearly labeling with contents and location where used.

## PART 2 - PRODUCTS

- 2.1 PAINT MATERIALS: Premium grade by Sherwin-Williams, Benjamin Moore, Pratt & Lambert, Devoe Paint, Negely, Certified Labs, Tnemec, Coronado, PPG or other manufacturers approved in advance by the Architect.
- 2.2 HIGH BUILD EPOXY COATING, LOW GLOSS (MPI #108): A two component epoxy, high solids, low gloss coating for use on interior or exterior concrete, masonry and primed metal surfaces. Metal surfaces may be primed with conventional epoxy primers, epoxy zinc rich primers or inorganic zinc rich primers.

Listing Mfr	Label	Product Name	Code
09 91 00 – PAINTING & COATINGS		Arch-533	XX/XX/20XX

Benjamin Moore		Epoxy Mastic Coating	M45/M46
Columbia Paint	DuPont	Corlar	2.15T
Coronado Paint		Polyamide Epoxy Coating Semi-Gloss	101-251
ICI Paints	Devoe Coatings	Bar-Rust 235	235
PPG	Aquapon	High Build Epoxy Marine Coating	97-130/97-139
Sherwin-Williams	Industrial & Marine	Macropoxy 646 Fast Cure Epoxy	B58 W 6series

2.3 PENETRATING CONCRETE SEALER: MasterProtect H 400 by BASF, clear, water-based, 40% silane penetrating sealer / water repellent.

2.4 PAINTING SCHEDULE:

- A. INTERIOR CMU: 1 coat block filler; 2 coats scrubable semi-gloss acrylic latex wall paint.
- B. PAINTED WOOD: 1 coat alkyd primer; 2 coats alkyd semi-gloss enamel.
- C. TRANSPARENT WOOD FINISH: MPI #85/ Lacquer, Clear, Satin. solvent based, nitrocellulose type, clear, finishes for interior wood surfaces. Application by airless, HVLP or conventional spray equipment.
- D. FERROUS METAL: 1 coat alkyd primer; 2 coats alkyd semi-gloss enamel.
- E. EXPOSED STEEL STRUCTURE: Touch-up factory primer. In areas where there is no ceiling, "dry-fall" all exposed structure. One color will be used on exposed primary structure & a second on secondary structure.
- F. GALVANIZED METAL: 1 coat galvanized metal primer; 2 coats alkyd semi-gloss enamel.
- G. DRYWALL: Very light sprayed orange peel or rolled texture; 1 coat latex wall primer; 2 coats scrubable semi-gloss acrylic latex wall paint.
- H. EPOXY PAINTED VERTICAL SURFACES: Primer or block filler as appropriate for substrate. 2 coats epoxy semi gloss.
- I. CONCRETE FLOORS NOT SCHEDULED OTHERWISE: Penetrating concrete sealer.

2.5 UNDERCOATS AND THINNER: Use only the thinners recommended by the paint manufacturer, and use only to the recommended limits. Insofar as practicable, use undercoat, finish coat, and thinner material as parts of a unified system of paint finish by the same manufacture.

2.6 COLOR SCHEDULES: The Architect will prepare a color schedule with samples for guidance in painting. The Architect may select varied colors on different surfaces, with variations for ceilings, trim, doors, miscellaneous work, and metal work, subject to the following:

2.7 APPLICATION EQUIPMENT: For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint, and as approved by the Architect.

2.8 WET AREAS: In toilet rooms and other wet areas, add an approved fungicide to paints. For oil base paints, use 1% phenolmercuric or 4% tetrachlorophenol. For water emulsion and glue size surfaces, use 4% sodium tetrachlorophenol.

2.9 OTHER MATERIALS: Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not paint over dirt, rust, scale, grease, moisture, scuffed

surfaces, or conditions otherwise detrimental to formation of a durable paint film. Do not proceed until unsatisfactory conditions are corrected.

- 3.2 MATERIAL PREPARATION: Mix and prepare paint materials in strict accordance with the manufacturers' recommendations as approved by the Architect. When materials are not in use, store in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free from foreign materials and residue. Stir materials before application, producing a mixture of uniform density. Do not stir into the material any film which may form on the surface, but remove the film and, if necessary, strain the material before using.
- 3.3 SURFACE PREPARATION: Perform preparation and cleaning procedures in strict accordance with the paint manufacturers' recommendations as approved by the Architect. Remove or provide surface applied protection for items in place not to receive paint finish during painting operations. Clean each surface to be painted prior to applying paint or surface treatment. Remove oil and grease with clean cloths and cleaning solvent prior to start of mechanical cleaning. Schedule cleaning and painting to avoid dust and other contaminants.
  - A. PREPARATION OF WOOD SURFACES: Clean wood surfaces until free from dirt, oil, and other foreign substances. Smooth finished wood surfaces exposed to view, using the proper sandpaper to produce a uniformly smooth and unmarred wood surface. Unless specifically approved by the Architect, do not proceed with painting of wood surfaces until the moisture content of the wood is 12% or less.
  - B. PREPARATION OF METAL SURFACES: Thoroughly clean surfaces until free from dirt, oil, and grease. On galvanized surfaces, use solvent for the initial cleaning, and then treat the surface thoroughly with phosphoric acid etch. Remove etching solution completely before proceeding. Allow to dry thoroughly before application of paint. Teacup shop-applied prime coats which have been damaged, and touchup bare areas prior to start of finish coats application.
  - C. CEMENTITIOUS MATERIALS: Prepare cementitious surfaces of concrete, concrete block, cement plaster and cement-asbestos board to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
- 3.4 PAINT APPLICATION: Slightly vary the color of succeeding coats. Do not apply additional coats until the completed coat has been inspected and approved. Sand and dust between coats to remove defects visible to the unaided eye from a distance of five feet. On removable panels and hinged panels, paint the back sides to match the exposed sides. For completed work, match the approved Samples as to texture, color, and coverage. Remove, refinish, or repaint work not in compliance with the specified requirements.
  - A. BRUSH APPLICATIONS: Brush out and work the brush coats onto the surface in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, and other surface imperfections will not be acceptable.
  - B. SPRAY APPLICATION: Where spray application is used, apply each coat to provide the hiding equivalent of brush coats. Do not double back with spray equipment to build up film thickness of two coats in one pass.
- 3.5 DRYING: Allow sufficient drying time between coats, modifying the period as recommended by the material manufacture to suit adverse weather conditions. Consider oil-base and oleo-resinous solvent-type as dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and when the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- 3.6 MISCELLANEOUS SURFACES: Finish exposed electric panels, access doors, conduits, pipes, ducts, grilles, registers, vents, and items, of similar nature to match the adjacent wall and ceiling surfaces, or as directed. Paint visible duct surfaces behind vents, registers, and grilles flat black. Wash metal with solvent, prime, and apply two coats of alkyd enamel. Paint prime coated hardware to match adjacent surfaces.
- 3.7 SEALING: Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime all surfaces of finish carpentry. When transparent finish is required, use spar varnish for backpriming. Seal tops, bottoms, and cut-outs of unprimed wood doors immediately upon delivery to job.





## DIVISION 10 – SPECIALTIES

### 10 11 00 - VISUAL DISPLAY UNITS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Porcelain enamel chalkboards.
  - 2. Porcelain enamel markerboards.
  - 3. Natural-cork tackboards.
- B. Related Sections include the following:

##### 1.3 SUBMITTALS

- A. Product Data: For each type of visual display board indicated. Include motor capacities and individual panel weights for sliding chalkboard and markerboard units.
- B. Shop Drawings: For each type of visual display board required.
  - 1. Include dimensioned elevations. Show location of joints between individual panels where unit dimensions exceed maximum panel length.
  - 2. Include sections of typical trim members.
  - 3. Show anchors, grounds, reinforcement, accessories, layout, and installation details.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors and textures available for the following:
  - 1. Chalkboards and Markerboards: Actual sections of porcelain enamel finish for each type of chalkboard and markerboard required.
- D. Product Certificates: Signed by manufacturers of tackboards certifying that vinyl-fabric-faced cork tackboard materials furnished comply with requirements specified for flame-spread ratings.

##### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an authorized representative of chalkboard manufacturer for both installation and maintenance of the type of sliding chalkboard units required for this Project.
- B. Source Limitations: Obtain visual display boards through one source from a single manufacturer.

- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of visual display boards and are based on the products indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
  - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Fire-Test-Response Characteristics: Provide vinyl-fabric-faced tackboards with the following surface-burning characteristics as determined by testing assembled materials composed of facings and backings identical to those required in this Section per ASTM E 84 by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify vinyl-fabric-faced tackboards with appropriate markings of applicable testing and inspecting agency.
  - 1. Flame Spread: 25 or less.
  - 2. Smoke Developed: 10 or less.

## 1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify field measurements before preparation of Shop Drawings and before fabrication to ensure proper fitting. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

## 1.6 WARRANTY

- A. General Warranty: The special porcelain enamel chalkboard warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Porcelain Enamel Chalkboard Warranty: Submit a written warranty executed by manufacturer agreeing to replace porcelain enamel chalkboards that do not retain their original writing and erasing qualities, become slick and shiny, or exhibit crazing, cracking, or flaking within the specified warranty period, provided the manufacturer's written instructions for handling, installation, protection, and maintenance have been followed.
  - 1. Warranty Period: 50 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Best-Rite Chalkboard Co.
  - 2. Carolina Chalkboard Co.
  - 3. Claridge Products and Equipment, Inc.
  - 4. Ghent Manufacturing, Inc.
  - 5. Greensteel, Inc.
  - 6. Lemco, Inc.
  - 7. Marsh Chalkboard Company.
  - 8. Nelson Adams Company.
  - 9. Newline Products

### 2.2 MATERIALS

- A. Porcelain Enamel Chalkboards and Markerboards: Balanced, high-pressure-laminated, porcelain enamel chalkboards of 3-ply construction consisting of face sheet, core material, and backing.

1. Face Sheet: 0.024-inch enameling grade steel especially processed for temperatures used in coating porcelain on steel. Coat exposed face and edges with a 3-coat process consisting of primer, ground coat, and color cover coat. Coat concealed face with a 2-coat process consisting of primer and ground coat. Fuse cover and ground coats to steel at manufacturer's standard firing temperatures, but not less than 1200 deg F. Provide manufacturer's standard matte-finish cover coat, with color selected from manufacturer's standards.
  2. Core: 3/8" thick, particleboard core material complying with requirements of ANSI A208.1, Grade 1-M-1.
  3. Backing Sheet: 0.005-inch-thick, aluminum-foil sheet backing.
- B. Natural-Cork Tackboards: Single-layer, 1/4-inch-thick, seamless, compressed fine-grain, bulletin board quality, natural-cork sheet; face sanded for natural finish; complying with MS MIL-C-15116, Type II.

## 2.3 ACCESSORIES

- A. Metal Trim and Accessories: Fabricate frames and trim of not less than 0.062-inch-thick, extruded-aluminum alloy, size and shape as indicated, to suit type of installation. Provide straight, single-length units. Keep joints to a minimum. Miter corners to a neat, hairline closure.
1. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
  2. Chalktray: Manufacturer's standard, continuous, solid, extrusion-type, aluminum chalktray with ribbed section and smoothly curved exposed ends for each chalkboard.
  3. Map Rail: Furnish map rail at top of each unit, complete with the following accessories:
    - a. Display Rail: Provide continuous cork display rail approximately 1 or 2 inches wide, as indicated, integral with map rail.
    - b. End Stops: Provide one end stop at each end of map rail.
    - c. Map Hooks: Provide 2 map hooks for every 48 inches of map rail or fraction thereof.
    - d. Flag Holder: Provide one flag holder for each room.

## 2.4 FABRICATION

- A. Porcelain Enamel Chalkboards: Laminate facing sheet and backing sheet to core material under pressure with manufacturer's recommended flexible, waterproof adhesive.
- B. Assembly: Provide factory-assembled chalkboard and tackboard units, unless field-assembled units are required.
1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.
  2. Provide manufacturer's standard vertical joint system between abutting sections of chalkboards.
  3. Provide manufacturer's standard mullion trim at joints between chalkboards and tackboards.

## 2.5 FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

- B. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- C. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 607.1.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine wall surfaces, with Installer present, for compliance with requirements and other conditions affecting installation of visual display boards.
  - 1. Surfaces to receive chalkboards or markerboards shall be free of dirt, scaling paint, and projections or depressions that would affect smooth, finished surfaces of chalkboards or markerboards.
  - 2. Surfaces to receive tackboards shall be dry and free of substances that would impair the bond between tackboards and substrate.
  - 3. Verify proper placement of blocking as required for sufficient support before proceeding.
  - 4. Do not proceed with installation until unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Deliver factory-built visual display boards completely assembled in one piece without joints, where possible. If dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefabricate components at the factory, disassemble for delivery, and make final joints at the site. Use splines at joints to maintain surface alignment.
- B. Install units in locations and at mounting heights indicated and according to manufacturer's written instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- C. Coordinate Project-site-assembled units with grounds, trim, and accessories. Join parts with a neat, precision fit.

- 3.3 INSTALLATION ON EXTERIOR WALL: When unit is called to be installed on an exterior wall, provide 1/4" spacer to allow for air flow behind unit.

#### 3.4 ADJUSTING AND CLEANING

- A. Verify that accessories required for each unit have been properly installed and that operating units function properly.
- B. Clean units according to manufacturer's written instructions.

## 10 12 00 - STOREFRONT DISPLAY CASES

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Glass display case consisting of aluminum storefront framing with sliding glass doors and shelves built into an alcove.
- 1.2 QUALITY ASSURANCE: It is the intent of this specification to establish minimum standards for materials, construction, workmanship and finish product of the work performed under this section.
- 1.3 SUBMITTALS: Submit shop drawings and product data for all work under this section. Drawings shall show size, arrangement, type of material, construction and relationship to adjacent work. Upon completion of installation, and as a condition of its acceptance, submit copies of warranty, operating instructions and maintenance instruction, if applicable.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS:

- A. Storefront: Equal to Kawneer TriFab 400 Screw Spline System for Inside Glazing.
- B. Glass Shelves: Tempered glass, 1/4 inch thick with polished, rounded edges.
- C. Sliding Glass Doors: Tempered glass, 1/4 inch thick with polished, rounded edges.
- D. Plastic Laminate Finish: Equal to Wilsonart Laminate Premium Aeon. Color to be selected by Owner. Mount to 1/2 inch plywood backing secured to metal studs.
  1. LAMINATE MANUFACTURER COORDINATION: Laminate manufacturer to be same for following systems:
    - a. 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK
    - b. 06 41 16 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS
    - c. 06 41 17 - PLASTIC-LAMINATE-CLAD ADJUSTABLE SHELVING
    - d. 08 14 23 - PLASTIC-LAMINATE-FACED WOOD DOORS
    - e. 10 12 00 - STOREFRONT DISPLAY CASES

#### 2.2 HARDWARE:

- A. Standards: Equal to Knape & Vogt Series 82 Standard. Finish color to match Storefront finish.
- B. Brackets: Equal to Knape & Vogt Series 182 Bracket System. Finish color to match Storefront finish.
- C. Track: Plastic sliding door track and guide equal to Knape & Vogt KVM-P2417. Recess into Storefront. Finish to match Storefront finish.
- D. Lock: Ratchet lock equal to Keymatic by C.R. Laurence.
- E. Strike Plates: Provide strike plate with finger grip for each glass door equal to C.R. Laurence. Finish to match Storefront finish.

### PART 3 - EXECUTION

- 3.1 PREPERATION: Examine the areas and conditions under which work of this Section will be performed and correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Take field measurements before fabrication where possible, do not delay job progress.
- 3.2 INSTALLATION: Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections. Anchor securely in place, install plumb, level and in true alignment. Install hardware and adjust for smooth, proper operation. Clean and protect completed system; repair damage.

**10 14 00 - SIGNAGE****PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for signage, as shown on the Drawings. GENERAL: Provide signs which designate permanent rooms that may be used by the public, complying with TAS requirements for braille, character, height, finish & contrast.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. Comply with recommendations contained in the "Americans with Disabilities Design Guidelines" & the Texas Accessibility Standards.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review, to include rubbing for approval.

**PART 2 - PRODUCTS**

- 2.1 MATERIAL: Signage material & mounting to be weather & vandalism resistant.
- 2.2 ROOM IDENTIFICATION SIGNS: Provide 1/8" acrylic room identification signs w/ fused imbedded separately engraved characters & optically correct beaded braille. Mount beside door at each room adjoining corridor except restrooms. Text & color to be selected by Architect. Letters and numbers on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke-width-to-height ratio between 1:5 and 1:10. Letters and numerals shall be upper case, sans serif or simple serif type at least 5/8 in (16 mm) high, but no higher than 2 in (50 mm) and shall be accompanied with Grade 2 Braille. The characters and background of signs shall be eggshell, matte, or other non-glare finish. Characters and symbols shall contrast with their background.
- 2.3 RESTROOM IDENTIFICATION SIGNS: Provide 1/8" acrylic room identification signs meeting the requirements above, mounted beside door at each restroom. Text & color to be selected by Architect. Provide braille text & international symbol for accessibility.
- 2.4 TRAFFIC SIGNAGE: Provide accessible parking & directional signage as indicated.
- 2.5 EXTERIOR BUILDING SIGNAGE: Provide cast aluminum stud mounted letters with chrome finish. Font to be Euro Style Ext. Bold unless noted otherwise on drawings. Refer to drawings for size & quantity.
- 2.6 PLAQUE: Provide one (1) 24" x 36" satin finish cast aluminum plaque with dark textured background. Text & location to be provided by Architect.

**PART 3 - EXECUTION**

- 3.1 PREPARATION: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 MOUNTING LOCATION AND HEIGHT FOR INTERIOR SIGNAGE: Where permanent identification is provided for rooms and spaces, signs shall be installed on the wall adjacent to the latch side of the door. Where there is no wall space to the latch side of the door, including at double leaf doors, signs shall be placed on the nearest adjacent wall. Mounting height shall be 60 in (1525 mm) above the finish floor to the centerline of the sign. Mounting location for such signage shall be so that a person may approach within 3 in (76 mm) of signage without encountering protruding objects or standing within the swing of a door.
- 3.3 INSTALLATION: Install this work in strict accordance with the original design, and the manufacturer's recommendations as accepted by the Architect. Install plaque using rosette head anchor bolts. Exterior building letters to be stud mounted. Place & attach firmly & accurately into position, square, plumb, level, & true. Protect work during storage, installation & until final acceptance, replacing any damaged material.
- 3.4 SIGNAGE SCHEDULE: As per drawings.

## 10 21 13 - SOILID PLASTIC TOILET COMPARTMENTS

### PART 1 - GENERAL

#### 1.1 SCOPE

- A. Requirements of the general conditions and special conditions apply to the work in this section.
- B. Provide all labor, materials, etc. necessary for the completion of the work of this section as specified or shown on the drawings.
- C. Work of this section consists of, but is not limited to the following:
  - 1. Toilet compartments
  - 2. Urinal Screens
  - 3. Hardware, etc.

#### 1.2 SUBMITTALS

- A. Submit shop drawings, including details and a sample of each item of hardware (if requested) for architect's approval.
- B. Provide drawings showing location for adequate steel reinforcements or wood blocking in walls to be provided by others for proper securement of the finished work.
- C. Furnish color samples for use of the architect.
- D. Furnish documentation on hardware, headrail, and continuous wall bracket to meet specification as outlined.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Plastic Panels: High density polyethylene (HDPE) suitable for exposed applications, waterproof, non-absorbent, and graffiti-resistant textured surface, Class C.
- B. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B 86.
- C. Stainless Steel Sheet: ASTM A 240 or A 666, 300 series.
- D. Stainless Steel Castings: ASTM A 743/A 743M.
- E. Aluminum: ASTM B 221.

#### 2.2 PLASTIC TOILET COMPARTMENTS

- A. Toilet Compartment Type:
  - 1. Overhead braced.
    - a. Basis of Design Product: Bradley, Mills Partitions, Bradmar Solid Plastic, Sentinel, Series 400.
    - b. Approved Manufacturers:
      - i. Scranton Products



- B. Urinal Screen Style:
  - 1. Floor Braced:
    - a. Basis of Design Product: Bradley, Mills Partitions, Bradmar Solid Plastic, Model #3.
      - i Approved Manufacturers:
        - Scranton Products
    - b. 4" wide front attached post, maximum.
    - c. Continuous heavy-duty aluminum brackets.
- C. Door, Panel, and Pilaster Construction, General: HDPE, with a 3/16" (4.8mm) radiused edge.
  - a. Provide exposed surfaces free of pitting, visible seams and fabrication marks, stains, or other imperfections.
  - b. Provide aluminum heat sink at bottom edge of panels and doors.
- D. Door Construction: 1 inch thick.
- E. Panel Construction: 1 inch thick.
- F. Pilaster Construction: 1 inch thick.
- G. Headrail: Extruded anodized aluminum headrail with anti-grip profile. Clamps around pilaster and is secured to the wall with stainless steel brackets.
- H. Shoes: 4 inches high minimum, 300 series stainless steel with No. 4 satin brushed finish.
- I. Urinal-Screen Construction: Matching toilet compartment panel construction
  - 1. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe and sleeve (cap) matching that on the pilaster.
- J. Brackets (Fittings): Full-Height (Continuous) Type: Manufacturer's standard design; heavy-duty aluminum.
- K. Plastic Panel Finish: Manufacturer's standard impregnated finish, with one color in each room.
  - 1. Color: As selected by Architect from manufacturer's full range.

## 2.3 HARDWARE

- A. Hardware, Heavy Duty: Manufacturer's heavy-duty stainless steel, including stainless steel tamper-resistant fasteners:
  - 1. Hinges: Self-closing continuous spring-loaded type adjustable to hold doors open at any angle up to 90 degrees, with emergency access by lifting door.
  - 2. Latch and Keeper: Surface-mounted slide latch with flat rubber-faced combination door strike and keeper, with provision for emergency access, meeting requirements for accessibility at accessible compartments.
  - 3. Coat Hook: Combination hook and rubber-tipped stop, sized to prevent door from hitting compartment-mounted accessories. Provide wall bumper where door abuts wall. Provide formed L-shaped hook without stop at outswing doors. Mount with stainless steel through-bolts.

4. Door Pull: Standard unit on outside of inswing doors. Provide pulls on both sides of outswing doors.

## 2.4 FABRICATION

- A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- B. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at bottoms of posts. Provide caps, shoes, and covers at posts to conceal anchorage.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine work area to verify that measurements, substrates, supports, and environmental conditions are in accordance with manufacturer's requirements to allow installation.
  1. Proceed with installation once conditions meet manufacturer's requirements.

### 3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
- B. Install toilet partitions and screens in spaces with operating, temperature controlled HVAC systems. Shield partitions and screens from direct sunlight.
- C. Clearances: Install with clearances indicated on Drawings. Where clearances are not indicated, allow maximum 1/2 inch between pilasters and panels, and 1 inch between panels and walls.

### 3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 15 degrees from closed position when unlatched. Set hinges on out-swinging doors and doors in privacy screens to return doors to fully closed position.

### 3.4 FINAL CLEANING

- A. Remove packaging and construction debris and legally dispose of off-site.
- B. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer's recommendations.

## **10 21 14 - SOLID PHENOLIC TOILET COMPARTMENTS**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Toilet Compartments
- B. Urinal Screens

#### **1.2 RELATED SECTIONS**

- A. Support for ceiling-hung compartments.
- B. Wall backing required to secure mounting brackets.
- C. Support for floor-anchored compartments.
- D. Toilet room accessories.

#### **1.3 REFERENCES:**

- A. National Fire Protection Association 101 Life Safety Code 1991 Edition. Chapters 5, 6, 8-30.
- B. ANSI A117- 1986 Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- C. UBC - Chapters 5 and 33 Requirements for Handicapped.
- D. Title 24, California Code of Regulations. Parts 2, 3, and 5.
- E. ADA, Accessibility Guidelines for Buildings and Facilities, Federal Register Volume 56, Number 144, Rules and Regulations.
- F. Fair Housing Amendments Act of 1988, Accessibility Guidelines, Federal Register Volume 56, Number 44.
- G. International Building Code.

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturers
  - 1. Model numbers for compartments manufactured by Bobrick Washroom Equipment, Inc. are listed to establish a standard of quality for design, function, materials, workmanship, and appearance. Other manufacturers may be submitted for evaluation by the architect by following the conditions of the substitutions clause. Unless approval is obtained ten days prior to the bid date, all bids shall be based on the standard of quality. The architect shall be the sole judge as to the acceptability of all products submitted for substitution.
  - 2. Compartments shall be the product(s) of a single manufacturer.

#### **1.5 SUBMITTALS**

- A. Comply with requirements of Section regarding submittals.
- B. Manufacturer's Data
  - 1. Provide required number copies of:
    - a. Product data sheets.
    - b. Installation instructions.
    - c. Replacement parts information.
- C. Shop Drawings
  - 1. Provide required number of copies of all shop drawings.
  - 2. Show fabrication and erection of compartment assemblies, to extent not fully described by manufacturer's data sheets.
  - 3. Show anchorage, accessory items and finishes.
  - 4. Provide location drawings for bolt hole locations in supporting members for attachment of compartments.
- D. Samples
  - 1. Furnish scale model of compartments, including stile, shoe, door, door hardware, divider panel, and mounting brackets.
  - 2. Furnish sections showing stile anchoring and leveling devices, concealed threaded inserts, panel and stile construction and edge construction.

#### 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver items in manufacturer's original unopened protective packaging.
- B. Store materials in original protective packaging to prevent physical damage or wetting.
- C. Handle so as to prevent damage to finished surfaces.

#### 1.7 WARRANTY

- A. Furnish ten year limited warranty for panels, doors, and stiles against breakage, corrosion, delamination, and defects in factory workmanship.
- B. Furnish one year guarantee against defects in material and workmanship for stainless steel door hardware and mounting brackets.

### PART 2 - PRODUCTS

#### 2.1 CONFIGURATIONS

- A. Toilet Compartments shall be: Floor-Anchored (1181/1181.67 Duraline Series)

- B. Urinal Screens shall be: Post-to-Ceiling (1183 Duraline Series)

## 2.2 COMPONENTS/MATERIALS

### A. Stiles, Panels, Doors, Screens, and Benches

1. Solid phenolic material constructed of solidly fused plastic laminate with mattefinish melamine surfaces, colored face sheets, and black phenolic-resin core that are integrally bonded. Edges shall be black. Brown edges shall not be acceptable. Color and pattern as selected by architect from Bobrick standard colors.
2. Finish Thickness
  - a. Stiles and doors shall be 3/4" (19 mm).
  - b. Panels and benches shall be 1/2" (13 mm).
3. Urinal screen 4" wide front attached post, maximum.

### B. Hardware

1. All hardware to be 18-8, type-304 stainless steel with satin finish.
2. All hardware shall be concealed inside compartments with the exception of out-swinging doors.
3. Hardware of chrome-plated "Zamac" is unacceptable.

### C. Latch

1. Sliding door latch shall be 16 gauge (1.6 mm).
2. Sliding door latch shall require less than 5-lb force to operate. Twisting latch operation will not be acceptable.
3. Latch track shall be attached to door by flathead machine screws into factory-installed threaded brass inserts.
4. Latch handle shall have rubber bumper to act as door stop.
5. Latch shall allow door to be lifted over 16-gauge (1.6-mm) keeper for emergency access.
6. Metal-to-metal connection shall withstand a direct pull of over 1000 lb. per screw.

### D. Hinges

1. Cam shall be adjustable in the field to permit door to be fully closed or partially open when compartment is unoccupied.
2. Hinges shall be attached to door and stile by theft-resistant, oneway stainless steel machine screws into factory-installed metal inserts. Fasteners secured directly into the core are not acceptable.
3. Metal-to-metal connection shall withstand a direct pull of over 1000 lb. per screw.

- E. Coat Hook shall be constructed of stainless steel and shall project no more than 1-1/8" (29 mm) from face of door. Coat hook shall be secured by theft-resistant, one-way stainless steel screws.

- F. Mounting Brackets shall be constructed of stainless steel and shall be mounted inside compartment. Mounting brackets exposed on the exterior of the compartment will not be acceptable. Wall mounted urinal screen brackets shall be 11 gauge (3 mm) double thickness.
- G. Leveling Device shall be 3/16" (5-mm) hot rolled steel bar; chromate-treated and zinc-plated; through-bolted to base of solid phenolic stile.
- H. Stile Shoe shall be one-piece, 4" (102-mm) high, type-304, 22-gauge (0.8-mm) stainless steel with satin finish. Top shall have 90° return to stile. Patented one-piece shoe capable of adapting to 3/4" or 1" stile thickness and capable of being fastened (by clip) to stiles starting at wall line.
- I. Headrail (Overhead Braced) shall be satin finish, extruded anodized aluminum (.125" / 5-mm thick) with anti-grip profile.

### PART 3 - EXECUTION

#### 3.1 INSPECTION

- A. Check areas scheduled to receive compartments for correct dimensions, plumbness of walls, and soundness of surfaces that would affect installation of mounting brackets.
- B. Verify spacing of plumbing fixtures to assure compatibility with installation of compartments.
- C. Do not begin installation of compartments until conditions are satisfactory.

#### 3.2 ERECTION

- A. Install compartments rigidly, straight, plumb, and level and in accordance with manufacturer's installation instructions.
- B. Installation methods shall conform to manufacturer's recommendations for backing and proper support.
- C. Conceal evidence of drilling, cutting, and fitting to room finish.
- D. Maintain uniform clearance at vertical edge of doors.

#### 3.3 ADJUSTMENT AND CLEANING

- A. Adjust hardware for proper operation after installation.
- B. Set hinge cam on in-swinging doors to hold doors open when unlatched.
- C. Set hinge cam on out-swinging doors to hold unlatched doors in closed position.
- D. Clean exposed surfaces of compartments, hardware, and fittings.

## 10 21 15 – POWDER COATED STEEL TOILET COMPARTMENTS

### PART 1 - GENERAL

#### 1.1 SCOPE

- A. Requirements of the general conditions and special conditions apply to the work in this section.
- B. Provide all labor, materials, etc. necessary for the completion of the work of this section as specified or shown on the drawings.
- C. Work of this section consists of, but is not limited to the following:
  - 1. Toilet compartments
  - 2. Urinal Screens
  - 3. Hardware, etc.

#### 1.2 SUBMITTALS

- A. Submit (6) sets of shop drawings, including details and a sample of each item of hardware (if requested) for architect's approval.
- B. Provide drawings showing location for adequate steel reinforcements or wood blocking in walls to be provided by others for proper securement of the finished work.
- C. Furnish color samples for use of the architect.
- D. Furnish documentation on hardware, headrail, and continuous wall bracket to meet specification as outlined.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Steel Panels: 22 gauge galvanealed steel faces insulated with a moisture-resistant honeycomb core, with electrostatic powder coating, oven cured.
- B. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B 86.
- C. Stainless Steel Sheet: ASTM A 240 or A 666, 300 series.
- D. Stainless Steel Castings: ASTM A 743/A 743M.
- E. Aluminum: ASTM B 221.

#### 2.2 POWDER COATED STEEL TOILET COMPARTMENTS

- A. Toilet Compartment Type:
  - 1. Floor-Mounted with Overhead brace.
    - a. Basis of Design Product: Bradley, Mills Partitions, Bradmar Powder Coated, Sentinel, Series 400.
- B. Urinal Screen Style:
  - 1. Floor Braced:

- a. Basis of Design Product: Bradley, Mills Partitions, Bradmar Powder Coated, Model #3.
  - b. 4" wide front attached post, maximum.
  - c. Continuous heavy-duty aluminum brackets.
- C. Door Construction: 1 inch thick.
- D. Panel Construction: 1 inch thick.
- E. Pilaster Construction: 1-1/4 inch thick.
- F. Headrail: Extruded anodized aluminum headrail with anti-grip profile. Clamps around pilaster and is secured to the wall with stainless steel brackets.
- G. Shoes: 4 inches high minimum, 300 series stainless steel with No. 4 satin brushed finish.
- H. Urinal-Screen Construction: Matching toilet compartment panel construction
  - 1. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe and sleeve (cap) matching that on the pilaster.
- I. Brackets (Fittings): Full-Height (Continuous) Type: Manufacturer's standard design; heavy-duty aluminum.
- J. Plastic Panel Finish: Manufacturer's standard impregnated finish, with one color in each room.
  - 1. Color: As selected by Architect from manufacturer's full range.

## 2.3 HARDWARE

- A. Hardware, Heavy Duty: Manufacturer's heavy-duty stainless steel, including stainless steel tamper-resistant fasteners:
  - 1. Hinges: Self-closing continuous spring-loaded type adjustable to hold doors open at any angle up to 90 degrees, with emergency access by lifting door.
  - 2. Latch and Keeper: Surface-mounted slide latch with flat rubber-faced combination door strike and keeper, with provision for emergency access, meeting requirements for accessibility at accessible compartments.
  - 3. Coat Hook: Combination hook and rubber-tipped stop, sized to prevent door from hitting compartment-mounted accessories. Provide wall bumper where door abuts wall. Provide formed L-shaped hook without stop at outswing doors. Mount with stainless steel through-bolts.
  - 4. Door Pull: Standard unit on outside of inswing doors. Provide pulls on both sides of outswing doors.

## 2.4 FABRICATION

- A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- B. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at bottoms of posts. Provide caps, shoes, and covers at posts to conceal anchorage.

## PART 3 - EXECUTION

### 3.1 EXAMINATION



- A. Examine work area to verify that measurements, substrates, supports, and environmental conditions are in accordance with manufacturer's requirements to allow installation.
  - 1. Proceed with installation once conditions meet manufacturer's requirements.

### 3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
- B. Install toilet partitions and screens in spaces with operating, temperature controlled HVAC systems. Shield partitions and screens from direct sunlight.
- C. Clearances: Install with clearances indicated on Drawings. Where clearances are not indicated, allow maximum 1/2 inch between pilasters and panels, and 1 inch between panels and walls.

### 3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 15 degrees from closed position when unlatched. Set hinges on out-swinging doors and doors in privacy screens to return doors to fully closed position.

### 3.4 FINAL CLEANING

- A. Remove packaging and construction debris and legally dispose of off-site.
- B. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer's recommendations.

## 10 22 33 - ACCORDIAN FOLDING PARTITIONS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

##### A. General

1. Furnish and install self-support truss system for use with accordion partitions.

#### 1.2 RELATED WORK BY OTHERS

- A. Preparation of opening will be by General Contractor. Any deviation of site conditions contrary to approved shop drawings must be called to the attention of the architect.
- B. All header, blocking, lateral bracing, surrounding insulation, and sound baffles as required in 1.04 Quality Assurance.
- C. Paint or otherwise finishing all trim and other materials adjoining the Unispan.

#### 1.3 SUBMITTALS

- A. Complete shop drawings are to be provided prior to fabrication indicating construction and installation details. Shop drawings must be submitted within 60 days after receipt of signed contract.

#### 1.4 QUALITY ASSURANCE

- A. Preparation of the opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Partitions.
- B. The Unispan system shall be validated by calculations performed by a licensed Professional Engineer.
- C. The manufacturer shall have a quality system that is registered to the ISO 9001 standards.

#### 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Proper storage of Unispan system before installation and continued protection during and after installation will be the responsibility of the General Contractor.

#### 1.6 WARRANTY

- A. Partition system shall be guaranteed for a period of two years against defects in material and workmanship, excluding abuse.

### PART 2 - PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Upon compliance with all of the criteria specified in this section, Manufacturers wishing to bid products equal to the product specified must submit to the architect 10 days prior to bidding complete data in support of compliance and a list of three past installations of products similar to those listed. The submitting manufacturer guarantees the proposed substituted product complies with the performance items specified and as detailed on the drawings.

#### 2.2 MATERIALS

- A. Product to be Hufcor Series U901 Unispan as manufactured by Hufcor Inc.

1. The supporting truss shall be factory fabricated of steel and aluminum. Unispan is attached to the building structure for lateral support only. The load of the truss and partition is supported by the Unispan column posts. Bolt together truss has anodized aluminum top and bottom cords with integral anodized aluminum track and steel web-members.
2. Posts. End columns shall be 2-1/2" x 5" [63.5 x 127] clear anodized aluminum posts. Posts shall be attached to the truss with steel brackets and bolts. Posts shall be anchored to the floor with concealed fasteners. Posts shall be located approximately 1-1/2" [38] from adjacent wall surfaces. The space between the post and the adjacent wall shall be fitted with a vinyl gasket to inhibit sound.
3. Ceiling anchors provide lateral support and shall be set at intervals across the span of the beam. Blocking for ceiling anchors to be provided by others in accordance with the plans.

B. Weight of the system

1. The horizontal truss shall weigh 10-12 lbs. per lineal foot of width.
2. The support columns shall weigh 3.5 lbs. per foot of height each.
3. The floor shall support a maximum of 360 psi at each post.

C. Finishes

1. Exposed trim and track shall be of clear anodized architectural grade extruded aluminum alloy 6063-T6.
2. Posts shall be of clear anodized architectural grade extruded aluminum alloy 6063-T6.

D. Available Accessories/Options

1. Medium Density Fiberboard Header Side Panels (to cover sides of truss if it is below the ceiling).
  - a. Vinyl covered. Color to be selected from partition manufacturer's standard line.
  - b. Carpet covered. Color to be selected from partition manufacturer's standard line.
  - c. Fabric covered. Color to be selected from partition manufacturer's standard line.
  - d. Unfinished for field finishing.
  - e. Mineral wool insulation for sound retardation.

## 2.3 OPERATION

- A. Accordion partitions installed in the Unispan system shall be center stacked, and manually operated.
- B. Unispan may be disassembled and relocated to an alternate location as needed.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Installation. The complete installation of the Unispan self-support system shall be by an authorized factory-trained installer and be in strict accordance with the approved shop drawings and manufacturer's standard printed specifications, instructions, and recommendations.

### 3.2 CLEANING

- A. All surfaces shall be wiped clean and free of handprints, grease, and soil.
- B. Cartoning and other installation debris shall be removed to onsite waste collection area, provided by others.

## 10 22 39 - FOLDING PANEL PARTITIONS

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish and install operable partitions. Provide all labor, materials, tools, equipment, and services for operable walls in accordance with provisions of contract documents. Complete shop drawings are to be provided prior to fabrication indicating construction and installation details. Shop drawings must be submitted within 60 days after receipt of signed contract. Furnish and install steel support. Provide all labor, materials, tools, equipment and services for the overhead steel track support and tube steel columns for the jamb support of any pocket doors in accordance with the provisions of the contract documents. Installation and welding to be completed by an AWS Certified Welder. Prepunching of support structure in accordance with approved shop drawings.
- 1.2 QUALITY ASSURANCE:
  - A. Fire hazard classification: ASTM E84
  - B. Sound transmission classification: ASTM E90
  - C. Noise isolation classification: ASTM E336, ASTM E413
  - D. Design and construction of surrounding conditions shall be per ASTM 557.
- 1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING: Proper storage of partitions before installation and continued protection during and after installation will be the responsibility of the General Contractor.
- 1.4 RELATED WORK BY OTHERS:
  - A. Paint or otherwise finishing all trim and other materials adjoining head and jamb of operable partitions.
  - B. All header, blocking, support structures, jambs, track enclosures, surrounding insulation, and sound baffles as required in quality assurance.
  - C. Preparation of opening will be by General Contractor. Any deviation of site conditions contrary to approved shop drawings must be called to the attention of the architect.
- 1.5 WARRANTY: Installation shall be guaranteed for a period of no less than four (4) years against defects in material and workmanship.

### PART 2 - PRODUCTS

- 2.1 ACCEPTABLE MANUFACTURERS: Hufcor, Inc. Upon compliance with all of the criteria specified in this section, Manufacturers wishing to bid products similar to the product specified herein must submit to the architect 10 days prior to bidding complete data in support of compliance and a list of three (3) past installations of products similar to those listed. The submitting manufacturer guarantees the proposed substituted product complies with the product specified and as detailed on the drawings.
- 2.2 PANELS:
  - A. Series: 362 – Manual Paired Partition
    1. STC: 51
    2. Weight: 10.2lbs per s.f.

3. Panels: Top supported, center stacking, manual operated paired panel
4. Seals:
  - a. Top: continuous contact sweep seals
  - b. Bottom: both manual operated mechanical seals and continuous contact sweep seals
  - c. Vertical: seals are interlocking
5. Trim:
  - a. Lambs wool
  - b. Grey or brown horizontal trim
  - c. Vertical trim – edge protection
6. Surface: Highland Vinly/Steel
7. Jambs:
  - a. Stack End: Wall Jamb with sweeps to seal against panel
  - b. Color to match trim color
  - c. Lead End: Bulb Seal Jamb
8. Carriers: Four High density polymer covered steel ball bearing wheels
9. Track: Type 42 Clear Anodized Extruded Aluminum
10. Finish Options:
  - a. Courtroom Partition surface to be Wood Trim / Stained Doors
  - b. Meeting Partition surface to be Acoustical Carpet
11. Other attributes:
  - a. Vertical sound seals between panels will be tongue and groove configuration consisting of extruded aluminum astragals incorporating vinyl acoustical seals.
  - b. Horizontal seals, both top and bottom, incorporate 1/4" vinyl strips for proper acoustical seal upon activating.
  - c. Hinges on inset pass doors are recessed and project no more than 1/4" beyond panel faces.
  - d. Footbolts and stabilizers are internal and edge activated. No protruding footbolts attached to panel faces are allowed.

## 2.3 SUSPENSION SYSTEM:

- A. For heights to 22'-2": anodized thermally treated architectural grade extruded aluminum track, connected to the structural support by pairs of 3/8" diameter threaded steel rods. L, T, or X intersections shall be factory assembled and welded. Track soffit shall be of anodized aluminum finish providing enclosure of plenum sound barrier on both sides of track for maximum sound control. Each panel shall be supported by two dual horizontal wheel type trolley assemblies made of glass-reinforced, self-lubricating acetal with all-steel precision-ground bearings.
- B. For heights over 22'-2": 7 gauge brake formed steel track connected to the structural support by pairs of threaded steel rods. L, T, or X intersections shall be factory assembled and welded.
- C. Track soffit shall be of anodized aluminum finish providing enclosure of plenum sound barrier on both sides of track for maximum sound control. Each panel shall be supported by two dual horizontal wheel type steel trolley assemblies with precision-ground bearings. Each wheel shall have a acetal cushion.
  - 1. Plenum closure (by others): Design of plenum closure must permit lifting out of header panels to adjust track height. Plenum closure required for maximum sound control of partition.

#### 2.4 OPERATION:

- A. Partitions shall be top supported, manually operated individual panels. Friction disc/puck type carrier and track systems not allowed.
- B. Both top and bottom horizontal seals will be simultaneously operated by a removable handle located approximately 42" from the floor at panel edge. Automatic or foot pedal type activation of seals is not acceptable. The seals shall not contact the floor or track during movement of the panels. Operation of the seals requires no more than 180 degree turn of the handle. Horizontal floor seals to provide 1-1/2" nominal operating clearance and exert 100 (lbs) pounds of downward stabilizing pressure when extended. Horizontal top seals, when retracted, provide 1" operating clearance between top of panel and track for friction-free movement. Over 22'2" top seal will be finger type continuous contact.
- C. Final partition closure to be by Lever Closure Panel. Lever panel constructions to be same as basic panels but provided with an expanding jamb operated by a removable handle. Expanding jamb shall compensate for out-of-plumb conditions or minor wall irregularities and provides 250 (lbs) pounds of pressure seal to achieve maximum sound control. No permanently fixed, wall-mounted jambs are allowed.

2.5 ACOUSTICAL PERFORMANCE: Laboratory acoustical performance is to be tested by an independent acoustical consultant at a laboratory accredited by the National Bureau of Standards in accordance with quality assurance under general conditions and shall have obtained an STC of at least 51. Complete written test report by the testing agency is to be included in submittal.

2.6 ACCESSORIES: Concealment panels.

#### PART 3 - EXECUTION

- 3.1 INSTALLATION: Install in accordance with manufacturer's instructions. Installation to be by the authorized factory-trained installer. Provide all labor, materials, tools, equipment, and services for operable walls in accordance with provisions of contract documents.
- 3.2 STEEL SUPPORT: Provide all labor, materials, tools, equipment and services for the overhead steel track support and tube steel columns for the jamb support of any pocket doors in accordance with the provisions of the contract documents. Installation and welding to be completed by an AWS Certified Welder. Prepunching of support structure in accordance with approved shop drawings.

## 10 22 40 – HEAVY DUTY OPERABLE FOLDING PANEL PARTITIONS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

##### A. General

1. Furnish and install operable partitions and suspension system. Provide all labor, materials, tools, equipment, and services for operable walls in accordance with provisions of contract documents.

#### 1.2 SUBMITTALS

- A. Complete shop drawings are to be provided prior to fabrication indicating construction and installation details. Shop drawings must be submitted within 60 days after receipt of signed contract.

#### 1.3 QUALITY ASSURANCE

- A. Preparation of the opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.
- B. The partition STC (Sound Transmission Classification) shall be achieved per the standard test method ASTM E90 and E413-87. All tests must be from an independent, currently operating, NIST-accredited Laboratory available to verify results.
- C. Floor Conditions: In order to be able to operate in the best possible manner, ensure that the variation in floor levels, along the centerline of the partition will not exceed +/- 1/4" [6mm] per 10'-0" [3000mm], on a non-cumulative basis, and for 30" [760mm] on each side of the partition center line. The maximum allowable variation from one end of the opening to the other will not exceed 1/2" [12mm].
- D. Any deviation of site conditions contrary to approved shop drawings must be called to the attention of the architect.

#### 1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Proper storage of partitions before installation, and continued protection during and after installation will be the responsibility of the General Contractor.

#### 1.5 WARRANTY

- A. Partition Panels shall be guaranteed for a period of two years with Drive Unit, Track and Carriers guaranteed for a period of ten years. This guarantee is against defects in material or workmanship of manufacturer's product.

### PART 2 - PRODUCTS

#### 2.1 BASIS OF DESIGN

- A. Gymdoor 801 Model 8011 Single Stack by Moderco Inc.

#### 2.2 MATERIALS



- A. Product to be top supported Gymdoor 801 Continuously-Hinged, Electrically Operated panels as manufactured by Moderco Inc.
  1. Panels shall be nominally 3" [76 mm] thick, in manufacturer's standard equal widths up to 48 1/2" [1230 mm], and continuously hinged, electrically operated.
  2. Panel faces shall be of minimum 18 ga. galvanized steel sheets welded to an 16 ga. steel frame with appropriate substrates to meet the STC requirement.
  3. Interlocking vertical seals between the panels shall consist of tongue and groove vinyl astragals creating an acoustical interlock between panels.
  4. Horizontal top seals shall be continuous-contact sweeps. Horizontal bottom seals shall be adjustable seals with fixed sweeps.
  5. The panel hinges shall be steel butt-type hinges. The number and spacing of the hinges shall be as required by the manufacturer for the height & weight door specified.
- B. Weight of the panels shall not exceed 5.1 lbs/sq.ft [25 kg/sq.m] based on Options selected.
- C. Suspension system:
  1. Track shall be a 5" [127 mm] steel beam weighing 10 lbs/ft [15kg/m]. Track shall include support brackets and minimum 5/8" [16 mm] diameter rods, spaced to manufacturer's standards.
    - a. Every other panel shall be supported by one 4-wheeled carrier. Wheels to be sealed steel ball bearings. Carrier design shall ensure that all wheels remain in contact with the track during normal movement of the panels.
  2. Drive System:
    - a. The drive unit (located at the storage end of the unit) shall be equipped with a C.S.A. (UL) approved 1 HP, 208 V, 3-phase, 60 Hz motor.
    - b. The drive unit shall be equipped with an endless 3/16" [5 mm] aircraft type cable and limit switches
    - c. Operation of the partition shall require the use of two (2) simultaneously operated key switches positioned on opposite sides of the partition with a clear unobstructed view during operation of the partition.
    - d. The travel limits of the partition shall be controlled by limit switches positioned on the track system, thereby ensuring full travel before shut off.
- D. Finishes
  1. Face finish shall be:
    - a. Reinforced vinyl wallcovering with woven backing, weighing 20 oz. or more per lineal yard [465 g/m]. Color shall be selected from manufacturer's standard color selector.
- E. Accessories/Options

1. Pass Door: ADA-compliant, located as indicated on shop drawings. The door shall be of the same construction and thickness as other panels.

F. Safety items:

1. Photo-electric sensors (prevents operation if someone is in the area of the partition)
2. Safety lead edge (stops partition if it strikes an object)

2.3 OPERATION

- A. Panels shall be electrically operated, top supported, continuously hinged.
- B. Continuous contact top and adjustable bottom sweeps.

2.4 ACOUSTICAL PERFORMANCE

- A. Acoustical performance shall have been tested at an NIST-accredited, independent laboratory in accordance with ASTM E90. Standard panel construction shall have obtained an STC rating of 43
- B. Copies of the written test report are to be made available upon request. Tests must have been conducted at a laboratory available for verification of results.

PART 3 - EXECUTION

3.1 INSTALLATION.

- A. The complete installation of the operable wall system shall be by an authorized factory-trained installer and be in strict accordance with the approved shop drawings and manufacturer's standard printed specifications, instructions, and recommendations.

3.2 CLEANING

- A. All track and panel surfaces shall be wiped clean and free of handprints, grease, and soil.
- B. Packing and other installation debris shall be removed from the job site.

3.3 TRAINING

- A. Installer shall demonstrate proper operation and maintenance procedures to owner's representative.
- B. Operating keys and owner's manuals shall be provided to owner's representative.

## **10 26 41 - BULLET RESISTANT PANELS**

### **PART 1 - GENERAL**

- 1.1 REFERENCE: The publication below forms a part of this specification.
  - A. UNDERWRITERS LABORATORY UL 752 9th Edition Standard for Bullet Resisting Equipment dated Jan. 27,1995
  - B. ASTM E119-00e Standard Test for ONE HOUR FIRE RATING of building construction and materials.
- 1.2 SUBMITTALS: The following shall be submitted in accordance with Sections 01340 and the SPECIAL CONTRACT REQUIREMENTS: Submit for approval prior to fabrication catalog cuts, brochures, specifications, UL LISTING VERIFICATION, proof of possession of PRODUCT LIABILITY INSURANCE in an amount not less than five million U.S. dollars, and printed data in sufficient detail to indicate compliance with the contract documents and the manufacturer's instructions for the installation of Bullet Resistant Fiberglass. Furnish verification of compliance with ASTM E119-00e ONE HOUR FIRE RATING from a recognized testing laboratory. Submit (1) 24"x24" & (2) 12"x12" sample panels to architect for review.
- 1.3 DESIGN: Through the design, manufacturing technique and material application the Bullet Resistant Fiberglass shall be of the "non-ricochet type ". This design is intended to permit the encapture and retention of an attacking projectile lessening the potential of a random injury or lateral penetration.
- 1.4 DELIVERY, STORAGE AND HANDLING: Deliver the materials to the project with the manufacturer's UL Labels intact and legible. Handle the material with care to prevent damage. Store the materials inside under cover, stack flat and off the floor.
- 1.5 WARRANTY: All materials and workmanship shall be warranted against defects for a period of two (2) year from the date of receipt at the project site.

### **PART 2 - PRODUCTS**

- 2.1 BULLET RESISTANT FIBERGLASS MATERIAL: The panels shall be made of multiple layers of starch-oil woven roving ballistic grade fiberglass cloth impregnated with a thermoset polyester resin and compressed into flat rigid sheets. The production technique and materials used shall provide the controlled internal delamination to permit the encapture of a penetrating projectile. Bullet Resistant Fiberglass panels shall be UL Listed Armortex® OF 300 manufactured by Safeguard Security Services, Ltd., San Antonio, Texas. Phone: (210)-661-8306, (800)-880-8306, Fax: (210)-661-8308. Unlisted bullet resistant fiberglass products will not be considered acceptable or equal. To insure the lowest freight and installation expense, UL Listed Level 3 bullet resistant fiberglass not manufactured with starch – oil ballistic grade cloth will be in excess of 7/16" in thickness and or exceed 4 lbs. per square foot and is not acceptable.
- 2.2 SECURITY LEVEL: The Bullet Resistant Fiberglass must be UL LISTED RATED FOR LEVEL 3
- 2.3 SUBSTITUTIONS: Other UL Listed bullet resistant fiberglass products are acceptable if in compliance with all requirements of this specification. Alternate products must be submitted to the architect for approval two weeks prior to bidding.

### **PART 3 - EXECUTION**

- 3.1 SUPPORTING MEMBERS: Prior to installing the bullet resistive material the contractor shall verify that all supports have been installed as required by the contract documents and the architectural drawings.
- 3.2 JOINTS: All joints shall be reinforced by a back-up layer of bullet resistive material. The bullet resistance of the joint, as reinforced, shall be at least equal to that of the panel. Minimum width of reinforcing layer at joint shall be 4". ( 2" on each panel or a 2" minimum overlap)

- 3.3 APPLICATION: Armor shall be installed in accordance with the manufacturer's printed recommendations. Armor panels shall be adhered using an industrial adhesive, mastic, screws or bolts. Method of application shall maintain the bullet resistive rating at junctures with the concrete floor slab, the concrete roof slab, the bullet resistive door frames, the bullet resistive window frames, and all required penetrations.

## 10 26 13 - CORNER GUARDS

### PART 1 - GENERAL

1.1 SUMMARY: Corner guard system for wall protection

1.2 SCOPE: Provide corner guards at ALL exterior corners at drywall and/or plaster walls.

#### 1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM)
- B. National Building Code of Canada (NBC)
- C. National Fire Protection Association (NFPA)
- D. Society of Automotive Engineers (SAE)
- E. Underwriters Laboratory (UL)
- F. Underwriters Laboratory of Canada (ULC)
- G. Uniform Building Code (UBC)

#### 1.4 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide corner guard system that conform to the following requirements of regulatory agencies and the quality control of IPC Door and Wall Protection Systems, InPro Corporation.
  - 1. Fire Performance Characteristics: Provide UL Classified corner guards conforming with NFPA Class A fire rating. Surface burning characteristics, as determined by UL-723 (ASTM E-84), shall be flame spread of 10 and smoke development of 350 - 450. Provide ULC (Canada) listed corner guards conforming to the requirements of the National Building Code of Canada 2010, Subsection 3.1.13. Surface burning characteristics, as determined by CAN/ULC-S102.2, shall be flame spread of 15 and smoke developed of 35.
  - 2. Self Extinguishing: Provide corner guards with a CC1 classification, as tested in accordance with the procedures specified in ASTM D-635-74, Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position, as referenced in UBC 52-4-1988.
  - 3. Impact Strength: Provide rigid vinyl profile materials that have an Impact Strength of 30.2 ft-lbs/inch of thickness as tested in accordance with the procedures specified in ASTM D-256-90b, Impact Resistance of Plastics.
  - 4. System Impact Resistance: Provide a corner guard system that resists an impact of 153.9 ft-lbs while producing no visual blemishes upon the vinyl cover surface and no deformations in the vinyl retainers, as tested in accordance with the applicable provisions of ASTM F 476-84, paragraph 18, Impact Test.
  - 5. GREENGUARD Certified: Provide GREENGUARD Certified material. Profiles shall meet the requirements of GREENGUARD Certification Standards for Low-Emitting Products and GREENGUARD Product Emission Standard for Children & Schools.
  - 6. Chemical and Stain Resistance: Provide corner guards that show resistance to stain when tested in accordance with applicable provisions of ASTM D-543.
  - 7. Fungal and Bacterial Resistance: Provide rigid vinyl that does not support fungal or bacterial growth as tested in accordance with ASTM G-21 and ASTM G-22.
  - 8. Color Consistency: Provide components matched in accordance with SAE J-1545 - (Delta E) with a color difference no greater than 1.0 units using CIE Lab, CIE CMC, CIE LCh, Hunter Lab or similar color space scale systems.

#### 1.5 SUBMITTALS

- A. Product Data: Manufacturer's printed product data for each type of corner guard specified.

- B. Detail Drawings: Mounting details with the appropriate fasteners for specific project substrates.
- C. Samples: Verification samples of corner guard, 8" (203mm) long, in full size profiles of each type and color indicated.
- D. Manufacturer's Installation Instruction: Printed installation instructions for each corner guard.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in unopened factory packaging to the jobsite
- B. Inspect materials at delivery to assure that specified products have been received.
- C. Store in original packaging in a climate controlled location away from direct sunlight.

#### 1.7 PROJECT CONDITIONS: Products must be installed in an interior climate controlled environment.

#### 1.8 WARRANTY: Limited Lifetime Warranty against material and manufacturing defects.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURER

- A. Basis of Design: IPC Door and Wall Protection Systems, InPro Corporation, PO Box 406 Muskego, WI 53150 USA;
- B. Substitutions: As approved by Architect prior to bidding.
- C. Provide all corner guards and wall protection from a single source.

#### 2.2 MANUFACTURED UNITS

- A. Corner Guard System
  - 1. 160BN BluNose High Impact Corner Guard Profile
  - 2. Width: 2" (51mm) x 2" (51mm), 90 degree
  - 3. Height: 8' (2.44m)
  - 4. Custom Angles – Provide vinyl covers and retainers with custom angles where needed.
  - 5. Place corner guards above cove base, top at 8'-4" AFF.

#### 2.3 MATERIALS

- A. Vinyl Covers: Snap on cover of .080" (2mm) thickness shall be extruded from chemical and stain resistant polyvinyl chloride with the addition of impact modifiers. No plasticizers shall be added (plasticizers may aid in bacterial growth).
- B. Vinyl Retainers: Continuous vinyl retainers of .070" (1.8mm) thickness with a co-extruded flexible vinyl apex shall be fabricated from polyvinyl chloride with the addition of impact modifiers.

#### 2.4 COMPONENTS

- A. Top caps and bottom caps shall be made of injection molded thermoplastics.
- B. Fasteners: All mounting system accessories appropriate for substrates indicated on the drawings shall be provided.
- C. Optional flexible top caps shall be made of injection molded flexible PVC.

#### 2.5 FINISHES

- A. Vinyl Covers: Colors of the corner guard to be selected by the architect from the IPC finish selection. Surface shall have a pebblette texture.

- B. Molded Components: Top caps and bottom caps shall be of a color matching the corner guards. Surface shall have a pebblette texture.

### PART 3 - EXECUTION

- 3.1 EXAMINATION: Examine areas and conditions in which the corner guard systems will be installed. Complete all finishing operations, including painting, before beginning installation of corner guard system materials. Wall surface shall be dry and free from dirt, grease and loose paint.
- 3.2 PREPARATION: Prior to installation, clean substrate to remove dust, debris and loose particles.
- 3.3 INSTALLATION
  - A. General: Locate corner guard as indicated on the approved detail drawings for the appropriate substrate and in compliance with the IPC installation instructions. Install corner guard level and plumb at the height indicated on drawings.
  - B. Installation of 160BN BluNose High Impact Surface Mount
    - 1. Corner Guard:
      - a. Retainer Installation
        - i Position the vinyl retainer against the wall, allowing 5/16" (8mm) from the bottom of the retainer to the top of the cove base or baseboard for the bottom cap.
        - ii Drywall: Secure the retainer to the wall using #8 x 1-1/4" Phillips round head, self-tapping screws. Stagger the fasteners on each wing of the retainer. Use 4 screws per 3' (.91m) length, 6 screws per 4' (1.22m) length, 10 screws per 8' (2.44m) length, or 12 screws per 9' (2.74m) length.
        - iii Concrete: Drill 1/4" (6.5mm) holes into the ends of the retainer for the top and bottom caps. Stagger the holes on each wing of the cap. Use the slotted tabs on the top and bottom cap to transfer hole location to the retainer. Drill 1/4" (6.5mm) holes on the two wings of the retainer. Stagger the fasteners on each wing of the retainer. Drill 4 holes per 3' (.91m) length, 6 holes per 4' (1.22m) length, 10 holes per 8' (2.44m) length, or 12 holes per 9' (2.74m) length. Transfer the location of all mounting holes to the wall. Drill 1/4" (6.5mm) holes and position ALLIGATOR anchors into the holes on the wall. Mount the retainer with #10 x 1-3/4" Phillips pan head screws and tighten to secure the retainer to the wall.
      - b. Top and Bottom Cap Installation:
        - i Drywall: Overlap the retainer with the mounting tabs of the top and bottom caps and attach them to the retainer using two, #8 x 1-1/4" phillips flat head, self-tapping screws per cap. Stagger the fasteners on each wing of the cap.
        - ii Concrete: Overlap the retainer with the mounting tabs of the top and bottom caps and attach them to the retainer and into the ALLIGATOR anchors using two, #8 x 1-1/2" phillips flat head screws per cap. When installing flexible top caps on custom angle corner guards, use cup washers and flat head screws to fasten the top caps to the retainer.
        - iii Position the vinyl cover on the retainer to check the fit. Adjust the top cap on the retainer to obtain a tight fit with the vinyl cover. Starting at the top, push the vinyl cover over the retainer pressing over the entire length until the cover snaps securely into place.
- 3.4 CLEANING: At completion of the installation, clean surfaces in accordance with the IPC clean-up and maintenance instructions.

## 10 28 00 - TOILET, BATH AND LAUNDRY ACCESSORIES

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUBMITTALS: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified. Product Schedule, indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet and Bath Accessory Schedule and room designations indicated on Drawings in product schedule.
- 1.3 COORDINATION: Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

### PART 2 - PRODUCTS

- 2.1 MANUFACTURERS: Subject to compliance with requirements, manufacturers offering accessories that may be incorporated into the Work include, but are not limited to, the following:
  - A. Bobrick Washroom Equipment, Inc.
  - B. Bradley Corporation.
  - C. General Accessory Manufacturing Co.
  - D. ASI
- 2.2 ACCESSORY SCHEDULE:
  - A. PAPER TOWEL DISPENSER: At each lavatory & Where shown on drawings, provide stainless-steel paper towel dispenser complying with the following - Surface-mounted type sized for minimum of 300 C-fold or 400 multifold paper towels without using special adapters; with hinged front equipped with tumbler lockset; and with refill indicators that are pierced slots at sides or front.
  - B. TOILET TISSUE DISPENSER: At each toilet & where shown on drawings, provide double-roll toilet tissue dispenser, surface mounted with concealed anchorage of chrome-plated zinc alloy (zamac) or steel, designed for 4-1/2- or 5-inch-diameter-core tissue rolls. Operation to be eccentric-shaped, molded-plastic spindle revolves one-half revolution per dispensing operation for controlled delivery; core cannot be removed until roll is empty.
  - C. SOAP DISPENSER: At each lavatory & where shown on drawings, provide soap dispenser complying with the following - Liquid Soap Dispenser, Horizontal-Recessed-Tank Type: Minimum 45-oz. capacity, stainless-steel dispenser that is removable for servicing and secured with tumbler lockset; with stainless-steel piston, springs, and internal parts designed to dispense soap in measured quantity by pump action; and with integral check valve to prevent leaking.
  - D. GRAB BAR: At each HC accessible toilet, HC shower & where shown on drawings, provide 0.05" thk stainless-steel grab bar, 1-1/4 inches OD for medium-duty applications. Mounting to be concealed with manufacturer's standard flanges and anchors. Gripping Surfaces to be manufacturer's standard slip-resistant texture.
  - E. MOP AND BROOM HOLDER: In each janitor's closet & where shown on drawings, provide mop and broom holder, 36-inch-long unit fabricated of minimum nominal 0.0375-inch-thick, stainless-steel hat channel with four spring-loaded, rubber, cam-type, mop/broom holders.
  - F. UNDERLAVATORY GUARD: At all exposed lavatory piping, provide underlavatory guard. Insulating piping coverings to be white, antimicrobial, molded-vinyl covering for supply and drain piping assemblies intended for use at accessible lavatories to prevent direct contact with and burns from piping. Provide components as required for applications indicated with flip tops at valves that allow service access without removing coverings.



- G. SANITARY NAPKIN DISPOSAL UNIT: At each women's toilet stall & where shown on drawings, provide stainless-steel sanitary napkin disposal unit, to be partition-mounted, dual-access type with adjustable flanges for partition mounting to serve two toilet compartments; self-closing door; and reusable receptacle that is removable from one side.
- H. MIRROR UNIT: At each lavatory & where shown on drawings provide stainless-steel, channel-framed mirror. Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
- I. HAND DRYER: Basis of Design - Provide hand dryer as shown in drawings. Basis of design to be World Dryer Slim-Dri Hand Dryer L-974, Aluminum cover with White finish, ADA compliant, Automatic activation, 10 year warranty.
- J. FOLDING SHOWER SEAT: At each accessible shower & where shown on drawings, provide heavy-duty hinged seat designed to fold up against wall when not in use with stainless-steel support braces, hinges, frame, and fasteners; of all-welded construction; L-shaped seat meeting requirements of the Texas Accessibility Standards. Seat to be phenolic or polymeric composite of slat-type or one-piece construction. Color as selected by Architect from mfr's full range. Contractor to submit this item to the Owner's accessibility reviewer & receive approval prior to installation. Approved manufacturers are limited to the following:
  - 1. Bradley – 956 series (Discontinued)
  - 2. Tubular Specialties Mfg. - 731PH
  - 3. Brey-Krause Mfg. Co. – Style B
- K. BABY CHANGING STATION: 36" wide x 22" deep x 4" deep folding, surface mounted changing station. Materials to be polypropylene with Microban antimicrobial additive embedded into bed surface. Include Braille label. Unit shall be equipped with a pneumatic cylinder for controlled opening and closing of bed. Bed shall be secured to metal mounting chassis with a concealed steel-on-steel hinge. No hinge structure shall be exposed on interior or exterior surfaces. Unit shall comply with ADA regulations when properly installed. Bed shall have smooth concave changing area with a nylon safety strap and two hooks for bags or purses. Color to be selected by Architect.
  - 1. Basis of Design: Koala Kare KB200.
- L. COLLAPSABLE SHOWER DAM: At all showers with less than 1.5" lip at edge, provide a rubber, collapsable water retainer, to be 1.5" wide with curved or straight endcap, as fits the shower unit, fastened with epoxy glue.

### PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.2 INSTALLATION: Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Provide wood blocking at drywall partitions. Install units level, plumb, and firmly anchored in locations and at heights indicated. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.
- 3.3 FABRICATION: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible. Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.
- 3.4 ADJUSTING AND CLEANING: Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items. Remove temporary labels and protective coatings. Clean and polish exposed surfaces according to manufacturer's written recommendations.

## 10 44 16 - FIRE EXTINGUISHERS AND CABINETS

### PART 1 - GENERAL

- 1.1 SUMMARY: Provide portable fire extinguishers and cabinets. Provide mounting brackets where no cabinet is indicated. Submit for approval shop drawings, product data.
- 1.2 QUALITY ASSURANCE: Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
  - A. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.
  - B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
- 1.3 SUBMITTALS: Shop Drawings for overall sizes and details of fabrication and erection, relationship to adjacent construction, showing anchorage, hardware, accessories, and finishes. Submit manufacturer's technical data, including descriptive data for products & installation instructions.

### PART 2 - PRODUCTS

- 2.1 MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - A. Fire-Protection Cabinets:
  - B. General Accessory Manufacturing Co.
  - C. J.L. Industries, Inc.
  - D. Larsen's Manufacturing Company.
  - E. Modern Metal Products; Div. of Technico.
  - F. Samson Products, Inc.
- 2.2 FIRE EXTINGUISHERS: UL listed and labeled units. At areas other than kitchen or food preparation, provide 10 lb, multi-purpose ABC dry chemical type. At kitchen or food preparation areas provide 10lb, BC dry chemical type.
- 2.3 CABINETS: UL listed and labeled units. Semi-recessed with door & mounting hardware.
  - A. At metal stud partitions less than 6": Basis of design to be Larsen Manufacturing 2409, semi-recessed. At athletic areas, corridors and lobbies provide rolled edge frame.
  - B. At metal stud partitions 6" and greater: Basis of design to be Larsen Manufacturing 2409-RT, fully recessed.
  - C. At block partitions: Basis of design to be Larsen Manufacturing 2409-6R, 2-1/2" semi-recessed. At athletic areas, corridors and lobbies provide rolled edge frame.
  - D. Door & Glazing style: Basis of design to be Larsen Manufacturing Vertical Duo with clear acrylic glazing.
  - E. Lettering: To be red in vertical style.
  - F. Handles: To be manufacturer typical, except at athletic areas provide recessed handle.
  - G. Materials: Trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
  - H. Fire-Rated Cabinets: Listed and labeled to meet requirements of ASTM E 814 for fire-resistance rating of wall where it is installed.

### PART 3 - EXECUTION

- 3.1 PREPARATION: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Install at locations and heights indicated and acceptable to authorities having jurisdiction. Install cabinets plumb and level at heights acceptable to authorities having jurisdiction. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections. Restore damaged finishes and test for proper operation. Cabinets to maintain the fire rating of installed wall assembly. Clean and protect completed work from damage.

# 10 51 13 - KNOCK-DOWN LOCKERS

## PART 1 - GENERAL

- 1.1 SCOPE OF WORK: Furnish and install K.D. knock-down Metal Corridor and Employee Lockers, complete, as shown and specified per contract documents including metal bases, slope tops and filler panels.
- 1.2 QUALITY ASSURANCE: Provide metal lockers that are standard products of a single manufacturer, with interchangeable like parts. Include necessary mounting accessories, fittings, and fastenings. Firm experience (minimum 5 years) in successfully producing the type of metal lockers indicated for this project, with sufficient production capacity to produce required units without causing delay in the work. Engage an experienced (minimum 2 years) installer who has successfully completed installation of the type of metal lockers and extent to that indicated for this project.
- 1.3 SUBMITTALS: Submit drawings showing locker types, sizes, quantities, including all necessary details relating to anchoring, trim installation and relationship to adjacent surfaces. Provide color charts showing manufacturer's available colors (minimum 24). Provide metal samples if requested. Locker numbering sequence will be provided by the approving authority and noted on approved shop drawings returned to locker contractor.
- 1.4 PRODUCT HANDLING: All work shall be fabricated in ample time so as to not delay construction process. All materials shall be delivered to the site at such a time as required for proper coordination of the work. Materials are to be received in the manufacturer's original, unopened packages and shall bear the manufacturer's label. Store all materials in a dry and well ventilated place adequately protected from the elements.
- 1.5 GUARANTEE: Submit upon completion of the work, covering all defects in materials and workmanship excluding finish, damage resulting from deliberate destruction and vandalism under this section for a period of 2 years from the date of final acceptance by the owner.

## PART 2 - PRODUCTS

- 2.1 AVAILABLE MANUFACTURERS: Subject to compliance with the design, material, method of fabrication and installation as required in this specification section or modified as shown on drawings. Manufacturers offering products which may be incorporated in the work include, but are not limited to:
  - A. List Industries Inc. (Basis of Design)
  - B. Art Metal Products; Div. of Fort Knox Storage Co.
  - C. DeBourgh Manufacturing Co.
  - D. Penco Products, Inc.
  - E. Lyon Metal Products, Inc.
- 2.2 MATERIAL
  - A. STEEL: All sheet steel used in fabrication shall be prime grade free from scale and imperfections and capable of taking a heavy coat of high gloss baked enamel.
  - B. FASTENERS: Cadmium, zinc or nickel plated steel; bolt heads, slotless type; self locking nuts or lock washers.
  - C. EQUIPMENT: Hooks and hang rods of cadmium plated or zinc plated steel or cast aluminum. Stainless Steel recessed handle. Number Plates: To be polished aluminum with not less than 3/8" high etched numbers attached to door with two aluminum rivets.
  - D. FABRICATION: Fabricate lockers square, rigid and without warp, with metal faces flat and free from dents or distortion. Make all exposed metal edges safe to touch. Weld frame members together to form rigid, one-piece structure. Weld, bolt, or rivet other joints and connections as standard with manufacturer. Grind exposed welds flush. Do not expose bolts or rivet heads on fronts of locker doors or frames.
  - E. FINISHING: All locker parts to be cleaned and coated after fabrication with a seven stage zinc/iron phosphate solution to inhibit corrosion, followed by a coat of high grade enamel electrostatically sprayed and baked at 325 degrees Fahrenheit for a minimum of 30 minutes to provide a tough durable finish. Color to be selected from manufacturer's standard list of

colors. Two-Tone Color Combination Shall be at no additional cost with the locker body, frame and trim chosen from one standard color and the doors chosen from a second standard color.

- 2.3 LOCKER TYPES: Lockers shall equal to "SUPERIOR - MARQUIS STUDENT" as manufactured by List Industries Inc. or approved equal. All body parts solid.
- A. FRAME: Fabricate of 16 gauge (minimum) channels, with integral continuous door stop/strike formed on vertical members
  - B. WARDROBE DOORS: Outer door to be fabricated from single sheet prime 14 gauge with 7/8" bends at top and bottom and 3/4" double bends at the sides with a minimum 3" wide 18 gauge full height channel door stiffener MIG welded to the inside of door face at the hinge side as well as to the top and bottom return bends.
  - C. DOOR RECESSED LOCKER HANDLE: All locker doors shall have recessed stainless steel cup and handle shaped to receive a built-in combination lock with key override. The recess pan shall be deep enough to have the lock be flush with the outer door face. The pull handle shall be the full width of the recess pan, fabricated of stainless steel and be welded to the recess pan flush with the door face for easy opening of the locker door.
  - D. LATCH ASSEMBLY: Shall be single point rigid non-moving positive latch by means of a heavy gauge (minimum 12 gauge) latch securely welded to the 14 gauge Vertical frame member. The latch assembly must be made of a single piece of steel and have a built-in combination lock with key override. A pry resistant lug which inserts into the door shall be an integral part of the 12 gauge latch. Rubber bumpers shall be securely attached to the door strike. If built-in locks are to be used on openings 30" high or higher, a 14 gauge horizontal support channel (HSA) shall be bolted to the side panel and the back side of the latch as a reinforcement.
  - E. DOOR HINGES: Shall not be less than 3-1/2" long 13 gauge seven knuckle pin type, securely riveted to frame and welded to the door. Doors are to be secured to frame with a minimum of two tamper resistant countersunk rivets per hinge. Provide 3 hinges for doors 48" and higher and 2 for doors shorter than 48".
  - F. BODY: Fabricate back and sides of 24 gauge (minimum) sheet steel, with double flanged connections extending full height. Form top, bottom and intermediate tier dividers of 24 gauge (minimum) sheet steel with single return bends at all sides. Bolt to front horizontal frame members in addition to side panels. Form hat shelves at single tier lockers of 24 gauge (minimum) sheet steel with single bends at sides and back and a double bend at front.
- 2.4 LOCKER ACCESSORIES: Built-In Combination Locks (Spring Bolt Action) with (5) Master / Control keys. Single tier lockers: Hat shelf, one double prong ceiling hook and not less than three single prong wall hooks. Multi tier lockers: One double prong ceiling hook and not less than three single prong wall hooks. (Two single prong wall hooks only at 9" wide). Finished End Panels Shall be "Boxed" type formed from 16 gauge cold rolled steel with 1/2" O.D. double bends on sides and a single bend at top and bottom with no exposed holes or bolts. End panels must be formed with slope at top to cover the ends of the continuous slope tops. Finish to match lockers. Provide at all exposed ends. Continuous Slope Tops Not less than 20 gauge sheet steel, approximately 18 degrees pitch, in lengths as long as practical but not less than four lockers. To be installed in addition to the locker flat top with end closures for support. Finish to match lockers. Provide fillers where indicated, of not less than 18 gauge sheet steel, factory fabricated and finished to match lockers.

### PART 3 - EXECUTION

- 3.1 INSTALLATION: Installation shall be in strict conformance with referenced standards, the manufacturer's written directions, as shown on the drawings and as herein specified.
- 3.2 PLACEMENT: Lockers shall be set in place, plumb, level, rigid, flush and securely attached to the wall (or bolted together if back-to-back) and anchored to the floor or base according to manufacturer's specifications.
- 3.3 ANCHORAGE: About 48" o.c., unless otherwise recommended by manufacturer, and apply where necessary to avoid metal distortion, using concealed fasteners. Friction cups are not acceptable.
- 3.4 TRIM: Sloping tops and metal fillers shall be installed using concealed fasteners. Provide flush, hairline joints against adjacent surfaces.

- 3.5 ADJUSTMENT: Upon completion of installation, inspect lockers and adjust as necessary for proper door operation. Touch-up scratches and abrasions to match original finish.

## 10 51 14 - ATHLETIC LOCKERS

### PART 1 - GENERAL

- 1.1 SCOPE OF WORK: Furnish and install Heavy-Duty All Welded Athletic Lockers, complete, as shown and specified per contract documents.
- 1.2 QUALITY ASSURANCE: Provide metal lockers that are standard products of a single manufacturer, with interchangeable like parts. Include necessary mounting accessories, fittings, and fastenings. Firm experience (minimum 5 years) in successfully producing the type of metal lockers indicated for this project, with sufficient production capacity to produce required units without causing delay in the work. Engage an experienced (minimum 2 years) installer who has successfully completed installation of the type of metal lockers and extent to that indicated for this project.
- 1.3 SUBMITTALS: Submit drawings showing locker types, sizes, quantities, including all necessary details relating to anchoring, trim installation and relationship to adjacent surfaces. Provide color charts showing manufacturer's available colors (minimum 24). Provide metal samples if requested. Locker numbering sequence will be provided by the approving authority and noted on approved shop drawings returned to locker contractor.
- 1.4 PRODUCT HANDLING: All work shall be fabricated in ample time so as to not delay construction process. All materials shall be delivered to the site at such a time as required for proper coordination of the work. Materials are to be received in the manufacturer's original, unopened packages and shall bear the manufacturer's label. Store all materials in a dry and well ventilated place adequately protected from the elements.
- 1.5 GUARANTEE: Submit upon completion of the work a lifetime warranty covering all defects in materials and workmanship excluding finish, damage resulting from deliberate destruction and vandalism.

### PART 2 - PRODUCTS

- 2.1 AVAILABLE MANUFACTURERS: Subject to compliance with the design, material, method of fabrication and installation as required in this specification section or modified as shown on drawings. Manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
  - A. List Industries Inc.
  - B. Republic Storage Systems Inc.
  - C. Wildcat Lockers
  - D. Debourgh Mfg Co
  - E. Penco Products, Inc.
  - F. Lyon Metal Products, Inc.
- 2.2 MATERIAL
  - A. STEEL: All sheet steel used in fabrication shall be prime grade electrogalvanized steel free from scale and imperfections and capable of taking a heavy coat of high gloss baked enamel.
  - B. FASTENERS: Cadmium, zinc or nickel plated steel; bolt heads, slotless type; self locking nuts or lock washers.
  - C. HARDWARE: Hooks cadmium plated or zinc plated steel or cast aluminum. Hang rods to be stainless steel. To be polished aluminum with not less than 3/8" high etched numbers attached to door with two aluminum rivets.
- 2.3 SIZES
  - A. As indicated in drawings.
- 2.4 FABRICATION: All lockers shall be factory-assembled, of all MIG welded construction, in multiple column units to meet job conditions. All locker components shall be fabricated from prime grade Electrogalvanized steel. Assembly of locker bodies by means of bolts, screws, or rivets will not be permitted. Welding of knockdown locker construction is not acceptable. Grind exposed welds and metal edges flush and make safe to touch.

- 2.5 FINISHING: All locker parts to be cleaned and coated after fabrication with a seven stage zinc/iron phosphate solution to inhibit corrosion, followed by a coat of high grade enamel electrostatically sprayed and baked at 325 degrees Fahrenheit for a minimum of 30 minutes to provide a tough durable finish. Color to be selected from manufacturer's standard list of colors. Two-tone color combination shall be at no additional cost with the locker body, frame and trim chosen from one standard color and the security box door, name plate holder and foot locker lid/seat chosen from a second standard color.
- 2.6 FRAME / VERTICAL SIDE PANELS: Shall be of 16 gauge electrogalvanized sheet steel framed by 16 gauge hollow "T" tubular sections and channel frame members designed to enclose all four edges of the side panel with the entire assembly MIG welded to form a rigid frame for each locker. The channel frame members are welded to the front and rear vertical frame members to create and anchor bearing surface of 1-1/4 inches wide x 22" deep at each side panel.
  - A. TOP: Shall be formed of 12 gauge electrogalvanized front channel brace securely welded to frame assembly for rigid unit construction. The rear top to be 16 gauge electrogalvanized steel.
  - B. BACKS: Shall be formed from one piece 16 gauge electrogalvanized steel and securely MIG welded to side frames.
- 2.7 LOCKER ACCESSORIES: Each locker shall be equipped with a name or number card holder of 20 ga. Electrogalvanized steel. Each locker shall have a full width stainless steel clothes rod and a fold out polished stainless steel Mirror attached to unit frame. Each locker to have two heavy-duty clothes hooks securely riveted to locker back.
  - A. Lock: Each locker shall have hasp for use with user provided padlock..
  - B. Finished End Panels (If required): Shall be "Boxed" type formed from 16 gauge cold rolled steel with 1/2" O.D. double bends on sides and a single bend at top and bottom with no exposed holes or bolts. End panels must be formed with slope at top to cover the ends of the continuous slope tops. Finish to match lockers. Provide at all exposed ends.
  - C. Fillers (If required): Provide where indicated, of not less than 20 gauge sheet steel, factory fabricated and finished to match lockers.

### PART 3 - EXECUTION

- 3.1 INSTALLATION: Installation shall be in strict conformance with referenced standards, the manufacturer's written directions, as shown on the drawings and as herein specified. Lockers shall be set in place, plumb, level, rigid, flush and securely attached to the wall (or bolted together if back-to-back) and anchored to the floor or base according to manufacturer's specifications.
- 3.2 ANCHORAGE: About 48" o.c., unless otherwise recommended by manufacturer, and apply where necessary to avoid metal distortion, using concealed fasteners. Friction cups are not acceptable.
- 3.3 TRIM (As required): Sloping tops, metal fillers and end panels shall be installed using concealed fasteners. Provide flush, hairline joints against adjacent surfaces.
- 3.4 ADJUSTMENT: Upon completion of installation, inspect lockers and adjust as necessary for proper door operation. Touch-up scratches and abrasions to match original finish.



## **10 73 16 - ALUMINUM CANOPIES**

### **PART 1 - GENERAL**

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-I Specification Sections, shall apply to work specified in this Section.
- 1.2 GENERAL DESCRIPTION OF WORK: Work in this section shall include design, fabrication and installation of complete welded, extruded aluminum (and acrylic) protective cover system. All work shall be in complete accordance with the drawings and this specification.
- 1.3 REFERENCES
  - A. Specifications for Aluminum Structures, Sixth Edition, 1994.
  - B. ASCE 7-95, Minimum Design Loads for Buildings and Other Structures, December 1995.
  - C. American Architectural Manufacturers Association (AAMA)
  - D. American Society for Testing and Materials (ASTM)
- 1.4 RELATED SECTIONS
  - A. 03 30 00 - CAST-IN-PLACE CONCRETE
  - B. Division 04 MASONRY
  - C. 05 50 00 - METAL FABRICATIONS
  - D. 07 62 00 - SHEET METAL FLASHING AND TRIM
  - E. 07 92 00 - JOINT SEALANTS
- 1.5 SUBMITTALS
  - A. Deferred Submittal: Submit the canopy and its structural design with footings to the building official for review prior to commencing the work. Verify with governing agency requirements for this submittal or if required by authority having jurisdiction.
  - B. Product Data: Submit manufacturer's product information, specifications and installation instructions for building components and accessories.
  - C. Shop Drawings: Submit complete shop drawings including all necessary plan dimensions, elevations and details. General Contractor shall verify all dimensions and provide elevations at each column, finish floor, and related soffit before releasing to manufacturer for fabrication. Submit foundation design and structural calculations.
  - D. Certification: Submit design calculations signed by a Registered Professional Engineer, licensed in the project state. Design calculations shall state that the protective cover system design complies with the wind requirements of ASCE 7-95, the stability criteria of applicable building code, and all other governing criteria. QUALITY ASSURANCE: Protective Cover shall be wholly produced by a recognized manufacturer with at least five years experience in the design and fabrication of extruded aluminum walkway cover systems. Components shall be assembled in shop to greatest extent possible to minimize field assembly. Protective cover shall be installed by manufacturer. Third party installation is not acceptable. Protective cover system, including material and workmanship, shall be warranted from defects for a period of one year from substantial completion of installation.
  - E. Samples: Submit samples or color charts showing manufacturer's full range of standard colors.

1. Samples shall be on actual material to be provided (i.e. sheetmetal). Color samples on paper material, displayed electronically or other similar means shall not be acceptable.

- 1.6 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

## PART 2 - PRODUCTS

- 2.1 MANUFACTURERS: Contract documents are based on products manufactured by Canopy Solutions, Dickinson, TX. Approved alternate manufacturers are:
  - A. Avadek Walkway Covers & Canopies, Houston, TX
  - B. E.L. Burns Company, Shreveport, LA; Architectural Fabrication (new name)
  - C. Peachtree Protective Covers, Inc., Hiram, GA
- 2.2 DESIGN: Protective cover shall be all welded extruded aluminum system complete with internal drainage. Non-welded systems are not acceptable. Roll formed deck is not acceptable. Expansion joints shall be included to accommodate temperature changes of 120oF. Expansion joints shall have no metal to metal contact. All canopies and footings shall be engineered to meet minimum wind load criteria established for this project.
- 2.3 MATERIALS: All sections shall be extruded aluminum 6063 alloy, heat treated to T-6 temper. Sheet acrylic shall be equal to Rohm & Haas Plexiglas7 extruded acrylic per ASTM D1547. Polycarbonate glazing shall be equal to G.E. Lexan7. Fasteners shall be aluminum, 18-8 stainless steel or 300 series stainless steel. Aluminum columns embedded in concrete shall be protected by clear acrylic. Grout shall be 2000 p.s.i. compressive strength, 1 part Portland cement and 3 parts masonry sand; Add water to produce pouring consistency. Gaskets shall be dry seal santoprene pressure type.
- 2.4 COMPONENTS: Columns shall be radius-cornered tubular extrusion of size shown on drawings with cutout and internal diverter for drainage where indicated. Circular downspout opening in column not acceptable. Beams shall be open-top tubular extrusion of size and shape shown on drawings, top edges thickened for strength and designed to receive deck members in self-flashing manner. Structural ties shall be installed in tops of all beams. Deck shall be extruded self-flashing sections interlocking into a composite unit. Closures at deck ends shall be welded plates. Fascia shall be manufacturer's standard shape. Size as indicated on drawings. Flashing shall be .040 aluminum (min.). All thru-wall flashing by others. Arches for barrel vault protective covers shall be sharp-cornered tubular extrusions of size shown in drawings.
- 2.5 FABRICATION: Beams and columns shall be factory welded with neatly mitered corners into one-piece rigid bents. All welds shall be smooth and uniform using an inert gas shielded arc. Suitable edge preparation shall be performed to assure 100% penetration. Grind welds only where interfering with adjoining structure to allow for flush connection. Field welding is not permitted. Rigid mechanical joints shall be used when shipping limitations prohibit the shipment of fully welded bents. Deck shall be manufactured of extruded modules that interlock in a self-flashing manner. Interlocking joints shall be positively fastened at 8" O.C. creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings must have minimum shear strength of 350 pounds each. Deck shall be assembled with sufficient camber to offset dead load deflection.
- 2.6 FINISH: Factory flouropolymer (Kynar) finish, specify AAMA 605.2, two coat. Color shall be selected by architect.

## PART 3 - EXECUTION

- 3.1 PREPARATION: Erection shall be performed after all concrete, masonry, and roofing work in the vicinity is complete and cleaned.
- 3.2 INSTALLATION: Column sleeves (styrofoam blockouts) or anchor bolts (if required) shall be furnished by canopy contractor and installed by the General Contractor. Protective cover shall be erected true to line, level and plumb. Aluminum columns embedded in concrete shall be protected by clear acrylic. Downspout columns shall be filled with grout to the discharge level to prevent standing water. Non-draining columns shall have weep holes installed at top of concrete to remove condensation.
- 3.3 FOOTINGS AT FLATWORK: If column is installed into flatwork in a two-stage process (i.e. not pouring column into a footing), contractor shall provide expansion material and sealant at cold joint and finish to match surrounding concrete in appearance.
- 3.4 CLEANING: All protective cover components shall be cleaned promptly after installation.

3.5 PROTECTION: Extreme care shall be taken to protect materials during and after installation.

## **10 73 17 - STEEL CANOPIES**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

- A. Refer to Instructions to Proposers for substitutions.
- B. Scope: Provide all structural arched standing seam steel panels for canopies as indicated on the drawings and as required to properly interface with as-built conditions at time of installation; including all trim and accessories required for a complete installation.

#### **1.2 SUBMITTALS**

- A. Comply with Section all General & Supplemental Conditions..
- B. Shop Drawings: Indicate size, material and finish. Show location and installation procedures.
  - 1. Include details of joints, attachments and clearances.
  - 2. Include all wind load calculations.
  - 3. Include all support mechanisms to be used by other trades for supporting where the steel canopy / assembly shall be supporting their work, fixtures and / or equipment.
- C. Product Data: Manufacturer's specification and technical data for all products and materials proposed to be furnished.
- D. Manufacturer's installation instructions for this particular assembly.
- E. Samples or color charts showing manufacturer's full range of standard colors.
  - 1. Samples shall be on actual material to be provided (i.e. sheetmetal). Color samples on paper material, displayed electronically or other similar means shall not be acceptable.
- F. All shop drawings, and other submittals as required, shall be sealed, signed and dated by a structural engineer licensed in the state of Texas.
  - 1. Provide engineering calculations with shop drawings / submittals.
- G. Deferred Submittal: Submit the canopy and its structural design with footings to the building official for review prior to commencing the work. Verify with governing agency requirements for this submittal or if required by authority having jurisdiction.

#### **1.3 ENGINEERING**

- A. All walkway canopies shall be engineered by a structural engineer licensed in the state of Texas.
- B. If / where the steel canopy / walkway cover is a complete, ground up, stand-alone assembly, design of walkway column / post footings shall be included by the manufacturer. Coordinate with the Contractor for installation responsibility.
- C. All canopies and footings shall be engineered to meet minimum wind load criteria established for this project.

- D. Coordinate with other trades as required for fixtures and other work that shall be supported by the steel canopy / walkway cover assembly (i.e. light fixtures, conduits, ductwork, and similar). Incorporate all such connections and interface into submittals and shop drawings.
- E. Coordinate requirements and acquisition of a separate building permit or governmental approval as applicable.

#### 1.4 REFERENCE STANDARDS

- A. ASTM A-36, Structural Steel Shapes.
- B. ASTM A-500, Cold formed welded and seamless carbon sheet structural tubing in rounds and shapes.
- C. ASTM A792-83-AZ50: Specifications for Sheet Steel 55% Aluminum-Zink Alloy-Coated by the Hot-Dip Process, "Galvalume".
- D. All steel shall be minimum Grade D – 40,000 PSI minimum yield strength.
- E. All steel shall be galvanized in accordance with ASTM A653, coating class G-90, unless otherwise specified.
- F. SMACNA Architects Sheet Metal Manual and recommended standards.
- G. AISC Steel Construction Manual and recommended standards.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. All structural shapes, including columns, eave struts, and rake end framing, shall be standard, class A steel shapes, ASTM A36 or ASTM A500 as applicable.
  - 1. Structural framing shall be designed to conform to eave heights, and column sizes and spacing as indicated on the Drawings.
  - 2. Structural framing connections shall be shop welded and field bolted.
- B. Standing Seam Panels:
  - 1. All metal panels shall be fabricated from 55% Al-Zn alloy coated sheet metal, in either bare or factory painted finish as indicated.
  - 2. Minimum Gauge: 24 gauge galvanized sheet stock; and heavier where required to meet structural and wind loading criteria.
  - 3. Nominal 12" wide x 4-1/2" rib height.
  - 4. Minimal corrugations are permitted to enhance structural properties of the panel.
  - 5. Panel design shall incorporate a minimum 180 degree seam between adjacent panels.
- C. Gutters, Downspouts, Trim and Flashing:
  - 1. Minimum Gauge: 24 gauge galvanized sheet stock.
  - 2. All gutters, trim and flashing shall be designed to be installed with concealed fasteners as much as possible.
  - 3. Color / finish for all sheetmetal components shall match shall be as selected by the Architect from manufacturer's standard colors.
- D. Fasteners:

1. Sheetmetal fasteners shall be zinc, Tek-5 self-tapping sheetmetal screws in appropriate length for attachment being made.
2. Head / exposed portion of fastener shall be finished to match associated metal panel finish where a colored panel is specified.

E. Suspension Accessories

1. Coordinate with other trades and provide necessary suspension accessories as required support other work, materials and / or fixtures directly related to the steel canopy / walkway cover.
2. Suspension accessories shall be 24 gauge minimum flat sheetmetal straps fabricated from same material as panels.
3. Straps shall be a minimum 1" wide, and wider where suitable for the required purpose.
4. Suspension straps shall integrate directly with panel seam to eliminate the need for mechanical fasteners.

F. Other Accessories:

1. Where steel canopies and walkway covers are shown to be attached to and supported by the building or similar assembly, coordinate with Contractor as required to provide anchoring devices.
2. Where columns or posts to be provided by the steel canopy manufacturer require imbed anchoring devices, coordinate with Contractor as required to provide anchoring devices.
3. The steel canopy / walkway cover shall include all components required to be a complete assembly in conformance with the design indicated on the Drawings.

2.2 FINISHES

A. Pre-painted Finish: Finish for all sheetmetal work shall be a premium, factory applied / baked on PVDF paint finish using a Kynar 500 resin base, containing a minimum of 70% fluoropolymer, meeting AAMA 2605-98 standards.

1. BASF "Fluoroceram"
2. PPG Industries "Duranar"
3. The Velspar Corporation "Fluopon"
4. Color shall be as selected by the Architect from the full range of manufacturer's standard colors.
5. Where factory finished sheet metal is shipped with a protective plastic membrane, adhere to manufacturer's requirements for storage, installation and removal of protective membrane. In the event the protective membrane becomes "baked on", discard all such product and provide new product properly maintained and stored.

B. Bare Finish: Unpainted panels / flashing shall be "Galvalume Plus", a Galvalume sheet coated with a clear acrylic coating.

1. Satin Finish Galvalume is not acceptable.

## 2.3 MANUFACTURERS

- A. The following manufacturers have been pre-approved to provide work of this section; subject to meeting or exceeding all specified requirements.
  - 1. Spanco Building Systems (basis of design)
  - 2. MBF Constructors Inc
  - 3. MIC Industries

## PART 3 - EXECUTION

### 3.1 FABRICATION

- A. Structural framing shall be designed for connections to be shop welded and field fabricated.
  - 1. System shall be designed to minimize exposed field fasteners.
  - 2. Coordinate with other trades as required for proper interface with adjacent work – as constructed.
  - 3. Coordinate dimensional requirements prior to fabrication.
- B. Coordinate with Contractor for installation of attachment plates / anchoring devices to be installed in the exterior wall assembly which are required to support steel canopies and walkways supported by the building.
- C. Structural standing seam roof panels 12 feet or less in length may be shop rolled / fabricated.
- D. Structural standing seam roof panels longer than 12 feet shall be field rolled at the site.
- E. All standing seam roof panels shall be provided in continuous lengths.

### 3.2 ERECTION

- A. All erection shall be supervised by a system manufacturer representative who is fully trained and experienced on the proposed assembly and who is thoroughly knowledgeable with the specific requirements of this project.
- B. Prior to erection, carefully examine all adjacent interfacing work. Notify the Contractor of any deficiencies and do not proceed until fully resolved.
- C. Erection shall be in accordance with final reviewed shop drawings, and manufacturer's standards and recommendations.
- D. Erect steel canopies and walkway covers straight and true; and to elevations indicated on the Drawings. Confirm proper interface with all adjacent work by others.
- E. Where columns are being used as downspouts, column bases shall be filled with grout to the discharge level to prevent standing water. Downspout deflectors shall be installed after grouting.
- F. Install all flashing, trim and accessories required for a complete, finished assembly.

### 3.3 CLEANING AND PROTECTION

- A. Take all necessary precautions to prevent damage or scratching of the installed assembly.
- B. Remove all debris, cuttings, fasteners, and similar items.



## 10 75 00 - FLAGPOLES

### PART 1 - GENERAL

- 1.1 SECTION INCLUDES: Aluminum cone-tapered, ground-set, flagpoles as shown on the Drawings and specified herein, including accessories, base, excavation, concrete foundation and anchoring devices.
- 1.2 PRODUCTS NOT FURNISHED OR INSTALLED UNDER THIS SECTION: Flags; provided by Owner.
- 1.3 STANDARDS: ASTM A36 "Standard Specification for Structural Steel". ASTM A48 "Standard Specification for Gray Iron Castings". ASTM A53 "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless". ASTM B221 "Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes". ASTM D1187 "Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal". NAAMM Metal Finishes Manual. NAAMM Metal Flagpole Manual.
- 1.4 STRUCTURAL PERFORMANCE: Provide flagpoles capable of withstanding the effects of wind loads as determined according to the building code in effect for this Project or NAAMM FP 1001, "Guide Specifications for Design Loads of Metal Flagpoles" whichever is more stringent. Provide flagpoles, base, and anchoring devices to resist a minimum wind velocity of 90 mph with poles flagged, or more if required by code.
- 1.5 SUBMITTALS: Submit Manufacturer's specifications and installation instructions, including base and fittings being provided, & Shop Drawings showing general layout, dimensions, foundation, base, flash collar, halyards, cleats, finial, flag attachment devices, anchoring devices, jointing and finishes. Certify that concrete meets specifications. Provide manufacturer's certification, signed, dated, and sealed by the flag pole manufacturer's Registered Professional Engineer, attesting that the flag pole system conforms to the wind resistivity requirements.
- 1.6 DELIVERY, STORAGE AND HANDLING: Spiral wrap flagpoles with heavy kraft paper, wood strip and steel band or polyethylene wrap and pack in tube prior to shipment. Deliver flagpoles in original wrappings and in maximum lengths that can be shipped. Store flagpoles in original wrappings, in area protected from weather, moisture, and damage. Handle flagpoles to prevent damage and soiling.

### PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
  - A. American Flagpole
  - B. Concord Industries, Inc.
  - C. EMC Div. of Eden Manufacturing Corp.
  - D. Morgan-Francis Flagpoles
  - E. The Flag Center Inc.
- 2.2 MATERIALS:
  - A. Aluminum Pipe: Extruded aluminum, ASTM B221, 6063-T6 alloy.
  - B. Aluminum Alloys for Castings: ASTM B179.
  - C. Cast Iron: ASTM A48.
  - D. Galvanized Corrugated Steel Sheets: ASTM A444.
  - E. Steel: ASTM A36.
  - F. Bituminous Paint: Asphalt emulsion ASTM D1187.
- 2.3 POLE: Cone tapered, seamless, uniform, straight line tapered above cylindrical butt section. Pole height 32' unless shown otherwise on plan. Other pole dimensions per manufacturer's standard. Poles and exposed aluminum parts, color anodized in accordance with NAAMM Metal Finishes Manual, AA C22A42, mill finish.
- 2.4 BASE: Ground Set Foundation Assembly. Provide cast aluminum flash collar, with a stepped profile, unless otherwise shown. Size base to accommodate butt diameter of flagpole. Foundation Sleeve 16 gage corrugated galvanized steel tube with inside diameter approximately 3 inches larger than outside butt diameter of flagpole. Provide Foundation Sleeve Plate, Centering Wedges, Ground Spike, Foundation Support Plate.

- 2.5 FITTINGS: Ball finial, approximately 6 in. in diameter, seamless, spun stainless steel. Provide cast aluminum, ball bearing, non-fouling, stationary double truck assembly. One cast aluminum cleat, 9 in. long, per halyard. Provide one continuous halyard per flagpole, No. 10 nylon with metal core rope. Provide four chromium plated bronze swivel snaps with neoprene or vinyl covers.

**PART 3 - EXECUTION**

- 3.1 EXAMINATION: Inspect foundations for proper depth and size of sleeve. Installation of flagpoles constitutes acceptance of existing conditions.
- 3.2 INSTALLATION: Install flagpoles, base assemblies, and fittings in compliance with approved shop drawings and manufacturer's instructions. Paint portions of flagpole to be concealed with heavy coat of bituminous paint. Excavate for foundation width of at least four times pole butt diameter at bottom and five times at top. Depth as shown, or specified herein. Install foundation sleeve assembly. Set poles in approved locations, making certain that ground spike is properly grounded.
- 3.3 FOOTING: Place concrete in single casting. Provide thickness of footing under base plate at least 15% in in. of pole height in feet or minimum thickness, 4 in., whichever is greater. Provide diameter of foundation bottom at least 4 times outside butt diameter of pole or minimum diameter, 24 in., whichever is greater. Provide diameter of foundation top at least 5 times outside butt diameter of pole or minimum diameter, 30 in., whichever is greater.
- 3.4 SETTING POLE: Center pole, plumb and true in the sleeve with temporary wood wedges and fill sleeve with screened dry sand, thoroughly tamped in 6 in. layers. Remove wood wedges and seal space between pole and sleeve with waterproof cement. Allow concrete to cure at least 14 days before erecting pole. Install flash collar, or other base selected, and seal with sealant specified.
- 3.5 TEST AND ADJUSTMENT: Check operation of fittings and controls; adjust as necessary for smooth operation of halyards and flags.

## 10 81 50 - INTEGRATED PEST MANAGEMENT (IPM)

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Scope:
  - 1. Control of pests while the contractor manages the facility.
  - 2. Pest management services for [1] [2] [5] years after completion of construction.
  - 3. Included Pest Populatinos:
    - a. Indoor populations of rodents, insects (including termites), arachnids, and other arthropods.
    - b. Outdoor populations of potentially indoor-infesting species that are within the property boundaries.
    - c. Nests of stinging insects within 20 (twenty) feet of the building and within the property boundaries.
    - d. Individuals of all excluded pest populations that are incidental invaders inside the building.
  - 4. Excluded Pest Populations:
    - a. Birds, bats, snakes, and all other vertebrates other than commensal rodents.
    - b. Pests that primarily feed on outdoor vegetation.
- B. Related Sections
  - 1. Section 01 50 00 - Temporary Facilities
  - 2. Section 01 57 19.11 - Indoor Air Quality (IAQ) Management
  - 3. Section 01 74 13 - Progress Cleaning
  - 4. Section 01 78 23 - Operation and Maintenance Data
  - 5. Section 31 31 16 - Soil Control
  - 6. Section 32 93 00 - Landscape Planting

#### 1.2 DEFINITIONS

- A. Action Threshold: The level at which action is initiated as determined by how many pests can be tolerated.
  - 1. The action threshold reflects the pest management objective for the site. The presence of some pests does not, in itself, necessarily require action. When pest populations exceed established action thresholds, action must be taken.
- B. Biological Control: The use of living organisms—parasites, predators, or pathogens—to maintain pest populations.
- C. Cultural Control: The manipulations of the site ecosystem that make it less friendly to the establishment and proliferation of pest populations.
- D. Exclusion: The practice of structural and procedural modifications to reduce access used by pests.
- E. Integrated Pest Management (IPM): An approach to pest management that uses current, comprehensive information on the life cycles of pests and their interactions with the environment to identify and implement effective methods of pest control with the least possible hazard to people, property, and the environment.
- F. Mechanical Control: The use of one or more physical components of the environment, such as temperature, humidity, or light, to the detriment of the pest.
- G. Phenology: The annual cycles of plants and animals and how they respond to seasonal changes in their environment.

#### 1.3 QUALITY ASSURANCE

- A. Pesticides
  - 1. Contractor shall be responsible for application of pesticides according to the label.
  - 2. Regulatory compliance:
    - a. All pesticides used by the Contractor must be registered with the U.S. Environmental Protection Agency (EPA) and applicable jurisdictions.

- b. Transport, handling, and use of all pesticides shall be in strict accordance with the manufacturer's label instructions and all applicable laws and regulations.
3. Contractor shall not store any pesticide product in the project building(s) and site.
4. Prohibited Pesticides:
  - a. Contractor shall not apply any pesticide product that has not been included in the approved IPM Plan or approved in writing by the Owner.
5. Minimization of Risk:
  - a. When pesticide use is necessary, Contractor shall employ the least risk pesticide, most precise application technique, and minimum quantity of pesticide necessary to achieve control.
  - b. Application of pesticides in any inside or outside area shall not occur unless visual inspection or monitoring devices indicate the presence of pests in that specific area.
  - c. Recommendations for preventive pesticide treatments in areas where inspection indicates a potential insect or rodent infestation will be evaluated by the Owner on a case-by-case basis. Written approval must be granted by the Owner prior to any preventive pesticide application.
  - d. Notification: Contractor shall notify Owner at least 48 hours in advance of the application of any pesticide. Exceptions may be made for applications made for emergencies, where an imminent threat to health exists (e.g., stinging insects). For emergency applications, notification must be made as soon as practical.

B. Key Pests and Action Thresholds

key pest	action threshold	
	interior	exterior
birds	1 bird	1 nest on building
Rats, mice, squirrels, racoons	any evidence	any evidence
flies	1 complaint (when one or more become a nuisance)	1 complaint (when one or more become a nuisance); also, <b>30/day</b> based on monitoring count
ants	1 complaint	1 fire ant mound within 100 feet of building/pavement
cockroaches	1 cockroach in public areas or fresh food areas	n/a
pantry pests (meal moth, flour beetles)	1 complaint	n/a
crickets	1 complaint	n/a
Bats	Any evidence	Any evidence
Wasps, hornets	1 complaint	1 nest within 20 feet of building
Scorpions, spiders	1 complaint	n/a

PART 2 - PRODUCTS

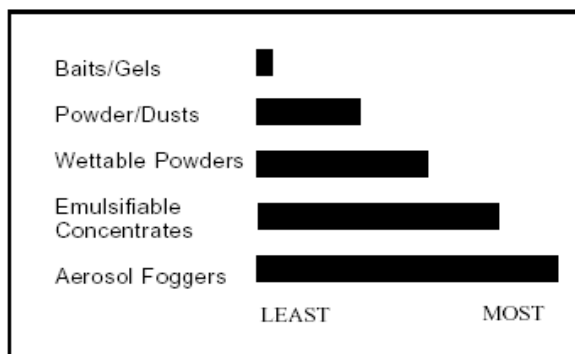
2.1 CHEMICAL CONTROLS

A. Prohibited Pesticides

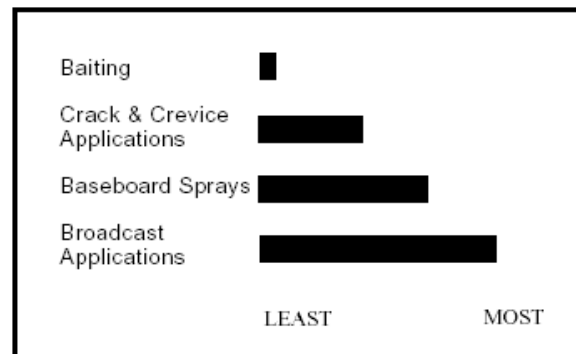
1. Pesticides containing active ingredients classified as known, likely or probable carcinogens or reproductive toxins according to any of the following lists: State of California EPA List of Chemicals Known to Cause Cancer

- or Reproductive Toxicity, State of Illinois EPA List of Known Endocrine Disruptors, US EPA List of Chemicals Evaluated for Carcinogenic Potential.
2. Pesticides containing inert ingredients included on US EPA's List 1: Inerts of Toxicological Concern.
  3. Pesticide formulations and uses presenting a potential physical hazard or dust/powder inhalation hazard to building occupants.
  4. Pesticides with label precautionary statements including "toxic" or "extremely toxic" to bees, birds, fish or wildlife. Does not apply to pesticides used as per label directions to control bird, fish, wildlife or stinging insect pests.
  5. Pesticides with label precautionary statements including specific warnings regarding ground or surface water contamination.
- B. Lesser Risk Pesticides: Materials listed on the U.S. National Organic Program's Final Rule, US Code of Federal Regulations 7CFR 205, list of acceptable materials and as follows:
1. Botanical pesticides: Botanical pesticides can be as simple as pureed plant leaves, extracts of plant parts, or chemicals purified from plants. Pyrethrum, neem formulations, and rotenone are examples of botanicals. Some botanicals are broad-spectrum pesticides. Others, like ryania, are very specific. Botanicals are generally less harmful in the environment than synthetic pesticides because they degrade quickly, but they can be just as deadly to beneficials as synthetic pesticides.
  2. Crawling insects: Boric acid based or plant based pesticides.
    - a. Pyrethrum, neem formulations, rotenone, and others as approved by Owner.
  3. Rodents: Vitamin D3 (Cholecalciferol) or Quintox.
  4. Weeds: Plant based pesticides and herbicides. Coordinate with Section 32 90 00 (02900) – Planting.
    - a. Botanical pesticides: Pyrethrum, neem formulations, rotenone, and others as approved by Owner.
  5. Plant diseases: Plant based fertilizers. Coordinate with Section 32 90 00 (02900) – Planting.
    - a. Compost Teas: Verify that compost tea does not include invasive species, including seeds. Verify that compost tea does not include animal pathogens.
- C. Lesser Risk Pesticide Application Methodologies

**Likelihood the Pesticide Will Become Airborne**



**Use Pattern and Amount of Pesticide Used**



## PART 3 - EXECUTION

### 3.1 NON-CHEMICAL PEST MANAGEMENT

A. Provide IPM as follows

1. Cultural Controls

- a. Sanitation and exclusion: Recommend structural and procedural modifications as appropriate to reduce food, water, harborage, and access used by pests.
- b. Soils: Maintain healthy, biologically active soils. Coordinate with Section 32 90 00 (02900) – Planting.
- c. Habitat for beneficial organisms: Recommend modifications as appropriate to promote healthy habitat for beneficial organisms. Habitat enhancement may include flowering annual or perennial plants that provide pollen and nectar needed during certain parts of the insect life cycle, overwintering sites, and wind protection. Coordinate with Section 32 90 00 (02900) – Planting.
- d. Phenology: Determine correlation with insect emergence and pest control. Develop recommendations as appropriate.

2. Mechanical Controls

- a. Traps
  - i Rodents: Trapping devices shall be the standard method for indoor rodent control. All such devices shall be concealed out of the general view and in protected areas so as not to be affected by routine cleaning and other operations.
  - ii Insects: Trapping devices shall be the standard method for indoor fly control.
- b. Vacuums
  - i Insects: Portable vacuums shall be the standard method for initial cleanouts of cockroach infestations, ants, termites, and for control of spiders in webs.
- c. Flame weeding: Unless otherwise approved by Owner, flame weeding shall not be permitted.
- d. Mulches, living or non-living:
  - i Weeds: Mulch shall be used for suppression of weeds, insect pests, and plant diseases as appropriate. Coordinate with Section 32 90 00 (02900) – Planting.
- e. Boiling Water:
  - i Fire Ants (exterior): Boiling water shall be the standard method for control of exterior fire ants. Use boiling water at a rate of approximately 3 gallons per mound.

3. Biological Controls

- a. Lady bugs, nematodes, and other biological controls: Permitted only for control of exterior ants, aphids, and/or other insects as appropriate. Coordinate with Section 32 90 00 (02900) – Planting.
- b. Bats: Permitted only for control of exterior insects as appropriate.

3.2 CHEMICAL PEST MANAGEMENT

- A. Chemical Controls: Unless otherwise approved by Owner, Contractor shall use non-chemical methods of control. When pesticide use is necessary, the Contractor shall employ the least risk, NOP-listed pesticide; most precise application technique; and minimum quantity of pesticide necessary to achieve control.
- B. Baits Boxes: Bait boxes shall be maintained with an emphasis on the safety of non-target organisms.
  - 1. Bait boxes shall be placed out of the general view, in locations where they will not be disturbed by routine operations.

2. Lids shall be securely locked or fastened shut.
3. Bait boxes shall be securely attached or anchored to floor, ground, wall, or other immovable surface, so that the box cannot be picked up or moved.
4. Bait shall be secured in the feeding chamber of the box and never placed in the runway or entryways of the box.
5. Bait boxes shall be labeled on the inside with the Contractor's business name and address, and dated by the Contractor's technician at the time of installation and each servicing.

### 3.3 PEST REMOVAL

- A. Pest Removal: Remove traps, bait boxes, and their contents according to the approved IPM Plan and as requested by Owner.

### 3.4 SPECIAL REQUESTS AND EMERGENCY SERVICE

- A. On occasion, the Owner may request that the Contractor perform corrective, special, or emergency service(s) that are beyond routine service requests. The Contractor shall respond to these exceptional circumstances and complete the necessary work within three (3) hours after receipt of the request.

### 3.5 FIELD QUALITY CONTROL

- A. Inspection: Inspect building and site for pests and beneficials to gather information about the health of the landscaping and local ecosystem, pests, and natural enemies.
  1. Methods:
    - a. Sweep nets, sticky traps, and pheromone traps may be used to collect insects for both identification and population density information.
    - b. Leaf counts may be used for recording plant growth stages.
    - c. Square-foot or larger grids laid out in a field may provide a basis for comparative weed counts.
    - d. Records of rainfall and temperature may be used to help predict the likelihood of disease infections.
  2. Schedule: Inspect at regular intervals and at critical times in accordance with approved IPM Plan.
  3. Reports: Document results of inspections. Submit using form approved by Owner.
- B. Recommendations: Throughout the term of this contract, the Contractor shall be responsible for advising the Owner about any structural, sanitary, or procedural modifications that would reduce pest food, water, harborage, or access.
  1. The Contractor shall be responsible for adequately suppressing all pests included in this contract regardless of whether or not the suggested modifications are implemented.
  2. The Contractor will not be held responsible for carrying out structural modifications as part of the pest control effort. However, minor applications of caulk and other sealing materials by the Contractor to eliminate pest harborage or access may be approved by the Owner on a case by case basis. The Contractor shall obtain the approval of the Owner prior to application of sealing material and other structural modification.

## 10 95 10 - MISC. ACCESSORIES AND EQUIPMENT

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all Misc. Accessories & Equipment, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture, providing air good circulation.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

### PART 2 - PRODUCTS

- 2.1 GENERAL: Provide materials which are compatible with any underlying material. Provide all accessories required for a complete and proper installation, as recommended by the manufacturer.
- 2.2 FOLDING CHANGING SEAT: Basis of Design: Model #SSB2480240-PWS Folding Seat from Seachrome Corp.
  - A. Frame: Type 304 Stainless Steel tube, 1-1/4" x 18ga. sq. main frame with 1" x 18ga. rd. cross members.
  - B. Leg: "H" shaped yoke of type 304 stainless steel tubing, 1" x 18ga. rd tubing, welded to 1-1/4" rd. x 12ga. frame hinge.
  - C. The swing down legs shall automatically level when the seat is lowered to a horizontal sitting position. The seat is to automatically lock itself when swing into its "up" position with the use of stainless cross members.
- 2.3 COAT HOOKS: 2 Hook, side-by-side. Material: Aluminum with natural aluminum finish. Hook height: minimum 1-1/2". Hook width: minimum 1-1/8".
- 2.4 MONITOR MOUNTING BRACKET: Basis of design is Aegis Mechtronics MT-MWB200 Heavy Duty Monitor Bracket Wall Mount. Shall support a monitor up to 42". Aluminum construction with black power coat finish. Horizontal Adjustment: 180 degree (3 joints). Vertical Tilt: +2 to -10 degree. Rotation level adjustment: +/- 3 degrees. Load of 80 lbs.
- 2.5 CANOPY COLUMN WRAP DOWNSPOUT NOZZLE: Basis of design is Jay R. Smith Mfg. Co. 1770 Downspout Nozzle. Material: Cast Bronze. Finish: Nickel. Approved Manufacturers: Watts Water Technologies, Josam Company.

### PART 3 - EXECUTION

- 3.1 UTILITY COORDINATION: Coordinate & verify that all required utility services are provided by other subcontractors or provide those required under the work of this section.
- 3.2 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.3 INSTALLATION: Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Provide wood blocking at drywall partitions. Place & attach all components firmly & accurately into position, square, plumb, level, & true.



- 3.4 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.

**DIVISION 11 – EQUIPMENT**

**11 13 00 - LOADING DOCK EQUIPMENT**

**PART 1 - GENERAL**

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUMMARY: This Section includes Dock bumpers & levelers.
- 1.3 SUBMITTALS
  - A. Product Data: Include rated capacities, furnished specialties, accessories, details of construction relative to materials, dimensions of individual components, profiles, and finishes.
  - B. Maintenance Data: For loading dock equipment to include in the maintenance manuals specified in Division 1. Include name, address, and telephone number of manufacturer's nearest authorized service representative.
- 1.4 DELIVERY, STORAGE, AND HANDLING: Store and handle dock seals and shelters in a manner to avoid significant or permanent damage to fabric or frame. Comply with manufacturer's written instructions for minimum and maximum temperature requirements for storage.

**PART 2 - PRODUCTS**

- 2.1 MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - A. Dock Bumpers:
    - 1. American Floor Products Co., Inc.
    - 2. Durable Corporation.
    - 3. Kelley Dock Systems.
    - 4. R.C. Musson Rubber Co.
    - 5. Rite-Hite Corporation.
  - B. Edge-of-Dock Levelers:
    - 1. Flexon, Inc.
    - 2. Beacon Machinery, Inc.
    - 3. Kelley Dock Systems.
    - 4. Rite-Hite Corporation.
    - 5. Rol-Lift; Long Reach Holdings, Inc.
- 2.2 DOCK BUMPERS
  - A. Laminated-Tread Bumpers: Provide units of size indicated, fabricated from multiple plies cut from fabric-reinforced rubber tires to a uniform thickness of 4-1/2 inches. Laminate plies under pressure on 3/4-inch- diameter, steel supporting rods that are welded and bolted to 1/4-inch- thick, structural-steel angle closures with predrilled anchor holes. Size angles to provide not less than 1 inch of tread plies extending beyond the face of closure angles.

- B. Anchorage Devices: Provide anchor bolts, nuts, washers, bolts, sleeves, cast-in-place plate, and other anchorage devices as required to fasten bumpers securely in place and to suit installation type indicated. Hot-dip galvanize anchorage components.

## 2.3 EDGE-OF-DOCK LEVELERS

- A. General: Provide edge-of-dock levelers of type, function, operation, capacity, size, and construction indicated, complete with controls, safety devices, and accessories required. Dock levelers shall compensate for differences in height between truck bed and loading platform in the following manner:
  - 1. Vertical Travel: Minimum working range shall be 5 inches (127 mm) above and 5 inches (127 mm) below adjoining platform level. Provide an operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact.
  - 2. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.
  - 3. Automatic Lateral Compensation: Tilting of ramp with lip extended and resting on truck bed shall compensate automatically for canted truck beds of up to 3 inches (76 mm) over width of ramp.
  - 4. Lip Operation: Provide manufacturer's standard mechanism that automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck, and automatically retracts lip when truck departs.
  - 5. Automatic Ramp Return: Provide automatic return of unloaded ramp, from raised or lowered positions to stored position, level with platform, as truck departs. Leveler shall be able to be retracted to stored position while truck is at dock.
- B. Hydraulic Operating System: Provide electric hydraulic raising and hydraulic lowering of ramp, controlled from a remotely located push-button station. Equip leveler with a packaged unit including a unitized, totally enclosed, nonventilated electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler indicated. Provide a hydraulic velocity fuse connected to main hydraulic cylinder to limit loaded ramp's free fall to not more than 3 inches (76 mm).
  - 1. Electrical Requirements: Coordinate wiring requirements and current characteristics with building electrical system. See Division 16 Sections.
  - 2. Remote-Control Station: Provide a single-button station of the constant-pressure type, enclosed in a NEMA ICS 6, Type 12 box. Raise ramp and lip to vertical position and extend lip and ramp to truck bed by holding the button depressed.
- C. Rated Capacity: Provide dock levelers capable of supporting a total gross load indicated below without permanent deflection or distortion, as determined by actual tests complying with requirements of MH 30.1 for rated capacity.
  - 1. Total Load: Not less than 20,000 lb (9072 kg).
- D. Safety Devices: Provide manufacturer's standard and optional safety devices as follows:
  - 1. Cross-Traffic Support: Provide manufacturer's standard method of supporting ramp at platform level in stored position with lip retracted. Provide a means to release supports to allow ramp to descend below platform level.

2. Maintenance Strut: Provide an integral strut to positively support ramp in up position during maintenance of dock leveler.
- E. Construction: Fabricate dock-leveler frame from structural- and formed-steel shapes. Fabricate platform, including hinged lip, from nonskid steel plate. Fabricate entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material-handling vehicles. Include two dock bumpers attached to frame.
- F. Finish and Color: Manufacturer's standard paint applied to factory-assembled and -tested dock levelers before shipping. Paint toe guards yellow to comply with ANSI Z535.1, and paint remainder of surfaces in manufacturer's standard color.

### PART 3 - EXECUTION

- 3.1 EXAMINATION: Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of loading dock equipment. Proceed with installation of loading dock equipment only after unsatisfactory conditions have been corrected.
- 3.2 PREPARATION: Coordinate installation of loading dock equipment indicated to be attached to or recessed into concrete or masonry, and furnish anchoring devices with templates, diagrams, and instructions for their installation. Clean recessed pits of debris.
- 3.3 INSTALLATION, GENERAL: Comply with manufacturer's detailed written instructions for installing loading dock equipment.
- 3.4 DOCK-BUMPER INSTALLATION: Attach dock bumpers to structure in a manner that complies with requirements indicated for spacing, arrangement, and position relative to top of platform and anchorage. Plug-weld anchor holes in contact with steel inserts and fillet weld at other locations.
- 3.5 DOCK-LEVELER INSTALLATION: Set curb angles in concrete with tops flush with platform. Fit exposed connections together to form hairline joints. Coordinate forming recessed pit for dock levelers to ensure that recess is adequate to accommodate leveler in proper relation to loading platform. Attach levelers to structure in a manner that complies with requirements indicated for arrangement and position relative to top of platform. Weld anchor holes in contact with continuous embedded dock edge channel. Weld or bolt bumper blocks to dock face.
- 3.6 ADJUSTING: Adjust loading dock equipment for safe, efficient operation. Test dock levelers and lifts for vertical travel within operating range indicated.
- 3.7 CLEANING AND PROTECTING: Restore marred, abraded surfaces to their original condition. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure loading dock equipment is without damage or deterioration at the time of Substantial Completion.

## 11 21 73 - COMMERCIAL LAUNDRY EQUIPMENT

### PART 1 - GENERAL

- 1.1 SCOPE: Provide all labor, materials, equipment and accessories needed to provide and install Laundry & Training Room Equipment as indicated on the drawings and specifications herein.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 SUBMITTALS: Submit catalog cuts, shop drawings necessary to indicate size, location and methods of attachment within 45 days after commencement date.
- 1.4 DELIVERY, STORAGE AND HANDLING: Deliver materials to jobsite, contractor will be responsible for unloading and storage until materials are ready to be installed.
- 1.5 WARRANTY: Provide manufacturer's standard 3 year warranty.

### PART 2 - PRODUCTS

- 2.1 WASHER-EXTRACTOR:
  - A. Equal to UniMac High-Performance UWN045T4V Washer.
    1. Capacity: 45 lb.
    2. Control: UniLinc
- 2.2 DRYER:
  - A. Equal to UniMac Standard UT050 Natural Gas Dryer.
    1. Dry Weight Capacity: 50 lb.
    2. Cylinder Size: 37" diameter by 30" deep.
    3. Cylinder Volume: 18.6 cubic feet.
    4. Control: UniLinc
- 2.3 OTHER MATERIALS: Furnish and install all supplementary materials, whether or not specifically indicated, required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

### PART 3 - EXECUTION

- 3.1 UTILITY COORDINATION: Coordinate & verify that all utility services are provided by other subcontractors or provide those required under the work of this section.
- 3.2 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.3 INSTALLATION: Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Coordinate mounting brackets with steel structure & mount securely. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Place & attach all components firmly & accurately into position, square, plumb, level, & true.
- 3.4 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.

## 11 30 33 - RETRACTABLE STAIRS

### PART 1 - GENERAL

- 1.1 SUMMARY: Metal Folding Disappearing Stairway including stairway, frame and door.
- 1.2 DELIVERY, STORAGE AND HANDLING: Store stairway until installation under roof, if possible; or, if stored outside, under a tarp or suitable cover.
- 1.3 WARRANTY: The unit carries a limited warranty of 1 year against defective material and workmanship, covering parts only, no labor or freight. Defective parts, if deemed so by the manufacturer, will be replaced no charge, freight excluded, upon inspection at manufacturer's plant which warrants same.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURER

- A. Precision Ladders, LLC, P. O. Box 2279 - Morristown, Tennessee 37816-2279. Phone: (800)225-7814. FAX: (423)586-2091.
- B. Other manufacturers meeting these specifications & approved by the Architect.

#### 2.2 MATERIALS

- A. Door - 1/8" aluminum door panel (standard) or 20 gauge steel door with 2 hour fire-rated Warnoc Hersey label that meets ASTM E-119 & UBC 43-7 requirements, passed 250° temperature rise in the first 30 minutes(optional). Steel piano hinge. Door overlaps bottom flange of frame (standard). Fire rated steel door is flush with bottom of frame. Provide eye bolt to accommodate pole for opening and closing.
- B. Stairway
  1. Stringers
    - a. 6005-T5 Extruded aluminum channel 5" X 1" X 1/8"
    - b. Tri-fold design
    - c. Steel blade type hinges
    - d. Adjustable foot with plastic Mar-guard.
    - e. Pitch 63° (standard). Or as required.
  2. Treads
    - a. 6005-T5 Extruded aluminum channel 5 3/16" X 1 1/4" X 1/8".
    - b. Depth 5 3/16".
    - c. Width 21 1/4" (standard). Widths to 30" available.
    - d. Deeply serrated top surface.
    - e. 9 1/2" riser height (standard). Other riser heights available.
    - f. 500 lbs load rating.

- 2.3 FRAME: Custom fabricated from 1/8" steel with factory-installed tread(s) to cover the distance from finished ceiling to finished floor above. Frame shall be on a 63 degree angle on the hinge end in order to continue the climb from ceiling and beyond on the same incline as the folding portion of the unit. The frame shall have pre-drilled and mounted brackets to allow for hanging from and fastening to the floor above.

#### 2.4 HARDWARE

- A. Steel blade type hinge connecting stringer sections, zinc-plated and chromate-sealed, bolted to stringers.
- B. Steel operating arms, both sides, zinc-plated and chromate-sealed.
- C. Double acting steel springs and V-hooks, both sides.
- D. Rivets rating at 1100# shear.

**2.5 SAFETY**

- A. Steel bar handrail riveted to stringers, upper section, right side standard.
- B. Steel section alignment clips at stringer section joints.
- C. Molded rubber guards at corners of aluminum door panel.

**2.6 ACCESSORIES**

- A. Steel pole to aid opening and closing stairways.
- B. Keyed lock for door.

**2.7 FINISHES**

- A. Mill finish on aluminum stairway components.
- B. Prime coat on frame.
- C. Primed and painted handrail.

**PART 3 - EXECUTION**

- 3.1 **SURFACE CONDITIONS:** Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.2 **INSTALLATION:** Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Provide wood blocking at drywall partitions. Place & attach all components firmly & accurately into position, square, plumb, level, & true.
- 3.3 **ADJUSTMENT:** Upon completion of installation, inspect and adjust as necessary for proper door operation. Touch-up scratches and abrasions to match original finish.
- 3.4 **PROTECTION/CLEANING:** Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.

## 11 41 23 - WALK-IN COOLERS

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for Walk-In Refrigerated Compartment, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture, providing air good circulation.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

### PART 2 - PRODUCTS

- 2.1 GENERAL: Provide (2) US Cooler Walk In Freezers, or equal. Unit to be 12' 0" left to right, 12' 0" front to back and 7'6" high. Provide materials which are compatible with any underlying material. Provide all accessories as required for a complete and proper installation, as recommended by the manufacturer
- 2.2 CONSTRUCTION: Walk-In shall be manufactured equal to National Sanitation Foundation requirements and shall bear the NSF Seal of Approval. Unit shall be constructed of modular panel allowing easy set-up and installation of walk-in. Panels shall be connected together by cam lock connectors activated by an L-shaped allen wrench supplied with walk-in. Cam locks must be able to be moved in case of future modifications. Unit must have capacity to be easily disassembled for relocation or future expansion.
- 2.3 MATERIALS: Walls, ceilings, and floor shall consist of interior and exterior metal laminated to rigid foam insulation. All wall, ceiling, and floor panels, excluding door panel and floor border where door is placed, shall be manufactured using no wood products. Vinyl gasket shall be provided on panel edges to provide a vapor proof seal. Vinyl gasket must be installed so back edge of gasket material wraps around metal skin.
- 2.4 INSULATION: All wall and ceiling insulation shall be 4" thick, high quality, rigid virgin expanded Polystyrene for insulation, 1 ¼ lb. Density, type VIII. K factor of not more than .22 R factor of no less than 4.5 per inch, initial R-18 minimum total walls R factor. Vapor transmission shall be less than 1.7 perm and foam must meet UL 25 flame spread rating with average smoke rating less than 150.
- 2.5 ELECTRICAL: All electrical items shall be UL approved for use in walk-in environments. Refrigeration systems shall be remote with quick disconnects and 20' of precharged lines. Freezers shall be supplied with a hermetic compressors and evaporator coils. Compressor to be equal to Russell. The Evaporator coil shall be equal to Russell. One Freezer set operate at a temperature of 35 degrees Fahrenheit. The second freezer shall operate at a temperature of -10 degrees Fahrenheit.
- 2.6 METAL: All walls, ceiling, and exterior floor skins shall be 26 gauge.
- 2.7 ENTRANCE DOOR: Door opening shall be 34" x 76". Door shall be a self-closing flush mount style with magnetic gasket and come complete with quality chrome latches and hinges. Latch shall have inside safety release handle. Door shall be fitted on top of both sides with magnetic gasket. Frame shall come equipped with 1 ¼" channel. Channel shall consist of a galvanized base with a snap on stainless steel cover to allow removal of heater wire. Door shall be fitted with replaceable triple-edge wiper type sweep, which shall provide a vapor tight seal resistant to oil, fats, water, and abrasion.



**PART 3 - EXECUTION**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.2 INSTALLATION: Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Provide wood blocking at drywall partitions. Place & attach all components firmly & accurately into position, square, plumb, level, & true. Electrical and Plumbing connections shall be the responsibility of the respective sub-contractors.
- 3.3 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.

## 11 52 13 - PROJECTION SCREENS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Front-projection screens.
- B. Related Sections include the following:
  - 1. Division 6 Section "Rough Carpentry" for wood backing for recessed screen installation.

#### 1.3 DEFINITIONS

- A. Gain: Ratio of light reflected from or refracted by screen material to that reflected perpendicularly from a magnesium carbonate surface as determined per FS GG-S-00172D(1).
- B. Half-Gain Angle: The angle, measured from the axis of the screen surface, to the most central position on perpendicular plane through the horizontal centerline of the screen where the gain is half of the peak gain.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of screen specified.
- B. Shop Drawings: Show layout and types of projection screens. Include the following:
  - 1. Anchorage details.
  - 2. Frame details.
  - 3. Accessories.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain projection screens through one source from a single manufacturer. Obtain each screen as a complete unit, including necessary mounting hardware and accessories.
- B. Coordination of Work: Coordinate layout and installation of projection screens with other construction supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system, and partitions.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver projection screens until building is enclosed, other construction within spaces where screens will be installed is substantially complete, and installation of screens is ready to begin.

PART 2 - PRODUCTS

2.1 FRONT-PROJECTION SCREENS

- A. Material and Viewing Surface of Front-Projection Screens: Provide screens manufactured from mildew- and flame-resistant fabric of type indicated for each type of screen specified and complying with the following requirements:
  1. Reflective viewing surface, matte silver, silver lenticular, pearlescent, or high-gain matte neutral, with the following gain characteristics: Peak gain of 2.0, and half-gain angle of at least 25 degrees.
  2. Material: Vinyl-coated glass-fiber fabric.
  3. Mildew Resistance: Provide mildew-resistant screen fabrics as determined by FS 191A/5760.
  4. Seamless Construction: Provide screens in sizes indicated without seams.
  5. Edge Treatment: Black masking borders.
  6. Size of Viewing Surface: As indicated.
- B. Manually Operated Screens: Provide manufacturer's standard spring-roller-operated units designed and fabricated for wall or ceiling installation and consisting of case, screen, mounting accessories, and other components necessary for a complete installation.
  1. Screen Case: Fabricated in 1 piece from steel sheet not less than 0.0299 inch, with flat back design and vinyl covering or baked-enamel finish. Provide end caps with integral roller brackets and universal mounting brackets, finished to match end caps, for wall or ceiling mounting.
  2. Screen Mounting: Top edge securely anchored to a 3-inch-diameter, rigid steel spring roller; bottom edge formed into a pocket holding a tubular metal slat, with ends of slat protected by plastic caps, and saddle and pull attached to slat by screws.
- C. Motorized Screens: Provide manufacturer's standard motor-operated units designed and fabricated for wall or ceiling installation and consisting of case, screen, mounting accessories, and other components necessary for a complete installation. Provide surface mounted or recessed/ concealed installation as noted.
  1. Screen Case: Fabricated in 1 piece from steel sheet not less than 0.0299 inch, with flat back design and vinyl covering or baked-enamel finish. Provide end caps with integral roller brackets and universal mounting brackets, finished to match end caps, for wall or ceiling mounting.
  2. Control: Provide hard-wired or wireless remote control of motorized operation.
- D. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  1. Manually Operated Front-Projection Screens (6' x 6'):
    - a. Bretford Manufacturing, Inc.
    - b. Da-Lite Screen Co., Inc.
    - c. Draper Shade & Screen Co., Inc.

- d. Stewart Filmscreen Corp.
- 2. Motorized Projection Screen:
  - a. Stewart Filmscreen Model B (Luxus Grande S6) electric motorized front projection screen with GreyHawk screen material, and LVC screen control wall-switch, or approved equal.
  - b. Other manufacturers as determined to be equal at the sole discretion of the Architect.

### PART 3 - EXECUTION

- 3.1 UTILITY COORDINATION: Coordinate & verify that all required utility services are provided by other subcontractors or provide those required under the work of this section.
- 3.2 INSTALLATION
  - A. General: Install projection screens at locations indicated to comply with screen manufacturer's written instructions.
  - B. Install front-projection screens with screen cases in position and relationship to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered. Test manually operated units to verify that screen operating components are in optimum functioning condition.
- 3.3 PROTECTING AND CLEANING
  - A. Protect projection screens after installation from damage during construction. If damage occurs despite such protection, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition.

# **11 53 13 - LABORATORY FUME HOODS**

## **PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture, providing air good circulation.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

## **PART 2 - PRODUCTS**

- 2.1 GENERAL: Provide materials which are compatible with any underlying material. Provide all accessories required for a complete and proper installation, as recommended by the manufacturer.
- 2.2 FUME HOOD:
  - A. Fume Hood with Exhaust Fan: Labconco model 3030000
  - B. Work Surface: Labconco model 4882806 w/ appropriate cut outs for accessories listed below
  - C. Cold Water Faucet: Labconco model 4005100
  - D. Cup sink: Labconco model 4005200
  - E. Cup sink cover: Labconco model 4005201
  - F. PVC Trap: Labconco model 1432600
  - G. Gas Service Fixture: Labconco model 4005000
  - H. Electrical Receptacle: Labconco model 4005800
  - I. Acid Storage Base Cabinet 9901200
  - J. 8" ADA Filler Panels for Base Cabinet: Labconco model 9920307
  - K. Vent Kit for Storage Cabinet: Labconco model 9919002
  - L. Paint exposed ductwork.
- 2.3 ACCESSORIES:
  - A. Metal Roof Penetration Flashing: Dektite Adjustable Multi-size Pipe Flashing by IPS Corp.

## **PART 3 - EXECUTION:**

- 3.1 UTILITY COORDINATION: Coordinate & verify that all required utility services are provided by other subcontractors or provide those required under the work of this section.
- 3.2 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.

- 3.3      INSTALLATION: Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Provide wood blocking at drywall partitions. Place & attach all components firmly & accurately into position, square, plumb, level, & true.
- 3.4      PROTECTION & CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.

# 11 61 23 - FOLDING AND PORTABLE STAGES

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

- A. Portable stage platforms.
- B. Portable seating-platform risers.

### 1.2 RELATED SECTIONS

- A. Division 01 Section "Special Project Procedures for Music Education Facilities" for coordinating installation of related products.
- B. Division 01 Section "Sustainable Design Requirements" for related LEED general requirements.

### 1.3 REFERENCES

- A. American Hardboard Association
  - 1. AHA A135.4: Basic Hardboard.
- B. American Society of Civil Engineers (ASCE):
  - 1. ASCE 7 – Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International
  - 1. ASTM B 209: Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 2. ASTM B 221: Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 3. ASTM B 429: Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
- D. NFPA International
  - 1. NFPA 701: Fire Tests for Flame-Resistant Textiles and Films.
- E. U.S. Department of Commerce, National Institute of Standards and Technology
  - 1. DOC PS 1: U.S. Product Standard for Construction and Industrial Plywood.
- F. US Green Building Council (USGBC):
  - 1. Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

### 1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance:
  - 1. Stage Platforms and Risers: Uniform Live Load: 125 lbf/sq. ft. (6 kN/sq. m).

2. Treads of Stairs: Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m), and concentrated load: 300 lbf (1.33 kN) on area of 4 sq. in. (25.8 sq. cm), whichever produces the greater stress.
3. Guard Top Rail and Handrail Concentrated Load: 200 lbf (0.89 kN) applied at any point in any direction.
4. Guard Top Rail Uniform Load: 50 lbf/ft. (0.73 kN/m) applied in any direction.
5. Intermediate Rails, Panels, and Baluster Concentrated Load: 50 lbf (0.22 kN) applied to 1 sq. ft. (0.093 sq. m) area.

## 1.5 SUBMITTALS

- A. Product Data: Manufacturer's data sheets and installation instructions.
- B. Shop Drawings: Prepared by manufacturer. Include elevations showing components and details of each condition of installation. Show fabrication and installation details and relationship to adjacent work. Include plans, elevations, sections, and details, and relationship to other work.
- C. Operation and Maintenance Data.
- D. Warranty: Submit sample meeting warranty requirements of this Section.

## 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum [5] years experience in manufacture of stages, platforms, and risers in use in similar environments. Obtain stage platforms and risers through one source from a single approved manufacturer.
  1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time period allowed for substitution review:
    - a. Product data.
    - b. Samples of each component of product specified.
    - c. Project references: Minimum of 5 installations not less than [5] years old, with owner contact information.
    - d. List of successful installations of similar products available for evaluation by Architect.
    - e. Sample warranty.
  2. Submit substitution request not less than 15 days prior to bid date. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
  3. Approved manufacturers must meet separate requirements of Submittals Article.
- B. Source Limitations: Obtain the following products through one source from a single approved manufacturer in accordance with Division 01 Section "Special Project Procedures for Music Education Facilities":
  1. Folding and portable stages and risers.



2. Music education storage casework.

3. Sound conditioned rooms.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle stage platforms and risers in accordance with manufacturer's recommendations. Ship to jobsite only after roughing-in, painting work, and other related finish work has been completed and installation areas are ready to accept units and recommended temperature and humidity levels will be maintained during the remainder of construction.

#### 1.8 WARRANTY

- A. Special Warranty: Manufacturer's written warranty indicating manufacturer's intent to repair or replace components of stage platforms and risers that fail in materials or workmanship within [5] years from date of Substantial Completion. Failures are defined to include, but are not limited to, the following:
1. Fracturing or breaking of unit components which results from normal wear and tear and normal use other than vandalism.
  2. Delamination or other failures of glue bond of components.
  3. Warping of components not resulting from leaks, flooding, or other uncontrolled moisture or humidity.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Basis of Design: Stage platform and riser design is based upon products of the manufacturer listed below. Provide basis of design product or approved comparable product. Comply with requirements of Part 1 Quality Assurance Article for approval of products not named below.
- B. Wenger Corporation, Owatonna, MN; Telephone: (800)4WENGER (800-493-6437); Email: [info@wengercorp.com](mailto:info@wengercorp.com); Website: [www.wengercorp.com](http://www.wengercorp.com).
1. Basis of design product: Versalite Staging System and Versalite Seated Riser System.

#### 2.2 MATERIALS

- A. Aluminum: Comply with the following:
1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
  2. Extruded Bars, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
  3. Extruded Structural Pipe and Tube: ASTM B 429.
- B. Softwood Plywood: DOC PS 1.
- C. Hardboard: AHA A135.4, Tempered Grade.

- D. Hardware and Fasteners: Manufacturer's standard non-corroding type, permanently mounted to units, remaining set or tightened under load and vibration in service, and designed to preclude user contact with sharp edges.

## 2.3 FABRICATION

- A. General: Provide portable stages and risers meeting requirements of Performance Requirements Article, with the following characteristics:
  - 1. Portable and storable in space indicated.
  - 2. Easily set up and disassembled without use of special tools or loose fasteners.
  - 3. Modular and reconfigurable.

## 2.4 STAGE PLATFORMS AND SEATED RISERS

- A. Frame: Extruded 6063T aluminum tube, 3 inch (76 mm), grooved to accept attachments.
- B. Legs: Extruded 6063T aluminum square tube, 1.97 by .098 inch (50 by 2.5 mm), 8, 16, 24, 32, and 40-inch (200, 410, 610, 810, and 1020 mm) high, as required for layout indicated, configured to fit into clamping mechanism mounted on deck panel bottom, with non-marking tips.
- C. Deck Panels: Manufacturer's standard panel construction, 3/4-inch (19-mm) overall thickness, consisting of minimum 1/2-inch (12-mm) thick plywood substrate with finish surfaces consisting of black 0.030" (.76-mm) thick Standard Textured polypropylene with black smooth HDPE backer sheet. edged with extruded aluminum.
  - 1. Panel Dimensions: Manufacturer's standard sizes, as required for layout indicated.

## 2.5 ACCESSORIES

- A. Guards and Railings: Complying with performance requirements specified in Part 1, clamp-attached without tools, with built-in chair stop.
- B. Storage Cart: Steel tube-framed, 8-panel folding transport cart with heavy-duty 8-inch (200- mm) casters and clamping safety strap. Provide number of carts required for layout indicated.
- C. Closure Panels: Closure panels matching Standard textured horizontal surface, not less than 3/4-inch (19-mm) thick plywood, located as follows:
  - 1. Front of unit.
  - 2. Sides of unit.
  - 3. Intermediate risers.

## 2.6 FINISHES

- A. Metal Finishes: Aluminum: Mill finish.
- B. Opaque Finish for Hardboard: 100 percent acrylic latex primer, specially formulated for adhesion to impermeable surfaces, 2-coat, satin finish, black. Basis of design product: Rosco, Tough Coat Primer, [www.rosco.com](http://www.rosco.com).

**PART 3 - EXECUTION****3.1      INSTALLATION**

- A.      Install units in location as directed to verify components are complete and operational.
- B.      Train Owner's personnel to adjust, operate, and maintain units.
- C.      Disassemble units following approval and store in location indicated. Turn over operation and maintenance instructions to Owner.

# 11 61 33 - STAGE EQUIPMENT

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section. Refer to the Contract Drawings for any plans, graphic representations, schedules, and notations showing stage equipment work.

### 1.2 GOVERNING CLAUSE:

- A. For the sake of brevity these specifications shall omit phrases such as "(Sub) Contractor shall furnish and install", "unless otherwise indicated or specified", etc., but these phrases are nevertheless implied. Mention of materials and operations requires the (Sub) Contractor to furnish and install such materials and perform such operations completely to the satisfaction of the Architect. Exceptions are noted herein or shown on the drawings.

### 1.3 SCOPE OF WORK:

- A. Work under this contract shall include the furnishing of all labor, materials, tools, transportation services, supervision, etc., necessary to complete the installation of the Motorized Front of House Truss Assembly, Stage Curtains, Stage Curtain Tracks, Stage Lighting Fixtures, Stage Dimming and Control System as well as any other items as herein listed, all as described in these specifications, as illustrated on the accompanying drawings; or as directed by the Architect or his Representative.
- B. All conduits, junction boxes (except as otherwise noted), power wire and circuits, etc. for Stage Lighting and Dimming System, are provided by the Project Electrical Contractor. This does not, however, relieve this Contractor from the responsibility for complete, working, overall systems and coordination with the Electrical Contractor is required.
- C. This contractor shall coordinate all work closely with General Contractor, particularly in coordinating the installation of A/C ducts, water or sprinkler pipes, drain pipes, and support steel. In addition, close coordination with the project electrical contractor shall be required to provide information and direction for installation of electrical hardware for the job.
- D. This contractor shall furnish and install a complete Stage Equipment package with all necessary apparatus and equipment required to insure on completion, systems of high quality in excellent working order as specified herein and on the attached diagrams.

### 1.4 SUBSTITUTIONS:

- A. Specific fabric and items of equipment are specified by trade names. It has been determined by the Owner that these are the particular items desired by the owner and established a standard of quality, equipment function and/or process. It is neither the purpose nor intent of these documents to eliminate competitive bids. A contractor may submit an alternate bid based on equipment different from that specified only if that Contractor has received prior approval in writing from the Architect at least 10 days prior to bid. Accompanying each request shall be a letter specifically detailing each substitution including catalog data, specifications, swatches, operative samples, technical information, drawings, performance and test data, and complete descriptive and functional information to assist in a fair evaluation. Failure to submit any substitution for prior approval or not providing sufficient data for evaluation shall require the exact item specified to be furnished. Architect's approval of a substitution for bid purposes will not relieve the contractor from the responsibility of meeting all specification criteria. If an approval of a substitution is granted, the stage equipment contractor shall be fully responsible for meeting the intent of the specifications as well as, any and all changes (wiring, power, distribution, support structure, etc.) such substitution shall require.

1.5 DEFECTIVE OR NON-APPROVED MATERIALS:

- A. Should any stage equipment be found defective, not meeting specifications, or that which has not been approved in writing by the Owner shall, upon discovery (including any time within the period of the guarantee), be replaced with the specified equipment or material at no additional cost.

1.6 GUARANTEE:

- A. The Stage Contractor shall guarantee all of the work that is performed under this contract, including all materials, and workmanship, for a period of one (1) year from the date of full acceptance of the work. The stage lighting control console shall be guaranteed for a period of two (2) years from the date of full acceptance of the work. Lamps for lighting fixtures shall be guaranteed against failure for thirty (30) days. Nothing in this guarantee shall cause repair or replacement by the Stage Equipment Contractor where negligence, neglect or improper operation by the Owner has caused the failure of any equipment installed under this contract.

1.7 DISCREPANCIES:

- A. All sizes in the specifications are approximate and should be adhered to as closely as possible but all curtains and equipment shall be sized to fit properly. The exact measurements are the responsibility of the Stage Contractor. If there are discrepancies in the specifications and/or drawings, the Stage Contractor shall ask for a clarification from the Architect. If no clarification is requested, the Architect's judgment shall rule.

1.8 APPROVED STAGE EQUIPMENT CONTRACTORS

- A. One company shall be responsible for the installation of all aspects of the stage equipment as specified in this section. This shall include but not be limited to all, curtains, tracks, motors and control, stage lighting fixtures, stage dimming, and dimming controls and miscellaneous equipment.
- B. In order to be a Stage Equipment Contractor on this project, a Contractor must have successfully completed at least five (5) projects of similar size and scope within the last five (5) years. Upon request, the Contractor shall furnish list of these projects and contact names and phone numbers for references. Inspection of one completed installation may be requested by the Architect/Architect's Representative prior to consideration of request to bid. Companies, which have no experience in the installation and operation of a similar style of stage equipment, will not be considered. The stage equipment contractor shall have been in business under the same name for five (5) full years preceding the date of this bid doing work similar to the type specified. The decision of the Architect as to the capability of the Bidder to successfully complete and maintain the system, based on this pre-qualification information shall be final.
- C. The Stage Equipment Contractor shall employ only fully trained stage riggers and mechanics, assisted by common laborers, for the erection of the stage equipment. The stage riggers shall be completely familiar with the type of equipment to be installed. A competent Job Superintendent shall be on the job at all times when work is in progress. He shall represent the Stage Equipment Contractor and all directions given by him shall be as binding as if given by the Stage Equipment Contractor.

1.9 DIMMING/CONTROL EQUIPMENT MANUFACTURERS:

- A. Dimming, fixtures and control equipment specified herein shall be the sole responsibility of a single manufacturer who shall fabricate all assemblies and major sub-assemblies in his own shops. The manufacturer shall have been producing theatrical lighting and SCR control equipment for at least five consecutive years.
- B. Specific hardware and item of equipment are specified by trade names as it has been determined by the Owner that these particular items establish a standard of quality, equipment function and/or process that is desired. It is neither the

purpose nor intent of these documents to eliminate competitive bids. A contractor may submit his bid based on equipment different from that specified only if that Contractor has received prior approval in writing from the Architect. In order that they have sufficient time to evaluate the proposed deviation from specification, all requests of this nature shall be in the Architect's office no less than ten (10) working days prior to the bid date.

- C. The dimming and control specified are manufactured by Electronic Theater Controls (ETC). The following companies also have prior approval to bid their equipment if it meets or exceeds the specifications. Approval of any individual manufacturer's equipment does not relieve the manufacturer of meeting the general requirements as set forth in these specifications.

Dimming and Controls:	Electronic Theater Controls Strand Lighting
Distribution:	Altman Stage Lighting Co., Inc. Strand Lighting SSRC, Inc. Union Connector Co. Inc. Electronic Theater Controls
Lighting Fixtures:	
Ellipsoids:	Electronic Theater Controls Altman Stage Lighting Co., Inc. Strand Lighting
Fresnels:	Colortran, Inc. Strand Lighting Altman Stage Lighting Co., Inc.
Scoop Lights:	Colortran, Inc. Strand Lighting Altman Stage Lighting Co., Inc.
Far Cyc:	Colortran, Inc. Strand Lighting Altman Stage Lighting Co., Inc.
Follow Spots:	Lycian Stage Lighting Strong International, Inc.

- D. All other companies must receive prior approval to bid this project. Please refer to section D - Substitutions.

## 1.10 DOCUMENTATION

### A. SHOP DRAWINGS:

- Shop drawings and equipment data sheets shall be submitted to the Architect/Architect's Representative under general provisions within 90 days after award of the contract. Failure to comply with this 90-day requirement shall be cause for disqualification of the selected (Sub) Contractor and cancellation of contract without cost to the Owner, on the basis that the selected (Sub) Contractor does not have the ability or intention to comply with the specifications.
- Approval of submitted equipment shall be obtained prior to equipment purchasing or fabrication. If shop drawings are rejected, correct and resubmit in the manner as specified. All shop drawing information shall be submitted at the same time; no partial submittal will be accepted.
- Drawings shall indicate complete details, dimensions, product types and locations of all equipment, clearances required, guides, cables, sets, (sub) contractor fabricated equipment, and all other details required to

completely describe the work to be performed. Submittals drawings shall be presented at a scale of not less than 1/8" = 1'-0" for conduit plans, 1/4" for equipment layouts, 1/2" = 1'-0" for mounting details, and 1/2" = 1'-0" for plate and panel details. Each sheet to allow space for approval stamps and have the name of the project, the (sub) contractors and/or the supplier's name, address telephone number, and the date submitted.

4. Submit the following items for Architect's approval, prior to fabrication:
  - a. Stage plan view
  - b. Stage side section view
  - c. Details of custom equipment, hanging methods, fabric samples (12" x 12") and catalog sheets on all standard hardware to be furnished..
  - d. Electrical riser diagrams indicating the necessary control wiring for all dimming, distribution, controls with wire tag number for every connection. Show all terminal blocks with wire numbers and location.
  - e. Plan and elevation views indicating all electrical hardware locations and layout
  - f. Provide full dimensions for panel layouts with finishes and materials for all custom panels.
  - g. Details of installation and erection, including adjoining conditions and necessary clearances,
  - h. Indication by arrow and boxed caption of each variation from contract drawing and specifications, except those indicated as acceptable in specifications or on drawings

1.11 FABRIC SAMPLES:

- A. Submit sample books of each fabric specified containing standard colors available in the quality of the material specified for the Owner's or Architect's selection of color and approval. More than one color may be selected. After selection, upon request, submit one square foot samples of each material in each color for final review.

1.12 RECORD DRAWINGS AND DATA:

- A. Submit in accordance with General Provisions. Also within 30 days of final test and completion of the installation, submit the following to the Architect:
  1. Three (3) complete sets of "as built and approved" drawings (rolled, not folded showing systems and elements as installed, including field modifications and adjustments.
  2. Three (3) sets of maintenance data including a list indicating replacement parts lists for all items of equipment, wiring diagrams, control diagrams, any and all keys for cabinets, racks, key operated switches etc. and complete operation manuals.
  3. Three (3) notarized Certificates of FLAMEPROOFING for each fabric used.
  4. Three (3) Certificates of Guarantee
  5. Electrical distribution drawing of the theater in plan view (1/4" = 1'-0") indicating all electrical outlets and their corresponding circuit number dry-mounted to foam board and framed under 1/8" clear plastic.

1.13 INSTRUCTION OF OWNER PERSONNEL:

- A. This contractor or his representative, fully knowledgeable and qualified in the operation of all systems installed, shall provide eight (8) hours of instruction to the Owner-designated personnel on the use and operation of the equipment. Designated instruction times shall be arranged through the Architect.

1.14 PERMITS:

- A. Obtain all permits necessary for the execution of any work pertaining to the installation, and conform in all trades with all applicable local codes and with the National Electric Code. Obtain all permits necessary for operation of any equipment by the Owner.

1.15 CLEAN UP:

- A. It shall be the responsibility of this Contractor to remove all debris from the building or site caused by his operations to a common trash point or receptacle on the job site, as determined by the General Contractor.

PART 2 - EQUIPMENT

2.1 GENERAL RIGGING STANDARDS

- A. All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted. Wire rope shall be galvanized. Fasteners, chain, and other miscellaneous hardware shall be either cadmium or zinc plated. All materials used in this project shall be new, unused and of the latest design. Refurbished materials are not permitted. In order to establish minimum standards of safety, a minimum factor of 8 shall be used for all equipment and hardware used on this project. In addition, the following factors shall be used:

2.2 HANGING HARDWARE

- A. Support Cables and Fittings: All support cables unless otherwise noted shall be 7 x 19 construction, galvanized aircraft cable with a breaking strength of 7000 lbs. Damaged or deformed cable shall not be used. Cable fittings and clips shall conform to wire rope manufacturer's recommendations as to size, number, and method of installation. Clips shall be drop forged "Crosby" or "Malleable". There shall be two cable clips for each lift line tie-off. Pressed sleeve fittings shall be Nico-press. Eyes shall be formed over wire rope thimbles of correct sizes. All wire rope rigging shall be installed so as to prevent abrasion or rubbing of the wire rope against any part of the building construction or other equipment; pulleys and sheaves shall be so aligned as to provide a maximum fleet angle of two degrees; mule blocks, cable rollers, guides and sag bars shall be installed as required to provide proper alignment. The use of 3/16" proof coil chain is acceptable for hanging hardware.
- B. Trim Chains: If aircraft cable is used to hang stage equipment hardware, there shall be a trim chain attached to the cable. The trim chains shall be 1/4" grade 30 proof coil chain 30" long with a 1/4" screw pin shackle on one end. The shackle shall be rated at not less than 800 lbs. capacity and shall be secured with safety wire. Trim chains shall be installed on batten or equipment end of each support line.
- C. Pipe Battens: Pipe battens shall be 1-1/2" in diameter schedule 40 pipe. All battens shall be painted black to prevent rusting. Where splicing is required, a pin, 18" long and the same diameter as the inside diameter as the pipe shall be used. Bolt splices with 5/16" bolts grade 5 with nylon locking nuts, two in each pipe at 90 degrees to each other.
- D. Motorized Rigging Requirements:
  - 1. General
    - a. The hoist assembly shall consist of a self-contained winch unit mounted on the support steel.



- b. Furnish and install motorized line shaft winches (2) assembly to raise and lower the front of house electric battens and other stage equipment as specified herein. Winches shall operate at a fixed speed.
- c. The lower batten shall travel from a low trim of 4'-0" above stage floor to approximately 3'-0" below the winch assembly. Line shaft winches shall have drums alternately grooved for right and left hand winding to prevent the batten from traveling laterally. Drums shall be supported on each side with a flange block assembly and there shall be one drum per lift cable. Miscellaneous hardware such as battens, cable, etc. shall follow USITT standards and specifications.

2. Winch System

- a. The gear reducer shall be a double reduction worm gear or a combination right Angle helical worm gear reducer. Reducer shall have a minimum service factor of 1.0. The AC brake-motor shall be 1723 RPM, horsepower as required, three phase, 60 Hz with an integral brake. The brake shall be rated for 200% of the motor torque and be sized to stop and hold the moving load within four inches. Brake shall automatically be applied in case of power failure. Motor shall have a 1.0 service factor.
- b. Provide a 100% fail safe system with dual motors/gear boxes to provide a redundant back up. Each motor shall be capable of holding 100% load. Provide dual motor brakes capable of holding 200% of the load.
- c. The cable drum diameter shall be a minimum of 32 times the cable diameter. The cable drum shall be of proper length to hold all of the cable in a single layer. The cables shall be prevented from jumping out of the grooves by two 3/8" cable retainers. The drum shall hold a minimum of the cable required for travel plus three dead wraps. Drums are to be helically grooved for the appropriate sized cable and have key-slots for the easy connection of cables. The drum hub shall be keyed directly to the continuous shaft off the reducer. Chain or belt drives are not acceptable.
- d. The winch frame shall be constructed of structural steel members, compactly designed to support the winch components and load in a minimum amount of space. The frame shall provide secure support for the winch assembly preventing twisting. In the frame shall be incorporated a cable keeper bar that is located next to the grooves in each drum to prevent lines from jumping grooves and slack lines from unwinding.
- e. Shaft will be a steel drive sized and of material to prevent excess twisting due to load torque. Maximum twist allowable is to be 0.25 degrees per linear foot. Shaft coupling is to be flange type gear couplings. Chain couplings are not acceptable. An internal brake shall be installed to stop a runaway system at 1½ times the rated speed.
- f. Each motor/gear box shall have an adjustable four-element limit switch that stops the winch at the upper and lower extremes of travel. Dual motor assemblies shall have two separate limit switches. Two of the elements shall be back up or over-travel limits, wired such that the winch cannot be operated until the cause of normal limit failure is determined and repaired.

3. Motor Selector Panel

- a. The faceplate shall be a 1/8" anodized aluminum panel. The operator panel will activate the winches and a key switch will activate the system. Provide an indicator light to show when the system is on and active.

- XX/XX/20XX

- c. Cable Size: 3/16"
- d. Number of Lift line: 7
- e. Type of Limit Switches: 4 position

## 2.3 STAGE CURTAIN TRACK EQUIPMENT

- A. Tracks shall be by H&H Specialties of South El Monte, California. Manufacturer's recommendations on installation of all tracks and related hardware shall be followed. Automatic Devices Inc. of Allentown, PA shall be considered equal.
  - 1. Track for the Front Curtain shall be H&H Model #400 heavy-duty steel track in two (2) 26' long sections, complete with all necessary accessories for rope draw operation including #308 spring tension pulley.
  - 2. Track for the Mid-stage Curtain shall be H&H Model #400 heavy-duty steel track in two (2) 26' long sections, complete with all necessary accessories for rope draw operation including #308 spring tension pulley.
  - 3. Track for the Midstage Flipper Legs shall be H&H Model #400 walk-along track in two (2) 9' long sections complete with all necessary accessories. Attach track to midstage curtain track to prevent sway.
  - 4. Track for the Rear Curtain shall be H&H Model #400 heavy-duty steel track in two (2) 26' long sections, complete with all necessary accessories for rope draw operation including #308 spring tension pulley
  - 5. Track for the Rear Flipper Legs shall be H&H Model #400 walk-along track in two (2) 9' long sections complete with all necessary accessories. Attach track to Rear curtain track to prevent sway.
  - 6. Track for the Sky Cyclorama shall be H&H #400 heavy-duty steel track in one (1) 48' long section, complete with all necessary accessories for rope draw operation including #308 spring tension pulley.

## 2.4 STAGE CURTAINS:

- A. FABRICS:
  - 1. Front Curtain and Valance: Chemically flameproof, 25 ounce Memorable Velour (54" width) as supplied by KM Mills of Greenville, S.C. or J.B. Martin Velour of Quebec, Canada. Color to be selected by Owner.
  - 2. Mid-Stage Curtain, Flippers, Borders, Side Legs, Rear Curtain: Chemically flameproof, 16 ounce Princess Velour (54" width) as supplied by KM Mills of Greenville, S.C. or 16 ounce Melody Velour as supplied by J.B. Martin Velour of Quebec, Canada. Color to be black.
  - 3. Sky Cyclorama: Seamless 20'-4" chemically flameproof fabric as supplied by Rosebrand Fabric of New York, New York. Color to be bleached white.
- B. FLAMEPROOFING
  - 1. Fabrics used in fabrication of draperies shall be inherently flameproof or shall be chemically flameproof with a formula approved Bureau of Standards U.S. Department of Commerce, and finished fabric, after treatment, shall pass such tests as are required by the Fire Marshall of the local Fire Dept., and Owner. A certificate for each type and color of cloth used shall be furnished to the Owner when request for final payment is made. Certificate shall state name of Stage Equipment Contractor, name of firm doing flame proofing treatment, date of treatment, date re-treatment will be required, method of treatment, and to the certificate shall be affixed the

signature of an officer, or authorized representative of the firm furnishing the draperies. A Notary Public in the State of Texas shall notarize the information on certificate.

C. FABRICATION OF STANDARD STAGE DRAPERIES:

1. Sew fabrics with box pleats to 3-1/2" wide heavy-duty upholstery jute webbing, pleats spaced 12" on centers, unless otherwise specified. Use mercerized cotton thread, minimum weight #16, color to match cloth shall be full length and shall be without splices for entire length of the curtain.
2. Properly join panels smooth and free of puckering at seams, hems, and turn backs.
3. Where completed curtains are to be operated on a traveler track, equip each pleat with a 2" plated harness snap hook mounted to curtain by means of a strap of web-beltting to curtain by riveting with not less than 2 tubular rivets per snap hook. Web-beltting straps shall pass over front and backsides of pleats and rivets shall go completely through the web belting, jute webbing, and all thickness of curtain fabric. Canvas straps, leather straps, grommets and s-hooks, cotter key hooks, etc., shall not be acceptable.
4. Where completed curtains are to be tied to a pipe batten, each pleat shall be equipped with a 30" long #4 braided nylon tie line through a No. 2, or larger brass grommet, each to be on 12" centers located in the box pleats at the webbing.
5. Bottom hems of all curtains shall be 5" and shall be equipped with a separate canvas pocket sewn inside bottom hems in such manner as to have the bottom of the canvas pocket at least 1-1/2" above bottom of curtain hem. Load canvas pocket with #6 galvanized pump chain, secured to prevent bunching and shifting within the pocket.
6. Off-stage vertical hems and center-facing turn backs of the front curtain shall be one-half width (27") of material faced back and no sewn hem shall be permitted within these hems. Vertical hems of all masking borders, travelers, and cyclorama curtains shall be 6".
7. Finish curtains properly in the best manner and method of the industry, and after hanging, thoroughly brush to remove dust, visible dirt, loose threads, loose fabric lint, etc. Wrinkles shall be allowed to fall out naturally.
8. Fullness desired for each panel of curtains is indicated by the number of widths specified for each item. Any number of widths less than the number specified will result in re-fabrication of curtains.

D. FABRICATION OF SKY CYC:

1. Across the top of each unit the fabric shall sewn flat to a 3-1/2" webbing double stitched with #16 mercerize cotton thread. Provide the curtain with a 2" plated harness snap hook every 12" on center mounted to curtain by means of a strap of web belting to curtain by riveting with not less than 2 tubular rivets per snap hook. Web-beltting straps shall pass over front and backsides of pleats and rivets shall go completely through the web belting, jute webbing, and all thickness of curtain fabric. Sew a 6" bottom hem and provide chain weight in a separate bottom pocket. Side hems shall be 3" wide double folded double stitched hems.

E. STAGE CURTAIN SCHEDULE:

Curtain	Fabric	Size	Widths Req'd.	Installation
Valance	25 oz. velour	44' w x 5'-0" h	16 full widths	On pipe batten 48' long
Front Curtain	25 oz. velour	2 panels, ea. 26' w x 16' h	20 full widths (10 per panel)	On specified track

Mid-stage Curtain	16 oz. velour	2 panels, ea. 26' w x 17' h	18 full widths (9 per panel)	On specified track
Mid-stage Flippers	16 oz. velour	2 panels, ea. 9' w x 17' h	7 full widths (3.5 per panel)	On specified track
Border #1	16 oz. velour	42' w x 6'-0" h	15 full widths	On pipe battens, 41' long
Border #2	16 oz. velour	42' w x 6'-0" h	16 full widths	On pipe battens, 44' long
Rear Curtain	16 oz. velour	2 panels, ea. 26' w x 17' h	18 full widths (9 per panel)	On specified track
Rear Curtain Flippers	16 oz. velour	2 panels, ea. 9' w x 17' h	7 full widths (3.5 per panel)	On specified track
Sky Cyclorama	Seamless Muslin	48' w x 17' h	1 seamless width Sewn flat	On specified track

## 2.5 MISCELLANEOUS EQUIPMENT

### A. STAGE LADDER AND DOLLIE:

1. Provide one (1) extension trestle type ladder having a lowered working height of 12'-0" and extendible to a height of 20'-0", both heights when ladder extension legs are fully retracted. Ladder shall bear Underwriter's Laboratories, Inc. label. Provide one (1) ladder dolly, fitted with full swivel rubber-tired 4" casters at each corner; casters shall be correctly mounted to provide full stability for ladder. Casters shall be ball bearing mounted. Provide a safety-locking device attached to ladder dolly that shall enable easy, yet safe and secure locking of ladder to dolly when ladder is in operation. Ladder shall be wooden or fiberglass. Metal ladders shall not be acceptable.

## 2.6 STAGE DIMMING AND CONTROL SYSTEM

### A. DIMMER RACKS

1. The dimmer rack shall be provided with wired spaces for all circuits. A dimmer shall be provided for each circuit and blank modules provided for each expansion circuit. Dimmer rack shall be ETC Sensor. The dimmer racks shall house all dimmer modules, control electronics, and branch circuit breakers. Provide module and breaker quantities as indicated below. System shall have the performance features that follow. Rack shall be UL Listed and labeled. Rack shall employ dead front construction of code gage steel. Each rack must have a hinged locking door. Each rack must have an electrostatic air filter. Ventilation shall be by a low-noise fan activated by DMX level data. In the event of an over-temperature situation, each dimmer shall be shut down independently as required. Systems that shut the entire rack down upon over-temp will not be accepted. Each module dimmer rack shall be provided with a keypad and LCD display for rack configuration, backup and fault indication.
2. Each rack shall maintain active scene for a user programmable period after loss of DMX-512 signal from console.
3. Standard control format shall be USITT DMX-512. Dimmer rack CEM must accept two independent DMX signals concurrently in a highest-takes-precedence manner for each dimmer. Rack shall store a minimum of thirty-two user programmable back-up looks that may be activated in case of loss of control signal. Each dimmer must include discrete "boost" feature to allow over-voltage output to compensate for voltage drop in branch wiring and allow a true 120 volts at the fixture lamp or "trim" max voltage output to lengthen lamp life. Each rack shall include a beacon that shall flash to indicate failures. Provide racks to accommodate the following:
4. Main Stage: Provide one dimmer rack to control 96 base circuits

B. DIMMER MODULES

1. Dimmer modules shall be plug-in type. No more than two dimmers per module will be accepted. Modules shall be assembled of aluminum or steel. Dimmer modules with housings manufactured of plastic or a flammable material will not be accepted. Each dimmer module shall contain magnetic circuit breakers(s), solid state switching module(s), choke(s) and connectors. Each dimmer must have the discreet capability to operate in a dimmed or a non-dimmed mode. This function shall be selectable from the control console or the rack-mounted keypad. Each dimmer circuit shall use solid state switching devices consisting of two silicon controlled rectifiers in an inverse parallel configuration, snubber network and all required gating circuitry on the high voltage side of an integral opto-coupled control voltage isolator.
2. Dimmer modules shall include toroidal filters to reduce lamp filament sing and limit the radio frequency interference on line and load conductors. The current rise-time shall be not less than 500 microseconds measured at 90-degree conduction angle from 10-90% of the output waveform with the dimmer operating at rated load. Power efficiency shall be at least 97% at full load.
3. Dimmer shall accept hot patching of an incandescent load up to the full capacity of the dimmer. Dimmer output shall be regulated for incoming line voltage variations except that the output voltage cannot be increased above a level equal to line voltage less dimmer insertion drop. Line regulation shall be +/- 1V over a 90-140 volt range for changes up to 10%. Load regulation shall be +/- 2V for 1-100% of rated current. Dimmers shall employ a scheme for compensation for harmonic distortion of the power line for any variation in load. Response to control shall be less than 25 milliseconds.
4. Main Stage: 48 dual 20 amp D20E dimmer modules

C. CONTROL ELECTRONICS

1. Control Electronics shall be plug-in module(s). A discreet keypad and LCD display shall be provided for each rack section of 96 dimmers. The control electronics shall provide the following functions: Thirty-two user programmable back-up looks shall be provided in case of loss of control signal and may be recalled from the rack keypad(s) remote station(s) and the control console. Dimmer multiplexing control: This optional feature allows each dimmer to be switched into multiplex mode. This function shall allow discrete control of two separate fixtures from one dimmer. This shall be accomplished by plugging in a multi-plexer at the fixture location and use of fixtures capable of multiplexing. Systems that provide this feature shall be considered as providing the expansion circuits requirements of this specification.

D. CONTROL CONSOLE

1. Console shall be a memory lighting control console designed to provide complete control of solid-state lighting and entertainment control devices suitable for professional use in television, theatrical, live concert and audio-visual display applications. Provide two control consoles each complete with one 6-foot power cord, one 25-foot DMX cable, and one 17" LCD monitor. Approved consoles are:
2. ETC Express 48/96 –
  - a. The console shall have a minimum of the following features:
  - b. 600 cues per show
  - c. Up, Down, and Wait times for each cue
  - d. 48 control channels in two-scene operation
  - e. 192 control channels in single scene operation
  - f. Two DMX 512 outputs, 1536 channels
  - g. Recordable Time fade and wait time on all submasters

- h. Individual up time, down time, and hold time for cues
- i. 2000 Recordable macros
- j. Two timed/manual fader pairs
- k. Overlapping inhibitive or pile-on submasters
- l. 24 overlapping submasters with bump buttons and integral LED's
- m. Ten pages of submaster memory
- n. Cues may be linked to other cues
- o. Macros may be linked to cues and cues may be linked to other cues
- p. 10 factory-programmed profiles
- q. Help key to display an individual help screen for each console key
- r. Monitor display with the ability to display level status of all control channels simultaneously
- s. Floppy disk storage for off-line storage of shows in a format compatible with IBM-PC computer disk drives.
- t. Numeric, function, and macro keys on console
- u. Track pad for level and rate control as well as moving light control and x-y pan tilt
- v. Outputs for a parallel printer that is IBM-PC compatible
- w. Display of system fault indicators: DMX Port errors, Incoming power under (<90 VAC) or over (>140 VAC) voltage, airflow obstruction in rack, System over or under-temperature, Backup cue errors
- x. Display of system status indicators: individual phase voltages, power frequency, control link address, recorded error log
- y. Display of backup function indicators: check panic status, record backup cues
- z. Ability to edit dimmer attributes (Example: dim/non-dim)
- aa. Flexi-channel mode to allow display of show channels only
- bb. Ability to park dimmers, channels or groups at fixed levels
- cc. Sub-routine for cue based effects
- dd. Moving light feature including:
- ee. 16 bit fade resolution
- ff. Dedicated moving light patch

E. EDIT FUNCTION

1. Control system shall contain an IBM-PC compatible show editing system, making it possible to create or modify show information on a computer without using the console. Editing shall be accomplished by using the function keys and selected alphanumeric keys in a syntax similar to the lighting console, with on-screen menus, prompts, and help features to guide the user. Shows and their components may be arranged and saved in new configurations. An evening's program may be compiled from any portion of the existing repertory of cues.
2. The edit function shall make it possible, through ASCII text files, to import information from other software programs, or to send via modem to another location. Through the print menu options, using the PC's parallel port, it shall be possible to create a hard copy of show information, or to determine the differences between two show files.
3. Edit function shall provide the following features and functions:
4. Runs on an IBM PC, AT, PS-2 or compatible computer.
5. Parallel printers are supported.
6. Edit function shall be available for free download on Internet or disk and hard copy documentation shall be provided.

F. AUXILIARY CONTROL PROCESSOR UNIT

1. The auxiliary control processor unit shall support 32 wall stations or remote devices in any number of rooms. A maximum of 512 DMX dimmers may be assigned to one of 128 system control zones. A maximum of 250 presets and system events shall be allowed. The processor shall receive inputs from wall stations, lighting control consoles; Windows® based PCs, and/or third party devices. It shall process the information and distribute it to dimmer racks, building management systems, audio/visual systems, and/or other associated devices. A Windows® based configuration program shall allow patching dimmers to zones, with proportional levels and user selectable dimmer output curves; programming presets and system events; naming of presets and channels; and setting room and station assignments.
2. The processor unit shall be a microprocessor based, solid state device. The field programmable system configuration and program information shall be stored in Flash Memory, which does not require battery backup. Systems requiring battery backup memory shall not be acceptable. A PCMCIA socket shall be provided for system configuration and program information backup and update. Systems without a simple method of backup shall not be acceptable.
3. A DMX512 input shall be provided for snapshot input. This input shall accept level information from any DMX source. The DMX512 input shall be opto-isolated. Systems without opto-isolation are not acceptable.
4. A DMX512 output shall be provided. This output shall transmit level information to dimmers and other DMX devices.
5. An Echelon® Link Power™ network port shall be provided for communications with wall stations, remote interfaces, and other third party network devices. The Link Power network shall utilize polarity-independent; low-voltage Class II unshielded twisted pair (UTP) wiring, type Belden 8471, or equivalent. The network topology may be bus, loop, home run, or any combination of these three. Systems utilizing a proprietary low voltage station network shall not be acceptable.
6. In the event of power loss, the processor shall return to its last valid state when power is restored.
7. It shall be possible to record presets, consisting of any number of zones set to any level with an associated fade time. It shall be possible to recall a preset from a pushbutton, remote input, Astronomical Time Clock event (ATC), or macro.
8. A macro language shall allow sequences of presets and system events to be stored and recalled. Conditional arguments may be used within a macro to check time or input states. Macros may be assigned to pushbuttons, remote inputs, and/or ATC events.
9. An internal ATC shall allow presets and system events to be recalled at a preprogrammed time relative to sunrise or sunset or at a specific time of day. Systems not providing an internal ATC shall not be acceptable. A room combine function shall allow adjacent sections of a dividable room to be combined or divided, such that their combined lighting may be controlled from any or all of their wall stations. Room combine functions may be assigned to pushbuttons remote inputs, macro, or ATC events.
10. A setup menu shall be provided with the processor. This menu shall be accessed using the LCD display and keypad of the CEM on which the processor is mounted. This menu shall provide basic setup functions. A Windows® based configuration program shall be provided for setup and programming of any size system. All functions of the system may be configured and monitored using this program. Configuration shall not be required in systems with only one room.



G. TOUCHSCREEN LCD

1. LCD stations shall contain a backlit graphic Liquid Crystal Display (LCD) with a touch screen interface. The LCD station shall provide a graphical user interface. The graphical user interface shall provide system configuration, programming, and playback displays.
2. The LCD station shall provide a means of configuring a single room system. This configuration shall include patching dimmers to zones and assigning profiles to zones. The LCD station shall have the ability to "Snapshot" looks from the control console and set them as presets on the LCD station.
3. The LCD station shall provide a means of programming the system. It shall be possible to program and edit presets and macros, with event timing, using the LCD station. It shall be possible to program and edit Astronomical Time Clock (ATC) events and assign presets and macros to ATC events using the LCD. Room Combine configurations shall be controlled using the LCD. It shall be possible to import a bitmap image of a divisible room to be used as a graphical map for room combine functions. It shall be possible to recall presets and macros from the LCD station. Zone levels shall also be directly controllable using the LCD. All LCD functions shall be password protected, allowing several levels of security. If no password is assigned to a function, the password screen shall not appear.

H. DIMMING AND CONTROLS BILL OF MATERIALS:

QTY	DESCRIPTION
1	SR-48 Dimmer Rack With 48-D20E dimmer modules and rack control module
1	Unison ER4 Processing Rack
2	ULCD Touch screen Stations (1 ULCD-4F in SMP; 1 portable ULCD-4P in booth)
4	Entry Stations
1	Express 48/96 Control Console With One (1) 17" LCD Color Monitor
1	Receptacle Station With DMX-in and Unison receptacle
1	Set of 25' Control Cables
1	Set of two (2) M715 Little Work Light
1	Cover For Console

2.7 DISTRIBUTION

A. Pipe-mounted Plug boxes

1. These units shall be pipe-mounted boxes of 18 gauge steel with two sets of knockouts on the sides. There shall be two (2) flush mounted female receptacles. The female receptacles shall be three pole grounded connectors (stage pin type). The finish of the boxes shall be flat black enamel paint. Provide with U-bolts to mount box to top of 1-1/2" pipe. Pipe to stand off pipe 1" so not interfere with lighting instrument c-clamps. (Give to Electrical Contractor for installation; termination of wiring by Stage Equipment Contractor)

B. Connector Strips

1. These units shall consist of 4" x 4" 18 gauge steel or aluminum wire way with removable cover sections for access. A terminal compartment which shall be factory installed on the end shall contain molded barrier type terminals for the feed connection. Use heavy steel mounting straps on approximately 5' on center with U-bolts to grip two 1-1/2" Schedule pipes. Provide two (2) 1.5" diameter sch. 40 steel pipes for each unit, the same length as the specified connector strip. All connector strips over the stage shall have type SO, 18" cable pigtails shall be secured by strain relief and shall be furnished with three pole grounded type female receptacles (20A. stage pin type). The connector strip over the audience area shall have flush mounted female

receptacles (20A. stage pin type). Internal wiring shall be rated at 125 degrees Centigrade. Exterior finish shall be baked enamel and all parts of the unit shall be UL listed.

C. Floor Pockets:

1. The floor pocket shall be a wiring device designed for flush mount installation in the stage floor. The floor pocket shall be constructed of cast iron with non-skid tread pattern and cable notches. The plate shall contain four (4) recessed mounting holes to secure plate to back box. The cover shall be constructed with integral hinges and cable notches. Secured to the plate shall be an angled sheet steel mounting plate for receptacles.
2. The back box shall be sized according to the number of connectors required. Knockouts shall be provided in the back box for contractor connection. ) Connector shall be 20 Amp grounded stage pin receptacles. The finish shall be baked black enamel. Provide each floor pocket with neoprene dust flaps. Floor pocket for "Center of House" control position shall meet this same general specification with scheduled receptacles mounted on interior plate.

D. Pantograph:

1. The CMS Pantograph assembly shall consist of an extruded aluminum wire-way 6.605" wide by 1.450" high in cross section containing five cable compartments. The length of each section to be specified based on the distance between rigging pick up cables and maximum actual travel. The CMS shall raise and lower the enclosed electrical cable as it travels with the battens.
2. The CMS shall provide a permanent electrical connection for the lighting system circuits. The CMS shall be installed between rigging lift lines and in such as way as to prevent electrical cables from fouling with other hoisting components or mechanism. The CMS unit housing shall have an electrostatic paint finish in black.
3. CMS aluminum wire-way shall have a uniform minimum wall thickness of .094. CMS housing shall be inherently rustproof.
4. Festoon cable shall be 12 or 10 AWG annealed stranded bare copper insulated with flame-retardant Polyvinyl Chloride (PVC) and provided in the specified number of conductors. CMS units shall contain electrically insulated, adjustable pressure pad strain relief devices to hold all cable securely in place.
5. CMS unit shall be provided with two (2) PMB1 pipe clamp mounting devices for attachment to 1-1/2" pipe (2" O.D.). Each CMS hinge section to be provided with a pair of 7 gauge hinge arms and grade 8 attachment hardware. Uni-strut P1001 horizontal stabilization track to be supplied. One (1) P2950 trolley and PTB1 mounting bracket shall be provided with unit to attach extruded aluminum wire-way to P1001. One (1) P2949 trolley and PCB1 bracket shall be provided with unit to manage excess cable. Two (2) P1001 end stop plates to be provided to prevent the P2950 trolley from exiting the P1001 track.
6. NOTE: Each receptacle on floor pockets, plug boxes and connector strips shall have a 2" high black number on a yellow background to designate the circuit number. The exact numbering, circuiting and spacing of system are to be determined by architect during submittal phase of project.

E. Distribution Schedule:

1. Main Theatre:

QTY	DESCRIPTION
1	FRONT OF HOUSE POSITION

	1 - BAL-56-20-2PGFL-3-520R CONNECTORSTRIP w/20-20 amp flush stage pin receptacles and 3 – 20 amp Edison outlets with pantograph assembly with 20' of travel
1	1 <sup>ST</sup> ELECTRIC POSITION 1 - BAL-40-20-2PGPT CONNECTORSTRIP with 20 – 20 amp stage pin receptacles on 18" long pigtails
1	2 <sup>ND</sup> ELECTRIC POSITION 1 - BAL-40-20-2PGPT CONNECTORSTRIP w/20 – 20 amp stage pin receptacles on 18" long pigtails
1	3 <sup>RD</sup> ELECTRIC POSITION 1 – BAL-40-16-2PGPT CONNECTORSTRIP w/16 – 20 amp stage pin receptacles on 18" long pigtails
6	FLOORPOCKETS FP-2/2-2PGFL w/ 2-20 amp flush mounted stage pin receptacles

## 2.8 FIXTURES

### A. ELLIPSOIDALS

1. The ellipsoidal spotlights shall be the Source Four spotlights as manufactured by Electronic Theatre Controls, Inc. Lamp Source Four's high efficiency lamp shall utilize a compact tungsten filament contained in a krypton-filled quartz envelope. The lamp base shall be an integral die cast aluminum heat sink that reduces seal temperature and ensures proper lamp alignment. The lamp shall be 575 Watts with 16,500 lumens, with a color temperature of 3,250 K and have 300 hours of lamp life. Source Four's optical train shall combine a compact filament lamp with a precision molded borosilicate, ellipsoidal reflector and a single spherical lens to produce an optimum cosine field. Source Four ellipsoidal spotlights are constructed of rugged, die cast aluminum, finished in black, high temperature epoxy paint. Tools are not required for either lamp alignment or cleaning the reflector or lens. Precision tooled mechanical assemblies provide smooth operation, positive locking of adjustments and interchangeable components.
2. Source Four Ellipsoidals shall provide, but not be limited to: Die cast aluminum housings, Integral cable clamp for power leads, Positive locking of lamp focus, Independent lamp alignment controls, High impact, thermally insulated knobs and shutter handles, Reflector secured with shock mounts, Rotating shutter assembly for keystone angles, Heavy gauge stainless steel shutters, Lens secured with silicone shock mounts, Interchangeable lens tubes for different fields, Teflon guides for smooth lens tube movement, Sturdy gel frame holders with two accessory slots, Top mounted, quick release gel frame retainer, Rugged steel yoke with two mounting positions, 300+ Rotation of fixture within yoke, Positive locking, hand operated yoke clutch, Optional iris, Optional slot for motorized pattern devices

### B. THEATRE FRESNELS

1. Housing shall consist of die cast and extruded aluminum components with high temperature black finish. 6" Optical Train shall consist of medium pre-focus tungsten halogen lamp, an etched super pure aluminum clad reflector, 6" x 4" low expansion borosilicate fresnel lens mounted in a hinged door for rapid lamp replacement.
2. Socket shall be medium pre-focus, porcelain insulated, UL recognized for 250 volts, 1200 watts, 200oC continuous operation. Rated lamp seal temperatures shall not be exceeded. 6" Performance with (ANSI code BTR) lamp in spot focus shall be 175,000-beam candlepower with 12.5o field, and in flood focus shall be 11,200-beam candlepower with 63.5o field. For mounting, unit shall be provided with a heavy steel yoke and a painted malleable iron C-clamp adjustable for up to 2" I.D. pipe, with a tapped and threaded steel hanger pin. Accessories shall be mounted into front door gel clips and secured with a positive locking safety clip. Unit shall be provided with 36" long 3 wire leads covered by black sleeving and 20-amp stage pin connector.
3. Fresnel instruments from Strand Lighting #12087, Colortran #213-512 or the Altman 6" 1KAF shall be considered equivalent.

C. CYCLORAMA LIGHTING

1. Housing shall be constructed of sheet steel with gray and black enamel finish. Optical Train shall consist of a recessed single contact double-ended base tungsten halogen lamp, specular random patterned reflector, and an easily accessible socket assembly for lamp replacement.
2. Socket assembly steatite insulated, UL listed, rated for 600 volts, 3000 watts, 200oC continuous operation. Rated lamp seal temperatures shall not be exceeded. For mounting, unit shall be provided with a heavy steel yoke, a painted malleable iron, C-clamp adjustable for up to 2" ID pipe. Unit shall be provided with 36" 3-wire braided glass leads with 20 amp stage pin connector. The entire unit shall be UL listed for up to 2000 watts.
3. Cyc Lights from Stand Lighting #26187, Colortran #3FC1V-50B and Altman "Sky Cyc" shall be considered equivalent.

D. FOCUSING SCOOP

1. Housing shall be constructed of aluminum and steel with a baked enamel grey finish. Optical Train shall consist of medium pre-focus base tungsten halogen lamp, high temperature diffused reflector and easily accessible socket assembly for lamp replacement.
2. Socket assembly shall be medium pre-focus type, porcelain base, UL listed, rated for 250 volt, 1200 watts, 200oC under continuous operation. Rated seal temperatures shall not be exceeded. Performance with catalog number (ANSI code EGJ) lamp shall be a 27.5o beam and a 60.5o field with 42,000 beam candlepower in spot focus, and in flood focus a 50.8o beam and a 88.0o field with 16,845 beam candlepower. For mounting, unit shall be provided with a heavy steel yoke with C-clamp for pipe up to 2" ID. Unit shall be provided with 36" 3-wire braided glass leads with 20 amp stage pin connector. The entire unit shall be UL listed and labeled.
3. Focusing Scoop from Colortran #104-232, Strand Lighting and Altman #160 shall be considered equivalent.

E. FOLLOWSPOT

1. Provide the Lycian Model #1266 Standard Throw unit
2. The unit shall be designed for throws from 25 to 150 feet.
3. The unit is to be provided with an Osram Halomet HTI 400 watt lamp.
4. The units shall have a dowsers, iris and clipper.
5. The unit will have a built-in, six color automatic color changer.
6. The unit will provide 360-degree horizontal sweep with a 70 degree downward tilt and a 60 degree upward tilt.
7. The unit shall be cooled with a quiet cool running fan.
8. The unit shall be provided with a sturdy four-point collapsible base.

F. FIXTURE BILL OF MATERIALS:

QTY	FIXTURES
-----	----------

20	419 SOURCE FOUR FIXTURES WITH C-CLAMP, COLOR FRAME, PIN PLUG, 400PH-A PATTERN HOLDER, SAFETY CABLE AND HPL575/115 LAMP
4	436 SOURCE FOUR JR. FIXTURES WITH C-CLAMP, COLOR FRAME, PIN PLUG, 400PH-A PATTERN HOLDER, SAFETY CABLE AND HPL575/115 LAMP
30	6" FRESNEL WITH C-CLAMP, COLOR FRAME, PIN PLUG, SAFETY CABLE AND 1000W LAMP
12	FOCUSING SCOOP WITH C-CLAMP, COLOR FRAME, PIN PLUG, SAFETY CABLE AND 1000W LAMP
4	SKY-CYC-03 WITH C-CLAMP, (3) COLOR FRAMES, (3) PIN PLUGS, SAFETY CABLE AND (3) 1000W FFT LAMPS
2	LYCIAN SUPER ARC 1266 FOLLOW SPOT COMPLETE WITH CASTERED, FOLDING BASE, AUTOMATIC SELF CANCELLING COLOR BOOMERANG, HTI-400/24 LAMP, IRIS, AND DOWSER

G. WALL WORK LIGHTS:

1. Provide an industrial quality wall and /or ceiling mounted unit.
2. Unit shall have a gage type construction around glass housing.
3. Provide blue tinted glass globes.
4. Construction: aluminum housing. All materials shall be corrosion- resistant
5. Rating: 120/240VAC, 60 wall A type lamp.
6. Unit shall not require tools to re-lamp.
7. Quantity: 11 required
8. Acceptable product: Rig-a-Light VP Series

PART 3 - EXECUTION

3.1 GENERAL

- A. Verify that job conditions are ready to receive work of this section. Notify Architect of any existing condition that will adversely affect execution. Beginning of execution will constitute acceptance of existing conditions.
- B. Verify that field measurements are as shown on shop drawings.
- C. Verify that mechanical, electrical, and other items affecting work of this section are in place and ready to receive the work.

3.2 ELECTRICAL REQUIREMENTS OF THE STAGE EQUIPMENT CONTRACTOR:

- A. The Stage Equipment Contractor shall be responsible for all stage lighting and dimming hardware as specifically detailed in these specifications. This shall include:
  1. Furnishing all equipment specified
  2. Hanging of connector strips on specified stage rigging hardware.
  3. Set-up of the control console.
  4. Demonstration of equipment to owner's representatives.

5. Assembly and installation of stage lighting fixtures
6. Termination of all load (20A.) wiring in dimmer rack
7. Termination of all load (20A.) wiring at the distribution end
8. Supply, pull and termination of all low voltage control wire

B. The Stage Equipment Contractor shall not be responsible for the following:

1. Any main power wiring
2. Any conduit
3. Any load (line voltage - 110V) wire
4. Any house lights

### 3.3 FACTORY CHECKOUT:

- A. This contract shall also include the services of a qualified engineer regularly employed by the manufacturer of the system that shall check the installation and ensure its proper operation. No part of the system shall be energized before being so checked and the installation approved. Failure to observe this provision shall automatically relieve the manufacturer of any responsibility concerning the proper operation of the system or any part thereof and the replacement of parts which may have been damaged by the premature energizing. This engineer shall be made promptly available on the job site within fourteen (14) days after the manufacturer has received written notice. Engineer shall terminate all low voltage control wiring.

### 3.4 INSTALLATION

- A. Install using skilled workmen in accordance with manufacturer's printed instructions and recommendations.
- B. Install work in accordance highest industry standards. Handle materials to avoid dents and other damages.
- C. Set and secure materials and components rigid, plumb, and square.

# 11 62 33 - PRE-FAB MUSIC PRACTICE ROOMS

## PART 1 - GENERAL

- 1.1 SUMMARY: Furnish and install modular sound-isolating enclosures; Standard module including: Perimeter neoprene floor seal; Door with vision light; Corner posts with integrated speakers enclosures and wiring; Wall panels with integrated wiring and mountings for Microphones; Ceiling frame; Ceiling panels; Integrated ventilation, illumination, system control and power, and signal distribution systems; Access raceways for signal distribution systems (i.e. smoke detectors, intercom, warning devices, etc.). Integrated components allowing for upgrade to patented V-Room® Practice without disassembly.
- 1.2 REFERENCES: American Society for Testing and Materials; UL Standard 723 "Test For Surface Burning Characteristics of Building Materials."; ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- 1.3 DEFINITIONS: Noise Isolation Class (NIC): Single number rating used to describe noise reduction between two spaces through a complete structure. Because NIC is strongly affected by test environment, only NIC measured in strictly controlled independent laboratory environment may be used for comparing sound-isolating enclosures.
- 1.4 SYSTEM DESCRIPTION: Modular, sound-isolating enclosures with internal acoustical environments suitable for music instruction and rehearsal, voice announcements and tape recording, private consultations and testimony, and remedial instruction; modular in 15-inch increments; expandable without component modification or loss of acoustical performance; individual panels removable and replaceable with only partial disassembly of module. Modules shall have integrated wiring, speaker enclosures and microphones mounts to allow for upgrade of room to V-Room® Practice without disassembly. Modules shall be easily demountable and relocated without loss of effectiveness. Wall- and ceiling-panels will meet Underwriters' Laboratory (UL) Class 1 classification per U.L. Standard 723 for flame spread and smoke developed. Modules shall seal to any floor without being physically attached or with the use of caulking. Interior height of standard room is 7'-5¾". Room electrical system shall be U. L. classified to NEC.
- 1.5 PERFORMANCE REQUIREMENTS: Current production units with 410 cubic foot interior volume, 34% perforated interior panels, 12-inch airspace between modules, concrete floor construction. Internal room-fan system typically exchanges ambient surrounding air every 1.5 to 2 minutes. Airborne noise reduction, laboratory installation: NIC 40 from exterior to interior of module; NIC 60 from interior of one module to interior of adjacent module. Ambient noise at center of module; lighting and ventilating systems operating: Not exceeding NC 25. Reverberation time in contiguous octave bands, center frequencies from 125 to 4000 Hz: 0.45 plus or minus 0.1 second (based on a 640 cu. ft. interior volume). Sound-absorption coefficients of perforated wall and ceiling panels:

One-third Octave Band Center Frequency (Hz)	Absorption Coefficient (Sabins/sq. ft.)
125	0.57
250	0.98
500	1.13
1000	1.06
2000	1.06
4000	1.03

- A. Sound-isolating door: STC = 43 with a full window. Sound-isolating ventilation: acoustically isolated HVAC connection with a rating of STC = 45 (for directly connect HVAC).
- B. Control Panel: Twelve push buttons for program and level controls of acoustic-environment selections.

- 1.6 SUBMITTALS: Submit applicable reference standards, current performance data, U.L. Listing Card and application recommendations and product limitations. Submit assembly and installation drawings showing product components in assembly with adjacent materials and products. Operation and Maintenance Data. Warranty.
- 1.7 QUALITY ASSURANCE: Installer's Qualifications: Installation, disassembly and reassembly shall be by the manufacturer or shall be under the direct supervision of the manufacturer.
- 1.8 DELIVERY, STORAGE AND HANDLING: Pack and ship to avoid damage according to manufacturer's recommendations: Finish and assemble all components in the factory before shipment. Ship components in individual, sealed, labeled cartons. Deliver components to room designated for installation. Do not accept damaged products at the site. Do not install damaged products. Store products in heated indoor storage near point of installation. Retain protective packaging until installing.
- 1.9 PROJECT CONDITIONS: Do not install modules until all mortar, wet and dust producing trades have completed their work and finish floor is in place. Obtain required field measurements from Contractor and indicate on shop drawings.
- 1.10 WARRANTY: Provide manufacturer's written warranty that products found to be not in accordance with the requirements of the Contract Documents within a period of three years after date of commencement of warranties shall be corrected promptly after receipt of written notice from Owner.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Wenger Corporation
- B. Acoustic Systems, Inc.
- C. Other Manufacturers submitted & approved by Owner.

### 2.2 STANDARD MANUFACTURED COMPONENTS: 16-gauge steel channel with 1-1/4 inch thick neoprene pad adjustable plus or minus 3/8 inch to provide seal at floor and to compensate for 3/4 inch maximum variation in floor surface. Frame shall not lag, bolt or screw into building floor surface. Wall Panels: 15" x 30" wide and 4" thick; exterior face 16-gauge steel; interior face 22-gauge perforated or solid steel; filled with sound-absorbing material; acoustical seal by two continuous Isoloss™ gaskets at perimeter of each panel; alignment and compression seal between panels by mechanical locks. Integrated microphone mounts and wiring located behind perforated wall panels (2 per room). Forced fit "H" member or friction fit panels not allowed.

- A. Door Panel: Right hand or left hand, out-swinging or in-swinging pre-hung 36" door in frame; two inches thick; exterior face - 16-gauge steel; interior face - 14-gauge steel; filled with sound-absorbing material; 24 by 76 inches vision light glazed with 1/4 inch and 3/16 inch panes of laminated safety glass, 2-inch air space; frame - 16-gauge tubular steel filled with sound-absorbing material; 16-gauge door insert panels; double acoustical seal - magnetic and compression seal at head and jambs, adjustable sweep seal at bottom; hardware - ramped metal threshold (1/2"), continuous hinge, handicapped approved handle, bumper, schoolhouse function lock. (Door is STC 43.)
- B. Corner Assembly: Same construction as wall panels. 11-1/2" wide on each outside face. Exterior face 16-gauge steel; interior face 22-gauge perforated steel. Filled with sound-absorbing material; acoustical seal by two continuous Isoloss™ gaskets at perimeter of each panel; alignment and compression seal between panels by mechanical locks. Integrated speaker enclosures and wiring in each corner assembly.
- C. Ceiling Panels: 15" wide and 4" thick same construction as wall panels. Ceiling spans greater than 105 inches require center support beam.



- D. Light Panels: U.L. classified to NEC with U. L. label on each light panel; same construction as ceiling panels; provide fluorescent luminaries with sound level "A" rated, electronic ballasts; all parts UL/CSA listed; provide thermal overload protection; 12-foot power cable.
- E. Ceiling Frame: 16-gauge steel channel to align ceiling and wall panels with clamping mechanism to compress ceiling panel acoustical gaskets.
- F. Vent Panel (non-direct connect HVAC systems): 15" wide by 6" thick for intake air through acoustical plenum with 1-1/2 inch sound-absorbing duct liner and four 90-degree bends; number of vent panels equal to number of fan panels.
- G. Fan Panel (non-direct connect HVAC systems): U.L. classified to NEC with U. L. label on each fan panel; same construction as vent panel with six 90-degree bends; accessible from module interior; 12-foot power cable. Each fan panel typically provides 150 cfm exhaust to surrounding ambient environment.
- H. Light/Vent Panels (direct connected HVAC systems): U.L. classified to NEC with U. L. label on each light/vent panel; ceiling vent panel 15" wide by 6" thick for intake air through acoustical plenum with 1-1/2 inch sound-absorbing duct liner and four 90-degree bends; 8" round-duct connection; use only flex duct for connection (to maintain sound isolation); provide fluorescent luminaries with sound level "A" rated. Maximum of 120 cfm per vent panel.
- I. Power Panel: U.L. classified to NEC with U. L. label on each power panel; same construction as wall panels; junction and electrical boxes with airtight cover plates; interior - one four-plex receptacle, toggle switches labeled "LIGHT", "AIR" and "SYSTEM" to control luminaire, fan and future V-Room® Practice active acoustics; two four-plex boxes located 8 inches from the ceiling with two double cover plates for connections for alarms, warning devices, smoke detectors, etc.; exterior - three power receptacles; signal wiring raceway through 30 inch length 3/4 inch of conduit dropping vertically between exterior and interior junction boxes; 20 foot power cable. Integrated wiring and access plate for future upgrade to V-Room® Practice. Electrical components shall be UL/CSA listed.
- J. Hardware and Electrical Cover Plates: Satin chrome. All Other Components: Iron phosphate precoat and epoxy powder thermoset (baked) finish; colors: oyster wall and ceiling panels with charcoal trim; door insert panels with choice pebble, wedgewood, black and raspberry. Air-dry finish not allowed.
- K. Window Panel: Same construction and interchangeable with wall panels; 30" panel, 24" by 76" vision light - 15" panel 9" by 76" vision light - panes of 1/4 and 3/16 inch laminated safety glass with 2" air space.]

### PART 3 - EXECUTION

- 3.1 UTILITY COORDINATION: Coordinate & verify that all required utility services are provided by other subcontractors or provide those required under the work of this section.
- 3.2 INSTALLATION: Manufacturer installs modules or directly supervises installation. Assemble and install modules without the use of caulking or other wet sealants, fillers, insulation, rivets, or sheet metal screws. All components are manufactured units, pre-wired where appropriate. Field modification, cutting, fitting and wiring are prohibited.
- 3.3 ADJUSTING: Adjust all gaskets, seals and hardware for maximum performance.
- 3.4 CLEANING: Clean all surfaces according to manufacturer's recommendations. Remove all packaging and construction rubbish and debris.

## 11 66 00 - ATHLETIC EQUIPMENT

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all Athletic Equipment, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture, providing air good circulation.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

### PART 2 - PRODUCTS

- 2.1 GENERAL: Provide materials which are compatible with any underlying material. Provide all accessories required for a complete and proper installation, as recommended by the manufacturer. APPROVED MANUFACTURERS: Equal to Draper, Porter, Performance Sport Systems, Progressive Athletics Inc., AALCO Mfg, ADP Lemco, or as approved by the Architect.
- 2.2 VOLLEYBALL INSERTS: Steel sleeve with operable chrome cover by Performance Sport Systems "Ultra Play PVS System", or as approved by the Architect.
- 2.3 WALL & COLUMN PADS: Vinyl coated nylon on polyurethane foam wall pads equal to "Draper, Inc". Pad to extend to 7'-0" above the floor or as indicated in drawings. Color & graphic design as selected by Architect.

### PART 3 - EXECUTION

- 3.1 UTILITY COORDINATION: Coordinate & verify that all required utility services are provided by other subcontractors or provide those required under the work of this section.
- 3.2 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.3 INSTALLATION: Install precast units level, plumb, square, and true, without exceeding the recommended erection tolerances of PCI MNL-127 "Recommended Practice for Erection of Precast Concrete." Coordinate mounting brackets with steel structure & mount securely. Install materials and systems in proper relation with adjacent construction and with uniform appearance.
- 3.4 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.

# 11 66 22 – BASEBALL FIELD EQUIPMENT

## PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all Athletic Equipment, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture, providing air good circulation.
- 1.5 BIDDER-DESIGN SYSTEM: For the work of this this section, provide design, engineering and fabrication for the complete installation of the assembly included in the Bidder's Cost of the Work. Include all accommodations for complete installation of system, including footings & coordination with each trade forming a component part of the system or assembly as required to meet the design and performance criteria, and as required to maintain the integrity of the building design aesthetic. Architect will be the judge for acceptance of Bidder-Design systems.
- 1.6 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information & engineer sealed drawings to the Architect for review.

## PART 2 - PRODUCTS

- 2.1 GENERAL: Provide materials which are compatible with any underlying material. Provide all accessories required for a complete and proper installation, as recommended by the manufacturer.
- 2.2 EQUIPMENT
  - A. GOAL POSTS: Equal to Bison FB55HS-SY Official High School Football Goal Posts, 5-9/16" dia.
    1. 23'4" crossbar
    2. Meet NFHS specifications
    3. 6' set back
    4. Main upright is 5-9/16" O.D. sched. 40 pipe
    5. Crossbar is 4-1/2" O.D. steel tube
    6. Top uprights are 20' high, 2-3/8" dia. alum.
    7. Yellow powder coated paint finish
    8. Provide post pad and wind streamers
  - B. DELAY OF GAME TIMER: Equal to Spectrum Model 1125T-A2.
  - C. SCOREBOARDS: Material & labor for scoreboard, associated wiring, connections & structure provided by Owner. Conduit material/labor & overall coordination provided by Contractor.

- D. FOUL POLE - 30'H & 6"DIA W/MESH WING & GROUND SLEEVE - EQUAL TO MODEL LGFPW630 BY SPORTSFIELD SPECIALTIES
- E. TENSION CABLE NETTING BACKSTOP - 25' HIGH @ SOFTBALL (NETTING AT FIELD SIDE OF SOFTBALL DUGOUTS) 30' HIGH @ BASEBALL BY AALCO OR APPROVED EQUAL
- F. HELMET RACK - AALCO 24 OR APPROVED EQUAL; (1) @ EACH DUGOUT
- G. BAT RACK - AALCO 21 OR APPROVED EQUAL; (1) @ EACH DUGOUT
- H. DUGOUT BENCH - 24'L AALCO ELITE OR APPROVED EQUAL; (1) @ EACH DUGOUT
- I. EXTERIOR BATTING CAGES - 70'Lx14'Wx12'H AALCO KING KONG BATTING CAGE OR APPROVED EQUAL
- J. INDOOR PRACTICE FACILITY BATTING CAGES - 65'Lx14'Wx12'H KING KONG RETRACTABLE BATTING CAGE W/ ABC PERIMETER LIFT BY AALCO OR APPROVED EQUAL

**PART 3 - EXECUTION**

- 3.1 UTILITY COORDINATION: Coordinate & verify that all required utility services are provided by other subcontractors or provide those required under the work of this section.
- 3.2 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.3 INSTALLATION: Install precast units level, plumb, square, and true. Install materials and systems in proper relation with adjacent construction and with uniform appearance.
- 3.4 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.

# 11 66 23 - BASKETBALL GOALS

## PART 1 - GENERAL

- 1.1 SCOPE: Provide all labor, materials, equipment and accessories needed to provide and install basketball goals as indicated on the drawings and specifications herein.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 SUBMITTALS: Submit catalog cuts, shop drawings necessary to indicate size, location and methods of attachment.
- 1.4 DELIVERY, STORAGE AND HANDLING: Deliver materials to jobsite, contractor will be responsible for unloading and storage until materials are ready to be installed.

## PART 2 - PRODUCTS

- 2.1 APPROVED MANUFACTURERS: Equal to Draper, Porter, Performance Sport Systems, Progressive Athletics Inc., AALCO Mfg or as approved by the Architect.
- 2.2 BASKETBALL BACKSTOP CONSTRUCTION: Provide "Center-Strut" ceiling suspended basketball backstops. Vertical front drop frame assembly shall consist of main, center mast of 6-5/8" heavy wall structural steel tube with diagonal sway braces of 2-3/8" O.D. structural pipe. Goal shall mount directly through bank and into a heavy structural steel weldment which shall be clamped to the vertical 6-5/8" O.D. center support to eliminate any strain on bank should a player hang on the front mounted goal. This direct mount feature shall conform to the N.C.A.A. recommendation (No. 5, page 8, paragraph 3-E, dated March, 1985) which states that the design of the unit shall transfer the load on the goal directly to the backboard support so as to minimize stress to the glass backboard. The upper bank extension assembly shall be adjustable, providing the official N.C.A.A. and National High School Association regulation of 6" (15.24 cm) from the front of the "Center-Strut" to the face of the backboard. All metal parts shall be painted (I) coat of flat black enamel.
- 2.3 BACKBOARD SUPPORT BASIS OF DESIGN:
  - A. Draper EZ FOLD TF-20, Ceiling-Suspended, Forward-Folding
  - B. Draper EZ FOLD Model DGW, Wall-Mounted, Side-Folding
  - C. Draper EZ FOLD Model TBS-26B, Ceiling-Suspended, Side-Folding
- 2.4 BASKETBALL BACKSTOP TYPE: Ceiling suspended, rear braced backstop, retractable as indicated. Backbrace assembly shall consist of heavy wall 1-7/8" O.D. pipe, with zinc plated internal telescoping tube to facilitate raising of backstop. Brace shall be provided with adjustable collar to precisely plumb face of bank during installation.
- 2.5 OPERATION: All folding backstops supplied standard with motorized winch. Winch shall be fully enclosed worm gear type manual wall mounted winch to hold backstops at any position when raising or lowering. Hoist cable shall be 1/4" diameter galvanized aircraft cable with 7000 lb. ultimate strength of operation. Joints lock backboard in playing position and is easily disengaged by upward force of hoist cable. Main court goals to be side swing.
- 2.6 BACKBOARDS: Boards to be 48" x 72" rectangular with safety pad & official international orange markings. Special, offset, formed steel back extension fittings shall provide the official NCAA and NFSA of 6" from front of drop frame to face of the backboard. Frame shall be suspended by special adjustable hangers to provide for precise plumbing of frame during installation. Support hanging at anchor and goal mounting locations. Provide 2" thick safety padding factory installed. Goal to be spring mounted.
  - A. MAIN COURT BACKBOARDS MATERIAL: Heavy duty glass equal to Porter 918.
  - B. SIDE COURT BACKBOARDS MATERIAL: Fiberglass

2.7 BACKSTOP SAFETY LOCK: Lock shall be inertia sensitive to automatically lock a basketball backstop in position at any time in storage or during the raising or lowering cycle due to surge of speed created by possible malfunction of hoisting apparatus, such as the winch, cable, pulleys, support fittings, etc.

2.8 HEIGHT ADJUSTABLE: At Elementary and Intermediate Schools all goals shall be height adjustable.

MANUAL OPERATION:

- A. 503092 – For Manual 8'-10' height adjustment of rectangular bank.
- B. 503094 – For Manual 8'-10' height adjustment of fan bank.
- C. 503003 – Portable Height Adjuster Operator. Provide (2) for use with Manual Height Adjustable.

MOTORIZED OPERATION:

- D. 503093 – For Motorized 8'-10' height adjustment of rectangular bank.
- E. 503097 – For Motorized 8'-10' height adjustment of fan bank.

**PART 3 - EXECUTION**

- 3.1 UTILITY COORDINATION: Coordinate & verify that all required utility services are provided by other subcontractors or provide those required under the work of this section.
- 3.2 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.3 INSTALLATION: All installation work shall be done by the manufacturer or a factory trained authorized installer fully approved and certified by manufacturer. The installation shall be made in complete accordance with the manufacturer's instructions and/or recommendations. Securely install this work to be completely structurally sound.
- 3.4 ADJUSTMENT AND CLEARING: Adjust all folding mechanisms for smooth operation. Clean work area and remove debris from site.

## **11 66 24 - VOLLEYBALL EQUIPMENT**

### **PART 1 - GENERAL**

- 1.1 SUMMARY: Volleyball court and storage equipment for gymnasium. Provide equipment for two (2) courts to be set up simultaneously.
- 1.2 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all Athletic Equipment, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.3 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.4 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.5 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture, providing air good circulation.
- 1.6 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information, shop drawings and finish samples to the Architect for review.
- 1.7 QUALITY ASSURANCE
  - A. All volleyball equipment, components, and accessories shall be products of a single manufacturer.
  - B. Volleyball equipment shall be designed, fabricated, and installed to comply with requirements for competition play of the following associations:
    1. Federation Internationale de Volleyball (FIVB).
    2. National Collegiate Athletic Association (NCAA).
    3. National Federation of State High School Associations (NFHS).
    4. USA Volleyball (USAV).

### **PART 2 - PRODUCTS**

- 2.1 BASIS OF DESIGN: Performance Sports Systems.
  - A. Approved manufacturers:
    1. Porter Athletic;
    2. Aalco Athletic Equipment;
    3. Draper Manufacturing;
    4. Progressive Athletics Inc.;
    5. ADP Lemco;
    6. Or as approved by the Architect.

- 2.2 VOLLEYBALL COURT EQUIPMENT:

- A. 5100 OmniSteel Collegiate One-Court Volleyball System.
- B. Provide full system as listed below for two courts:
  - 1. (1) 3" O.D. Scholastic Upright
  - 2. (1) 3" O.D. Scholastic Upright with Winch
  - 3. (2) 3" Floor Sleeves
  - 4. (2) Swivel Brass or Chrome Cover Plates
  - 5. (1) Competition Net
  - 6. (1) Pair of Antennas and Sideline Markers
  - 7. (2) Upright Safety Pads
  - 8. (1) Set of Four Cable Covers
  - 9. (1) 6446 Rolling Referee Stand with padding.

### 2.3 VOLLEYBALL STORAGE EQUIPMENT

- A. 6295 Volleyball Equipment Storage Cart.
  - 1. Provide one storage cart.

## PART 3 - EXECUTION

### 3.1 COORDINATION

- A. Coordinate layout of volleyball courts and location of floor [sleeves] [anchors] with installation of floor surfacing and application of game lines and boundaries.
- B. Coordinate location of sleeves and required size of sleeve footing with trade responsible for placing concrete. Provide sleeves in adequate time to allow casting in concrete floor slabs. Ensure that setting of sleeve compensates for type of floor finish to be provided.
- C. Ensure that sleeves for each volleyball court are spaced at 35'-6" on center. SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.

### 3.2 INSTALLATION:

- A. Floor cover plates: Install centered directly over floor sleeves in accordance with manufacturer's instructions. Route out floor to ensure cover is flush with finished floor. Install cover with flat head screws.

### 3.3 FIELD QUALITY CONTROL

- A. Insert standards in sleeves and attach nets, boundary markers, antennae, judges platform, protection padding, and other accessories. Verify that all items have been provided and are as required for complete installation.
- B. Verify that standards are vertical and rigid. Operate telescoping feature. Verify net height settings are accurate.
- C. Provide missing items and correct deficiencies.



**3.4 CLEANING AND DEMONSTRATION**

- A. Remove protective wrappings and wash surfaces.
- B. Review installed volleyball system with Owner's designated representatives. Demonstrate installation of equipment and operational features.

## **11 66 33 - TRAINING ROOM EQUIPMENT**

### **PART 1 GENERAL:**

- 1.1 SCOPE: Provide all labor, materials, equipment and accessories needed to provide and install Laundry & Training Room Equipment as indicated on the drawings and specifications herein.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 SUBMITTALS: Submit catalog cuts, shop drawings necessary to indicate size, location and methods of attachment within 45 days after commencement date.
- 1.4 DELIVERY, STORAGE AND HANDLING: Deliver materials to jobsite, contractor will be responsible for unloading and storage until materials are ready to be installed.

### **PART 2 MATERIALS:**

- 2.1 ICE MACHINE:
  - A. Basis of Design: Manitowoc S-Series 450 Ice Machine on B-400 Bin.
  - B. BTU Per Hour: 7,000 (average) 9,600 (peak)
  - C. Compressor Nominal rating:3/4HP
  - D. Ambient Temperature Range: Air and water: 35° to 110°F
  - E. Water Pressure Ice Maker Water In: Min. 20psi (137.9kPA) Max. 80 psi (551.1kPA)
- 2.2 WHIRLPOOL: Whitehall Manufacturing Model S-110-M Sports whirlpool with seat.
- 2.3 TRAINER TAPE TABLES: Material provided by Owner.
- 2.4 OTHER MATERIALS: Furnish and install any supplementary materials, weather or not specifically indicated, required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

### **PART 3 EXECUTION:**

- 3.1 UTILITY COORDINATION: Coordinate & verify that all utility services are provided by other subcontractors or provide those required under the work of this section.
- 3.2 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.3 INSTALLATION: Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Coordinate mounting brackets with steel structure & mount securely. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Place & attach all components firmly & accurately into position, square, plumb, level, & true.

- 3.4 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.

## **11 66 43 – INTERIOR SCOREBOARD**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES:**

- A. Indoor single-sided LED Basketball and Volleyball scoreboard with control center.
- B. Exterior single-sided LED Baseball and Softball scoreboard with control center.
- C. Exterior single-sided LED football, soccer or track scoreboard with control center.
- D. Delay of game timer.
- E. Shot clock.

#### **1.2 REFERENCES**

- A. Standard for Electric Signs, UL-48
- B. Standard for Control Centers for Changing Message Type Signs, UL-1433, 1st Edition
- C. Federal Communications Commission Regulation Part 15
- D. National Electric Code

#### **1.3 SUBMITTALS**

- A. Product Details: Submit literature for manufacturer scoreboard, control and accessories as specified.
- B. Specification Drawings: Submit face layout, dimensions, electrical wiring diagrams, structural support and mounting.
- C. Resources: Submit manufacturer installation instructions and operation manual.

#### **1.4 QUALITY ASSURANCE**

- A. Source Limitations: Provide scoreboard and components through one source from a single manufacturer.
- B. Scoreboard designed for indoor use.
- C. Shall be ETL listed for UL Standards 48 and 1433
- D. Shall be FCC compliant
- E. Shall be NEC compliant

#### **1.5 WARRANTY AND SERVICE PLAN**

- A. Guarantee for a period of five (5) years against any defects in materials.
- B. Warranty does not cover unauthorized repairs or modifications, abuse, neglect, acts of God, exceptionally high or low voltage, and/or improper grounding, installation, operation or shipment to the factory.

**PART 2 - PRODUCT:**

- 2.1 BASIS OF DESIGN: Spectrum Corporation, 10048 Easthaven Blvd., Houston, TX 77075 Phone: 713-944-6200, 800-392-5050, Fax: 713-944-1290 Website: spectrumscoreboards.com
- 2.2 SCOREBOARDS:
- A. Basketball Scoreboard Model 5205-A2 with MS-250 control scoring console for basketball and volleyball.
  - B. Baseball Scoreboard Model 9108K-C2 with MSX control scoring console for baseball and softball.
  - C. Scoreboard Model 11110-A2 with MSX control scoring console for football, soccer, and track.
  - D. Delay of game timer Model 1125T-R4

**PART 3 - EXECUTION:**

- 3.1 VERIFICATION: Confirm the mounting structure is completely cured and prepared for scoreboard. Verify plans and specification drawings are in accordance with manufacturer's instructions and approved drawings.
- 3.2 INSTALLATION
- A. Confirm scoreboard location. Verify electrical requirements have proper power source.
  - B. Confirm conduit and wiring are in place to be routed to scoreboard and accessories as shown on electrical plans by the Electrical Contractor. The contractor assigned the scoreboard equipment shall be responsible for all routing of conduit and wiring.
  - C. Secure scoreboard and confirm accessories are level and plumb with brackets and fasteners.
  - D. Test scoreboards and accessories to ensure all operations performing accurately.
  - E. Clean and touch-up any exposed areas.

## **11 66 53 - GYMNASIUM DIVIDERS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes: Manually & Electrically operated fabric gymnasium divider.

#### **1.2 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23 - Submittal Procedures:
  - 1. List of proposed products and product data.
  - 2. Loads to be transmitted to building structural members and requirements for supplementary bracing and structural support members.
  - 3. Shop drawings showing layout, elevations, dimensions, fabrication details, method of attachment and electrical wiring diagrams.
  - 4. Manufacturer must provide calculations and reports for tests performed by an independent testing laboratory accredited by the American Association of Laboratory Accreditation (A2LA) that clearly demonstrate compliance with minimum safety factors included in product specifications.
  - 5. Certificates for Divider Curtain Vinyl and Mesh to prove they meet the requirements of Greenguard Children & Schools
  - 6. Samples of fabric [for selection by Architect].
  - 7. Manufacturer's installation and maintenance instructions.

#### **1.3 QUALITY ASSURANCE**

- A. Source limitation: All components including curtain, suspension system, electric winches, and controls for divider shall be products of a single manufacturer.
- B. All welding to be performed by personnel having passed Welder Qualification testing in accordance with American Welding Society (AWS) code D1.1 or higher. Manufacturer to provide certification and test results upon request

#### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Do not deliver divider until building is enclosed and other construction within gymnasium is substantially complete.

### **PART 2 - PRODUCTS**

#### **2.1 BASIS OF DESIGN**

- A. Draper, Inc., 411 South Pearl Street, Spiceland, Indiana 47385.
- B. Manufacturers of equivalent products submitted and approved in accordance with Section 01630 - Product Substitution Procedures.

## 2.2 MANUAL GYMNASIUM DIVIDER

- A. Type: Manually operated, horizontal pull type gymnasium divider including clamps for attachment to building structure, and other components required for complete functional installation; Walk-Draw Gym Divider as manufactured by Draper Company, Inc.
- B. Operation: Curtain suspended from overhead track and manually pulled open and closed while walking.
- C. Configuration: As indicated on Drawings.
  - 1. Stack space for curtain shall not exceed 1-1/8 inches per carrier.
  - 2. Minimum required clearance for curtain on each side of track: 6 inches.
- D. Track: 16 gage galvanized steel channel-type track 1-1/2 by 1-1/4 inches attached to structural support [with beam clamps and hanger brackets at 8 feet maximum on center.
- E. Attachment: Attachment: Attach to structural support with beam clamps, hanger brackets, and [1/2 inch] [13 mm] diameter threaded rods. Attachment clamps designed to be capable of supporting a minimum of 5,000 lbs each and provided in sufficient number to provide a combined minimum 45:1 attachment point safety factor.
- F. Carriers: [1-1/8 inches] [29 mm] diameter ball bearing wheels with trim chain for attachment to grommets in curtain top. Space carriers at [12 inches] [305 mm].
- G. Divider bottom: Weighted with No. 2/0 coil proof chain in curtain pocket.

## 2.3 ROLL-UP GYM DIVIDER

- A. Type: Electrically operated, roll-up gymnasium divider including motor, belts, controls, clamps for attachment to building structure, threaded rod supports, and other components required for complete functional installation; Roll-Up Gym Divider as manufactured by Draper, Inc.
- B. Operation: Curtain rolled up and down by belts wound onto overhead rotating drive pipe operated by electrical motor.
- C. Configuration: Rectangular shape with straight bottom and extending across room as indicated on Drawings.
  - 1. Maximum dimension of stored divider: [2 feet] [610 mm] from bottom of structural support to bottom of rolled curtain.
  - 2. Minimum required clearance between vertical curtain edges and adjacent fixed objects: [6 inches] [152 mm].
  - 3. Provide 36 inches space between curtain ends and walls or fixed objects to allow passage space around divider.
- D. Operating mechanism: Drive pipe winch powered with 3/4 HP, 110VAC, 60-cycle, single-phase, reversible capacitor, C-Face motor with thermal overload protection. Entire winch assembly to be UL listed and shall carry a five-year warranty. Provide with load holding worm gear reduction and integral limit switches to control curtain travel. Drive pipe shall rotate in pipe support assemblies spaced at approximately [9 feet] [2.7 m].
- E. Attachment: Attach to structural support with beam clamps, hanger brackets, and [1/2 inch] [13 mm] diameter threaded rods. Attachment clamps designed to be capable of supporting a minimum of 5,000 lbs each and provided in sufficient number to provide a combined minimum 45:1 attachment point safety factor.

- F. Hoist belts: [5 inches] [127 mm] wide white polyester webbing attached to drive pipe, passing under bottom batten, and terminating at top batten. Space belts at approximately [15 feet] [4.6 m].
- G. Bottom roller: [3-1/2 inches] [89 mm] diameter steel pipe with aluminum strip for attachment of curtain.

#### 2.4 FOLD-UP GYM DIVIDER

- A. Type: Electrically operated, fold-up gymnasium divider including motor, cables, controls, clamps for attachment to building structure, threaded rod supports, and other components required for complete functional installation; Fold-Up Gym Divider as manufactured by Draper, Inc.
- B. Operation: Curtain moves by accordion fold-up action as bottom steel pipe is raised by hoist lines passing through grommets.
- C. Configuration: Rectangular shape with straight bottom and extending across room as indicated on Drawings.
  - 1. Stored divider dimensions from bottom of structural support to bottom of folded curtain:
    - a. Maximum: [42 inches] [1067 mm].
    - b. Minimum: [30 inches] [762 mm].
  - 2. Minimum required clearance between vertical curtain edges and adjacent fixed objects: [6 inches] [152 mm].
  - 3. Provide 36 inches space between curtain ends and walls or fixed objects to allow passage space around divider.
- D. Operating mechanism: Drive pipe winch powered with 3/4 HP, 110VAC, 60-cycle, single-phase, reversible capacitor, C-Face motor with thermal overload protection. Entire winch assembly to be UL listed and shall carry a five-year warranty. Provide with load holding worm gear reduction and integral limit switches to control curtain travel. Drive pipe shall rotate in pipe support assemblies spaced at approximately [9 feet] [2.7 m].
- E. Attachment: Attach to structural support with beam clamps, hanger brackets, and [1/2 inch] [13 mm] diameter threaded rods. Attachment clamps designed to be capable of supporting a minimum of 5,000 lbs each and provided in sufficient number to provide a combined minimum 45:1 attachment point safety factor.
- F. Hoist lines: [1/8 inch] [3 mm] diameter steel cable with 2,000 pounds minimum breaking strength attached to bottom batten and passing through curtain grommets at 18 inches to terminate at top drive pipe. Space lines at approximately [111 inches] [2819 mm].
- G. Divider bottom: Hoist lines secured to [1-5/8 inches] [41 mm] diameter steel pipe batten in [6 inches] [152 mm] wide curtain pocket.

#### 2.5 TOP-ROLL GYM DIVIDER

- A. Type: Electrically operated, top-roll gymnasium divider including motor, controls, clamps for attachment to building structure, threaded rod supports, and other components required for complete functional installation; Top-Roll Gym Divider as manufactured by Draper, Inc.
- B. Operation: Curtain moves by rolling directly onto drive tube without the use of belts or cables.
- C. Configuration: Rectangular shape with straight bottom and extending across room as indicated on Drawings.



1. Maximum dimension of stored divider: [14 inches] [355 mm] from bottom of structural support to bottom of rolled curtain.
  2. Minimum required clearance between vertical curtain edges and adjacent fixed objects: [6 inches] [152 mm].
  3. Provide 36 inches space between curtain ends and walls or fixed objects to allow passage space around divider.
- D. Operating mechanism: Drive pipe winch powered with 3/4 HP, 110VAC, 60-cycle, single-phase, reversible capacitor, C-Face motor with thermal overload protection. Entire winch assembly to be UL listed and shall carry a five-year warranty. Provide with load holding worm gear reduction and integral limit switches to control curtain travel. Drive pipe shall rotate in pipe support assemblies spaced at approximately [10 feet] [3.1 m].
- E. Attachment: Attach to structural support with beam clamps, hanger brackets, and [1/2 inch] [13 mm] diameter threaded rods. Attachment clamps designed to be capable of supporting a minimum of 5,000 lbs each and provided in sufficient number to provide a combined minimum 45:1 attachment point safety factor.
- F. Drive pipe: [5 inches] [127 mm] diameter steel pipe. Drive pipe shall roll in precision laser cut and formed support assemblies. Assemblies spaced at a maximum of 10 feet [3 m] on center
- G. Divider bottom: [1-5/8 inches] [41 mm] diameter steel pipe batten in 6 inches [152 mm] wide curtain pocket.

## 2.6 RIDGE-FOLD GYM DIVIDER

- A. Type: Electrically operated, fold-up gymnasium divider conforming to roof slope and including motor winch, cables, sheave assemblies, controls, clamps for attachment to building structure, supports, and other components required for complete functional installation; Ridge-Fold Gym Divider as manufactured by Draper Company, Inc.
- B. Operation: Gym divider shall utilize pivot joints to fold compactly into roof contour. Curtain moves by accordion fold-up action as weighted bottom is raised by hoist lines passing through curtain grommets. Hoist lines pass through sheave assemblies attached to roof structure. Lines pass through intermediate sheaves which act as idler assemblies and direct lines to motorized winch. Lines terminate at individual drums sized in variable ratios allowing raised curtain to conform to roof slope.
- C. Configuration: Pivot joints in top and bottom batten pipes allow divider to conform to roof contour in both open and stored positions. Divider extends across room as indicated on Drawings.
1. Minimum required clearance between vertical curtain edges and adjacent fixed objects: [6 inches] [152 mm].
  2. Provide 36 inches space between curtain ends and walls or fixed objects to allow passage space around divider.
- D. Operating winch: Powered with C-Face motor sized for specific project torque requirements and equipped with thermal overload protection and rotary counting limit switch to control curtain travel. Individual drums sized in variable ratios shall be provided for factory termination of each cable. Winch to be attached to roof structure.
- E. Sheaves: Heavy-duty assemblies with roller bearings and attached to roof structure at each hoist location.
- F. Hoist lines: [1/8 inch] [3 mm] diameter steel cable with 2,100 pounds minimum breaking strength. Lines shall attach to battens concealed at curtain bottom, pass through curtain grommets at [18 inches] [547 mm] to sheave assembly, continue through intermediate sheaves along slope of roof to winch, and terminate at individual drums. Space lines at approximately [111 inches] [2819 mm].

- G. Top curtain support: [1-5/8 inches] [41 mm] diameter steel pipes with pivot joints in curtain pocket and suspended from sheave assembly and roof structure with No. 2/0 chain.
- H. Attachment: Attach sheaves and winch to structural support with beam clamps, steel angle brackets.
- I. Divider bottom: Hoist lines secured to [1-5/8 inches] [41 mm] diameter steel pipe batten with pivot joints in [6 inches] [152 mm] wide curtain pocket.

## 2.7 CURTAIN

- A. Bottom 8 feet: Opaque solid vinyl coated polyester fabric:
  - 1. Weight: 18 ounces per SY.
  - 2. Resistant to rot, mildew, and ultraviolet light.
  - 3. Flammability: Rated self extinguishing in accordance with California State Fire Code F-31.5 and F-140.
  - 4. Color: as selected by Architect from manufacturer's standard range.
- B. Upper curtain section: Vinyl coated polyester mesh.
  - 1. Weight: 9 ounces per SY.
  - 2. Resistant to rot, mildew, and ultraviolet light.
  - 3. Flammability: Rated self extinguishing in accordance with California State Fire Code F-230.
  - 4. Color: [White] [Red] [Yellow] [Blue and black weave] [Grey] [Black] [Selected by Architect from manufacturer's standard range.]
- C. VOC Emission: Divider Curtain Vinyl and Mesh to be low emitting and certified to meet all of the requirements of the GREENGUARD Children & Schools and GREENGUARD certification program. Manufacturer to provide certificate and/or test results upon request.
- D. Seams: electronically welded with [1 inch] [25 mm] full contact weld.
- E. Outer edge hems: Triple turned with double welds.
- F. Top edge: Solid fabric in triple thickness and double welded to form [6 inches] [152 mm] wide pocket for top pipe batten; or For Top-Roll solid fabric, cut square for attachment to roller tube and of sufficient length to allow at least two complete wraps on roller tube at all times.
- G. Bottom edge: Pocket to house chain weights or cut square for attachment to roller pipe with aluminum stop strip; or pocket to house bottom pipe batten.

## 2.8 CURTAIN SAFETY DEVICE

- A. Provide Draper Model 504301 Curtain Lok safety device. Curtain Lok to be directly speed sensitive to automatically lock divider curtain in position at any time during storage or operation. In the event of an over-speed situation (greater than 1.5 feet per second) caused by malfunction of the hoisting apparatus, whether sudden or gradual, device will immediately activate. Curtain Lok work regardless of direction of rotation and automatically resets when load is reversed or removed.

## 2.9 CONTROLS

- A. Provide key lock, 3-position, momentary contact wall control switch to lower, raise, and stop gymnasium divider. Provide with switch box and plastic cover plate; For Roll-Up, Top-Roll, Fold-Up, and Ridge-Fold Draper gymnasium dividers with Smart Gym Group Control System, provide Smart Gym Group Controller capable of controlling Electric Divider Curtains, Electric Height Adjusters, Basketball Backstops with Electric Winches, Wrestling Mat Lifters and other Auxiliary Devices from a centralized location. Group Control Systems to have 120V control processor that is fully programmable to operate gymnasium equipment and auxiliary devices provided by others. Group Control System must be capable of operating up to 1000 devices and can be programmed to operate single devices or groups of up to four devices simultaneously.
- B. Devices are controlled via 120V relay panels that may be mounted at remote location(s.) Each relay panel includes 8 relays. Devices that operate in an up/down or in/out cycle require two relays; devices that operate in an on/off cycle require one relay. Communications between processor and the relay panel(s) is 24V.
- C. User interacts via a 24V flush mounted graphical color touch screen to be custom programmed to match the project conditions. Touch screen to require entry of four-digit security code prior to accessing control screens. Security code is to be fully programmable by the user. Touch screen should be mounted in full view of equipment being operated and a minimum of one touch screen should be each room with equipment being operated.
- D. Complete control system to include one pre-programmed Model 503024 control processor and power supply in 18" x 18" x 6" surface mounted enclosure, the required number of Model 503027 relay panels in surface mounted 15" x 8" x 2" surface mounted enclosure and the requested number of [Model 503025 Grayscale or Model 503026 color] graphical touch screen to be mounted in 4 ½" x 4 ½" x 2 ½" electrical box.
- E. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL: All conduits complete with wire from power source to control processor, from control processor to relay panels, from relay panels to devices and from control processor to touch screen and one 4 ½" x 4 ½" x 2 ½" electrical box for mounting touch screen.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Coordinate support of gymnasium divider with roof structure to ensure proper distribution of loads and adequacy of attachment points. Ensure that building structure has been designed for loads of specific gymnasium divider to be provided. Provide additional structural framing members as required.
- B. Coordinate configuration, size, and installation of gymnasium divider with height, slope, and type of building structure and lighting fixtures, mechanical equipment, ductwork, fire-suppression system, bleachers, athletic equipment, and other potential obstructions.
- C. Field verify dimensions prior to fabrication.
- D. Coordinate electrical requirements for motorized operating mechanism to ensure proper power source, conduit, wiring, and boxes for keyed switches. Prior to installation, verify type and location of power supply.
- E. For installations made after wood gymnasium flooring is installed, provide protection and exercise care not damage flooring.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's written instructions and shop drawings.

- B. Install even and level with curtain hanging 2 inches above floor in down position.
- C. Install control switch such that operator has view of complete gymnasium divider during lowering and raising.
- D. Adjust limit switches of electric winch to ensure accurate position in both stored and lowered positions.

### 3.3 TESTING AND DEMONSTRATION

- A. Operate divider curtains to ensure proper lifting and lowering. Adjust as required to ensure smooth operation and accurate positioning.
- B. Demonstrate to Owner's designated representatives complete operation and required maintenance.

# 11 68 24 - TENNIS NET AND NET POST EQUIPMENT

## PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.3 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

## PART 2 - MATERIALS

- 2.1 POST FOUNDATIONS: Post foundations shall be not less than 18" in diameter at the top, not less than 30" at the bottom, and not less than 36" in depth, with side walls formed flat and square to each other. An extended concrete base at the bottom of the foundation, shaped like a foot pointing in the direction of the opposing net post, will increase the foundation's resistance to stress and strain of torque in the direction of force. Foundations shall be so constructed as to provide a distance of 33' on a singles court and 42' on a doubles court, measured from center of post to center of post. Concrete for foundations shall use well-graded rock, gravel or stone mixed in ratios attaining a compressive strength of not less than 3,500 lbs. per square inch at the 28th day after pouring. For asphalt courts, the top of the concrete foundation shall be round to prevent radial cracking.
- 2.2 NET POSTS AND SLEEVES: Net posts may be galvanized steel or aluminum. They may be installed in sleeves or installed permanently in foundations. Tennis post ground sleeves may be steel, aluminum or PVC. Circular posts shall have an outside diameter of not less than 2 7/8", while square posts shall not be less than 3" across. Minimum yield strength is 1,100 lbs., with a minimum of 1,500 lbs. tensile strength. Mechanical tensioning devices (worm gear, ratchet reel, or screw-type) are to be limited in the amount of force applied to the net post, not to exceed 1/2 post yield strength. Posts and post sleeves shall be set 42' apart for a doubles court, measured from the center of one post to the center of the other. For tournament use, it is recommended that a second set of net post sleeves be supplied 33' (center to center) apart for singles play. Posts shall be set plumb and true so as to support the net at a height of 42" above the court surface.
- 2.3 CENTER STRAP ANCHOR: The ground anchor shall be made from a strong, non-corrosive metal pipe not less than 10" in length, 1 5/8" o.d. minimum. A non-corrosive 1/4" o.d. pin is centered through the pipe 1/4" to 3/8" below the opening for the purposes of attaching a center strap hook. A center strap anchor shall be set in concrete footings measuring 12" x 12" x 12". The base of the footing shall be slightly larger (15" x 15") to avoid the possibility of heaving due to freeze/thaw action. The top of a concrete footing set in an asphalt court shall be round to minimize radical cracking. The cross pin in the ground anchor shall be flush with the court and parallel to the net.
- 2.4 NET: A regulation doubles tennis net 42' (12.802m) long and 3'3" (991mm) high. A regulation singles net is the same height, but is only 33' (10.058m) long. Since according to the rules of tennis, net posts are set 42' (12.802m) apart for doubles and 33' (10.058m) apart for singles, measured from center to center, this creates an obvious problem—how to install a 42' (12.802m) or 33' (10.058m) net, pulled taut with tension bars and cording, on the posts. To solve this problem, many net manufacturers actually offer nets slightly shorter than the regulation dimension (i.e. 41' 9" [12.725m] for a doubles net). The net is composed of eight distinct parts referred to by various names. Components are called the body, headband, cable, side bindings, bottom bindings, dowels, tie strings, and lacing twine.
- 2.5 BODY: The net body shall be weather resistant synthetic netting 1 3/4" square mesh and the tensile strength of the twine shall not be less than 275 lbs.

- 2.6 HEADBAND (TOP BINDING): The headband shall be made of two pieces or plies. The outer piece shall be manufactured from a white synthetic material or white canvas, treated for resistance to sunlight and mildew. Inner and outer headbands shall be folded over the cable and lock stitched with four separate rows of stitching the length of the net.
- 2.7 CABLE: The cable shall be fabricated from multi-stranded galvanized steel wire rope. It shall have a minimum core diameter of 5/32" (excluding coating) and be 47' in length. Its tensile strength shall be not less than 2,600 lbs. The cable may be vinyl coated.
- 2.8 SIDE BINDINGS (TAPES): Side bindings shall be fabricated of black synthetic material, treated to prevent deterioration from sunlight. Five nickel or brass grommets shall be placed equidistantly from top to bottom at each side of the net to accommodate the lacing twine after forming a pocket to accept dowels.
- 2.9 BOTTOM BINDINGS (TAPES): Bottom bindings shall be made of black abrasion-resistant synthetic material, treated to prevent deterioration from sunlight.
- 2.10 DOWELS: Dowels shall be 3/8" - 5/8" round and a maximum of 40" in length and shall be made of wood, metal or fiberglass.
- 2.11 TIE STRINGS: Tie strings shall be made from black u.v. stabilized, synthetic cord, not less than 60" long, and having a breaking strain of not less than 275 lbs. One piece is required for each end of the net headband.
- 2.12 LACING TWINE: Lacing twine shall be made from the same material as tie strings, but shall be not less than 96" inches long. There shall be one such piece for each side binding.
- 2.13 CENTER STRAP: A center strap is used to hold the net at the proper height of 36" at its center. A white strap 2" wide, made from canvas or synthetic material treated for resistance to sunlight and mildew, is used. A height adjusting non-corrosive buckle or buckles must prevent slippage when fully stressed. At the bottom of the strap, a non-corrosive spring loaded hook is used to attach the center strap to the ground anchor pin.

### PART 3 - EXECUTION

- 3.1 FIELD CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.2 INSTALLATION: Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Install materials and systems in proper relation with adjacent construction and with uniform appearance.
- 3.3 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.
- 3.4 TAUTNESS AND CENTER HEIGHT: Check net tautness by suspending a 24 lb. (10.9kg) weight from the center of a singles net or a 14 lb. (6.36kg) weight from the center of a doubles net and wind the net slowly to a center height of 36" (914mm). Install the center strap and adjust it to maintain the height of 36" (914mm). Remove the weight. This method produces a net cable tautness of approximately 500 - 550 lbs. (227 - 250kg).

# 11 68 25 - TENNIS COURT DIMENSIONS AND RELATED MEASUREMENTS

## PART 1 - GENERAL

- 1.1 PLAYING LINES: The outside dimensions of the playing lines shall be as follows:
  - A. Doubles 36' x 78' (10.97m x 23.77m)
  - B. Singles 27' x 78' (8.23m x 23.77m)
  - C. All lines shall be not less than 1" (2.54 cm) nor more than 2" (5 cm) in width, except the base line which may be up to 4" (10 cm) in width and the center line which shall be 2" (5 cm) in width. All measurements shall be to the outer edge of the lines except the center line and the center mark which shall be on the center line of the court.
- 1.2 TOLERANCE: The lines shall be laid out and applied as close to the exact measurements as is possible within the limitations of the surface on which they are being applied. At no time shall the playing lines or the line dimensions vary more than 1/4" from the exact measurements, unless the court surface won't allow (natural grass moves, artificial grass stretches, etc).
- 1.3 FENCING: Fencing is required across the back of the court (backstop) and along each sideline from the corner 20'-40' up the sidelines (sidestop). The area up to 40' on either side of the net can be left open or shorter fencing may be used. The backstops shall be 10' (or 3m) in height above the court surface.
- 1.4 NET POSTS: Net posts shall be set 3' (.91m) outside the side line, which is 42' (12.802m) apart, center to center for doubles play, and 33' (10.058m) apart, center to center for singles play. (Please refer to the diagram.) The top of the net at the inside face of the posts or supports when used to support a net for singles play on a doubles court shall be exactly 42" (1.067m) above the court surface. There shall be no obstruction above the top of the net at any point, including at the post.
- 1.5 PLAYING LINES: Playing lines shall be painted on an asphalt or concrete court using line paint approved by the manufacturer of the coating material used on the court. Base lines shall be not more than four inches (4") wide and playing lines not more than two inches (2") wide, accurately positioned in accordance with regulations of the United States Tennis Association.

## PART 2 - MATERIALS

- 2.1 NOT APPLICABLE

## PART 3 - EXECUTION

- 3.1 NOT APPLICABLE

# 11 68 36 - BASEBALL FIELD EQUIPMENT

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Stadium game equipment is indicated on the Drawings and includes the following items:

1. Netting and cable support system for stadium backstop.
2. Foul Ball poles.
3. Field Equipment.
4. Pitching Rubbers and Bases.

### 1.2 SUBMITTALS

- A. Product data: Submit manufacturer's specifications and installation instruction.
- B. Shop Drawings: Submit shop drawings for the fabrications and installation of stadium game equipment.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products listed below or as approved in writing by the Architect prior to bidding.

### 2.2 MATERIALS:

- A. Backstop Netting: SPECTRA #18, Allied Signal SPECTRA polyethylene fiber, #18, approximate tensile strength per bar is 350 lbs, 3200 denier per ply for a total count of 9,600. Treated to provide additional UV and weather protection.
- B. Backstop cable support system:
1. Cables: All cables to be galvanized IWRC 7 x 19 class or 6 x 19 class.
    - a. End termination allowed:
      - i Swaged wire rope socket
      - ii Mechanical splice sleeve
      - iii Forged wire clips and thimbles
  2. Terminations must handle design loads as engineered by manufacturer.
  3. Cable sizes: See structural drawings for required cable sizes.
    - a. Fittings: Other cable fittings shall be sized to match the load carrying capacity of the cable or design load where the fitting is used. (Turnbuckles, shackles, coupling links, wall brackets, net hold down clips, etc.)



- ## PART 3 - EXECUTION

- XX/XX/20XX

have undivided responsibility for the performance of all component parts. Install cables according to the practices recommended by the Wire Rope Technical Board. Install net so net pattern is horizontal and vertical. Install net to cables by lacing the perimeter of the net to the cable (every other mesh) using treated twine with a tensile strength equal to or greater than the net. Cables shall be free of all kinks and bends. Care shall be taken not to injure or damage cables during installation.

## **11 90 13 - APPLIANCES & EQUIPMENT**

### **PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all Appliances, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture, providing air good circulation.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.
- 1.6 DEMONSTRATION: Appliance supplier shall demonstrate the operation of all appliances to the Owner's staff at a mutually agreeable time.

### **PART 2 - PRODUCTS**

- 2.1 GENERAL: Provide materials which are compatible with any underlying material. Provide all accessories required for a complete and proper installation, as recommended by the manufacturer.
- 2.2 WASHER-EXTRACTOR: Maytag MFR50 208V high performance washer extractor or another product determined by the Architect to be equal & receiving his prior approval.
- 2.3 DRYER: Maytag MDG50MN gas & 208v clothes dryer, or another product determined by the Architect to be equal & receiving his prior approval.
- 2.4 ICE MACHINE: Manitowoc Flake Ice Machine QF400 with self-contained storage, or another product determined by the Architect to be equal & receiving his prior approval.
- 2.5 WHIRLPOOL: Whitehall Manufacturing Model S-110-M Sports whirlpool with seat
- 2.6 CONCESSIONS ICE MACHINE: Manitowoc S-322 Cube Ice Machine with a B-320 storage bin.
- 2.7 CONCESSIONS REFRIGERATOR: Maytag 22 cf Side-by-Side model MCB2256H, stainless steel finish.
- 2.8 CONCESSIONS GAS RANGE: Maytag model MGR5875Q, stainless steel finish.
- 2.9 CONCESSIONS CHEST FREEZER: Kenmore 8.8 cf model 14932, white finish.

### **PART 3 - EXECUTION:**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.

- 3.2      INSTALLATION: Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Provide wood blocking at drywall partitions. Place & attach all components firmly & accurately into position, square, plumb, level, & true. Electrical and Plumbing connections shall be the responsibility of the respective sub-contractors.
- 3.3      PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.

# 11 95 13 - ART ROOM KILN SYSTEM

## PART 1 - GENERAL:

- 1.1 SCOPE: Provide all labor, materials, equipment and accessories needed to provide and install Art Room Kiln System as indicated on the drawings and specifications herein.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 SUBMITTALS: Submit catalog cuts, shop drawings necessary to indicate size, location and methods of attachment within 45 days after commencement date.
- 1.4 DELIVERY, STORAGE AND HANDLING: Deliver materials to jobsite, contractor will be responsible for unloading and storage until materials are ready to be installed.

## PART 2 - MATERIALS:

- 2.1 CERAMICS KILN: Skutt KM1027

MODEL	PHASE	VOLTS	MAXIMUM		CHAMBER			O.D.DIMENSION						POWER		COPPER WIRE SIZE	NEMA RECP. CONF.	BTU'S
KM1027	1	240	CONE	TEMP	DEPTH	OPENING	CU.FT.	A	B	C	D	E	F	AMPS	WATTS	6	6-50	22000
			10	2350	27	23.38	7	32	28.5	2.5	8	17	18	48	11520			

- 2.2 KILN VENTILATION SYSTEM: Provide equal to Skutt EnviroVent Ventilation System to draws out firing odors and vents them outdoors before they enter the studio or classrooms atmosphere. The EnviroVent is UL listed when installed with a Skutt kiln bearing the UL mark and meets local building codes. System to include an integral blower unit in-line switch, stainless steel exit duct, 4" flexible ducting vent to outdoors. Air-cooled motor is UL and CSA listed, 115 V, 1.1 A household current. Will not overheat or shut off from heat of firings. Provide 2 year warranty.

## PART 3 - EXECUTION:

- 3.1 UTILITY COORDINATION: Coordinate & verify that all utility services are provided by other subcontractors or provide those required under the work of this section.
- 3.2 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.3 INSTALLATION: Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Coordinate mounting brackets with steel structure & mount securely. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Place & attach all components firmly & accurately into position, square, plumb, level, & true.
- 3.4 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.

## DIVISION 12 – FURNISHINGS

### 12 21 13 - WINDOW BLINDS

#### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required to provide 1" aluminum louver mini-blinds at the following locations:
  - A. All exterior windows (excluding entries)
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

#### PART 2 - PRODUCTS

- 2.1 BLINDS: Horizontal 1" mini-blinds by "Levolor", SWF Contract, or another product determined by the Architect to be equal & receiving his prior approval. Provide all accessories required for a complete and proper installation, as recommended by the manufacturer. Provide colors/patterns as selected by the Architect from the manufacturer's standard selection.
- 2.2 SUPPLEMENTARY MATERIALS: Furnish and install any supplementary materials, whether or not specifically indicated, required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

#### PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 PREPARATION: Take field measurements before fabrication where possible so as not to delay job progress. Coordinate this work with interfacing work to ensure proper sequencing. Inspect installed work of other trades and verify its completion to a point where this work may continue. The Contractor is responsible for verifying dimensions & conditions; in event of discrepancy, notify Architect prior to installation.
- 3.3 INSTALLATION: Install this work in strict accordance with the original design, and the manufacturer's recommendations as accepted by the Architect. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Place & attach all components firmly & accurately into position, square, plumb, & level.
- 3.4 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, using cleaner recommended by the manufacturer.

## 12 24 14 - ROLLER WINDOW SHADES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes roller shades and motorized shade operators.
- B. Related Sections include Division 26 Sections for electrical service and connections for motorized shade operation.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, details of installation, operational clearances, wiring diagrams, and relationship to adjoining Work.
  - 1. Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.
- C. Coordination Drawings: Drawn to scale and coordinating penetrations and ceiling-mounted items.
- D. Samples: For each exposed finish and for each color and texture required.
- E. Window Treatment Schedule: Use same designations indicated on Drawings.
- F. Maintenance data.

#### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Fire-Test-Response Characteristics: Provide products passing flame-resistance testing according to NFPA 701 by a testing agency acceptable to authorities having jurisdiction.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with WCMA A 100.1.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 ROLLER SHADES

- A. Basis of Design: Design is based on **ThermoVeil 1300 Series** manufactured by MechoShade Systems, Inc. Subject to compliance with requirements, provide products by named manufacturer or comparable products approved by the Architect.

- B. Shade Band Material: PVC-coated polyester.
  - 1. Product: ThermoVeil 1300 Series by MechoShade Systems, Inc. 1300 Series 5% Open.
  - 2. Colors: As selected by Architect from manufacturer's full range
  - 3. Material Openness Factor: Five percent.
- C. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets. Provide capacity for multiple roller shade band(s) per roller.
- D. Direction of Roll: Regular, from back of roller.
- E. Mounting Brackets: Galvanized or zinc-plated steel.
- F. Fascia: L-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; continuous panel concealing front and bottom of shade roller, brackets, and operating hardware and operators; removable design for access.
- G. Top/Back Cover: L-shaped; material and finish to match fascia; combining with fascia and end caps to form a six-sided headbox enclosure sized to fit shade roller and operating hardware inside.
- H. Pocket-Style Headbox: U-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; with a bottom cover consisting of slot opening of minimum dimension to allow lowering and raising of shade and a removable or an openable, continuous metal access panel concealing shade roller, brackets, and operating hardware and operators within.
- I. Pocket with Ceiling Slot Opening: Six-sided box units for recessed installation; fabricated from formed-steel sheet, extruded aluminum, or wood; with a bottom consisting of slot opening of minimum dimension to allow lowering and raising of shade and a removable or an openable, continuous metal access panel concealing rollers, brackets, and operating hardware and operators within.
  - 1. Corner Section: Factory formed and welded.
- J. Bottom Bar: Steel or extruded aluminum. Provide concealed, by pocket of shade material, internal-type.
- K. Mounting: As indicated on Drawings.
- L. Shade Operation: Manual; with continuous-loop bead-chain, clutch, and cord tensioner and bracket lift operator.
- M. Shade Operation: Motorized operator with line voltage hardwired otors with IQMLC controller and 3-button IQMLC switch.

## 2.2 ROLLER SHADE FABRICATION

- A. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F:
  - 1. Shade Units Installed between (Inside) Jambs: Edge of shade not more than 1/4 inch from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed.



2. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- B. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting fascia, headbox, roller, and operating hardware and for hardware position and shade mounting method indicated.
- C. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.

## 2.3 MOTORIZED ROLLER SHADE OPERATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by manufacturer of roller shade.
- B. General: Provide factory-assembled motorized shade operation systems designed for lifting shades of type, size, weight, construction, use, and operation frequency indicated. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with the building electrical system.
- C. Comply with NFPA 70.
- D. Control Equipment: IQMLC; comply with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6 with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.
- E. Electric Motors: UL-approved or -recognized, totally enclosed, insulated motor, complying with NEMA MG 1, with thermal-overload protection, brake, permanently lubricated bearings, and limit switches; sized by shade manufacturer to start and operate size and weight of shade considering service factor or considering Project's service conditions without exceeding nameplate ratings.
  1. Service Factor: According to NEMA MG 1, unless otherwise indicated.
  2. Motor Characteristics: Single phase, 110 V, 60 Hz.
  3. Motor Mounting: Within manufacturer's standard roller enclosure.
- F. Remote Controls: IQMLC, 3-button electric controls complying with NEMA ICS 6, Type 1 enclosure recessed or flush mounting.
- G. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop shade at fully raised and fully lowered positions.
- H. Install IQMLC in a location permitting easy access.

## PART 3 - EXECUTION

### 3.1 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions, and located so shade band is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.
- B. Connections: Connect motorized operators to building electrical system.

- C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- D. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

### 3.2 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roller shades. Refer to Division 01 Section Demonstration and Training."

## 12 24 15 - MOTORIZED SHADES

### PART 1 - GENERAL:

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required to provide motorized shades as shown & needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.

### PART 2 - MATERIALS

#### 2.1 MOTORIZED SHADES

- A. Manufacture: Motorized FlexShades by Draper, Inc., 411 South Pearl Street, Spiceland, Indiana 47385-0425; 765-987-7999. Manufacturers of equivalent products submitted and approved
- B. Electric Operator: Drive unit inside roller, 3-wire, instantly reversible, lifetime lubricated. Right hand standard. Adjustable limit switches, thermal overload protector and electric brake. Operates on 110-120V AC 1 PH 60 HZ current. Draws 1.2 AMP.
- C. Rollers: Size - 2" dia. with .080 wall, in steel or extruded aluminum.
- D. Mounting Brackets: 1018 plated steel stamping. Sizes 1 5/8" and 2 1/4". Styles for mounting to wall, ceiling, or jamb. Brackets do not require additional adapters.
- E. Roller Idler Assembly: Type 6/6 injected molded nylon and a zinc-plated cold rolled steel pin. Sliding pin for easy installation and removal of the roller.
- F. Slat: Aluminum, min. 1/8" x 1", encased in heat seamed hem.
- G. Endcaps: 1028 steel stamping. 2 sizes: 3 1/4" x 3 3/4" and 4 1/2" x 4 1/2". Complete with adapter roller bracket. Installs to wall, ceiling, or jamb. Accepts snap-lock fascia or headbox. Clear anodized, black, white, ivory, or Charcoal bronze baked enamel finish available.
- H. Fascia: L-shaped cover of extruded aluminum, .060 wall. Snap-lock assembly to endcaps without exposed fasteners. Clear anodized, black, white, ivory, or charcoal bronze baked enamel finish available.
- I. Headbox: Standard consists of fascia and L-shaped back/top cover. Optional, for pocket installation, includes a U-shaped back/top/front cover with removable bottom closure panel.
- J. Pocket Boxes: Shade pockets, Type D to be fabricated of 6063-T5 aluminum alloy for perimeter installation. Accepts FlexShades installed with ceiling brackets. Type D finished in white paint. 4 5/8" x 4 1/2" x .125" with tile support lip and removable bottom closure.
- K. Coupler Assembly: Coupler: Type 6 nylon. Coupler pins: 1018 zinc plated steel. Coupler brackets: 1018 Zinc plated steel painted white with center steel bushing. Allows for one motor to drive up to 2 additional shade rollers. Overall width of group not to exceed 30'. Coupler assembly to fit 2" or 3" dia. rollers with adjacent rollers of the same diameter.

- L. Fabrics: Series SW3000 SheerWeave (old SW2400): Vinyl coated fiberglass and vinyl coated polyester woven into a 63 x 15 mesh. 14.8 oz./sq. yd., .027" thick. Flame retardant rating: Meets NFPA 701 Small Scale and Large Scale. 72" roll width. Avg. 14% open. Colors available: Mushroom Sand, Pearl White, Custard Cream, Mauve, Pale Grey, Spanish Grey, Dusty Grey, Ninja Grey, Chocolate, Sand Dollar, Espresso, Honey Sage, Black Forest, Mossy Green, Harvest Wheat.

- 2.2 SUPPLEMENTARY MATERIALS: Furnish and install any supplementary materials, weather or not specifically indicated, required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

**PART 3 - EXECUTION:**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 PREPARATION: Take field measurements before fabrication where possible so as not to delay job progress. Coordinate this work with interfacing work to ensure proper sequencing. Inspect installed work of other trades and verify its completion to a point where this work may continue. The Contractor is responsible for verifying dimensions & conditions; in event of discrepancy, notify Architect prior to installation.
- 3.3 INSTALLATION: Install this work in strict accordance with the original design, and the manufacturer's recommendations as accepted by the Architect. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Place & attach all components firmly & accurately into position, square, plumb, & level.
- 3.4 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, using cleaner recommended by the manufacturer.

## 12 35 50 - LIBRARY CASEWORK

### PART 1 - GENERAL

#### 1.1 SCOPE

- A. All library casework, tops, fillers and accessories.
- B. Submittals and shop drawings.
- C. Related work
  - 1. Rough carpentry: Grounds and blocking.
  - 2. Finish carpentry.

#### 1.2 QUALITY ASSURANCE

##### A. STANDARDS:

- 1. The latest edition of the "Quality Standards" and "Architectural Casework Details" of the Architectural Woodwork Institute shall apply and by reference are hereby made a part of this specification. Any reference to Premium, Custom or Economy In the specification shall be as defined in the latest edition of the AWI "Quality Standards". Any item not given a specific quality grade shall be Custom grade as Defined in the latest edition of the AWI "Quality Standards".
- 2. All charging desks, carrels and shelving shall be constructed and finished in one plant. If any of this work is to be sub-contracted to other firms this information shall be so specified in the bid. The reason for this requirement is so that careful attention can and shall be given to the close matching of wood finish and veneers by direct supervision of one (1) Library Furniture Manufacturer.
- 3. The library casework supplier shall be a manufacturer technically proficient and experienced in the production of quality casework. Manufacturers seeking approval to bid shall submit evidence prior to approval to bid of adequate plant, equipment, manpower and experience to produce the quality of casework specified and deliver on schedule. Units of the following manufacturers are acceptable, conditional to meeting intent and requirements of the design and specifications:
  - a. Brodart Manufacturing, 280 North Road, McElhatten, PA 17748
  - b. The Worden Co, P.O. Box 915C, Holland, Michigan 49423
  - c. Library Bureau, 172 Industrial Road, fitchburg, MA 01420-0004

#### 1.3 SUBMITTALS

##### A. SHOP DRAWINGS

- 1. Submit in accordance with section 01 33 23. Indicate materials, species, construction, sizes, shapes, quantities, location and conditions of adjoining work. Show items in related or dimensional position with sections or details shown either full size or 3" = 1'0" scale.

2. Units illustrated on the Plans or schedule generally follow the designs shown in casework catalogs. Variations of dimensions that are necessary within +/- 1/2" deviations from what is shown are acceptable, provided that they do not affect the function or quantities shown, or the strength or stability of the unit.
3. Field verify dimensions of cabinet locations prior to fabrication.

B. CATALOGS

1. Submit casework manufacturer's catalog showing materials, component profiles, fastening methods, assembly methods, joint details, accessory listings including hardware and schedule of finishes.

C. SAMPLES

1. Submit samples of laminated plastic and each species of solid wood and plywood for Architect's selection and approval. Identify each sample species, cut, and grade. Submit samples of miscellaneous hardware if requested by Architect. Submit finished samples of each finish to be applied at factory.

1.4 FIELD DIMENSIONS

- A. The library casework manufacturer is responsible for details and dimensions not controlled by job conditions and shall show on his shop drawings all required field measurements beyond his control. The general contractor and the casework manufacturer shall cooperate to establish and maintain these field dimensions.

1.5 PRODUCT HANDLING

- A. Deliver, store and handle casework in a manner to prevent damage and deterioration. Do not deliver until building or storage area is sufficiently dry so that casework will not be damaged by excessive changes in moisture content. Maintain relative humidity in storage areas so that the woodwork will not be damaged by excessive changes in moisture content.

1.6 WARRANTY

- A. Provide manufacturer's written warranty guaranteeing all materials and workmanship for a period of five years from date of project Substantial Completion. Defects reported within the guarantee period will be promptly corrected without charge to the Owner.

PART 2 - PRODUCTS

- 2.1 (FIVE PLY) SOLID NORTHERN HARDWOOD LUMBER CORE - Solid northern hardwood lumber core panels must be constructed of good grade, full strip or finger jointed hardwood strips cut in random widths of 1" to 3" and bonded with water resistant adhesive. Lumber Core must consist of no more than five plies of material. The core shall be covered on both sides with a veneer layer applied at right angles to the core to maintain flatness. A final layer of northern red oak veneer shall be applied to both sides parallel to the core stock.
- 2.2 (SEVEN PLY) SOLID NORTHERN HARDWOOD VENEER CORE - Solid northern hardwood veneer core panels must be constructed of an odd number of hardwood veneer plies with face and back northern red oak veneers. Each ply is applied at right angles to the grain of the adjacent ply to resist warping. All plies are to be hardwood free from blisters, wrinkles, laps and other defects.
- 2.3 (THREE PLY) STRUCTURAL PANEL CORE - Solid structural panels must be constructed of wood chips bonded with a water-resistant adhesive. These solid cores of no less than 45 lb. medium density fiberwood (MDF) or particleboard (MDP) must have northern red oak veneers applied on exposed panels. The physical properties of these cores must meet or exceed American National Standard specifications ANSI 208.1 and/or ANSI 208.2.

- 2.4 HIGH PRESSURE LAMINATE - Where specified for work or top surfaces, high pressure laminate must be .050" thick and used with an appropriate backer sheet. High pressure laminate shall be of maximum hardness to resist scratches, marring, fading, staining, etc. and shall comply with performance standards set by the National Electric Manufacturers Association. NEMA-LDI-1964, LD-3 GP50.
- 2.5 HARDBOARD - Where specified, hardboard must be composed of compressed wood fibers, pressed by hydraulic pressure into homogeneous sheets of 1/4" in overall thickness.
- 2.6 HARDWARE - Must be of modern design, constructed to meet the requirements of institutional furniture equipment.
- 2.7 JOINERY - All joints are of traditional furniture construction such as bore and dowel or cleat reinforced. All joints are glued, pinned, and/or screwed.
- 2.8 WOOD - All hardwood is Northern grown and free of imperfections. After slow air-seasoning, it is carefully kiln-dried to a moisture content of 5-7%. Glued-up panels will have two surfaces faced and will be uniform in color, using random widths not less than 1" or more than 4". Wood Species - All exposed wood is Northern-grown grade "A" red oak selected for uniformity of grain and color. Plywood will be constructed with an odd number of plies to resist warpage. All inner plies will be sound and cross-banded. Face veneers will be selected for uniformity of grain and color on one or both sides, as design of each item requires. Veneered Particleboard - Veneered particleboard will be constructed with an odd number of plies to resist warpage. The inner core will be 45# density particleboard, rated M-2 or better. Face veneers will be selected for uniformity of grain on one or both sides, as design of each item requires. Lumber Core - Lumber core shall be 5-ply of the best grade with tight glue joints and controlled strip width to minimize warpage. Lumber core table and carrel tops shall be 1-3/16" thick, 5-ply construction meeting American National Standards Institute, Inc. standards for "Clear Grade". Center Core of Lumber Core Panel - will be constructed of wood strips 1" thick and not less than 4" wide. Wood strips will be "full length" of the panel, with no butt end joints, and will run the longest dimension of the panel. The wood strips will be free of knots or other defects. All wood strips shall be glued together on all edges to form "tight joint" construction, creating a "solid core" panel. Panels will be made of solid poplar hardwood. Cross Bands of Lumber Core Panel - shall be of a minimum 1/10" thick poplar, applied to the top and bottom of the center core, with grain direction at a 90 degree angle to the grain of the center core. Plastic Laminate - Plastic laminate for work surfaces will be .050" thick balanced by a backing sheet not less than .020" on the reverse side to prevent warpage. Only lo-glare finish will be used to provide low reflection surface with a gloss meter reading of 4-10 machine direction. All laminate will be bonded to core with contact cement under high-pressure. Laminate used meets or exceeds National Electrical Manufacturers Association (NEMA) standards.
- 2.9 FINISHING PROCEDURE - Prior to the finishing operation all furniture shall be hand sanded, cleaned, and inspected for imperfections. The furniture shall be treated with a pre-stain conditioner to promote surface penetration of special-formulated stains designed for maximum penetration and adhesion. Selected stain shall be applied on all visible surfaces in a uniform manner and allowed to dry. Catalyzed conversion sealer shall then be applied, allowed to dry, and is then sanded. Furniture is inspected for imperfections prior to application of top coat. A top coat of catalyzed conversion varnish shall then be applied.
- 2.10 FURNISHING
  - A. UL LISTED - Furniture is listed under UL standard QAWZ for office furnishings and has earned a UL Listed label. Included in this listing are tables, access furniture, carrels and circulation desks, as well as the power-entry and power-distribution assemblies that are required to electrify them.
    1. UL listed furniture has been tested by Underwriters Laboratories and found to be in compliance with applicable UL Standards for Safety. UL has examined the materials and construction methods and has conducted flammability and stability tests to reach this determination.
  - B. SHELIVING - Shelving construction will be modular type, utilizing all natural hardwoods. No particleboard or synthetic materials will be used. Shelving units are designed with the starter and adder concept and will measure 36" from center to center of the uprights.

- C. END PANELS - Oak end panels will be 1" thick, 7-ply hardwood veneer-core. All exposed vertical edges and 42", 48", and 60 -/2" high top edges are banded with matching solid hardwood. Edges will be square, but eased. Vertical rows of holes will be drilled near the front and the rear of each panel for shelf adjustment on 32mm centers. Panels will be drilled at front and rear, top and bottom for embedding internally and externally threaded bushings. Tops and bases will be attached to end panels with 5/16" - 18 x 6" hex-head bolts, nuts and washers.
- D. INTERMEDIATE UPRIGHTS - Intermediate uprights will be 3/4" thick, of solid-oak hardwood glued up in flush panel design. Random width boards, no more than 4" or less than 1" will be used. Edges will be square, but eased. Shelf pinholes will be bored on both sides of the panel and will be staggered so that pins can be deeply seated without coinciding with the pinholes on the opposite side. Clip and metal strip style shelf attachments are available if specified. Panels will be drilled through at front and rear, top and bottom, for attachment of tops and bases with 5/16" 18 - 4" hex-head bolts, nuts, and washers.
- E. CORNICE TOPS - Cornice tops will have a 2-1/4" fascia, 3/4" thick, of solid oak banded to a 3/4" plywood panel of specified depth. The top front corner of the fascia will have a 1/8" radius. On the inside surface of the top at each end, butted to the fascia, a solid hardwood bolting cleat 1-1/4" x 1-1/4" will be both glued and stapled. For additional strength, glue blocks will be added at the intersection of the cleats and top panel as well as at the intersection of the fascia and top panel. Bolting cleats will be drilled to allow assembly bolts to pass through.
- F. INDIVIDUAL PLASTIC CORNICE TOPS - Cornice tops will have a 2-1/4" fascia, 3/4" thick, solid oak banded to a 3/4" 3-ply 45# density particle board core, that consists of a top surface of .050" thick high pressure laminate, with a backing sheet not less than .020" thickness for balanced construction. Plastic laminate will have a lo-glare finish, being resistant to scratches, fading, staining, etc. Plastic laminate will meet or exceed NEMA standards.
- G. BASE - The base front will be 4" high and 1/2" thick solid oak. A 2" x 3/4" rail will be tenoned full-length to the inside of the front. Bolting cleats 2-1/4" x 1-1/4" will be glued and stapled perpendicular at the ends of the rail and will be drilled to allow assembly bolts to pass through. A second full-length rail will be glued and stapled to the rear of the bolting cleats for support and proper alignment. Bases will be made so that the base shelf rests on the bolting cleats and sets behind and flush with the top of the base front.
- H. SHELVES - Shelves will be 3/4" thick of solid, glued-up hardwood. Each shelf will have a 2" nosing of solid, Northern-grown red oak. Random widths no more than 4" or less than 1" will be used. To ensure adequate support for heavy volumes, no substitute for solid hardwood should be permitted. Adjustable shelves will be grooved 11/32" diameter half round on the underside to set firmly on the 1" long, 5/16" diameter shelf pins, which are cadmium-plated and threaded
- I. ATTACHMENT - Four bolts will be used to attach each single-faced base or top, except for 16" deep single-faced units, on which six bolts will be used. Eight bolts will be used to attach each double-faced base or top. All hardware will be concealed from view after assembly. Each single-faced unit will be supplied with a metal bracket, lead anchor and screws for fastening to the wall. Double-faced ranges that do not have partitions will receive two steel sway bars 53" long and 5/16" square. These attach to each end panel and the next intermediate panel with screws.

## 2.11 CIRCULATION DESK/ MODULAR DESK WITH CONTINUOUS DESKTOP APPEARANCE

- A. TOPS - Tops will be 1 3/16" thick, 3-ply particleboard core, including a top surface of .050" thick, high-pressure laminate, with a backing sheet not less than .020" thickness for balance construction. The plastic laminate shall have a lo-glare finish and shall be resistance to scratches, fading and staining in accordance with NEMA standards. Edges will be solid Northern-grown red oak with a bullnose shape. Edges will be applied to the top after the top laminate sheets are applied consisting an external edge band.
- B. END PANELS - End panels will be 1 3/16" thick, comprised of select face veneers of Northern-grown red oak over a particleboard core. The panel will be externally banded on two edges with a 5/8" x 1 3/16" oak edge band shaped to



match the bullnose of the desk top. Top and bottom of end panel will be banded with a 1/8" x 1 3/16" edge band with the edges eased.

- C. FRONT PANELS - Front panels will be 3/4" thick, comprised of select-face veneers of Northern-grown red oak over a particleboard core, with a 1/16" veneer band along the bottom edge.
- D. DRAWERS - Drawers will be constructed of all hardwoods with full extension slides with either 50 or 100 lb. load capacity. File drawers are letter size and will have hangers to conveniently support hanging files. Drawer fronts will be 3/4" thick, comprised of select plain-sliced face veneers of Northern-grown red oak over a 45# density particleboard core; all edges will be banded with 1/16" veneer bands to match the face veneers.
- E. DEPRESSIBLE BOOK TRUCK - The Depressible Book Truck fits under 32" high circulation desk. Construction will be 3/4" edge-banded plywood in flush panel design. The depressible platform will be plastic laminated and mounted on a spring mechanism, and shall have nylon rollers mounted into all four edges for ease of operation and stability. The truck will be supplied with four heavy duty 3" swivel casters mounted to solid hardwood caster blocks. The unit will hold approximately 40 average size books.

## 2.12 LIBRARY TABLES

- A. TABLETOP - Standard tabletops shall be 1 3/16" thick, 5-ply lumbercore, including a top surface of .050" thick, high-pressure plastic laminate, with a backing sheet not less than .020" thickness for balanced construction. Plastic laminate shall have a lo-glare finish and shall be resistant to scratches, fading and staining in accordance with NEMA standards. Edges will be solid Northern-grown red oak, radiused 3/4" on top and bottom, forming a half-round bullnose shape. Edges will be applied to the core after the top and bottom laminate sheets are applied, (External Edge Band). Drop edge band will be 1" thick x 1 5/8" wide and will extend 3/8" below the core. Square and rectangular tabletop edge bands shall be mitered at the corners, with corners radiused 1/8"
- B. LEGS - Legs will be glued up, 2 1/4" square solid Northern-grown red oak. All vertical edges of legs will receive a 1/2" radius. Bottom edges of legs will be radiused 1/8". Each leg will have a 2" diameter, adjustable glide mounted in a recessed tee-nut. The glide is further recessed into the leg by means of a counter-sunk boring which accepts the upper two-thirds of the glide. Legs will attach to tabletops by means of a 5" square x 5/16" thick cold-rolled steel plate. The plate is attached to the leg by a 5/16" x 2 1/2" machine bolt engaging a 5/8" diameter barrel nut inserted into the leg. The steel plate is attached to the tabletop by five 5/16" x 1" machine bolts engaging internally and externally threaded bushings in the underside of the tabletop. Leg plates will be positioned behind, and be hidden by, the extended table edge band.
- C. TABLETOP SUPPORT - For maximum rigidity, rectangular tables, 60" or more wide, will receive a V-shaped, 14 - gauge steel keel securely fastened to the underside of the tabletop. Tables 48" deep and more than 60" wide will receive two steel keels parallel to the length of the table. Tables 90" or wider will receive two extra legs located under the center of the table to provide added support.
- D. TABLETOP HEIGHT - ADA table will be 32" high (adult height), and student tables shall be 29" heights.

- 2.13 COMPUTER WORK STATIONS - Work stations shall be of modular starter and adder design, with 33" overall height. Work stations are available in 36", 48", 72", 96", and 108" widths. A knee-space panel located below the work surface will support all work surfaces greater than 48" wide. Work surface height shall be 27 1/2". Work surface depth shall be 27 1/2" with an additional 1 1/2" wide cord drop between the work surface and back panel to allow passage of electrical cords. Work surface shall be attached to end and intermediate panels by means of two metal 22 1/2" long "Z" brackets with 5/16" - 18 hex-head bolts engaging internally and externally threaded bushings embedded into panels. The back panel shall be attached to end and intermediate panels using hidden metal keyways and shoulder screws. The shelf shall be attached to end and intermediate panels and back panels with 3/4" x 3/4" steel, angle brackets painted black, and #8 black screws.

- 2.14 WORK SURFACE - Standard work surfaces shall be 1 3/16" thick, 3-ply, 45# density particle board, including a top surface of .050" thick, high-pressure plastic laminate, with a backing sheet not less than .020" thickness for balanced construction. Plastic laminate will have a lo-glare finish, being resistant to scratches, fading, staining, etc. Plastic laminate will meet or exceed NEMA standards. Front edge of work surface shall have a 5/8" x 1 5/8" solid oak edge band in a half-round bullnose shape. The back edge of the top shall have a black metal band 1 1/2" wide which shall project above the work surface 1/4" to act as a retainer.
- 2.15 END AND INTERMEDIATE PANELS - End and intermediate panels shall be 1 1/8" thick, 45# density particleboard core with select face veneers of Northern-grown red oak. All edges shall be banded with a 1.7mm solid oak edge band. Intermediate panels shall receive a 3" diameter grommet below the work surface to allow passage of electrical and data wires. Each panel shall receive two 1 1/4" adjustable glides.
- 2.16 BACK PANEL - Back panel shall be 3/4" thick, 45# density particleboard core with select face veneers of Northern-grown red oak. The top and bottom edges shall be banded with a 1.7mm solid oak edge band. Back panels shall attach to end and intermediate panels by means of recessed metal fasteners and shoulder screws. The back panel on double-faced units shall receive a 3" diameter grommet located below the work surface to allow passage of electrical and data wires.
- 2.17 SHELF - Shelf shall be 3/4" thick x 8" deep 45# density particleboard core with face veneers of select Northern-grown red oak. Shelf shall be banded on the front edge with a 1.7mm solid oak band. Shelf shall attach to end and intermediate panels by means of a pair of metal "L" brackets. Back corners of shelf shall have a 3" x 3" cutout to allow for the passage of electrical cords. The shelf shall be positioned 10" below the bottom of the work surface.
- 2.18 WIRE MANAGEMENT DOOR - The wire management door will be positioned between the bottom of the work surface and the shelf, and is designed to form a concealed wire management channel 8 1/2" high x 9 1/2" deep. The door is 1/4" thick with select oak face veneers. The door will slide in two aluminum tracks, one that is attached to the bottom of the work surface while the other is attached to the top of the shelf.
- 2.19 KNEE-SPACE PANEL - All 72" and 96" wide workstations, as well as functional corner units, shall have a knee-space panel positioned under the work surface for additional work surface support. Units 108" wide shall have two knee-space panels. The knee-space panel shall be 1 1/8" thick 45# density particleboard core with select face veneers of Northern-grown red oak. The panel shall be banded on exposed edges with a 1.7mm solid oak band. The knee-space panel shall attach to the back panel using a 1 3/4" square solid oak post, grooved to deceive the knee space panel and back panels. Panels shall attach to the post using recessed metal fasteners and shoulder screws. The knee space panel shall attach to the bottom of the work surface using metal angle brackets and wood screws. The knee-space panel shall be angled in the back to create a space to allow passage of electrical and data cords. The knee-space panel shall receive two 1 1/4" diameter black adjustable glides.
- 2.20 LOUNGE SEATING - Frame shall be solid oak upholstered with grade 200 fabric. Solid oak arms shall have a radius arc design with radius top cushions. Seats and backs shall be replaceable.
- 2.21 LOUNGE TABLE - Lounge table shall have a solid oak frame with a laminate top. Top shall have a radius solid oak edge band. Style of lounge tables shall coordinate with lounge seating for consistency of appearance. Table shall be 32" x 32" x 18"H.
- 2.22 SLED BASE CHAIRS - Chairs shall have a solid oak frame with steel slug and bolt connecting the back post to the side seat rail. Chairs shall utilized multiple dowel and crossbraces for connecting members. Seat shall have a flexalator spring suspension unit to support the occupant covered with a dense foam pad and specified upholstery. Back shall be radiused and replaceable. Chairs shall be sled base design with Grade 200 fabric. Chairs shall have an 18" seat height.

### PART 3 - EXECUTION

#### 3.1 INSPECTION

- A. Verify that the existing conditions are ready to receive work.

- B. Beginning of installation shall mean that installer accepts existing conditions.

### 3.2 INSTALLATION

- A. Install items in accordance with manufacturer's instructions and recommendations. Provide all hardware necessary to secure and install all items.
- B. Allow for connection of electrical work. Coordination of all contractors involved is required.
- C. Coordinate with related items such as blocking and furring.
- D. All shelving and other furniture shall be carefully adjusted to the floor and leveled. Wall shelving shall be attached to the walls at the most inconspicuous locations and in a manner to ensure a secure attachment.
- E. Install plumb, level true and straight with no distortions. Where equipment abuts other furnished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, top closures and moldings as indicated or required, and finish to match.
- F. Anchor cabinets securely in place with concealed (when doors and drawers are closed) fasteners, anchored into structural support members or wall construction. Comply with manufacturer's instructions for support of units.
- G. Complete hardware installation and adjust doors and drawers for proper operation.
- H. Modular Shelving: install all adjustable shelves at equal spacing unless otherwise indicated.

### 3.3 CLEANING AND PROTECTION

- A. Repair or remove and replace defective work as directed upon completion of installation. Verify that moving parts are operating freely.
- B. Clean exposed and semi-exposed surfaces, polish all wood surfaces, touch-up as required or replace components as necessary to eliminate evidence of damage or deterioration.
- C. Protection: Advise contractor of final protection and maintained conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

## 12 35 53 - LABORATORY CASEWORK

### PART 1 - GENERAL

- 1.1 GENERAL: Furnish all labor, materials, tools, & equipment as required for Wood Science Laboratory Casework & Equipment, as shown on the Drawings, specified herein, and as needed for a complete and proper installation. The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.2 WORK BY LABORATORY EQUIPMENT CONTRACTOR
  - A. Furnishing, delivering to the building, uncrating, setting in place, leveling and anchoring all Casework and Equipment listed in the specification and/or shown on the drawings/Equipment Schedule.
  - B. Furnishing plumbing fixtures and fittings as defined within the specifications, complete with tank nipples and lock nuts for securing fixtures and fittings to tops. Installation will be by other respective trades as a part of their final connections.
  - C. Furnishing electrical service fixtures directly attached to the Casework or Equipment as called for within the specifications, or as shown on the drawings/Equipment Schedule. All electrical boxes and receptacles shall be supplied only, not attached or assembled. Installation will be by other respective trades as a part of their final connections.
  - D. Furnishing sink bowls and cup sinks, complete with required overflow, plugs, strainers, and tailpieces as called for within the specifications, or as shown on the drawings/Equipment Schedule. Sinks supplied, not attached or assembled. Installation will be by other respective trades as a part of their final connections.
  - E. Furnishing and installing filler panels and scribes as required for a finished installation.
  - F. Removing all debris, dirt, and rubbish accumulated as a result of the installation of this Equipment, leaving premises broom clean and orderly.
  - G. FURNISHING ALL FUME HOOD EXHAUST BLOWERS.
  - H. PROVIDE ELECTRICAL BOXES IN LAB CASEWORK.
  - I. FURNISHING ALL SCIENCE LAB EQUIPMENT SHOWN IN THE DRAWINGS.
- 1.3 OTHER WORK IN CONSTRUCTION CONTRACT
  - A. Furnishing, installing, and connecting of all vents, revents, and special plumbing fixtures or piping to meet local codes, even though not specifically called for in the specifications and/or shown on the drawings.
  - B. Furnishing and installation of all rigid or flexible conduit, wire, pulling of wire, fittings and special electrical equipment and accessories, including receptacles, and cover plates shipped loose. All shall be installed in accordance with local codes even though not specifically called for in the specifications and/or shown on the drawings.
  - C. Providing framing and reinforcements of walls, floors and ceilings necessary to adequately support the Equipment, and all bucks and plaster grounds required for proper installation of Equipment.
  - D. Installation of base molding as provided by the Laboratory Equipment Contractor to be installed by the flooring Contractor.
  - E. Furnishing any miscellaneous materials, generally classified as maintenance or supply items.

- F. Providing protection and security during and after Laboratory Equipment installation.
- G. The General Contractor shall provide hoisting or elevator services at no charge to the Laboratory Equipment Contractor.

#### 1.4 STRICT COMPLIANCE

- A. All sinks shall be of the drop-in design approved by cabinet manufacturer. All sink sizes shall be as indicated within the Equipment Schedule or as shown on the drawings.
- B. All service fixtures shall be of vandal resistant design. All fixtures shall be equal to the Chicago Faucet Company VR-1 ALEF design, or the Sheldon Unicast/Unimix design. Provide all fixtures with vacuum breaker & aerator.
- C. All plywood not exposed to view shall be of hardwood Birch veneer, Sound Grade 2 or better. Plywood allowing knots, repaired knots, worm holes, or other defects will not be allowed.
- D. All manufacturers shall comply with the minimum SEFA (Scientific Equipment & Furniture Association) Recommended Practices for Laboratory Furniture, Casework, Shelving and Tables according to the SEFA 8-1999 publication. All manufacturers shall submit a signed copy of the SEFA Laboratory Furniture Certificate of Performance with all supporting documentation, indicating their proposed products comply with the above minimum testing performance standards ten (10) days prior to the day of the bid.

#### 1.5 QUALITY ASSURANCE

- A. It is the intent of this specification to identify both performance requirements of casework as well as certain material and hardware that shall be provided for laboratory casework. Performance requirements shall be based on furnishing laboratory furniture in accordance with the "Recommended Practices" for casework, shelving and tables as outlined in the SEFA-8-1999 publication. Materials and hardware shall be provided as outlined in the specification.
- B. The specifications and drawings define and show the essential minimum requirements as to the quality of materials, hardware, finish, construction, design, functions and overall workmanship of the Casework and Equipment. All Casework and Equipment must strictly comply with these specifications.
- C. Where a definite material or manufacturer is specified, it is not the intent to discriminate against any product of another manufacturer. However, it is the intent to provide for the Owner a quality and educationally functional installation of laboratory equipment and casework, and to exclude laboratory equipment and casework, which does not comply with this specification.
- D. Minimum standards are set forth herein. Laboratory Equipment and Casework manufacturer (s) are cautioned that only Equipment meeting the standards set forth in this specification will be acceptable.
- E. Casework and Equipment manufacturer shall have been manufacturing Science Laboratory Casework for a minimum of ten (10) years.
- F. Construction of Casework and Equipment shall be within the requirements for accessibility as required within the Equipment Schedule or shown on the drawings, and as governed by the "Federal American with Disabilities Act (ADA)". The successful bidder shall be responsible to ensure compliance with applicable accessibility codes. Items where noted, shall be manufactured as described, with all materials and functions per this specification.
- G. Any bidder proposing to supply Casework and Equipment differing from these standards must clearly state in writing how the Laboratory Casework and Equipment he proposes to furnish differs from the specification requirement. The burden of proof of the proposed change, modification, or substitution is upon the bidder. The Owner's decision of approval or disapproval of the proposal shall be final. Bidders shall not rely upon approvals made in any other manner.

- H. If a bidder does not provide written documentation, it shall be rightfully construed as based upon supplying the essential requirements, design, construction, and materials as defined within this specification.
- I. The Owner, or his designated representative, reserves the right to reject any proposal offering Casework and Equipment, which in his opinion does not meet the standard of quality, established by this specification. Any such decision will be considered final and not subject to further recourse.
- J. Should a supplier provide materials or shop drawings where it is evident they do not comply with the specification and the order be canceled, it is the supplier's responsibility for all expenses incurred.
- K. Catalogs of Sheldon Laboratory Systems, Inc., Crystal Springs, MS, have been used for the purpose of identification, function and design. Where such catalog designations are given for the items of Casework and Equipment, these items shall be complete as described and shown in the catalog, unless exceptions are especially mentioned in the Equipment Schedule or described within these specifications.
- L. The listed manufactures' Casework and Equipment have been determined to be representative of the requirements of the Owner. Casework as manufactured by Sheldon Laboratory Systems, Inc., Crystal Springs, MS. Casework and Equipment of other manufacturers shall be approved. However, approval will be subject to compliance with the minimum standards as established by this specification. All manufacturers' standard specification shall be modified as required to include construction, hardware, finish and operating features herein specified.

#### 1.6 SUBMITTALS

- A. Certificates
  - 1. Submit laboratory certificate of performance to SEFA-8 testing. Certificates shall certify that the laboratory furniture proposed for this project has been tested in conformance with the full requirements of the SEFA-8 recommended practice. SEFA-8/1998 form F1, F2, and F3 shall be submitted with the shop drawings, signed by an office for review and approval by the Architect/Owner.
  - 2. Submit notarized test reports on each different top material specified.
- B. Shop Drawings
  - 1. Submit shop drawings for Casework and Equipment showing plans, elevations, end cross-sections, service run spaces, location and type of service fixtures with lines thereto, based upon actual measurements obtained in the field.
  - 2. Show details and location of anchorages and fitting to floors, walls, and bases.
  - 3. Include layout of units with relation to surrounding walls, doors, windows, and other building components.
  - 4. Coordinate shop drawings with other trades involved.
- C. Samples (To be submitted within 14 days if requested for Owner review and consideration.)
  - 1. Submit 4" x 4" samples of specified finishes, including top materials; all samples will be reviewed by the Owner, for color, texture, and pattern. Compliance with other specified requirements is the exclusive responsibility of the supplier.
  - 2. Submit one (1) full sized sample of a finished base cabinet with one drawer and cupboard below with adjustable shelf, complete with all hardware and without finished top.

3. Submit one (1) vandal resistant gooseneck fixture as proposed, with vacuum breaker and aerator for cold water and gas services.
  4. Submit one (1) vandal resistant gooseneck fixture as proposed, with vacuum breaker and aerator for hot and cold-water services.
  5. Submit detailed drawings/samples for the proposed student laboratory station/stations. Include notations/details indicating compliance with this specification.
- D. Sample approval requirements
1. The Contractor shall not award subcontract to the Laboratory Equipment supplier until the architect has approved the submitted samples and certificates. The supplier will be permitted only one submission of samples.
  2. Samples are not limited to the above list.
  3. All samples shall be submitted to the Architect/Owner to demonstrate the supplier's ability to furnish the required Laboratory Casework and Equipment furnishings in accordance with this specification.
  4. Acceptable sample units will be retained and used for comparison inspections during the installation process completion and acceptance of the work.
  5. Failure to comply with the submittal requirements will be sufficient grounds for rejection of the bid.
  6. Remove sample units from the premises when directed by the Owner.

## PART 2 - PRODUCTS

### 2.1 MATERIALS - GENERAL: The following definitions apply to Laboratory Casework and Equipment:

- A. Exposed portions of Casework include all surfaces visible when doors and drawers are closed. Bottoms of cases more than 4'-0" above the floor shall be considered exposed. All visible members in open cases or behind glass doors shall be considered as exposed portions.
- B. Semi-exposed portions of Casework include those members behind opaque doors, such as shelves, divisions, interior faces of ends, dust panels, drawer sides, bottoms and the back face of doors. Top of cases 6'-6" or more above the floor shall be considered as semi-exposed.
- C. Concealed portions of Casework include backs, sleepers, web frames, toe spaces, bottom underside, and other surfaces not usually visible after installation.
- D. Cabinet bodies at sink base units & all counter tops to be exterior grade plywood core.

### 2.2 CASEWORK CONSTRUCTION - MINIMUM REQUIREMENTS

- A. All manufacturers are cautioned, the Laboratory Casework and Equipment is not necessarily the standard of any one manufacturer. All manufacturers shall adhere to this specification, even though such construction features may vary from their standard construction or design practices. Bids based upon "Manufacturer's Standard" will be rejected.
- B. Cabinets and cases shall be assembled in accordance with Laboratory Grade Casework construction methods using reinforcing at all major points of strain, properly glued and further reinforced with screws, or steel power lock pins.

- C. All cabinets, cases, tables and other units shall be of the size and configuration indicated on the drawings and/or Equipment Schedule.
- D. Cabinet End Panels: 3/4" thick, 7-ply solid core, hardwood plywood with the exposed edge having a 3 mm solid Oak banding.
- E. Vertical Partitions: 3/4" thick, 7-ply solid core, hardwood plywood with the exposed edge having a 3 mm solid Oak banding.
- F. Top Frame - Base Cabinets: 2" x 1-1/4" solid Oak rails front and back, grooved to receive 1/4" diameter thru-bolt and cross rails. Cross rails are 2" x 1" solid hardwood fully housed into front and back rails with mortised and tenoned joints to form a full four-sided top frame.
- G. Top Rail - Sink Cabinets: 2" x 1-1/4" solid Oak top front rail grooved to receive 1/4" diameter thru-bolt. Back rail of identical material installed mid-way to receive removable back panel and allowing plumbing chase at the back of the cabinet.
- H. Bottom Frame - Base Cabinets: 2" x 1-1/4" solid Oak rails front and back, grooved to receive 1/4" diameter thru-bolt and 1/2" thick, 5-ply solid core, hardwood plywood bottom panel. Panel fully housed into front and back rails with mortised and tenoned joints to form a totally solid and rigid assembly.
- I. Bottom Frame - Sink Cabinets: 2" x 1-1/4" solid Oak rails front and back, grooved to receive 1/4" diameter thru-bolt and cross rails. Cross rails are 2" x 1" solid hardwood fully housed into front and back rails with mortised and tenoned joints to form a full four-sided bottom frame. Sink cabinet bottoms are 1/4" thick tempered hardboard attached to the bottom frame. All sink cabinet bottoms are removable for plumbing purposes and replaceable.
- J. Top and Bottom - Upper and Tall Cabinets: 2" x 1-1/4" solid Oak rails front and back, grooved to receive 1/4" diameter thru-bolt and 1/2" thick, 5-ply solid core, hardwood plywood panel. Panel fully housed into front and back rails with mortised and tenoned joints to form a totally solid and rigid assembly.
- K. Intermediate Rail: 3/4" x 3" solid Oak, located between drawers/drawers and doors/drawers when locks are provided. Rail is grooved to receive security panel and lock cam.
- L. Security Panel: 1/4" thick tempered hardboard provided between drawers/drawers and doors/drawers when base cabinets are to have locks, which are keyed differently.
- M. Drawers:
  - 1. Exposed Drawer Front: 3/4" thick, 3-ply solid core surfaced with Oak veneer both sides and all edges banded with 3 mm solid Oak. Banding with square edge having a slight radius to provide a flush 1/4" overlap over drawer opening. The drawer front shall not be a part of the drawer construction. Optional: 3/4" thick plastic laminate material with all edges banded with 3 mm black PVC. Core material of 3/4" thick, 45 lb. density, industrial grade particleboard having both faces with finished materials.
  - 2. Body: Back, sides and front of drawer box shall be 1/2" thick solid hardwood, or 1/2" thick 9 ply Baltic Birch, joined by multiple dowels and inter-fibrous friction fasteners. Drawer bottom is 1/4" thick tempered hardboard set in groove all around, and glued with a continuous bead of hot-melt glue around the perimeter securing the bottom panel to all parts of the drawer box.
  - 3. Finish: All drawer bodies shall receive a coat of #2500 Honey Oak stain and sealer.



- N. Doors - Solid: 3/4" thick, 3-ply solid core, surfaced with Oak veneer both sides and all edges banded with 3 mm solid Oak. Optional: 3/4" thick plastic laminate material with all edges banded with 3 mm black PVC. Core material of 3/4" thick, 45 lb. density, industrial grade particleboard having both faces with finished materials
- O. Doors - Framed Glass: 3/4" thick, veneer core plywood, machined to receive glass panels. Glass is set into machined opening and held in place by removable plastic retainer. All glass openings must have square corners. All door edges with 3 mm solid Oak banding. Optional: 3/4" thick plastic laminate material with all outer edges banded with 3 mm black PVC. Door panel shall be machined to receive glass panel. Glass is set in machined opening and held in place by removable plastic retainer. Core material of 3/4" thick, 45 lb. density, industrial grade particleboard having both faces with finished materials.
- P. Cabinet Back Panels
  - 1. Exposed Interior: 1/4" thick 3-ply Oak plywood
  - 2. Unexposed Interior: 1/4" thick tempered hardboard (Removable at sink cabinets.)
  - 3. Exposed Exterior: Back sides of cabinets and demonstration tables exposed to view shall be 3/4" thick, 7-ply solid core, Oak hardwood plywood with exposed edges having a 3 mm solid Oak banding.
- Q. Toe Space Board: 3/4" thick, 7-ply solid core, hardwood plywood secured between end panels and further secured with screws to the back side of the bottom front rail.
- R. Access Panels/Filler Panels: A minimum of 1/2" thick 5-ply solid core, Oak veneer hardwood plywood. Where access panels or filler panels are required adjacent cabinets, provide the panels with a recessed toe space.
- S. Cabinet Shelves: Shelves over 30" in length, shall be 1" thick, 9-ply solid core, hardwood plywood. Shelves under 30" in length, shall be 3/4" thick, 7-ply solid core, hardwood plywood. All shelves having front edge banded with 3 mm solid Oak. All shelves adjustable on 1-1/4" centers except the center shelf of tall cases.
- T. Frames: Provide factory manufactured Oak frames to support the epoxy resin counter tops between casework and/or table legs. For ADA accessible work spaces, provide custom frames to allow a knee space clearance of 29" high. If frames are connected to supporting legs, all shall be secured with thru-bolt construction. Hanger bolts or lag bolts are not considered of equal strength or quality.

## 2.3 HARDWARE

- A. Hinges: Institutional type, five-knuckle, with pins of not less than .177" in diameter and leaves of not less than .095" thick. Hinges shall be wrought steel with powder coat finish. Two (2) hinges shall be provided on doors less than 36" in height and three (3) hinges for doors 36" and over.
- B. Physical Properties: Hinge must be capable of supporting 150 lbs. placed 12" from hinge center with door open 90 degrees.
- C. Pulls: Solid metal, wire type, 4" long mounted with two (2) screws fastened from the back. Pulls shall have powder coat finish to match the hinges. Provide two (2) pulls for drawers over 24" wide.
- D. Drawer Slide System: Drawer slides shall be epoxy powder coated, cold rolled steel, featuring a captive roller system with in and out position keeper. Drawers runners shall be side and bottom mounted with a minimum 100 lb. load rating per SEFA 8-1999 test procedures.
- E. Door Catches: Dual aligning magnetic catch. Provide two (2) per door. (Top and bottom).

- F. Elbow Catches: To be installed on the left door of double door base cabinets when locks are specified.
  - 1. Elbow catch and strike plates must be cast or extruded aluminum.
  - 2. Elbow catches must have coiled compression spring for positive securing action.
  - 3. Catches must have two slotted adjustment screw holes.
  - 4. Strike plate must be secured with one screw in a slotted adjustment hole, and one screw for positive anchoring.
  - 5. Formed sheet metal catches and strike plates are prohibited.
- G. Shelf Supports: Nickel plated metal clips fitted into holes on cabinet end panels.
- H. Locks (Where indicated on the drawings, by catalog number or within Equipment Schedule.): 5 Tumbler, die cast zinc alloy plated cylinder. Positive tumbler operation for unlocking is accomplished by the action of a heavy brass key. All locks provided with two (2) keys and subject to master keying.
- I. Clamp-on upright rods (Where required within this specification or indicated by catalog number on drawings/Equipment Schedule.): Cast aluminum "C" clamp with integral threaded aluminum upright rod designed to clamp securely on any working counter or table having a 1" or more overhang, and 5/8" to 1-1/2" thickness.
- J. Upright rod base (Where required within this specification or indicated by catalog number on drawings/Equipment Schedule.): Aluminum alloy with tapered hole to accept upright support rod. Rod base secured by washer and locking nut below the counter.
- K. Upright support rod (Where required within this specification or indicated by catalog number on drawings/Equipment Schedule.): 3/4" diameter aluminum alloy, 40" long with lower end tapered to rod base.
- L. Horizontal support rod (Where required within this specification or indicated by catalog number on drawings/Equipment Schedule.): 3/4" diameter aluminum alloy, 42" long, having both ends rounded.
- M. 90 degree connector (Where required within this specification or indicated by catalog number on drawings/Equipment Schedule.): Aluminum alloy block with thumb screws for securing upright rod at a 90 degree to horizontal apparatus rods.
- N. Tote trays: Trays of thermosetting reinforced fiberglass with heavy duty lipped rim. (Trays of polystyrene or other thermoplastic not acceptable.) Trays formed of one-piece homogeneous form with all corners coved and smooth surfaces. Trays light in color and weight. An inverted tray shall support 200 lbs. without buckling or distortion. Trays shall be heat resistant to withstand boiling water for 20 minutes without effect. A ten second application of a match flame shall not cause damage except slight discoloration.
- O. Cabinet base molding: Extruded vinyl or rubber, black, 4" high. Provide on all exposed sides and fronts of floor-mounted cabinets. All outside corners shall be of formed stainless steel.

## 2.4 LABORATORY GRADE WOOD FINISH

- A. All exposed wood parts shall be sanded and buffed in preparation for the finishing processes. The first coat shall be a stain and sealer of synthetic resin. The product is then cured at elevated temperatures. After the first sealer coat, the product shall be sanded, wiped clean and then two (2) additional coats of an acid resisting synthetic resin shall be applied and heat cured. Unexposed interior surfaces shall receive one (1) sealer coat and one (1) coat of acid resistant synthetic resin.

- B. Cabinet Finish Chemical Test and Evaluation: All manufacturers proposing to submit a bid must provide certification that their finish will comply with the following requirements.

1. Chemical Resistance

- a. Chemical Reagents: Withstand one (1) hour contact with ten (10) drops (1/2 ml) covered by watch glass, convex side down in center pool to prevent evaporation.
    - i Hydrochloric Acid, all concentrations
    - ii Nitric Acid, 30%
    - iii Sulfuric Acid, 50%
    - iv Acetic Acid, all concentrations
    - v Phosphoric Acid, 75%
    - vi Ammonium Hydroxide, all concentrations
    - vii Sodium Hydroxide, all concentrations
    - viii Potassium Hydroxide, all concentrations
    - ix Zinc Chloride, saturated
    - x RESULT: No visible effect other than slight discoloration, change of gloss or temporary softening of film.
  - b. Solvents: Withstand contact with ten (10) drops (1/2 ml.) placed on the surface until evaporated.
    - i Benzene
    - ii Methyl Alcohol
    - iii Toluene
    - iv Ethyl Alcohol
    - v Chloroform
    - vi Ethyl Ether
    - vii Carbon Tetrachloride
    - viii Acetone
    - ix Naptha
    - x RESULT: No visible effect other than slight discoloration, change of gloss, or temporary softening of film.
  - c. Heat Resistance: Hot water (190-205 degrees) allowed to trickle down surface tilted 45 degrees for five minutes without visible effect.
  - d. Moisture Resistant: Cellulose sponge 2" x 3" x 1" soaked with water and placed on finish for 100 hours and kept constantly wet without effect.
2. Fade Resistance: 100 hours exposure to a Sylvania 275 R.S. sun lamp placed 10" above surface with only slight discoloration.

2.5 COLOR SELECTIONS

- A. All Casework shall be finished on exposed and semi-exposed surfaces in a color selected from the manufacturer's standard color chart.
- B. Door and drawer fronts shall be Oak veneer or high-pressure plastic laminate as selected from manufacturer's standard Wilson Art color chart. Manufacturer shall provide a minimum of (6) standard wood stains, and fourteen (14) plastic laminate patterns.

- C. Color options of one basic wood stain for casework and up to two (2) accent plastic laminate colors for the door and drawer fronts per department. Only one (1) wood stain and one (1) accent color may be applied to any one cabinet.
- D. Trim group:
  - 1. Plastic laminate "flush overlap" fronts: Pulls and hinges, and extruded thermoplastic edge banding in black. All interior hardware furnished in manufacturer's standard finish.
  - 2. Oak veneer "flush overlap" fronts: Pulls and hinges are powder coated black or powder coated satin chrome. All interior hardware furnished in manufacturer's standard finish.

## 2.6 TOPS

- A. All counter top depths shall be as shown in the Drawings.
- B. Backsplash height shall be 4".
- C. Molded epoxy resin
- D. A modified epoxy resin especially blended to produce a high chemical resistant material. Tops shall be 1" thick overall.
  - 1. Physical and mechanical properties:
    - a. Tensile strength: 10,700 psi
    - b. Compressive strength: 30,600 psi
    - c. Flexural strength: 12,800 psi
    - d. Hardness: 105 Rockwell "M"
    - e. Density: 2.03 gr/cc

## 2.7 SINKS, TROUGHS, and SERVICE TURRETS

- A. Epoxy resin
  - 1. All wall counter epoxy resin sinks shall be of "drop-in" design.
  - 2. One piece construction, without cemented joints. Inside corners and bottoms coved for easy cleaning.
  - 3. Surface shall be stain free, "non-glaring" black, inert to action of all chemicals in normal laboratory usage.

## 2.8 PLUMBING FIXTURES

- A. All laboratory fixtures to meet SEFA standards with all working parts removable and interchangeable with fixtures of same type and number. Index buttons clearly marked in accordance with SEFA standard color code. All fixtures provided with vacuum breaker and aerator.
- B. Vandal resistant laboratory fixtures required at all sink locations. Fixtures shall be designed specifically to provide extra protection against student abuse and vandalism. All fixtures shall have the main body cast in one-piece 5A-ASTM-30 brass. Tubing shall not be a part of the fixture structure.
- C. Vandal resistant laboratory fixture finish shall be a special epoxy powder coating applied over a sand blasted surface and baked at elevated temperatures to provide a smooth, corrosion resistant, Laboratory Grade finish.

- D. All service fixtures shall be the Sheldon Unicast or Unimix combination fittings. Acceptable Alternate: Chicago Faucet Company VR-1 ALEF. Provide fixture with E3-2 aerator and E22 vacuum breaker. Where hot and cold mixing fixture indicated within drawings/Equipment Schedule, provide (1) Chicago Faucet Company 1333-LH-ALEF, and (1) Chicago Faucet Company 1333-RH-ALEF. Each to include appropriate vacuum breaker and aerator. (No other substitutions will be allowed or considered.)

## 2.9 DRAIN FITTINGS

- A. All sinks provide with acid resistant outlet, stopper, and tailpiece.

## 2.10 ELECTRICAL FIXTURES

- A. Electrical fixtures, a part of, or installed in the equipment shall be approved by the National Board of Underwriters and must conform to city and state building ordinances.
- B. Knock out boxes, where indicated, installed by the electrical contractor.
- C. Receptacles, grounded type, voltage and amperage as indicated. All receptacles, switches, indicator lights, motor starters and light fixtures to be quality equal to Hubbel, Arrow, Bryant or Killark specification. All receptacles shall be of GFCI type.

## 2.11 STRUCTURAL POLYESTER

- A. Glass fiber reinforced structural polyester where required for counter tops, sinks or lab station understructures as described within this specification.
- B. One piece molded construction. All curbs, raised edges, sinks and service turrets shall be integral with all surfaces.
- C. Material shall be non-burning when submitted to the ASTM D-635 test. When required, bidder shall provide a notarized certificate stating that all polyester materials furnished on this project complies with the following test criteria which is a part of the ASDTM test criteria:

Test	Non-burning
HTL-15 (average)	60
Oxygen index (average)	30
Smoke development (average)	300

- 2.12 SCIENCE LAB EQUIPMENT: Provide all science lab equipment & apparatus as shown in the Drawings, including fume hood & chemical/flammable cases.

## PART 3 - EXECUTION

### 3.1 PRODUCT HANDLING/COORDINATION

- A. The Laboratory Casework and Equipment contractor shall coordinate all deliveries and installation of this equipment with the Contractor/Owner and all associated trades. It is recommended that all finish painting be completed in the areas in which Laboratory Casework and Equipment is to be installed prior to such installation. The Laboratory Casework and Equipment shall not be delivered to the jobsite until the following conditions have occurred:
  1. Overhead ceiling work, ductwork installation, lighting, acoustical tile, etc. is completed.
  2. Windows and exterior doors are installed. Building is secure and weather-tight.

3. Air circulation control system is functional and maintaining relatively constant temperature and humidity conditions closely approximating those to be maintained by the Owner.
4. Finish flooring installed.
- B. Utility Coordination: Coordinate & verify that all required utility services are provided by other subcontractors or provide those required under the work of this section.

### 3.2 FABRICATION

- A. Fabricate Laboratory Casework and Equipment to dimensions, profiles, and details shown or described on the floor plans/Equipment Schedule to fit actual field conditions.
- B. Assemble the units in the shop in as large components as practicable to minimize field cutting and jointing. Mortise and tenon, glue and screw joints for maximum strength using precision jigs and clamps to insure square corners and vertical plumb surfaces.

### 3.3 CASEWORK INSTALLATION

- A. Install plumb, level, true and straight with no distortions. Shim as required, using concealed shims. Where laboratory furniture abuts other finished work, scribe and apply filler strips for accurate fit with fasteners concealed where needed.
- B. Base cabinets:
  1. Set cabinets straight, plumb and level. Adjust tops within 1/16" of a single plane. Fasten each individual cabinet with no less than two (2) fasteners into floor, where they do not adjoin other cabinets.
  2. Where required, assemble units into one integral unit with joints flush, tight and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16".
- C. Wall cabinets:
  1. Securely fasten to solid supporting material, not plaster, lath, or wallboard. Anchor, adjust, and align wall cabinets as specified for base cabinets.
  2. Reinforcement of stud walls to support wall mounted cabinets will be done during wall erection by trades involved. However, the responsibility for accurate location and sizing of the reinforcement is part of this work.
- D. Adjust casework and hardware so that all doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by the manufacturer.

### 3.4 TOPS INSTALLATION

- A. Field jointing, where practicable, make in same manner as factory jointing using dowels, splines, adhesives, and fasteners recommended by the top manufacturer. Locate field joints as shown on acceptable shop drawings so there is no job site processing of top or edge surfaces.
- B. Workmanship:
  1. Abut top edge surfaces in one true plane with internal supports placed to prevent deflection.
  2. Provide holes and cutouts as required for mechanical and electrical service fixtures.

**3.5 GUARANTEE**

- A. The contractor shall guarantee all materials and workmanship of Casework and Equipment provided on this contract for a period of one year from the date of final acceptance. Any defective materials or faulty workmanship occurring within that time shall be replaced or corrected promptly without charge upon notification by the Owner or his designated representative.

**3.6 CLEANING AND PROTECTION**

- A. Repair or remove and replace defective work as directed upon completion or installation.
- B. Clean shop finished casework. Touch-up as required and remove and refinish damaged or soiled areas.
- C. Protection: Advise contractor of procedures and precautions for protection of materials and installed Casework and Equipment from damage by the work of other trades until acceptance of the work by the Owner. Advise the Contractor of the required temperature/humidity conditions, which must be maintained during the remainder of the construction period.
- D. Cover all Casework and Equipment with a 4 mil polyethylene film for protection from damage during the remainder of construction.

## 12 35 54 - MUSIC ROOM STORAGE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Furnish musical instrument cabinet system.
- B. Products Furnished and Installed Under this Section:
  - 1. All music education cabinets shown on drawings.
  - 2. All mounting and connection hardware and accessories.

#### 1.2 REFERENCES

- A. American Laminators' Association Performance Standard ALA 1988.
- B. ANSI - BHMA Standard A156.9, Grade 1.
- C. NEMA LD3 - 1985 for General Purpose use GP 28.
- D. ASTM PE - 84 - 80.
- E. Flame spread: 200 or less, Class C. (Substrates may be special-ordered to meet Class 1 or A rating.)

#### 1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
  - 1. Music education system of storage cabinets will be specifically designed and engineered for the intended use and will meet the minimum performance characteristics specified herein. Music instrument storage units will be chip- and abrasion-resistant under normal usage and will protect instruments and cases from damage under normal usage.
  - 2. Provide one-piece-high molecular polyethylene instrument and uniform/robe storage shelving with integral ventilation grooves designed and engineered to withstand continuous use without surface- or front-edge breakdown.
  - 3. Individual instrument, robe/uniform storage cabinets will be manufactured with thermofused polyester laminated panels; finish both faces all components. All end panels to be factory-jigged and drilled to accept unit-to-unit through bolting; no conventional wood screws attaching units side-to-side will be permitted. Each instrument storage cabinet will be furnished with an integral base and four (4) steel levelers accessible from within the unit but concealed in final installation. These features combine to provide modularity, on-site re-arrangement or future relocation of any music education storage cabinet.
  - 4. Provide inset-style door panels, solid- or wire-grille as shown on drawings; reveal- or full-overlay style solid- or wire-grille doors will not be permitted due to inherent weakness of overlay hinges. All hinges shall be structurally attached to vertical panels using engineered and tested through-bolt hardware and either welded to wire-grille doors or through-bolted to solid door leaf; screw-mounted hinges will not be permitted.
- B. Manufacturer to Provide Documentation of Following Minimum Performance Requirements:



1. Molded plastic instrument storage shelf shall have a static load capacity of over 1,000 lbs.
2. Full-height, solid-hinged door for instrument storage units will support a minimum dynamic live load of 315 lbs. applied at outer edge.
3. Wire-grille door hinge to be welded to door frame in five places; pull tested to withstand 3,000 lbs.
4. Garment-hanger rods support a minimum vertical load of 200 lbs. applied anywhere along the width of the unit. Revolving shelf shall have load capacity of 50 lbs. on each side of shelf; 100 lbs. per 360 degree shelf. Instrument-storage-shelf system shall have a factory warranty of ten years against defects in material and/or workmanship.

#### 1.4 WORK NOT INCLUDED

- A. General millwork and custom cabinetry unless specified herein or so noted on plans as included with this section.
- B. Rubber, vinyl or other finished material for toe base.
- C. Padlocks, locks master-keyed to room doors and other special locks.
- D. Blocking within walls.

#### 1.5 SUBMITTALS

- A. Product Data: Submit applicable reference standards, performance and test data, application recommendations and limitations.
- B. Shop Drawings: Submit design- and installation-drawings showing product components in assembly with adjacent materials and products.
- C. Quality Control Submittals:
  1. Manufacturer's installation instructions.
- D. Contract Closeout Submittals:
  1. Maintenance recommendations.
  2. Warranty.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Pack and ship to avoid damage according to manufacturer's recommendations:
  1. Finish and assemble components in factory before shipment.
  2. Ship components in individual, sealed, labeled cartons.
  3. Deliver components to room designated for installation.
- B. Do not accept or install damaged products at the site.

- C. Store products in heated, indoor storage near point of installation. Retain protective packaging until installing.

## 1.7 PROJECT CONDITIONS

- A. Environmental Requirements: Do not install cabinets until all mortar, wet- and dust-producing work is completed.
- B. Field Measurements: Obtain required field measurements from the contractor and indicate on shop drawings.

## 1.8 WARRANTY

- A. Provide manufacturer's written warranty that products not in accordance with requirements of contract documents within three years after commencement of warranties shall be corrected promptly after receipt of written notice from owner. Cabinet shelf will be warranted for ten years.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Wenger Corporation
- B. Melhart ([www.melhart.com](http://www.melhart.com))
- C. Other Manufacturers submitted & approved by Architect.

### 2.2 MUSICAL INSTRUMENT & ROBE/UNIFORM CABINET SYSTEM

- A. Cabinet Wall Panels:  $\frac{3}{4}$ " thick industrial (cabinet) grade particleboard, 45-49 lb. density with thermoset polyester (melamine not acceptable) laminate on both sides for totally-finished construction. No backer sheets or unfinished surfaces may be used on unexposed sides. Color: oyster.
- B. Cabinet Shelving: Cabinets up to 48" wide: One-piece, high-density, blow-molded polyethylene with 1-3/8" radius front edge (patented). Cabinets up to 27" wide mount to cabinet walls with one-piece molded rigid ST nylon clip depending on cabinet model. 48" shelves are supported by two or three structural tubular members 1-1/2" x 1" x 16-gauge wall thickness with 14-gauge welded end plates. Shelf is replaceable without damage to adjacent surfaces. Doweled shelves will not be permitted. 60-inch-wide cabinets: One-piece, high-density, formed polyethylene with radius front edge and 3/16" wall thickness. Ribbed for structural integrity. Supported by three structural tubular members 1-1/2" x 1" x 16-gauge wall thickness with 14-gauge welded end plates. Corner cabinet revolving shelving: Shelf is constructed of 16-gauge steel and is bolted to revolving 12-gauge steel center post with 10-gauge steel brackets. Shelf and center post in oyster powder-coat finish.
- C. Door Options: Welded steel grille construction with powder coat finish. Color: oyster. Welds at T-joints must be 360°. Hinges, five-knuckle, institutional-hinge type. Hinge will support 315 lbs. dynamic vertical load. Hinge pin shall be 2-3/4" long. Hinge welded to doorframe in five places and fastened to cabinet with through-bolt construction; attachment by wood screws not acceptable. Finish: oyster powder paint. Two hinges on compartment doors; four on full-height doors. All doors shall be factory-provided with locking slide bolt designed for padlocks with formed steel strike plate through-bolt connected to cabinet end panel in 12-gauge steel. Provide clear plastic label holder for identification card insert. Finish: powder paint coating. Color: oyster.
- D. Edging: Heat bonded 3mm beveled PVC edge-banding machine applied using hot-melt adhesives; edges and corners machine profiled for safety. Integral color: oyster.

- E. Finish Hardware: Two inch, 1/4-20 panel connectors with 15mm head diameter. Steel thread inserts shall be utilized to join desired cabinets side-to-side; use factory-jigged and -drilled joinery holes. Finish: Powder paint coating. Color: oyster. Cabinet Levelers: Structural levelers each cabinet accessible from within the unit when desired, concealed in complete installation; glides with minimum 3/8" diameter threaded rod mounted in steel corner brackets. Provide minimum four glides per cabinet; six glides for cabinets with divider panels.
- F. Cabinet Back Panel: Standard cabinet back to be 1/4" thick pre-finished hardboard. Color: oyster to match interior of side and top panels. Corner cabinet revolving shelf model includes 1/4" thick pre-finished hardboard curved deflector panel.
- G. Flag storage and garment optional ring constructed of 5/16" diameter steel rod bolted to steel center post with 10-gauge steel brackets all in oyster powder coat finish. Flag-storage option includes bottom steel shelf with adhesive carpeted pad.

2.3 MANUFACTURED UNITS: Fabricate and package all components in the factory and ship fully- assembled or ready-to-assemble.

#### 2.4 CLOSURE OPTIONS REQUIRED

- A. Vertical Closure Kit: Provide visual closure between wall and cabinet. Constructed of 3/4" thick thermoset polyester composite wood to match cabinet side panels. Colors: oyster. Will fit 3/4"- to 30"-wide opening.
- B. Horizontal Closure Kit: Provide visual closure between top of cabinet and soffit. Constructed of 3/4" thick thermoset polyester composite wood to match cabinet side panels. Color: oyster. Will fit 3/4"- to 30"-high opening.
- C. Top Back Filler Kit: Provide visual closure between back wall and top panel of cabinet. Constructed of 3/4" thick thermoset polyester composite wood to match cabinet top panels. Color: oyster. Will fit 10"- and 20"- deep openings.
- D. Finished Back Panel: Provide panel to attach to cabinet back that is exposed. Constructed of 1/2" thick thermoset polyester composite wood to match cabinet. Color: oyster.

#### 2.5 MUSIC LIBRARY STORAGE SYSTEM

- A. Cabinet End Panels: 3/4" thick industrial grade particleboard, minimum 48 pcf, with thermofused polyester laminate, color-oyster.
- B. Cabinet Shelving: 3/4" thick plywood, with thermofused polyester laminate, color-oyster. On 7-shelf unit, four shelves are adjustable with removable steel pin mechanism. Two shelves are fixed (center and second from top).
- C. Edging: All exposed edges include heat bonded 3mm beveled PVC edgebanding, color-oyster.
- D. Cabinet Back Panel: Standard cabinet back panel to 1/4" thick prefinished hardboard, and able to mount on left or right hand side of cabinet end panels. Color-oyster.
- E. Joinery Hardware: Two inch, 1/4-20 panel connectors with 15mm head diameter. Finish: Powder paint coating, color-oyster.
- F. Casters: Each cabinet shall include four rigid 8" diameter casters.
- G. Guide Frame: Each cabinet shall include steel guide frame, constructed of 1" sq., 16 gauge steel tubing. Also included are limiting cable and bumpers to control side and outward movement of cabinet. Frame finish: oyster powder paint.
- H. Music Divider: Each shelf shall contain a metal music divider to separate and organize music. Labels shall also be provided for each shelf.

- I. End Cover: Installations with exposed ends shall include end panel constructed of 5/8" thick industrial grade particleboard, with thermofused polyester laminate, color-oyster.
- J. Wall Anchor: A 12-gauge steel hat channel is included for attaching guide frame to the wall. The anchor contains holes spaced 2" apart for attachment to wall studs, and allows guide frame to bolt to wall anchor.
- K. Top Closure: Provides solid surface for storage of miscellaneous items, not to exceed static load of 50 lbs./sq. ft. Constructed of 3/4" plywood with thermofused polyester laminate, color-oyster.

### PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 PREPARATION: Take field measurements before fabrication where possible so as not to delay job progress. Coordinate this work with interfacing work to ensure proper sequencing. Inspect installed work of other trades and verify its completion to a point where this work may continue. The Contractor is responsible for verifying dimensions & conditions; in event of discrepancy, notify Architect prior to installation.
- 3.3 INSTALLATION: Install this work in strict accordance with the original design, and the manufacturer's recommendations as accepted by the Architect. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Place & attach all components firmly & accurately into position, square, plumb, & level.
- 3.4 ADJUSTING: Adjust all hardware for smooth operation.
- 3.5 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, using cleaner recommended by the manufacturer.

## 12 35 55 - SEWING LAB CASEWORK

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Sewing Lab Casework and Equipment required for this work is scheduled on the drawings. Refer to Fixture Schedule for design of individual units. 4" base molding by flooring contractor. Casework shall be delivered to the building, set in place, leveled and secured. All mechanical hook-ups are to be by proper trades.
- 1.2 QUALITY ASSURANCE: Catalogs of Sheldon Lab Systems, a Division of General Equipment Manufacturers, Jackson, MS, have been used for the purpose of identification, function and design. All units shall be complete as described in the catalog. Base Specification: Sheldon Lab Systems "Series 200". Other manufacturers will be approved subject to compliance with this specification. Other manufacturers shall modify their standard construction, hardware, finish and operation features to comply with this specification.
- 1.3 SUBMITTALS: Submit rough-in and shop drawings in compliance with Section 01340 of this specification. Upon completion of installation, and as a condition of its acceptance, submit copies of warranties, operating instructions and maintenance instructions.

### PART 2 - PRODUCTS:

- 2.1 CABINETS: A. Materials: 1. Solid wood: a. Exposed - Red Oak b. Unexposed - Other acceptable solid hardwoods. 2. Plywood: a. Exposed - 7 ply Oak hardwood plywood b. Unexposed - 7 ply Birch hardwood plywood Fir plywood unacceptable. B. Casework construction: 1. Casework fronts shall be "flush overlap", wood veneer with 3mm solid oak banding or plastic laminate with black PVC 3mm edge banding. 2. Full four sided top frame- members a minimum 1-1/4" thick x 2" w. 3. 3/4" thick end panels with solid oak edge banding. 4. Units glued and screwed or bolted. Dowels and glue unacceptable without reinforcement fasteners. 5. Flush interior bottoms a minimum of 1/2" thick. 6. Bottoms provided with solid hardwood front and back rails a minimum 1-1/4" thick x 2" wide. C. Drawers: 1. Solid hardwood or hardwood plywood bodies a minimum of 1/2" thick. 2. Hardboard bottom a minimum of 1/4" thick 3. Drawer fronts removable/replaceable. D. Shelves: 1. 3/4" thick hardwood plywood with solid Oak edge banding on one long side. 2. Shelves over 30" long with 1" with solid Oak banding on one long side. 3. All shelves adjustable except center shelf on tall cases. E. Hardware: 1. Drawer runners 20 gauge, epoxy coated, with nylon rollers. Maximum load capacity of 100 lbs. per pair. 2. Pulls - Institutional type, elliptical shaped with powder coat. Color as selected by architect from manufacturer's standard. 3. Hinges - 2-1/2" high, institutional type, tight pin, five knuckle with powder coated finish. Color as selected by architect from manufacturer's standard. 4. Locks where required by Fixture Schedule. A minimum 5 tumbler, keyed differently with master key. 5. Tote trays of thermosetting glass fiber reinforced with heavy lipped rim and identification card holder. F. Finish: 1. All casework finish shall be laboratory grade heat cured, and include stain and sealer coat of synthetic resin and two coats of acid resisting synthetic resin with sanding and elevated temperature curing between coats.
- 2.2 TOP MATERIALS: A. Plastic laminate: 1. Backsplash/curbs 4" high overall. 2. Countertops and backsplash/curbs 1-1/4" thick 3. Commercial grade plastic laminates conforming with NEMA Publications LD3-80, GP50, Abrasion Class 1. 4. Plastic laminate .050 thick, secured with waterproof contact cement to particle board substrate. 5. Self-edge all counters and backsplash/curbs. 6. Provide cut-outs on job-site.
- 2.3 SPECIALIZED EQUIPMENT: Pull-out Sewing Center (HE19331) Size 18"W x 27-3/4"D x 27-3/4"H. Top material of 1-1/4" thick plastic laminate. Each sewing machine unit shall have a pull-out having a work surface approximately 22-1/2" x 16-1/4", and a drop down leaf 17" x 13-1/2". Provided with a pull-out platform designed to accommodate most standard machine heads, either flat bed or free arm type. Platform features extra heavy duty, full extension ball bearing, metal slides. Adjustable counterbalance torsion spring allows the machine to be raised, lowered and stored in the upright position. Positive adjustable straps for machine height adjustment shall be provided. The 13-1/2" drop leaf & the top of the platform are 3/4" thick. One duplex A.C. Electric receptacle. Sewing Center shall be available in twilight vinyl ends with standard finish wood (oak) fronts with oak edge banding. Garment Center (HE68900) Size 47"W x 21-5/8"D x 82-3/4"H. Self-contained unit complete with full height solid doors, equally divided into two sections, one section to have clothes rod, one section to contain one iron-a-way unit with control panel recessed within a

separate door-panel, hinged so that storage located behind the iron-away is also easily accessible. Electrical Contractor to provide flexible conduit from point of rough-in to prewired control panel.

**PART 3 - EXECUTION:**

- 3.1 JOBSITE CONDITIONS: Prior to beginning installation, verify that equipment may be installed in accordance with manufacturer's recommendations. In the event of discrepancy, do not proceed with installation until such discrepancy has been resolved.
- 3.2 INSTALLATION: Install plumb, level, true and straight without distortions. Shim as required, using concealed shims. Scribe and apply filler strips at adjoining finished work. B. Securely fasten only to solid supporting material.
- 3.3 ADJUSTMENT AND CLEANING: Adjust all hardware so doors and drawers operate smoothly. Lubricate as recommended by manufacturer. Clean all interiors and exteriors of casework. Touch-up as required. Cover all casework with 4 mil polyethylene film. Clean all debris and rubbish as a result of this installation.

## **12 36 40 - STONE COUNTERTOPS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes stone countertops.

#### **1.2 SUBMITTALS**

- A. Product Data: For manufactured products.
- B. Shop Drawings: Include plans, sections, details, and attachments to other work.
- C. Samples: For each stone type indicated.

#### **1.3 QUALITY ASSURANCE**

- A. Installer Qualifications: Fabricator of products.
- B. Source Limitations for Stone: Obtain each variety of stone from a single source with resources to provide materials of consistent quality in appearance and physical properties.
  - 1. Make stone slabs available for Architect to examine for appearance characteristics. Architect will select aesthetically acceptable slabs.

#### **1.4 PROJECT CONDITIONS**

- A. Field Measurements: Verify dimensions of construction to receive stone countertops by field measurements before fabrication.

### **PART 2 - PRODUCTS**

#### **2.1 STONE**

- A. Varieties and Sources: Subject to compliance with requirements, provide stone as indicated on the Drawings.

#### **2.2 ADHESIVES, GROUT, SEALANTS, AND STONE ACCESSORIES**

- A. Water-Cleanable Epoxy Adhesive: ANSI A118.3.
  - 1. Available Manufacturers: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. C-Cure.
    - b. Custom Building Products.
    - c. Laticrete International, Inc.
    - d. MAPEI Corp.

- B. Sealant for Countertops: Manufacturer's standard sealant of characteristics indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants" and will not stain the stone it is applied to.
  - 1. Single-component, neutral-curing silicone sealant.
  - 2. Color: As selected by Architect from manufacturer's full range.
- C. Stone Sealer: Colorless, stain-resistant sealer that does not affect color or physical properties of stone surfaces, as recommended by stone producer for application indicated.
  - 1. Available Manufacturers: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Custom Building Products.
    - b. Hillyard, Inc. (couldn't find)
    - c. HMK Stone Care System.
    - d. Miracle Sealants Company. Marketed by rust-oleum
    - e. Stone Care International Inc.

## 2.3 STONE FABRICATION

- A. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.
- B. Fabricate stone countertops in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.
  - 1. Dress joints straight and at right angle to face, unless otherwise indicated.
  - 2. Fabricate molded edges with machines having abrasive shaping wheels made to reverse contour of edge profile to produce uniform shape throughout entire length of edge.
  - 3. Finish exposed faces of stone to comply with requirements indicated. Provide matching finish on exposed edges of countertops, splashes, and cutouts.
- C. Comply with recommendations in MIA's "Dimension Stone -Design Manual."
- D. Nominal Thickness: Provide thickness indicated, but not less than 3/4 inch. Gage backs to provide units of identical thickness.
- E. Splashes: Provide 3/4-inch-thick backsplashes and end splashes, unless otherwise indicated.
- F. Joints: Fabricate countertops without joints.
- G. Cutouts and Holes:
  - 1. Undercounter Fixtures: Make cutouts for undercounter fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.



2. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION OF COUNTERTOPS

- A. General: Install countertops by adhering to supports with water-cleanable epoxy adhesive.
- B. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Shim and adjust stone to locations indicated, with uniform joints of widths indicated and with edges and faces aligned according to established relationships.
- C. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Use power saws with diamond blades to cut stone. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- D. Install backsplash and end splash by adhering to wall with water-cleanable epoxy adhesive. Leave 1/16-inch gap between countertop and splash for filling with sealant. Use temporary shims to ensure uniform spacing.
- E. Apply sealant to gaps specified for filling with sealant; comply with Division 07 Section "Joint Sealants." Remove temporary shims before applying sealant.

#### 3.2 ADJUSTING AND CLEANING

- A. In-Progress Cleaning: Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.
- B. Clean stone countertops not less than six days after completion of sealant installation, using clean water and soft rags. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.
- C. Sealer Application: Apply stone sealer to comply with stone producer's and sealer manufacturer's written instructions.

## 12 48 13 - ENTRANCE FLOOR MATS AND FRAMES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes entrance mats in surface-mounted frames.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of floor mat and frame.
- B. Samples: For each floor mat, tread rail, and frame member.
- C. Maintenance data.

#### 1.3 QUALITY ASSURANCE

- A. Accessibility Requirements: Provide installed floor mats that comply with "Texas Accessibility Standards" (TAS).

### PART 2 - PRODUCTS

#### 2.1 ROLL-UP MATS

- A. Basis-of-Design Product: Design is based on C/S Pedisystems Peditred LP. Subject to compliance with requirements, provide named product or comparable product approved by the Architect by one of the following:
  - 1. Balco, Inc.
  - 2. Reese Enterprises, Inc.
- B. Roll-up, Aluminum-Rail Hinged Mats: Extruded-aluminum tread rails 1-1/2 inches wide by 3/8 inch thick, sitting on continuous vinyl cushions.
  - 1. Tread Inserts: 1/4-inch-high, 28-oz./sq. yd. weight, level-cut, nylon-pile, fusion-bonded carpet.
  - 2. Colors, Textures, and Patterns of Inserts: As selected by Architect from manufacturer's full range.
  - 3. Hinges: Plastic.
- C. Surface-Mounted Tapered Frames: Tapered aluminum frame members, not less than 1-1/2 inches wide, attached to mat at all 4 edges, with welded mitered corners.

#### 2.2 FABRICATION

- A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.
- B. Surface-Mounted Frames: As indicated for permanent surface-mounted installation, complete with corner connectors, splice plates or connecting pins, and postinstalled expansion anchors.

- C. Coat surfaces of aluminum frames that will contact cementitious material with manufacturer's standard protective coating.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.

**3.2 PROTECTION**

- A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

## 12 61 13 - AUDITORIUM SEATING

### PART 1 - GENERAL

- 1.1 SUMMARY: Deliver and install fixed padded and upholstered chairs as specified, floor mounted, with self-lifting seat that rises to a uniform 3/4-safety fold position.
- 1.2 SUBMITTALS:
  - A. Product data for each chair model specified to include construction details, material descriptions and finish options
  - B. LEED:
    1. Product data for MR Credit 4 documenting recycled content.
  - C. Seating layout (shop drawings) developed from the contract drawings that show aisle widths, chair spacing for each row, row-lettering and chair-numbering scheme, chair dimensions and back pitch. Layout drawings to also include locations for accessories, including left- and right-hand tablet arms, electrical devices, accessibility provisions and attachments to other work.
  - D. Samples for verification & finish selection to include:
    1. Initial finish selections to be made from manufacturer's standard color and fabric guides.
    2. Final powder coat selection to be approved from manufacturers standard-sized samples not less than 1" x 3".
    3. Final laminate selection to be approved from manufacturers standard-sized samples not less than 2" x 2".
    4. Final plastic color selection to be approved from manufacturers standard-sized samples not less than 2" x 3".
    5. Final wood finish selection to be approved from manufacturers standard-sized samples not less than 4" x 3".
    6. Final upholstery fabric selection to be approved from fabric mills standard swatch size if available.
  - E. Maintenance instructions and inspection guidelines furnished for each chair model specified.
  - F. Manufacturers standard warranty.
- 1.3 QUALITY ASSURANCE:
  - A. Source Limitations:
    1. Obtain each type of fixed seating required, including accessories and mounting components, from a single manufacturer.
    2. Obtain fabric of a single dye lot for each color and pattern of fabric required except when yardage requirement exceeds maximum dye lot. Multiple dye lots shall be color matched for quality assurance.
  - B. Fire Performance Characteristics of Upholstered Seating:
    1. Fabric shall be Class 1 according to DOC CS 191 and 16 CFR 1610.61, tested according to California Technical Bulletin 117.

2. Padding shall comply with California Technical Bulletin 117.

1.4 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not deliver or install seating until spaces are enclosed and weather tight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary or permanent HVAC system is operating and maintaining ambient temperature and humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Take field measurements to verify or supplement dimensions indicated on contract drawings prior to manufacturing.

1.5 PROJECT COORDINATION:

- A. Do not deliver or install seating until space is free of lifts and/or scaffolding used by other trades which may interfere with installation and/or damage seating.
- B. Coordinate layout and installation of electrical wiring and devices with electrical contractor to ensure that floor junction boxes for electrical devices are accurately located for final connection to the building's power supply by the electrical contractor.
- C. Coordinate layout and installation of seating with HVAC contractor to ensure that vents are located in a manner that will not interfere with seating installation.
- D. Coordinate concrete requirements needed for proper installation.

1.6 WARRANTY:

- A. Provide a manufacturer's warranty covering the material and workmanship for the specified warranty period from date of final acceptance.
- B. Warranty Periods:
  1. Structural Components: five years.
  2. Operating Mechanisms: five years.
  3. Plastic, Wood and Painted Components: five years.
  4. Upholstery Fabric: one year.
  5. Electrical Components: one year.

PART 2 - PRODUCTS

2.1 MATERIALS AND FINISHES:

- A. Steel shall meet requirements for ASTM A 36/A 36M plates, shapes, and bars; ASTM A 513 mechanical tubing; ASTM A 1008/A 1008M cold-rolled sheet; and ASTM A 1011 hot-rolled sheet and strip.
- B. All exposed metal parts shall be powder coated with a hybrid thermosetting powder coat finish. The powder coat finish shall be applied by electrostatic means to a thickness of 2 - 5 mils, and shall provide a durable coating having a 2H Pencil hardness. Prior to powder coating, metal parts shall be treated with a three-stage non-acidic, bonderizing process

for superior finish adhesion, and after coating shall be oven baked to cause proper flow of the epoxy powder to result in a smooth, durable finish. Manufacturer's standard color range shall be used.

- C. Concealed plywood shall meet requirements for HPVA HP-1 hardwood plywood.
- D. Upholstery fabric shall be 100% polyolefin Sherpa or Shire pattern by Absecon Mills, Inc. Fabric shall have an acrylic backing and have a minimum weight 16 oz. per lineal yard ( $\pm 1$  oz.). Fabric shall meet class 5 specifications for color fastness and light fastness and withstand 250,000 double rubs per ASTM D-4157. Fabric shall meet flammability resistance outlined in California Technical Bulletin 117, section E; CS-191-53, class 1; NFPA 260-1989, Class 1; UFAC, class 1; B.S. 5852 part 1: 1979 Ignition Source 0, smoldering cigarette.
- E. Upholstery padding shall be molded or slab polyurethane foam.
- F. Plastic Laminate shall meet requirements NEMA LD 3, Grade VGS for vertical surfaces and Grade HGS for horizontal surfaces. Color and pattern to be chosen from manufacturer's standard offering.
- G. Molded Plastics:
  - 1. Structural components shall be mar and dent resistant high density glass-filled polypropylene with UV stabilizers.
  - 2. Decorative components shall be mar and dent resistant high density polyethylene (HDPE) with UV stabilizers.
  - 3. Plastic components shall be chosen from manufacturer's standard offering.

## 2.2 FIXED AUDIENCE SEATING:

- A. Permanent arrangement of fixed audience seating as shown on seating layout drawings.
  - 1. Approved manufacturers subject to compliance with requirements outlined herein.
  - 2. Basis-of-design for fixed audience seating is Irwin Seating Company model 91.12.00.4 Millennium:
- B. Chair support columns shall be a formed 14 gauge (.0747") steel tube with an integral back wing plate. Column shall exhibit a 10° rearward incline to help conceal back attachment hardware. Brackets for seat attachment shall be 7-gauge (.1875") steel for superior strength, formed with an integral support buttress. Floor attachment foot shall be formed from 12 gauge (.105) steel to 7-1/2" x 2-5/8" in size. All steel components shall be robotic welded for precise assembly and exceptional integrity. Foot-to-column welds are to be concealed on the inside of the foot for a clean appearance. The standard shall be fabricated to be compatible with the floor incline, and to maintain proper seat and back height and angle.
- C. Aisle end panels shall be injection molded glass-filled polypropylene and enclose the upper 2/3 of the support column. Panels are teardrop-shaped with a concave rear edge and well-rounded surfaces around a center area which features a laminate surfaced insert.
- D. Backs shall be padded and upholstered on their face, with a one-piece injection molded polymer rear panel formed with rounded top. The foundation of the back component shall be provided by a 7/16" thick, 5-ply hardwood inner panel that shall also serve as the upholstery substrate. The face of the back shall be upholstered over a 2" thick polyurethane foam pad. The polyfoam pad shall be securely cemented to the plywood inner panel and upholstered with a 1-piece cover securely fastened to the hardwood inner panel by means of upholstery staples to facilitate ease of re-upholstering. The rear designer panel shall be injection molded HDPE plastic, high impact-resistant, with textured outer surface, formed to enclose the edges of the inner upholstery panel at the top and both sides of the back, and shall be not less than 25" in

length, extending down to the rear of the seat. There shall be no exposed screws above the armrests. Wings used for the attachment of the complete back assembly to the standards shall be not less than 14 gauge (.0747") steel. Wings shall be firmly secured to the inner panel through the use of threaded t-nuts fastened to the inner panel. Assembled chair shall have a nominal back height of 34". The back assembly shall be certified through routine ISO testing to withstand a 250 lb. static load test applied approximately 16" above the seat assembly and a 100,000 cycle 40 lb. swing impact test.

- E. Seats shall be padded and upholstered on their top surface with a structural, injection molded polypropylene seat foundation. Seats shall self-rise to a uniform position when unoccupied. The mechanism shall be certified through routine ISO testing to exceed 300,000 cycles during ASTM Designation F851-87 Test Method for Self-Rising Seat Mechanism. In addition, the seat shall withstand as a 600 lb. static load test applied approximately 3" from the front edge of the seat assembly and a 50,000 cycles 125 lb. vertical drop impact test.
  1. Seat foundation shall be engineered glass-filled, injection molded polypropylene, strengthened by deep internal ribs and gussets, completely enclosing the self-rising hinge mechanism. Bottom surface of the foundation shall be textured and feature an attractive molded recess. Bolted attachment of the seat assembly to the chair standard shall be concealed by a color-coordinated plastic cap to present a finished, refined appearance.
  2. When unoccupied, the seat shall rise automatically to a 3/4 safety fold position, and upon a slight rearward pressure, shall achieve full-fold, allowing the patron additional passing room. The seat shall rotate on two, molded, structural, glass-filled nylon hinge rods in internally molded channels with integral down-stops for exceptional strength. Seat-lift shall be accomplished by compression springs and self-lubricating plastic cams.
  3. The base structure for the cushion assembly shall be an ergonomic contoured, rigid thermoplastic resin panel covered with a 3" thick molded polyurethane foam pad. Cushion assembly is upholstered with a carefully tailored fabric cover secured around the perimeter of the thermoplastic resin panel by means of a drawstring and staples and securely locked to the seat foundation, preventing unauthorized removal; but facilitating convenient access by trained maintenance personnel.
- F. Chair width shall vary to accommodate sightlines and row lengths.
- G. Back height and pitch shall be fixed as shown on seating layout drawings.
- H. Center standards shall be provided with a glass-filled polypropylene armrest support structure capable of surpassing a 200 lb. vertical static load test applied 3" from the front edge of the armrest. Armrest support shall be attached to the support column with an integral ribbed post that binds into the steel support column and locked in place with a concealed security screw. Support structure is capped with a low profile polypropylene armrest attached with concealed hardware.
- I. Row-lettering and chair-numbering shall be provided for identification of all chairs as shown on approved seating layout drawings. Number plates shall be 5/8" x 1-5/8" aluminum with a clear finish and black sans serif numerals. The seat pans shall be recessed at the center of the front edge for the number plates, and attached by two (2) pop rivets. Letter plates shall be 2" round with a clear finish and black sans serif numerals attached to aisle standard by two (2) pop rivets. Attaching hardware shall have a finish compatible to plates.
- J. Accessible Seating:
  1. Shall be designated on the seating layout drawings and designed to allow an individual to transfer from a wheelchair to the theatre chair. The aisle standard shall be equipped with an armrest capable of lifting to a position parallel with the support column, opening sideways access to the seat. Aisle standards so equipped shall be provided with a label, displaying an easily recognizable "handicapped" symbol. Decorative requirements of aisle standards are waived for the handicapped access standards.

2. Chairs located as shown in the contract drawings shall be mounted upon moveable steel bases. The steel bases shall be available for sections of one (1), two (2), or three (3) chairs. The bases shall be fabricated from 3/16" x 3-1/2" x 15-1/2" steel, with cross members securely fastened to the horizontal base members via Tec screws. Holes shall be provided for the attachment of the chair standards. Moveable bases are secured to the floor when the seating is in use with reverse anchors.
- K. Aisle lights shall be furnished for aisle standards designated on the approved seating layout drawings. Aisle lights shall be low voltage, non-hazardous 12 volt, D.C. Fixtures shall be mounted to the top rear of the glass-filled polypropylene aisle panel to provide illumination of the aisle panel and adjacent floor and/or steps. Fixtures are 2-1/4" diameter black hooded assemblies with high-output, light emitting diodes (LED) designed to provide an even, consistent wash of white illumination. The aisle light standards shall be completely pre-wired with 18" of wiring extending beyond the standards. The base of each aisle light standard shall be provided with a flex-steel conduit connector thru which the wiring extension shall pass. Seating supplier shall furnish as part of the aisle light package a voltage reduction device suitable for conversion of 120 volt, A.C., facility power to 12 volt, D.C., for aisle lights requirement. The voltage reduction device shall be Underwriters' Laboratories listed as a Class II Power Unit for proper supply of power to the aisle lights. All wiring connections from the electric distribution system to the aisle light standards, as well as installation, proper safe mounting, and connection of the voltage reduction device, shall be the responsibility of the electrical contractor, including provision of suitable locking-style electrical disconnect device.
- L. Furnish extra materials from the same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Furnish complete seat and back assemblies equal to 1% percentage of amount installed for each type and size of chair seat and back.
  2. Furnish seat and back fabric covers equal to 1% percentage of amount installed for each type and size of cushion.
  3. Furnish armrests equal to 1% percentage of amount installed for each type of armrest.
  4. 1% percentage additional spares covers for seats and backs.

## 2.3 FABRICATION:

- A. Manufacture fabric-covered cushions with molded padding beneath fabric and with fabric covering free of welts, creases, stretch lines, and wrinkles. For each upholstered component, install pile and pattern run in a consistent direction.
- B. Fabricate floor attachment plates to conform to floor slope, if any, so that standards are plumb and chairs are maintained at same angular relationship to vertical throughout project.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Prior to layout and installation examine floors, risers, and other adjacent work and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the work including, but not limited to, plumb of riser faces and concrete conditions.
- B. Examine locations of electrical connections.
- C. Examine locations of HVAC supply ducts.



- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install seating in locations indicated and fastened securely to substrates according to manufacturer's written installation instructions.
- B. Use installation methods and fasteners that produce fixed audience seating assemblies with individual chairs capable of supporting an evenly distributed 600-lb static load applied 3" from front edge of the seat without failure or other conditions that might impair the chair's usefulness.
- C. Install seating with chair end standards aligned from first to last row and with backs and seats varied in width and spacing to optimize sightlines.
- D. Install riser-mounted attachments to maintain uniform chair heights above floor.
- E. Install chairs in curved rows at a smooth radius.
- F. Install seating so moving components operate smoothly and quietly.
- G. Install wiring conductors and cables concealed in components of seating and accessible for servicing.

### 3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Prepare test and inspection reports.

### 3.4 ADJUSTING

- A. Adjust chair backs so that they are properly aligned with each other.
- B. Adjust self-rising seat mechanisms so seats in each row are aligned when in upright position.
- C. Verify that all components and devices are operating properly.
- D. Repair minor abrasions and imperfections in finishes with coating that matches factory-applied finish.
- E. Replace upholstery fabric damaged during installation.

## **12 62 23 - PORTABLE BLEACHERS**

### **PART 4 - GENERAL**

#### **4.1 SECTION INCLUDES**

- A. Design, fabrication, and installation of portable bleachers and continuous angle frame bleachers.
  - 1. Understructure: galvanized steel (standard) or aluminum (optional).

#### **4.2 SUBMITTALS**

- A. Shop Drawings: Submit shop drawings sealed by a registered professional engineer indicating location, size, details, and quantity of all concrete, steel, aluminum components and accessories.
- B. Color Chart: Submit for selection if applicable.
- C. Product Sample: Submit if applicable
- D. Manufacturer's product data. Submit if applicable.
- E. Certificates: Submit if applicable.

#### **4.3 QUALITY ASSURANCE**

- A. Codes and Standards: Design, fabrication, and installation shall be in accordance with applicable codes, regulations, and accessibility requirements (ADA). Owner will furnish local code requirements.
- B. Manufacturer Qualifications: Minimum 10 years experience in the design and manufacture of bleachers.
- C. Installer Qualifications: Employ persons trained and experienced in the installation of bleachers.
- D. Welders: AWS certified.

#### **4.4 PROJECT CONDITIONS**

- A. Owner will verify site location.
- B. Owner will locate all underground utilities and obstructions.
- C. Owner will furnish geotechnical report indicating soil conditions and allowable soil bearing pressure.
- D. Owner will verify bleacher location and benchmark dimensions and elevation.

#### **4.5 WARRANTY**

- A. Warranty bleachers to be satisfactory as to design, workmanship, and materials for 1 year beginning after completion of project.

### **PART 5 - PRODUCTS**

#### **5.1 MANUFACTURER**

- A. Sturdisteel Company
- B. Southern Bleacher Company.
- C. Steel Stadiums
- D. As approved by Owner

**5.2 PORTABLE BLEACHERS AND CONTINUOUS ANGLE FRAME BLEACHERS**

- A. Size – See drawings
- B. Design: Design shall be in accordance with American Institute of Steel Construction , AA-94 – Aluminum Design Manual, and ACI.
- C. Design Loads:
  - 1. Live Load: 100 pounds per square foot (psf) gross horizontal projection.
  - 2. Perpendicular Sway Load: 10 per linear foot (plf) of seat plank.
  - 3. Lateral Sway Load: 24 plf of seat plank.
  - 4. Wind Load: Per local building code requirements.
  - 5. Live Load for Seat and Tread Planks: 120 plf.
  - 6. Guardrail and Handrail Loads: A single 200 pounds concentrated or 50 plf distributed load applied in any direction, at any location.
- D. Shop Connections: Welded and capable of carrying stress put upon them.
- E. Welding: AWS standards.
- F. Framework: Space prefabricated angle bleacher frames at 6 foot intervals and connect by crossbraces.
- G. Rise and Depth Dimensions:
  - 1. Vertical Rise and Horizontal Depth per Row: 8 inches by 24 inches.
  - 2. Seat Above its Respective Tread: 17 inches.
- H. Riser: 1/2" x 7 1/2" anodized aluminum board. At top row 1/2" x 9 3/8" anodized aluminum board.
- I. Seats: 1 1/2" x 9 1/2" anodized aluminum board, with end caps.
- J. Treads: 2 – 1 1/2" x 9 1/2" mill finish aluminum boards with end caps. 1 – 1 1/2" x 9 1/2" mill finish board for 3 row non-elevated units.
- K. Guardrail: Furnish at all sides of bleacher, entry stairs, walkways, ramps, portals, and landings where 30" or more above adjacent area or grade. Material shall be anodized aluminum pipe with end plugs at ends of straight runs or elbows at corners. Secure to angle posts by galvanized fasteners. Top rail shall be 42 inches (min.) above walkways and entrances

and 42 inches (min.) above any adjacent seat. Include 9 gauge galvanized chain link fencing fastened in place with galvanized fittings and aluminum ties.

- L. Front Walkway on Continuous Angle Frame Bleachers: 60 inches wide , elevated 30 or 40 inches high on mudsills, 28 ½" or 38 ½" on slabs. Walkway deck with 1 ½" by 9 ½" mill finish aluminum boards.
- M. Steps: Galvanized steel frames with 1 ¾" x 11 ½" mill finish aluminum boards with 1" x 1" dark bronze contrasting nosing.
- N. Transport Kit for Portable Bleachers: Painted steel tube tow bar with tongue. Wheel sets with 5.30 x 12 tires.
- O. Entry Stairs: Provide entry stairs for elevated bleachers in accordance with local code requirements, 7 " maximum rise, 11" minimum tread, and guardrails and handrails per local building code.
- P. Aisle Width: 48 inch minimum middle aisle width and 36" minimum end aisle width. Greater width as needed to meet code egress requirements.
- Q. Mudsills: 1 ½ inch by 5 1/2 inch (optional 1 1/2 inch by 7 1/2 inch) treated lumber, drilled for field bolting.
- R. Press Box: Independently supported and connected to rear of bleacher with aisle access provided. Press box specifications are separate.
- S. Accessibility Provision: Incorporate ramps and wheelchair spaces within bleacher system in accordance with local code requirements and ADA.

### 5.3 MATERIALS

- A. Framework:
  - 1. Galvanized Steel: ASTM A36, A572 Gr 50, A992 Hot-dipped galvanized after fabrication in accordance with ASTM A123.
  - 2. Aluminum: Aluminum alloy 6061-T6, mill finish.
- B. Extruded Aluminum:
  - 1. Seat Boards: Extruded aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II.
  - 2. Tread Boards and Riser Boards: Extruded aluminum alloy 6063-T6, mill finish.
- C. Guardrail: Aluminum anodized pipe, 1 5/8 inches O.D.
- D. Accessories:
  - 1. Steel Bolts and Nuts: Equal to or greater than ASTM A307, galvanized. All structural connections are snug tight per RCSC 2000 specification.
  - 2. Hold-Down Clip Assembly: Aluminum alloy 6063-T6.
  - 3. Form Fitted End Caps: Aluminum alloy 2024, clear anodized 204R1, AA-M10C22A31, Class II.
  - 4. Channel End Caps: Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II.

PART 6 - EXECUTION

6.1 INSTALLATION

- A. Install portable bleachers and continuous angle frame bleachers complete in accordance with manufacturer's written instructions and approved shop drawings.

6.2 ADJUSTING

- A. Inspect completed bleachers and make necessary adjustments to ensure properly installed conditions.

## 12 63 23 - STADIUM AND ARENA SEATS

### PART 1 - GENERAL

- 1.1 SCOPE: Deliver and install fixed auditorium chairs with molded plastic seat and back, and aisle and center standards, all as specified, riser and floor mounted, with self-lifting seat which raises automatically to a uniform 3/4 fold position. Comply with ADA (Americans with Disabilities Act) Rules and Regulations.
- 1.2 SIZES: Varying lateral sizes of backs shall be used in accordance with approved seating plans, with standards in each row spaced laterally so that the end standards shall be in alignment from first to last row whether aisles are of constant or converging width.
- 1.3 SHOP DRAWINGS: Submit a complete seating plan developed from the contract drawings, showing all chairs, sizes, and aisle widths. Assume complete responsibility for the accuracy of all chair measurements shown on the seating plan.
- 1.4 PREPARATION: Examine work in place on which seating work is dependent. Defects which may influence satisfactory completion and performance of seating work shall be corrected in accordance with the requirements of the applicable section of work prior to commencement of seating work. Take field measurements to verify or supplement dimensions indicated. Be responsible for accurate fit of work.
- 1.5 WARRANTY: Provide a manufacturer's warranty covering the material and workmanship for a period of one year from date of final acceptance. Repair or replace any part which becomes defective during the warranty period, excepting where the product has been subject to accident, alterations, abuse, misuse or neglect.

### PART 2 - MATERIALS

- 2.1 GENERAL: Chairs shall be provided which display a continuity of design, and all components shall complement one another in form, style and texture, thereby evincing a contemporary, timely appearance of the completed facility. Design of chairs shall combine the best of aesthetics through continuity of detail in all components, while offering rugged structural soundness and excellent comfort. Comfort shall be of prime importance in the design of chair components; and design shall be based on nationally recognized studies of human form and dimensions. The seat and back shall be blow-molded plastic, designed and contoured to provide structural superiority, while giving total body support for maximum comfort to the seated individual. The plastic shall be smooth on the face except for decorative surface grooves to provide a continuity of visual detail between the seat and back. Support standards shall be of steel, designed for simplicity, rugged structure, and compatibility with the design of plastic components.
- 2.2 STEEL: Steel shall be the primary structural material for all chair components, including seat support mechanisms, aisle and center standards, and back component attachment. Steel structural components shall be die-formed according to modern manufacturing methods, and assembled by means of state-of-the-art MIG welding processes. All steel shall have smooth surfaces and be of sufficient gauge thickness and designed to withstand strains of normal use and abuse.
- 2.3 PLASTIC: Plastic shall be high impact-resistant, HDPE polyethylene with ultra-violet light inhibitors to retard fading. Plastic shall have a burn rate of 1" per minute when tested in accordance with ASTM D635 or the Department of Transportation Motor Vehicle Safety Standard No. 302. Concern for the environment requires that molded plastic parts be designed to be recyclable, and shall be clearly designated with a "RECYCLE" symbol on each piece.
- 2.4 FINISH: All exposed metal parts shall be powder coated with an epoxy powder coat finish. The powder coat finish shall be applied by electrostatic means to a thickness of 3 mils, and shall provide a durable coating having a 4H pencil hardness. Prior to powder coating, metal parts shall be treated with a five-stage bonderization process for superior finish adhesion, and after coating shall be oven baked to cause proper flow of the epoxy powder to result in a smooth durable finish. Manufacturer's standard color range shall be used. Color of plastic shall be selected from manufacturer's standard color range.

- 2.5      **HARDWARE:** All assembly hardware shall be rust resistant, black-plated. Threaded components shall utilize the standard thread configuration and standard driver sizes common for the area where chairs are installed.
- 2.6      **MOLDED PLASTIC BACKS:** The back components shall be one-piece, double-wall blow-molded plastic construction, high density, high impact-resistance linear polyethylene with smooth surface. The backs shall extend to a height of 32 inches above level floor, and shall be plain and smooth on their face. Multiple sizes of back components (minimum of 5 available: 18" - 22") shall be utilized to provide varying row lengths, and shall be accomplished without the use of mold inserts which result in unsightly insert lines in the backs. The blow-molded plastic shall be designed to be a sturdy structural component and serve in concert with formed, heavy-gauge steel wings to make the back the focal point of the chair structure. Wings shall provide increased structural integrity for the back without influencing appearance, and shall be attached without fasteners exposed on the face of the back, providing a pitch of back inclined 14 degrees from vertical.
- 2.7      **MOLDED PLASTIC SEAT:** The seat components shall be one-piece, double-wall, blow-molded plastic construction, high density, high impact-resistant linear polyethylene with smooth surface. The top of the seat shall be formed to provide even, comfortable support for the seated individual by properly contouring to the shape of the human form; with generous supportive length, gently falling away at the front of the seat, for providing gentle support for the underside of the occupant's thighs. Seat component shall be molded to avoid sharp, pressure-generating ridges. The bottom of the seat shall be contoured to provide a structural boxed construction for exceptional strength of the component, while giving a continuity of design in concert with the back plastic. Heavy gauge steel seat-lift arms, designed to blend aesthetically with the plastic, shall enhance the structure of the seat by transferring seat loads to the seat hinge structure. Seats shall automatically self-lift to a uniform three-quarter fold position when unoccupied, and shall rotate on a large, square, solid steel hinge rod, extending continuously from standard to standard to provide a focus for the seat structure. Seat uplift shall be accomplished by torsion springs guided by nylon bushings. Quiet operation of the seat shall be assured by raised neoprene initial downstops, with final seat support of metal-to-metal contact. Seat shall be certified to pass testing according to ASTM Designation F851-87 Test Method for Self-Rising Seat Mechanisms, as well as 600 lb. static load test to the front edge of the seat.
- 2.8      **STANDARDS - WELDED TUBULAR STEEL CONSTRUCTION:** Aisle and center standards shall be of modern pedestal design, utilizing heavy gauge, welded, 2-1/2" x 1" rectangular tubular steel for sturdy, rigid support structure. Standards shall be floor mounted and riser mounted as shown. All weldments shall be gas shielded, arc weld. Aisle standards shall be provided with a decorative panel of blow-molded HDPE plastic, shaped and contoured to enhance and complement the design of the seat and back. The plastic shall provide the same texture and color as seat and back plastic, and shall act in concert with other components to evince a unity of design. The aisle standard decorator panels shall be supported and secured to the aisle standard structural members by sturdy 14 gauge (.0747") steel brackets. Structure of aisle and center standards shall be provided by 14 gauge (.0747") tubular, formed 2-1/2" x 1" rectangular steel columns, extending in one plane from riser attachment or near floor level to armrest, and shall be designed to provide minimal obstruction to facility maintenance. Formed steel attachment brackets for bolting seat and back components, and armrests, shall be securely welded to the columns at locations necessary to maintain these components in a comfort-generating relationship to each other, and placing the components at a proper height above finished floor. Riser mounting - support columns shall be securely welded to formed 7 gauge (.1793 ") steel riser attachment brackets. Floor mounting - support columns shall be securely welded 360 degrees around to 1/4" thick, steel floor attachment feet.
- 2.9      **ARMRESTS:** Aisle and center standard armrests shall be molded HDPE plastic, formed to be aesthetically compatible with other chair components. Armrests shall have locking keyways molded into the bottom to securely lock onto heavy steel tabs at the top of the standards. Further, one security screw shall be utilized.
- 2.10     **NUMBER AND LETTER PLATES:** A numbering system shall be provided for identification of all chairs; and shall be furnished as shown on the approved seating layout. Number and letter plates shall be bright aluminum with black characters, Bauhaus Bold character style. Number plates shall be approximately 1-3/4" x 2-3/4" size shaped to blend aesthetically with the major chair components and located in a molded recess in the upper corner of the back. Row letter plates shall be 2" diameter round, securely attached to the aisle standard decorator panels. Plates shall be affixed with color-coordinated pop rivets.

- 2.11 AISLE LIGHTS: Aisle lights shall be furnished for the aisle standards located as designated on the approved seating plan. Aisle lights shall be low voltage, non-hazardous 24 volt AC system, utilizing a single wedge-based bulb, and providing adequate illumination for floor and/or steps adjacent to aisle standards. The light assembly shall be recessed within the aisle standard structural column, concealed from sight and protected from damage, and shall be furnished complete with light socket, 4-watt bulb (14,000 hr. life & 22 lumen min. rating), and detachable, louvered, translucent aisle light cover. The standard shall be completely pre-wired with 18" of wiring extending beyond the standard. The standard shall be provided with a flex-steel conduit-connector through which the wiring extension shall pass. Seating supplier shall furnish as part of the aisle light package a voltage reduction device, suitably housed in a steel safety enclosure; and equipped with primary and secondary fuses, terminal blocks, and control enclosure safety disconnect; all components Underwriters' Laboratories listed and assembled by licensed electricians to facilitate safe connection to the building electrical system. All wiring connections from the electric distribution system to the aisle light standards, and installation and connection of the voltage reduction device shall be the responsibility of the electrical contractor.
- 2.12 HANDICAPPED ACCESS AISLE STANDARDS: Aisle standards designated on the contract drawings shall be arranged for easy access by handicapped individuals and shall be designed to allow the individual to transfer easily from a wheelchair to the theatre chair. The aisle standard support column shall be inclined to the rear at the top by 16 degrees, and shall be equipped with an armrest capable of lifting to a position parallel with the chair back, opening sideways access to the seat. Aisle standards so equipped shall be provided with a label, displaying an easily recognizable "handicapped" symbol. Decorative requirements of aisle standards are waived for the Handicapped Access Standards.

### PART 3 - EXECUTION

- 3.1 SCOPE OF WORK: The installation is to be performed by the successful bidder, under the direction of a capable installation superintendent, in a manner satisfactory to the Architect, and the job turned over to the owner with all chairs complete and ready to use.
- 3.2 METHOD OF INSTALLATION: The seating plan is to be reproduced on the floor, all dimensions checked against the plan and necessary adjustments made in the layout for all discrepancies.
- A. Chairs shall be attached by means of an approved type of lead shield expansion bolts. Riser mount chairs shall be attached with 3/8" expansion bolts by not less than 3" long. Floor mount chairs shall be attached with 1/4" expansion bolts by not less than 2" long. There shall be two (2) bolts per standard.
- 3.3 CLEANING: Remove all debris caused by this work from the premises.



## 12 63 33 - PERMANENT GRANDSTANDS

### PART 1 - GENERAL

#### 1.1 SYSTEM DESCRIPTION

- A. Provide labor, material, equipment and supervision necessary to complete installation of permanent steel grandstand, including the following:
  - 1. Steel Substructure
  - 2. Decking System
  - 3. Concrete Foundation
  - 4. Press Box Support Structure
  - 5. Press Box

#### 1.2 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturers must have ten years of experience in the manufacture of bleachers and grandstands; welders must be AWS certified; manufacturing capability according to various code compliances.
- B. Installer Qualifications: Experienced in the proper installation of grandstands.
- C. Source Quality Control: Mill Test Certification.

#### 1.3 SUBMITTALS

- A. Manufacturer's Product Data: Submit manufacturer's descriptive product data for project.
- B. Shop Drawings: Manufacturer to submit shop drawings sealed by a registered professional engineer and schedules for type, location, quantity, and details of steel and aluminum components required for project.
- C. Certificates:
  - 1. Insurance Certificate
  - 2. Bid Bond
- D. Product Sample: Submit one 18 inch seat sample.
- E. Color Sample: If applicable, submit sample.

#### 1.4 SITE CONDITIONS

- A. Field Site:
  - 1. Owner to make site accessible.
  - 2. Owner to verify site locations, benchmarks.

- B. Underground Utility Line: Owner to clearly mark all underground utilities and obstructions and Owner to relocate all that conflict with grandstand.
- C. Soil Test: Furnished by Owner.

## 1.5 WARRANTY

- A. Permanent Grandstand shall be under warranty for a period of one year beginning at Date of Substantial Completion for Projects installed by Manufacturer. The Grandstand is warranted to be free from defect in materials and workmanship in the course of manufacture. This warranty excludes any other defects resulting from abnormal use in service, accidental or intentional damage or any occurrences beyond Manufacturer's control.

## 1.6 MAINTENANCE

- A. Owner is to conduct annual inspection and required maintenance of grandstand to ensure safe conditions. It is also recommended that a professional engineer or registered architect perform inspections biennially.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Southern Bleacher Company.
- B. Steel Stadiums.
- C. Other manufacturers seeking to be approved must submit product literature on horizontal beam design to the Owner for review and receive approval from Owner seven days prior to bid date.

### 2.2 PERMANENT STEEL GRANDSTAND

- A. Product Description
  - 1. Horizontal Beam Design: Home: Gross Seating capacity of 1280, 16 rows, and 120 feet long. Visitor: Gross Seating capacity of 896, 16 rows, and 84 feet long.
    - a. Press Box Support Structure 8 x 30.
    - b. Filming platform 8 x 24.
  - 2. Vertical columns are placed 18 feet 0 inches on center laterally and 15 feet on center front to back.
  - 3. Horizontal beams are wide flange beams.
  - 4. Traverse bays are free of crossbracing the total length of the grandstand.
  - 5. Stringers are wide flange with steel angle rise and depth fabrication and are placed 6 feet on center.
  - 6. Front Walkway:
    - a. Width 73 inches.
    - b. Elevated 4 feet above grade at benchmark.

7. Entry stairs to be firmly anchored to uniformly poured concrete bases.
  - a. Stair rise: 7 inches per Uniform Building Code with aluminum closure.
  - b. Stair tread depth: 11 inches per Uniform Building Code.
  - c. Guardrails on Stair to be 42 inches above leading edge of step with intermediate rail spacing at 4 inches.
  - d. Stairs to have handrail extension. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corner. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the nosing of treads and landings. Handrails shall be continuous the full length of the stairs and shall extend in the direction of the stair run not less than 12 inches beyond the bottom riser. Ends shall be returned or shall terminate in newel posts or safety terminals.
8. Aisles:
  - a. Aisles with seating on both sides to have 34 inch high handrail with intermediate rail at approximately 22 inches above tread.
  - b. Anodized aluminum handrails with rounded ends are discontinuous to allow access to seating through a space 22 inches (min.) to 36 inches (max.).
  - c. Halfsteps shall provide equal rise and run throughout aisle. Each shall have aisle nosing with black powder coat finish and riser closure with clear anodized finish. If colored riser is specified for seating area, the aisle nose and riser closure shall be of same finish.
9. Decking:
  - a. Rise per row 9 3/4 inches, depth per row 25 inches.
  - b. Each seat 17 inches above its respective tread.
  - c. Decking Arrangement: Full Deck
    - i Seats: 2 x 10 anodized aluminum.
    - ii Treads: 2 – 2 x 11 mill finish aluminum.
    - iii Risers: 1 x 8 anodized finish aluminum.
    - iv Aisle extension: 2 x 4 mill finish aluminum.
    - v Front walkway: 4 – 2 x 10 and 3 – 2 x 12 mill finish aluminum.
    - vi Entry stairs and ramps to be 2 x 12 mill finish aluminum.
    - vii Open ends of planks to be covered with aluminum end caps, securely fastened to the plank.

- viii Joint sleeves: Dual joint sleeves to be inserted at each butt joint of each load bearing aluminum plank, and to penetrate 6 inches into each plank at the joint.
10. Guardrailing: To be at all sides of bleacher, entry stairs and ramps, portals, and landings. Railing to be anodized aluminum with end plugs at ends of straight runs and/or elbows at corner. All guardrails shall be secured to angle rail risers by galvanized fasteners. Railing shall be 42" above walkways and entrances. Railing shall be 42" above any adjacent seat. Guardrailing on sides and back shall include 9 gauge galvanized chain link fencing fastened in place with galvanized fasteners and aluminum ties.
11. Filmers Platform: 8 feet deep by 12 feet wide at rear of visitor grandstand with guardrailing 42" above the deck on all sides.
12. Ramps:
  - a. Slope: 1 in 12.
  - b. Guardrail to be 42 inches above ramp with intermediate rail spacing at 4 inches.
  - c. Ramps to have handrail extension. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the ramp surface. Handrails shall be continuous the full length of the ramp and shall extend in the direction of the ramp not less than 12 inches beyond the end of the ramp. Ends shall be returned or shall terminate in newel posts or safety terminals.
13. Handicap provision:
  - a. Quantity of wheelchair spaces: Home –10; Visitor - 8
  - b. Riser area adjacent to wheelchair spaces to have closed intermediate construction.
- B. Materials/Finishes
  1. Substructures:
    - a. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
    - b. Shop connections are seal welds.
    - c. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.
    - d. Painted steel finish is unacceptable.
  2. Extruded Aluminum:
    - a. Seat Planks, Backrests, and Railing are extruded aluminum alloy, 6063-T6 with clear anodized 204R1, AA-M10C22A31, Class II finish
    - b. Tread planks are extruded aluminum alloy 6063-T6 mill finish

- c. Joint Sleeve Assembly to be inserted in flat plank to maintain true alignment in joining together two plank pieces. Extruded aluminum alloy, 6063-T, mill finish. Splice cover is unacceptable between two flat plank pieces joined in a straight line.
  - 3. Accessories:
    - a. Channel End Caps: Aluminum alloy 6063 T6, clear anodized 204R1, AA M10C22A31, Class II. Polyethylene end cap is unacceptable.
    - b. Cast End Caps: Aluminum 319 alloy, cast finish. (Required for back rest and RS plank only)
    - c. Hardware:
      - i Bolts, Nuts: Hot dipped galvanized or plated.
      - ii Hold down Clip Assembly: Aluminum alloy 6061 T6, mill finish.
      - iii Structural Hardware: Equal to or greater than hot dipped galvanized ASTM A307. No connections utilizing high strength bolts are classed as slip critical.
    - d. Aisle Nose and Stair Nose: Aluminum alloy, 6063-T6, black powder coat finish.
- C. Fabrication:
  - 1. Design Load:
    - a. Live Load: 100 psf gross horizontal projection.
    - b. Lateral Sway Load: 24 plf seat plank.
    - c. Perpendicular Sway Load: 10 plf seat plank.
    - d. Live Load of Seat and Tread Planks: 120 plf.
    - e. Guardrail: Per Uniform Building Code.
    - f. Windload: 30 psf across vertical projection.
  - 2. All manufactured connections to be shop welded.
    - a. Manufactured by certified welders conforming to AWS Standards.

## 2.3 WOOD STRUCTURE PRESS BOX

- A. Product Description
  - 1. Press Box Support Structure: Independently supported but connected to rear of grandstand. Support Structure to be 8 feet wide x 30 feet long with 6 feet landing on one end.
  - 2. Press Box Dimensions: 8 feet wide x 24 feet long.
  - 3. Filming Area/Observation Deck located on Press Box roof.

B. Materials/Finishes

1. Press Box Support Structure:

- a. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
- b. Shop connections are seal welds.
- c. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.

2. Press Box: All materials shall be new and shall comply with ASTM specifications.

a. Floor

- i Main support to be a galvanized steel floor frame sized to support structure and metal belly pan for support of insulation.
- ii Sub-floor: 3/4 inch AC Grade exterior plywood over 2 inch x 10 inch flooring.
- iii Finish Floor: 12 inch x 12 inch x 1/8 inch thick vinyl tile.
- iv Insulation: Kraft faced fiberglass building insulation R-11, 3 1/2 inches thick. Batt or roll as manufactured by Owens-Corning Fiberglas Corp. or equal.

b. Wall Structure

- i Studs: 2 inch x 4 inch #2SPF 16 inch O.C.
- ii Insulation: Kraft faced fiberglass building insulation R-11, 3 1/2 inch thick. Batt or roll as manufactured by Owens-Corning Fiberglas Corp. or equal.
- iii Interior Finish
  - 1/2 inch vinyl coated gypsum panels, Gold Bond vinyl-surfaced Durasan-Harvest-Maize.
  - Cove Base: Vinyl 4 inch x .080 equal to PRO CB-35 Nubian.
- iv Exterior Finish
  - 26 gauge white prefinished steel rib paneling over 1/2 inch CD exterior grade plywood.
  - Wall panels are attached with metal to wood TEK screws - 6" O.C. at the top and bottom of the panels and 12" O.C. at mid point between top and bottom attachment points.
  - Lap screws are placed at each end of the panels, at the intermediate supports, and at the mid point between supports (TEK #14).

c. Roof Structure

- i Roof Joists: 2 inch x 8 inch SYP on 16 inch O.C.
  - ii Roof Decking: 3/4 inch T & G CD Plywood.
  - iii Finish Roof: Single ply .060 Versiguard black membrane or equal.
  - iv Insulation: Kraft faced fiberglass building insulation, 6 inches thick. Batt or roll as manufactured by Owens-Corning Fiberglas Corp. or equal.
  - v Cornice: 26 gauge steel prefinished white to match metal siding.
  - vi Ceiling: 12 inch x 12 inch x 1/2 inch acoustical tile attached to 1/2 inch sheetrock with adhesives.
- d. Exterior Door(s)
  - i Full flush steel construction with honeycomb core. 18 gauge skin sheets. Dimensions: 3 feet 0 inches x 6 feet 8 inches.
  - ii Steel door frame complete with threshold and weatherstripping.
  - iii Hardware: Equal to keyed passage as manufactured by Schlage Lock Co. Finish: Satin Chromium Plated US26D. Keyed alike locks.
- e. Interior Door(s)
  - i Interior Birch Unit. Dimensions: 3 feet 0 inches x 6 feet 8 inches.
- f. Windows
  - i Frame: Extruded aluminum single hung, vertical rise unit.
  - ii Glazing: Clear tempered or safety panes.
  - iii Dimensions of each unit: Varies as per Press Box size.
  - iv Finish: Bronze enamel.
- g. Work Bench
  - i 16 inch wide work bench constructed of 3/4 inch BC grade plywood and 2 inch x 4 inch framing with knee braces.
  - ii Plastic laminate top: Equal to Wilsonart Laminates. Finish: D30-6 Natural Almond. Thickness: 050 (12 mm nominal).
- h. Painting: Equal to Jones Blair 15 year.
  - i Surfaces: Exterior Door(s), Door Frame(s)
    - Primer: Factory applied

- Finish: 2 coats semi-gloss enamel.
  - ii Surfaces: Interior Doors (if applicable): Stain to coordinate with interior finish.
  - iii Surfaces: Exterior Siding
    - Primer: Factory applied
    - Finish: Factory applied
    - Touchup: If applicable
  - i. Caulking: All Temperature, UV sealant.
  - j. Electrical
    - i Fixtures: 2-lamp, 40 watt fluorescent, white strip design. Sizes: Varies as per Press Box size. Equal to Lithonia Lighting.
    - ii Wiring to be in EMT or flexible metal conduit per N.E.C. 100 amp breaker box with 1 1/4 inch conduit to be stubbed out of press box ready for service line to be connected. Service line to Press Box is responsibility of Owner.
    - iii Electrical outlet(s) installed per NEC shall be standard duty.
    - iv Empty double outlet boxes with 3/4 inch conduit stubbed out bottom of Press Box for use of Owner. Quantity: Varies as per Press box size.
    - v Filming Area/Observation Deck : Weathertight outlet box for cameras. Quantity: Dependent on Press Box size.
  - k. Filming Area/Observation Deck
    - i Access Options
      - Interior: Roof hatch with OSHA-rated aluminum ladder mounted to an interior back wall.
    - ii Roof guardrail to be 42" above walking surface around perimeter of deck. The guardrail to include 9 gauge galvanized chain link fencing fastened in place with galvanized fasteners and aluminum ties.

## 2.4 WARRANTY

- A. The Press Box is warranted to be free from defect in materials and workmanship in the course of manufacture. This warranty excludes any other defects resulting from abnormal use in service, accidental or intentional damage or any occurrences beyond manufacturer's control.

## PART 3 - EXECUTION

- 3.1 INSTALLATION: All work performed by technicians experienced in bleacher seating installation.



- 3.2 FIELD QUALITY CONTROL: Footings for the grandstand shall provide sufficient bearing area at bottom to support all loads of the grandstand. Depth and design of footings shall be engineered for specific soil conditions. Hot-dipped galvanized anchor bolts shall be secured in the concrete footings. Concrete shall attain working strength of 3,000 psi. Foundations based upon minimum soil bearing of 2000 psf at 3 feet below grade.
- 3.3 CLEAN UP: Clean up all debris caused by work of this section.

## 12 65 13 - GYMNASIUM FIXED SEATING

### PART 1 - GENERAL

- 1.1 SCOPE: Deliver and install fixed gym chairs with double-wall molded plastic seats and backs, and aisle and center standards, all as specified, riser and floor mounted, with self-lifting seat which raises automatically to a uniform 3/4 fold position.
  - 1.2 ADA: Comply with ADA (Americans with Disabilities Act) Rules and Regulations.
  - 1.3 SIZES: Lateral sizes of backs shall be used in accordance with approved seating plans, with standards in each row spaced laterally so that the end standards shall be in alignment from first to last row whether aisles are of constant or converging width.
  - 1.4 SHOP DRAWINGS: Submit a complete seating plan developed from the contract drawings, showing all chairs, sizes, and aisle widths. Assume complete responsibility for the accuracy of all chair measurements shown on the seating plan.
  - 1.5 EXAMINATION & ACCEPTANCE OF WORK IN PLACE: Examine work in place on which seating work is dependent. Defects which may influence satisfactory completion and performance of seating work shall be corrected in accordance with the requirements of the applicable section of work prior to commencement of seating work.
  - 1.6 FIELD MEASUREMENTS: Take field measurements to verify or supplement dimensions indicated. Be responsible for accurate fit of work.
  - 1.7 MATERIALS AND WORKMANSHIP:
    - A. Provide new materials of types specified.
    - B. Turn over all work to the owner in undamaged condition.
    - C. Provide workmanship of the best quality by craftsmen skilled in their respective trades.
  - 1.8 QUALITY ASSURANCE: To assure high and satisfactory quality, design, color and operation of products, reference has been made to brand names; however, it is not intended to limit competition and items of brands that are equal will be given full consideration.
- BASE SPECIFICATION:
- | <u>SPECIFIED</u>      | <u>FIXED CHAIR</u> |
|-----------------------|--------------------|
| Irwin Seating Company | #303030 PATRIOT    |
- 1.9 RESPONSIBILITY OF BIDDER: Bidder shall submit with his bid a list of five (5) seating projects of similar size which have been in service for 5 years or longer. Projects submitted shall incorporate chairs with seats, backs and standards consistent with those offered on this project. Acceptable Products of American Seating Corporation (Model #406), Grand Rapids, MI and Hussey Seating (Medallion Series), New Berwick Maine will be considered as acceptable manufacturers. Strict Compliance to the specifications will be required.
  - 1.10 DELIVERY: Deliver the seating at a proper time for installation that will not interfere with other trades operating in the building. Bid seating for installation and completion in Late 2004, or as directed by contractor after that date.
  - 1.11 WARRANTY:
    - A. Provide a manufacturer's warranty covering the material and workmanship for a period of one year from date of final acceptance.

- B. Repair or replace any part which becomes defective during the warranty period, excepting where the product has been subject to accident, alterations, abuse, misuse or neglect.

1.12 REPLACEMENT STOCK: Upon completion of the work of this Section, deliver to the Owner an extra stock of 4 seats, neatly packaged, and clearly labeling with contents.

## PART 2 - MATERIAL SPECIFICATIONS

2.1 STEEL: Steel shall be the primary structural material for all chair components, including seat support mechanisms, aisle and center standards, and back component attachment. Steel structural components shall be die-formed according to modern manufacturing methods, and assembled by means of state-of-the-art MIG welding processes. All steel shall have smooth surfaces and be of sufficient gauge thickness and designed to withstand strains of normal use and abuse.

2.2 PLASTIC: Plastic shall be high impact-resistant, HDPE polyethylene with ultra-violet light inhibitors to retard fading. Plastic shall have a burn rate of 1" per minute when tested in accordance with ASTM D635 of the Department of Transportation Motor Vehicle Safety Standard No. 302. Concern for the environment requires that molded plastic parts be designed to be recyclable, and shall be clearly designated with a "RECYCLE" symbol on each piece.

2.3 FINISH:

- A. Metal Parts: All exposed metal parts shall be powder coated with an epoxy powder coat finish. The powder coat finish shall be applied by electrostatic means to a thickness of 3 mils, and shall provide a durable coating having a 4H pencil hardness. Prior to powder coating, metal parts shall be treated with a five-stage bonderization process for superior finish adhesion, and after coating shall be oven baked to cause proper flow of the epoxy powder to result in a smooth durable finish. Manufacturer's standard color range shall be used.
- B. Plastic Parts: Color of plastic shall be selected from manufacturers standard color range.
- C. Hardware: All assembly hardware shall be rust resistant, black-plated. Threaded components shall utilize the standard thread configuration and standard driver sizes common for the area where chairs are installed.

2.4 DESIGN AND CONCEPT:

- A. Chairs shall be provided which display a continuity of design, and all components shall complement one another in form, style and texture, thereby evincing a contemporary, timely appearance of the completed facility. Design of chairs shall combine the best of aesthetics through continuity of detail in all components, while offering rugged structural soundness and excellent comfort. Comfort shall be of prime importance in the design of chair components; and design shall be based on nationally recognized studies of human form and dimensions.
- B. The seat and back shall be blow-molded plastic, designed and contoured to provide structural superiority, while giving total body support for maximum comfort to the seated individual. The plastic shall be smooth on the face except for decorative surface grooves to provide a continuity of visual detail between the seat and back. Support standards shall be of steel, designed for simplicity, rugged structure, and compatibility with the design of plastic components.

2.5 MOLDED PLASTIC BACKS:

- A. The back components shall be one-piece, double-wall blow-molded plastic construction, high density, high impact-resistance linear polyethylene with smooth surface. The backs shall extend to a height of 32 inches above level floor, and shall be plain and smooth on their face. Back components minimum of 20" wide shall be utilized to provide varying row lengths, and shall be accomplished without the use of mold inserts which result in unsightly insert lines in the backs. The blow-molded plastic shall be designed to be a sturdy structural component and serve in concert with formed, heavy-gauge steel wings to make the back the focal point of the chair structure. Wings shall provide increased structural

integrity for the back without influencing appearance, and shall be attached without fasteners exposed on the face of the back, providing a pitch of back inclined 14 degrees from vertical.

2.6 MOLDED PLASTIC SEAT:

- A. The seat components shall be one-piece, double-wall, blow-molded plastic construction, high density, high impact-resistant linear polyethylene with smooth surface. The top of the seat shall be formed to provide even, comfortable support for the seated individual by properly contouring to the shape of the human form; with generous supportive length, gently falling away at the front of the seat, for providing gentle support for the underside of the occupant's thighs. Seat component shall be molded to avoid sharp, pressure-generating ridges. The bottom of the seat shall be contoured to provide a structural boxed construction for exceptional strength of the component, while giving a continuity of design in concert with the back plastic. Heavy gauge steel seat-lift arms, designed to blend aesthetically with the plastic, shall enhance the structure of the seat by transferring seat loads to the seat hinge structure.
- B. Seats shall automatically self-lift to a uniform three-quarter fold position when unoccupied, and shall rotate on a large, square, solid steel hinge rod, extending continuously from standard to standard to provide a focus for the seat structure. Seat uplift shall be accomplished by torsion springs guided by nylon bushings. Quiet operation of the seat shall be assured by raised neoprene initial downstops, with final seat support of metal-to-metal contact. Seat shall be certified to pass testing according to ASTM Designation F851-87 Test Method for Self-Rising Seat Mechanisms, as well as 600 lb. static load test to the front edge of the seat.

2.7 STANDARDS - WELDED TUBULAR STEEL CONSTRUCTION:

- A. Aisle Standards and Center Standards shall be identical, clean, open design, without decorator panel, extending in one plane from near floor level to armrest, and shall be designed to provide minimal obstruction to facility maintenance. Support structure shall be heavy gauge, 1" x 2-1/2" rectangular tubular 14 gauge (.0747") steel columns. Formed steel attachment brackets for bolting seat and back components, and armrests, shall be securely welded to the columns at locations necessary to maintain these components in a comfort-generating relationship to each other, and placing the components at a proper height above finished floor. All weldments shall be gas shielded, arc weld.
  - 1. Riser mounting - support columns shall be securely welded to formed 7 gauge (.1793 ") steel riser attachment brackets.
  - 2. Floor mounting - support columns shall be securely welded 360 degrees around to 1/4" thick, steel floor attachment feet.

2.8 ARMRESTS: Armrests shall be 10 gauge (.125") formed steel, securely welded to the top of each aisle and center standard armrest. Armrests shall be flat on the top surface with the edges rounded and broken approx. 15 degrees, shall be 2" x 9" size, and shall be provided with a closed return at the front to prevent interference with occupant's clothing. All weldments shall be gas shielded, arc weld.

2.9 NUMBER AND LETTER PLATES: A numbering system shall be provided for identification of all chairs; and shall be furnished as shown on the approved seating layout. Number and letter plates shall be bright aluminum with black characters, Bauhaus Bold character style. Number plates shall be approximately 1-3/4" x 2-3/4" size shaped to blend aesthetically with the major chair components and located in a molded recess in the upper corner of the back. Row letter plates shall be 2" diameter round, securely attached to the aisle standard decorator panels. Plates shall be affixed with color-coordinated pop rivets.

2.10 HANDICAPPED ACCESS AISLE STANDARDS: Aisle standards designated on the contract drawings shall be arranged for easy access by handicapped individuals and shall be designed to allow the individual to transfer easily from a wheelchair to the theatre chair. The aisle standard support column shall be inclined to the rear at the top by 16 degrees, and shall be equipped with an armrest capable of lifting to a position parallel with the chair back, opening sideways access to the seat. Aisle standards so

equipped shall be provided with a label, displaying an easily recognizable "handicapped" symbol. Decorative requirements of aisle standards are waived for the Handicapped Access Standards.

- 2.11 BENCH SEAT: 10" deep molded plastic bench equal to Irwin Seating Company, two-color scheme as selected by Architect.

### PART 3 - EXECUTION

- 3.1 SCOPE OF WORK: The installation is to be performed by the successful bidder, under the direction of a capable installation superintendent, in a manner satisfactory to the Architect, and the job turned over to the owner with all chairs complete and ready to use.
- 3.2 METHOD OF INSTALLATION:
- A. The seating plan is to be reproduced on the floor, all dimensions checked against the plan and necessary adjustments made in the layout for all discrepancies.
  - B. Chairs shall be attached by means of an approved type of lead shield expansion bolts. Riser mount chairs shall be attached with 3/8" expansion bolts by not less than 3" long. Floor mount chairs shall be attached with 1/4" expansion bolts by not less than 2" long. There shall be two (2) bolts per standard.
- 3.3 CLEANING: Remove all debris caused by this work from the premises.

## 12 66 13 - TELESCOPING BLEACHERS

### PART 1 - GENERAL

- 1.1 WORK INCLUDED: Manufacture, deliver and install Telescopic Seating Systems in accordance with applicable codes, the following specifications, and approved drawings.
- 1.2 RELATED WORK BY OTHERS
  - A. Adequate floor levelness for operation of telescopic seating.
  - B. Adequate wall strength for attachment and operation of wall attached telescopic seating.
  - C. Electrical wiring within the building as required for power operated telescopic seating.
- 1.3 SYSTEM DESCRIPTION
  - A. Telescopic seating system shall be multiple tiered seating rows comprised of seat and deck components, risers, and supportive understructure.
  - B. Telescopic seating shall be operable on the telescopic principle, stacking vertically in minimum floor area when not in use.
  - C. The first moving row, on manual sections, shall be secured with release lever. All other rows shall be mechanically locked, operable only upon unlocking and cycling of first row. Power sections shall be secured with mechanical locks as well as the power system, operable upon activating the pendant control.
- 1.4 DESIGN LOAD CRITERIA (STRUCTURAL):
  - A. NFPA Standard: Comply with requirements of NFPA 102, "Standard for Assembly Seating, Tents and Membrane Structures", and specifically with Chapter 5, "Folding and Telescopic Seating", except where other requirements are indicated by the architect/owner. Seating layout design shall be in compliance with Code/Year National Building Code.
  - B. Manufacturer: Company specializing in telescopic seating with a minimum of 20 years experience in manufacturing telescopic seating.
  - C. Quality Standards: Manufacturer to be I.S.O. 9001:2000 certified.
  - D. Engineer Qualifications: Manufacturer to employ a registered, licensed Professional Engineer to certify that the equipment to be supplied meets or exceeds the design criteria of this specification.
  - E. Installation: Shall be handled directly by the manufacturer or by a factory certified installation subcontractor.
  - F. Product Liability: Certification of insurance coverage of not less than \$5,000,000.
  - G. Welding Processes: To be performed by certified professional welding operators in accordance with American Welding Society, (AWS), D1,1 "Structural Welding Code-Steel".
  - H. Product Improvements: Equipment provided shall incorporate manufacturer's design improvements and materials current at time of shipment, provided that such improvements and materials are consistent with the intent of these specifications.
- 1.5 SUBMITTALS
  - A. BID SUBMITTALS:
    1. Manufacturer's descriptive literature and specifications.

2. List of deviations from these specifications, if any.
3. Certification of Insurance.
4. I.S.O. Certification.

B. JOB SUBMITTALS

1. Shop Drawings showing all equipment to be furnished with details of accessories to be supplied including necessary electrical service to be provided by others. All electrical submittals must include U.L. listing number.
2. Samples of material and color finish as requested by Architect.
3. Warranty, operation and maintenance instructions to the owner upon completion.

1.6 DESIGN CRITERIA

- A. Telescopic seating shall be designed to support, in addition to its own weight, and the weight of added accessories, a uniformly distributed live load of not less than 100 lbs. per sq. ft. (4.8 kN per sq. m.) of gross horizontal projection.
- B. Seat boards and footrest shall be designed for a live load of not less than 120 lbs. per linear foot (1.751 kN per linear m).
- C. A sway force applied to seats shall be 24 lbs. per linear ft. (350 N per linear m.) parallel to the seats and 10 lbs. per linear ft. (146 N per linear m.) perpendicular to the seats. Sway forces shall not be considered simultaneously applied.
- D. Railings, posts and sockets designed to withstand the following forces applied separately:
  1. Handrails shall be designed and constructed for:
    - a. A concentrated load of 200 lbs. (890 N) applied at any point and in any direction.
    - b. A uniform load of 50 lbs. per ft. (730 N/m) applied in any direction.
    - c. The concentrated and uniform loading conditions shall not be required to be applied simultaneously.
  2. Guards shall be designed and constructed for:
    - a. A concentrated load of 200 lbs. (890 N/m) applied at any point and in any direction along the top railing member and;
    - b. A uniform load of 50 lbs. per ft. (730 N/m) applied horizontally at the required guardrail height and simultaneous uniform load of 100 lbs. per ft. (1460 N/m) applied vertically downward at the top of the guardrail. The concentrated and uniform loading conditions shall not be required to be applied simultaneously.
  3. American Institute of Steel Construction (AISC), American Iron and Steel Institute (AISI) and Aluminum Association (AA) design criteria shall be the basis for calculation of member sizes and connections.
  4. Wood members shall be designed in accordance with National Forest Products Association, (NFOPA), and National Design Specification for Wood Construction.

1.7 WARRANTY

- A. The manufacturer shall warrant all work performed under these specifications to be free of defects for a period of one year.

- B. Any materials found to be defective within this period will be replaced at no cost to the owner. This warranty shall not include replacements required by Acts of God, war, vandalism, flood, fire, calamity or deliberate abuse or misuse of the equipment.

## PART 2 - PRODUCTS

- 2.1 ACCEPTABLE MANUFACTURERS: Seating system shall be equal to the Irwin 4500 Telescopic System as manufactured by Hussey, Irwin Telescopic Seating Company, or an approved equal.
- 2.2 ROW SPACING: 24"
- 2.3 MATERIALS
  - A. Seating Area: Wall Attached, Electrically Operated.
  - B. Accessories:
    - 1. Aisles shall be footrest level as indicated on drawings. Aisles at the footrest level shall have non-slip treads on the top front edge.
    - 2. Intermediate aisle steps shall be provided. Steps are permanently attached closed design. All rises and tread depths throughout the system shall be consistent. In addition, steps shall be designed to eliminate any possible toe catch between the top of the intermediate step and the bottom of the nose beam (IBC 2000 sec.1003). Front step shall be hinged for storage on first row deck without the need for removal.
  - C. Aisle handrails.
    - 1. Removable aisle handrails shall be provided. Aisle railings shall be an individual rail design, located on every other row starting at row two (2). Railing to be constructed of 1 1/2" 11 ga. round steel tubing, finished in a textured powder coated epoxy. Aisle rails spanning several rows, or rails made from square tubing will not be acceptable. For safety, rail pockets that protrude beyond the face of the bleacher while in the closed position or railings with blunt, non-turned ends will not be allowed, (IBC 2000 sec. 1008).
  - D. Wheel Chair Seating Areas.
    - 1. Permanent wheel chair spaces shall be provided at the section joint location or section length as shown on plans. Permanent notches to have a Panelam closure panel to eliminate any open areas under the system. Closure panels to support row two eliminating damage to the understructure or the need for front railings.
  - E. Access Panels: Provide access panels as needed for future maintenance.
- 2.4 FABRICATION
  - A. Understructure System:
    - 1. Steel supports and rolling frames shall be constructed of formed steel shapes of the size and shape necessary to support the design loads. All support bracing shall begin at Row 2 and be of diagonal or "knee" type for rigidity. Diagonal bracing to be a "U" shaped formed steel channel. Angle iron or "X" type bracing is unacceptable.
    - 2. Wheels shall not be less than 6" diameter x 1-3/8" non-marring soft rubber face to protect wood or synthetic floor surfaces. Each operating row shall have a minimum of 6 wheels through 26" row spacing, and 10 wheels above 30" spacing.
    - 3. Each fully skirted wheel channel shall be continuously in contact with adjacent channels by nylon guides, to eliminate metal to metal contact, and non-binding guide rods to provide alignment when opening and closing. Lubrication shall not be required either at time of installation or periodically.



4. Each cantilever arm shall be triple formed 12-gauge steel, supported by a 1/4" thick double formed column cap securely welded to the post assembly. Each cantilever arm shall be field adjustable by way of a 1/2" diameter set screw.
5. Vertical columns shall be a minimum of 2" x 4" 14 gauge high tensile steel structural tube to meet design criteria.
6. Deck supports shall be triple formed 12-gauge steel bolted to the rear beam, nose, and deck board with locking hardware.

**B. Seat Systems:**

1. Plastic Seat Modules - Shall each be 18" long, one piece, with scuff resistant textured surface 10" deep and contoured seat surface with vertical front.
2. Shall be blow-molded, double walled, high density, impact resistant, UV stabilized, linear polyethylene available in 12 bright standard colors, as selected by architect/owner. Custom colors available as an option.
3. Each module to be bracket supported with concealed mounting hardware attachment for rigidity.
4. Modules shall allow a full 26 1/4" unobstructed area for foot room comfort and cleaning. Modules with external ribs or multiple piece modules are not acceptable.
5. Each module has two recessed areas for seat number locations. Coordinate numbering with Owner.

**C. Deck System:**

1. Panelam decking shall have a 0.030 (30 thousandths) high density polyethylene overlay, permanently bonded to structural western fir plywood in strict compliance with U.S. Product Standard PS 195. Polyethylene finish to be textured grey or beige. Plywood shall be supported along the front and back edge for maximum rigidity. An "H" type aluminum splice beam shall be provided between all decks. Plywood with clear or painted finish is unacceptable.
2. Panelam thickness to be 5/8".
3. Decking shall be through bolted to steel supports with locking hardware. Decking attached by the use of self tapping fasteners or retained by friction only is unacceptable.

**D. Nosing:** Nosing with panelam decks shall be one piece, formed, 14 gauge steel with a minimum G-60 pre-galvanized finish.

**E. Rear Risers:** Rear riser shall be a minimum 14 gauge formed steel with a minimum G-60 pre-galvanized finish.

**F. Formed Steel Deck Support Members:** Support members shall connect the front nosing and rear riser members. These shall provide support for the decking, throughout its length, and at intermediate locations to limit deflection. Deck supports to have maximum spacing of 60" up to 26" row spacing, and 36" up to 30" row spacing.

**G. Finish:** For rust resistance in standard or high humidity conditions all painted surfaces shall be finished in textured EPOXY POWDER COATED Semi-Gloss Black.

**2.5 PROPULSION SYSTEM**

- A. FRICTION POWER:** The entire group shall open and close, by the friction drive system, as a complete unit. The manufacturer will determine the number of power units required based on the group length and number of rows involved. Hinging of the lower skirt board is not acceptable.

1. Each power unit shall use two large 6" diameter by 9 1/2" long tube with non-marring 1/2" thick rubber covering to grip floor for opening and closing.
2. The power units shall develop tractive forces adequate to operate bleachers under normal conditions but inadequate to operate should significant obstacles be encountered.
3. Manufacturer shall provide all wiring from power source within bleacher seating including pendant control. Removable pendant control shall be hand held with forward and reverse button, plugging into a single receptacle (friction power only). Electrical contractor shall provide 208/230V, 5 wire 3-phase, 60 HZ power source (please specify) behind each group of seating. Amperage to be as specified by seating manufacturer depending on the number of power units required. For wall-attached installations, power source to terminate in a surface mounted junction box above floor. For reverse units; power source to terminate in a junction box, flush mounted under first seating row in center of group. Electrical contractor shall perform the connections to the seating equipment at the junction box. All electrical parts and wiring shall be installed in complete accord with the National Electric Code. ALL SYSTEMS SHALL BE DESIGNED TO COMPLY WITH U.L. (U.L. Listing #E168517)

2.6 FILMING PLATFORM: Provide visitor side Filming platform, minimum dimension of 48" x 48".

2.7 VINYL END CURTAINS: Where bleacher ends are exposed, provide manufacturer standard hanging, folding, vinyl end curtains with full body two-color printed graphic.

### PART 3 - EXECUTION

- 3.1 REVIEWS AND APPROVALS: Shop drawings shall be approved and job site field measurements taken prior to installation, and telescopic gym seating shall be installed in conformance therewith.
- 3.2 COORDINATION: Coordinate with other trades to ensure proper blocking and support.
- 3.3 INSTALLATION: The installation of the telescopic gym seating will be handled directly by the manufacturer or by a factory authorized installation subcontractor qualified to perform the installation function.
- 3.4 PROTECTION: The manufacturer's representative shall transmit instructions in both operation and maintenance to the owner. Factory service personnel shall inspect all telescopic gym seating to assure safe conditions.

## 12 67 13 - PEWS

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Pew Body shall be model #301-4036 as manufactured by Sauder Manufacturing Company, Archbold OH. Pew End shall be Sauder model #302-1305.
- 1.2 QUALITY ASSURANCE: Manufacturer shall be regularly engaged in the manufacture of similar items for a minimum of twenty (20) years, and shall have a history of successful production acceptable to the architect.
- 1.3 SUBMITTALS: Pew manufacturer or manufacturer's rep shall submit product data, shop drawings, fabric samples, and stain/finish samples upon request, prior to fabrication of pews. Pew manufacturer or manufacturer's rep shall field measure project and generate as-built, computer generated floor plan layouts for final approval prior to fabrication.
- 1.4 DELIVERY, STORAGE, AND HANDLING: Pew manufacturer shall be responsible for coordinating timely delivery with owner/contractor to prevent any storage or handling of product by owner/contractor prior to assembly and installation. Pew manufacturer shall be responsible for all delivery, unloading, assembly, and complete installation of pews, using factory trained regional installation crews.
- 1.5 WARRANTY: The manufacturer shall provide a written twenty-five (25) year warranty against defects in materials and workmanship.

### PART 2 - PRODUCTS

- 2.1 ACCEPTABLE MANUFACTURERS: Sauder Manufacturing Co.

#### 2.2 MATERIALS & CONSTRUCTION

- A. Pew Back: Back shall be contoured for comfort, and shall be of 5-ply construction, with a core of ½" Novoply particleboard (45 lb density), two plys crossband of 1/8" hardboard (64.2 lb density), with one ply plain sliced northern red oak on both faces. The pew back cap shall be 5/4 premium Northern red oak, finger jointed before being molded to obtain required lengths. The cap shall be attached using a hydraulic press using assembly glue and a press fit joint, and shall have an undercap support molding for added strength.
- B. Pew Seat: 5-ply construction, shaped to body contour. Core material shall be 5/8" Novoply particleboard (45 lb density), with two plys crossband of 1/8" hardboard (64.2 lb density), with one ply plain sliced northern red oak on top faces, and continuous balance sheet of bottom face. An integral solid lumber edge band shall be laminated into the 5-ply seat for screw-holding at back-to-seat joint.
- C. Intermediate supports shall extend the full height of the pew back to the cap, and shall be 1 ½" thick. Construction shall be 3-ply, with Novoply particleboard (45 lb density) core, with one ply plain sliced red oak veneer on each face. Front and rear edge bands shall be machine applied, assuring constant pressure.
- D. Pew Ends: Construction method shall be determined by exact style of pew end chosen. Veneer edge banding shall not be used in the construction of pew ends.
- E. Bookracks shall be constructed of solid premium Northern red oak, and shall include felt padding on bottom for silencing. Attachment to pew back shall use concealed keyhole design to prevent exposed screw heads.
- F. Finish: Stain color shall be selected from Sauder standard finish samples, or may be matched to customer's sample. Stain shall be applied using a manually operated spray system, then brushed or hand wiped to ensure thorough penetration, and allowed to fully air dry. A two-component, catalyzed sealer shall then be applied using a manually

operated spray system, and oven cured. Final top coat shall be a two-component, high solid varnish applied using a manually operated spray system, and oven cured. The top coat shall be UV stable to prevent yellowing and shall be specially formulated to provide excellent scratch resistance and protection from household chemicals.

### PART 3 - EXECUTION

- 3.1      INSTALLATION: Pew manufacturer shall be responsible for all delivery, unloading, assembly, and complete installation of pews, using factory trained regional installation crews. Installation crews shall position the pews according to the approved floor plan and shall scribe each individual support to fit the floor. Concealed expansion anchors drilled into concrete floors shall be used to secure the pews. All joints shall be wedged tight before screws are inserted. Moldings shall be attached with concealed pins to cover exposed screw heads.

**DIVISION 13 – SPECIAL CONSTRUCTION**

**13 12 14 - POND FOUNTAIN**

**PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for Pond Fountain, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

**PART 2 - PRODUCTS**

- 2.1 MATERIAL: Provide material equal to Stratavator Fountains as follows:

1	Nozzle	Grand Geyser- #81193
2	Body Assembly & Pump	2 HP 230 Volt 60 Hz 1 PH #82741
3	Pump Electrical Cable	(8/4)- #85807
4	Lights	500 W 110-120 Volt (M Flood)- #8450C
5	Lighting Electrical Cable	Homeruns for Cable (6/3)- #85808 @
6	Lighting Mounting Kits	500 watt Lights 6/8 Gauge Cable- #85445
7	Accessories	Artificial Rock Float Cover

- 2.2 OTHER MATERIALS: Furnish and install any supplementary materials, weather or not specifically indicated, required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

**PART 3 - EXECUTION**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Install materials in accordance with manufacturer's instructions and approved submittals. Install materials in proper relation with adjacent construction and with uniform appearance.

## **13 12 33 - WATER PLAY EQUIPMENT**

### **PART 1 - GENERAL:**

- 1.1 SCOPE: Provide all labor, materials, equipment and accessories needed to provide and install Water Play Equipment as indicated on the drawings and specifications herein.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 SUBMITTALS: Submit catalog cuts, shop drawings necessary to indicate size, location and methods of attachment within 45 days after commencement date.
- 1.4 DELIVERY, STORAGE AND HANDLING: Deliver materials to jobsite, contractor will be responsible for unloading and storage until materials are ready to be installed.

### **PART 2 - MATERIALS:**

- 2.1 APPROVED MANUFACTURERS: New Braunfels General Store Intl., Inc. (830-620-4000) or as approved prior to bidding by the Architect.
- 2.2 PLAY FEATURES: Foam Li'l Squirt Modular Units as shown.
- 2.3 SURFACE COATING: F-601 Granulated Non-slip Surfacing.
- 2.4 OTHER MATERIALS: Furnish and install any supplementary materials, weather or not specifically indicated, required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

### **PART 3 - EXECUTION:**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.2 INSTALLATION: All installation work shall be done by the manufacturer or a factory trained authorized installer fully approved and certified by manufacturer. The installation shall be made in complete accordance with the manufacturers instructions and/or recommendations. Securely install this work to be completely structurally sound. Provide connection to utilities as required for proper operation.
- 3.3 ADJUSTMENT AND CLEARING: Adjust all folding mechanisms for smooth operation. Clean work area and remove debris from site. Protect until final completion.

# 13 31 33 - SPECIAL FABRIC STRUCTURES

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. The shade structure contractor shall be responsible for sealed engineering drawings for the structure and foundation, fabrication, shop drawings, supply, and installation of the work specified. The intent of this specification is to have a single source supplier who is responsible for the above functions.
- B. Work included: Sealed Engineered drawings, fabrication, and installation of the structure as detailed in the sealed approved engineered drawings, including but not limited to:
  - 1. Structural Steel
  - 2. Fabricated shade panels
  - 3. Stainless steel cables
  - 4. Clamping
  - 5. Fasteners
  - 6. Concrete work
  - 7. Other work as indicated on the drawings
  - 8. Manufacturers to provide as-built site plan and color samples.

### 1.2 REFERENCES

- A. Shade structures must comply with the latest revision of applicable codes and regulations including IBC 2009.
- B. American Society for Testing Materials (ASTM)
- C. American Welding Society: Structural Welding Code AWS D1.1: Symbols for Welding and Nondestructive Testing AWS 2.3.
- D. American Institute of Steel Construction (AISC): Specifications for the design, fabrication and erection of structural steel.

### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, including dimensions and data on features, performance, ratings, and finishes.
- B. Shop Drawings: Detail assemblies of standard components that are custom assembled for specific application on this Project; drawings shall be to scale, and adequate size for review. Submit six (6) sets of shop drawings and two (2) sets of structural calculations signed and sealed by a Professional Engineer licensed in the State of Texas. Structural calculations shall follow IBC 2003 showing 90 mph with fabric top on. No pass through will be allowed in the calculation and full dead and live loads need to be accounted for in the design.

- C. Basis for Certification: Indicate whether “withstand” certification is based on actual test of assembled components or on calculation.
  - 1. The term “withstand” means “the unit will remain in place without separation of any parts from the device” when subjected to the seismic forces specified.
  - 2. The term “withstand” means “the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event”.
- D. Field quality test reports.

#### 1.4 QUALITY ASSURANCE

- A. Fabrication and erection is limited to firms with proven experience in design and construction of fabric shade structures and such firms shall meet the following minimum requirements.
- B. A single contractor shall design, engineer, manufacture and erect the fabric shade structures.
- C. The contractor shall demonstrate to have a minimum of four (4) years experience in the engineering, fabrication, and erection of permanent fabric structures. Experience in the awning industry does not qualify.
- D. The Contractor shall demonstrate that it has a staff within their company office, of experienced fabric structure installation personnel who will undertake the installation of each project, and will assist with maintenance and longevity of their product.
- E. The Contractor shall submit a Corporate Quality Control Manual describing their complete, quality assurance program.
- F. The Contractor shall have insurance as required by the State of Texas.
- G. The Contractor must have Approved Fabricator Status for Structural Steel.
- H. The Contractor must be a licensed contractor in Texas.
- I. The Contractor must be able to provide proof of liability insurance, which meets the following minimum standards.
  - 1. General Liability: Each Occurrence - \$2,000,000; General Aggregate - \$2,000,000
  - 2. Excess Liability: Each Occurrence - \$5,000,000; General Aggregate - \$5,000,000.

#### 1.5 WARRANTY

- A. Warranty: Written ten (10) years in which manufacturer warrants the fabric panels (cloth, stitching and fading), and its perimeter attachment system and the structural support system has been installed in accordance with the Project and the manufacturer’s specifications and will be free from defects in material or workmanship which will impair its normal use. Warranty on painted surfaces for twelve (12) months. Twenty (20) years for the structural integrity of the steel. The warranty shall extend from the date of substantial completion of the fabric panel shade structure, specifically the first date on which the entire fabric panel is subject to design pre-stress conditions.
- B. A five (5) year written maintenance program to be supplied by the manufacturer specifying who will provide annual maintenance for tensioning of cable – starting at three (3) months after installation, and every year thereafter.
  - 1. Including turnaround time on replacement of fabric or parts received within 72 hours for scheduling repair.



2. The inspection must be signed by a designated representative of Owner, to verify compliance.
3. Provide a guaranteed fabric replacement price per SF for repairs, not including labor, to the School District.
4. Acceptable repairing of fabric would consist of: repairing tear on a seam or replacement of fabric panel to as existing seam. Repairing fabric with patching in unacceptable.
5. Shade structure contractor will be responsible for any cost incurred for site visits due to maintenance program as well as one site visit, for possible fabric repair. Including cost for equipment for removal and reinstallation of fabric and repair at manufacturer's shop.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with all requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified or approved equal. Note: manufacturers listed below are for courtesy only; all manufacturers must show evidence of and meet all the requirements of this specification.
  1. USA Shade and Fabric Structures, Inc. – (512) 836-5500– Rob Edgar
  2. ShadePro LLC – (210) 651-1041
  3. Shade Concepts LLC – (830) 643-9430 – Liam Arnott

### 2.2 PRODUCT REQUIREMENTS

- A. The shade structure shall be designed to comply with IBC 2003 and require a maximum 2 inch deflection at the top of column when calculating the steel deflection at the 90 mph wind load. Shade structure design shall use gusset plates in lieu of tube bracing at all rafter/ ridge beam connections. The standard design shall be a hip structure; size shall be provided by architect.
- B. Life Safety: All fabric shade structures shall be designed so that no life safety issue is created. The fabric structure shall not rely on the fabric for structural stability.

### 2.3 ERECTION HARDWARE

- A. Bolt and fastening hardware shall be determined based on calculated engineering load requirements.
  1. Low strength: ASTM P595 stainless steel bolts, nuts and washers.
  2. Medium strength: ASTM A307 zinc plated steel bolts, nuts, and washers.
  3. High strength: ASTM A325 zinc plated steel bolts, nuts, and washers.
- B. All erection bolts to be ASTM A307, Grade B, treated to retard corrosion, or stainless steel.
- C. Wire rope is to be one-half (1/2") inch nominal diameter, 6 strand, minimum 19 wires per strand, with a minimum nominal tensile strength of 20,000 lbs. Wire rope shall be secured with approved fittings and cable hardware, as per manufacturer's specifications and design approved by Owner's representative.

- D. All hardware is to be first grade stainless steel. All bolt fittings including nylon washers for watertight seals at all joints.

## 2.4 TENSIONING CABLE

- A. Steel cable is determined based on calculated engineering load.
  - 1. 1/2" or larger diameter cable, 6 x 19 IRWC Galvanized cable
  - 2. 3/8" diameter and smaller diameter cable: 7 x 19 Strand Core Galvanized
  - 3. Cable shall be smooth and free of burrs.

## 2.5 CONCRETE

- A. Unless noted otherwise for footing and piers by General Contractor's Engineer, concrete specification for footings, piers, slabs, curbs and walkways shall meet a minimum 3,500 psi at 28 day strength.
- B. Concrete work is executed in strict accordance with the latest American Concrete Institute Building Code (ACI 318-99).
- C. Slump 4" maximum.
- D. Whenever daily ambient temperatures are below 80 degrees Fahrenheit, the contractor may have mix accelerators and hot water added at the batch plant.
  - 1. temperature range between 75-80 degrees, 1% accelerator High Early (non-calcium)
  - 2. temperature range between 70-75 degrees, 2% accelerator High Early (non-calcium)
  - 3. temperature range below 70 degrees, 3% accelerator High Early (noncalcium)
- E. The contractor shall not pour any concrete when daily ambient temperature is below 55 degrees Fahrenheit.
- F. Cast in place footing: Use cast in place anchors A-36 steel.
- G. Curbs and walkways:
  - 1. Walkways, unless noted otherwise on the drawings or Geo-tech Report, shall be 4 inch thick Class A concrete paving on a 2 inch sand cushion over six inch compact fill.
  - 2. On walkways use plain-steel welded wire reinforcement: ASTM A-185, fabricated from as drawn steel wire into flat sheets.
  - 3. On curbs use reinforcing bars: ASTM A-615/A-615M, Grade 60 (Grade 420); deformed.
  - 4. Provide bar supports to support reinforcing off of base material.
  - 5. Wheel stops: Where applicable pre-cast, air entrained concrete. Secured with galvanized steel, 3/4 inch (19 mm) diameter, 10 inch (254 mm) minimum length dowels.
  - 6. Joints:

- a. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
  - b. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one half hour unless pavement terminates at isolation joints.
  - c. Isolation joints: Form isolation joints of preformed joint filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
  - d. Contraction joints: Form weakened plane contraction joints, sectioning concrete into areas as indicated. Construct construction joints for a depth equal to at least one fourth of the concrete thickness to match jointing of existing adjacent concrete pavement.
  - e. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a ¼ inch (6 mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.
7. Floating Finish:
  - a. Intent is to match finish and adjacent flat work.
    - i In isolated areas where there is no adjacent finish to match, use the following finish:
  - b. Medium to Fine Textured Broom Finish: Draw a soft bristle broom across float finished concrete surface perpendicular to line of traffic to provide a uniform, fine line texture.
8. Concrete Tolerance:
  - a. Comply with tolerances of ACI 117 and as follows:
    - i Elevation ¼ inch (6mm)
    - ii Thickness: plus 3/8 inch (10mm), minus ¼ inch (6mm)
    - iii Surface: Gap below 10 foot (3m) long, unlevelled straightedge not to exceed ¼ inch (6mm)
    - iv Contraction Joint Depth: plus ¼ inch (6mm), no minus
    - v Joint Width: plus 1/8 inch (3mm), no minus
9. Repairs and Protection:
  - a. Remove and replace concrete pavement that is broken, damaged or defective or that does not comply with requirements in this Section.
  - b. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.
  - c. Maintain concrete pavement free of stains, discoloration, dirt and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

2.6 FOOTINGS

A. Quality Assurance:

1. Drilled Pier Standard: Comply with provisions in ACI 336.1, "Reference Specifications for the Construction of Drilled Piers", unless modified in this Section.
2. Footings shall be placed in accordance with and conform to engineered specifications and drawings.

B. Steel Reinforcement:

1. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
2. J-bolts for anchoring plates for poured in place concrete shall meet ASTM A36 (raw material) and ASTM A307 for fabricated parts.

C. Steel Casing:

1. Steel Pipe Casings: ASTM A283/A 283M, Grade C; or ASTM A36/A 36M, carbon steel plate, with joints full penetration welded according to AWS D1.1.

D. Concrete Mix: Reference 2.5 above.

E. Excavation:

1. Unclassified Excavation: Excavation is unclassified and includes excavation to bearing elevations regardless of character of materials or obstructions encountered.
2. Classified Excavation: Excavation is classified as standard excavation, special excavation, and obstruction removal and includes excavation to bearing elevations, as follows:
3. Standard Excavation includes excavation accomplished with conventional augers fitted with soil or rock teeth, drilling buckets, and underreaming equipment attached to drilling equipment of size, power, torque and downthrust necessary for the Work.
4. Special Excavation includes excavation that requires special equipment or procedures above or below indicated depth of drilled piers where drilled pier excavation equipment used in standard excavation, operating at maximum power, torque, and downthrust, cannot advance the shaft.
5. Obstructions: Removal of unanticipated boulders, concrete, masonry, or other unforeseen obstructions that cannot be removed by conventional augers fitted with soil or rock teeth, drilling buckets or underreaming tools attached to drilling equipment of size, power, torque, and downthrust necessary for the Work, will be paid according to Contract provisions for changes in the Work.
6. Tolerances: Construct drilled piers to remain within ACI 336.1 tolerances.

F. Installation:

1. Install steel casings of minimum wall thickness indicated and of diameter not less than diameter of drilled pier. Install casings as excavation proceeds, to maintain sidewall stability.

2. Comply with recommendations in CRSI's "Manual of Standard Practice" for fabricating, placing and supporting reinforcement.
3. Place concrete in continuous operation and without segregation immediately after inspection and approval of shaft by Owner's representative. Notify Architect and testing agency six hours before excavations are ready for tests and inspections.
4. Place concrete to fall vertically down the center of drilled pier without striking sides of shaft or steel reinforcement. Vibrate top 60 inches (1500 mm) of concrete.
5. Coordinate withdrawal of temporary casings with concrete placement to maintain at least a 60 inch (1500mm) head of concrete above bottom of casing. Vibrate top 60 inches (1500mm) of concrete after withdrawal of temporary casing.

## 2.7 POWDER COATING

- A. Prior to cleaning steel, sandblast steel with G50 steel grit before powder coat clean, paint higher adhesion.
- B. All steel tubing shall be coated for rust protection and finished with a minimum 3.5 mil thick UV-inhibited weather resistant Powder Coating.
  1. Powder used in the powder coat process shall have the following characteristics.
    - a. Specify gravity: 1.68 +/- 0.05.
    - b. Theoretical coverage: 114 +/- 4 ft<sup>2</sup>/lb.mil.
    - c. Mass loss during cure: <1%
    - d. Maximum storage temperature: 75 degrees Fahrenheit
  2. Powder coating shall meet the following tests:
    - a. ASTM D523-89 – Gloss at 60°, 85-95
    - b. HOI TM 10.219 – PCI Powder smoothness, 7
    - c. ASTM D2454-91 – Overbake resistance time, 200%
    - d. ASTM D3363-92A – Pencil hardness, H2-H
    - e. ASTM D2794-93 – DIR/Rev Impact, Gardner, 140/140 in/lbs.
    - f. ASTM D3359-95, B Adhesion, cross hatch, 5B Pass
    - g. ASTM D522-93a – Flexibility Mandrel, 1.4 in dia., no fracture
    - h. ASTM B 117-95 – Salt Spray, 1000 hours
    - i. UL DtoV2 – Organic coating Steel enclosures, elect eq recognized
  3. Application Criteria:

- a. Electrostatic spray, cold
  - i Substrate: 0.032 in. CRS
  - ii Cure schedule: 10 minutes at 400 degrees Fahrenheit
  - iii Pretreatment: Bonderite 1000
  - iv Film Thickness: 2.0 – 3.0 Mils.
- 4. Powder coating colors are to be selected by the Architect/ School Rep. from the following: Black- RAL 9017, Brown-RAL 8019, and Grey- RAL 7037.

## 2.8 THREAD

- A. Gore Tenara sewing thread should be made up of 100% expanded PTFE fiber, known as Teflon. Sewing thread should be warranty for minimum of eight (8) years.
- B. Shall be high strength and low shrinkage.
- C. Shall have a wide temperature and humidity range.
- D. Flex and abrasion resistant and UV radiation immunity.
- E. Shall be unaffected by cleaning agents, acid rain, mildew, rot, chlorine, saltwater and pollution.
- F. Lockstitch thread – 1200 Denier or approved equal.
- G. Chainstitch thread – 2400 Denier or approved equal.

## 2.9 SEWING

- A. Fabric pockets shall be double thickness and proportioned to receive a ½" cable.
- B. All corners shall be reinforced with extra Non-Tear cloth and strap to distribute the load. Reinforcing shall be equivalent to triple thick fabric where pockets meet at corners.
- C. The perimeters that contain the cables shall be double lock stitched.

## 2.10 FABRIC SPECIFICATIONS

- A. Raw Material:
  - 1. High density Polyethylene
  - 2. Ultra Violet additives for stability.
- B. Construction:
  - 1. A Monofilament and tape construction: Rachel Knitted to ensure material will not unravel if cut.

## 2.11 FABRIC PANEL MATERIAL

- A. Cloth shall be made of high-density polyethylene cloth with UV stabilizer treatment.
- B. The material shall be manufactured with tensioned fabric structures in mind.
- C. The fabric knit is to be made using monofilament and tape filler, which has weight of 195g per square meter. Material to be Rachel knitted to insure material will not unravel if cut.
- D. Burst strength of 260 kpa (37,7098 PSIA)
- E. Tear Strength: Warp 220 lb and weft 462 lb.
- F. Life expectancy is a minimum of twelve (12) years continuous exposure to the sun. Minimum fading after five (5) years.
- G. Fabric must have a minimum of 82% shade protection factor and 85% ultra violet protection factor.
- H. Fabric shall have a Fire Rating of not less than Class A or One (1).
- I. Fabric colors to be selected by the Architect/ School Rep. from the following: Terra Cotta, Navy Blue, and Forest Green.

## 2.12 STEEL TUBING

- A. All final steel tubing shall be in accordance with approved shop drawings and calculations. Minimum diameter as noted on the plans.
- B. All steel tubing to be triple coated for rust protection using in-line zinc electroplating. Ailed Flo-coat process. Tubing to be internally coated with zinc and organic coatings to prevent corrosion.
- C. All steel is cleaned, degreased or etched to ensure proper adhesion of powder coat in accordance with manufacturer's specification.
- D. Steel tubing and plates shall be finished with a minimum of 2.5 – 3.5 mil thick UV-inhibited weather resistant powder coat.
- E. All hollow structural steel shapes shall be cold-formed HSS ASTM A-500, grade C, unless otherwise noted.
- F. Plate products shall comply with ASTM A-572, grade 50.
- G. All steel used on this project must be new and accompanied by the mill certificates.
- H. For colors, refer to 2.11, I.

## 2.13 STEEL

- A. Where size of structure or determine loads require larger structural steel members or steel greater than 7 gauge thickness, carbon steel may be substituted. Cleaning and coating of carbon steel will conform to the following:
  - 1. Sandblast steel with G50 grit prior to cleaning process.
  - 2. Steel members are to be pre-heated prior to powder coat application to assure adhesion.
- B. All carbon structural steel shall conform to ASTM A-500.

- C. Structural steel to be detailed, fabricated, and erected in accordance with AISC specifications.
- D. Shop connections are welded unless noted otherwise. Field connections shall be separately indicated on all drawings.
- E. Weld Connections: Comply with AWS D1.1 and AWS Structural Welding Code for steel welding procedure specifications, tolerances, appearance and quality of welds for methods used in welding work.
- F. Correct deficiencies in Work that inspections indicate do not comply with Engineered Drawings and Contract Documents.

## 2.14 WELDING

- A. All shop and certified welds shall be executed in accordance with the latest edition of the American Welding Society specifications.
- B. All welding procedures shall comply with the AWS D1.1 – AWS Structural Welding Code. Steel and certification for welding procedures that do not have a lapse of greater than 6 months from the original WQR date.
- C. All welds shall be continuous where length is not given, unless otherwise shown or noted on drawings.
- D. All welds shall be performed using gas-metal arc welding using ER-7053 wire. All fillet welds are a minimum ¼” unless otherwise noted. All steel shall be welded shut at terminations to prevent internal leakage.
- E. Internal weld sleeving not allowed.
- F. All welds to be performed using E70xx .035 wire by a certified welder. All welds shall develop the full strength of the weaker member. Field welding is not acceptable.
- G. All steel shall be welded shut at terminations to prevent internal leakage.

## PART 3 - EXECUTION

### 3.1 PROJECT INSTALLATION

- A. The contract work to be performed shall consist of furnishing all labor, materials, equipment, parts, and supplies necessary for installation. Installation is to be completed by in-house factory approved crew with a minimum of 2 years experience.
- B. The drilled piers must be installed in accordance with specifications in engineering drawings. Depth and design of drilled piers will be determined by the manufacturer's registered engineer after evaluating the GeoTech Soils report for each school as included in the Project Manual. Manufacturer is responsible for coordinating a "Dig Safe" test with the utility companies to locate any existing utility lines within a 3 foot radius of the new pier locations to assure no utility lines are hit. Contractor is to notify Architect immediately. If damage to the utility occurs, contractor is responsible for having it fixed. Contractor is not responsible for cost of repair if due diligence is proven.
- C. All steel shall be erected in accordance with AISC guidelines. Fabrication tolerances for structural steel will be accepted as 1/8" on beams (rafters) under 30 feet and ¼" on beams (rafters) over 30 feet. Columns are to be plumbed with 1" in every 10 feet. All steel that is erected must be correctly dimensioned as per sealed, shop drawings. Any piece found to exceed ¼" from the design dimension will be rejected.
- D. All concrete work is to be done in accordance with ACI guidelines. All pour backs are to be of equal specification as used in caissons. All concrete will have a professional trowel finished to acceptable grade. All concrete junctures with existing surface are to be tooled with concrete edger.



- E. Paint repairs to scratches, dings, scuffs and other paint damage are to be accomplished by using Professional procedures (spray gun). Scratches should be carefully touch sanded and repainted utilizing a method, which leaves the paint invisible. Use of brushes or rollers on powder-coated surface is not acceptable. All repairs should match or blend with original finish. Field touch up is a last resort procedure and extensive damaged portions may be rejected and returned to the factory for recoating.
- F. The Contractor shall assume all responsibility for that portion of the site in which the installation is being done. The contractor also assumes full responsibility for the safekeeping of all materials and equipment.
- G. The Contractor assumes responsibility for project work and shall provide and maintain all necessary protection, as required by state and local codes, ordinances, or laws.
- H. Any damage incurred to existing structures, installations, or other property by the Contractor or Subcontractor shall be replaced and or repaired to original conditions at the Contractor's expense and to the approval of the client or their representative.
- I. All work areas shall be left in an equal or cleaner condition than at the commencement of the Project.

### 3.2 SHIPPING AND HANDLING

- A. All steel surfaces touched by tie down straps are to be padded before final clinching. This can be accomplished by using carpet pads or factory manufactured padding. All dunnage must be padded before painted products are set in place. Smaller and loose pieces must be padded and totally separate from paint padding. Unloading: Lift forks to be covered with properly fitted padding. All dunnage must be padded vertically and horizontally to prevent damage to painted surfaces. When unloading, take care to prevent tools and other hard surface items from making contact with painted items.

### 3.3 SAFETY PROCEDURES

- A. Contractor to supply and install six foot, metal chain link, temporary fencing for work area. All work must be completed inside the fenced area. No transporting of any equipment or driving of any vehicles outside the fenced area will be allowed while children are on the playgrounds or adjacent areas.
- B. All start dates, work schedules, and completion dates to be faxed to Architect one week prior to start of installation. All schools will be notified of the schedule by Architect and confirmed before starting installation. The Contractor is responsible for the coordination of work with other trades with Owner.
- C. All staff personnel are to be dressed and conduct themselves in accordance with OSHA standards. All staff must be properly trained for equipment that they might use. Safety is a top priority.
- D. All vehicles and machinery are to be properly licensed and insured and must be operated by licensed operators in accordance with OSHA standards. All cranes and lifts must be operated in accordance with manufacturer's guidelines. **Only rubber tired vehicles are allowed on the playslab surface. All non-rubber tired cranes and lifts, if utilized,** must have the ability to raise parts or equipment without driving on the playslab surface with a minimum of a 50-foot reach. Contractor will be held responsible for any damage to playslab surface and loss of warranty if these procedures are not followed.
- E. The handling of steel during installation is critical. Exercise care when lifting items so that it does not come into contact with other surfaces. Clean sand and other deleterious material from structural items before moving or lifting. Before installation, all items are to be washed with soap and water and dried with cloths. All grease, dust, oils, and other latent

materials are to be removed during this washing. When pouring concrete pour backs at columns, protect paint by using plastic and tape to prevent concrete from splashing on finish surfaces.

- F. All concrete must be cut with a wet diamond blade to ensure that it leaves a clean finish. If at any stage the existing remaining surface lifts, creating a tripping hazard, additional saw cutting will be required so as to leave a neat and uniform joint.
- G. Cover all open holes at all times with solid plywood and spoils to prevent access until concrete is poured. H. All equipment and/or product must be stored inside the fenced area.

## 13 34 16 - PERMANENT GRANDSTANDS

### PART 1 - GENERAL

#### 1.1 SYSTEM DESCRIPTION

- A. Provide labor, material, equipment and supervision necessary to complete installation of permanent steel grandstand, including the following:
  - 1. Steel Substructure
  - 2. Decking System
  - 3. Concrete Foundation
  - 4. Press Box Support Structure
  - 5. Press Box

#### 1.2 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturers must have ten years of experience in the manufacture of bleachers and grandstands; welders must be AWS certified; manufacturing capability according to various code compliances.
- B. Installer Qualifications: Experienced in the proper installation of grandstands.
- C. Source Quality Control: Mill Test Certification.

- 1.3 BIDDER-DESIGN SYSTEM: For the work of this this section, provide design, engineering and fabrication for the complete installation of the assembly included in the Bidder's Cost of the Work. Include all accommodations for complete installation of system, including footings/structural support & coordination with each trade forming a component part of the system or assembly as required to meet the design and performance criteria, and as required to maintain the integrity of the building design aesthetic. Architect will be the judge for acceptance of Bidder-Design systems.

#### 1.4 SUBMITTALS

- A. Manufacturer's Product Data: Submit manufacturer's descriptive product data for project.
- B. Shop Drawings: Manufacturer to submit shop drawings sealed by a Texas registered professional engineer and schedules for type, location, quantity, and details of steel and aluminum components required for project.
- C. Certificates:
  - 1. Insurance Certificate
  - 2. Bid Bond
- D. Product Sample: Submit one 18 inch seat sample.
- E. Color Sample: If applicable, submit sample.

#### 1.5 WARRANTY

- A. Permanent Grandstand shall be under warranty for a period of one year beginning at Date of Substantial Completion for Projects installed by Manufacturer. The Grandstand is warranted to be free from defect in materials and workmanship in the course of manufacture. This warranty excludes any other defects resulting from abnormal use in service, accidental or intentional damage or any occurrences beyond Manufacturer's control.

1.6 MAINTENANCE

- A. Owner is to conduct annual inspection and required maintenance of grandstand to ensure safe conditions. It is also recommended that a professional engineer or registered architect perform inspections biennially.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS,

A. Basis of Design: Sturdisteel, PO Box 2655 Waco, Texas 76702 USA; website: [www.sturdisteel.com](http://www.sturdisteel.com)

- B. Southern Bleacher Company.
- C. Sturdisteel.
- D. Steel Stadiums.
- E. Dant Clayton
- F. Other manufacturers seeking to be approved must submit product literature on horizontal beam design to the Owner for review and receive approval from Owner seven days prior to bid date.

2.2 PERMANENT STEEL GRANDSTAND

A. Product Description

1. Vertical columns are placed 18 feet 0 inches on center laterally and 15 feet on center front to back.
2. Horizontal beams are wide flange beams.
3. Traverse bays are free of crossbracing the total length of the grandstand.
4. Stringers are wide flange with steel angle rise and depth fabrication and are placed 6 feet on center.
5. Entry stairs to be firmly anchored to uniformly poured concrete bases.
  - a. Stair rise: 7 inches per Building Code with aluminum closure.
  - b. Stair tread depth: 11 inches per Building Code.
  - c. Guardrails on Stair to be 42 inches above leading edge of step with intermediate rail spacing at 4 inches.
  - d. Stairs to have handrail extension. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corner. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the nosing of treads and landings. Handrails shall be continuous the full length of the stairs and shall extend in the direction of the stair run not less than 12 inches beyond the bottom riser. Ends shall be returned or shall terminate in newel posts or safety terminals.
6. Aisles:

- a. Aisles with seating on both sides to have 34 inch high handrail with intermediate rail at approximately 22 inches above tread.
  - b. Anodized aluminum handrails with rounded ends are discontinuous to allow access to seating through a space 22 inches (min.) to 36 inches (max.).
  - c. Halfsteps shall provide equal rise and run throughout aisle. Each shall have aisle nosing with black powder coat finish and riser closure with clear anodized finish. If colored riser is specified for seating area, the aisle nose and riser closure shall be of same finish.
7. Decking:
  - a. Decking Arrangement: Full Deck
    - i Seats: 2 x 10 anodized aluminum.
    - ii Treads: 2 x 11 mill finish aluminum.
    - iii Risers: 1 x 8 anodized finish aluminum.
    - iv Aisle extension: 2 x 4 mill finish aluminum.
    - v Front walkway: 2 x 10 & 2 x 12 mill finish aluminum.
    - vi Entry stairs and ramps to be 2 x 12 mill finish aluminum.
    - vii Open ends of planks to be covered with aluminum end caps, securely fastened to the plank.
    - viii Joint sleeves: Dual joint sleeves to be inserted at each butt joint of each load bearing aluminum plank, and to penetrate 6 inches into each plank at the joint.
8. Guardrailing: To be at all sides of bleacher, entry stairs and ramps, portals, and landings. Railing to be anodized aluminum with end plugs at ends of straight runs and/or elbows at corner. All guardrails shall be secured to angle rail risers by galvanized fasteners. Railing shall be 42" above walkways and entrances. Railing shall be 42" above any adjacent seat. Guardrailing on sides and back shall include 9 gauge galvanized chain link fencing fastened in place with galvanized fasteners and aluminum ties.
9. Ramps:
  - a. Slope: 1 in 12.
  - b. Guardrail to be 42 inches above ramp with intermediate rail spacing at 4 inches.
  - c. Ramps to have handrail extension. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the ramp surface. Handrails shall be continuous the full length of the ramp and shall extend in the direction of the ramp not less than 12 inches beyond the end of the ramp. Ends shall be returned or shall terminate in newel posts or safety terminals.

10. Handicap provision:
  - a. Quantity of wheelchair spaces: Per Texas Accessibility Standards & ADA.
  - b. Riser area adjacent to wheelchair spaces to have closed intermediate construction.
- B. Materials/Finishes
  1. Substructures:
    - a. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
    - b. Shop connections are seal welds.
    - c. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.
    - d. Painted steel finish is unacceptable.
  2. Extruded Aluminum:
    - a. Seat Planks, Backrests, and Railing are extruded aluminum alloy, 6063-T6 with clear anodized 204R1, AA-M10C22A31, Class II finish
    - b. Tread planks are extruded aluminum alloy 6063-T6 mill finish
    - c. Joint Sleeve Assembly to be inserted in flat plank to maintain true alignment in joining together two plank pieces. Extruded aluminum alloy, 6063-T, mill finish. Splice cover is unacceptable between two flat plank pieces joined in a straight line.
  3. Accessories:
    - a. Channel End Caps: Aluminum alloy 6063 T6, clear anodized 204R1, AA M10C22A31, Class II. Polyethylene end cap is unacceptable.
    - b. Cast End Caps: Aluminum 319 alloy, cast finish. (Required for back rest and RS plank only)
    - c. Hardware:
      - i Bolts, Nuts: Hot dipped galvanized or plated.
      - ii Hold down Clip Assembly: Aluminum alloy 6061 T6, mill finish.
      - iii Structural Hardware: Equal to or greater than hot dipped galvanized ASTM A307. No connections utilizing high strength bolts are classed as slip critical.
    - d. Aisle Nose and Stair Nose: Aluminum alloy, 6063-T6, black powder coat finish.
- C. Fabrication:
  1. Design Load:

- a. Live Load: 100 psf gross horizontal projection.
  - b. Lateral Sway Load: 24 plf seat plank.
  - c. Perpendicular Sway Load: 10 plf seat plank.
  - d. Live Load of Seat and Tread Planks: 120 plf.
  - e. Guardrail: Per Uniform Building Code.
  - f. Windload: 30 psf across vertical projection.
2. All manufactured connections to be shop welded.
- a. Manufactured by certified welders conforming to AWS Standards.

2.3 CLOSURE SYSTEM (BID ALT): Basis of design is Dant Clayton "Vertical Closure System". Vertical closure shall be provided at the locations indicated and shall enclose the area from the walking surface to 4" above grade. Vertical closure material shall be corrugated 6063-T6 extruded aluminum riserboards and shall be provided in a color powder coated (or anodized) finish. Provide all supporting structure & attachments. Closure locations:

- A. Front & rear of grandstand
- B. Egress stairs and associated platforms at front walkway
- C. Egress ramps and associated platforms
- D. Behind cross aisle (if applicable)
- E. Sides of grandstand

### PART 3 - EXECUTION

- 3.1 INSTALLATION: All work performed by technicians experienced in bleacher seating installation.
- 3.2 FIELD QUALITY CONTROL: Footings for the grandstand shall provide sufficient bearing area at bottom to support all loads of the grandstand. Depth and design of footings shall be engineered for specific soil conditions. Hot-dipped galvanized anchor bolts shall be secured in the concrete footings. Concrete shall attain working strength of 3,000 psi. Foundations based upon geotechnical report.
- 3.3 UTILITY COORDINATION: Coordinate & verify that all utility services are provided by other subcontractors or provide those required under the work of this section.
- 3.4 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.5 INSTALLATION: All work performed by technicians experienced in bleacher seating installation. Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Coordinate mounting brackets with steel structure & mount securely. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Place & attach all components firmly & accurately into position, square, plumb, level, & true.

- 3.6 CLEAN UP: Clean up all debris caused by work of this section.
- 3.7 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.



# 13 34 17 - CONTINUOUS ELEVATED ANGLE-FRAME BLEACHERS

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

- A. Continuous, elevated, angle-frame bleachers.

### 1.2 RELATED REQUIREMENTS

- A. Section 03 30 00 – Cast-in-Place Concrete: Concrete foundations.
- B. Section 13 34 17 – Metal Press Boxes.

### 1.3 REFERENCE STANDARDS

- A. AAMA 2603 – Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
- B. AISC Steel Construction Manual.
- C. Aluminum Association (AA) Aluminum Design Manual.
- D. ASTM A 36 / A 36M – Standard Specification for Carbon Structural Steel.
- E. ASTM A 123 / A 123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- F. ASTM A 307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
- G. ASTM A 572 / A 572M – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- H. ASTM A 992 / A 992M – Standard Specification for Structural Steel Shapes.
- I. AWS D1.1 / D1.1M – Structural Welding Code – Steel.

### 1.4 PREINSTALLATION MEETINGS

- A. Convene preinstallation meeting 2 weeks before start of installation of continuous, elevated, angle-frame bleachers.
- B. Require attendance of parties directly affecting work of this section, including Contractor, Architect, installer, and manufacturer's representative.
- C. Review materials, preparation, installation, adjusting, protection, and coordination with other work.

### 1.5 BIDDER-DESIGN SYSTEM

- A. For the work of this this section, provide design, engineering and fabrication for the complete installation of the assembly included in the Bidder's Cost of the Work. Include all accommodations for complete installation of system, including footings/structural support & coordination with each trade forming a component part of the system or assembly as required to meet the design and performance criteria, and as required to maintain the integrity of the building design aesthetic. Architect will be the judge for acceptance of Bidder-Design systems.

### 1.6 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, including installation instructions.
- B. Shop Drawings:
  - 1. Submit manufacturer's shop drawings, including plans, elevations, sections, and details, indicating location, size, details, and quantity of steel and aluminum components and accessories.

2. Indicate locations of exit stairs, ramps, seat locations, decking configurations, and overall general materials to be supplied.
  3. Shop drawings shall be signed and sealed by a qualified, registered professional engineer, registered in state of the installation.
- C. Samples: Submit manufacturer's color samples for selection.
- D. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.
- E. Design Data:
1. Submit manufacturer's design data, including an analysis to indicate that the structural members shall have sufficient strength to support required loads and ability to resist loads subjected, without exceeding allowable stresses of the materials.
  2. Design data shall be signed and sealed by a qualified, registered professional engineer, registered in state of the installation.
- F. Manufacturer's Project References: Submit manufacturer's list of successfully completed continuous, elevated, angle-frame bleacher projects, including project name and location, name of architect, and type and quantity of bleachers furnished.
- G. Installer's Project References: Submit installer's list of successfully completed continuous, elevated, angle-frame bleacher projects, including project name and location, name of architect, and type and quantity of bleachers installed.
- H. Warranty Documentation: Submit manufacturer's standard warranty.

## 1.7 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
1. Manufacturer regularly engaged, for past 10 years, in design and manufacture of continuous, elevated, angle-frame bleachers of similar type to that specified.
  2. Fabricate structural steel in an AISC-certified plant; certified "STD" at time of the bid.
  3. Manufacturer listed by AISC as a certified fabricator.
  4. Certification and inspections in accordance with IBC Chapter 17.
- B. Installer's Qualifications:
1. Installer regularly engaged, for past 5 years, in installation of continuous, elevated, angle-frame bleachers of similar type to that specified.
  2. Employ persons trained and experienced for installation of continuous, elevated, angle-frame bleachers.
  3. Welder's Qualifications: AWS certified within past 12 months for each type of weld required.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Delivery Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage and Handling Requirements:
  - 1. Store and handle materials in accordance with manufacturer's instructions.
  - 2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
  - 3. Do not store materials directly on ground.
  - 4. Protect materials and finish during storage, handling, and installation to prevent damage.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Basis of Design: Sturdisteel, PO Box 2655 Waco, Texas 76702 USA; website: [www.sturdisteel.com](http://www.sturdisteel.com)
- B. Southern Bleacher Company.
- C. Steel Stadiums.
- D. Other manufacturers seeking to be approved must submit product literature on horizontal beam design to the Owner for review and receive approval from Owner seven days prior to bid date.

2.2 DESIGN REQUIREMENTS

- A. Design: Conform to AISC Steel Construction Manual and AA Aluminum Design Manual.
- B. Applicable Codes: Design and workmanship shall be in accordance with IBC 2012 and ICC 300 Bleachers, Folding and Telescopic Seating, and Grandstands.
- C. Design Loads:
  - 1. Live Loads:
  - 2. Uniform Loading, Structure: 100 psf.
  - 3. Uniform Loading, Seats: 120 plf.
  - 4. Sway Loads:
  - 5. Perpendicular to Seats: 10 plf.
  - 6. Parallel to Seats: 24 plf.
  - 7. Wind Loads: Local building code.
  - 8. Snow Loads: Local building code.
  - 9. Seismic Loads: Local building code.
  - 10. Handrail and Guardrail: 200 lbs. concentrated in any direction.
- D. Shop Connections: Welded and capable of carrying stress put upon them.
- E. Welding: AWS D1.1.

- F. Concrete Foundations: Manufacturer shall design and install concrete foundations as specified in Section 03 30 00.

## 2.3 CONTINUOUS ELEVATED ANGLE-FRAME BLEACHERS

- A. Framework: Space prefabricated angle bleacher frames at 6-foot intervals and connect by crossbraces.
- B. Rise and Depth Dimensions:
1. Vertical Rise per Row: 8 inches.
  2. Horizontal Depth per Row: 24 inches.
  3. Seat Above its Respective Tread: 17 inches.
- C. Risers:
1. 1/2-inch by 6-1/4-inch anodized aluminum board.
  2. At Top Row: 1/2-inch by 11-1/2-inch anodized aluminum board.
- D. Seats: 1-1/2-inch by 9-1/2-inch anodized aluminum board with end caps.
- E. Treads: Two 1-1/2-inch by 9-1/2-inch mill finish aluminum boards with end caps.
- F. Guardrail:
1. Sides and back of bleachers, entry stairs, walkways, ramps, portals, and landings where 30 inches or more above adjacent area or grade.
  2. Material: Anodized aluminum pipe with end plugs at ends of straight runs or elbows at corners.
  3. Secure to angle posts with galvanized fasteners.
  4. Top Rail: 42 inches minimum above walkways, entrances, and any adjacent seat.
  5. Chain Link Fencing: 9-gauge galvanized steel, fastened in place with galvanized fittings and aluminum ties.
- G. Front Walkway:
1. Width: 60 inches.
  2. Elevated:
  3. Deck: 1-1/2-inch by 9-1/2-inch mill finish aluminum boards.
- H. Steps:
1. Frames: Galvanized steel.
  2. 1-3/4-inch by 11-1/2-inch mill finish aluminum boards with 2-inch by 2-inch dark bronze contrasting nosing.
- I. Entry Stairs:

1. Entry Stairs, Guardrails, and Handrails: In accordance with local code requirements.
  2. Rise: 7 inches maximum.
  3. Tread: 11 inches minimum.
- J. Aisle Width:
1. Middle Aisle Width: 48 inches minimum.
  2. End Aisle Width: 36 inches minimum
  3. Provide greater aisle width as needed to meet local building code egress requirements.
- K. Mudsills: 1-1/2-inch by 7-1/2-inch treated lumber, drilled for field bolting.
- L. Accessibility: Incorporate wheelchair spaces within bleachers to conform to applicable code and ADA.

## 2.4 MATERIALS

- A. Framework:
1. Galvanized Steel:
    - a. ASTM A 36, ASTM A 572 Grade 50, and ASTM A 992.
    - b. Hot-dipped galvanized after fabrication in accordance with ASTM A 123.
- B. Seat Boards: Extruded aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II.
- C. Riser Boards: Extruded aluminum alloy 6063-T6; clear anodized 204R1, AA-M10C22A31, Class II.
- D. Tread Boards: Extruded aluminum alloy 6063-T6, mill finish.
- E. Guardrail: Aluminum anodized pipe, 1-5/8-inch OD.
- F. Accessories:
1. Steel Bolts and Nuts: ASTM A 307, galvanized.
  2. Structural Connections: Snug tight to conform to RCSC Specification for Structural Joints Using High-Strength Bolts.
  3. Hold-Down Clip Assembly: Aluminum alloy 6063-T6.
  4. Form-Fitted End Caps: Aluminum alloy 2024, clear anodized 204R1, AA-M10C22A31, Class II.
  5. Channel End Caps: Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II.
- G. Concrete Foundations: Specified in Section 03 30 00. Footings for the grandstand shall provide sufficient bearing area at bottom to support all loads of the grandstand. Depth and design of footings shall be engineered by the manufacturer for specific soil conditions.

2.5 CLOSURE SYSTEM (BID ALT): Basis of design is Dant Clayton "Vertical Closure System". Vertical closure shall be provided at the locations indicated and shall enclose the area from the walking surface to 4" above grade. Vertical closure material shall be corrugated 6063-T6 extruded aluminum riserboards and shall be provided in a color powder coated (or anodized) finish. Provide all supporting structure & attachments. Closure locations:

- A. Rear of grandstand
- B. Egress stairs and associated platforms at front walkway
- C. Egress ramps and associated platforms
- D. Behind cross aisle (if applicable)
- E. Sides of grandstand

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas to receive continuous, elevated, angle-frame bleachers.
- B. Notify Architect of conditions that would adversely affect installation or subsequent use.
- C. Do not begin surface preparation or installation until unacceptable conditions are corrected.

#### 3.2 PREPARATION

- A. Install concrete foundations for continuous, elevated, angle-frame bleachers as specified in Section 03 30 00 and indicated on the Drawings.

#### 3.3 INSTALLATION

- A. Install continuous, elevated, angle-frame bleachers in accordance with manufacturer's instructions at locations indicated on the Drawings.
- B. Install bleachers plumb, level, square, straight, and secure.
- C. Anchor bleachers securely in place to concrete foundations.

#### 3.4 ADJUSTING

- A. Inspect completed continuous, elevated, angle-frame bleachers and make necessary adjustments to ensure proper installation.
- B. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
- C. Remove and replace with new material, damaged components that cannot be successfully repaired, as determined by Architect.

#### 3.5 PROTECTION

- A. Protect completed continuous, elevated, angle-frame bleachers to ensure that, except for normal weathering, bleachers will be without damage or deterioration at time of Substantial Completion.

## 13 34 18 - METAL PRESS BOX

### PART 1 - GENERAL

#### 1.1 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturers must have ten years of experience in the manufacture of bleachers and grandstands; welders must be AWS certified; manufacturing capability according to various code compliances.
- B. Installer Qualifications: Installer must have ten years of experience in the proper installation of grandstands.
- C. Source Quality Control: Mill Test Certification.

- 1.2 BIDDER-DESIGN SYSTEM: For the work of this this section, provide design, engineering and fabrication for the complete installation of the assembly included in the Bidder's Cost of the Work. Include all accommodations for complete installation of system, including footings/structural support & coordination with each trade forming a component part of the system or assembly as required to meet the design and performance criteria, and as required to maintain the integrity of the building design aesthetic. Architect will be the judge for acceptance of Bidder-Design systems.

#### 1.3 SUBMITTALS

- A. Manufacturer's Product Data: Submit manufacturer's descriptive product data for project.
- B. Shop Drawings: Manufacturer to submit shop drawings sealed by a registered professional engineer and schedules for type, location, quantity, and details of concrete, steel and aluminum components required for project.
- C. Provide Design Calculations and Erection Drawings prepared by, or under direct supervision of, Registered Professional Engineer, licensed to practice in State of Texas with all drawings and calculations bearing his seal.
- D. Color Sample: If applicable, submit sample.

### PART 2 - PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Basis of Design: Sturdisteel, PO Box 2655 Waco, Texas 76702 USA; website: [www.sturdisteel.com](http://www.sturdisteel.com)
- B. Southern Bleacher Company.
- C. Steel Stadiums.
- D. Dant Clayton
- E. American Grandstands Inc.
- F. Other manufacturers seeking to be approved must submit product literature on horizontal beam design to the Owner for review and receive approval from Owner seven days prior to bid date.

#### 2.2 PRESS BOX

- A. Product Description



1. Press Box Support Structure: Independently supported but connected to rear of grandstand.
  2. Filming Area/Observation Deck located on Press Box roof.
- B. Materials/Finishes
1. Press Box Support Structure:
    - a. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
    - b. Shop connections are seal welds.
    - c. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.
  2. Press Box: All materials shall be new and shall comply with ASTM specifications.
    - a. Floor
      - i Main support to be a galvanized steel floor frame sized to support structure and metal belly pan for support of insulation.
      - ii Sub-floor: 3/4 inch AC Grade exterior plywood over 2 inch x 10 inch flooring.
      - iii Finish Floor: 12 inch x 12 inch x 1/8 inch thick vinyl tile.
      - iv Insulation: Kraft faced fiberglass building insulation R-11, 3 1/2 inches thick. Batt or roll as manufactured by Owens-Corning Fiberglas Corp. or equal.
    - b. Wall Structure
      - i Studs: 2 inch x 4 inch #2SPF 16 inch O.C.
      - ii Insulation: Kraft faced fiberglass building insulation R-11, 3 1/2 inch thick. Batt or roll as manufactured by Owens-Corning Fiberglas Corp. or equal.
      - iii Interior Finish
        - 1/2 inch vinyl coated gypsum panels, Gold Bond vinyl-surfaced Durasan-Harvest-Maize.
        - Cove Base: Vinyl 4 inch x .080 equal to PRO CB-35 Nubian.
      - iv Exterior Finish
        - 26 gauge white prefinished steel rib paneling over 1/2 inch CD exterior grade plywood.
        - Wall panels are attached with metal to wood TEK screws - 6" O.C. at the top and bottom of the panels and 12" O.C. at mid point between top and bottom attachment points.

- Lap screws are placed at each end of the panels, at the intermediate supports, and at the mid point between supports (TEK #14).

c. Roof Structure

- i Roof Joists: 2 inch x 8 inch SYP on 16 inch O.C.
- ii Roof Decking: 3/4 inch T & G CD Plywood.
- iii Finish Roof: Single ply .060 Versiguard black membrane or equal.
- iv Insulation: Kraft faced fiberglass building insulation, 6 inches thick. Batt or roll as manufactured by Owens-Corning Fiberglas Corp. or equal.
- v Cornice: 26 gauge steel prefinished white to match metal siding.
- vi Ceiling: 12 inch x 12 inch x 1/2 inch acoustical tile attached to 1/2 inch sheetrock with adhesives.

d. Exterior Door(s)

- i Full flush steel construction with honeycomb core. 18 gauge skin sheets. Dimensions: 3 feet 0 inches x 6 feet 8 inches.
- ii Steel door frame complete with threshold and weatherstripping.
- iii Hardware: Equal to keyed passage as manufactured by Schlage Lock Co. Finish: Satin Chromium Plated US26D. Keyed alike locks.

e. Interior Door(s)

- i Interior Birch Unit. Dimensions: 3 feet 0 inches x 6 feet 8 inches.

f. Windows

- i Frame: Extruded aluminum single hung, vertical rise unit.
- ii Glazing: Clear tempered or safety panes.
- iii Dimensions of each unit: Varies as per Press Box size.
- iv Finish: Bronze enamel.

g. Work Bench

- i 16 inch wide work bench constructed of 3/4 inch BC grade plywood and 2 inch x 4 inch framing with knee braces.
- ii Plastic laminate top: Equal to Wilsonart Laminates. Finish: D30-6 Natural Almond. Thickness: .050 (12 mm nominal).

h. Painting: Equal to Jones Blair 15 year.

- i Surfaces: Exterior Door(s), Door Frame(s)
      - Primer: Factory applied
      - Finish: 2 coats semi-gloss enamel.
    - ii Surfaces: Interior Doors (if applicable): Stain to coordinate with interior finish.
    - iii Surfaces: Exterior Siding
      - Primer: Factory applied
      - Finish: Factory applied
      - Touchup: If applicable
  - i. Caulking: All Temperature, UV sealant.
  - j. Electrical
    - i Fixtures: 2-lamp, 40 watt fluorescent, white strip design. Sizes: Varies as per Press Box size. Equal to Lithonia Lighting.
    - ii Wiring to be in EMT or flexible metal conduit per N.E.C. 100 amp breaker box with 1 1/4 inch conduit to be stubbed out of press box ready for service line to be connected. Service line to Press Box is responsibility of Owner.
    - iii Electrical outlet(s) installed per NEC shall be standard duty.
    - iv Empty double outlet boxes with 3/4 inch conduit stubbed out bottom of Press Box for use of Owner. Quantity: Varies as per Press box size.
    - v Filming Area/Observation Deck : Weathertight outlet box for cameras. Quantity: Dependent on Press Box size.
  - k. Filming Area/Observation Deck
    - i Access Options
      - Interior: Roof hatch with OSHA-rated aluminum ladder mounted to an interior back wall.
    - ii Roof guardrailing to be 42" above walking surface around perimeter of deck. The guardrailing to include 9 gauge galvanized chain link fencing fastened in place with galvanized fasteners and aluminum ties.

### PART 3 - EXECUTION

- 3.1 FIELD QUALITY CONTROL: Footings for the grandstand shall provide sufficient bearing area at bottom to support all loads of the grandstand. Depth and design of footings shall be engineered by the manufacturer for specific soil conditions. Hot-dipped galvanized anchor bolts shall be secured in the concrete footings. Concrete shall attain working strength of 3,000 psi. Foundations based upon minimum soil bearing of 2000 psf at 3 feet below grade.

- 3.2 UTILITY COORDINATION: Coordinate & verify that all utility services are provided by other subcontractors or provide those required under the work of this section.
- 3.3 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.4 INSTALLATION: All work performed by technicians experienced in bleacher seating installation. Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Coordinate mounting brackets with steel structure & mount securely. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Place & attach all components firmly & accurately into position, square, plumb, level, & true.
- 3.5 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.

# 13 34 19 - METAL BUILDING SYSTEM

## PART 1 - GENERAL

- 1.1 WORK INCLUDED: The pre-engineered metal building system shall be design-build, to include the design of all structure required for all building elements and construction of entire structure as designed.
  - A. STRUCTURAL & ENEVELOPE DESIGN: Structural design to include all building elements, except as specifically noted in the drawings. Structural design shall take into consideration design loads to include but not be limited to support of exterior walls including masonry, roof structure, projecting elements from building, interior walls, supported elements on the perimeter of the building and the interior of the building. Design building envelope and insulating systems to prevent intrusion of water, wind, vermin and bats and to meet energy code locally applicable.
  - B. BUILDING STRUCTURE & ENVELOPE: Building structure to be provided complete with structural framing (columns, rafters, struts, purlins, girts); wind beams to support exterior walls; metal roof & wall panels; roof and wall insulation; building canopies; metal flashings; trim; gutters and downspouts; wind and lateral bracing; fasteners; closure pieces; and roof and wall accessories and other components and material required for a complete installation. Provide building envelope to prevent intrusion of wind, water, vermin and bats; provide insulation system to meet energy code locally applicable.
- 1.2 DESCRIPTION: Clear & multispans gabled or single slope rigid frame structure with uniform or variable depth column and uniform or variable depth rafter sections of shop welded steel plates or open web rafter sections, supported by intermediate steel pipe or square tube columns or intermediate uniform depth columns. Column spacing as shown on drawings.
- 1.3 QUALITY ASSURANCE: Metal building manufacturer shall be certified in accordance with American Institute of Steel Construction (AISC) quality certification program category MB for metal buildings. This certification is to cover areas of general management, engineering and drafting, procurement, operations and quality control. Upon request the manufacturer shall provide proof of certification.
- 1.4 CODES AND STANDARDS:
  - A. Use following where applicable in building design:
    1. AWS D1.1 "Structural Welding Code-Steel."
    2. MBMA "Low-Rise Building Systems Manual"
    3. AISI "Specifications for the Design of Cold Formed Steel Structural Members".
    4. AISC "Steel Construction Manual" and "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings."
    5. AAMA "Aluminum Construction Manual."
    6. AISC "Specification for Structural Joints Using ASTM A325 or ASTM A490 bolts."
  - B. Use the following where applicable in other phases of design:
    1. Building Code and regulations of other governing authorities having jurisdiction.
    2. Applicable portions of the Structural Steel Painting Council (SSPC) Standards, as referenced herein.
    3. Federal (Fed. Spec.), Military (MIL) and Commercial (CS) Standards and Specifications, as referenced herein.
    4. American Society for Testing and Materials (ASTM), Standards as referenced herein.
    5. Underwriters' Laboratories, Inc. (UL Classification 90).
- 1.5 DESIGN CRITERIA: international Building Code (IBC), latest edition, for building location. Vertical live load 20 PSF. Roof Covering Design to support either 50 PSF uniformly distributed or 200 lb. concentrated (point) load (over 1' x 1' area) located at center of maximum roofing (panel) span; most severe condition shall govern. Design structure for code required wind load, velocity proportioned and applied as horizontal and uplift forces according to MBMA Low-Rise Building Systems Manual design practices. Steel frame to provide lateral support for masonry walls.
  - A. DESIGN COORDINATION: Manufacturer will review all drawings & coordinate design to accommodate all other construction systems; components found by the Architect not to be properly coordinated will be re-engineered, modified & reinstalled with no additional charge or schedule disruption.

- 1.6 DEFLECTION & DRIFT: Allowable deflection and drift shall be determined by the building manufacturer to meet AISC Design Guide 3 Serviceability Considerations based on the roofing, cladding, ceiling, partitions and equipment types specific to the project. Secondary and primary structural members shall at a minimum meet the requirements for the building type and location called for under the most recent IBC, AISC & MBMA. All structural members shall be designed within deflection limits under maximum loading conditions so as to not cause movement or cracking in masonry walls or other architectural elements.
  - A. Minimum Deflection: L/360
  - B. Minimum Horizontal Drift: H/240
- 1.7 CONCEPTUAL FRAMING DIAGRAM: Any conceptual framing diagrams provided by the Architect are meant only to communicate design intent and are not inclusive of all structural elements required under this specification.
- 1.8 SUBMITTALS: (1) Design Calculations and Erection Drawings prepared by, or under direct supervision of, Registered Professional Engineer, licensed to practice in State of Texas with all drawings and calculations bearing his seal. Show each type structural building frame required and their locations within structure; details of anchor bolt settings; sidewall, endwall, and roof framing; diagonal bracing and location within structure; metal floor deck and joist types; wall and roof insulation and types; longitudinal and transverse cross sections; details of curbs, roof jacks, and items penetrating roof; canopy framing and details; trim, gutters, downspouts, liner panels, wall and roof coverings, and all accessory items; materials; finishes; construction and installation details; and other pertinent information required for proper and complete fabrication, assembly and erection of watertight metal building system. (2) Color sample sets showing full color range available, for selection purposes. (3) Manufacturer's specifications and descriptive literature. (4) Written certification, prepared and signed by Registered Professional Engineer licensed to practice in State of Texas, attesting that building design meets specified loading requirements, requirements of codes and authorities having jurisdiction at project site, and other requirements specified. (5) Manufacturer's certification that the roof system shall qualify for UL Class 90.
  - A. CODE COMPLIANCE: It shall be the responsibility of the contractor to ensure that submitted design meets all locally applicable building and energy codes.
- 1.9 PRODUCT HANDLING, DELIVERY AND STORAGE: Deliver and store prefabricated components, sheets, panels, and other manufactured items so they will not be damaged or deformed. Stack materials on platforms or pallets above grade or on concrete slab, covered with opaque tarpaulins or other approved weather-resistant ventilated covering. Store metal sheets and panels if subjected to water accumulation in such a manner so they will drain freely. Do not store sheets and panels in contact with other materials which might cause staining. Damaged material must be reported to determine if replacement is required. Inspect panels to prevent moisture between panels, and secure as required.
- 1.10 WARRANTIES: Manufacturer, contractor & installer to jointly & unconditionally warrant the workmanship & the completed assembly against leaks for a period of two (2) years. Manufacturer to provide twenty (20) year paint finish & no-perforation warranty (NDL) of wall & roof panels. Warranties to provide for full & immediate replacement of defective work upon notification by Owner during the warranty period.. When two manufacturers supply the structure and the roof panels separately, both manufacturers shall furnish to the Architect certification with shop drawings that they approve of the other manufacturer and all warranties and guarantees will be in effect.
- 1.11 PREINSTALLATION CONFERENCE: Schedule and hold preinstallation conference minimum one week prior to beginning of work on scope addressed in this section. Coordinate scheduling of meeting with Architect so that Architect can attend meeting.

## PART 2 - PRODUCTS

- 2.1 ACCEPTED MANUFACTURERS: The product of the following manufacturers' is acceptable provided that they comply with the remainder of this Specification. Products of the other manufacturers not listed below will be considered, provided complete design information is submitted to the Architect for approval seven days prior to the proposal.
  - A. Alliance Steel Buildings
  - B. LMB Steel Structures Inc.
  - C. Ceko Building Systems
  - D. Varco-Pruden Buildings
  - E. Whirlwind Steel Buildings
  - F. Red Dot Buildings

- 2.2 STRUCTURAL STEEL: Structural Plate or Bar Stock, Minimum yield strength (Fy) of 50,000 PSI. Cold Formed Structural Steel, Minimum yield strength (Fy) of 55,000 PSI. Primary Structural Bolts and Nuts, ASTM A325; size and quantity required by metal building system manufacturer. Provide wall anchors, bearing plates, ceiling extensions, beam bolts, and other accessories necessary or required for complete installation. Join structural members fabricated of plate or bar stock together by continuous automatic submerged arc welding process with all welding performed under the supervision of certified welders in accordance with standard practices of AWS D1.1. Make all primary rigid frame field-bolted connections with A325 high-strength bolts of size required by building system manufacturer. Clean all components of oil, dirt, loose scale, and foreign matters. Factory paint with one (1) coat of manufacturer's standard primer.
- 2.3 PRIMARY FRAMING: Rigid frames of shop-welded steel plate columns and rafters, both tapered and uniform depth sections as required by drawings, complete with all necessary stiffeners, connection plates and holes for field-bolted assembly. Columns and Rafters, fabricated with holes in web and/or flanges for attachment of secondary members. Splice Plates, factory fabricated for precision for all rafter-to-rafter and/or column-to-rafter connections, complete with connection bolt holes. Base Plates, Cap Plates, Splice Plates and Stiffeners, fabricate to sizes required, complete with all holes for connection of primary and secondary structural members; factory weld into place. Manufacturer will review all drawings & insure that structural members are designed to clear all other construction.
- 2.4 ENDWALL FRAMING: Precision cold-formed and/or shop-welded steel plate members consisting of rafters and columns fabricated for field-bolted assembly. Columns, Rafters, Splice Plates, Clips, Angles and Channels, factory fabricate to size required.
- 2.5 SECONDARY FRAMING: (1) Purlins - Manufacturer's standard 8" Z sections, roll formed from minimum (Fy) 55,000 PSI steel, punched for attachment. (2) Girts - 8" Z or channel sections of roll formed Fy 55,000 PSI steel, punched for attachment with 1/2" diameter bolts. (3) Eave Struts - 7 1/4" x 4" sections of cold formed minimum Fy 55,000 PSI steel, with vertical web to receive sidewall panels and two 1/2" diameter bolt attachments to rigid frame in factory-punched holes in column or bracket. (4) Roof Struts - provide as required, detailed and shown on final shop drawings, as required by design analysis, with attachment to top flange or rigid frame rafters by two 1/2" minimum size diameter bolts at each end of strut.
- 2.6 MASONRY WIND BEAMS: At all exterior walls with masonry above 7'-0" provide wind beams as designed by building manufacturer with a deflection criteria of L/360.
- 2.7 ROOF PANELS: The standing seam roof panel shall be precision roll-formed to provide 24" net coverage, 24-gauge, 50,000 PSI minimum yield steel. The panel edges shall join together to form a 3" high rib with high standing seam. The seam shall be a closed, double lock design with factory-applied sealant. The panel flats shall be embossed with cross ribs at 6" o.c. to minimize oil-can and flutter. The panel ends shall be factory-notched for end splicing (when required). Panels shall be longest length possible to minimize end splices. The panels shall be secured to the structure with concealed clips designed to accommodate the roof expansion/contraction and to provide a 1" insulation stand-off. The clip shall be made of 12 gauge steel, minimum yield of 36 ksi, coated with G90, meeting ASTM A446. Perimeter trim, start/finish panels, ridge cover and transition flashing shall be provided and shall be designed to accommodate the roof's expansion/contraction. Closures, sealants and fasteners shall be provided as required for a weathertight installation. Finish 0.5 oz. per sq. ft. aluminum-zinc alloy-coating "Galvalume".
- 2.8 WALL & SOFFIT PANELS: See specs 07610 Preformed Metal Wall & Soffit Panel
- 2.9 FASTENERS/WALL PANELS: Manufacturer's standard long-life coated #12 x 7/8" self-drilling carbon steel screws for liner panels and/or exterior single skin wall panels and #12-14 x 1 1/4" self-drilling carbon steel screws for exterior single skin wall panels utilizing blanket insulation up to 5" thick. Trim Fasteners standard plated and finish painted #8 x 5/8" self-drilling screws with 1/4" hex washer head. All exposed fastener heads will be factory colored to match color of panels, with sealing washer.
- 2.10 FASTENERS/STANDING SEAM ROOF PANELS: Panel Clips - manufacturer's standard sliding design to allow for unrestrained expansion and contraction movement of panels. Provide complete with 1/4-14 x 1 1/2" plated self-drilling fasteners at each clip. Exposed Fasteners for Eave, End Splice, Ridge Cover and Flashings standard #12-14 x 1 1/4" self-drilling screw with sealing washer; cap head and washer backer with 0.008" thick Type 302 stainless steel caps or zinc/aluminum alloy head. Painted or unpainted. Standing Seam Sealant - approved type nonshrinking, nondrying butyl-based sealant specifically formulated for factory application in standing seams and to allow roof panel assembly at temperatures from minus 10 deg F to 140 deg F.
- 2.11 WIND BRACING: Commercial grade steel rod bracing or K-frames located as determined by manufacturer, located so as to not conflict with other building elements. Preferred locations as shown in drawings. Provide complete with necessary slope washers, flat washers and adjusting nuts at each end. Clean components free of oil, dirt, loose scale and foreign matter.

- 2.12 WALL AND ROOF INSULATION: Wall and roof insulation systems to meet locally applicable energy codes. Manufacturer's standard noncombustible fiberglass blanket. Metal panel wall insulation to be R19 minimum, FSK faced with 3/16" thick closed-cell polyethylene foam thermal break. Roof insulation in concealed areas to be R30 minimum, two-layer R19+R19 system, "Energy Saver FP" system by Guardian Building Products, or another product determined to be equal by the Architect & approved in writing prior to submission of proposal; first layer installed parallel with the purlins, second layer positioned above and perpendicular to the purlins, with 1" minimum foam spacers installed at purlins to minimize conductive heat transfer from the purlins to the roof panels.
- A. Thermal Design shall be an Approved Manufacturer.
- B. Bay Insulation Systems shall be an Approved Manufacturer.
- 2.13 GUTTERS AND DOWNSPOUTS: Gutters for standing seam roof shall be suspended box sections of 26-gauge galvanized steel formed to match the configuration of the gable trim. Gutters shall be independent of the roof seal and shall be attached to the eave strut adapter by means of a gutter hanger. Gutter hangers shall be spaced at 4'-0" centers and attached to inside face of gutter and eave adapter by #12 self-drilling screws and to outer face of gutter by trim fasteners. Gutter sections shall be lapped 2" and sealed with sealant and then fastened with fasteners as specified on manufacturer's drawings. Gutter end closures shall be sealed with sealant and fastened with pop rivets as specified on manufacturer's drawings. Downspouts shall be 29-gauge galvanized factory-colored steel with a minimum cross section of 20 square inches. Downspouts shall be located according to design requirements as specified, or as shown. Downspouts shall be attached to a thimble installed in the gutter. Downspouts shall be attached to the wall panel using 26-gauge galvanized factory-colored steel straps on 10'-0" centers. A 75-degree elbow shall be provided at the base of all downspouts to direct the water flow away from the building. Finish, manufacturer's standard siliconized polyester system finish in color selected by Architect from all manufacturer's options including metallic colors.
- 2.14 ROOF JACKS AND PIPE FLASHING: Roof jack shall be a 26-gauge, Shell White steel cone factory installed and sealed to roof panel. Cone shall be made of same material. Stack or pipe penetration shall be at the centerline of a major corrugation of the roof panel. Pipe flashing shall consist of a molded rubber cone with an aluminum ring bonded to the base. Pipe flashing shall accommodate pipe diameter as specified and be capable of flashing penetration at any location of the roof panel. Flashing shall be sealed and fastened in accordance with manufacturer's drawings.
- 2.15 MANUFACTURER LOGOS: No manufacturer logos shall be visible on the building exterior or interior.

### PART 3 - EXECUTION

- 3.1 ERECTION: Erection shall be accomplished by a trained, competent erector having experience in erecting metal buildings. Install all metal building system components in strict compliance with manufacturer's instructions shown on final shop drawings. Handle and store all materials to avoid damage and replace any damaged materials. Erector shall observe and follow recommendations of the Metal Building Manufacturers Association (MBMA) practice and procedures where applicable. Do not field cut or alter structural members without approval from manufacturer.
- 3.2 STRUCTURAL FRAMES: Erect true to line, level and plumb, brace and secure with temporary bracing in all directions as required. Level base plates and secure to anchor bolts to level plane with full bearing to foundation supporting structures.
- 3.3 BRACING: Install all permanent diagonal rod or angle bracing in roof and sidewalls as approved by manufacturer. Properly tighten rods to avoid excessive sag.
- 3.4 FRAMED OPENINGS: Securely attach to building structural framing members, square and plumb.
- 3.5 ROOFING AND SIDING PANELS: Install roof and canopy panels in such a manner to permit drainage to eaves of building, with panel ends square to eave. Install wall panels with vertical edges plumb. Arrange and nest sidelap joints away from prevailing winds when possible. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to grid lines. Protect factory finishes from mechanical damage or abrasions. Install approved type closures to exclude weather. Install weather seal under ridge cap. Flash and seal roof panels at eave, gable and perimeter of all openings through roof and elsewhere as required or shown on drawings. Flash and/or seal wall and liner panels at perimeter of all openings, under eaves and gable trims, along lower panel edges, and elsewhere as required or shown on drawings, as applicable. Remove all fastener or cutting shavings from roof and wall as erection is completed.



- 3.6 STANDING SEAM ROOF PANELS: Install panels with positive interlock between installation clips and standing seams in manner that will allow panels to support erection loads prior to closing of seams. Install concealed panel clips over top of roofing insulation along each standing seam at location and spacing determined by metal building manufacturer. Where panel end splices occur, nest panels with 3" end laps and install interlocking clamping plates and sealant. Make splice independent of structure to allow for free expansion and contraction movement of panels without stress on splice. Close standing seams to assure complete sealant engagement and to assure structural integrity of panel-to-panel and panel-to-clip connections. Use fasteners penetrating roof panel only at eaves and end splices. At these conditions, use fasteners in conjunction with clamping plates (with factory-punched holes to assure correct fastener placement) and approved type butyl sealant to assure positive watertight seals. Install ridge cover units of approved expansion joint design to accommodate expansion and contraction movement of roof panels without ponding at end splices.
- 3.7 WALL PANELS: Install wall panels on exterior side of metal framing with liner panels installed on building interior in locations shown on drawings. Align bottoms of panels to proper coverage and fasten with manufacturer's recommended and supplied fasteners. Cut and fasten flashing and trims with approved type fasteners. Install all fasteners with power tool having adequate torque and proper r.p.m. adjusted to seat fastener without damage to heads, washers or panels. Install panel sidelap away from prevailing wind or view direction when possible, maintaining proper lap without fastener dimpling or excessive overlap.
- 3.8 ACCESSORIES: Install gutters, downspouts, flashings, trim, ridge covers, roof curbs, pipe flashings, closure strips, roof jacks, and other accessories and sheet metal items in accordance with manufacturer's recommendations for positive attachment to building and provide a weathertight mounting.
- 3.9 THERMAL INSULATION: Install in accordance with manufacturer's recommended procedure, performed concurrently with installation of wall and roof panels. Install blankets straight and true. Fasten tabs together or lap and glue to provide complete vapor barrier. Place insulation with facing exposed to interior of building unless shown otherwise.
- 3.10 TOUCH-UP: Touch-up all abrasions, scratches, field welds or other damages in shop-primed or factory-finished painted surfaces consistent with shop primer or factory-finished painting.
- 3.11 TOLERANCES: Erect framing in accordance with AISC and manufacturer's specifications and instructions, except columns shall be plumbed with a tolerance of 1:300.

## DIVISION 14 – CONVEYING EQUIPMENT

### 14 24 23 - HYDRAULIC PASSENGER ELEVATORS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section includes: Hydraulic passenger elevators as shown and specified. Elevator work includes:
  - 1. Standard pre-engineered hydraulic passenger elevators.
  - 2. Elevator car enclosures, hoistway entrances and signal equipment.
  - 3. Jack(s).
  - 4. Operation and control systems.
  - 5. Accessibility provisions for physically disabled persons.
  - 6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
  - 7. Materials and accessories as required to complete the elevator installation.
- B. Related Sections:
  - 1. Division 3 Concrete: Installing inserts, sleeves and anchors in concrete.
  - 2. Division 4 Masonry: Installing inserts, sleeves and anchors in masonry.
  - 3. Division 5 Metals:
    - a. Providing hoist beams, pit ladders, steel framing, auxiliary support steel and divider beams for supporting guide-rail brackets.
    - b. Providing steel angle sill supports and grouting hoistway entrance sills and frames.
  - 4. Division 9 Finishes: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
  - 5. Division 22 Plumbing:
    - a. Sump pit and oil interceptor.
  - 6. Division 23: Heating, Ventilation and Air Conditioning
    - a. Heating and ventilating hoistways and machine rooms.
  - 7. Division 16 Sections:
    - a. Providing electrical service to elevators, including fused disconnect switches.
    - b. Emergency power supply, transfer switch and auxiliary contacts.

- c. Heat and smoke sensing devices.
  - d. Convenience outlets and illumination in machine room, hoistway and pit.
- C. Work Not Included: General contractor shall provide the following in accordance with the requirements of the Model Building Code and ANSI A17.1 Code. For specific rules, refer to ANSI A17.1, Section 300 for hydraulic elevators. State or local requirements must be used if more stringent.
1. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.
  2. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.
  3. Hatch walls require a minimum two hours of fire rating. Hoistway should be clear and plumb with variations not to exceed 1/2" at any point.
  4. Elevator hoistways shall have barricades, as required.
  5. Install bevel guards at 75° on all recesses, projections or setbacks over 2" (4" for A17.1 2000 areas) except for loading or unloading.
  6. Provide rail bracket supports at pit, each floor and roof. For guide rail bracket supports, provide divider beams between hoistway at each floor and roof.
  7. Pit floor shall be level and free of debris. Reinforce dry pit to sustain normal vertical forces from rails and buffers.
  8. Where pit access is by means of the lowest hoistway entrance, a vertical ladder of non-combustible material extending 42" minimum, (48" minimum for A17.1-2000 areas) shall be provided at the same height, above sill of access door or handgrips.
  9. Machine room to be enclosed and protected.
  10. Machine Room temperature must be maintained between 55° and 90° F.
  11. If machine room is remote from the elevator hoistway, clear access must be available above the ceiling or metal/concrete raceways in floor for oil line and wiring duct from machine room.
  12. Access to the machinery space and machine room must be in accordance with the governing authority or code.
  13. Provide an 8" x 16" cutout through machine room wall, for oil line and wiring duct, coordinated with elevator contractor at the building site.
  14. All wire and conduit should run remote from either the hoistways or the machine room.
  15. When heat, smoke or combustion sensing devices are required, connect to elevator machine room terminals. Contacts on the sensors should be sided for 120 volt D.C.
  16. Install and furnish finished flooring in elevator cab.
  17. Finished floors and entrance walls are not to be constructed until after sills and door frames are in place. Consult elevator contractor for rough opening size. The general contractor shall supply the drywall framing so that the wall fire resistance rating is maintained, when drywall construction is used.
  18. Where sheet rock or drywall construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.

19. Before erection of rough walls and doors; erect hoistway sills, headers, and frames. After rough walls are finished; erect fascias and toe guards. Set sill level and slightly above finished floor at landings.
20. To maintain legal fire rating (masonry construction), door frames are to be anchored to walls and properly grouted in place.
21. The elevator wall shall interface with the hoistway entrance assembly and be in strict compliance with the elevator contractor's requirements.
22. General Contractor shall fill and grout around entrances, as required.
23. Elevator sill supports shall be provided at each opening.
24. All walls and sill supports must be plumb where openings occur.
25. For applications with jack hole, free and clear access to the elevator pit area for the jack hole-drilling rig is required.
26. Where jack hole is required, remove all spoils from jack hole drilling.
27. When not provided by Elevator Contractor, jack hole shall accommodate the jack unit. If required the jack hole is to be provided in strict accordance with the elevator contractor's shop drawings.
28. Locate a light fixture and convenience outlet in pit with switch located adjacent to the access door.
29. A light switch and fused disconnect switch for each elevator should be located inside the machine room adjacent to the door, where practical, per the National Electrical Code (NFPA No. 70).
30. As indicated by elevator contractor, provide a light outlet for each elevator, in center of hoistway (or in the machine room).
31. For signal systems and power operated door: provide ground and branch wiring circuits, including main line switch. For car light and fan: provide a feeder and branch wiring circuits, including main line switch.
32. Wall thickness may increase when fixtures are mounted in drywall. These requirements must be coordinated between the general contractor and the elevator contractor.
33. Provide supports, patching and recesses to accommodate hall button boxes, signal fixtures, etc..
34. Locate telephone and convenience outlet on control panel.

## 1.2 SUBMITTALS

- A. Product data: When requested, the elevator contractor will provide standard cab, entrance and signal fixture data to describe product for approval.
- B. Shop drawings:
  1. Show equipment arrangement in the machine room/control space, pit and hoistway. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
  2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
  3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.

4. Indicate electrical power requirements and branch circuit protection device recommendations.
- C. Powder Coat Paint selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- D. Plastic laminate selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- E. Metal Finishes: Upon request, standard metal samples provided.
- F. Operation and maintenance data. Include the following:
  1. Owner's Manual and Wiring Diagrams.
  2. Parts list, with recommended parts inventory.

### 1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: An approved manufacturer with minimum fifteen years experience in manufacturing, installing, and servicing elevators of the type required for the project.
  1. Must be the manufacturer of the power unit, controller, signal fixtures, door operators cab, entrances, and all other major parts of the elevator operating equipment.
    - a. The major parts of the elevator equipment shall be manufactured in the United States, and not be an assembled system.
  2. The manufacturer shall have a documented, on-going quality assurance program.
  3. ISO-9001:2000 Manufacturer Certified
  4. ISO-14001:2004 Environmental Management System Certified
- B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than fifteen years of satisfactory experience installing elevators equal in character and performance to the project elevators.
- C. Regulatory Requirements:
  1. ASME/ANSI A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
  2. Building Code: National.
  3. NFPA 70 National Electrical Code.
  4. NFPA 80 Fire Doors and Windows.
  5. Americans with Disabilities Act Accessibility Guidelines (ADAAG).
  6. CAN/CSA C22.1 Canadian Electrical Code.
  7. CAN/CSA B44 Safety Code for Elevators and Escalators.
- D. Fire-rated Entrance Assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10(B), and NFPA 80. Provide entrance assembly units bearing Class B or 1 1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).
- E. Inspection and testing: Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.

1. Arrange for inspections and make required tests.
2. Deliver to the Owner upon completion and acceptance of elevator work.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Manufacturing will deliver elevator materials, components and equipment and the contractor is responsible to provide secure and safe storage on job site.

1.5 PROJECT CONDITIONS

- A. Prohibited Use: Elevators shall not be used for temporary service or for any other purpose during the construction period before Substantial Completion and acceptance by the purchaser unless agreed upon by Elevator Contractor and General Contractor with signed temporary agreement.
- B. Provide the hole for the jack unit (if required by the type of jack provided), based on excavation through normal soil or clay which can be removed by manual digging or by standard truck-mounted regular drilling unit. Provide a casing if required to retain the walls of the hole. General contractor shall remove excavation spoils deposited in the elevator pit.
  1. If a physical obstruction or hindrance is encountered below the ground surface, including boulders, rock, gravel, wood, metal, pilings, sand, water, quick sand, caves, public utilities or any other foreign material, obtain written authorization to proceed with excavating using special excavation equipment.
  2. Maintain a daily log of time and material costs involved.
  3. Elevator contractor will be compensated on a time and material basis for additional costs incurred after encountering the physical obstruction or hindrance, including the cost of the special excavation equipment.

1.6 WARRANTY

- A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months from date of Substantial Completion.

1.7 MAINTENANCE

- A. Furnish maintenance and call back service for a period of 12 months for each elevator from date of Substantial Completion during normal working hours, excluding callbacks. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation.
- B. Manufacturer shall have a service office and full time service personnel within a 100 mile radius of the project site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: ThyssenKrupp Elevator

2.2 MATERIALS

- A. Colors, patterns, and finishes: As selected by the Architect from manufacturer's standard colors, patterns, and finish charts.
- B. Steel:
  1. Shapes and bars: Carbon.

- 2. Sheet: Cold-rolled steel sheet, commercial quality, Class 1, matte finish.
- 3. Finish: Factory-applied baked enamel.
- C. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness.
- D. Carpet: By others.

## 2.3 HOISTWAY EQUIPMENT

- A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood subfloor. Underside of the platform shall be fireproofed. The car platform shall be designed and fabricated to support one-piece loads weighing up to 25% of the rated capacity.
- B. Sling: Steel stiles affixed to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.
- C. Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.
- D. Guide Shoes: Slide guides shall be mounted on top and bottom of the car.
- E. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on a steel template that is fastened to the pit floor or continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.
- F. Jack: Jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to insure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the following jack type: Twin post holeless. Two jacks piped together, mounted one on each side of the car with a polished steel hydraulic plunger housed in a sealed steel casing having sufficient clearance space to allow for alignment during installation. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. Each Jack Assembly shall have a check valve built into the assembly to allow for automatically re-syncing the two plunger sections by moving the jack to its fully contracted position. The jack shall be designed to be mounted on the pit floor or in a recess in the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section.
- G. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the landings and correct for overtravel or undertravel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.
- H. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit. Provide proper grade oil as specified by the manufacturer of the power unit.

## 2.4 POWER UNIT

- A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit consisting of the following items:
  - 1. Oil reservoir with tank cover.
  - 2. An oil hydraulic pump.
  - 3. An electric motor.
  - 4. Oil control valve with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and electro-magnetic controlling solenoids.

- B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.
- C. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating shall be selected for specified speed and load. The motor shall be rated for 80 starts per hour.
- D. Control System: Shall be microprocessor based and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure.
- E. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
  - 1. Relief valve shall be externally adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
  - 2. Up start and stop valve shall be adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
  - 3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
  - 4. Lowering valve and leveling valve shall be adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.

## 2.5 HOISTWAY ENTRANCES

- A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening bolted\knock down construction.
  - 1. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates, sight guards, and necessary hardware.
  - 2. Main landing door & frame finish: Stainless steel panels, no. 4 brushed finish.
  - 3. Typical door & frame finish: Stainless steel panels with no. 4 brushed finish.
  - 4. Special wall condition occurs at the 1st floor. Elevator manufacturer shall include the burden of providing an entrance frame to fit up to a 20" deep wall. The 2nd floor wall condition will be less than 12" deep.
- B. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.
- C. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway horizontal sliding door.
  - 1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
  - 2. Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.
  - 3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.
- D. Hoistway Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

## 2.6 CAR ENCLOSURE



- A. Car Enclosure:
  - 1. Walls: Cab type TKLP, flat durable wood core finished on both sides with high pressure plastic laminate. The wood core shall not contain Urea Formaldehyde. Plastic laminate selection shall be standard grade from TKE's standard color selection.
  - 2. Canopy: Cold-rolled steel, 14 gauge minimum thickness, with hinged exit.
  - 3. Ceiling: Suspended type, fluorescent lighting with translucent diffuser mounted in a metal frame painted "black".
  - 4. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with brushed stainless steel.
  - 5. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
    - a. Door Finish: Stainless steel panels: No. 4 brushed finish.
    - b. Cab Sills: Extruded aluminum, mill finish.
  - 6. Handrail: Provide 1.5" diameter cylindrical metal on rear wall. Handrail shall have a stainless steel, no. 4 brushed finish.
  - 7. Ventilation: Manufacturer's standard 2-speed exhaust fan, mounted on the car top, with keyed switch control in the car operating station.
  - 8. One (1) set of cab protection pads shall be furnished to the owner. Manufacturer's standard stainless steel buttons for hanging these pads shall be included on all walls and the front return.
- B. Car Top Inspection: Provide a car top inspection station with an "Auto-Inspection" switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station will give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

## 2.7 DOOR OPERATION

- A. Door Operation: Provide a direct current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. Door movements shall be electrically cushioned at both limits of travel and the door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. Closed-loop, microprocessor controlled motor-driven linear door operator, with adjustable torque limits, also acceptable. AC controlled units with oil checks or other deviations are not acceptable.
  - 1. No Un-Necessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.
  - 2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.
  - 3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel will reverse and the door will reopen to answer the other call.

4. Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a buzzer will sound. When the obstruction is removed, the door will begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors will stop and resume closing only after the obstruction has been removed.
  5. Limited Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors will reverse and reopen partially. After the obstruction is cleared, the doors will begin to close.
  6. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors will recycle closed then attempt to open six times to try and correct the fault.
  7. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors will recycle open then attempt to close six times to try and correct the fault.
  8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.
- B. Door Protection Devices: Provide a door protection system using 150 or more microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

## 2.8 CAR OPERATING STATION

- A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate. Swing return shall have a brushed stainless steel finish. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons that illuminate using long lasting LED's shall be included for each floor served, and emergency buttons and switches shall be provided per code.
- B. Emergency Communications System: Integral ADA phone system provided.
- C. Auxiliary Operating Panel: Not Required
- D. Car Riding Lanterns: A car riding lantern shall be installed in the elevator cab and located in the entrance strike and return columns. The lanterns, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.
- E. Special Equipment: Not Applicable

## 2.9 CONTROL SYSTEMS

- A. Controller: The elevator control system shall be microprocessor based and software oriented. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.
- B. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.
- C. Starting: An adjustable solid state soft starter shall be provided.

## 2.10 HALL STATIONS

- A. Hall Stations, General: Provide illuminating LED pushbuttons to indicate that a call has been registered at that floor for the indicated direction. Provide 1 set of pushbutton risers.
  - 1. Provide one pushbutton riser with faceplates having a brushed stainless steel finish.
  - 2. Phase 1 firefighter's service key switch, with instructions, shall be incorporated into the hall station at the designated level.
- B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.
- C. Hall Position Indicator: Not Applicable
- D. Hall lanterns: Not Applicable
- E. Keyed Hoistway Access: Provide keyed hoistway access integral with the terminal hall stations.

## 2.11 MISCELLANEOUS ELEVATOR COMPONENTS

- A. Oil Hydraulic Silencer: Install an oil hydraulic silencer (muffler device) at the power unit location. The silencer shall contain pulsation absorbing material inserted in a blowout proof housing arranged for inspecting interior parts without removing unit from oil line.
- B. Power unit shall be isolated from the slab with Mason ND type neoprene isolators.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and machine rooms/control space, as constructed and verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

### 3.2 INSTALLATION

- A. Install elevator systems components and coordinate installation of hoistway wall construction.
  - 1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
  - 2. Comply with the National Electrical Code for electrical work required during installation.
- B. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.
- C. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.
- D. Lubricate operating parts of system where recommended by manufacturer.

### 3.3 FIELD QUALITY CONTROL

- A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required by A17.1 Code and local authorities having jurisdiction. Perform other tests, if any, as required by governing regulations or agencies.
- B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

### 3.4 ADJUSTING

- A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

### 3.5 CLEANING

- A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless steel shall be cleaned with soap and water and dried with a non-abrasive surface; shall not be cleaned with bleached-based cleansers.
- B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.

### 3.6 PROTECTION

- A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

### 3.7 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.
- B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

### 3.8 ELEVATOR SCHEDULE

- A. Elevator Qty. 1
  - 1. Elevator Model: AMEE 21
  - 2. Rated Capacity: 2100 lbs.
  - 3. Rated Speed: 80 FPM, full load up
  - 4. Operation System: TAC32 Microprocessor
  - 5. Travel: 12'-0" +/- (to be confirmed)
  - 6. Landings: 2 total
  - 7. Openings:
    - a. Front: 2
    - b. Rear: 0
  - 8. Clear Car Inside: 5'-8" wide x 4'-3" deep x 7'-4" (clear under finished ceiling)
  - 9. Cab Height: the cab height nominal 8'-0"
  - 10. Hoistway Entrance Size: 3' - 0" wide x 7'-0" high
  - 11. Door Type: Single Speed side opening, handed per the plans
  - 12. Power Characteristics: 208 Volts, 3Phase, 60 Hz.
  - 13. Seismic Requirements: Zone 1
  - 14. Fixture & Button Style: Signa4 Signal Fixtures with brushed stainless steel faceplates

### 3.9 SPECIAL FEATURES: Handicap Features to Meet Current ANSI, TAS, & ADA Code Requirements Including:

- A. Phone: ADA Hands-Free Telephone Device
- B. Service: Twelve (12) Months New Installation Maintenance
- C. Warranty: Twelve (12) Months on Factory Material
- D. Independent Service Operation
- E. 2007 Fireman's Service Operation
- F. Door Nudging Operation
- G. Mason ND Type Isolation Under the Power Unit
- H. Solid State Soft Starting
- I. Automatic Fan-Light Shutdown Operation
- J. TKE Standard Design Pit Ladder and Sill Support Angles
- K. MicroLight Proximity Type Infrared Door Protection
- L. Two Speed Fan Including Key Switch
- M. Keyed Hoistway Access Operation at the Terminal Landings

## 14 42 16 - VERTICAL WHEELCHAIR LIFTS

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for wheelchair lift, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 PRODUCT HANDLING: Protect stored materials against exposure to weather and contact with moisture.
- 1.5 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.
- 3.5 WARRANTY: The manufacturer shall warrant all parts under these specifications to be free of defects for a period of three years.

### PART 2 - PRODUCTS

- 2.1 GENERAL: Provide materials which are compatible with any underlying material. Provide all accessories required for a complete and proper installation, as recommended by the manufacturer.
- 2.2 WHEELCHAIR LIFT:
  - A. Operation: Electric motor operation
  - B. Power supply: 110 volt, 15 amp, single phase, 60 Hz
  - C. Controls: Controls shall be exterior of lift and interior for user operation.
  - D. Emergency Operation: Battery-operated with automatic recharging system and remote access manual lowering valve
  - E. Capacity: 600 lb.
  - F. Platform Size: Minimum of 34 in. by 54 in.
  - G. Lift Height: As per drawings.
  - H. Lifting Time: Maximum of 20 seconds to height of 60"
  - I. Side Guards: 42" minimum with maximum openings less than 4"
  - J. Finish: Powder coated, color to be chosen by Architect

### PART 3 - EXECUTION:

- 3.1 UTILITY COORDINATION: Coordinate & verify that all required utility services are provided by other subcontractors or provide those required under the work of this section.
- 3.2 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.3 INSTALLATION: Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Provide wood blocking at drywall partitions. Place & attach all components firmly & accurately into position, square, plumb, level, & true.
- 3.4 PROTECTION/CLEANING: Protect work during storage, installation & until final acceptance, replacing any damaged material. Clean completed work, removing excess material and blemishes from exposed surfaces, using cleaner recommended by the manufacturer.

**DIVISION 22 - PLUMBING**

**22 14 53 - RAINWATER HARVESTING SYSTEM**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes designing, fabricating, & furnishing rainwater harvesting system, consisting of:
  - 1. Rainwater first wash diverter.
  - 2. Storage tanks.
  - 3. Collection system.
  - 4. Distribution pumps.
  - 5. Pressure switches.
  - 6. Controls.
  - 7. Secondary filters.

**1.2 DEFINITIONS**

- A. Rainwater Harvesting System: An assembly of manufactured components integrated into an automated system that collects, stores, and distributes rain water for use in situ; including water treatment as appropriate to intended use.

**1.3 SUBMITTALS**

- A. Product Data: Prior to installing any work, submit product data on all components of the rainwater harvesting system[s]. Unless otherwise indicated, include the following for each type of product provided under work of this Section:
- B. Manufacturer's brochure indicating equipment model(s).
- C. Shop Drawings: For each system, include plans, sections, details, and attachments to other work, for the following:
  - 1. Pumps.
  - 2. Storage.
  - 3. Connection to roofing system.
  - 4. Connection to irrigation system.
  - 5. Connection to plumbing system.
  - 6. All piping, accessories & appurtenances
  - 7. Calculations: For each system submit the following:
    - a. Maximum water capacity.
  - 8. Collection data: Include the following:
    - a. average rainfall rate (inches annually)

- b. total collection area (s.f.)
  - c. potential collection (s.f.= gallons)
  - d. peak gallons @ 5"/hour
  - e. peak gallons @ 5 min. duration
  - f. available gallons
- 9. Water Demand: Include the following:
- 10. Landscaping: total estimated planted area (acres) application rate / week (high) gallons application rate /week (low) gallons required.
- 11. Designer/Installer Qualifications.
- D. Operation and Maintenance Manuals Submittals: At substantial completion provide the following:
  - 1. Operation and maintenance procedures, including variations of procedures appropriate for normal climatic conditions anticipated throughout an annual cycle of operations.
  - 2. Include layout drawings, parts lists, and component manufacturer's product data.
  - 3. Provide instructions on operation, calibration, troubleshooting, and servicing equipment.

#### 1.4 QUALITY ASSURANCE

- A. Designer/Installer Qualifications: For work of this Section, engage an experienced rainwater consultant who has specialized in systems similar to those required for this Project and with a record of successful in-service performance. Designer/Installer shall be an "Accredited Professional" by The American Rainwater Catchment Systems Association.
- B. Pre-Construction Meeting: After award of Contract and prior to the commencement of the Work of this Section, schedule and conduct meeting to discuss the Work of this Section and to coordinate with related Work. Convene pre-construction meeting to comply with requirements of Division 01 and as follows:
  - 1. Notify all attendees at least two weeks prior to the conference.
  - 2. Require attendance of parties directly affecting Work of this Section, including, but not limited to:
  - 3. Owner,
  - 4. Contractor,
  - 5. Architect,
  - 6. System Designer/Installer,
  - 7. Roofing Provider/Installer,
- C. Review methods and procedures related to installation and operation of Work of this Section, including coordination with related Work.



- D. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

## 1.5 SEQUENCING AND SCHEDULING

- A. Coordinate the Work with installation of associated roofing, waterproofing, flashings, and roof accessories specified under other sections as the Work of this Section proceeds.
- B. Coordinate the Work with installation of associated irrigation and plumbing systems specified under other sections as the Work of this Section proceeds.

## 1.6 WARRANTY

- A. Warranty: Warrant the system against defects including equipment failure and leakage, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, abnormal weather conditions unusual for warranty period.
- B. Warranty Period: One year after date of Substantial Completion,

## PART 2 - PRODUCTS

### 2.1 SYSTEM COMPONENTS

- A. Catchment Area:
  - 1. Roofing, gutters & downspouts by others, as indicated
- B. Conveyance:
  - 1. Piping.
    - a. Schedule 40 PVC, sized per system requirements.
    - b. Overflow pipe shall empty into a non-flooding area.
  - 2. Pump(s), sized as appropriate to water demands of system. Acceptable Manufacturers:
    - a. Goulds.
    - b. Grundfos.
  - 3. Control Panel:
    - a. Housed in Nema 4 hinged wall mount enclosure with back plate, fully integrated into rainwater harvesting system, prefabricated and configured to run pumps as required.
    - b. Provide one normally open float switch to protect pump from run dry condition.
    - c. Provide one normally closed float switch to activate normally closed solenoid valve to activate make-up water source.
- C. Storage:

1. Above ground design as manufactured by Texas Metal Cisterns, San Marcos, Texas. Tanks shall be custom fabricated of galvanized steel with protective interior coating. Provide a 12" inspection cover & be accessible for routine maintenance. Manufacturer shall guarantee tank against leaks for one year.
  2. Tank Pad: Reinforced concrete; system design shall accommodate load requirements of tank.
  3. Bulkhead fittings, sized to match system inlet, outlet, pump flow rate, vents, and other penetrations.
- D. Water Treatment:
1. First wash piping.
  2. Post catchment filtration - Replaceable cartridge type, sized per system requirements.
- E. Accessories:
1. Joint Sealants: Non-toxic and as specified in Division 07 (7).
  2. Fasteners: non-corrosive and compatible with materials being fastened.
  3. Sight-tube & valves to monitor water level at each tank group.
  4. Valves & drains.
  5. Waterproof electrical connection box: Located in manway, field installed.
- F. Lead components are not permitted.

## 2.2 FABRICATION

- A. Design prefabricated components and necessary field connections required for installation to permit easy assembly, repair and maintenance, and disassembly.
- B. Design and construct to comply with applicable regulatory requirements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions under which system will be installed, with Designer/Installer present, for compliance with requirements.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install system components in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Arrange equipment so that components requiring removal or maintenance are readily accessible without disturbing other components. Arrange for clear passage between components.
- C. Connect to utility supplies and equipment.

- D. Ground components in accordance with component manufacturer's instructions.
- E. Install prefilters at time storage tanks are installed.

### 3.3 FIELD QUALITY CONTROL

- A. System Designer to provide startup services to include:
- B. Installation oversight and technical support.
- C. Terminate and test control system wiring and operation of electrical components.
- D. Demonstrate proper pump and controls operation.
- E. Make adjustments to meet user-defined system performance.
- F. Review operation and maintenance procedures with Owner's representative

**DIVISION 26 - ELECTRICAL****26 41 19 - EARLY STREAMER EMISSION LIGHTNING PROTECTION****PART 1 - GENERAL**

- 1.1 WORK INCLUDED: Provide all labor, material, equipment, and services to perform all operations required for the complete installation and related work as specified herein. Any such work included in any other section of these specifications that is not specifically described therein shall comply with the requirements of this section. The following items of work are specifically included in, but not necessarily limited to, the work of this section without limiting the generality implied by these specifications:
- A. ESE lightning protection air terminal
  - B. Mast, complete with base and supports
  - C. Down conductors
  - D. Grounds
  - E. Transient Voltage Surge Suppression
- 1.2 SUBMITTALS: The ESE installer shall provide ten (10) complete sets of shop drawings for review, showing location of ESE air terminal, mast conductors, installation procedures and details. Detailed manufacturer's data sheets on all components, accessories and miscellaneous equipment to be used in the installation shall also be submitted. One complete set of independent performance testing documents on the ESE air terminal system shall be submitted to show compliance with the protection area of the unit submitted for the installation.
- 1.3 DESCRIPTION OF SYSTEM: The ESE installer shall provide a complete installation of equipment to comprise a complete system against damage by lightning. The ESE installer shall be responsible for all material and labor to accomplish this result. The system, including the ESE air terminal, conductors, mast and complementary parts, shall be installed so that completed work is unobtrusive and does not detract from the building appearance.
- 1.4 CODES, REGULATIONS, PERMITS: The completed system shall comply with the ESE manufacturer's standard, equipment supplier drawings and specification requirements for installation of ESE lightning protection systems. The installer, at his expense, shall accomplish any corrections required by the inspection. Noncompliance shall be reported to the equipment supplier for consideration.
- 1.5 STANDARDS OF QUALITY: The ESE system equipment supplier, contractor, and installer shall install the ESE system in compliance with the ESE Manufacturer's Standard. The ESE system and manufacturer's guarantees and warranties shall be submitted to the owner upon completion of the ESE system installation.
- 1.6 SERVICE AND TESTING: Installation of equipment shall be done under the direct supervision of a manufacturer and per the manufacturer's requirements. The lightning protection installing contractor shall provide photos and/or video of the installation, including but not limited to, mast mounting, bonding connections (waterline & structural steel), down conductors, ground rods/grids and all buried, concealed or inaccessible connections and components. This information shall be forwarded to the ESE manufacturer for evaluation, certification, archiving and documentation. The ground resistance of the completed system shall be measured using IEEE "Fall of Potential Method" in the presence of the Architect/Engineer and shall be forwarded to the ESE manufacturer. Ground resistance shall be ten (10) Ohms or less.

**PART 2 - PRODUCTS**

- 2.1 ESE AIR TERMINAL: The complete assembly shall consist of a 5/8" air terminal, which is HD 29 CU, and heavy chrome plated 24 CH. Lock nut and washer shall be chrome plated copper. Support structure shall be chrome plated soft copper. Sphere shall be threaded to the air terminal. The base of the ESE air terminal shall be threaded for interconnection to top of mast.

- 2.2 CONDUCTORS: Copper conductors shall be 28 strands of 14-gauge wire rope lay, with a net weight of 375 pounds per 1,000 feet (60mm<sup>2</sup>), minimum. The structural steel may be utilized as main conductor if the steel is electrically continuous or is made so via other means. Every other column or an average of 60'-0" (18m) intervals shall be bonded and connected to the ground system. All conductors shall be secured every 3'-0" (900mm) maximum. Fasteners and clips utilized shall be of equal corrosion resistance as the material being secured. Bonding of all conductive material within 6'-0" (1800mm) of the conductor shall be accomplished via secondary conductor no smaller than #6 (14mm<sup>2</sup>) copper. Bare copper material shall not be installed on dissimilar metals. Corrosion resistant copper or bronze equipment shall be utilized where these conditions exist. Corrosion resistant copper conductors and fittings shall be utilized where corrosive atmospheres are present. Conductors shall be installed so that a conductor shall always have a horizontal or downward path, free of "U" and "V" pockets, with the exception that an 8" (203mm) maximum rise or a rise of 3" (80mm) maximum for every 12" (300mm) of conductor length shall be permitted in a main conductor run. Each ESE terminal shall have two (2) paths to ground from the base plate of the mast, with the exception of an elevated mast that may have a single conductor run for a maximum of 16'-0" (4880mm) before two (2) down conductors shall be initiated. The electrical contractor shall furnish and install all necessary PVC conduit for concealed down conductors. No bend of a conductor shall be less than ninety (90) degrees and shall not have a radius of bend of less than 8" (203mm). Exceptions are through roof and wall assemblies and "T" connections.
- 2.3 MAST: Aluminum or galvanized steel mast, height to be determined by the area of protection, with threaded connection for the ESE air terminal and bonding plate for cable connection. Wind and safety factors shall be documented for the geographic area of installation, to determine the size and structure of mast. Base support, depending upon application, flat mounting base, side mounting base and/or structural support, and/or flag- pole may be utilized.
- 2.4 GROUNDING SYSTEM: Ground rods shall be copperclad 3/4" (20mm) x 10' (3000mm), minimum. One set of tripod grounds shall be installed for each down conductor [two (2) minimum per system; refer to para. 2.2, sub para. C, for structural steel used as down conductors, grounding requirements]. Ground plates of high conductivity copper sheet, 20 gauge minimum, 18 in. sq. 460mmsq. [three (3) required per down conductor], may be used in lieu of or in combination with ground rods to achieve the ten (10) ohm resistance grounding system requirement. The cable attachments to the ground rods must be accomplished via exothermic welds or mechanical clamp. Cable attachments to the ground plates shall be via cast bronze bond plates of eight 8in2 (5161mm<sup>2</sup>) of contact area. A ground loop may be substituted for the ground rods or ground plates. The ground loop must be of a main size conductor and shall comply with the ten (10) Ohm resistance requirement of the grounding system. Ground rods, ground plates, and ground loop conductors shall be installed a minimum of 1ft. (300mm) below grade and a minimum of 2ft. (600mm) away from the foundation. All grounding locations shall be as evenly spaced around the building perimeter as possible. A minimum of one (1) inspection well, rated for the traffic of the installation area, shall be installed for each down conductor or two (2) minimum per ground loop. Bonding of grounded systems shall be via main size conductors. The bonding shall be accomplished to achieve equal potential of all grounds. All underground connections shall be via exothermic welds, where possible.
- 2.5 CONNECTORS, FITTINGS, FASTENERS, AND HARDWARE: Provide all connectors, fittings, fasteners, hardware, clamps, guards, lugs, exothermic welds, etc., as required to connect, and install all parts of the system. All equipment shall be fabricated from copper and/or bronze material
- 2.6 SURGE SUPPRESSION: Provide surge protection on the electrical, telephone, and antenna and TV lead wires. The surge suppresser for the main electrical panel shall be industrial grade, with replaceable modules, fused, indicator lights. The electrical surge suppression equipment shall be installed at the main entrance of the electrical system with a disconnecting mechanism. The surge suppresser shall have the capability of being disconnected without shutting down the electrical system. Telephone surge suppression shall be to the standards of the telephone system carrier. The suppresser shall be industrial grade with replaceable modules, and a reaction time of less than one (1) nanosecond. This surge equipment shall be installed at the main entrance of the telephone system. Antenna and TV lead wire suppressers shall be industrial grade suitable for the conductor, coax or hard wire. The suppresser shall have a reaction time of less than one (1) nanosecond and shall be installed as close to the antenna or TV camera as possible.

### PART 3 - EXECUTION

- 3.1      INSTALLATION-GENERAL: Installation shall be accomplished in a professional manner by an installer of verifiable ESE system installation. All work installed within the building shall be concealed. All work installed in accessible locations shall be properly guarded and protected. All material shall be installed in a manner to prevent electrolytic action under presence of moisture. All roof, wall or other building penetrations shall be made in a manner to prevent the ingress of water or moisture. Roof penetrations shall be furnished and installed by the roofing contractor. PVC sleeves shall be provided where conductors pass through all floors; furnished and installed by others.

## 26 56 68 - EXTERIOR ATHLETIC LIGHTING

### PART 1 - GENERAL

- 1.1 SUMMARY OF THE WORK: The purpose of these specifications is to define the performance and design standards for the lighting project for the Jarrell ISD Football field. This is a specification for materials and installation. The manufacturer shall supply lighting equipment to meet or exceed the following general criteria:
  - A. Four 70' Steel poles with 48 fixtures.
  - B. The foundations shall be a pre-cast concrete section or steel reinforced concrete piers with anchor bolts.
  - C. Factory wire harnesses with plug-in connections will be provided.
  - D. Pole top section shall be factory assembled with fixtures mounted to the crossarms aimed and internally wired at the factory.
  - E. Factory assembled and wired remote ballast enclosures shall be furnished 10' above ground level.
- 1.2 MANUFACTURER'S WARRANTY
  - A. Manufacturer shall warrant in writing the entire structure from foundation to pole top(excluding fuses, and lamps) to be free from defects in materials and workmanship for a period of seven years starting from the date of delivery.
  - B. Manufacturer agrees in writing to provide labor and materials for a period of two years to replace defective parts or repair defects in workmanship, or, at its election, to pay reasonable costs of labor for such repairs. For the remainder of the warranty period, replacement materials will be provided at no charge.
  - C. Lamps shall be warranted by the manufacturer in writing not to fail for two years from the date of delivery. Lamps which fail during the first year of the warranty period will be replaced and installed at no cost to the owner. Lamps which fail during the second twelve months will be replaced by the manufacturer but installation will be the owner's responsibility.
  - D. Manufacturer warrants in writing accurate alignment of the luminaires on the luminaire assembly for a period of seven years starting from the date of delivery.
- 1.3 SUBMITTAL REQUIREMENTS
  - A. Manufacturers must supply the following 10 days prior to bid to gain bid approval:
    1. Initial and Maintained light level scans meeting criteria of Specifications.
    2. Engineer stamped document showing fixtures will maintain alignment with 125mph winds with 1.3 gust factor.
    3. Lighting design showing pole locations and mounting height
    4. Full UL Report to become property of owner
    5. Drawing and literature of entire structure
    6. Lamp cut sheet showing wattage and initial mean lumens
    7. Manufacturer must supply written guarantee of light performance for initial light levels on the field and spill light levels.
    8. Commitment to supply Foundation design and pole calculations signed and stamped by licensed structural engineer

9. Manufacturer's warranty
10. Complete photometric report by an independent testing laboratory for each fixture type being used to prove that 70% of light is in lower portion of beam.
11. References of 10 similar lighting projects in the state of Texas.
12. Product sample to Architect to include pole, crossarm with fixtures attached, remote enclosure and wire harness. Proof that poles meet NFPA 780 Lightning protection.

PART 2 - MATERIAL

2.1 LIGHTING PERFORMANCE

A. Horizontal Light Levels and Uniformities

1. Initial Light Levels: 37.5 FC
2. Maintained Light Levels: 30 FC
3. The uniformities of the playing field shall be measured by comparing the maximum reading to the minimum reading. The ratio shall not exceed the following: 2.5:1

B. Light Loss Factor

1. The light loss factor used to determine the target maintained light levels shall be a maintenance factor of .8 multiplied by the lamp tilt factor. Maintenance factor is calculated as follows: ambient temperature factor (1) x voltage factor (1) x ballast factor (1) x lamp lumen depreciation (.84) x luminaire dirt depreciation (.95) per I.E.S. manual RP-6-88, p92.

C. Point by Point Analysis

1. Above light levels shall demonstrated on a computer generated model which consist of a grid as defined below:

Area of Lighting	# of Points	Size of Area	Grid Spacing
Football	96	360' x 160'	30' x 20'

D. Lamp Type

1. Lamps shall be 1500 watt metal halide and shall meet ANSI designation M48PC-1500 BU and be Philips, Sylvania or General Electric.

E. Lumens per Lamp

1. Manufacturer shall supply computer generated point by point light scans based on 155,000 lumens per lamp. No high output lamps permitted.

F. Beam Control Fixtures

1. The reflector system design of the approved lighting fixture shall place more than 60% of the total light output below the maximum candlepower point. The manufacturer shall supply photometric reports completed by a independent testing laboratory on each reflector type being used.



- G. Mounting Height
  - 1. All poles shall have a mounting height as indicated on drawings.
- H. Inspection and Testing Procedures
  - 1. All testing will be done with the entire facility illuminated.
  - 2. Horizontal footcandle readings shall be taken with the meter positioned horizontally 36" above grade.
  - 3. Testing equipment for measurement of footcandle levels shall be a calibrated Gossen Panalux Electronic 2 or an approved equal.
  - 4. For final approval of the project the manufacturer shall provide a final report from the test results that shall provide the following items:
    - a. Identification of number and location of the test stations.
    - b. Actual horizontal footcandle readings taken at each test station.
    - c. Number of hours of operation.

## 2.2 STRUCTURAL REQUIREMENTS

- A. Fixture and Crossarm
  - 1. The fixture must be assembled to the crossarm and aimed in the factory. The fixture shall be die cast aluminum construction and coated with polyurethane powder coat paint.
  - 2. Luminaires shall be attached to the crossarm by a minimum of two bolts, which shall be stainless steel and Empigard coated. There shall be no penetrations of the top or sides of the crossarm.
  - 3. The crossarm, reflector and its attachment to the pole shall be provided by the manufacturer such that it will structurally withstand winds of 125 m.p.h. with 1.3 gust factor without misalignment of any luminaire and without any damage to the crossarms or its components.
- B. Aiming Recapturing Device
  - 1. Light fixtures shall have a positive latching device for each luminaire on the assembly. The device shall provide for automatic repositioning of the aiming after relamping. In addition, there shall be a stainless steel bolt and nut to secure the alignment.
- C. Stainless Steel Fasteners, Bolts, and Hinges
  - 1. All latches, hinges and non-current carrying fasteners shall be stainless steel and shall further be coated with a clear thermoset polymer coating such as Empigard to prevent galvanic interaction.
- D. Pole Material
  - 1. The poles shall be high strength steel hot-dip galvanized to ASTM A123 standard inside and out after all secondary modifications.
- E. Foundation and Pole Strength
  - 1. The pole wind loading shall be designed to withstand winds of 80 m.p.h. based upon SBC-C building code standards utilizing the 50 year mean recurrent isotach wind map data. The foundation shall be a centrifugal spun concrete base or poured in place concrete with anchor bolts. Direct Burial Steel Poles not acceptable.

Manufacturer shall provide a foundation design stamped and sealed by a Texas licensed Structural Engineer based on soils with 2000 psf unconfined compressive strength.

## 2.3 LIGHTING SYSTEM ELECTRICAL SAFETY

### A. Enclosed Wiring

1. All wiring shall be contained inside the crossarms or pole. No exposed wiring. Crossarms for future fixtures shall also include wiring.

### B. NEMA 3R Rated Electrical Components Enclosure

1. The electrical components enclosure shall be a NEMA 3R rated gasketed enclosure to house the ballasts, capacitors, fuses, thermal magnetic circuit breakers and distribution lugs. Each enclosure must have the ballast, capacitor and fuse labeled to identify the fixture it services.
2. Enclosures shall be located on pole approximately 10' from ground level. This enclosure is to be UL listed with ballast, capacitor, fuses as part of a singular UL listing. Enclosure shall be hot-dip galvanized to ASTM-A123-89a standards after fabrication to an average thickness of 2.5 mils. Sheet steel galvanized prior to fabrication will not be accepted. Enclosure must have a continuous hinge attaching the door to the enclosure.
3. One equipment grounding lug shall be provided within the electrical components enclosure which is rigidly fastened to the enclosure, sized to accept up to a 1/0 conductor. There shall also be provided a provision for a ground terminal of sufficient size to permit connection of the grounding conductors from the capacitors and the ground wire from the wiring harness.
4. One enclosure on each pole shall include a UL listed thermal magnetic circuit breaker such that electrical power to all equipment on the pole served by the feeder circuit shall be disengaged by the operation of one switch. The breaker shall be located in a compartment separated from any capacitors or ballasts. There shall be provided by the manufacturer a set of distribution terminal blocks which shall be factory wired from the breaker to the blocks. These blocks shall provide for termination of all ballast connection wiring

### C. Factory Assembled Wire Harness

1. The internal pole wire harness shall be assembled in the factory as a part of the lighting equipment to ensure quality and consistency and will be covered under the manufacturer's equipment warranty. Wire Harness for future fixtures shall also be included and installed.
2. The wire harness shall be supported at the top of the pole by a stainless steel wire mesh grip matched to the size of the harness. 2' below the wire mesh grip and then at not more than 10' intervals along the entire length of the wire harness an abrasion protective bumper device of soft, durable abrasive resistant material not less than 2" in diameter attached around the wire harness to protect the harness from striking and being damaged by the interior surface of the pole. Wire harness must be spiral wound.
3. There shall be included within the wire harness one conductor for use as a grounding conductor. The grounding conductor shall be equal in size to the load carrying conductors.

### D. UL Listing

1. The lighting equipment shall have a UL listing for all electrical components from its connection to the feeder conductors, to its completion at the lamp socket including all connections. This listing shall be based upon UL testing and evaluation of the compatibility of the enclosures and the components for use in combination in this application in addition to the individual components being UL listed or recognized.

### E. Lighting Protection Meeting NFPA 780 Code

1. All structures shall be equipped with lightning protection meeting standards established by NFPA 780 (National Fire Protection Association).

**PART 3 - EXECUTION**

- 3.1 **SURFACE CONDITIONS:** Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 **COORDINATION:** Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- 3.3 **WELDING:** Perform shop and/or field welding required in connection with the work of this Section in strict accordance with pertinent recommendations of the American Welding Society. Where field welding is required, comply with AWS recommended procedures of manual-shielded metal-arc welding for appearance and quality of weld. Grind exposed welds smooth & touch-up.
- 3.4 **FABRICATION:** Fabricate with accurate angles and surfaces which are true to the required lines and levels, grinding exposed welds smooth and flush, forming exposed connections with hairline joints, and using concealed fasteners wherever possible.
- 3.5 **INSTALLATION:** Install this work in strict accordance with the original design, requirements of governmental agencies having jurisdiction, and the manufacturer's recommendations as accepted by the Architect. Set work accurately into position, plumb, level & true, & anchor firmly into position.

**DIVISION 27 – COMMUNICATIONS****27 05 13 - LOCAL AREA NETWORK SYSTEM****PART 1 - GENERAL****1.1 SCOPE OF WORK**

- A. Supply, deliver, install, test and certify in writing the proposed structured cabling system.
- B. The system shall consist of copper cabling, connectors and interconnect/patching equipment, wiring blocks, cable management devices, communications outlets, distribution taps, inner-duct, conduit, equipment racks/cabinets, and any other materials, equipment or labor necessary to meet the requirements within this document.
- C. The contractor shall provide all testing and documentation (written and electronic) upon completion of the installation, as stated herein prior to system acceptance.
- D. This package is to include all labor and material for the installation and certification for the complete network cabling system only.
- E. The contractor will be responsible for providing a Systimax or Panduit certification upon completion of the project.

**1.2 QUALITY ASSURANCE**

- A. ONLY APPROVED SUBSTITUTIONS MAY BE MADE AS TO BRAND OR PRODUCT.
- B. Construct each item of equipment, including parts and accessories in a workmanlike manner, using new materials of the best quality obtainable for the purposes intended. Each item shall be capable of performing its function over an extended period of time with a minimum of attention and maintenance. Design and build materials, wiring and equipment in accordance with the best practices of the electrical and computer industries and conform to the standards of:
  - 1. National Electrical Code (NEC).
  - 2. National Fire Protection Agency (NFPA) NFPA 70.
  - 3. Applicable State and Local Regulations.
  - 4. Underwriters' Laboratory (UL) UL444, UL1863.
  - 5. Americans with Disabilities Act (ADA).
  - 6. All applicable parts will be FCC Class B approved.
  - 7. ISO/IEC 11801, 60603-7.
  - 8. All wiring will be installed to E.I.A./T.L.A.-568 Standards for Category 5, IEEE 801.3 and Category 6.
  - 9. CSA
  - 10. ANSI/TIA/EIA – 606, 607

11. ASTM 4566-94

- C. The Contractor shall warrant the equipment to be new and free from defects in material and workmanship, and will, within one (1) year from date of final Owner acceptance, repair and replace all or any part of the equipment or systems found to be defective, at no cost to the Owner.
- D. Installer Experience & References: Installer shall have at least five (5) years successful experience in network system installation of the type specified and shall be prepared to cite references for at least three (3) such projects.
- E. Installer Credentials and Responsibility: Installer shall be a Registered Communication Design and Distribution (RCDD) or Professional Engineer (PE) and shall execute all work under this contract according to the regulations governing such certification. All submittals, installation drawings and record documents shall bear the name, registration number and signature of the certified party.
- F. The Contractor shall show satisfactory evidence that he maintains a local service organization, within 75 miles of the job site, capable of furnishing adequate inspection and service to the equipment with 24 hours of notification of trouble.
- G. The contractor shall be a Certified Authorized Panduit PCI Design and Installation Company or a Certified Business Partner of Systimax Solutions– in order to maintain Warranty.

1.3 SUBMITTALS

- A. The contractor must submit and meet all Panduit System and/or Systimax Solutions Warranty Requirements as specified by Panduit at the time of the Bid.
- B. Furnish the District shop submittals for the networking system.
- C. Provide shop submittals which include the following information:
  - 1. Complete specifications on each item of equipment proposed.
  - 2. Complete point-to-point drawings showing all equipment connections and connections to control equipment. All devices to show room or area location for identification purposes.
- D. Installation Drawings: Submit installation drawings showing all required devices, equipment and components in plan and bearing the signature of the certified installer. Installer shall make specific and clear indication of all installed conditions.

1.4 ADDITIONAL REQUIRED DOCUMENTATION

- A. This documentation will include all items listed and may include other information as requested by Owner/Architect.
  - 1. Vendor will supply original material for all application software installed.
  - 2. Vendor will supply original disks of all applicable software.
  - 3. Vendor will supply original documentation of all application software.
  - 4. Vendor will supply original registration forms of all software and hardware installed.
  - 5. Vendor will document all wiring paths, work station setups, file server setup, and supply three (3) copies of that documentation.

6. Vendor will supply a list of all serial numbers, where applicable, of equipment installed.

## PART 2 - PRODUCTS

### 2.1 BACKBONE CABLING: Between MDF Room and each IDF Room

- A. Voice backbone shall be UTP with in single sheath. Individual pairs shall be easily identifiable with industry color codes. The backbone shall also be CM, CMR, or CMP as required by the NFPA standard and NEC codes (100 pair).
- B. Data Fiber Optic Backbone Cable shall be rated OFNP or OFNR per the installation environment as defined by the NFPA and NEC. Fiber construction shall be multi-mode with a core/cladding size of 50/125 microns. Contractor shall purchase and install the appropriate fan out and breakout materials where dictated by the application and choice of fiber optic cable type. The maximum attenuation of the cable shall be 850nm at 3.75 dB/Km and 1300 nm at 1.50dB/Km. All fiber shall be installed and run in a plenum rated innerduct or 1" aluminum flex conduit.
- C. Fiber Optic Cable
  1. Between IDF Rooms and MDF Room: Fiber Optic Cable size shall be 12 strand Multi-Mode (Strand Count), and termination shall be per owner requirements. Manufacturer Panduit or Systimax Solutions.
- D. All Backbone terminations shall be terminated to appropriate equipment required. All voice interconnects shall be Panduit 100 type Tower or Systimax 110P type hardware system Category 5E termination blocks, with Panduit or Systimax system cable management to route cable. Contractor must provide a complete cross connect system in quantities sufficient to allow initial cross connect plus 50% additional for future growth of system. Contractor will also provide and install three (3) each, 4ft.x8ft.x3/4" plywood sheets painted and rated by code and standards. The backboards shall be installed on the same wall as the entrance conduits. The boards shall be painted white in color. Panduit Vertical cable managers for tower systems shall be used between every 300 or 900 pair tower.
- E. All fiber optic equipment including connectors, trays, boxes, rack mount enclosures, and patch cords shall be Panduit or Systimax. Connector type shall be SC connectors for both Single-mode and Multi-mode applications. All fiber optic cords shall be factory assembled and tested, and supplied for each terminated fiber connection, plus 15%. Lengths shall be 3 meters.

### 2.2 HORIZONTAL CABLING:

- A. All Data station cables shall meet the requirements published in the specifications for TIA/EIA 568-B.
- B. All Voice station cables shall meet the requirements published in the specifications for TIA/EIA 568-B.
- C. All copper cable shall be Panduit using proper insulation as required by standards, and code. Four pair UTP Cat. 6 cables shall be used for all Data terminations. Four pair UTP Cat. 5E cables shall be used for all voice terminations. No split pairs shall be allowed.
  1. Cable:
    - a. Data Panduit PUP6004BU-U or Systimax 2071 004E BI for all Category 6 installations.
    - b. Voice Panduit PUP5504WHU-U or Systimax 2061 004B Wh for all Category 5E installations.
- D. Voice termination hardware shall be provided and installed in quantities adequate to terminate voice riser cabling at the MDF and IDF rooms and PBX tails at the MDF. Panduit Pan Punch Tower system or Systimax 110P shall be used.

- E. Each area outlet shall be Systimax M-series and Flexible or Panduit Mini-Com series faceplates.
1. Faceplates for in wall applications:
    - a. For student stations: The classroom data drops should be either Panduit CFPL31W or Systimax M13L-262 (1 gang face plate accepts 3 jacks), or the Panduit CFPL41W or Systimax M14L-262 (1 gang face plate accepts 4 jacks), or Panduit CFPL61W or Systimax M16L-262 (1 gang face plate accepts 6 jacks). Reference symbol schedule for additional information. All student stations shall have two network data connection ports.
  2. For Teacher Stations:
    - a. Panduit CBEIW-2G or Systimax M13F-262 (2 GANG FACE PLATE), 1 each.
    - b. Panduit CJRRIW or Systimax 760005389 (RED RCA CONNECTOR), 1 each.
    - c. Panduit CJRWIW or Systimax 760005306 (WHITE RCA CONNECTOR), 1 each.
    - d. Panduit CJRYIW or Systimax 760005348 (YELLOW RCA CONNECTOR), 1 each.
    - e. Panduit CJSVIW or Systimax 760005264 (S-VIDEO MODULE), 1 each.
    - f. Panduit CMD15HDIW or Systimax 760028912 (15 PIN VGA MODULE), 1 each.
    - g. Panduit CHF21W or Systimax 760008656 (TWO MODULE SPACE ½ INSERT), 2 each.
    - h. Panduit CHF2MIW (TWO MODULE SPACE 1/3 INSERT), 2 each. None needed with Systimax Solutions system.
    - i. Panduit CHB2MIW (BLANK INSERT), 1 each. None needed with Systimax Solutions system.
    - j. Panduit CJ688TPRD or Systimax MGS400-317(RED CAT. 6 JACK), 2 each.
    - k. Panduit CMBIW or Systimax 108066457 (BLANK MODULE INSERT), 1 each.
    - l. All teacher stations shall have two network data connection ports.
    - m. All non teaching staff offices shall have two network data connection ports.
  3. For wall mount Voice/Phone stations: KWP5E.
  4. Faceplates for Modular Furniture application (if applicable):
  5. Panduit UICFFP4BL or Systimax M14CE (If mod furniture will not accept modular furniture faceplates, please provide Panduit CBXC4\*\* or Systimax M104SMB for each drop location needed.)
- F. Each Data and Voice outlet shall be Systimax M-Series or Panduit Giga-TX enhances Modular Jacks, All fiber connectors, BNC, RCAM or S-Video connectors shall be Panduit or Systimax. Consult Owner for selected color designations. (\*\*-color code)
1. Accepted Connector Type for copper terminations:

- a. Panduit CJ688TPRD or Systimax MGS400-317 (For all Category 6 requirements)
  - b. Panduit CJ5E88TIW or systimax MPS100E-246 (For all Category 5E requirements)
- G. All racks shall be Systimax or Panduit racks, using the same manufactures wire managers. Vertical wire managers shall be installed on both sides and center(s) of racks. Panduit TRGK672, and TRGB191 rack or Systimax 108528951grounding products shall be used for each rack installed. All rack mounted patch panel cablisg shall be supported using Panduit Tak-Tape(TTS-20RO) or Systimax rack anchor kit 108527524. Each rack installed shall be supplied and installed by the contractor with one (1) Panduit CMRPSV20 or Systimax VPS110R power strip.
  1. Accepted Racks, and Vertical Managers.
    - a. Floor Racks: Panduit CMR19X84 or Systimax 108527441
    - b. Vertical Managers: Panduit PRV8 with PRD8 or Systimax 108527350 (6") (Shall be installed on ends of Racks)
    - c. Vertical Managers: Panduit PRV12 with PRD12 or Systimax 108527351 (10") (Shall be installed between each rack mounted side to side)
- H. All patch panels shall be Panduit or Systimax , designed to fit within standard 19" equipment racks. If modular patch panels are specified, the panels shall contain the quantity of RJ45 modular connectors per cable.
- I. All Data patch cords shall be Panduit or Systimax factory assembled patch cords. All patch cords shall meet the performance characteristics of the Horizontal cable being specified. The contractor shall provife patch calbes for all Data Work Area Outlets (WOA), and Cross Connects. The quantity of LAN patch cords shall be equal to the number of active data ports installed within the project plus 15%. The quantity of Workstation cords shall be equal to the number of active data ports installed plush 15%. Patch cord length shall be equal to the minimum factory produced length that will allow cross connection and interconnection to be accomplished by the owner without hindrance while allowing minimum bend radius and adequate strain relief to be maintained at all times. At least one Panduit or Systimax duplex fiber patch cord shall be provided in quantities sufficient to provide on (1) cord for each Cisco hub if shown in drawings.
- J. Cable Runway shall be sized per owners requirements minimum 12" wide. Cable runway shall be Black painted steel, and shall be sized to TIA/EIA 569 guidelines for fill capacity for the number of cables it shall be used for. All fittings, supports, connectors, and accessories shall be of the same manufacturer of the cable raceway. Contractor will supply ladder rack to attach across each rack and mounted to the Communications Room Backboard. All drops from the tray shall use CMW-KIT waterfalls.
  1. Accepted Cable Runways:
    - a. Chatsworth Products
    - b. B-Line
- K. J-Hooks shall be Panduit J-Pro J-hooks, or equal, with adequate support. J-hooks shall be configured to provide support for both voice and data cable within the plenum space. J-hooks shall be supported using commercially available components designed for the purpose of the existing building structure, and appropriate brackets for mounting application. J-Hooks shall not be supported from fixtures originally placed to support other equipment. Cabling contractor shall utilize the appropriate quantity of J-hooks and spaced as recommended by TIA/EIA industry standards, maximum spacing 5'-0" O.C. Panduit Tak-Ty type HLSP3S-X12, or equal, shall be used for each J-hook to support and manage cables. No more than 40 Cat. 6 cables per J-hook, and 50 Cat. 5E cables per J-hook shall be allowed. Use Velcro tie wraps, plastic or nylon straps not allowed.



- L. If any coax cable is needed, the contractor shall mount taps, connect cables, and secure cable and tap to appropriate TIA/EIA rated plywood backboard. Tap value shall be determined by contractor to provide a minimum signal level of +6dB at each WAO. The contractor shall place RG-6, 75 Ohms coax from tap location in the IDF to each TW outlet as specified in the drawings and specifications. Panduit type "F" connectors, or equal, shall be used for all TV WAO locations. Gilbert connectors or equal shall be used for all other terminations.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. All new equipment will be connected and left in first class operating condition for a complete and functional networking system.
- B. Installation of structural cabling system will be certified by Owner's personnel and/or Owner's Representative. This certification may include (but is not limited to):
  - 1. All network equipment.
  - 2. Visually checking all terminations.
  - 3. Testing cable connectors for compliance with all specifications.
  - 4. Using test equipment to certify any 10BASE-T connections.
- C. Proposed network shall be installed as per these specifications and the Owner or Owner Representative's interpretation of the current E.I.A./T-568 Standards for Category 5 and IEEE 801.3 10BASE-T as detailed under Wiring, this specification. These specifications shall include:
  - 1. EIA/TIA-570 May 31, 1991
  - 2. EIA/TIA-569 October 15, 1990
  - 3. EIA/TIA-588 July 9, 1991
  - 4. EIA/TIA TSB-36 November, 1991
  - 5. EIA/TIA TSB-40 August, 1992
- D. The installation shall incorporate the following minimum clearances between the networking cables and other systems.
 

1. Transformer	4'-0"
2. Fluorescent Light Fixture	2'-0"
3. Electrical Conduit or Cable	2'-0"
4. Minimum Bending Radius	2 2"
- E. All cable shall have both ends labeled. This will include all fiber, coax, UTP cables, work station patch cables and patch panel cables. A list will be provided listing all labels.
- F. All cable paths and wiring methodology documentation including label information must be provided.

- G. Cables shall be concealed from view and routed in an orderly manner. Pull cables through the bar joists or as high as possible. Cables that interfere with maintenance shall be re-routed as directed by the Engineer. Bundle cables together and strap with securely at five feet (5') increments. All data cabling shall be independently supported from structure.
- H. Use of Panduit TAK-TAPE TTS-20R0, or equal, in the MDF, IDF and computer room (data center) is required. No nylon cable ties shall be allowed. In all plenum applications, Panduit HLTP or HLTP Tak-Ty cable ties, or equal, shall be used.
- I. Do not exceed the minimum bend of 4 X Outside Diameter (OD) for 4 pair UTP, 10 x OD for multi pair (more that 4 pair) UTP, 1.18 in. for two fiber cable, and 10 x OD for multi fiber cable.
- J. Per TIA/EIA 568-B never un-twist the pairs of cable beyond the absolute minimum required for termination.
- K. The cable jacket on UTP shall only be stripped back the minimum required to terminate to connecting hardware.
- L. Cable management panels shall be used when terminating cable.
- M. Maximum cable lengths shall not be exceeded.
- N. All horizontal runs, moves, adds, and changes must be documented. Permanent Link tests results must be provided.
- O. Reinstalling cable that has been pulled out of modular furniture is not allowed.
- P. All penetrations through fire rated building structures (walls and floors) shall have a metal stuffing pipe that extends 12" beyond each side of the building structure and sealed with an appropriate firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly firestopped.

### 3.2 LABELING AND DOCUMENTATION

- A. All cables, faceplates, patch panels, 110 blocks, boxes and patch cords shall be labeled as to TIA/EIA-606-A standards and as designed to be used for the specific Product. All conduits and innerduct shall be labeled as well. Contractor shall specify the label manufacturer to be used and is subject to Owner approval prior to commencement of the work.
- B. All dedicated telecommunications grounding bus bars shall be labeled.
- C. Cross-connect fields shall be labeled according ANSI/TIA/EIA 606-A.
- D. Contractor shall supply final As-Built drawings to Owner prior to cutover. There drawings shall show details of each WAO, IDF locations and cable routings. All drawings are to be saved electronically in Autocad format.
- E. Test documentation shall be provided in a three-ring binder(s) and in CD-ROM format within three weeks after the completion of the project. The binder(s) shall be clearly marked on the outside front cover and spine with the words "Test Results", the project name, and the date of completion (month and year). The test equipment by name, manufacturer, model number and last calibration date will also be provided at the end of the document. The test document shall detail the test method used and the specific setting of the equipment during the test. All test documents are to be saved in electronic format utilizing MS Excel, MS Word, MS Access or AutCAD.dwg. Contractor shall supply two (2) copies of test documents and drawings to the customer upon completion of the project.

### 3.3 GROUNDING

- A. Grounding shall meet the requirements of the NEC and additionally grounding bonding shall conform to ANSI/TIA/EIA-607. The cabling contractor shall accomplish all telecommunications hardware grounding utilizing ground lugs, H-taps, and grounding kits as recommended for the equipment. (example: TRGKJ4120) All ground cable shall be Green in color. If electrical contractor does not provide Ground Bars and Plates, it is the responsibility of the awarded cabling contractor to meet the requirements of this document.

### 3.4 TESTING AND CERTIFICATION

- A. Testing shall be accomplished by utilizing approved hand held testers and test leads used to meet the latest revision of TIA/EIA 568-B.2.
- B. Testing of cabling shall be performed prior to system cut-over, 100 percent of the UTP horizontal and riser pairs shall be tested for opens, shorts, polarity reversals, transposition and presence of AC voltage. UTP voice, and data horizontal wiring pairs shall be tested Permanent Link as to TIA/EIA 568-B.2. All fiber shall be passing test results as required by TIA/EIA standards. Category 6 shall be tested for all data cables, and Category 5E shall be tested for all voice cables. For any reason the cables have a failure, contractor is to find and resolve problem immediately.
  - 1. High speed unshielded twisted pair (UTP) data cable shall be performance verified using an automated test set. This test set shall be capable of testing for the continuity and length parameters defined above, and provide results for the following tests:
    - a. Near End Cross-Talk (NEXT)
    - b. Power Sum Near End Cross-Talk (PSNEXT)
    - c. Attenuation
    - d. Ambient Noise
    - e. Attenuation to Cross-Talk Ratio (ACR)
    - f. Line Mapping
    - g. Cable Length
    - h. Return Loss
    - i. Equal Level Far-End Cross-Talk (ELFEXT)
    - j. Power Sum Equal Level Far-End Cross-Talk (PSELFEXT)
    - k. Propagation Delay
    - l. Delay Skew
  - 2. Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the TIA/EIA Standard, and the result shown as pass/fail. Test results shall be printed directly from the test unit or from a download file using an application from the test equipment manufacturer. The printed test results shall include all tests performed, the expected test result and the actual test result achieved.

- C. Workmanship: Components of the premise distribution system shall be installed in a neat, orderly manner consistent with the best telephone and data installation practices. Wiring color codes shall be strictly observed and termination shall be uniform throughout. TIA/EIA 568-B wiring codes as shown on the drawings shall standardize all twisted pair wiring.
- D. Warranty: A manufactures Warranty and System Assurance Warranty for this Structures Cabling System shall be provided. Upon successful completion of the installation and subsequent testing by the installer, Owner shall be provided with a Warranty certificate registering the installation by specified suppliers.

## 27 10 00 - STRUCTURED CABLING

### PART 1 - General

#### 1.1 SECTION INCLUDES

- A. Communications equipment room fittings
- B. Communications backbone cabling
- C. Communications horizontal cabling
- D. Communications faceplates and connectors
- E. Communications connecting cords, devices and adapters

#### 1.2 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

- A. All conduit and EMT required for Communications cabling pathway in/out of cross connect closets and in/out of wall cavities at the work area. EMT or Conduit for pathways shall have no more than two 90 degree bends and no continuous section over 100'.
- B. All core holes and poke through devices in the floor for the installation of Communications cabling.
- C. All core holes and EMT sleeves between floors for the routing of Communications cabling.
- D. Backboxes for the mounting of NEMA sized faceplates.
- E. Drag line or pull string at the backboxes fished through EMT or conduit to the other end for installing 4 pair and multi-pair cables.
- F. Minimum of 2 walls covered in 3/4" AC grade plywood painted white with fire retardant paint in each cross connect closet or connection point for data, voice, video, security and building automation systems. Plywood walls shall be covered 4' H x 8' W whenever possible.
- G. Basket tray or ladder racking to support main pathway cable bundles.

#### 1.3 RELATED SECTIONS

- A. Section 27 11 00 Communications Equipment Room Fittings
- B. Section 27 13 00 Communications Backbone Cabling

#### 1.4 REFERENCES

- A. ANSI/TIA/EIA 568-B.1 Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.
- B. ANSI/TIA/EIA 568-B.2, Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components
- C. ANSI/TIA/EIA 568-B.3 Commercial Building Telecommunications Cabling Standard, Part 3: Optical Fiber Cabling Components Standard
- D. ANSI/TIA/EIA 569-B Commercial Building Standards For Telecommunications Pathways And Spaces
- E. ANSI/TIA/EIA 606-A The Administration Standard For The Telecommunications Infrastructure Of Commercial Building
- F. ANSI/J-STD-607-A Commercial Building Grounding And Bonding Requirements For Telecommunications
- G. ANSI/TIA/EIA-606-A, Administration Standard for Commercial Telecommunications Infrastructure
- H. ANSI/TIA/EIA-862 Building Automation Systems Cabling Standard for Commercial Buildings
- I. ANSI/TIA-942 Telecommunications Infrastructure Standard for Data Centers
- J. ASTM D 4566-05, Standard Test Methods for Electrical Performance Properties of Insulations and Jackets for Telecommunications Wire and Cable, 2005
- K. BICSI Telecommunications Distribution Methods Manual (TDMM) 11th Edition

- L. BICSI Information Transport Installation Manual (ITSM) 5th Edition
- M. ISO/IEC 11801 – Information Technology – Generic Cabling for Customer Premise
- N. IEEE 802.3 Standard for Information technology -Telecommunications and information exchange between systems - Local and metropolitan area networks – Specific requirements Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications
- O. IEC 61156-1, Multicore and Symmetrical Pair/Quad Cables for Digital Communications – Part 1: Generic Specification, 2005
- P. NFPA-70 National Electrical Code 2008 edition
- Q. NECA/BICSI-568-A Standard for Installing Commercial Building Telecommunications Cabling
- R. Federal Communications Commission Part 15 and Part 68
- S. UL 444 – Standard for Safety of Communications Cable
- T. UL 1666 – Standard for Safety of Flame Propagation Height
- U. NFPA 262 – Flame Travel and Smoke of Wires and Cables
- V. Local Authority Having Jurisdiction

#### 1.5 DEFINITIONS

- A. ANSI – American Northern Standards Institute
- B. AWG – American Wire Gauge
- C. BICSI – Building Industry Consulting Service International
- D. EIA – Electronics Industry Alliance
- E. ETL – Intertek Semko Labs
- F. FCC – Federal Communications Commission
- G. IEC – International Electrotechnical Commission
- H. IEEE – Institute of Electrical and Electronic Engineers
- I. IDC – Insulation displacement contact
- J. ISO – International Standards Organization
- K. J-STD – Joint Standard
- L. NECA – National Electrical Contractors Association
- M. NFPA – National Fire Protection Agency
- N. SC – Subscriber Channel
- O. TIA – Telecommunications Industry Association
- P. UL – Underwriters Laboratory
- Q. 1GBase-T – networking protocol capable of transmitting 1 billion bits of information per second over copper twisted pair  
10GBase-SX – networking protocol capable of transmitting 10 billion bits of information per second over optical fiber at 850 nanometers

#### 1.6 SYSTEMS DESCRIPTION

- A. Horizontal copper cabling system consists of Category 6 cables with four unshielded twisted pairs of solid annealed copper wrapped in plenum rated insulation with an overall plenum rated jacket with a wire thickness of 23 AWG. Each four pair cable is terminated onto 8 position 8 conductor Category 6 connectors using 110 style IDCs. Connectors are placed into NEMA sized faceplates at the work area and placed into rack mounted patching panels in the equipment / networking rooms.
- B. Backbone copper cabling system consists of Category 6 cables with multiple pairs of unshielded twisted pairs of solid annealed copper wrapped in plenum rated insulation with an overall plenum jacket in bundles of 25, 50, 100 or 300 pairs with a wire thickness of 24 AWG.. All conductors are terminated onto 110 style blocks with C5 IDC clips and are placed only in equipment / network rooms.
- C. Backbone optical fiber cabling system consists of 50 micron single mode Yellow plenum jacket. All strands are terminated using a single mode connector specifications and placed into rack mounted metal panels with plates

containing adapter sleeves to couple the connectors together for a physical contact. Panels are placed only in the equipment / network rooms.

D. Cabling colors:

1. Cat 6 Data cables (from patch panel to room - classroom or office - ports & patch to access switch) = Blue
2. Cat 6 (?) VoIP cables (from patch panel to room - classroom or office ports & patch to access switch) = Green

E. Cat 6 Security cameras, other networked security devices (from patch panel to room - classroom or office - ports & patch panel to access switch) = Red

F. Cat 6 Network infrastructure (from patch panel to wireless access points & patch panel to access switch) = Yellow \*this matches the single mode fiber jacket color

G. Management cabling for remote access, HAVC units, other non client data needs = White

1.7 SUBMITTALS

A. See section 01 33 00 – Administrative Requirements, for submittal procedures.

B. See Section 27 11 00 for submittal requirements.

C. See Section 27 13 00 for submittal requirements.

1.8 QUALITY ASSURANCE

A. Qualifications

1. Install all components as directed by Manufacturer's installation guidelines.
2. All products shall bear the mark of UL or ETL for performance level.
3. System installation shall meet all applicable Local/State codes and safety requirements where project is located.
4. All products shall be new and un-used in original packaging.

B. Manufacturer Qualifications

1. Manufacturer shall be a telecommunications product manufacturer with at least 25 years experience.
2. Manufacturer shall be ISO 9001 certified manufacturer and shall employ Six Sigma methodology in its manufacturing process.

C. Bidder Qualifications

1. Bidding Contractor shall be a licensed to install telecommunications systems in the state where work will be performed.
2. Bidding Contractor shall have a minimum of 5 years experience installing structured cabling for telecommunications.

3. Bidding Contractor shall have the capability to bond project in its entirety.
4. Bidding Contractor shall be able to provide insurance at the request of the owner.

D. Installer Qualifications

1. Installer shall have an on site supervisor and one technician who are certified by the Manufacturer to install the Manufacturer's telecommunications products.
2. Communications Contractor shall have an RCDD on staff to certify that the Communications System can support the required applications on the various cabling media.
3. Communications Contractor shall have obtained training from the Manufacturer within 1 year prior to performing the Work.

E. Testing Agency Qualifications

1. Independent testing agencies shall be nationally recognized as having the expertise to independently verify copper and optical fiber cabling systems and components for performance.

1.9 DELIVERY, STORAGE, AND PROTECTION

- A. Communications Contractor shall ensure that materials delivery to work area shall be coordinated with construction site manager responsible for materials distribution to all trades.
- B. Communications Contractor is responsible for all materials, tools and vehicles left on the job site.
- C. Communications Contractor shall coordinate a disposal bin for the removal of all trash produced by the Communications Contractor personnel during the project.
- D. Communications Contractor shall ensure materials are stored in an environmental area where:
  1. Temperature does not exceed 120 degrees Fahrenheit nor below 32 degrees Fahrenheit.
  2. Humidity does not exceed 80 %.
  3. No direct exposure to sunlight.
- E. Follow Manufacturer's recommendations for handling of materials.

1.10 PROJECT CONDITIONS

A. Environmental Requirements

1. Communications Contractor shall ensure that any pollutants produced during the Work is disposed off according to local, state or national regulations. Follow the most stringent guidelines.
2. It is preferred that the Communications Contractor recycle any used or un-used components during the course of the construction project.
3. Coordinate with LEED project manager if cabling system or components will used for points in a LEED certified project.



B. Existing conditions

1. See Section 01 51 33 for Temporary Telecommunications requirements.

C. Field Measurements

1. Communications Contractor shall coordinate with electrical engineer on project that the main electrical service ground has a resistance to earth of less than 5 ohms.
2. Communications Contractor shall ensure that all grounding busbars for all equipment /network rooms shall have a resistance of less than 1 ohm back to the main electrical service ground.
3. Communications Contractor shall ensure that all field testers have been calibrated from the Manufacturer within 1 year.

1.11 SEQUENCING

- A. Communications Contractor shall coordinate with Owner's project manager on sequencing of various trades and construction teams for the lifecycle of the project.

1.12 SCHEDULING

- A. Communications Contractor shall provide a detailed construction schedule with hard dates for completion of roughing in cables, terminations and testing once scheduling sequence has been determined to the Owner's Project Manager.
- B. Cabling schedule shall be in a software program designated by the Owner's Project Manager.

1.13 WARRANTY

- A. Communications Contractor shall provide a 1 year parts and labor warranty against defective workmanship and/or system component failure.
- B. Communications Contractor shall execute a Lifetime Applications Assurance Warranty for parts and labor to support stated applications from the connectivity Manufacturer.

1.14 IDENTIFICATION

- A. In addition to other labeling requirements specified, label all patch panel and room ports per Owner's established protocol using a printed peel & stick label.
- B. Provide IDF zone maps with cabling routes printed in color at large scale & placed in each IDF closet for referencing needs. In addition provide a combined document of the routing, in color, for building referencing needs. Provide both in digital (PDF & Visio) and paper format.

1.15 SPECIFIC OWNER REQUIREMENTS

- A. Provide 4 port faceplates entirely.
- B. Generally, any single workstation location will have 2 data ports (blue) and 1 VoIP port (green) faceplate, with the 4th port closed or blocked for future use.

- C. In the classroom where the student computers are to be located provide a 2 port faceplate for data (blue). The teacher station requires 2 blue for data (phone is on wall not desk). The faceplate for the classroom wall mounted phone to be a green port and cable. The smart board to have a wide variety of audio and video outputs; as such the ports they use in general are: (1) VGA, multiple USB, the usual component video options. Locate power outlet very nearby but not behind the board.
- D. In the concession stand locations for the field house it makes more sense to have a data port (blue) per Point of Sale device plus phone port (green) per every 2 Point of Sale ports. The press boxes should have a data port for every phone port; which my guess is two pair per press box.
- E. In the common areas in the main building if there is to be seating for students I'd like that the power outlets have at least one USB port for charging devices. I would also think that a phone will be in those areas as well.
- F. For mobile point of sale machines provide data ports in the floor under a locking sealed plate. In the kitchen areas any data or VoIP ports to be angled or recessed type & water proof.
- G. In the computer lab 4 port face plates to be spaced so that all computers are within reach of a 7' patch cable.
- H. The Technology Workroom to have 2 port face plates for data (blue) along the wall with the cabinets. The benches in the middle of the room to have 4port faceplates in ceiling for data drops to the benches (1-4 port faceplate per bench pair).

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. The copper cabling system and optical fiber cabling system design uses Leviton connectors and SuperiorEssex cables.

### 2.2 SYSTEM PERFORMANCE

- A. Horizontal four pair Category 6 copper cabling system shall be capable of supporting 1GBase-T applications for a total distance of 100 meters with equipment cords.
- B. Backbone multipair Category 6 copper cabling system shall be capable of supporting analog and digital voice grade applications that operate at or below 16 Megahertz for a total distance of 800 meters with equipment cords.

### 2.3 SOURCE QUALITY CONTROL

- A. Materials shall be purchased from Distributors authorized by system Manufacturers to sell new and unused components.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Follow and adhere to installation practices specified by the applicable Telecommunications Industry Association standards.
- B. Follow and adhere to installation practices specified by BICSI Information Transport System Installation Manual 5th Edition.
- C. Follow and adhere to installation practices specified by BICSI Telecommunications Distribution Methods Manual 11th Edition.

- D. Follow and adhere to installation practices specified by NFPA-70 National Electric Code, Edition 2008.
- E. Follow and adhere to installation practices specified by the Manufacturers.

### 3.2 FIELD QUALITY CONTROL

- A. Contractor shall make available all ceiling and termination work for inspection by Manufacturer's representative or owner's representative.
- B. Contractor shall replace all defective components.

### 3.3 ADJUSTING

- A. No additional work outside of the contract scope of work shall be completed without the approval of the Owner or Owner's representative.

### 3.4 CLEANING

- A. Communications Contractor shall wipe down all equipment racks, cabinets and panels prior to turnover to the Owner.
- B. Communications Contractor shall sweep and mop the floors of all equipment rooms or connection point closets prior to turnover to the Owner.

### 3.5 PROTECTION

- A. It is the responsibility of the Communications Contractor to ensure equipment is protected from dust and water during the project with appropriate materials.
- B. Remove all protective covers and protective materials from equipment prior to turnover to Owner.

### 3.6 SCHEDULES

- A. Coordinate communications work with Owner's project manager and follow scheduling sequence as established by Owner's project manager.
- B. It is recommended that the Communications Contractor schedule closely with any systems furniture contractor to ensure turnover date is met.

## 27 11 00 - COMMUNICATIONS EQUIPMENT ROOM FITTINGS

### PART 1 - General

#### 1.1 SECTION INCLUDES

- A. Communications cabinets, racks, frames and enclosures
- B. Communications termination blocks and patch panels
- C. Communications cable management and ladder rack
- D. Communications rack mounted power protection and power strips

#### 1.2 RELATED SECTIONS

- A. Section 27 10 00 Structured Cabling
- B. Section 27 13 00 Communications Backbone Cabling

#### 1.3 REFERENCES

- A. ANSI/TIA/EIA-568-B.2 – Addendum 4-2002, Commercial Building Telecommunications Cabling Standard, Part 2: Solderless Connection Reliability Requirements for Copper Connecting Hardware
- B. ANSI/TIA/EIA-568-B.2 – Addendum 7-Pending, Commercial Building Telecommunications Cabling Standard, Part 2: Reliability Specifications for Copper Connecting Hardware
- C. EIA-310-D Cabinets, racks, panels and associated equipment
- D. UL-94V Tests for flammability of plastic materials for parts in devices and appliances
- E. UL-1863 Communications circuit accessories

#### 1.4 DEFINITIONS

- A. ANSI – American Northern Standards Institute
- B. EIA – Electronics Industry Alliance
- C. UL – Underwriters Laboratory

#### 1.5 SYSTEMS DESCRIPTION

- A. Racks are used for the mounting and housing of passive and active networking equipment. All racks utilize threaded screws to mount 19" spaced equipment.
- B. Termination blocks and patch panels are used for the termination of unshielded twisted pair cabling and optical fiber cabling.
- C. Termination blocks and patch panels are used for patching and cross connecting network edge devices to communicate with network switching equipment.
- D. Ladder racking within the communications room is used as a pathway for communications cable to route from the wall area over to the racks and cabinets.

- E. Cable management products are used within the racks along with wall termination blocks to route communication cables to their termination / patching points while maintaining required bend radius requirements.
- F. Rack mounted power protection for surge suppression, transient voltage suppression and current draw metering are necessary to protect sensitive networking equipment from damage while allowing for a centralized location for equipment power.

#### 1.6 SUBMITTALS

- A. With bid
  - 1. Product Data: Provide component descriptions and describe electrical characteristics of components.
- B. Prior to installation
  - 1. Submit a sample of one 48 port patch panel, one 2 RMU five ring wire manager and one 100 pair termination block with one C5 clip.
  - 2. Show overhead view and front view of racks and cabinets with equipment along with ladder racking within equipment rooms on proposed As-Built drawing in CAD prior to starting the Work for approval by Owner.
- C. Prior to final acceptance
  - 1. Provide a soft CAD copy As-Built of the equipment rooms showing layout of racks, cabinets, ladder racking and all mounted equipment upon Substantial Completion.
  - 2. Ensure all warranties specify that the Owner is entitled to all rights guaranteed by the warranty for various components.

#### 1.7 MAINTENANCE

- A. Extra Materials – provide to Owner at completion of project

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. All racks and ladder racking shall be manufactured by B-Line or Chatsworth.
- B. All termination blocks, patch panels, horizontal wire management and rack mounted power strips with power protection shall be manufactured by Leviton.
- C. Substitution of system components with other Manufacturers shall follow substitution procedures in Section 01 33 00.

#### 2.2 EQUIPMENT PERFORMANCE

- A. Component Requirements
  - 1. Racks
    - a. Free standing equipment rack shall be Chatsworth #55053-703 or B-Line #SB556084XUAL.
    - b. Free standing equipment racks used for the mounting and housing of passive and active networking equipment shall be made of strong and lightweight aluminum powder coated black.
    - c. Free standing racks shall be 84" in height, 20" in width and 15" in depth.

- d. Free standing racks shall accommodate equipment space totaling 45 rack mount units.
  - e. Free standing racks shall be sized to accept 19" spaced equipment and handle a total weight load of 1,000 pounds.
  - f. Free standing racks shall have 3" side rails tapped on both sides with universal hole patterns for threaded 12-24 screws.
  - g. Free standing racks to include racks that are enclosed and lockable.
2. Termination blocks
  - a. Termination blocks shall be Leviton 300 pair block #41MB2-3F5 for Category 6 multipair cables.
  - b. Additional 300 pairs blocks shall be Leviton #41MB2-EXT for increasing pair count of Category 6 multipair cables.
  - c. Vertical wire management shall be Leviton #41880-300.
  - d. Vertical wire management shall be used between fields of various 300 pair blocks to facilitate cross connect wire.
  - e. Termination blocks shall have a mouting frame kit with cable tray, C4/5 connectors, 100 pair bases, horizontal cord managers, label strip holders and white label strips.
3. Copper Patch panels
  - a. Patch panel shall be equal to Leviton #69586-U48 Category 6 universal configured 110 panel with cable management bar.
  - b. Patch panel shall have 48 ports in a height of 3.5" taking up 2 rack mount units.
  - c. Patch panels shall be 16 gauge steel painted black finish with white silk screen labeling and supplied with a rear cable management bar.
  - d. Patch panel may not be of the type that requires termination directly into the back of the patch panel, but the type that is open so the contractor can terminate with QuickPorts.
4. Optical fiber patch panel / enclosure
  - a. Optical fiber enclosure shall be Leviton part # 5P330-0HB
  - b. Fiber enclosures shall be constructed of 18 gauge steel powdered coated black.
  - c. Fiber enclosures shall be able to accept 3 splice trays.
  - d. All grommets used for entry and exit point of fiber cables from enclosures shall be self healing and be constructed of Ensolute.
5. Horizontal cable management
  - a. Horizontal cable manager shall be Leviton part #49253-BCM.
  - b. Horizontal cable manager shall have 5 smooth polished distribution rings with a total depth of 4.5" taking up 2 rack units.
  - c. Horizontal cable manager shall be constructed from 16 gauge steel powder coated black.

6. Vertical cable management
  - a. Vertical cable manager shall be Leviton part #4980L-VFR.
  - b. Vertical cable manager shall be slotted duct with 5" wide x 4" deep front and 4" wide x 4" deep rear management.
  - c. Vertical cable manager shall have hinges for covers and mounting brackets for mounting onto racks.
7. Ladder racking
  - a. Ladder racking shall be Chatsworth #10250-718 or B-Line #SB-17-18-P24.
  - b. Ladder racking shall be aluminum and 18" wide powder coated black.
8. Power protection power strips
  - a. Rack mounted power distribution unit (PDU) shall be Leviton #P1022-12L.
  - b. PDU shall have overload protection and easy to reset circuit breaker.
  - c. PDU shall be constructed from 18 AWG steel.
  - d. PDU shall have light emitting diodes to indicate "Power On" and "Ground/Polarity OK" feature.
  - e. PDU shall be rated for 20 Amps and have a 12' L5-20P plug and ten 5-20R receptacles.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Free standing racks
  1. Assemble free standing racks according to manufacturer's instructions. Verify that equipment mounting rails are sized properly for rack-mount equipment before attaching the rack to the floor.
  2. All racks must be attached to the floor in four places using appropriate floor mounting anchors. When placed over a raised floor, threaded rods should pass through the raised floor tile and be secured in the structural floor below.
  3. Racks shall be grounded to the telecommunications busbar using #6 AWG green insulated solid copper wire and any necessary attachment hardware provided by the Communications Contractor.
  4. The equipment load should be evenly distributed and uniform on the rack. Place large and heavy equipment towards the bottom of the rack. Secure all equipment to the rack with equipment mounting screws.
  5. Mount rack mount power strips within 6' of where active equipment will be placed.
- B. Ladder racking
  - a. Ladder rack may be attached to the top of the rack to deliver cables to the rack. The rack should not be drilled to attach ladder rack. Use appropriate hardware from the ladder rack manufacturer.
  - b. Ladder racking shall be supported every 5' with 3/8" threaded rod anchored and secured to permanent ceiling structure.

- c. Loading of cable rack shall not exceed 6" depth and should have retainers every 12" to prevent cables from spilling over the sides.
  - d. Where ladder racking butts up against wall the appropriately sized wall mount bracket shall be utilized.
  - e. Ladder racking shall utilize all appropriate radius drop stringers corner bends and other devices to maintain cable bend radius when entering and exiting racks and cabinets.
  - f. Mating pieces of ladder racking together shall utilize appropriate butt splice and junction splice kits.
  - g. All cut and exposed sharp ends shall utilize a plastic end cap to prevent injury.
2. Cable management
  - a. Vertical cable manager shall be installed on every rack vertical rail. Where two rack rails will be butted together there shall be two vertical wire managers between the racks.
  - b. Horizontal wire managers shall be utilized above and below every copper and fiber patch panel.
  - c. All cables shall sweep in and out of any cable management product without a deformation of cable jacket.
  - d. Ensure cables are properly supported when using cable management to ensure cables do not sag.
  - e. Utilize Velcro for securing of cables on cable management.
3. Termination Blocks
  - a. Mount securely to wood-based backboard at a height of 4' A.F.F. from the cable tray.
  - b. Route cable bundles through the back of the mounting frame; secure with Velcro, without over-stressing the cables.
  - c. Position vertical cord managers adjacent to wall mounting frame units with a 2" separation between block frames.
  - d. When cross connecting wire utilize wire cord managers horizontally and vertically.
  - e. Label all pairs using included designation strips.
4. Copper and Fiber patching panels
  - a. Mount patch panels using supplied screws and ensure panels are at a straight 180 degree orientation.
  - b. Ensure panels have horizontal wire management above and below the panels.
  - c. Machine label all termination ports on panels with copper cable number or optical fiber strand number.
  - d. Route all cables to backside of termination panels in an asymmetrical orientation to ensure cable bundles are split evenly.
  - e. Utilize rear wire management bars for supporting cables into point of termination.
  - f. Secure all cables on all panels using Velcro to prevent cables from pulling away.



- g. Utilize adapter plates inside enclosures with plastic plungers for quick and tool less mounting inside fiber enclosure.
- h. Utilize removable front and rear doors on fiber optic enclosures to route cables in and out of panel.

## 27 13 00- COMMUNICATIONS BACKBONE CABLING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Communications system requirements for backbone optical fiber cabling
- B. Communications system requirements for backbone twisted pair copper cabling
- C. Category 6 multi-pair cable
- D. Optical fiber cable

#### 1.2 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. See section 1.09.1

#### 1.3 RELATED SECTIONS

- A. Section 27 10 00 Structured Cabling
- B. Section 27 11 00 Communications Equipment Room Fittings

#### 1.4 REFERENCES

- A. ANSI/ICEA S-90-661, Category 6, 5, & 5e Individually Unshielded Twisted Pair Indoor Cables (With or Without an Overall Shield) for use in General Purpose and LAN Communications Wiring Systems
- B. ANSI/ICEA S-103-701-2005, Standard for Riser Cables
- C. ANSI/TIA/EIA-568-B.1 – Addendum 4-2003, Commercial Building Telecommunications Cabling Standard, Part 1: Recognition of Category 6 and 850 nm Laser-Optimized 50/125 µm Multimode Optical Fiber Cabling
- D. ANSI/TIA/EIA-568-B.3 – Addendum 1: Additional transmission performance specifications for 50/125 optical fiber cables.
- E. ANSI/TIA/EIA-604, Fiber Optic Connector Intermateability Standards
- F. ANSI/TIA/EIA-604-3-B-2004, FOCIS 3 Fiber Optic Connector Intermateability Standard, Type SC and SC APC
- G. TIA-455-220-A, FOTP-220 Differential Mode Delay Measurement of Multimode Fiber in the Time Domain
- H. TIA 492-AAAC, Detail Specification for 850 Nanometer Laser-Optimized, 50 micron Core Diameter / 125 Micron Cladding Diameter Class IA Graded-Index Multimode Optical Fibers
- I. TIA/EIA TSB140, Additional guidelines for field testing length, loss and polarity of Optical Fiber Cabling Systems
- J. ANSI/TIA-598-C-2005, Optical Fiber Cable Color Coding
- K. ANSI Z136.2, ANS For Safe Use Of Optical Fiber Communication Systems Utilizing Laser Diode And LED Sources
- L. ICEA S-83-596-2001, Fiber Optic Premises Distribution Cable
- M. TIA-526-14-A-2003, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
- N. TIA/EIA TSB140, Additional guidelines for field testing length, loss and polarity of Optical Fiber Cabling Systems

## 1.5 DEFINITIONS

- A. CAD – Computer Assisted Design
- B. Decibel – unit of measurement that expresses the magnitude of power relative to a specified reference level
- C. ICEA – Insulated Cable Engineers Association
- D. IL – Insertion Loss is a decrease in transmitted power
- E. MHz – Megahertz
- F. Micron (um) – unit of measure for width which is one millionth of a meter
- G. Multi-mode – optical fiber designed to carry multiple carrier signals distinguished by frequency or phase at the same time
- H. Nanometer (nm) – unit of measure for light wavelength which is one billionth of a meter
- I. Ohm – Measure of electrical resistance or impedance
- J. OLTS – Optical Loss Test Set
- K. OTDR – Optical Time Domain Reflectometer
- L. RL – Return Loss is the ratio, expressed in decibels, of the power of the outgoing signal to the power of the signal reflected back
- M. Tier 1 – testing of power loss through an optical fiber expressed as decibels
- N. Tier 2 – testing using a backscatter method to capture characteristics of an optical fiber link
- O. TSB – Telecommunications Supplemental Bulletin

## 1.6 SYSTEM DESCRIPTION

- A. Optical fiber cable and copper backbone components are expected to provide more than 25 years of continuous operation.
- B. Optical fiber cable and copper backbone cables are part of the NextLAN solution from Leviton and SuperiorEssex.
  - 1. Optical Fiber
    - a. Optical fiber cable provides for the transport of high bandwidth and high speed networking communications between equipment closets or connection points using short wavelengths of light.
    - b. Optical fiber cable is protected within a plastic plenum rated innerduct or interlocking armor for protection and security.
    - c. Optical fiber cable is terminated using fast cure epoxy Subscriber Channel (SC) duplex connectors as the system interface to network equipment.
  - 2. Copper Backbone
    - a. Cabling system is a 100 ohm Category 6 system.
    - b. Cabling system is capable of supporting analog or digital voice applications.

- c. Cabling system is an open panel system utilizing a 110 style wiring base (block) with IDC 5 pair clips mounted onto the base.
- d. Cable system blocks allow for the cross connect of 26-22 AWG solid copper wires using a 110 impact tool.

## 1.7 SUBMITTALS

### A. With bid

- 1. Product Data: Provide component descriptions and describe electrical, mechanical and optical characteristics of components.

### B. Prior to installation

- 1. Submit 10' section of proposed optical cable to be installed along with 2 terminated SC connectors on ends along with an SC duplex adapter plate and coupler to be installed. Show cable wraps with proposed labeling convention on fiber cable.
- 2. Submit 5' section of proposed backbone cable to be installed along with a 300 pair wiring base with legs and one C5 clip. Show cable wraps with proposed labeling convention on copper cable.
- 3. Show pathway, footages and labeling sequence of all cables on As-Built drawing in CAD prior to starting the Work for approval by Owner.
- 4. Provide a hard copy and soft copy of proposed test results to be submitted in the tester's native format.
- 5. Provide the most current UL or ETL test results showing Category 6 compliance for the proposed cabling system.

### C. Prior to final acceptance

- 1. Provide a 3' by 3' hard copy and soft CAD copy As-Built of the floor plan showing pathway, footages and labeling sequence of all optical fiber cables, copper cables, copper pairs and fiber strands upon Substantial Completion.
- 2. Provide 1 copy of printed and 1 soft copy of all Tier 1 test results in its native format using an OLTS.
- 3. Provide an affidavit by an Executor of the Communications Contractor that all backbone copper pairs have been verified for continuity using a hand held tester.
- 4. Provide a warranty statement from the connectivity Manufacturer for applications assurance and that the Owner is entitled to all rights guaranteed by the warranty.

## 1.8 WARRANTY

- A. Communications Contractor shall provide a 1 year parts and labor warranty against defective workmanship and/or system component failure.
- B. Communications Contractor shall execute a Lifetime Applications Assurance Warranty for analog / digital voice applications up to 800 meters for parts and labor from the connectivity Manufacturer.

## 1.9 MAINTENANCE

- A. Extra Materials – provide to Owner at completion of project

## PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. SuperiorEssex Laser Optimized optical fiber cable.
- B. SuperiorEssex multi-pair Category 6 cable.
- C. Substitution of system components with other Manufacturers shall follow substitution procedures in Section 01 33 00.

2.2 PERFORMANCE

A. Attributes – Optical Fiber

- 1. Optical cable is a multi-mode 62.5 micron optical fiber system.
- 2. Optical cable is capable of supporting baseband signaling for high bandwidth voice, data or video applications using 850 nm or 1300 nm LEDs or VCSELs.
- 3. Optical fiber cable is used as part of a cabling system in a panel to panel system utilizing duplex Subscriber Channel (SC) epoxy connectors coupled through a ceramic sleeve plastic housing as the interface.
- 4. Optical fiber cable shall provide for the continuous operation of transporting short wavelength light without introducing bit errors onto the transport system.
- 5. Optical fiber cable shall be a tight buffered distribution fiber with pull strength members with an Aqua color.
- 6. Optical fiber cable shall have a nominal outer diameter of .52" for with a completely round dimension for distribution cable.
- 7. Optical fiber cable shall have a nominal outer diameter of .58" for with a completely round dimension for interlocking armored cable.

B. Attributes – Copper backbone

- 1. Category 6 cables shall have an Impedance value of 100 ohms and be available in groups of 100, 200 and 300 pairs.
- 2. All multi-pair Category 6 cables shall utilize band marked insulated conductors.
- 3. All multi-pair Category 6 cables shall be grouped in 25 pairs using color coded sub-units.
- 4. Copper cable shall have a nominal outer diameter of .82 " for 100 pair, 1.15" for 200 pair and 1.39" for 300 pair with a completely round dimension.
- 5. Copper cable shall have a rip cord applied longitudinally along jacket.
- 6. Copper cable shall have sequential marking of footage.
- 7. Multi-pair cables are terminated onto a 110 open panel system with C5 clips to allow for the cross connect of 22-26 AWG wire to voice equipment.

C. Requirements – Optical fiber

- 1. Optical fiber cable shall be SuperiorEssex part # 440126G01 62.5/125 MM 12 count Multimode fiber
- 2. Optical fiber cable shall have 12 strands using industry standard color coding.
- 3. Optical fiber cable shall have 900 um jacketing of the individual strands.

4. Optical fiber cable shall have a flame retardant and low smoke FEP jacket.
  5. Optical fiber cable shall be protected inside plenum rated plastic duct or interlocking armor.
  6. Optical fiber SC connectors shall be rated for indoor and outdoor use.
- D. Requirements – Copper backbone
1. Copper cable shall be SuperiorEssex 100 pair part #18-799-36
  2. Copper cable conductors shall be constructed of 24 AWG solid annealed bare high quality copper inside insulation comprising of Fluorinated Ethylene Propylene (FEP).
  3. Multi-pair cables shall contain 100, 200, 400 or 600 conductors and twisted into multiple 25 pair configurations and unitized using standard color coded configuration.
  4. Copper cabling system shall be guaranteed to support digital and analog voice applications from .01 MHz up to 16 MHz.
  5. Backbone copper cabling system shall be capable of supporting digital or analog voice applications for a total distance of 800 meters with equipment cords for the life of the system.
  6. Cable system shall be guaranteed to not introduce crosstalk for voice applications during the Life of the system.
- E. Criteria – Optical Fiber System
1. Optical fiber cable shall be capable of exhibiting the following minimum optical characteristics:
    - a. Maximum attenuation of 3.5 dB per kilometer at 850 nm.
    - b. Maximum attenuation of 1.25 dB per kilometer at 1300 nm.
    - c. Optical cable shall have an effective laser launched modal bandwidth of 2, 000 MHz at 850 nm and 500 MHz at 1300 nm.
    - d. Optical fiber cable shall have an Overfilled Launch Bandwidth of 1, 500 MHz/Km.
  2. Optical fiber multimode SC epoxy connectors used in an optical cabling system shall be capable of exhibiting the following minimum mechanical characteristics when tested using the TIA-604 (FOCIS) and TIA-455 (FOTP) set of standards:
    - a. Insertion Loss of less than .2 dB
    - b. Back reflection better than -25 dB
    - c. Connector repeatability of less than .01 dB
    - d. Operating temperature of -40 degrees centigrade up to 85 degrees centigrade
    - e. Temperature cycling (loss variation) for Insertion Loss less than .1 dB
    - f. Temperature cycling (loss variation) for Return Loss less than 5 dB
    - g. Vibration (loss variation) for Insertion Loss of less than .1 dB
    - h. Vibration (loss variation) for Return Loss of less than 5 dB

- i. Cable retention greater than 15 foot pounds.
- F. Criteria – Copper cable system
  - 1. Copper backbone cable shall be capable of exhibiting the below minimum electrical characteristics when tested as a first level, second level or 2 level Channel, using a Time Domain Reflectometer (TDR) with a Level III or Level IV rating, at the frequency of 16 Megahertz (MHz):
    - a. Insertion Loss (IL) / 13.1 dB
    - b. Near End Crosstalk (NEXT) / 23 dB
    - c. Return Loss (RL) / 10 dB
- G. Tests
  - 1. Testing shall be performed using a Tier 1 tester such as an OLTS at the wavelength of 850 nm and 1300 nm.
  - 2. Test results shall be bi-directional showing a power loss not greater than 2.0 dB as part of a cabling system.
  - 3. One hard copy of all test results shall also be provided to the Owner upon substantial completion.
  - 4. All testers used shall be calibrated by the Factory within 1 year to ensure accuracy.
  - 5. Tier 2 testing using an OTDR is required if the Contractor splices any optical fiber strands.
  - 6. Test results for all Category 6 backbone copper multi-pair cables shall be provided as an excel spreadsheet, hard copy and soft copy, for each pair stating a "Pass" or "Fail" for continuity by the Communications Contractor.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify that pathways and spaces will allow fiber backbone cables and copper backbone cables to be installed according to manufacturer's recommendations.
- B. Verify that minimum bend radius of 10X the cables outside diameter can be achieved in pathways and spaces.
- C. Verify that cables can be properly supported by cable tray or hooks in ceiling.
- D. Compare to Contract Drawings and provide written notification if site conditions deviate from drawings.

#### 3.2 INSTALLATION

- A. Install all components in a neat and workmanlike manner.
- B. Cabling shall utilize a star topology with no more than 2 levels of backbone.
- C. Optical fiber cable length shall not exceed 300 meters.
- D. Copper backbone cable length shall not exceed 500 meters for the 1st level and 300 meters for the 2nd level for a total not to exceed distance of 800 meters.
- E. Install all copper and fiber backbone cables in accordance with manufacturer's recommendations.

- F. All optical fiber cables shall be installed in appropriately rated plastic tubing (innerduct) or interlocking armor for protection.
- G. All backbone communications cables shall be installed in pathways and spaces designated for communications cables.
- H. Ensure pulling tension of copper cables do not exceed a pull load of 25 foot pounds.
- I. Ensure pulling tension of optical fiber cables do not exceed a pull load of 50 foot pounds.
- J. No splices are permitted in any copper cable.
- K. Splices used for optical fiber cables shall not exceed .3 dB.
- L. Optical fiber cables and multipair copper cables shall support a bend radius of 10 times the cable outside diameter when not subject to tensile load, and 15 times the cable outside diameter when subject to tensile loading up to the cable's rated limit.
- M. Contractor shall provide in a quick and timely fashion any additional materials or labor that may be damaged during the work at no charge to the owner.
- N. Pull one additional "Mule Tape" or ¼" Nylon rope when pulling cables through any conduit.
- O. Properly support backbone cables in ceiling every 4'-5' using J-Hooks or cable tray.
- P. Provide 20' of service loop at both equipment closet ends.
- Q. Terminate cables so as not to pull tight on terminating equipment.
- R. Ensure that all splice closures for optical fibers are properly sealed for protection of the cable and splices.
- S. Neatly and permanently label all backbone cables with the cable number at both ends and at all splice locations.
- T. Terminate all pairs, conductors and strands at all ends according to manufacturer's instructions following color code sequence.
- U. Utilize Velcro in all closets.
- V. Label all fiber pairs using the 568SC method.
- W. Firestop all sleeves and conduit opening after the cable installation is complete.
- X. All optical fiber cable shall be installed in the fiber panels in accordance with the manufacturer's instructions.
- Y. Field test instruments for multimode fiber cabling shall meet the requirements of TIA 526 14 A.
- Z. Test with an Optical Loss Test Set (OLTS) with a calibration sticker that is within 1 year of calibration date.
- AA. The light source shall meet the launch requirements of ANSI/TIA 455 78 B, TIA-568B.3 and TIA TSB140. This launch condition can be achieved either within the field test equipment or by use of an external mandrel wrap with a Category 1 light source.
- BB. When using a mandrel wrap, the reference jumper should be wrapped in five non overlapping turns around a smooth round mandrel (rod) during the reference calibration of the source to the detector and for all loss measurements in accordance with TIA-568B.3 and TIA TSB140
- CC. Link attenuation testing shall use the One Reference Jumper Method specified by TIA 526 14 A, Method B, TIA 526 7, Method A.1, TIA-568B.3 and TIA TSB140.



- DD. Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices.
- EE. The backbone optical fiber cabling link segment shall be tested in both directions at both operating wavelengths of 850 nanometers and 1300 nanometers to account for attenuation deltas associated with wavelength.
- FF. Because backbone length and the potential number of splices vary depending upon site conditions, the link attenuation equation (1) should be used to determine acceptance values based upon this Standard's component requirement at each of the applicable wavelengths.
  - 1.  $\text{Link Attenuation} = \text{Cable Attenuation} + \text{Connector Insertion loss} + \text{Splice Insertion loss}$
- GG. Total loss budget for any fiber Channel shall not exceed 2.0 dB.

## 27 15 00 - COMMUNICATIONS HORIZONTAL CABLING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Communications system requirements for unshielded horizontal twisted four pair Category 6 copper cabling
- B. Category 6 unshielded twisted four pair cable

#### 1.2 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. See section 1.09.1

#### 1.3 RELATED SECTIONS

- A. Section 00 00 00 Procurement and Contracting requirements
- B. Section 01 00 00 General Requirements
- C. Section 27 05 00 Common Work Results for Communications
- D. Section 27 10 00 Structured Cabling
- E. Section 27 11 00 Communications Equipment Room Fittings
- F. Section 27 13 00 Communications Backbone Cabling
- G. Section 27 15 00 Communications Horizontal Cabling
- H. Section 27 16 00 Communications Connecting Cords, Devices and Adapters

#### 1.4 REFERENCES

- A. ANSI/TIA/EIA-568-B.1 – Addendum 1-2001, Commercial Building Telecommunications Cabling Standard, Part 1: Minimum 4-Pair UTP and 4-Pair ScTP Patch Cable Bend Radius
- B. ANSI/TIA/EIA-568-B.1 – Addendum 4-2003, Commercial Building Telecommunications Cabling Standard, Part 1: Recognition of Category 6 and 850 nm Laser-Optimized 50/125 µm Multimode Optical Fiber Cabling
- C. ANSI/TIA/EIA-568-B.2 – Addendum 1-2002, Commercial Building Telecommunications Cabling Standard, Part 2: Transmission Performance Specifications for 4 pair 100 ohm Category 6 Cabling
- D. ANSI/TIA/EIA-568-B.2 – Addendum 2-2001, Commercial Building Telecommunications Cabling Standard
- E. ANSI/TIA/EIA-568-B.2 – Addendum 3-2002, Commercial Building Telecommunications Cabling Standard, Part 2: Additional Considerations for Insertion Loss and Return Loss Pass/Fail Determination
- F. ANSI/TIA/EIA-568-B.2 – Addendum 4-2002, Commercial Building Telecommunications Cabling Standard, Part 2: Solderless Connection Reliability Requirements for Copper
- G. Connecting Hardware

1. ANSI/TIA/EIA-568-B.2 – Addendum 5-2003, Commercial Building Telecommunications Cabling Standard, Part 2: Corrections to TIA/EIA-568-B.2
2. ANSI/TIA/EIA-568-B.2 – Addendum 6-2003, Commercial Building Telecommunications Cabling Standard, Part 2: Category 6 Related Component Test Procedures
3. ANSI/TIA/EIA-568-B.2 – Addendum 7-Pending, Commercial Building Telecommunications Cabling Standard, Part 2: Reliability Specifications for Copper Connecting Hardware
4. ANSI/TIA/EIA 568-B.2 – Addendum 9-2005, Commercial Building Telecommunications Cabling Standard, Part 2: Additional Category 6 Balance Requirements and Measurement Procedures
5. ANSI/TIA/EIA 568-B.2 – Addendum 10-Draft 7.0, Commercial Building Telecommunications Cabling Standard, Part 2: Transmission Performance Specifications for 4-pair 100 OHM Category 6 Balance Requirements
6. ANSI/TIA/EIA 568-B.2 – Addendum 11-2005, Commercial Building Telecommunications Cabling Standard, Part 2: Specification for Increased Diameter of 4-pair UTP and ScTP Cable
7. IEEE Std 802.3an™, Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks – Specific requirements Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications Amendment 1: Physical Layer and Management Parameters or 10 Gb/s Operation, Type 10GBASE-T, 2006

## 1.5 DEFINITIONS

- A. ACR-F – Attenuation to Crosstalk Ratio Far End is the ratio of the attenuated signal on one pair to the crosstalk on an adjacent pair at the far end. Also known as ELFEXT.
- B. Baseband – single un-multiplexed signaling
- C. CAD – Computer Assisted Design
- D. IL – Insertion Loss is a decrease in transmitted power
- E. Level III or Level IV – Tester accuracy established by UL
- F. LCL – Longitudinal Conversion Loss
- G. MHz – Megahertz
- H. NEXT – Near End Crosstalk is noise induced from one pair to another pair within the cable jacket
- I. Ohm – Measure of electrical resistance or impedance
- J. PowerSum ACR-F – the ratio of the attenuated signal on multiple pairs to the crosstalk on a victim pair at the far end. Also known as PSELFEXT.
- K. PowerSum NEXT – noise induced from multiple pairs to a single pair within the cable jacket
- L. RL – Return Loss is the ratio, expressed in decibels, of the power of the outgoing signal to the power of the signal reflected back

M. TDR – Time Domain Reflectometer

## 1.6 SYSTEM DESCRIPTION

- A. Copper cabling system use a 4 pair unshielded twisted pair cable that is capable of transporting and supporting network speeds up to 1 Gigabit per second.
- B. Copper cabling system is capable of supporting baseband signaling for voice, data or video applications.
- C. Cabling system is a modular system utilizing an 8 position 8 conductor jack and plug for termination and interface.
- D. Cabling system components are expected to provide more than 25 years of continuous operation.
- E. Cabling system is a NextLAN solution from Leviton and SuperiorEssex.

## 1.7 SUBMITTALS

- A. Product Data: Provide component descriptions and describe electrical characteristics of components.
- B. Submit 10' section of proposed cable to be installed along with terminated Category 6 connectors on ends to be installed. Show cable wraps with proposed labeling convention on cable.
- C. Show pathway, footages and labeling sequence of all cables and faceplate locations on As-Built drawing in CAD prior to starting the Work for approval by Owner.
- D. Provide a hard copy and soft copy of proposed test results to be submitted in the Level III or Level IV TDR tester's native format for verification of electrical performance.
- E. Provide the most current UL or ETL test results showing Category 6 compliance for the proposed cabling system.
- F. Prior to final acceptance
  - 1. Provide a 3' by 3' hard copy and soft CAD copy As-Built of the floor plan showing pathway, footages and labeling sequence of all cables and faceplates upon Substantial Completion.
  - 2. Provide 1 copy of printed and 1 soft copy of all Category 6 cable test results in the Level III or Level IV tester's native format.
  - 3. Provide a warranty statement from the cable Manufacturer that the project has a Lifetime warranty against defects in features and performance of products.
  - 4. Ensure warranty specifies that the Owner is entitled to all rights guaranteed by the warranty.
- G. Warranty
  - 1. Communications Contractor shall provide a 1 year parts and labor warranty against defective workmanship and cable system component failure.
  - 2. Communications Contractor shall execute a Lifetime warranty against materials defect and an Applications Assurance Warranty for 1GBase-T applications for parts and labor from the cable system Manufacturer.

## 1.8 MAINTENANCE

- A. Extra Materials – provide to Owner at completion of project

**PART 2 - PART 2 – PRODUCTS**

**2.1 MANUFACTURERS**

- A. Leviton Category 6 connectors.
- B. SuperiorEssex Category 6 cable.

**2.2 PERFORMANCE AND FEATURES**

**A. Attributes**

1. Cable system shall have an Impedance value of 100 ohms.
2. All Category 6 cable conductors shall be terminated onto 8 position 8 conductor Category 6 connectors using 110 style IDC.
3. All Category 6 connectors shall be placed into QuickPort faceplates.
4. Cable system shall have four Category 6 blue cables installed at every faceplate for information access except for wall mount phones and Access Point antennas.
5. Wall mount phones and Access Point antennas shall receive one blue Category 6 cable for information access.
6. Appearance of cable system faceplates shall match the décor and mounting height of electrical outlet faceplates.
7. All faceplates shall have a station identification window for a machine label protected behind transparent plastic.

**B. Requirements**

1. Copper cabling system shall be guaranteed to support baseband signaling from 1 MHz up to 250 MHz.
2. Horizontal copper cabling system shall be capable of supporting 1GBase-T applications for a total distance of 100 meters with equipment cords for the life of the system.
3. Cable system shall be guaranteed to not introduce bit errors when operating at 1 Gigabit/second for the Life of the system.
4. Cable system shall have a Lifetime warranty for 1GBase-T applications assurance.
5. Cable system patch cords shall be rated for 1GBase-T applications.

**C. Criteria**

1. Cabling System shall be capable of exhibiting the following minimum electrical characteristics when tested as a 4 connector Channel, using a Level III or Level IV tester:
2. Insertion Loss (IL) / 33 dB

3. Near End Crosstalk (NEXT) / 38 dB
4. PowerSum NEXT (PSNEXT) / 37 dB
5. Attenuation Crosstalk Ratio – (ACR) / 7 dB
6. PowerSum ACR (PSACR) / 6 dB
7. Attenuation Crosstalk Ratio Far End – (ACR-F) / 20 dB
8. Power Sum Attenuation Crosstalk Ratio Far End – (PSACR-F) / 18 dB
9. Return Loss (RL) / 12 dB

D. Tests

1. Test results for all Category 6 copper cables shall be provided on CD in a Level III or Level IV tester's native format.
2. All Permanent Link tests shall have a "PASS" result for all required parameters from the frequency of 1 to 250 MHZ.
3. One hard copy and one soft copy in the tester's native format of all test results shall be provided to the Owner upon substantial completion.
4. Test results showing an asterisk (\*) will not be accepted as it is below the acceptable margin of the tester's accuracy limits.
5. All test results shall show electrical performance of the cabling system from 1 – 250 MHz when testing for Insertion Loss, Near End Crosstalk, Power Sum Near End Crosstalk, Attenuation to Crosstalk Ratio Far End, Power Sum Attenuation to Crosstalk Ratio Far End and Return Loss.

## 2.3 COMPONENTS

A. Attributes

1. All connectivity and cable shall have a Category 6 designation permanently and visibly displayed on the component.
2. Copper cable shall have a flame retardant and low smoke Polyvinyl Chloride jacket.
3. Copper cable shall have a maximum nominal outer diameter of .24 " with a completely round dimension.
4. Category 6 connectors shall provide Pair Separation Towers to assist with pair separation.
5. Category 6 connectors shall provide Retention Force Technology to maintain tne integrity against 4 or 6 position plugs.

B. Requirements

1. Copper cable shall be SuperiorEssex part # 54-246-2B NextGain Category 6 cable.

2. Connector shall be Leviton part # 61110-RW6 eXtreme 6 connector.
3. Patch panel shall be Leviton part # 69586-U48 Category 6 patch panel with mounting holes and screws.
4. Faceplate shall be Leviton part # 42081-4WS with top and bottom designation windows to hold a machine label.
5. Copper cable conductors shall be constructed of 23 AWG solid annealed bare high quality copper inside insulation comprising of Fluorinated Ethylene Propylene (FEP).
6. Copper cable shall contain eight conductors and twisted into four pairs consisting of a blue/blue-white, orange/orange-white, green/green-white and brown/brown-white configuration.
7. Copper cable shall have a web separator between all pairs.
8. Category 6 connector shall be made of high impact and fire retardant plastic with a UL 94V-O rating.
9. Category 6 connectors and patch panel ports shall have a minimum of 50 micro inches of gold, plated over 100 micro inches of nickel and plated over high quality copper alloy on each and every time.
10. Category 6 connectors and patch panel ports shall have a minimum force of 100 grams pressure on all the times for the life of the component.
11. Category 6 connectors and patch panel ports shall use 110 type Insulation Displacement Contacts for the termination of copper cable conductors.

C. Criteria

1. Category 6 connectors and patch panel port shall meet electrical specifications stated on chart below:

MHz	Insertion Loss	Parameter			
		NEXT	FEXT	RL	LCL
62.5	.16dB	58.1dB	47.2dB	28.1dB	32.1dB
100	.20dB	54.0dB	43.1dB	24.0dB	28.0dB
250	.32dB	46.0dB	34.1dB	16.0dB	20.0dB

2. Category 6 patch cords and equipment cords shall meet the electrical specifications stated on chart below:

MHz	Parameter	
	NEXT	RL
62.5	49.2dB	20.0dB
100	45.3dB	18.0dB
250	38.1dB	14.0dB

3. Category 6 cable shall meet the electrical specifications stated on charts below:

MHz	Insertion Loss	Parameter				
		NEXT	PSNEXT	ACR-F	PSACR-F	RL
62.5	15.4dB	47.4dB	45.4dB	31.9dB	28.9dB	21.5dB
100	19.8dB	44.3dB	42.3dB	27.8dB	24.8dB	20.1dB
250	32.8dB	38.3dB	36.3dB	19.8dB	16.8dB	17.3dB

MHz	Parameter	
	Propagation Delay	LCL
62.5	538ns	32.0dB
100	538ns	30.0dB
250	536ns	26.0dB

- D. Tests
  - 1. Field testing of installed cable channel shall be performed by Contractor using Annex I of the TIA/EIA 568-B document.
  - 2. Testing of connecting hardware components shall be performed using Annex E within the TIA/EIA-568-B.2 Addendum 1 document. Manufacturer of connectors to provide this data.
  - 3. Testing of four pair cable component shall be performed using Annex C within the TIA/EIA-568-B.2 Addendum 1 document. Manufacturer of cable to provide this data

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify that pathways and spaces will allow horizontal cables to be installed according to manufacturer's recommendations.
- B. Verify that minimum bend radius of 4X the cable diameter can be achieved in pathways and spaces.
- C. Verify that cables can be properly supported by cable tray or hooks in ceiling.
- D. Compare to Contract Drawings and provide written notification if site conditions deviate from drawings.

#### 3.2 INSTALLATION

- A. Install all components in a neat and workmanlike manner.
- B. Install all horizontal cables and termination frames in accordance with manufacturer's recommendations.
- C. Ensure terminations are at 180 degrees to the jack with no more than ¼" un-twisting and no more than ½" un-jacketing.
- D. Ensure terminations have no un-twisting and that tower separators are utilized to separate pairs.
- E. Ensure pulling tensions of cables are not exceeded.
- F. Maintain proper cable bend radius of 4 times the cable's outer diameter during placement.
- G. No splices are permitted.
- H. No link shall exceed 90 meters. Contractor is responsible for verifying proper footages.
- I. Contractor shall provide in a quick and timely fashion any additional materials or labor that may be damaged during the work at no charge to the owner.
- J. Pull one additional "Mule Tape" or ¼" Nylon rope when pulling cables through any conduit utilizing existing pull string.
- K. Properly support horizontal cables in ceiling every 4'-5' using J-Hooks or cable tray.
- L. Place horizontal cables in pathways and spaces dedicated for communications cables.
- M. Provide 5' of slack at station end in ceiling and not inside wall.
- N. Machine label all horizontal cables with cable number at both ends.



- O. Machine label all termination panels with cable number.
- P. Firestop all sleeves and conduit openings after cable installation.
- Q. Terminate all pairs and conductors at all ends according to manufacturer's instructions following color code sequence.
- R. Utilize Velcro in all closets.
- S. Label and document the horizontal cable installation to include labeling and pathways on the As-Built drawings.

## **27 41 16 - INTEGRATED AUDIO-VIDEO SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION OF THE WORK**

- A. The complete Audio-Video Systems (hereafter referred to as AV Systems) include the following items.
  - 1. A full-range loudspeaker system with subwoofers, delayed loudspeakers, and production intercom system in the Auditorium;
  - 2. Recessed ceiling-mounted loudspeakers in the backstage area;
  - 3. A video presentation system in the Auditorium;
  - 4. A two-way, stereo loudspeaker system in the Band Room;
  - 5. Ancillary devices related to the input, mixing, processing, and amplification of audio into the system.
  - 6. Microphones, jacks, wire, and all miscellaneous parts of the system.

#### **1.2 DESCRIPTION OF THE WORK**

- A. General Conditions and Requirements, Special Provisions, and applicable portions of Division I of the general contract are hereby made a part of this section.
- B. Architectural, Structural, mechanical, electrical, and other applicable documents are considered a part of the AV Systems documents insofar as they apply as if referred to in full.

#### **1.3 SCOPE OF THE WORK**

- A. These Specifications, together with the related drawings and General Conditions of the contract, comprise the requirements for the AV Systems for the project.
- B. Furnish, deliver, erect, install and connect completely all of the material and appliances described herein and in the Drawings, and supply all other incidental material and appliances, tools, transportation, etc., required to make the work complete, and to leave the AV Systems in first class operating condition, excluding those items listed under Section 1.10, RELATED WORK IN OTHER SECTIONS.
- C. Perform all assembly of equipment, wiring and inter-connection and soldering of wires to jacks, devices, terminals or equipment, using technical employees only, who are experienced in the installation of AV Systems equipment and its inter-connection. Coordinate final utility rough-in locations with actual equipment furnished.
- D. Verify dimensions and conditions at the job site prior to installation, and perform installation in accordance with these Specifications, manufacturers' recommendations and all applicable code requirements.

#### **1.4 QUALITY ASSURANCE**

- A. The intent of these Specifications is to describe and provide for complete AV Systems of high professional quality and reliability. Professional performance standards by the AV Systems Contractor (hereafter referred to as Installer) and the equipment will be required.

- B. In all cases, the Owner and Architect shall determine the acceptability of the work based upon the visits, observations, and reports of the AV Systems Consultant (hereafter referred to as Consultant).

#### 1.5 SUBSTITUTIONS

- A. Many items are listed in the Specifications by the manufacturer's type or model number, without a detailed performance specification, and may not include the phrase "or approved equal". Where this is the case, no substitutions will be accepted, without a written request from the Installer and the written consent of the Consultant.
- B. Where the phrase "or approved equal" appears, the item specified shall set a standard of quality and performance, based on the published specifications of the manufacturer and on the actual performance as known by the Consultant.
- C. Requests for substitution, when forwarded by the Installer to the Consultant, are understood to mean that the Installer represents that he has personally investigated the proposed substitute product and determined that it is equal to or superior in all respects to that specified, that the same guarantee will be provided for the substitution as for the specified product, and that the Installer will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be complete in all respects.
- D. Substitutions will not be considered if they are indicated or implied in Shop Drawing submissions without previous formal request, or, for their implementation, they require a substantial revision of the Contract Documents in order to accommodate their use.
- E. Space allocations and utility rough-ins have been designed on the basis of equipment items named by manufacturer and model number. If any equipment not so named is offered which differs substantially in dimension or configuration from the named equipment, provide scaled shop drawings showing that the substitute can be installed in the space available without interfering with other trades or with access for operation and maintenance in the completed project. The Installer shall coordinate final utility rough-in locations with actual equipment furnished.
- F. Where substitute equipment requiring different arrangement or connections from those shown in the drawings is accepted by the Consultant, install the equipment to operate properly and in harmony with the intent of the Drawings and Specifications, making all necessary incidental changes without increasing the Contract amount. Pay all additional costs incurred by adjoining or connecting trades.
- G. All requests for substitutions shall be submitted before the bid opening date. Substitutions shall be requested and approved in writing only, based upon these criteria.

#### 1.6 INSTALLER QUALIFICATIONS

- A. The work performed under this Section shall be performed by a AV systems contractor, normally engaged in the business of AV systems installation. The prospective contractor shall show proof, as part of the bid that the contractor has been in the AV Systems installation business for a period of not less than five years and has successfully completed projects of similar size and scope.
- B. Each bidder shall hold a current, valid franchise for the major lines of AV equipment furnished by him under these Specifications.
- C. The Owner and Architect reserve the right to reject any bids submitted by firms without sufficient experience in projects of similar size and scope.

#### 1.7 COOPERATION AND COORDINATION

- A. Cooperate and coordinate as required with the other contractors who are responsible for work not included in this section.
- B. Provide any and all information as required or requested by the Owner, Architect, Consultant, or General Contractor in order for this work to be completed to the satisfaction of the Owner, and in the best interests of the Project. Such assistance or information shall be transmitted in writing to the requesting party in all cases. All written correspondence shall be copied to the Consultant.

#### 1.8 GUARANTEE AND WARRANTY

- A. Guarantee all parts, labor, and workmanship furnished under this contract for a period of twelve months from the date of substantial completion.
- B. During the warranty period, report to the site and repair or replace any defective materials or workmanship without cost to the Owner. Warranty service shall be rendered within 48 hours after request by the Owner. Equivalent replacement equipment shall be temporarily provided when immediate on-site repairs cannot be made.
- C. Where warranties on individual pieces of equipment exceed twelve months, the guarantee period shall be extended to the warranty period of the particular items.
- D. Furnish complete and working AV Systems. Be of maximum assistance to the Owner during the guarantee period of the system, to the degree that maximum Owner satisfaction is assured.
- E. After completion of the work, the Installer shall submit a Certificate of Warranty, stating commence and expiration dates and conditions of the warranty, for signature of both parties. Incremental warranties for completed portions of the work may be negotiated at the discretion of the Owner, if delays occur beyond the control of the Installer.

#### 1.9 SHOP DRAWINGS AND SUBMITTALS

- A. Completely detailed shop drawings shall be prepared prior to the procurement of equipment or commencement of work. With permission from the Architect, electronic files of drawings will be made available to the Installer from the Consultant for a \$500.00 USD handling and service fee. Drawings shall be prepared and submitted on 30" x 42" paper. Equipment lists, data sheets, etc. shall be 8-½" x 11" size, properly bound into a single or multiple volumes as necessary. Submit quantity in accordance with Division 1, General Requirements.
- B. Within 45 days after the notice to proceed, submit to the Architect identical copies of the following for approval:
  - 1. A complete equipment list, with manufacturers' names, model numbers, and quantities of each item;
  - 2. Manufacturers' data sheets on all equipment items;
  - 3. Equipment rack layouts showing locations of all rack mounted equipment items;
  - 4. Floor plans and reflected ceiling plans, prepared at a scale of not less than 1/8"=1'-0", showing loudspeaker locations and orientation, wall plates, and all other related device locations;
  - 5. Proposed construction details for any custom fabricated items, including loudspeaker mounting, custom interface panels, patch panels, and wall plates. These details shall show dimensions, materials, finishes and color selection;
  - 6. Loudspeaker mounting details shall be certified by a structural engineer licensed by the State of Texas;

7. Comprehensive system schematics, showing detailed connections to all equipment, with wire numbers, terminal block numbers, and color coding;
  8. Riser diagrams showing conduit requirements with pull boxes, outlet boxes, physical cable layouts, part numbers of cable types used, and number of circuits in each conduit;
  9. Electrical power requirements for head-end and ancillary equipment. Include diagrams for any remote control of electrical power, in sufficient detail to coordinate with the electrical contractor, showing exact conduit requirements and locations for switched duplex receptacles;
  10. Certain other submittals as noted elsewhere in this specification, and as may be required for various equipment items prior to construction, fabrication, or finishing of that item;
  11. Submission of the AV contract documents/bid documents does not constitute a legitimate submittal and will not be reviewed;
  12. Incomplete submittals will not be reviewed.
- C. All final documentation shall be submitted and approved before final acceptance by the Owner will be granted. Submit the following in accordance with Division 1, General Requirements.
1. A complete as-installed equipment list, listed by room, with manufacturers' names, model numbers, serial numbers, and quantities of each item;
  2. A complete and correct system schematic, showing detailed connections for all parts of the system, including wire numbers, terminal block numbers and layouts, and other designations and codes. System performance measurements as noted elsewhere in this specification shall be documented. Include diagrams or charts showing final settings of all control knobs in the system (mixers, equalizers, power amplifiers, etc.). Submit copies of processor data files with software settings of each piece of equipment that is software controlled;
  3. Complete equipment rack layouts showing locations of all rack mounted equipment items;
  4. Floor plans and reflected ceiling plans, prepared at a scale of not less than 1/8"=1'-0", showing loudspeaker locations and orientation, wall plates, rack locations, and other related device locations;
  5. Riser diagrams showing as-installed conduit with pull boxes, outlet boxes, physical cable layouts, part numbers of cable types used, and number of circuits in each conduit;
  6. Manufacturer's warranties and operating instructions for each and every equipment item furnished. Include a copy of the certificate of warranty, signed by both parties.
  7. Incomplete submittals will not be reviewed.

#### 1.10 RELATED WORK IN OTHER SECTIONS

- A. All conduit with pull strings, all electrical pull boxes, and all outlet boxes shall be furnished and installed under the electrical section of Division 26. Conduits shall be run continuously from outlet box to outlet box. Conduit stub-outs are not acceptable except as noted. Coordinate as necessary for proper installation.
- B. All 120VAC power conductors and conduits associated with power circuits to all equipment locations shall be furnished and installed under the electrical section of Division 26. The 120VAC power to the equipment racks shall be terminated inside the racks to electrical contractor supplied hospital grade duplex convenience outlets.

- C. An insulated THW stranded copper ground wire, sized according to NEC, shall be installed under the electrical section of Division 26 from the equipment racks sheet metal to the primary ground point within the building, and terminated at each end to bare metal using approved connectors and clamps.
- D. All built-in millwork and grille cloth shall be furnished under other sections.
- E. Lyntec power sequencing equipment shall be provided and installed under Division 26.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. All items shall be new and unused.
- B. The following sections specifically list the acceptable equipment types and items for this project. Where quantities are not noted, they may be obtained from the drawings. In the event of a discrepancy between the specifications and the drawings, the greater quantity or better quality shall be furnished.
- C. Refer to Section 1.5, SUBSTITUTIONS of this specification.

### 2.2 WIRE AND CABLE

- A. All wire and cables shall be new and unused.
- B. Wire not installed in equipment racks, not portable, or not installed in conduit shall be plenum-rated and meet all applicable codes.
- C. Voice coil loudspeaker cable for main loudspeakers: West Penn C210 stranded 10AWG jacketed twisted pair, or approved substitution.
- D. Performance monitor loudspeaker cable: West Penn 226 stranded 14 AWG jacketed twisted pair, or approved equal.
- E. Constant voltage (70.7-volt) loudspeaker cable: West Penn 225 stranded 16AWG jacketed twisted pair, or approved substitution.
- F. Microphone-level audio cable (installed in conduit, not portable): Belden 8451 stranded 22AWG twisted pair with foil shield, or approved substitution.
- G. Line-level audio cable and all inter-rack audio cable: Belden 8451 stranded 22AWG jacketed twisted pair with foil shield, or approved substitution.
- H. Intercom Cable: West Penn 430 stranded 22AWG jacketed 2-twisted pair with individual foil shields, or approved substitution.
- I. Wireless microphone antenna cable: Belden 9914, 50 ohm RG-8A/U type coaxial cable or approved substitution with Amphenol Connex 112563 connectors.
- J. HDMI Interconnect cable: Extron HDMI Pro series cable.
- K. VGA Interconnect cable: Extron VGA M-M BK series cable.
- L. Twisted pair video transmission cable: Extron STP 201 series cable with STP RJ-45 shielded connectors.

- M. Other equipment control cables shall be stranded wire, appropriately shielded, of gauge and number of conductors required by the manufacturer for proper operation of the system or equipment item furnished.
- N. Wire and cable for all other devices shall be supplied in accordance with the recommendations of the device manufacturer and the National Electrical Code.

## 2.3 JACKS, CONNECTORS, AND WALL PLATES

- A. All plate-mounted connectors shall be ground-insulated from the plates on which they are mounted.
- B. Floor-mounted jacks, unless noted otherwise, shall be installed in floor pockets (described in this section). The interior plates shall be painted or anodized black. Nomenclature shall be engraved into the interior plate of each floor box with 1/8" block letters filled with white paint.
- C. For non-standard custom panels, connectors shall be installed on 1/8" thick black anodized brushed aluminum panels. Nomenclature shall be engraved into the panels with 1/8" block letters filled with white paint.
- D. All other jacks shall be installed on standard brushed stainless steel finish plates. Nomenclature shall be engraved into the plate with 1/8" block letters filled with black paint. All mic locations shall be numbered logically and consecutively, starting from one (1), as shown on drawings.
- E. Unless otherwise specified, all jacks and connectors for the AV systems shall be as follows:
  - 1. Microphone and line-level input jacks: Neutrik NC3FD-L-1-B 3-pin female XLR panel-mount jacks with gold-plated contacts, or approved equal.
  - 2. Audio output jacks: Neutrik NC3MD-L-1-B 3-pin male XLR panel-mount jacks with gold-plated contacts, or approved equal.
  - 3. Female cable-end audio connectors: Neutrik NC3FX-B 3-pin female XLR connectors with gold-plated contacts, or approved equal.
  - 4. Male cable-end audio connectors: Neutrik NC3MX-B 3-pin male XLR connectors with gold-plated contacts, or approved equal.
  - 5. 4-Pole Loudspeaker jacks: Neutrik NL4MP-B 4-pole Speakon® connectors with gold-plated contacts and mating NL4FC-B with gold-plated contacts, or approved equal.
  - 6. 8-Pole Loudspeaker jacks: Neutrik NL8MPR-BAG Speakon® connectors with gold-plated contacts.
  - 7. Wireless antenna wall-mount jack: Neutrik NBB75FI BNC bulkhead jack, or approved equal.
  - 8. Portable Racks Panel Mounted AC Power Jack: Neutrik NAC3MPA PowerCon® connectors with gold-plated contacts. Fabricate a 20-foot power cord with mating NAC3FCA PowerCon® connectors with gold-plated contacts, or approved equal.
  - 9. ProCo iRACK portable audio player interface rack-mounted panel.
  - 10. Furnish and install the required number of jacks and connectors as shown on the drawings.

## 2.4 EQUIPMENT RACKS AND POWER DISTRIBUTION

- A. Furnish equipment racks for use in housing equipment including, but not limited to, power amplifiers, signal processors, microphone splitters, playback equipment, intercom equipment, etc.
- B. Equipment rack colors shall be satin black. All mounting screws shall be theft resistant.
- C. Heat-producing components – such as power amplifiers – shall be mounted with one 1-3/4” vent panel installed between units. Fill all other portions of unused rack front sections with matching blank panels.
- D. Power distribution within racks shall be supplied via sequentially switched convenience outlets, allowing incremental switching of components. Program so that when rack power is switched, power amplifiers are last to turn on, and first to turn off.
- E. Install the required number of units, of sufficient size to accommodate the equipment specified, at the locations indicated in the drawings.
- F. Furnish (5) sets of spare keys for each equipment rack.
- G. Furnish and install the following:

## 2.5 MICROPHONES, STANDS, AND CORDS

- A. Provide microphones and related devices for multipurpose use.
- B. Provide a variety of stands for microphones. Stands should be ebony in color, have weighted bases, and have telescopic height adjustment.
- C. Provide high quality microphone cables in various lengths.
- D. Furnish and install the following:

## 2.6 WIRELESS MICROPHONE SYSTEMS

- A. Diversity UHF wireless microphone systems shall be used in all systems.
- B. Operating frequencies shall be selected so as to avoid interference. Consult with the manufacturer for frequency coordination.
- C. The wireless receivers shall be provided with rack-mount kits. Beige-colored microphones are specified. Verify desired lapel microphone colors (beige or black) with Owner.
- D. Furnish and install the following wireless system and accessories in the Auditorium:

## 2.7 AUDITORIUM MIXING CONSOLE

- A. Furnish a digital Front-of-House (FOH) mixing console for controlling the various audio signals for playback and recording.
- B. The unit shall have thirty-two (32) mono digital input channels and sixteen (16) mono digital output channels. Install the unit on the counter top in the control booth and connect as indicated in the drawings.
- C. Furnish and install the following:



2.8 AUDIO MIXERS

- A. Furnish audio mixers for use in controlling the various audio signals for playback and recording.
- B. Install the units in their respective equipment racks and connect as indicated in the drawings.
- C. Furnish and install the following:

2.9 PROCESSING

- A. Furnish digital audio signal processors to process levels, matrixing, equalization, leveling, limiting, etc. of the audio signals.
- B. Each digital signal processor shall have phoenix type connectors on all inputs and outputs, and shall accept line level signal inputs. Install the units in their respective equipment racks and connect as indicated in the drawings.
- C. Refer to Part 3.2 of this specification for additional information.
- D. Furnish and install the following:

2.10 PLAYBACK AND RECORDING EQUIPMENT

- A. Furnish audio playback and recording equipment.
- B. Units shall be furnished with balanced inputs and outputs. Mount the units in their respective equipment racks and connect as indicated in the drawings.
- C. Furnish and install the following:

2.11 POWER AMPLIFIERS

- A. Each power amplifier shall have an input connector which is either a screw-type barrier strip or XLR type. Output connections shall be barrier strip. Other types of connectors shall not be accepted.
- B. All power amplifiers shall have detented stepping input level controls. Install amplifiers in the equipment racks as recommended by the manufacturer and connect as indicated in the drawings.
- C. Furnish and install the following in the Auditorium:

2.12 MAIN LOUDSPEAKERS

- A. The drawings indicate the loudspeaker positions and angles of orientation.
- B. Speakers shall be suspended from the structure, at the positions and angles indicated. Suspend each component with aircraft quality steel cable and commercial rigging hardware, in such a way as to facilitate minor angle adjustments. Safety factor shall be at least 5. Secure any loose hardware to prevent vibration and rattling. Orient each speaker at the location and angles indicated in the drawings. Make minor adjustments as required to provide even sound distribution.
- C. Measure and record the impedance of each driver at the amplifier terminals. High frequency drivers shall be measured at 1000Hz; low frequency drivers shall be measured at 250Hz. Include the measurements in the final documentation.
- D. Furnish and install the following in the Auditorium:

2.13 CEILING MOUNTED LOUDSPEAKER ASSEMBLIES & PAGING SPEAKER

- A. Furnish ceiling mounted loudspeakers at the locations noted on the drawings.
- B. Each speaker shall be installed in a recessed enclosure. Furnish braces designed to provide additional support to the weight of the speaker and prevent tile sag. Coordinate exact locations with the Architect. Connect the loudspeakers as indicated in the drawings.
- C. Tap the transformers as indicated in the drawings. Measure and record the impedance at 1000Hz of each home run at the amplifier terminals. Include the measurements in the final documentation.
- D. Furnish and install the following in the Auditorium backstage areas:

2.14 PORTABLE PERFORMANCE MONITOR LOUDSPEAKERS

- A. Furnish portable foldback loudspeakers for use in monitoring program audio in the Auditorium stage area.
- B. The units shall be portable and will be connected to the monitor jack locations indicated in the drawings.
- C. Furnish the following:

2.15 DIRECT BOXES

- A. Furnish portable direct boxes to allow high-level electronic instruments to be plugged into a balanced microphone input.
- B. Furnish the following:

2.16 PRODUCTION INTERCOM SYSTEM

- A. Provide a full-featured party-line intercom system with two channels.
- B. Mount the mainstation in the Auxiliary equipment rack. Each station shall be wired for two-channel operation.
- C. Furnish and install the following:

2.17 ASSISTIVE LISTENING SYSTEM

- A. Furnish and install an assistive listening system for use by hearing-impaired persons.
- B. The unit shall be FM wireless and shall facilitate portable wireless body-pack receivers.
- C. Furnish and install the following in the Auditorium:

2.18 AUDITORIUM VIDEO PROJECTION SYSTEM

- A. Furnish high light output video/data projector and other equipment for projection of video, data, and graphic images on the front projection screen in the Auditorium.
- B. Perform all setup procedures and image convergence for each input according to the manufacturer's recommendations. The image shall be adjusted for full available screen width for each input. Mount the switcher and playback equipment in the video equipment rack and connect as indicated in the drawings.

- C. Furnish and install the following:

#### 2.19 PROJECTION SCREEN

- A. Provide a surface to receive light projected from the Auditorium video projector.
- B. Install and coordinate the Division 26 requirements for the projection screen housing.
- C. Perform all control systems programming, configuration, and setup required to allow raising and lowering of the screen(s) through the control system.
- D. Provide and install the following:

#### 2.20 VOLUME CONTROLS

- A. Furnish wall mounted remote volume controls for localized control of ceiling mounted loudspeakers at several locations.
- B. The volume controls shall be autotransformer-type attenuators mounted to standard stainless steel wall plates. Attenuators shall be step-type control with positive off position. Attenuation per step shall be 1.5dB. Power rating of each unit shall be selected to properly control the load to which it is connected. Coordinate color with Architect (white or ivory).
- C. Furnish and install the following:

#### 2.21 RECESSED FLOOR POCKETS

- A. Recessed floor boxes shall be used in the auditorium to house microphone and monitor speaker connections.
- B. Modify the interior plate to accept connectors as indicated in the drawings. The interior plates shall be painted or anodized black. Nomenclature shall be engraved into the interior plate of each floor box with 1/8" block letters filled with white paint.
- C. Furnish the following floor pockets to the Electrical Contractor for installation:

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Furnish components, racks, wire, cabinetry, connectors, materials, parts, equipment and labor necessary for the complete installation of the systems, in full accordance with the recommendations of the equipment manufacturers and the requirements of the drawings and specifications.
- B. Installation shall follow standard broadcast wiring and installation practice, and shall meet or exceed industry standards for such work, with particular attention given to any installation instructions in Part 2 of these Specifications.
- C. Equipment shall be held firmly in place with proper types of mounting hardware. All equipment affixed to the building structure must be self-supporting with a safety factor of at least five. All equipment shall be installed so as to provide reasonable safety to the operator and occupants. Supply adequate ventilation for all enclosed equipment items which produce heat.
- D. Furnish the system to facilitate expansion and servicing using modular, solid-state components. All equipment shall be designed and rated for continuous operation and shall be UL listed, or manufactured to UL standards.

- E. Observe proper circuit polarity and loudspeaker wiring polarity. No cables shall be wired with a polarity reversal between connectors with respect to either end. Special care shall be taken when wiring microphone cables, to insure that constant polarity is maintained. Balanced audio connectors shall be wired as follows.

<u>Wire</u>	<u>Connector</u>	<u>Signal</u>
Black	Pin #3 or Ring	Negative
Red or White	Pin #2 or Tip	Positive
Bare	Pin #1 or Shield	Ground

- F. Provide all audio circuits balanced and floating, except as noted in the Specifications or directed by the Consultant at the time of final equalization and testing. Shields of audio cables shall be grounded at one end only, at the outputs of the various equipment items in the system.
- G. Route cables and wiring within equipment racks and cabinetry according to function, separating wires of different signal levels (video, microphone level, line level, amplifier output, 120VAC, intercom, control, etc.) by as much physical distance as possible. Neatly arrange and bundle all cables loosely with plastic cable ties. Cables and wires shall be continuous lengths without splices.
- H. All system wire, except spare wire, after being cut and stripped, shall have the wire strands twisted back to their original lay and be terminated by approved soldered or mechanical means. No unterminated wire ends will be accepted. Heatshrink type tubing shall be used to insulate and dress the ends of all wire and cables. Include a separate tube for the ground or drain wire.
- I. All cables in conduits shall be insulated from each other and from the conduit the entire length and shall not be spliced. All cables and wires are to be continuous lengths without splices.
- J. All solder joints and terminations shall be made with rosin-core solder.
- K. Temperature regulated soldering irons rated at least 60 watts shall be used for all soldering work. No soldering guns or temperature unregulated irons shall be used on the job site.
- L. Mechanical connections shall be made using approved connectors of the correct size and type for the connection. Wire nuts will not be accepted.
- M. Each mechanical connector shall be attached using the proper size controlled-duty-cycle ratcheting crimp tool which has been approved by the manufacturer of the connectors. Conventional non-ratcheting type crimping tools are unacceptable, and shall not be used on the job site.
- N. Label all wires in racks and console as to destination and purpose with permanent labels. Clearly and permanently label all controls and connections at the front and back of the rack with permanent labels. Wall plates and custom panels shall be engraved and filled with contrasting paint, unless otherwise noted. All labeling shall be completed prior to final system inspection.

### 3.2 SOUND SYSTEMS FINAL TESTING AND EQUALIZATION

- A. Installer shall perform thorough preliminary testing of the Sound Systems prior to the final inspection by the Consultant. All systems and subsystems shall be tested to ensure that they are in proper working order and meet the performance specifications outlined in Part 3.3 below. Perform preliminary programming and setup of digital signal processors as necessary to conduct these tests.
- B. The completed Sound Systems shall be physically inspected by the Consultant to assure that all equipment is installed in a neat and professional manner, and in accordance with these Specifications. The Audio-Video systems shall be

inspected and equalized by the Consultant, BAI, Austin, Texas with assistance from the Installer. Provide a minimum of two weeks' notice to the Consultant for final inspection and equalization.

- C. The testing and equalization work shall be performed after the installation work has been completed, but prior to any use of the system. During the testing and equalization work, the Installer shall have on the job site one (1) competent technician who is familiar with the project, and who will be prepared to stay as long as his services are needed. It is estimated that approximately twelve (12) hours will be required for this work.
- D. The process of equalizing and testing the system may necessitate moving and adjusting certain loudspeakers. Adjustments shall be performed without claim for additional payment.
- E. Coordinate as necessary to ensure a totally quiet room during the Audio-Video systems testing and balancing period.
- F. Prior to requesting systems testing, verify the following:
  - 1. All systems are in first-class working condition and free of short circuits, ground loops, parasitic oscillations, excessive system noise beyond published specifications of the equipment, hum, RF interference, or instability of any form.
  - 2. All specified equipment, including loose and portable equipment is on the job site for proper accounting.
  - 3. All loudspeaker circuits have been tested, are connected to the proper crossover frequency, and are in perfect working order. Furnish impedance measurements of each circuit by facsimile transmission prior to final tests.
  - 4. All equipment controls are labeled, even if unused. If permanent labels cannot be furnished prior to system inspection, temporarily label every control as to its function with write-on tape. Supply labels or markers suitable for indicating knob settings after equalization is performed.
  - 5. Operation manuals for every equipment item furnished are on hand at the job site.
  - 6. Installer shall provide all signal processing software loaded on a portable PC and ready for use at time of testing. Installer shall provide a calibrated RTA and microphone, and pink noise generator at time of testing.
- G. Should the performance testing show that the Installer has not properly completed the systems, the Installer shall make all necessary corrections or adjustments and a second demonstration shall be arranged at the Installer's expense.
- H. The final acceptance of the system by the Owner will be based upon the report of the Consultant following inspection, testing, and demonstration. A list of items in need of completion or correction shall be prepared by the Consultant, which must be corrected by the Installer before final acceptance will be granted.

### 3.3 SOUND SYSTEM PERFORMANCE

- A. After equalization and testing, the sound system shall meet or exceed the following specifications:
  - 1. System shall be free of short circuits, ground loops, parasitic oscillation, excessive system noise, hum, RF interference, and instability of any form.
  - 2. Maximum SPL with band-limited pink noise input to the system shall be 100 dB before audible distortion occurs.
  - 3. Seat-to-seat variation in SPL at 4 kHz octave band pink noise shall be within a tolerance of plus or minus 3dB SPL.

4. Acoustic response of the system shall be plus or minus 1.5dB along a line which is flat from 50 Hz to 4 kHz and which rolls off at 1dB per octave to 16 kHz.

#### 3.4 OWNER TRAINING AND FAMILIARIZATION

- A. The Installer shall furnish the Owner's representatives with training necessary to properly operate the systems. Demonstrate in detail all functions of the systems. Provide a minimum of eight (8) full hours of instruction and familiarization for this purpose. The training phase shall be accompanied by complete as-built documentation as described in Section 1.9.
- B. The Installer shall have a qualified representative, familiar with the system, to assist in operation at one (1) scheduled event, selected by the Owner.

**DIVISION 28 – ELECTRONIC SAFETY AND SECURITY**

**28 05 00 – COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY SYSTEMS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. Scope: Design, installation and configuration of an IP based security camera/video surveillance system/door phone system. Submitted proposals should include card readers, cameras, video & access control management software, licensing, video storage devices, POE network switches, cabling, installation/labor costs, training, warranty and any other supplies or materials needed. The proposed video security system shall provide the ability to view, record and retrieve video at specified location.

**1.2 SUBMITTALS**

- A. Product Data: Submit manufacturer's data on Access Control System components including, but not limited to, electrical specifications, mechanical specifications, rough-in diagrams, and instructions for installation, operation and maintenance, suitable for inclusion in Operation & Maintenance manuals.
- B. Shop Drawings: Provide shop drawings showing equipment locations and arrangements to include, but not be limited to, central controllers, reader modules, card reader extenders, proximity card reading sensors, power supplies, switches, door wiring configurations, security camera locations and ancillary equipment. All drawings must be submitted in hard copy and electronic format.
- C. One Line Diagram: Submit a one-line diagram of the system configuration proposed. Submittals indicating typical riser diagrams are not acceptable. All drawings must be submitted in hard copy and electronic format.
- D. Operations & Maintenance Manual: Submit for prior approval, three (3) copies of manufacturer's manual for programming and operating the system and its related components.

**1.3 WARRANTY**

- A. System Components: One (1) year from final acceptance of each system component.

**PART 2 - PERFORMANCE**

**2.1 ACCESS CONTROL SYSTEM**

- A. Procurement, installation and configuration of Access Control System.
- B. Provide support for a minimum of 1000 card holders.
- C. Provide card reader equal to HID iClass Contactless card readers
- D. Provide all necessary Access Control and OS Software Licenses.
- E. Provide Access Control System power supplies and accessories.
- F. Provide capabilities to have custom clearances, schedules and reports.

- G. Provide capabilities for expansion in the future if needed.
- H. Provide campus and district level administrator trainings. (Video Reordered for District)
- I. Provide end user training. (Video Reordered for District)
- J. Provide complete design and installation of an exterior door card swipe system. Include all control equipment, field equipment, all installation labor and materials, all system startup and testing.
- K. The system will allow for monitoring all after hour access to identify individuals, time of entry, place of entry, etc.
- L. Electrical conduit and feeds from existing power sources.
- M. Magnetic locks shall be prohibited due to life safety issues, unless specified otherwise in hardware schedule.
- N. OS Software installation and configuration for server
- O. System Administration
- P. System Operator
- Q. Provide door hardware as per attached hardware schedule
- R. Provide power to doors as per attached hardware schedule
- S. Testing of all devices
- T. Must provide customer with complete set of PDF as built drawings.

## 2.2 IP DOOR CALL STATION

- A. 2-way hands free voice communication with master station.
- B. Call button to initiate call to master station
- C. HID integrated card reader
- D. Color video camera
- E. Provide Remote Access Control to main entry door. Verify exact location, in office area, of control with Owner.
- F. Flush Mount

## 2.3 VIDEO MANAGEMENT SYSTEM (VMS)/VIDEO STORAGE

- A. Provide capabilities for HD Remote Viewing at Principals office for their respective campus. Provide HD Remote viewing at Superintendent's office district-wide. Verify location with District.
- B. Procurement, installation and configuration of VMS, camera licensing and video storage.
- C. Provide for granular access controls for viewing and recording video.



- D. Provide at least one (1) year hardware and software maintenance and support for the VMS system and recording devices. Software maintenance and support shall begin for all devices effective the date of project completion and acceptance by Florence ISD.
- E. Provide campus and district level administrator trainings. (Video Reordered for District)
- F. Provide end user training. (Video Reordered for District)
- G. Provide thirty (30) day retention for each camera.

## 2.4 SECURITY CAMERAS

- A. Procurement, installation and configuration of Security Cameras.
- B. Procurement, installation and configuration of all necessary mounting hardware, cabling and any other miscellaneous materials needed to ensure proper functionality of security cameras.
- C. Proposer should recommend placement of cameras to provide coverage of the following areas:
  - 1. Exterior doors
  - 2. Interior corridors at exterior doors
  - 3. Aim cameras towards mechanical yards, parking lots and in particular school entrances
  - 4. Corridor coverage around bathrooms
  - 5. Interior commons areas such as cafeterias, gyms, foyers, etc.
- D. Interior Cameras (Mnimum)
  - 1. 2 Megapixel
  - 2. Compression – H.264, MPEG-4, MJPEG
  - 3. Lens – 2.8 – 10mm
  - 4. 30fps maximum frame rate
  - 5. Resolution – HD 1080p
  - 6. IEEE 802.3af Power over Ethernet
  - 7. 10/100 Ethernet (RJ-45) Connector
  - 8. Day/Night (IRC or intensifier)
  - 9. Activity/Motion Detection
  - 10. Event management – Alarm Output/Email/FTP
  - 11. Power over Ethernet

E. Exterior Cameras (Minimum)

1. 2 Megapixel
2. Compression – H.264, MPEG-4, MJPEG
3. IR Illumination
4. Lens – 2.8 – 10mm
5. 30fps maximum frame rate
6. Resolution – HD 1080p
7. IEEE 802.3af Power of Ethernet
8. 10/100 Ethernet (RJ-45) Connector
9. 1k10 impact resistant
10. IP66 weather rated
11. Day/Night (IRC or intensifier)
12. Activity/Motion Detection
13. Event management – Alarm Output/Email/FTP
14. Power over Ethernet

F. Other Camera Installation Requirements

1. The selected proposer is responsible for ensuring that all penetrations are sealed and weatherproof/fire-stopped
2. The selected proposer is responsible for ensuring the integrity of any camera housings/mounts included in this project
3. Cameras must be mounted in dust/water/impact resistant domes/enclosures.
4. Florence ISD will approve the proposed installation locations and final aiming/focus of cameras
5. The selected proposer is responsible for correcting any mounting/aiming/focusing deficiencies identified prior to completion of the project
6. Deconstruct existing cameras and cabling (Optional)

## 28 13 13 - ACCESS CONTROL SYSTEM

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Scope: Work of this Section includes all labor and materials required for adding components to an existing system. New components shall be provided as indicated on the Drawings and specified herein. Work shall provide for operation though any existing access controls systems of the Owner. Section includes specifications for an electronic access control system, which shall perform the following general services:
- B. Access Control for openings.

#### 1.2 DESCRIPTION OF WORK

- A. The work covered by this Specification shall include all labor, equipment, materials, ancillary materials and services to furnish, install, test, and turnover additional components added to an existing system to provide a complete and operational Access Control System (ACS), as described herein and in the contract drawings.
- B. Access Control System will manage access to the following areas of the buildings and grounds using existing district encoded proximity cards.
  - 1. Exterior and Interior Doors
- C. The extent of Access Control System work is defined as including, but not limited to:
  - 1. Reader Control Panels.
  - 2. Card reader interface modules.
  - 3. Proximity card reading sensors.
  - 4. Wiring, power supplies, switches and ancillary equipment.
  - 5. Wireless readers and panel interfaces
- D. Requirements are indicated elsewhere in these specifications for work including, but not limited to, raceways and electrical boxes and fittings required for installation of control equipment and wiring.
- E. Phasing of Work
  - 1. The work shall be performed in the following sequence:
- F. Commissioning of the new system components.

#### 1.3 SYSTEM DESCRIPTION

- A. General Access Control System Description:
  - 1. The Access Control System (ACS)'s primary function is to regulate access through specific portals to secured areas.

2. The microprocessor based controllers, with reader modules, shall be capable of controlling, at a minimum 16 card reader inputs and 2 door outputs (expandable to 16 per controller).

**B. Access Control System Hardware**

1. The configuration of the access control system shall be capable of meeting the following minimum performance and capacity requirements:
  - a. The access control system must incorporate distributed area processing, allowing the field hardware to make access decisions, based on stored and programmed memory, independent of communication with the host software.
  - b. The system must be capable of communicating via 10/100 Base T Ethernet Connection.
  - c. The minimum data transfer speed between controllers, reader interfaces and between controllers and host shall be 9,600 baud.
  - d. Provide necessary batteries to be used with UPS power supply to maintain all controller and module operations and provide limited DC lock power at either 12VDC or 24VDC.

**1.4 SUBMITTALS**

- A. **Product Data:** Submit manufacturer's data on Access Control System components including, but not limited to, electrical specifications, mechanical specifications, rough-in diagrams, and instructions for installation, operation and maintenance, suitable for inclusion in Operation & Maintenance manuals.
- B. **Shop Drawings:** Provide shop drawings showing equipment locations and arrangements for the Access Control System to include, but not be limited to, central controllers, reader modules, card reader extenders, proximity card reading sensors, power supplies, switches, door wiring configurations and ancillary equipment. All drawings must be submitted in hard copy and electronic format.
- C. **One Line Diagram:** Submit a one-line diagram of the system configuration proposed. Submittals indicating typical riser diagrams are not acceptable. All drawings must be submitted in hard copy and electronic format.
- D. **Operations & Maintenance Manual:** Submit for prior approval, three (3) copies of manufacturer's manual for programming and operating the system and its related components.

**1.5 QUALITY ASSURANCE**

- A. **Pre-Approved Security Contractors:**
  1. Texas Lock & Closer Inc. San Antonio, Texas 78201. Contact Mike Skinner 1-210-732-6273.
  2. Openings Solutions Georgetown, Texas 78628. Contact Tony Boatman 1-512-423-3148.
- B. **System Checkout:**
  1. **Pre-testing:** All components and assemblies of the control unit are to be pre-tested prior to installation.
  2. **Burn-in:** 30 days at normal operating conditions or equivalency.

3. On-site testing: Security Contractor shall functionally test each component in the system after installation to verify proper operation and confirm that the wiring and dressing conform to the wiring documentation.

## 1.6 WARRANTY

- A. System Components: One (1) year from final acceptance of each system component.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Power: All ACS equipment shall operate on 120-VAC. Any special power treatment required, such as filtering or spike elimination that may be required for proper operation and protection of the ACS, shall be provided with the system.
- B. Backup Power: ACS equipment shall be supplied from a UPS system, which may be tied to emergency building power circuits. The UPS shall power the equipment including, but not limited to, access control processors, modules, electronic locks, panel interface modules and lock power supplies for a minimum of 4 hours.
- C. Hardware: Provide a distributed access control system as required for a complete operating system as described herein and as shown on the schedule.

### 2.2 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
  1. Access Control System Hardware/Firmware/Software:
    - a. Vanderbilt Industries, Inc.
  2. Proximity Card Readers:
    - a. XceedID or Schlage Electronics. Match Existing District cards.
- B. Product Requirements: No Substitutions Permitted.

### 2.3 MATERIALS AND COMPONENTS

- A. Access Control System Hardware/Firmware
  1. Approved Products:
    - a. VRCNX-R Reader Controller, as manufactured by Vanderbilt Industries. No Substitutions.
    - b. VRINX Reader Interface Module, as manufactured by Vanderbilt Industries. No Substitutions.
    - c. PIM-485-SMS Wireless Interface Panel, as manufactured by Vanderbilt Industries. No Substitutions.
    - d. VIONX-8 Memory Expansion Boards, as manufactured by Vanderbilt Industries. No Substitutions.
- B. Proximity Card Reader (Reader):

1. General:
  - a. Proximity Card Reader (Reader) shall connect to the Reader Interface Module via data-line as specified by the manufacturer.
2. Approved Products:
  - a. Type: Standard Gang (MT15) Schlage Electronics aptiQ. No Substitutions.
  - b. Type: Mullion Mount (MT11) Schlage Electronics aptiQ. No Substitutions.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Prior to bidding, examine the project for nature, scope and intent of all work to be performed.
  1. Submission of a bid or proposal will constitute that examination has been made, and any difficulties foreseen identified and noted.
    - a. Any claims for labor, work, materials or equipment for difficulties encountered which should have been foreseen, shall not be recognized; and will be taken care of by the security contractor at no additional cost to Owner.

#### 3.2 DELIVERY

- A. Verify product delivery meets with date of completion.

#### 3.3 PREPARATION

- A. Furnish any inserts required for building into concrete, masonry, and other work, to support and attach work of this section. Furnish in ample time to comply with schedule of work into which inserts are built.
- B. Verify that power and outlets are in correct locations.
- C. Verify that building structure is properly prepared for mounting, attachment and support of equipment.
- D. Report in writing to the Owner any prevailing conditions that will adversely affect satisfactory execution of Work in this Section.
- E. Care shall be exercised at all times to protect property. Ladders shall not be placed against wallpapered or finished surfaces, equipment or furnishings. Desks or countertops shall not be used in lieu of ladders.
- F. By beginning Work, security contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to Owner.

#### 3.4 INSTALLATION -GENERAL

- A. Prior to installation of systems components and devices, verify all required preparations have properly occurred and that substrates are acceptable for installation.
  1. Verify all rough-ins and field dimensions.

2. Report any discrepancies or unsatisfactory conditions.
  - a. Do not begin work until unsatisfactory conditions have been corrected.
  - b. Owner consultant reserves the right to review proposed methods of construction/installation, reject proposed methods, and have the installation done in a satisfactory method at the security contractor's cost.
  - c. Installation constitutes acceptance of responsibility for performance.
- B. Install work in accordance with manufacturer's recommendations, instructions and final shop drawings.
  1. Installer shall be direct certified account of Vanderbilt Industries.
- C. Begin installation of electronic components only when the following is met, in each installation area:
  1. All wet work is completed.
  2. Area is dust free
  3. All work is completed in regard to painting
- D. Anchor components securely in place, plumb, level, and accurately aligned. Provide separators and isolators to prevent corrosion and electrolytic deterioration.
- E. Protect installed equipment from damage and soilage.
- F. Touch up minor scratches and abrasions with manufacturer's touch-up paint.
- G. Furnish and install all fastenings, plates and other incidental items required for complete and operational installation.
- H. Provide required low voltage electrical work in accordance with code requirements.

### 3.5 WIRING

- A. Clearly identify points of connection for wiring from all access control components to door control components at openings.
- B. Install all wiring connecting all system components and controlled and monitored devices.
- C. Install all transformers, relays and other accessories.
- D. Install all cable, and perform all cable splicing and equipment terminations.
- E. Pull continuously between connections where possible.
- F. Install electronic systems wiring and cabling in conduit or raceway, as required on drawings and schedules.
  1. Pulling cables and wires:

- a. Do not force or pressure in a manner, which will stretch, break or damage jacket. 1) Use an inert anti-friction material to assist in pulling wire. 2) Pull all cables and wires to be installed in a raceway all at one time.

### 3.6 SYSTEM PROGRAMMING

- A. The security contractor shall work with the owner and his representative to insure that the new components will be properly programmed into the existing system.

### 3.7 FINAL TESTING AND ACCEPTANCE

- A. The security contractor shall develop a Final Test and Acceptance (FTA) Plan. The plan shall identify each new system component provided in the work, intent of test, method or methods of test and expected results. Each component listed in the plan shall include space for test part signatures, brief comments, time of test and pass/fail check boxes. The FTA plan shall be submitted to Owner representative 30 days prior to the scheduled final test.
- B. Provide manufacturer's supervision of final testing of each system.
- C. Each system must test free from interference, opens, grounds, and short circuits.

### 3.8 OPERATIONAL DEMONSTRATION TEST (BURN-IN)

- A. Following completion of the Final Test, the system shall undergo a thirty (30) day Operational Demonstration Test (ODT) or Burn-In period. This operational demonstration period shall start when all specified systems and equipment have been installed and "Substantial Completion" is reached, with only a moderate number of punch list items remaining. During this period, the system shall be operated under a normal facility traffic load for no less than 30 days. If any item or system fails during the ODT, the 30-day burn-in period shall be suspended for that item until repaired or replaced. Once repaired or replaced, the burn-in period shall recommence. Final system acceptance of the entire project shall be withheld until after successful completion of this operational demonstration period for all systems and components.

### 3.9 CLEANING, TOUCH-UP AND PROTECTION

- A. Cleaning and Touchup: Immediately after installation, including the completion of wiring and testing, clean all work and touchup all damaged factory finishes.
- B. Protection: Provide protective covers, fenders, and barriers as necessary to maintain Work of this Section in same condition as installed.

### 3.10 ACCEPTANCE

- A. System Warranty shall not start until Acceptance. Acceptance shall be withheld until the following activities have been successfully completed:
  - 1. Acceptance of all submittals.
  - 2. Delivery of final documentation.
  - 3. Successful Final Test and Inspection
  - 4. Successful Operational Demonstration Test
  - 5. Successful training and demonstration, including operation of systems using the manuals.



**DIVISION 31 – EARTHWORK**

**31 00 00 - EARTHWORK**

**PART 1 - GENERAL**

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUMMARY - This Section includes the following:
  1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings.
  2. Excavating and backfilling for buildings and structures.
  3. Subbase course for concrete walks and pavements.
  4. Base course for asphalt paving.
  5. Subsurface drainage backfill for walls and trenches.
  6. Excavating and backfilling trenches within building lines.
  7. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
- 1.3 DEFINITIONS
  1. Backfill: Soil materials used to fill an excavation.
  2. Base Course: Layer placed between the subbase course and asphalt paving.
  3. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
  4. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
  5. Excavation: Removal of material encountered above subgrade elevations.
  6. Fill: Soil materials used to raise existing grades.
  7. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material 3/4 cu. yd. or more in volume that when tested by an independent geotechnical testing agency, according to ASTM D 1586, exceeds a standard penetration resistance of 100 blows/2 inches.
  8. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
  9. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.
  10. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
  11. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
- 1.4 SUBMITTALS: Submit Material Test Reports from a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
  1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
  2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.
  3. Laboratory compaction curve according to ASTM D 1557 for each on-site or borrow soil material proposed for fill and backfill.
- 1.5 PROJECT CONDITIONS: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated. Notify Architect not less than two days in advance of proposed utility interruptions. Do not proceed with utility interruptions without Architect's written permission. Contact utility-locator service for area where Project is located before excavating. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

**PART 2 - PRODUCTS**

- 2.1 SOIL MATERIALS:
  - A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

- B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Backfill and Fill: Satisfactory soil materials.
- E. Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2- inch sieve and not more than 12 percent passing a No. 200 sieve.
- F. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- H. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- I. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2- inch sieve and 0 to 5 percent passing a No. 8 sieve.
- J. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.
- L. Landscape Gravel: Washed granite gravel, with all aggregate consistently graded between 1/8" & 1/2" & no fines.

## 2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility.
- B. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides.
- C. Landscape weed barrier: Equal to DeWitt Pro-5, 5 ounce woven, needle-punched polypropylene fabric.

## PART 3 - EXECUTION

- 3.1 PREPARATION: Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- 3.2 DEWATERING: Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

- 3.3 EXCAVATION, GENERAL: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation. Rock excavation includes removal and disposal of rock.
- 3.4 EXCAVATION FOR STRUCTURES: Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections. Do not disturb bottom of excavation. Excavate to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
- 3.5 EXCAVATION FOR WALKS AND PAVEMENTS: Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.
- 3.6 EXCAVATION FOR UTILITY TRENCHES: Excavate trenches to indicated gradients, lines, depths, and elevations. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated. Clearance: 12 inches on each side of pipe or conduit. Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade. Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
- 3.7 APPROVAL OF SUBGRADE: Notify Geotechnical Engineer when excavations have reached required subgrade. If Geotechnical Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- 3.8 UNAUTHORIZED EXCAVATION: Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.
- 3.9 STORAGE OF SOIL MATERIALS: Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
- 3.10 FILL: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material. Place and compact fill material in layers to required elevations as follows:
  1. Under grass and planted areas, use satisfactory soil material.
  2. Under walks and pavements, use satisfactory soil material.
  3. Under steps and ramps, use engineered fill.
  4. Under building slabs, use engineered fill.
  5. Under footings and foundations, use engineered fill.
- 3.11 SUBBASE AND BASE COURSES: Install separation fabric on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends. Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 1557. Under pavements and walks, place subbase course on prepared subgrade and as follows:
  1. Place base course material over subbase.
  2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
  3. Shape subbase and base to required crown elevations and cross-slope grades.
  4. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
  5. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

- 3.12 UTILITY TRENCH BACKFILL: Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with concrete to elevation of bottom of footings. Place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- 3.13 MOISTURE CONTROL: Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.
- 3.14 COMPACTION OF BACKFILLS AND FILLS: Place and compact backfill in excavations promptly. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure. Compact soil under structures, building slabs, steps, and pavements, scarify and recompact top 6 inches of existing subgrade and each layer of backfill or fill material at 95 percent. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 92 percent. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.
- 3.15 GRADING: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Provide a smooth transition between adjacent existing grades and new grades. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances. Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances: plus or minus 1 inch.
- 3.16 SUBSURFACE DRAINAGE: Place a layer of drainage fabric around perimeter of drainage trench as indicated. Place a 6-inch course of filter material on drainage fabric to support drainage pipe. Encase drainage pipe in a minimum of 12 inches of filter material and wrap in drainage fabric, overlapping sides and ends at least 6 inches. Compact each course of filter material to 95 percent of maximum dry unit weight according to ASTM D 698.
- 3.17 FIELD QUALITY CONTROL: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.
- 3.18 PROTECTION: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.
- 3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS: Transport surplus satisfactory soil to designated storage areas on Owner's property. Spread excess soil as directed by Civil Engineer. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.
- 3.20 EROSION CONTROL: Take necessary measures during the construction period to control eroded soil, or any foreign substance, from entering any drainage or waterway.

## **31 05 04 - GENERAL SITEWORK REQUIREMENTS**

### **PART 1 - GENERAL**

- 1.1 SCHEDULING: All required traffic and safety control devices must be in place and inspected prior to the commencing of construction, and comply with any requirements of municipal authorities. No work adjoining to or within the City's Right-Way shall be made prior to giving the governing municipal authority a minimum of 48 HOURS notice.
- 1.2 DUST CONTROL: The Contractor shall use all necessary means to prevent dust from being a nuisance or hazard to the public and adjoining landowners during construction.
- 1.3 UNDERGROUND UTILITIES: Coordination with underground utility companies shall be made by the Contractor prior to construction. Locations indicated on plans are approximate. Contractor is responsible for locating & marking all underground utility lines & the repair of any encountered during construction. Should the Utility Company require that their forces repair any damage, the Contractor shall reimburse.
- 1.4 SUBMITTALS: The Contractor shall submit in writing, for review, data & samples of proposed construction materials. The data supplied shall be sufficiently detailed to prove suitability of the item and its adherence to the Specifications. The Engineer may require preliminary samples of materials for independent testing prior to final approval.
- 1.5 APPLICABLE PUBLICATIONS: The following publications, by reference below, form a part of this specification: Texas State Department of Highways and Public Transportation (SDH&PT), Standard Specifications for Construction of Highways, Streets and Bridges, 1982, Division No. I, II, III, & V; Construction Bulletin, C-12, Asphaltic Concrete Paving Mixtures, April, 1984.
- 1.6 TREE PROTECTION: There will be no construction, change in grade, or storage of materials within 10' of any tree. Any damage to trees will be charged against the Contractor. Provide adequate protection measures for any tree in the construction area. Professionally trim any tree limbs interfering with the construction in the presence of the Engineer's representative.
- 1.7 STORM WATER POLLUTION PREVENTION PLAN: The Contractor shall be responsible for meeting the requirements of the TPDES General Permit No. TXR150000 and is considered the "Operator" and shall prepare a Storm Water Pollution Prevention Plan where required and adhere to the requirements set forth therein. The Contractor shall provide the Owner and Engineer with copies of all documentation associated with the plan.
- 1.8 REVEGETATION: All areas regraded by construction operations shall be revegetated per Section 02488.

PART 2 - NOT APPLICABLE

PART 3 - NOT APPLICABLE

## 31 10 00 - SITE CLEARING

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all Site Clearing, as shown on the Drawings, specified herein, and as needed for a complete and proper installation. Clear and grub trees, stumps, vegetation, debris, rubbish, and designated improvements from site.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.

### PART 2 - PRODUCTS

- 2.1 Not Applicable

### PART 3 - EXECUTION

- 3.1 PROTECTION: Protect trees, landscaping, site improvements, and other items not scheduled for clearing, or that might be damaged by construction activities. Do not stockpile materials and restrict traffic within drip line of trees. Provide and maintain temporary guards to encircle trees or groups of trees; obtain approval before beginning work. Water vegetation as required to maintain health. Cover temporarily exposed roots with wet burlap and backfill as soon as possible. Coat cut plant surfaces with approved emulsified asphalt plant coating. Repair or replace vegetation which has been damaged or pay damages.
- 3.2 EROSION CONTROL: Provide temporary erosion and dust control as required by governing authority. Prevent erosion and siltation of streets, catch basins and piping. Control windblown dust.
- 3.3 STRIPPING: Remove heavy growths of grass before stripping. Strip 6" minimum of topsoil and stockpile at designated location on-site. Remove from site any stones, foreign matter and weeds.
- 3.4 BELOW GRADE IMPROVEMENTS: Remove below grade improvements at least 12" below finish grade and to the extent necessary to not interfere with new construction. Completely remove all improvements including stumps and debris except for those indicated to remain. Remove abandoned mechanical and electrical work as required.
- 3.5 DISPOSAL: Remove waste materials and unsatisfactory topsoil from site and dispose of in a legal manner or spread on-site as directed by Owner.

## 31 23 17 - TRENCH SAFETY

### PART 1 - GENERAL

- 1.1 DESCRIPTION: This item shall govern all trench excavation greater than five (5) feet in depth, if anticipated by indication on the Plans or required due to encountered field conditions. A "trench" shall be defined as an excavation greater in depth than in width.
- 1.2 COORDINATION: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. The requirements of other sections may affect the work under this section. Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases or work may be properly coordinated without delays or damage to any parts of the work.
- 1.3 GENERAL: Any trench greater than five (5) feet of depth shall have sloping areas in accordance with current OSHA regulations or be supported by an adequate trench protective system prepared by an experienced qualified person or qualified engineer. Before submitting a bid, each Contractor may, at his own expense, make such investigations and tests as the Contractor may deem necessary to determine a bid for performance of the work in accordance with the Contract Documents. Access for such investigations and tests must be coordinated with the Owner.
- 1.4 INDEMNIFICATION: The Contractor shall indemnify and hold harmless the Owner, Architect and Engineer, its employees and agents, from any and all damages, costs (including, without limitation, legal fees, court costs, and the cost of investigation), judgments or claims by anyone for injury or death of persons resulting from the collapse or failure of trenches constructed under this contract. The Contractor acknowledges and agrees that this indemnity provision provides indemnity for the Owner and Engineer in the case the Owner and/or Engineer is negligent either by act or omission in providing for trench safety, including, but not limited to inspections, failure to issue stop work orders, and the awarding of bid to the Contractor.

### PART 2 - MATERIAL – NOT APPLICABLE

### PART 3 - EXECUTION

- 3.1 GENERAL: Trench safety systems shall be accomplished in accordance with the detailed specifications set out in the provisions of EXCAVATIONS, TRENCHING AND SHORING, FEDERAL OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS, 29 CFR, PART 1926, SUBPART P, as amended, including Proposed Rules published in the FEDERAL REGISTER (Volume 52, Page 72) on Wednesday, April 15, 1987. The sections that are incorporated into these Specifications by reference include SECTIONS 1926-650 through 1926-653. Legislation that has been enacted by the TEXAS LEGISLATURE (H.B. No. 665) with regard to Trench Safety Systems, is hereby incorporated, by reference, into these Specifications. The Contractor is responsible for obtaining a copy of all sections of the FEDERAL REGISTER, OSHA regulations and STATE OF TEXAS requirements as current and applicable to trench protective system safety.
- 3.2 ANGLE OF REPOSE: Side sloping method shall be allowed in lieu of trench protective systems only in areas, if any, indicated on the Plans and/or approved by the Engineer. Sloping sides shall be in accordance with current OSHA requirements and shall vary as soil classifications along the excavation vary. The Contractor shall be responsible for expense of additional pavement repair, if applicable, proportional to slope of the excavation.
- 3.3 TRENCH PROTECTIVE SYSTEM/SHORING: A trench protective system requires "DESIGN BY A QUALIFIED PERSON OR A QUALIFIED ENGINEER," (For example, see 1926.652(b)(3) and 1926.652(c)(4). The Contractor shall provide for inclusion in the Contract Documents in the above mentioned design.
- 3.4 SAFETY PROGRAM: The Contractor shall provide to the Engineer and Owner a safety program specifically for the construction of trench excavation. The trench safety program shall be in accordance with OSHA STANDARDS governing the presence and activities of individuals working in and around the trench excavation.

- 3.5 INSPECTION: The Contractor shall make daily inspections of the Trench Safety Systems to ensure that the system meets OSHA requirements. Daily inspections are to be made by a "competent person" provided by the Contractor. If evidence of possible cave-ins, or slides, is apparent, all work in the trench shall cease until the necessary precautions have been taken by the Contractor to safeguard personnel entering the trench. It is the sole duty, responsibility and prerogative of the Contractor, not the Owner or the Engineer, to determine the specific applicability of the designed trench safety systems to each field condition encountered on the project. The Contractor shall maintain a permanent record of daily inspections.



## 31 31 16 - TERMITE CONTROL

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUMMARY: This Section includes Soil treatment for termite control.
- 1.3 SUBMITTALS: Treatments and application instructions, including EPA-Registered Label. Product Certificates: Signed by manufacturers of termite control products certifying that treatments furnished comply with requirements. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- 1.4 SOIL TREATMENT APPLICATION REPORT: After application of termiticide is completed, submit report for Owner's record information.
- 1.5 QUALITY ASSURANCE: A PCO who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment in jurisdiction where Project is located and who is experienced and has completed termite control treatment similar to that indicated for this Project and whose work has a record of successful in-service performance. Comply with all requirements of Texas "Structural Pest Control Board" & EPA.
- 1.6 COORDINATION: Coordinate soil treatment application with excavating, filling, and grading and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs, before construction.

### PART 2 - PRODUCTS

- 2.1 SOIL TREATMENT: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in a soluble or emulsible, concentrated formulation that dilutes with water or foaming agent, and formulated to prevent termite infestation. Use only soil treatment solutions that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA-Registered Label. Subject to compliance with requirements, provide Termidor SC, Dominion 2L or approved equal.

### PART 3 - EXECUTION

- 3.1 EXAMINATION: Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of the soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.
- 3.2 PREPARATION: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparing substrate. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil and around foundations. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended by termiticide manufacturer. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.
- 3.3 APPLICATION, GENERAL: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.
- 3.4 APPLYING SOIL TREATMENT: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly. Apply under all building foundations on grade. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions. Post warning signs in areas of application. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

## **31 32 13 - LIME SOIL STABILIZATION**

### **PART 1 - GENERAL**

- 1.1 SCHEDULING: All required traffic and safety control devices must be in place and inspected prior to the commencing of construction, and comply with any requirements of municipal authorities. No work adjoining to or within the City's Right-Way shall be made prior to giving the governing municipal authority a minimum of 48 HOURS notice.
- 1.2 DUST CONTROL: The Contractor shall use all necessary means to prevent dust from being a nuisance or hazard to the public and adjoining landowners during construction.

### **PART 2 - PRODUCTS**

- 2.1 SUBBASE STABILIZATION MATERIALS: for Type B Stabilization, materials listed in FDOT 914-2.
- 2.2 STABILIZING MATERIAL: pebble lime, slurry lime, or lime pressure injection, at a rate of 3.92 lbs/SF.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Do not start stabilized subbase operations until all piping, conduits, cables and other items to be placed underground beneath pavement areas are installed, inspected, accepted, and their trenches backfilled and compacted.
- B. Install and backfill storm drainage inlets, manholes and other structures within or adjacent to pavement areas before subbase operations begin. Upper portions of some structures which rest on subbase may be constructed after subbase is completed, but before limerock base operations begin.
- C. Examine areas where, and conditions under which, paving work is to be performed. Notify Contractor in writing, with a copy to Architect, of conditions detrimental to proper and timely completion of the Work. Do not commence work until unacceptable conditions have been corrected.
- D. After subbase stabilizing agent has been blended into soil and rolled, no open cut trenches into stabilized subbase will be allowed. If necessity arises to install lines beneath pavement area after subbase has been prepared, such installations shall be by boring or jacking method.

#### **3.2 LIMEROCK-STABILIZED SUBBASE**

- A. Have testing agency test existing subbase material for LBR value and to determine the quantity of limerock material which must be blended into soil to achieve LBR-30.
- B. Provide depth of subgrade shown on Drawings blended with limerock material to provide a firm and unyielding subbase having a minimum 30 Limerock Bearing Ratio (LBR) value. Minimum depth of limerock material to be blended with the subgrade soil: 3 in., loose measurement.
- C. Before spreading limerock stabilizing agent, surface of subgrade shall be approximately parallel to finished surface of pavement and shall be at elevations which will produce final elevations after spreading, blending, and compacting so that none of the top portion of subbase will be wasted in blade-grading to shown elevations. Spread limerock stabilizing agent with a mechanical spreader and blend into subgrade with a rotary tiller.

- D. Then have testing laboratory test the blended mixture to assure that a minimum bearing value of 30 LBR has been attained. After the 30 LBR value has been verified, compact stabilized subbase for its entire depth and width to minimum density of 98 percent of maximum attainable density as determined by Modified Proctor test, AASHTO T180.
- E. Blade surface of subbase to conform to lines and grades shown on Drawings. Check for required depth by use of a string line pulled tightly over tops of grade stakes. Have testing agency make additional determinations of depth and density at locations requested by Architect.

## **31 48 00 - DRILLED PIERS**

### **PART 1 - GENERAL**

- 1.1 WORK INCLUDED: Bored end bearing drilled piers with steel shaft liners or casing as required. Concrete placement and reinforcing steel.
- 1.2 RELATED WORK:
  - A. Geotechnical Data: Soils report.
  - B. Quality Control: Testing laboratory services.
  - C. Excavation: Excavation to working level.
  - D. Concrete Reinforcement: Requirements for concrete reinforcement.
  - E. Cast-in-Place Concrete: Requirements for concrete and placement of grade beams.
- 1.3 REFERENCES: ACI 336.1 - Construction of End Bearing Drilled Piers.
- 1.4 QUALIFICATIONS: Installer: Company specializing in performing the work of this section with minimum 3 years documented experience.
- 1.5 SHOP DRAWINGS: Submit shop drawings under provisions of Section 01300. Indicate details and schedules of pier installation, identify recommended pier lengths and diameters to suit design loads, and reinforcing requirements.
- 1.6 CONSTRUCTION INSPECTION & TESTING: Coordinate inspection & testing of this item under the requirements of Section 01 45 23.
- 1.7 PROJECT RECORD DOCUMENTS: Submit copies of project records and drawings under provisions of Section 01 32 00. Accurately record:
  - A. Sizes, depths, and location of actual piers.
  - B. Sequence of placing.
  - C. Base and head elevations.
  - D. Drilled hole diameter.

### **PART 2 - PRODUCTS**

- 2.1 MATERIALS:
  - A. Temporary Shaft Liners (as required): ASTM A252, Grade 2 one length steel pipe with plain ends; of diameters and weight per lineal foot indicated.
  - B. Concrete Materials and Mix: Specified in Section 03 30 00.
  - C. Reinforcement: Specified in Section 03 20 00.
  - D. Equipment: Appropriate to dewater excavated shaft.

### **PART 3 - EXECUTION**

- 3.1 PREPARATION: Verify site conditions will support equipment for performance of pier placement operations. Protect structures near the work from damage. Prepare to place piers from excavated working elevation. Use placement method which will not cause damage to nearby structures.
- 3.2 INSTALLATION: Drill concentric pier shafts to depths and diameters indicated. Place steel shaft liners immediately after drilling and inspection of pier shafts if free water is encountered. Jack firmly in place. Clean pier of loose material immediately after drilling and placing shaft liners. Maintain shafts free of water. Allow inspection of pier shafts prior to reinforcing steel and concrete placement. Prevent foreign matter from falling into shaft. Place reinforcing steel in accordance with Section 03200. Place concrete in accordance with Section 03300. Use equipment designed for vertical placement of concrete. Use tremie for placement of concrete which requires a fall of 15 feet or greater. Provide dowels for connection of grade beams. Place concrete through tremie if an inflow of subsurface water occurs. Place concrete to height sufficient to effect seal.
- 3.3 CONCRETE TESTING: Perform concrete testing under provisions of Section 01 45 23.
- 3.4 TOLERANCES:
  - A. Maximum Variation from Vertical: 1 inch.
  - B. Maximum Variation from Design Top Elevation: Plus 3 inches, minus 1 inch.
  - C. Top: Maximum 2 inches from location indicated.
- 3.5 NON-CONFORMING PIERS: Non-Conforming Piers: Piers that are placed out of position or are damaged. Provide additional piers or supplement piers to meet specified requirements.
- 3.6 MEASUREMENT AND PAYMENT: Bids shall be based on number of drilled piers, design length from top elevation to bottom of shaft, and diameter of shaft, as shown on Drawings. Payment for drilled piers will be made on actual net volume of drilled piers in place and accepted. The actual length and shaft diameter may vary to coincide with elevation where satisfactory bearing strata is encountered, and with actual bearing value determined by testing services, and with stability and characteristics of soil strata. Adjustments will be made on net variation of total quantities, based on design dimensions for shafts and bells. There will be no additional compensation for excavation, concrete fill, reinforcing, casings, or other costs due to unauthorized overexcavating shafts. No payment will be made for rejected drilled piers. Prices quoted include full compensation for labor, materials, tools, equipment, and incidentals required for excavation, trimming, shoring, casings, dewatering, reinforcing, concrete, and other items for complete installation. Unit prices for the following items, as set forth in contract conditions, will apply in event additions to or deductions from work are required and authorized by a written order from the Architect to the Contractor; include a separate statement of unit prices with bid.
  - A. Soil excavation per cubic yard.
  - B. Rock excavation per cubic yard.
  - C. Permanent steel casings, installed per lineal foot.
  - D. Reinforcing steel and dowels, installed per pound.
  - E. Concrete per cubic yard.

**DIVISION 32 – EXTERIOR IMPROVEMENTS**

**32 01 17 - FLEXIBLE PAVING REPAIR**

**PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all HMAC repairs, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The Drawings, Bidding Requirements, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.

**PART 2 - MATERIALS**

- 2.1 COARSE AGGREGATE. The coarse aggregate shall be that retained on a No. 10 Sieve, consisting of clean, tough, durable fragments of stone, crushed blast furnace slag, crushed gravel, gravel, or combinations, of uniform quality throughout.
- 2.2 FINE AGGREGATE. Fine aggregate shall pass the #10 sieve, & consist of sand, screening or a combination. The plasticity index of fine aggregate passing the #40 sieve shall be less than 6 per test method TEX-106-E. Sand shall be of durable stone particles free from foreign matter. Stone screening will be from a crushing operation of the same material as coarse aggregate, with 100% passing the 3/8" sieve & 0-30% passing the #200 sieve.
- 2.3 MINERAL FILLER. Mineral filler shall consist of thoroughly dry stone dust, portland cement or other mineral dust, free from foreign matter, approved by the Architect or Engineer. Meet the following grading requirements per SDH&PT Bulletin C-14: 100% passing #30 sieve; 90% minimum passing #80 Sieve; 65% minimum passing #200 sieve.
- 2.4 ASPHALTIC MATERIAL: Asphalt for the paving mixture shall meet the requirements of the Texas SDH&PT ITEM 300, "ASPHALTS, OILS AND EMULSIONS" & be compatible with the mineral aggregates used. Submit this material for approval.
- 2.5 TACK COAT. The asphaltic material for tack coat shall meet the requirements for cut-back asphalt RC-2, or be a cut-back asphalt of 50% to 70% asphaltic material & 30% to 50% gasoline or kerosene. RC-2 may be diluted with gasoline or kerosene, not to exceed 15%. Asphaltic materials shall meet the requirements of the Texas SDH&PT item 300, "Asphalts, Oils and Emulsion".
- 2.6 PAVING MIXTURES: The paving mixture shall consist of a uniform mixture of coarse aggregate, fine aggregate and asphaltic material. When tested in accordance with Texas SDH&PT Bulletin C-14, conform to TYPE "D", fine graded surface course. The Contractor shall submit for approval, a mix design.

**PART 3 - EXECUTION**

- 3.1 PREPARATION: Remove any loose existing pavement material at areas of deterioration to a solid substrate. Replace absent base material as required to achieve a uniform depth with adjacent material.
- 3.2 TACK COAT: The surface shall be given a uniform application of tack coat with an approved sprayer at a rate not to exceed 0.10 gal/sy. Tack Coat shall be applied just prior to beginning of HMAC overlay to a surface.
- 3.3 PLACING: When properly compacted the finished pavement will be smooth, of uniform density and meet cross sections and surface tests. Prevent splattering of adjacent items. Adjacent to other construction the surface shall be finished uniformly high to meet flush upon compaction. Asphaltic material shall not be placed when the general weather conditions, in the opinion of the Architect or Engineer, are NOT suitable.
- 3.4 COMPACTING: The pavement shall be compressed thoroughly and uniformly to the required density with approved equipment & methods. The surface of the pavement after compression, shall be smooth and true to the established line, grade and cross section.

## 32 01 30 - OPERATION & MAINTENANCE OF SITE IMPORVEMENTS

### PART 1 - GENERAL

- 1.1 SCHEDULING: All required traffic and safety control devices must be in place and inspected prior to the commencing of construction, and comply with any requirements of municipal authorities. No work adjoining to or within the City's Right-Way shall be made prior to giving the governing municipal authority a minimum of 48 HOURS notice.
- 1.2 DUST CONTROL: The Contractor shall use all necessary means to prevent dust from being a nuisance or hazard to the public and adjoining landowners during construction.
- 1.3 UNDERGROUND UTILITIES: Coordination with underground utility companies shall be made by the Contractor prior to construction. Locations indicated on plans are approximate. Contractor is responsible for locating & marking all underground utility lines & the repair of any encountered during construction. Should the Utility Company require that their forces repair any damage, the Contractor shall reimburse.
- 1.4 SUBMITTALS: The Contractor shall submit in writing, for review, data & samples of proposed construction materials. The data supplied shall be sufficiently detailed to prove suitability of the item and its adherence to the Specifications. The Architect may require preliminary samples of materials for independent testing prior to final approval.
- 1.5 APPLICABLE PUBLICATIONS: The following publications, by reference below, form a part of this specification: Texas State Department of Highways and Public Transportation (SDH&PT), Standard Specifications for Construction of Highways, Streets and Bridges, 1982, Division No. I, II, III, & V; Construction Bulletin, C-12, Asphaltic Concrete Paving Mixtures, April, 1984.
- 1.6 TREE PROTECTION: There will be no construction, change in grade, or storage of materials within 10' of any tree. Any damage to trees will be charged against the Contractor. Provide adequate protection measures for any tree in the construction area. Professionally trim any tree limbs interfering with the construction in the presence of the Architect's representative.
- 1.7 STORM WATER POLLUTION PREVENTION PLAN: The Contractor shall be responsible for meeting the requirements of the TPDES General Permit No. TXR150000 and is considered the "Operator" and shall prepare a Storm Water Pollution Prevention Plan where required and adhere to the requirements set forth therein. The Contractor shall provide the Owner and Engineer with copies of all documentation associated with the plan.
- 1.8 REVEGETATION: All areas regraded or disturbed by construction operations shall be revegetated.
- 1.9 ALSO SEE GEOTECHNICAL REPORT IN APPENDIX

### PART 2 - PRODUCTS

- 2.1 Not Applicable

### PART 3 - EXECUTION

- 3.1 Not Applicable

## 32 11 23 - FLEXIBLE BASE

### PART 1 - GENERAL

- 1.1 DESCRIPTION. This item shall consist of furnishing and placing a flexible base course to a minimum compacted thickness. Work shall be in accordance with lines, grades and typical sections indicated on the Plans.
- 1.2 COORDINATION: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. The requirements of other sections may affect the work under this section. Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.

### PART 2 - MATERIALS.

- 2.1 GENERAL: The materials shall be crushed as necessary to meet the requirements specified, and shall consist of durable coarse aggregate particles mixed with approved binding materials. Material must meet prior approval by the Architect & the following:

RETAINED ON SIEVE	%
1-3/4"	0
7/8"	8-30
3/8"	30-50
#4	45-65
#40	70-80
Maximum Liquid Limit of Binder	35
Maximum Plast. Index of Binder	12
Maximum Wet Ball Mill	40
Maximum Los Angeles Abrasion	4
THD Triaxial Class	1

Min. compressive strength: 45 @ 0 psi  
lateral & 175 @ 15 psi lateral.

### PART 3 - EXECUTION

- 3.1 PLACEMENT AND COMPACTION. The material shall not be placed adjoining concrete curb and gutter until a minimum of 2 consecutive days cure time. The material shall be delivered and placed in approved vehicles. Material deposited shall be spread and shaped by the same day of delivery unless otherwise approved by the Engineer. The material shall be bladed to position for compaction in a maximum of four (4) inch lifts. Each lift of material shall be moistened to achieve optimum moisture content. Each lift of material shall be rolled and compacted to achieve a minimum of 100% optimum density. Throughout the entire operation, the course shall be maintained by blading. All areas and "nests" of segregated course or fine material shall be corrected or removed and replaced with well-graded material, as directed by the Engineer. If additional binder is considered desirable or necessary after the material is spread and shaped, it shall be furnished and applied in the amount directed by the Engineer. Such binder material shall be carefully and evenly incorporated with the material in place by scarifying, harrowing, brooming or by other approved methods. The surface upon completion shall be smooth and in conformity with the typical section shown on the Plans and to the established lines and grades. All irregularities, depressions or weak spots which may develop shall be corrected immediately by scarifying the areas affected, adding suitable material as required, reshaping and recompacting by moistening and rolling. Should the preceding lifts or final section due to any reason or cause, lose the required stability, density and finish before the succeeding lift or surfacing is complete, it shall be recompacted and refinished at the Contractor's expense.
- 3.2 DENSITY: In-place density shall be tested upon completion of compaction, moistening and shaping of material to final grade. Total Specified Depth(s) specified shall be compacted to a minimum of 95% of optimum density and moistened to a minimum 90% of optimum moisture content. In-Place testing shall be accomplished by an independent testing firm and the random locations and spacing as directed by the Engineer. The Owner shall pay for the first testing for each location. The Contractor shall pay for each retake of in-field density per location if necessary at the rate per test established by the independent testing firm. Field density determination shall be made in accordance with TEST METHOD TEX-115-E as outlined in TEST METHOD TEX-114-E.
- 3.3 EQUIPMENT. Equipment necessary for proper prosecution of the work shall be on the project and approved by the Engineer prior to the beginning of construction operations. All equipment used shall be maintained in a satisfactory working condition. The



Contractor shall employ adequate methods in performing the work and shall conduct his operations in a satisfactory and workmanlike manner.

- 3.4 MAINTENANCE. The Contractor shall be required within the limits of this contract to maintain the site in good condition, until all work has been completed and accepted. Maintenance shall include immediate repair of any defects that may occur. This work shall be done by the Contractor at his entire expense, and shall be repeated as often as may be necessary to keep the area continuously intact. The Contractor shall not start or continue work without the expressed approval of the Engineer. The Engineer shall inspect the overall operation, sample the material and perform field density tests at his operation during the work. Material for testing and all rework for compliance shall be provided at the Contractor's expense. All additional testing and control shall be at the Contractor's expense. If the construction is deficient, the deficient area, as determined by the Engineer, shall be torn out and properly replaced entirely at the Contractor's expense.

## 32 12 13 - PRIME COATS

### PART 1 - PART 1 GENERAL

- 1.1 DESCRIPTION. This item shall consist of an application of a specified emulsion on the completed base course and/or other approved area in accordance with these Specifications. Prime coat shall not be applied when the air temperature is below 35 deg. F. and falling. The air temperature is taken in the shade and away from artificial heat. The material shall not be placed when general weather conditions, in the opinion of the Engineer, are not suitable.
- 1.2 COORDINATION: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. The requirements of other sections may affect the work under this section. Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.

### PART 2 - MATERIALS.

- 2.1 GENERAL: The emulsion material used for the prime coat shall when tested by approved laboratory methods meet the requirements of the TxDOT, ITEM 300, "ASPHALTS, OILS AND EMULSIONS". Article 300.2 Materials, Subarticle (6) Emulsions. The table of Cationic Emulsions is supplemented by the following:

Type	Curing Seal, Slow Setting
Grade	EPR-I

Description. EPR-I shall be a slow curing emulsion of petroleum resin and asphalt cement. This material may be used to form a curing seal for base and other specified materials. For use, EPR-I may be diluted with water up to a maximum of three (3) parts water to one (1) part EPR-1 in order to achieve the desired concentration of residual resin/asphalt and facilitate application.

Properties.	Min.	Max.
Furol Viscosity at 77 F,	14	40
Residue by Evaporation, % by weight	60	
Sieve Test, %	0.1	
Particle Charge Test	Positive	
Tests on the Distillation Residue:		
Flash Point, C.O.C. (F)	400	
Kinematic viscosity @ 140 F (CST)	190	350

- 2.2 PRODUCT QUALITY. The material shall only be used when maintained within manufacturer's recommendations and the following: Stored in a storage tank free of loose residue, water, trash and other solutions. Storage tank(s) shall be vented and have a minimum 2" outlet. Shall be stored since manufacture no longer than 2 years and with no separation. If allowed to freeze, concentrated material shall be recirculated until reblending is achieved. Diluted material shall be agitated or circulated when stored greater than 7 days prior to use.
- 2.3 EQUIPMENT. All storage tanks, piping, retorts, booster tanks and distributors used in storing and handling asphaltic material shall be kept very clean and in good operating condition at all times, and they shall be operated in such a manner that there will be no contamination of the material with foreign material. It shall be the responsibility of the Contractor to provide and maintain in good working order a recording thermometer at the storage unit at all times. The distributor shall have been recently calibrated and the Engineer shall be furnished an accurate and satisfactory record of such calibration. After beginning the work, should the yield on the material applied appear to be in error, the distributor shall be calibrated in a manner satisfactory to the Engineer before proceeding with the work.

### PART 3 - EXECUTION

- 3.1 APPLICATIONS. When, in the opinion of the Engineer, the area and/or base is satisfactory to receive the prime coat, the surface shall be cleaned by sweeping or other approved methods. If found necessary by the Engineer, the surface shall be lightly sprinkled just prior to application of the asphaltic material. The asphaltic material shall be applied on the clean surface by an

approved type of self-propelled pressure distributor so operated as to distribute the material in the quantity specified, evenly and smoothly under a pressure necessary for proper distribution. The Contractor shall provide all necessary facilities for determining the rate at which it is applied, and for securing uniformity at the junction of two distributor loads.

3.2 APPLICATION/DILUTION RATE. The material shall be placed at a minimum rate of 0.25 GAL/S.Y. at the following dilution rates prior type of application:

1.	CURING SEAL	3:1	Water to EPR-I
	Base, CSB & Subgrade		0.25 GAL/S.Y.
2.	SOIL EROSION	6:1	Water to EPR-I
			0.25 GAL/S.Y.
3.	DUST CONTROL	10:1	Water to EPR-I
			0.25 GAL/S.Y.

3.3 APPLICATION TEMPERATURE. The Engineer will select the temperature of application based on the temperature-viscosity relationship that will permit application of the asphalt within the limits recommended in the TxDOT, ITEM 300, "ASPHALTS, OIL AND EMULSIONS". The recommended range for the viscosity of the asphalt is 50 seconds to 60 seconds, SAYBOLT FURAL. The Contractor shall not apply the emulsion at an ambient temperature less than 35 deg., material temperature less than 32 deg., surface temperature less than 35 deg. F. Traffic shall not be allowed on the primed surface for a minimum of one (1) hour. Traffic shall be limited and/or avoided on the primed surface for a minimum of four (4) hours.

3.4 PRECEDING OPERATIONS and/or paving shall not be allowed on the primed surface for a minimum of four (4) hours unless a lesser period is determined satisfactory by the Engineer.

3.5 MAINTENANCE. The Contractor shall be responsible for the maintenance of the surface until the work is accepted by the Engineer. No traffic, hauling or placement of any subsequent courses shall be permitted over the freshly applied prime coat for a period of 4 hours or as authorized by the Engineer.

3.6 CLEANING. Prime on concrete areas shall be removed immediately before resin cures by applying high pressure water and soap. If prime is allowed to cure on concrete, solvents shall be used. This also applies to non-porous surfaces such as cars by using lanolin cleaners, mineral spirits or any industrial solvent.

## 32 12 16 - ASPHALT PAVING

### PART 1 - GENERAL

- 1.1 DESCRIPTION. This item shall consist of hot-mix asphaltic concrete overlay composed of a single application of tack covered with a specified depth of HMAC TYPE PAVEMENT in accordance with these Specifications. This item shall consist of a base course, a leveling-up course, a surface course or any combination of these courses, each to be composed of a compacted mixture of mineral aggregate and asphaltic material. The mixture, when designed and tested in accordance with these Specifications shall meet the following requirements: The pavement mixture shall be placed upon a one course surface treatment as herein specified and in accordance with the details shown on the Plans. The surface and concrete gutter edges shall be tack coated prior to placement. The paving mixture shall have a minimum cohesiometer value of 100.

IN-PLACE THICKNESS: 1-1/2" MINIMUM.	
LABORATORY DENSITY (SDH&PT BULLETIN C-14).	
Minimum .....	94 percent
Maximum .....	99 percent
Optimum .....	97 percent
STABILITY (TxDOT BULLETIN C-14). Not less than 30%, except when otherwise shown on the Plans.	
IN-PLACE DENSITY (TEST METHOD TEX-207-F).	

It is the intent of this Specification that the material be placed and compacted to a density of 93% to 100% of that density developed in the laboratory test method for molding stability specimens. Sufficient field density tests will be made in order to determine that the compaction procedure used by the Contractor is adequate and proper to accomplish the intent as stated above.

- 1.2 COORDINATION: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. The requirements of other sections may affect the work under this section. Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.3 INSPECTION AND TESTING: The Contractor shall notify the Engineer 48 hours before starting operation to permit inspection and approval of equipment and proposed procedures. The Contractor shall, at least 48 hours before starting operations, supply the Engineer with a typed list of equipment and machinery to be used on the job under this Specification and the name of the responsible Superintendent who will be available on the site during operations. Under no circumstances shall the Contractor start or continue work without the expressed approval of the Engineer. The Engineer shall inspect the overall operation, sample the material for laboratory density, stability, and extractions, and perform field density tests at his option during the work. Certified delivery tickets showing tonnage placed into the job and total number of square yards of paving laid shall be supplied to the Engineer for each day's work. Mix design testing and retesting as required and all rework for compliance shall be provided at the Contractor's expense. All job testing and inspection shall be at the Contractor's expense. Final payment shall be withheld until at least 2 locations selected at random have been cored by the Engineer to check thickness and quality, and a certificate of compliance has been issued by the Engineer.

### PART 2 - MATERIALS.

- 2.1 MINERAL AGGREGATES. The mineral aggregate shall be composed of a coarse aggregate, a fine aggregate, and if required, a mineral filler. Samples of coarse aggregate, fine aggregate and mineral filler shall be submitted and approval of both material and of the source of supply must be obtained from the Engineer prior to delivery. It shall contain not more than 1% per weight of organic matter, clays, loam or pebbles coated therewith as determined by TEST METHOD TEX-217-F. Mineral aggregate from each source shall meet the quality tests specified herein. The combined mineral aggregate, after final processing by the mixing plant, and prior to addition of asphalt and mineral filler, shall have a sand equivalent value of not less than 50, when subjected to the sand equivalent test, TEST METHOD TEX-203-F. Mineral aggregate from each source shall meet the tests specified herein.
- 2.2 COARSE AGGREGATE. The coarse aggregate shall be that part of the aggregate retained on a No. 10 Sieve; shall consist of clean, tough, durable fragments of stone, crushed blast furnace slag, crushed gravel, gravel, or combinations thereof as hereinafter

specified, of uniform quality throughout. Coarse aggregate will be tested in accordance with TEST METHOD TEX-217-F(II) (DECANTATION) and material removed shall not be more than 2% by weight. The coarse aggregate shall have an abrasion of not more than 40% loss by weight when subjected to the LOS ANGELES ABRASION TEST, TEST METHOD TEX-410-A.

- 2.3 FINE AGGREGATE. The fine aggregate shall be that part of the aggregate passing the No. 10 sieve and shall consist of sand or screenings or a combination of sand and screenings. The plasticity index of that part of the fine aggregate passing the No. 40 Sieve shall be not more than 6 when tested by TEST METHOD TEX-106-E. Sand shall be composed of durable stone particles free from injurious foreign matter. Screenings shall be of the same or similar material as specified for coarse aggregate. Fine aggregate from each source shall meet plasticity requirements. Stone screenings shall be the result of a crushing operation and meet the following grading requirements.

Passing the 3/8" Sieve ..... 100

Passing the No. 200 Sieve ..... 0-30

When authorized by the Engineer, stone screenings containing particles larger than 3/8 inch may be used but only that portion of the material passing the 3/8 inch sieve shall be considered as fulfilling the requirements for screenings when a minimum percentage of screenings is required for a particular mixture.

- 2.4 MINERAL FILLER. The mineral filler shall consist of thoroughly dry stone dust, slate dust, portland cement or other mineral dust approved by the Engineer. The mineral filler shall be free from foreign and other injurious matter. When tested by the method outlined in TxDOT BULLETIN C-14, it shall meet the following grading requirements:

Passing a No. 30 Sieve ..... 100

Passing a No. 80 Sieve ..... 90

Passing a No. 200 Sieve ..... 65

- 2.5 PAVING MIXTURE. Asphalt for the paving mixture shall be of the type of oil asphalt as determined by the Engineer and shall meet the requirements of the TxDOT ITEM 300, "ASPHALTS, OILS AND EMULSIONS". The grade of asphalt used shall be as designated by the Engineer after design tests have been made using the mineral aggregates that are to be used in the project. The subcontractor shall notify the Engineer of the source of his asphaltic material prior to the production of the asphaltic mixture and this source shall not be changed during the course of the project except on written permission of the Engineer.

- 2.6 TACK COAT. The asphaltic material for tack coat shall meet the requirements of cut-back asphalt made by combining 50% to 70% by volume of the asphaltic material as specified for the type of paving mixture with 30% to 50% by volume of gasoline and/or kerosene. If RC-2 cut-back asphalt is used, it may, upon instructions from the Engineer, be diluted by the addition of an approved grade of gasoline and/or kerosene, not to exceed 15% by volume. Asphaltic materials shall meet the requirements of the TxDOT ITEM 300, "ASPHALTS, OILS AND EMULSIONS".

- 2.7 PAVING MIXTURE TYPES. The paving mixture shall consist of a uniform mixture of coarse aggregate, fine aggregate and asphaltic material. The asphaltic material shall form from 4 to 8% of the mixture by weight, or from 9 to 19 percent of the mixture by volume. The grading of each constituent of the mineral aggregate shall be such as to produce, when properly proportioned, a mixture, which when tested in accordance with TxDOT BULLETIN C-14, will conform to the limitations for master grading given below:

PERCENT AGGREGATE BY WEIGHT OR VOLUME  
TYPE "D" (FINE GRADED SURFACE COURSE):

Passing 1/2" Sieve.....100

Passing 3/8" Sieve.....85 to 100

Passing 3/8" Sieve, retained on #4 Sieve..21 to 53

Passing No.4 Sieve, retained on#10 Sieve..11 to 32

Total Retained on No. 10 Sieve.....54 to 74

Passing #10 Sieve, retained on #40 Sieve...6 to 32

Passing #40 Sieve, retained on #80 Sieve...4 to 27

Passing #80 Sieve, retained on #200 Sieve...3 to 27  
 Passing # 200 Sieve.....1 to 8

- 2.8 MIX DESIGN. The Contractor shall submit to the Engineer for approval, at least 7 days prior to field operations, a Mix Design based on these Specifications and prepared by an approved laboratory in accordance with TxDOT C-14. This design may be one prepared by the subcontractor for this job or may be a workable design prepared previously for the same constituents. Information furnished to the Engineer for his approval of the Mix Design shall include the proposed gradation and asphaltic material type and percentage in accordance with his requirements in these Specifications. Also, the submitted laboratory back-up data will include:

- A. Hot bin gradations of material from proposed plant.
- B. Plot of % Density vs. % Asphalt.
- C. Plot of % Voids vs. Asphalt.
- D. Hveem Stability vs. % Asphalt.
- E. Cohesimeter Value vs. Asphalt.
- F. Certification that LOS ANGELES ABRASION, DECANTATION, PLASTICITY INDEX, AND SAND EQUIVALENT requirements can be met by the aggregates proposed for use.
- G. Bulk specific gravity of each aggregate.
- H. Weather absorption of each aggregate in accordance with TEST METHOD TEX-201-F.

The actual Job Mix Design may be adjusted from Mix Design after field operations are begun by written authorization of the Engineer, should it be necessary. It is the intent of these Specifications that the Job Mix Design utilize asphalt cement percentages as high as possible without reducing the stability below 30 and increasing the density beyond 98%, subject, however, to the judgment of the Engineer.

- 2.9 TOLERANCES. The Engineer will designate the exact gradation of the aggregate and asphalt content to be used in the mixture. The paving mixture produced shall not vary from the designated aggregate and asphalt content by no more than the tolerances allowed herein and shall remain within the limitations of the master grading specified. The respective tolerances, based on the percentage by weight of the mixture, are listed as follows:

PERCENT BY WEIGHT

Passing 1-3/3" Sieve, retained on 7/8" Sieve ..... plus or minus 4  
 Passing 7/8" Sieve, retained on 3/8" Sieve ..... plus or minus 4  
 Passing 5/8" Sieve, retained on 3/8" Sieve ..... plus or minus 4  
 Passing 3/8" Sieve, retained on No. 4 Sieve ..... plus or minus 4  
 Passing 1/4" Sieve, retained on No. 10 Sieve ..... plus or minus 4  
 Passing No. 4 Sieve, retained on No. 10 Sieve..... plus or minus 4  
 Total Retained on No. 10 Sieve..... plus or minus 4  
 Passing No. 10 Sieve, retained on No. 40 Sieve..... plus or minus 3  
 Passing No. 40 Sieve, retained on No. 80 Sieve..... plus or minus 3  
 Passing No. 80 Sieve, retained on No. 200 Sieve..... plus or minus 3  
 Passing No. 200 Sieve ..... plus or minus 2  
 Asphalt Material ..... plus or minus 0.3

- 2.10 EXTRACTION TEST. Samples of the mixture when tested by the EXTRACTION TEST, TxDOT BULLETIN C-14, shall not vary from the grading proportions of the aggregate and the asphalt content designated by the Engineer no more than the respective tolerance specified above, and shall be within the limits specified for master grading.

2.11 EQUIPMENT: All equipment shall be maintained in good repair and operating condition and shall be approved by the Engineer.

A. MIXING PLANTS. Mixing plants that will not continuously produce a mixture meeting all of the requirements of this Specification will be condemned. Mixing plants may be either the weight-batching type or the continuous mixing type. Both types of plants shall be equipped with satisfactory conveyors, power units, aggregate handling equipment, hot aggregate screens and bins and dust collectors, and shall consist of the following essential pieces of equipment.

1. WEIGHT BATCHING TYPE.

- a. COLD AGGREGATE BIN AND PROPORTIONING DEVICE. The cold aggregate bin shall have at least four compartments of sufficient size to store the amount of aggregate required to keep the plant in continuous operation and of proper design to prevent overflow of material of one bin to that of another bin. The proportioning device shall be of such as will provide a uniform and continuous flow of aggregate in the desired proportion of the dryer. Each aggregate shall be proportioned in a separate compartment.
- b. DRYER. The dryer shall be of the type that continually agitates the aggregate during heating and in which the temperature can be so controlled that aggregate operations required to obtain a mixture of the specified temperature. The burner, or combination of burners, and type of fuel used shall be such that in the process of heating the aggregate to the desired or specified temperature, no residue from the fuel shall adhere to the heated aggregate. A recording thermometer shall be provided which will record the temperature of the aggregate when it leaves the dryer. The dryer shall be of sufficient size to keep the plant in continuous operation.
- c. SCREENING AND PROPORTIONING. The screening capacity and size of the bins shall be sufficient to screen and store the amount of aggregate required to properly operate the plant and keep the plant in continuous operation at full capacity. Provisions shall be made to enable inspection forces to have easy and safe access to the proper location in the mixing plant where representative samples may be taken from the hot bins for testing. The aggregate shall be separated into at least three bins for producing TYPE "D" MIXTURES. If mineral filler is needed, an additional bin shall be provided. These bins shall contain the following sizes of aggregates:
- d. TYPE "D" (FINE GRADED SURFACE COURSE):
  - i BIN NO. 1: will contain aggregates of which 85% to 100% by weight will pass the No. 10 Sieve.
  - ii BIN NO. 2: will contain aggregates of which at least 70% by weight will be of such size as to pass the No. 4 Sieve and shall be retained on the No. 10 Sieve.
  - iii BIN NO. 3: will contain aggregates of which at least 75% of such size as to pass the 1/2" sieve and be retained on the No. 4 Sieve.
- e. AGGREGATE WEIGHT BOX AND BATCHING SCALES. The aggregate weight box and batching scales shall be of sufficient capacity to hold and weigh a complete batch of aggregate. The weigh box and scales shall conform to the requirements of TxDOT ITEM 520, "WEIGHING AND MEASURING EQUIPMENT".
- f. ASPHALTIC MATERIAL BUCKET AND SCALES. The asphaltic material bucket and scales shall be of sufficient capacity to hold and weigh the necessary asphaltic material for one batch. If the material is measured by weight, the bucket and scales shall conform to the requirements of the TxDOT ITEM 520, "WEIGHING AND MEASURING EQUIPMENT". If a pressure type flow meter is used to measure the asphaltic material, the requirements of the TxDOT ITEM 520, "WEIGHING AND MEASURING EQUIPMENT", SHALL APPLY, and an accurate asphaltic material recording meter shall be placed in the asphalt line leading to the spray bar so that the accumulative amount of asphalt used can be accurately determined.

- a. MIXER. The mixer shall be of the pug mill type and shall have a capacity of not less than 1,000 pounds in a single batch. The number of blades and the position of same shall be such as to give a uniform and complete circulation of the batch in the mixer. The mixer shall be equipped with an approved spray bar that will distribute the asphaltic material quickly and uniformly throughout the mixer. Any mixer that has a tendency to segregate the mineral aggregate or fails to secure a thorough and uniform mixing with the asphaltic material shall not be used. This shall be determined by mixing and taking samples from its different parts. This will be tested by the extraction tests and must show the batch is uniform throughout. All mixers shall be provided with an automatic time lock that will lock the discharge doors of the mixer for the required mixing period. The dump door or doors and the shaft seals of the mixer shall be tight enough to prevent the spilling of aggregate or mixture from the pug mill.
- B. CONTINUOUS MIXING TYPE.
  - a. COLD AGGREGATE BIN AND PROPORTIONING DEVICE. Same as for weight-batching type of plant.
  - b. DRYER. Same as for weight-batching type of plant.
  - c. SCREENING AND PROPORTIONING. Same as for weight-batching type of plant.
  - d. HOT AGGREGATE PROPORTIONING DEVICE. The hot aggregate proportioning device shall be so designed that when properly operated a uniform and continuous flow of aggregate into the mixer will be maintained.
  - e. ASPHALTIC MATERIAL SPRAY BAR. The asphaltic material spray bar shall be so designed that the asphalt will spray uniformly and continuously into the mixer.
  - f. ASPHALTIC MATERIAL METER. An accurate asphaltic material recording meter shall be placed in the asphalt line leading to the spray bar so that accumulative amounts of asphalts used can be accurately determined. Provisions of a permanent nature shall be made for checking the accuracy of the meter output.
  - g. MIXER. The mixer shall be of the pug mill continuous type and shall have a capacity of not less than 40 tons of mixture per hour. Any mixer that has a tendency to segregate the aggregate or fails to secure a thorough and uniform mixing of the aggregate with the asphaltic material shall not be used.
  - h. TRUCK SCALES. A set of standard platform truck scales, conforming to TxDOT ITEM 520, "WEIGHING AND MEASURING EQUIPMENT", shall be placed at a location approved by the Engineer.
- C. ASPHALTIC MATERIAL HEATING EQUIPMENT. Asphaltic material heating equipment shall be adequate to heat the amount of asphaltic material required to the desired temperature. Asphaltic material may be heated by steam coils which shall be absolutely tight. Direct fire heating of asphaltic materials will be permitted, provided the heater used is manufactured by a reputable concern and there is positive circulation of the asphalt throughout the heater. Agitation with steam or air will not be permitted. The heating apparatus shall be equipped with a recording thermometer with a 24-hour chart that will record the temperature of the asphaltic material where it is at the highest temperature.
- D. SPREADING AND FINISHING MACHINE. The spreading and finishing machine shall be of a type approved by the Engineer and shall be capable of producing a surface that will meet the requirements of the typical cross section and the surface test.
- E. PNEUMATIC TIRE ROLLERS. The roller shall be an acceptable medium pneumatic tire roller conforming to the requirements of the TxDOT ITEM 213, "ROLLING (PNEUMATIC TIRE), TYPE B, unless otherwise specified on the Plans. The tire pressure of each tire shall be adjusted as directed by the Engineer and this pressure shall not vary by more than 5 pounds per square inch.



- E. TWO AXLE TANDEM ROLLER. This roller shall be an acceptable power driven tandem roller weighing not less than 8 tons.
- F. THREE WHEEL ROLLER. This roller shall be an acceptable power drive three wheel roller weighing not less than 10 tons.
- G. STRAIGHTEDGES AND TEMPLATE. The subcontractor shall provide acceptable straightedges and templates for surface testing as required by the Engineer.

### PART 3 - EXECUTION

- 3.1 STOCKPILING OF AGGREGATES. Prior to stockpiling of aggregates, the area shall be cleaned of trash, weeds and grass and be relatively smooth. Aggregates shall be stockpiled in such a manner as to prevent mixing of one aggregate with another. No coarse aggregate stockpile shall contain more than 15% by weight of material that will pass a No. 10 Sieve except as noted on the Plans or provided for by special provision. Fine aggregate stockpiles may contain small coarse aggregate in the amount of up to 20% by weight, 100% of which shall pass the 1/2" sieve, however, the coarse aggregate shall meet the quality test specified herein for "COARSE AGGREGATES". Suitable equipment of acceptable size shall be furnished by the Contractor to work the stockpiles and prevent segregation of the aggregates.
- 3.2 STORAGE AND HEATING OF ASPHALTIC MATERIALS. The asphaltic material storage shall be ample to meet the requirements of the plant. Asphalt shall not be heated to a temperature in excess of 400 degrees F. All equipment used in the storage and handling of asphaltic material shall be kept in a clean condition at all times and shall be operated in such a manner that there will be no contamination with foreign matter.
- 3.3 FEEDING AND DRYING OF AGGREGATE. The feeding of various sizes of aggregate to the dryer shall be done through the cold aggregate bin and proportioning device in such a manner that a uniform and constant flow of materials in the required proportions will be maintained. The aggregate shall be dried and heated to the temperature necessary to produce a mixture having the specified temperature. In no case shall the aggregate be introduced into the mixing unit at a temperature more than 400 degrees F.
- 3.4 PROPORTIONING. The proportioning of the various materials entering into the asphaltic mixture shall be directed by the Engineer and in accordance with these Specifications. Aggregate shall be proportioned by weight using the weigh box and batching scales herein specified when the weight batch type of plant is used and by volume using the hot aggregate proportioning device when the continuous mixer type of plant is used. The asphaltic material shall be proportioned by weight or by volume based on weight using the specified equipment.
- 3.5 MIXING.
  - A. BATCH TYPE MIXER. In the charging of the weight box and in the charging of the mixer from the weigh box, such methods or devices shall be used as are necessary to secure a uniform asphaltic mixture. In introducing the batch into the mixer, all mineral aggregate shall be introduced first; shall be mixed thoroughly for a period of 5 to 20 seconds, as directed, to uniformly distribute the various sizes throughout the batch before the asphaltic material is added; the asphaltic material shall then be added and the mixing period may be increased, if, in the opinion of the Engineer, the mixture is not uniform.
  - B. CONTINUOUS TYPE MIXER. The amount of aggregate and asphaltic material entering the mixer and the rate of travel through the mixer shall be so coordinated that a uniform texture of the specified grading and asphalt content will be produced.
  - C. The mixture produced from each type of mixer shall not vary from the specified mixture by more than the tolerance herein specified.
  - D. The asphaltic mixture shall be at a temperature between 225 degrees F. and 350 degrees F. at the mixer or paver. The Engineer will determine the temperature, within the above limitations, and the mixture when dumped from the mixer shall not vary from this selected temperature more than 25 degrees F.

- 3.6 CONSTRUCTION METHODS: HMAC Overlay on the tack coating shall not be applied when the air temperature is below 60 degrees F. and is falling or when the temperature has been 35 degrees F. within the 12 hours immediately preceding, is rising. The air temperature shall be taken in the shade away from artificial heat. HMAC overlay shall not be applied when the temperature of the roadway surface is below 60 degrees F. Asphaltic material shall not be placed when the general weather conditions, in the opinion of the Engineer, are NOT suitable.
- 3.7 TACK COAT. The surface shall be given a uniform application of the tack coat under asphaltic materials of this Specification. This tack coat shall be applied, as directed by the Engineer, with an approved sprayer at a rate not to exceed 0.10 gallon per square yard of surface. Where the mixture will adhere to the surface on which it is to be placed without the use of a tack coat, the tack coat may be eliminated only at the direction of the Engineer. All contact surfaces or curbs and structures and all joints shall be painted with a thin uniform coat of the asphaltic material used for the tack coat. Overlay shall not be laid or vehicles moved upon surface until the emulsion breaks (the point when the water particles in the emulsion evaporates and the asphalt particles bond to the old pavement surface. Tack coat shall be applied just prior to beginning of a HMAC Overlay to the approved prepared subsurface. Tack coat shall be applied to any cold pavement just prior to overlaying an adjacent joint(s).
- 3.8 TRANSPORTING ASPHALTIC CONCRETE. The asphaltic mixture, prepared as specified above, shall be hauled to the work site in tight vehicles previously cleaned of all foreign material. The dispatching of the vehicles shall be arranged so that all material delivered may be placed, and all rolling shall be completed during the daylight hours. In cool weather or for long hauls, canvas covers and insulating of the truck bodies may be required. The inside of the truck body may be given a light coating of oil, if necessary, to prevent mixture from adhering to the body.
- 3.9 PLACING.
- A. Generally the asphaltic mixture shall be dumped and spread on the approved prepared surface with the specified spreading and finishing machine in such a manner that when properly compacted the finished pavement will be smooth, of uniform density and will meet the requirements of the typical cross sections and the surface tests. During the application of asphaltic material, care shall be taken to prevent splattering of adjacent pavement, or curb and gutter, and structures.
  - B. In placing a level-up course with the spreading and finishing machine in the forms, binder twine or cord, shall be set to line and grade established by the Engineer. When directed by the Engineer, level-up courses shall be spread with a motor grader.
  - C. When the asphaltic mixture is placed in a narrow strip along the edge of an existing pavement, or used to level up small irregular areas where the use of a finishing machine is not practical, the finishing machine may be eliminated when authorized by the Engineer, provided a satisfactory surface can be obtained by other approved methods.
- 3.10 FLUSH STRUCTURES. Adjacent to the flush curbs, gutters, liner and structures, the surface shall be finished uniformly high so that when compacted it will be slightly above the edge of the curb and flush structure.
- 3.11 COMPACTING.
- A. As directed by the Engineer, the pavement shall be compressed thoroughly and uniformly to the required density. The specified rollers shall be used.
  - B. Rolling with the three wheel and tandem rollers shall start longitudinally at the slides and proceed toward the center of the pavement, overlapping on successive trips by at least half the width of the read wheels. Alternate trips of the roller shall be slightly different in length. Rolling with pneumatic tire roller shall be done as directed by the Engineer. Rolling shall be continued until no further compression can be obtained and all roller marks are eliminated. If the subcontractor elects he may substitute the three axle tandem roller for the two axle tandem roller and/or the three wheel roller, but in no case shall less than two rollers be in use on each job. Additional rollers shall be provided if needed. The motion of the roller shall be slow enough at all times to avoid displacement of the mixture. If any displacement occurs, it shall be corrected at once by the use of rakes and of fresh mixture where required. The roller shall not be allowed to stand on pavement which has not been fully compacted. To prevent adhesion of the surface mixture to the roller, the wheels shall be kept thoroughly moistened with water, but an excess of water will not be permitted. All rollers must in good mechanical condition. Necessary precautions shall be taken to prevent the dropping of gasoline, oil, grease or other foreign matter on the pavement, either when the rollers are in operation or when standing.

- 3.12 HAND TAMPING. The edges of the pavement along curbs, headers, and similar structures and all places not accessible to the roller, or in such position as will not allow thorough compaction with the roller, shall be thoroughly compacted with lightly oiled tamps.
- 3.13 SURFACE. The surface after compression shall be smooth & true to the established line, grade & cross section.
- 3.14 PAVEMENT MARKING PAINT: Apply pavement striping to designate all parking spaces & markings.
- 3.15 MAINTENANCE: The Contractor shall be required within the limits of his contract to maintain the pavement in good condition, until all work has been completed and accepted. Maintenance shall include immediate repair of any defects that may occur. This work shall be done by the Contractor at his entire expense, and shall be repeated as often as may be necessary to keep the area continuously intact. Replacing the course for its full depth, rather than by adding a thin layer of material to the layer in need of repair. The Contractor shall perform preventive maintenance during the one year warranty period to include all labor, material and equipment necessary to maintain the surface in a condition equal to its condition at the final inspection. The Contractor will receive no additional compensation for work performed during the one year warranty period.

## 32 12 17 - TWO COURSE SURFACE TREATMENT

### PART 1 - GENERAL

- 1.1 DESCRIPTION. This section shall consist of multiple surface courses composed of asphaltic material covered with aggregate, constructed on a prepared base material in accordance with these Specifications.
- 1.2 APPLICABLE PUBLICATIONS: Construction and materials shall be in accordance with TxDOT ITEMS 300 and 302, Standard Specifications for Construction of Highways, 1993, which shall be included as applicable to these Specifications.
- 1.3 COORDINATION: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. The requirements of other sections may affect the work under this section. Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 WEATHER CONDITIONS. Shall not be applied when the air temperature is below 60 deg. F. and is falling or when the temperature has been below 50 deg. F. within the 12 hours immediately preceding, and is rising. Air temperature shall be taken in the shade and away from artificial heat. Asphaltic material shall not be placed when the general weather conditions, in the opinion of the Engineer, are not suitable.

### PART 2 - MATERIALS.

- 2.1 BITUMINIOUS MATERIAL. Asphaltic material shall conform to TxDOT Standard Specification For "Asphalts, Oils And Emulsions", Item 300, except the measurement and payment paragraphs shall not apply. Bituminous material delivered to the job shall come from a source approved for use by the TxDOT. The seal number from the tank and the number of the TxDOT laboratory test report shall accompany each shipment. TYPE AC, GRADE 5. Shall be homogeneous, free of water and shall not foam when heated to 347 deg. F.
- 2.2 AGGREGATES. Shall conform to TxDOT, ITEM 302, "Aggregates For Surface Treatment" (Precoat). TYPE PC or PD. GRADE 4 MOD.: As tested by TxDOT TEST METHOD TEX-200-F, PART I, the general requirements shall be as follows:
  - A. Retained on 3/4" Sieve.....0
  - B. Retained on 5/8" Sieve.....0
  - C. Retained on 1/2" Sieve.....0
  - D. Retained on 3/8" Sieve.....0-14
  - E. Retained on No.4 Sieve.....60-70
  - F. Retained on No. 10 Sieve.....99-100
- 2.3 PHYSICAL CHARACTERISTICS: Aggregates shall be composed of clean, tough and durable particles of gravel, crushed stone, or crushed slag. These materials shall not contain more than 5 percent by weight of soft particles and other deleterious material as determined by TEST METHOD TEX-217-F, PART I. The percent of wear, as determined by TEST METHOD TEX-410-A, for each of the materials shall not exceed 35 percent. Crushed gravel shall have a minimum of 85 percent of the particles retained on the No. 4 sieve with more than one crushed face, as determined by TEST METHOD TEX-413-A, (PARTICLE COUNT). The flakiness index for the aggregate, as determined by TEST METHOD TEX-224-F, shall not exceed the value of 17. The aggregate shall not contain more than 1.0 percent by weight of fine dust, clay-like particles and/or silt present when tested in accordance with TEST METHOD TEX-217-F, PART II. Pre-coated aggregates shall be aggregates of the type specified, treated (coated or fluxed) with 0.9 to 2.0 percent by weight of pre-coat material or fluxing material. The grade of aggregate specified shall meet all requirements prior to application of the pre-coat material or fluxing material.
- 2.4 EQUIPMENT.

- A. ASPHALTIC MATERIAL HEATING EQUIPMENT. Asphaltic material heating equipment shall be adequate to heat the amount of asphaltic material required to the desired temperature. Asphaltic material may be heated by steam coils which shall be absolutely tight. Direct fire heating of asphaltic materials will be permitted, provided the heater used is manufactured by a reputable concern and there is positive circulation of the asphalt throughout the heater. Agitation with steam or air will not be permitted. The heating apparatus shall be equipped with a recording thermometer within a 24-hour chart that will record the temperature of the asphaltic material where it is at the highest temperature.
- B. PNEUMATIC TIRE ROLLERS. The roller shall be an acceptable medium pneumatic tire roller conforming to the requirements of the TxDOT ITEM 213, "ROLLING" (PNEUMATIC TIRE), TYPE B, unless otherwise specified on the Plans. The tire pressure of each tire shall be adjusted as directed by the Engineer and this pressure shall not vary by more than 5 pounds per square inch. All equipment shall be maintained in good repair and operating condition and shall be approved by the Engineer.

### PART 3 - EXECUTION

- 3.1 CONSTRUCTION METHODS. The area to be treated shall be cleaned of dirt, dust, or other deleterious matter by sweeping or other approved methods. If it is found necessary by the Engineer, the surface shall be lightly sprinkled just prior to the first application of asphaltic material.

### 3.2 MATERIALS AND APPLICATIONS:

A.	ITEM	APPLICATION
	Asphalt Application Temperature	320 deg. F.
	Asphalt Type & Grade	AC-5
	Asphalt Rate Gal/S.Y.	0.25*
	Aggregate, Type	PC or PD
	Aggregate, Grade	4 MOD.
	Aggregate Rate C.Y./S.Y.	1:120**

\*May be adjusted +/- .05 Gal./S.Y. only at the direction of the Engineer.

\*\*May be altered +/- 1:010 C.Y./S.Y. only at the direction of the Engineer.

- B. Asphaltic material of the type and grade shown shall be applied on the clean surface by an approved type of self-propelled pressure distributor so operated as to distribute the material in the quantity specified, evenly and smoothly, under a pressure necessary for proper distribution. The Contractor shall provide all necessary facilities for determining the temperature of the asphaltic material in all of the heating equipment and in the distributor, for determining the rate at which it is applied, and for securing uniformity at the function of two distributor loads. The distributor shall have been recently calibrated and the Engineer shall be furnished an accurate and satisfactory record of such calibration. After beginning the work, should the yield on the asphaltic material appear to be in error, the distributor shall be calibrated in a manner satisfactory to the Engineer before proceeding with the work.
- C. Asphaltic material may be applied for the full width of the treatment in one application, unless the width exceeds 26 feet. No traffic or hauling will be permitted over the freshly applied asphaltic material. Asphaltic material shall not be applied until immediate covering is assured.

- D. Aggregate, of the type and grade shown, shall be immediately and uniformly applied and spread by an approved self-propelled continuous feed aggregate spreader, unless authorized by the Engineer in writing. The aggregate shall be applied at the approximate rates indicated and as directed by the Engineer.
- E. The entire surface shall then be broomed, bladed or raked as required by the Engineer and shall be thoroughly rolled with a minimum of two each pneumatic rollers.
- F. The Contractor shall be responsible for the maintenance of the surface until the work is accepted by the Engineer. All holes or failures in the surface shall be repaired by use of additional asphalt and aggregate and all fat or bleeding surfaces shall be covered with approved cover material in such manner that the asphaltic material will not adhere to or be picked up on the wheels of vehicles.
- G. Temporary stockpiling of aggregates shall be in an area(s) as coordinated with the Owner and shall be placed so that they neither obstruct nor interfere with roadway drainage. The Contractor shall be responsible for the proper preparation of all stockpile areas before aggregates are placed thereon, including leveling and cleaning of debris necessary for protection of the aggregate to prevent any contamination thereof.
- H. All storage tanks, piping, retorts, booster tanks and distributors used in storing and handling asphaltic materials shall be kept clean and in good operating condition at all times, and they shall be operated in such manner that there will be no contamination of the asphaltic material with foreign material. It shall be the responsibility of the Contractor to provide and maintain in good working order a recording thermometer at the storage heating unit at all times.
- I. The Engineer will select the temperature of application based on the temperature-viscosity relationship that will permit application of the asphalt within the limits recommended by the producer. The recommended range for the viscosity of the asphalt is 50 seconds to 60 seconds, SAYBOLT FURAL. The Contractor shall apply the asphalt at a temperature within 15 deg. F. of the temperature selected.

3.3 STOCKPILING OF AGGREGATES. Prior to stockpiling of aggregates, the area shall be cleaned of trash, weeds and grass and be relatively smooth. Temporary stockpiling of aggregates on the roadway will be permitted provided the stockpiles are spaced not less than 3,000 feet apart and are so placed that they neither obstruct traffic nor interfere with roadway drainage. The Contractor shall be responsible for the proper preparation of all stockpile areas before aggregates are placed thereon, including leveling and cleaning of debris necessary for protection of the aggregate to prevent any contamination thereof.

3.4 STORAGE AND HEATING OF ASPHALTIC MATERIALS. The asphaltic material storage shall be ample to meet the requirements of the plant. Asphalt shall not be heated to the temperature in excess of 400 deg. F. All equipment used in the storage and handling of asphaltic material shall be kept in a clean condition at all times and shall be operated in such a manner that there will be no contamination with foreign matter.

### 3.5 TESTING AND INSPECTION.

- A. ASPHALT. The Contractor will submit to the Engineer certifications by the material suppliers that the asphaltic material is from a source approved for use by the TxDOT, the seal number from the tank, and the number of the TxDOT LABORATORY TEST REPORT, and a certification that the material meets the requirements of this specification for each shipment.
- B. AGGREGATE. A written certification shall be submitted from the supplier certifying that the type of aggregate proposed for use meets the requirements of this specification and will also submit a 30 pound sample of aggregate to the Engineer for possible laboratory investigation. During the course of application, the Engineer may require alternation of procedures if the desired result is not achieved, including rates of asphalt and aggregate application.

- C. EQUIPMENT. Prior to start of operations, the Contractor will provide the Engineer a typed list of equipment to be used on the job and the name of the responsible superintendent on the job. The Contractor will not start or continue work without the expressed approval of the Engineer.
- 3.6 NOTIFICATION OF INTENT TO START CONSTRUCTION. Five working days prior to the start of operations, the Contractor will inform the Engineer of the time, date and location in which he intends to begin. No work will commence on the first day until the Engineer or his representative is on site and has given approval.
- 3.7 COMPLETION OF WORK. Work will not be considered finished until the Engineer has been contacted in due time to inspect all work accomplished and all work is finished to the Engineer's satisfaction.

## **32 14 13 - PRECAST CONCRETE UNIT PAVING**

### **PART 1 - GENERAL**

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.2 SUBMITTALS: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- 1.3 QUALITY ASSURANCE: Engage an experienced Installer who has completed unit paver installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance. Obtain each color, type, and variety of unit pavers, joint materials, and setting materials from a single source with resources to provide products and materials of consistent quality in appearance and physical properties without delaying the Work. Prior to installing unit pavers, construct mockups for each form and pattern of unit pavers required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work, including same base construction, special features for expansion joints, and contiguous work as indicated.
- 1.4 DELIVERY, STORAGE, AND HANDLING: Protect unit pavers and aggregate during storage and construction against soilage or contamination from earth and other materials. Wrap pavers in plastic or use other packaging materials that will prevent rust marks from steel strapping.
- 1.5 PROJECT CONDITIONS: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

### **PART 2 - PRODUCTS**

- 2.1 MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
  - A. Hastings Pavement Co., Inc.
  - B. Pavestone Co.
  - C. Wassau Tile, Inc.; Terra-Paving Div.
- 2.2 COLORS AND TEXTURES: Provide Architect's selections from manufacturer's full range of colors and textures for materials and products of type indicated.
- 2.3 UNIT PAVERS: Solid, interlocking paving units, ASTM C 936, made from normal-weight aggregates in sizes and shapes indicated.
- 2.4 ACCESSORIES - Concrete for Job-Built Edge Restraints: Comply with requirements of Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with minimum 28-day compressive strength of 3000 psi (20 MPa).
- 2.5 AGGREGATE SETTING-BED MATERIALS: Washed gravel or washed crushed stone complying with ASTM C 33 for Size No. 8 for coarse aggregate.
- 2.6 GEOTEXTILE: Woven or nonwoven geotextile manufactured from polyester or polypropylene fibers, with a permeability rating 10 times greater than that of soil on which paving is founded and an AOS (apparent opening size) small enough to prevent passage of fines from leveling course into graded aggregate of base course below.



- 2.7 SAND - Sand for Leveling Course: Fine, sharp, nonplastic aggregate complying with ASTM C 33. Sand for Joints: Fine, sharp, masonry sand with 100 percent passing the No. 16 (1.18 mm) sieve and no more than 10 percent passing the No. 200 (0.075 mm) sieve.

**PART 3 - EXECUTION**

- 3.1 EXAMINATION: Examine surfaces indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit pavers. Do not proceed with installation until unsatisfactory conditions have been corrected.
- 3.2 PREPARATION: Proof-roll prepared subgrade surface to check for unstable areas and areas requiring additional compaction. Do not proceed with installation of unit pavers until deficient subgrades have been corrected and are ready to receive subbase for unit pavers.
- 3.3 INSTALLATION, GENERAL: Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be visible or cause staining in finished work. Mix pavers from several pallets or cubes as they are placed to produce uniform blend of colors and textures. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Where pavers set in mortar bed are indicated as edge restraints for pavers set in aggregate setting bed, install pavers set in mortar first. Cut off mortar setting bed at a steep angle so that it will not interfere with aggregate setting bed. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf (16- to 22-kN) compaction force at 80 to 90 Hz. Perform at least 3 passes across paving with vibrator. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling. Repeat joint-filling process 30 days later.
- 3.4 REPAIR, POINTING, CLEANING, AND PROTECTION: Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment to eliminate evidence of replacement. Provide final protection and maintain conditions in a manner acceptable to Installer that ensures that unit paver work is without damage or deterioration at the time of Substantial Completion.

# 32 14 53 - LIGHTED GLASS PAVERS

## PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for Lighted Glass Pavers, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 SUBMITTALS:
  - A. Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.
  - B. Submit one (1) sample paver of each available color to Architect's office.

## PART 2 - PRODUCTS

- 2.1 MATERIAL: Solar Lighted Pavers:

Main Body	Polycarbonated Plastic
Colors	Red, Orange, Yellow, White, Blue Green
Solar Cell	Silicon Mono-Crystalline Type
Energy Storage	Ultra capacitor (EDLC)
Light Source	4x Super Bright Led
Light Mode	Constant
Charging Time	3 hours under sunlight 6 hours under shade 8 hour under rain
Temp. Range	-4F~167CF (-40C°~75C°)
Structure	Water-Proof
Size	8 x 8x 2 3/8
Weight	5.07lbs (2.3kg)

- 2.2 MANUFACTURE: Equal to Blackson Brick Company, Inc., 3100 Carlisle Suite 125, Dallas, Texas 75204, [www.blacksonbrick.com](http://www.blacksonbrick.com)
- 2.3 OTHER MATERIALS: Furnish and install any supplementary materials, weather or not specifically indicated, required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

## PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Install materials in accordance with manufacturer's instructions and approved submittals. Install materials in proper relation with adjacent construction and with uniform appearance.

## **32 16 00 - CURBS, GUTTERS, SIDEWALKS, AND DRIVEWAYS**

### **PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all Concrete Walkways & Paving, as shown on the Drawings, specified herein, and as needed for a complete and proper installation. Include walkways, ramps, curbs, entry drives & parking areas as indicated on the Drawings.
- 1.2 GENERAL: Minimum clear width - 42". Running slope - 1:20 maximum. Cross slope - 1:50 maximum. Change in level from 0.25" to 0.50" requires 1:2 beveled edge. Change in level greater than 0.50" requires ramp. Surface to be firm, stable & non-slip.
- 1.3 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. The requirements of other sections may affect the work under this section.
- 1.4 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.

### **PART 2 - PRODUCTS**

- 2.1 CONCRETE & ACCESORIES: Concrete, reinforcement, & accessories to be as required in Division 3. Reinforcing to be welded wire mesh and deformed steel bars, or fibermesh reinforcement admixture.
- 2.2 FIBER REINFORCEMENT: In addition to the welded wire fabric use a product equal to Fibermesh 300 micro-reinforcement system for concrete, of 100% virgin homopolymer polypropylene fibrillated fibers containing no reprocessed olefin materials. Manufacture to an optimum gradation for use as concrete secondary reinforcement at a minimum of 0.1% by volume (1.5 lbs/yd<sup>3</sup>, 0.9 kg/m<sup>3</sup>). UL Classified. Complies with National Building Codes and ASTM C III6/C III6M, Type III fiber reinforced concrete.
- 2.3 FINISH: Provide light broom finish. Exterior finishes to be Class C tolerances with true planes within 1/4 in. in 2 ft as determined by a 2-ft straightedge placed anywhere on the slab in any direction.
- 2.4 EXPANSION CONTROL: Provide redwood or preformed fiber joint fillers/sealers.
- 2.5 CURB RAMPS: Provide curb ramp wherever an accessible route crosses a curb, as shown. Maximum slope on 6" curb is 1:10 & a minimum of 36" wide. Do not project into traffic lanes. Provide tactile warnings & paint per TAS requirements.

### **PART 3 - EXECUTION**

- 3.1 PREPARATION: Proof roll sub-base and check for unstable areas. Report unsatisfactory conditions in writing. Beginning paving work means acceptance of sub-base.
- 3.2 INSTALLATION: Comply with concrete section for concrete mix, testing placement, joints, tolerances, finishing, curing, repairs and protection. Provide approximately 1.5" from grade to top of walk elevation unless indicated otherwise. Slope away from buildings.
- 3.3 JOINTS: Provide expansion joints at juncture of other construction & at 24' OC minimum. Provide smooth dowels through expansion joints at 18" OC maximum. Provide scored control joints at 6' OC minimum.
- 3.4 FINISHING: Finish at paving & walks to be fine bristled stiff broom, unless indicated otherwise.

## 32 17 23 - PAVEMENT MARKINGS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Furnish material and apply pavement and curb markings as described in Contract Documents.

#### 1.2 QUALITY ASSURANCE

- A. Regulatory Requirements - Paint handicap spaces to conform to ADA Standards and local code requirements.

#### 1.3 PROJECT CONDITIONS

- A. Apply only on dry surfaces, during favorable weather, and when damage by rain, fog, or condensation not anticipated.
- B. Latex Paint -
  - 1. Atmospheric temperature above 50 deg F.
  - 2. When temperature is not anticipated to drop below 50 deg F during drying period.
  - 3. Alkyd or Chlorinated Rubber Paint -
    - 4. Atmospheric temperature above 40 deg F.
    - 5. When temperature is not anticipated to drop below 40 deg F during drying period.

### PART 2 - PRODUCTS

#### 2.1 PAINT

- A. Non-reflectorized.
  - 1. Types -
    - a. Acrylic Latex for uncured paving
    - b. Alkyd or chlorinated rubber for cured paving
  - 2. Colors -
    - a. Yellow - Parking stripes, crosswalk stripes, and safety markings.
    - b. Blue And White - Handicapped markings.
    - c. Red - Fire lanes and no parking zones.
- B. Acceptable Products And Manufacturers -
  - 1. 442XX Traffic Marking Paint by Devoe, Louisville, KY (800) 654-2616
  - 2. Set-Fast Traffic Marking Paint by Sherwin-Williams, Cleveland, OH (800) 321-8194.
  - 3. Equal as approved by Engineer before installation.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Do not apply acrylic latex systems until paving has cured 7 days minimum. Do not apply alkyd or chlorinated rubber until paving has cured 3 months minimum.
- B. Surfaces shall be dry and free of grease and loose dirt particles. Scrape and wire brush chipped or damaged paint on existing curbs.
- C. Perform layout with chalk or lumber crayon only.

3.2 APPLICATION

- A. Site Tolerances
  - 1. General - Make lines parallel, evenly spaced, and with sharply defined edges.
  - 2. Line Widths -
    - a. Plus or minus 1/4 inch variance on straight segments.
    - b. Plus or minus 1/2 inch variance on curved alignments.
  - 3. Provide two coat application, each coat with coverage of 150 sq ft per gal. Do not apply second coat within three hours minimum or until first coat is thoroughly dried, whichever is longer.

3.3 CLEANING

- A. Remove drips, overspray, improper markings, and paint material tracked by traffic by sand blasting, wire brushing, or other method approved by Engineer prior to performance.

## 32 17 24 - REFLECTORIZED PAVEMENT MARKINGS

### PART 1 - GENERAL:

- 1.1 DESCRIPTION. This Item shall govern for furnishing and placing reflectORIZED pavement markings of the types, colors, shapes, sizes, widths, and thickness.
- 1.2 COORDINATION: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. The requirements of other sections may affect the work under this section. Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.

### PART 2 - PRODUCTS.

- 2.1 Type II Marking Materials. Type II markings are paint-type materials that are applied at ambient or slightly elevated temperatures. Type II marking materials shall conform to Texas Department of Transportation Materials Specifications D-9-8200, YPT-10 and D-9-8290.
- 2.2 Equipment Requirements. Equipment used to place pavement markings shall:
  - A. Be maintained in satisfactory operating condition.
  - B. Have production capabilities considered satisfactory by the Engineer when used to place markings of solid or broken lines.
  - C. Be capable of placing a center-line and no passing barrier-line configuration consisting of one (1) broken line with one (1) solid line at the same time to the standard alignment and spacing.
  - D. Be capable of placing lines with clean edges and of uniform cross-section. All lines shall have a tolerance of plus or minus 1/8 inch per four (4) inch width.
  - E. Apply beads by an automatic bead dispenser attached to the pavement marking equipment in such a manner that the beads are dispensed uniformly and almost instantly upon the marking as the marking is being applied to the road surface. The bead dispenser shall have an automatic cut-off control, synchronized with the cut-off of the pavement marking equipment.

### PART 3 - EXECUTION

- 3.1 General. Unless otherwise shown pavement markings may be applied by any method that will yield markings meeting the requirements of this specification.
- 3.2 Surface Preparation. Pavement to which material is to be applied shall be completely dry. Pavements shall be considered dry if, on a sunny day after observation for 15 minutes, no condensation occurs on the underside of a one (1) foot square piece of clear plastic that has been placed on the pavement and weighted on the edges.
- 3.3 Application of Type II Markings. The application of Type II marking materials shall be done only on surfaces with a minimum surface temperature of 50 F. The application rate for Type II marking material shall be: between 15 and 20 gallons per mile of solid four (4) inch line.

## 32 18 16 - ARTIFICIAL GRASS – MONOFILAMENT 2.5"

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Furnish all labor, materials, tools and equipment necessary to install monofilament artificial grass as indicated on the plans and as specified herein; including components and accessories required for a complete installation. including but not limited to
  - 1. Acceptance of prepared sub-base.
  - 2. Coordination with related trades to ensure a complete, integrated, and timely installation: Aggregate base course, sub-base material (tested for permeability), grading and compacting, piping and drain components (when required); as provided under its respective trade section.

#### 1.2 SUBMITTALS

- A. Substitutions: Other products are acceptable if in compliance with all requirements of these specifications. Submit alternate products to Architect for approval prior to bidding in accordance Section 01 25 13, Product Substitution Procedures.
  - 1. Provide substantiation that proposed system does not violate any other manufacturer's patents, patents allowed or patents pending.
  - 2. Provide a sample copy of insured, non-prorated warranty and insurance policy information.
- B. Comply with Section 01 33 00, Submittals Procedures. Submit for approval prior to fabrication.
- C. Shop Drawings:
  - 1. Indicate field layout; field marking plan and details for the specified sports; i.e., NCAA Football; roll/seaming layout; methods of attachment, field openings and perimeter conditions.
  - 2. Show installation methods and construction indicating field verified conditions, clearances, measurements, terminations, drainage.
  - 3. Provide joint submission with related trades when requested by Architect.
- D. Product Data:
  - 1. Submit manufacturer's catalog cuts, material safety data sheets (MSDS), brochures, specifications; preparation and installation instructions and recommendations; storage, handling requirements and recommendations.
  - 2. Submit fiber manufacturer's name, type of fiber and composition of fiber.
  - 3. Submit data in sufficient detail to indicate compliance with the contract documents.
  - 4. Submit manufacturer's instructions for installation.
  - 5. Submit manufacturer's instructions for maintenance for the proper care and preventative maintenance of the synthetic turf system, including painting and markings.
- E. Samples: Submit samples, 6 x 6 inches, illustrating details of finished product in amounts as required by General Requirements, or as requested by Architect.
- F. Product Certification:

1. Submit manufacturer's certification that products and materials comply with requirements of the specifications.
2. Submit test results indicating compliance with Reference Standards.
- G. Project Record Documents: Record actual locations of seams, drains and other pertinent information in accordance with Specifications and General Requirements.
- H. List of existing installations: Submit list including respective Owner's representative and telephone number.
- I. Warranties: Submit warranty and ensure that forms have been completed in Owner's name and registered with approved manufacturer.
- J. Testing data to the Owner to substantiate that the finished field meets the required shock attenuation, as per ASTM F1936.
- K. Submit Bills of Lading/Material Delivery Receipts for synthetic turf infill materials. Bills of lading shall bear the name of the project/delivery address, quantity of materials delivered, source/location of origin of infill materials and/or manufacturer, and date of delivery.
- L. Testing Certification: Submit certified copies of independent (third-party) laboratory reports on ASTM testing:
  1. Pile Height, Face Weight & Total Fabric Weight, ASTM D5848.
  2. Primary & Secondary Backing Weights, ASTM D5848.
  3. Tuft Bind, ASTM D1335.
  4. Grab Tear Strength, ASTM D1682 or D5034.

### 1.3 QUALITY ASSURANCE

- A. Comply with Section 01 43 00, Quality Assurance.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section. The turf contractor and/or the turf manufacturer:
  1. Shall be experienced in the manufacture and installation of monofilament grass turf for a minimum of three years. This includes use of a monofilament fiber, and the installation method.
  2. Shall have 100 fields in play for at least two years. Fields shall be 65,000 ft² or more
  3. Turf manufacturer shall have installed a minimum of 25 fields that are at least 8 years old, which is equal to the respective warranty period.
  4. Shall have a minimum of 10 installations in the State of Texas.
  5. Shall have a minimum of 100 installations in North America with a monofilament fiber, each field of 65,000 ft² or more.
  6. Shall provide third party certification confirming minimum requirement for tuft bind.
- C. Installer: Company shall specialize in performing the work of this section. The Contractor shall provide competent workmen skilled in this specific type of synthetic grass installation.
  1. The designated Supervisory Personnel on the project shall be certified, in writing by the turf manufacturer, as competent in the installation of specified monofilament material, including sewing seams and proper installation of the infill mixture.



2. Installer shall be certified by the manufacturer and licensed.
3. The installer supervisor shall have a minimum of 5 years experience as either a construction manager or a supervisor of synthetic turf installations
- D. Pre-Installation Conference: Conduct conference at project site at time to be determined by Architect. Review methods and procedures related to installation including, but not limited to, the following:
  1. Inspect and discuss existing conditions and preparatory work performed under other contracts.
  2. In addition to the Contractor and the installer, arrange for the attendance of installers affected by the Work, The Owner's representative, and the Architect.
- E. The Contractor shall verify special conditions required for the installation of the system.
- F. The Contractor shall notify the Architect of any discrepancies.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with Section 01 60 00, Product Requirements.
- B. Prevent contact with materials that may cause dysfunction.
- C. Deliver and store components with labels intact and legible.
- D. Store materials/components in a safe place, under cover, and elevated above grade.
- E. Protect from damage during delivery, storage, handling and installation. Protect from damage by other trades.
- F. Inspect all delivered materials and products to ensure they are undamaged and in good condition.

#### 1.5 SEQUENCING AND SCHEDULING

- A. Coordinate the Work with installation of work of related trades as the Work proceeds.
- B. Sequence the Work in order to prevent deterioration of installed system.

#### 1.6 WARRANTY AND GUARANTEE

- A. See Section 01780 - Closeout Submittals, For Additional Warranty Requirements.
- B. The Contractor shall provide a warranty to the Owner that covers defects in materials and workmanship of the turf for a period of eight (8) years from the date of substantial completion. The turf manufacturer must verify that their representative has inspected the installation and that the work conforms to the manufacturer's requirements. The manufacturer's warranty shall include general wear and damage caused from UV degradation. The warranty shall specifically exclude vandalism, and acts of God beyond the control of the Owner or the manufacturer. The warranty shall be fully third party insured; prepaid for the entire 8 year term and be non-prorated. The Contractor shall provide a warranty to the Owner that covers defects in the installation workmanship, and further warrant that the installation was done in accordance with both the manufacturer's recommendations and any written directives of the manufacturer's representative. Prior to final payment for the synthetic turf, the Contractor shall submit to owner notification in writing that the field is officially added to the annual policy coverage, guaranteeing the warranty to the Owner. The insurance policy must be underwritten by an "AM Best" A rated carrier and must reflect the following values:
  1. Pre-Paid 8-year insured warranty.
  2. Insured Warranty Coverage must be provided in the form of 1 single policy

3. Maximum per claim coverage amount of at least \$10,000,000.
4. Minimum of twenty-five million dollar (\$25,000,000) annual aggregate
5. Must cover full 100% replacement value of total square footage installed, minimum of \$7.00 per sq ft. (in case of complete product failure, which will include removal and disposal of the existing surface)
6. Policies that include self-insurance or self-retention clauses shall not be considered.
7. Policy cannot include any form of deductible amount.
8. Sample policy must be provided at time of bid to prove that policy is in force. A letter from an agent or a sample Certificate of Insurance will not be acceptable.

C. The artificial grass system must maintain a G-max of less than 200 for the life of the Warranty as per ASTM F1936

## 1.7 MAINTENANCE SERVICE

- A. Contractor shall train the Owner's facility maintenance staff in the use of the turf manufacturer's recommended maintenance equipment.
- B. Manufacturer must provide maintenance guidelines to the facility maintenance staff.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Approved manufacturers are as follows:
  1. FieldTurf USA model: XM6-65 2.5" - with 3lbs rubber, 4lbs sand
  2. Hellas model: Matrix 46 2.5" – with 3lbs rubber, 4lbs sand
  3. AstroTurf model: Gameday Grass 3D 52 2.5" - with 3lbs rubber, 4lbs sand

### 2.2 MATERIALS AND PRODUCTS – BASE BID

- A. Artificial grass system materials shall consist of the following:
  1. Carpet made of monofilament polyethylene fibers tufted into a perforated backing.
  2. Infill: Graded sand and cryogenic rubber crumb that partially covers the carpet.
  3. Glue, thread, seaming fabric and other materials used to install and mark the artificial grass monofilament turf.
- B. The installed artificial grass monofilament turf shall have the following minimum properties:

Standard	Property	Specification
ASTM D1577	Fiber Denier	9,000+
ASTM D3218	Tape Thickness	200 Microns
ASTM D5823	Pile Height	2.5"
ASTM D5793	Stitch Gauge	3/8" - 3/4"
ASTM D5848	Pile Weight	40oz/square yard
ASTM D5848	Primary Backing	7oz/square yard
ASTM D5848	Secondary Backing	16+oz/square yard
ASTM D5848	Total Weight	63oz/square yard
ASTM D1335	Tuft Bind (Without Infill)	8+ lbs

ASTM D5034	Grab Tear (Width)	>200 lbs/force
ASTM D5034	Grab Tear (Length)	>200 lbs/force
ASTM D4491	Carpet Permeability	>40 inches/hour
ASTM F1936	Impact Attenuation (Gmax)	<200
	Infill Material Depth	1.75 inches
	Sand Infill Component	4lbs/square foot
	Cryogenic Rubber Infill Component	3lbs/square foot
	Total Product Weight	1066oz/sq. yard

- C. Carpet shall consist of monofilament fibers tufted into a primary backing with a secondary backing.
- D. Carpet Rolls shall be 15' wide rolls.
  - 1. Rolls shall be long enough to go from field sideline to sideline.
  - 2. Where the playing field is for football, the perimeter white line shall be tufted into the individual sideline rolls.
- E. Backing:
  - 1. Primary backing to be comprised of two or more layers of polypropylene fabric.
  - 2. Secondary backing shall consist of an application of porous, heat-activated urethane to permanently lock the fiber tufts in place.
  - 3. Perforated (with punched holes), backed carpet are acceptable.
- F. Infill materials shall be approved by the manufacturer.
  - 1. The infill shall consist of a resilient-layered, granular system, comprising selected and graded sand and Cryogenic SBR rubber crumb. Bill of lading showing rubber is cryogenic rubber will be required.
  - 2. The sand component of the infill must represent at least 50% of the total infill, by weight.
- G. Non-tufted or inlaid lines and markings shall be painted with paint approved by the synthetic turf manufacturer.
- H. Thread for sewing seams of turf shall be as recommended by the synthetic turf manufacturer.
- I. Glue and seaming fabric for inlaying lines and markings shall be as recommended by the synthetic turf manufacturer.

## 2.3 MATERIALS AND PRODUCTS – ALTERNATE

- A. Artificial grass system materials shall consist of the following:
  - 1. Carpet made of monofilament polyethylene fibers tufted into a non-perforated porous backing.
  - 2. Infill: Graded sand and cryogenic rubber crumb that partially covers the carpet.
  - 3. Glue, thread, paint, seaming fabric and other materials used to install and mark the artificial grass monofilament turf.
- B. The installed artificial grass monofilament turf shall have the following properties:

Standard	Property	Specification
ASTM D1577	Fiber Denier	10,800
ASTM D3218	Tape Thickness	235 Microns
ASTM D5823	Pile Height	2.5"

ASTM D5793	Stitch Gauge	3/4"
ASTM D5848	Pile Weight	40oz/square yard
ASTM D5848	Primary Backing	7+oz/square yard
ASTM D5848	Secondary Backing	14+oz/square yard
ASTM D5848	Total Weight	61+oz/square yard
ASTM D1335	Tuft Bind (Without Infill)	8+ lbs
ASTM D5034	Grab Tear (Width)	>200 lbs/force
ASTM D5034	Grab Tear (Length)	>200 lbs/force
ASTM D4491	Carpet Permeability	>40 inches/hour
ASTM F1936	Impact Attenuation (Gmax)	<200
	Infill Material Depth	1.75 inches
	Sand Infill Component	6.2lbs/square foot
	SBR Rubber Infill Component	3lbs/square foot
	Total Product Weight	1386oz/sq. yard

- C. Carpet shall consist of ridged monofilament fibers tufted into a primary backing with a secondary backing.
- D. Carpet Rolls shall be 15' wide rolls.
  - 1. Rolls shall be long enough to go from field sideline to sideline.
  - 2. Where the playing field is for football, the perimeter white line shall be tufted into the individual sideline rolls.
- E. Backing:
  - 1. Primary backing to be comprised of two layers of polypropylene fabric.
  - 2. Secondary backing shall consist of an application of porous, heat-activated urethane to permanently lock the fiber tufts in place.
  - 3. Perforated (with punched holes), backed carpet are unacceptable.
- F. Infill materials shall be approved by the manufacturer.
  - 1. The infill shall consist of a resilient-layered, granular system, comprising selected and graded sand and SBR cryogenic rubber crumb. Bill of Lading will be required proving rubber is cryogenic rubber.
  - 2. The sand component of the infill must represent 50% of the total infill, by weight.
- G. Non-tufted or inlaid lines and markings shall be painted with paint approved by the synthetic turf manufacturer.
- H. Thread for sewing seams of turf shall be as recommended by the synthetic turf manufacturer.
- I. Glue and seaming fabric for inlaying lines and markings shall be as recommended by the synthetic turf manufacturer.

## 2.4 QUALITY CONTROL IN MANUFACTURING

- A. The manufacturer shall own and operate its own manufacturing plant in North America. Both tufting of the field fibers into the backing materials and coating of the turf system must be done in-house by the turf manufacturer. Outsourcing of either is unacceptable.
- B. The manufacturer's full-time in-house certified inspectors shall perform pre-tufting fiber testing on tensile strength, elongation, tenacity, denier, shrinkage, and twist i.e., turns per inch, upon receipt of fiber spools from fiber manufacturer.
- C. The manufacturer shall have its own, in-house laboratory where samples of turf are retained and analyzed, based on standard industry tests, performed by full-time, in-house, certified inspectors.

2.5 QUALITY CONTROL IN FIBER MANUFACTURING

- A. Synthetic turf fiber must perform in a uniform manner or manufacturer quality control issues in the extrusion processes will be suspected. Linear Low Density Polyethylene Polymer ("LLDPE") and batch additives obtained from a reputable manufacturer are required to manufacture superior quality monofilament yarn. The master batch formula must include a UV stabilizer package added to its polymer base.
- B. Adequate UV protection is essential to the long-term durability of any artificial grass fiber. Typically, stabilizer packages for polyethylene fibers have three components that protect the fibers from degradation: (1) primary antioxidants; (2) secondary antioxidants; and (3) UV stabilizers.

2.6 FIELD GROOMER & SWEEPER

- A. Supply field groomer as part of the work.
  - 1. Field Groomer shall include a towing attachment compatible with a field utility vehicle.
  - 2. Field Groomer shall be a FieldTurf GroomRight
  - 3. Field Sweeper shall include a towing attachment compatible with a field utility vehicle.
  - 4. Field Sweeper shall be a FieldTurf SweepRight

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that all sub-base leveling is complete prior to installation.
- B. Installer shall examine the surface to receive the synthetic turf and accept the sub-base planarity in writing prior to the beginning of installation.
  - 1. Acceptance is dependent upon the Owner's test results indicating compaction and planarity are in compliance with manufacturer's specifications.
  - 2. The surface shall be accepted by Installer as "clean" as installation commences and shall be maintained in that condition throughout the process.
- C. Compaction of the aggregate base shall be 95%, in accordance with ASTM D1557 (Modified Proctor procedure); and the surface tolerance shall not exceed 0-1/4 inch over 10 feet and 0-1/2" from design grade.
- D. Correct conditions detrimental to timely and proper completion of Work.
- E. Do not proceed until unsatisfactory conditions are corrected.
- F. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Prior to the beginning of installation, inspect the sub-base for tolerance to grade.
- B. Sub-base acceptance shall be subject to receipt of test results (by others) for compaction and planarity that sub-base is in compliance with manufacturer's specifications and recommendations.
- C. Dimensions of the field and locations for markings shall be measured by a registered surveyor to verify conformity to the specifications and applicable standards. A record of the finished field as-built measurements shall be made.

- D. When requested by Architect, installed sub-base shall be tested for porosity prior to the installation of the monofilament turf. A sub base that drains poorly is an unacceptable substrate

### 3.3 INSTALLATION - GENERAL

- A. The installation shall be performed in full compliance with approved Shop Drawings.
- B. Only trained technicians, skilled in the installation of athletic caliber synthetic turf systems working under the direct supervision of the approved installer supervisors, shall undertake any cutting, sewing, gluing, shearing, topdressing or brushing operations.
- C. The designated Supervisory personnel on the project must be certified, in writing by the turf manufacturer, as competent in the installation of this material, including sewing seams and proper installation of the Infill mixture.
- D. Designs, markings, layouts, and materials shall conform to all currently applicable National Collegiate Athletic Association rules, NFHS rules, and/or other rules or standards that may apply to this type of synthetic grass installation. Designs, markings and layouts shall first be approved by the Architect or Owner in the form of final shop drawings. All markings will be in full compliance with final shop drawings.

### 3.4 INSTALLATION

- A. Install at location(s) indicated, to comply with final shop drawings, manufacturers'/installer's instructions.
- B. The Contractor shall strictly adhere to specified procedures. Any variance from these requirements shall be provided in writing, by the manufacturer's on-site representative, and submitted to the Architect and/or Owner, verifying that the changes do not in any way affect the Warranty. Infill materials shall be approved by the manufacturer and installed in accordance with the manufacturer's standard procedures.
- C. Carpet rolls shall be installed directly over the properly prepared aggregate base. Extreme care shall be taken to avoid disturbing the aggregate base, both in regard to compaction and planarity.
  - 1. Repair and properly compact any disturbed areas of the aggregate base as recommended by manufacturer
- D. Full width rolls shall be laid out across the field.
  - 1. Turf shall be of sufficient length to permit full cross-field installation from sideline to sideline.
  - 2. No cross seams will be allowed in the main playing area between the sidelines.
  - 3. Each roll shall be attached to the next roll utilizing standard state-of-the- art sewing procedures.
  - 4. When all of the rolls of the playing surface have been installed, the sideline areas shall be installed at right angles to the playing surface.
- E. Artificial turf panel seams shall be sewn. Other than extension inlays, seams secured by other means including gluing are unacceptable. Installation shall be 99% sewn.
  - 1. Minimum gluing will only be permitted to repair problem areas, corner completions, and to cut in any logos or inlaid lines as required by the specifications.
  - 2. Seams shall be flat, tight, and permanent with no separation or fraying.
  - 3. In the case of all other lines and markings, turf carpet must be sheared to the backing (do not cut the backing) and adhered using hot melt adhesives.
- F. Infill Materials:

1. Infill materials shall be applied in numerous thin lifts. The turf shall be brushed as the mixture is applied. The infill material shall be installed to a depth determined by the manufacturer.
  2. Infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional. The Infill installation consists of a base layer of sand followed by a final application of specifically sized rubber that completes the system. The Infill shall be installed to the depth of 1.75".
- G. Non-tufted or inlaid lines and markings shall be painted in accordance with turf and paint manufacturers' recommendations. Number of applications will be dependent upon installation and field conditions.
- H. Synthetic turf shall be attached to the perimeter edge detail in accordance with the manufacturer's standard procedures.
- I. Upon completion of installation, the finished field shall be inspected by the installation crew and an installation supervisor.

### 3.5 FIELD MARKINGS

- A. Field markings shall be installed in accordance with approved shop drawings. If football is designated as the primary sport, all five yard lines will be tufted-in.
- B. Balance of sports markings will be inlaid in accordance with the Drawings.
- C. Center field logo shall be inlaid according to artwork indicated on Drawings and in accordance with manufacturer's standard palette of turf colors.
- D. End-zone letters and logos shall be inlaid according to artwork and fonts indicated on the Drawings, and in accordance with manufacturer's standard palette of turf colors.

### 3.6 ADJUSTMENT AND CLEANING

- A. Do not permit traffic over unprotected surface.
- B. Contractor shall provide the labor, supplies, and equipment as necessary for final cleaning of surfaces and installed items.
- C. All usable remnants of new material shall become the property of the Owner.
- D. The Contractor shall keep the area clean throughout the project and clear of debris.
- E. Surfaces, recesses, enclosures, and related spaces shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

### 3.7 PROTECTION

- A. Protect installation throughout construction process until date of final completion.

## 32 18 23 - SPORTS FIELD CONSTRUCTION

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all sportsfield construction, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Engineer for review.
- 1.5 QUALIFICATION: Approved Contractor must have successfully completed at least 10 sports field construction or renovation projects in the last 2 years. Provide references for all sports field jobs completed in the past 5 years.
- 1.6 DELIVERY, STORAGE, AND HANDLING
  - A. Deliver sod on rolls. Protect exposed roots from dehydration.
  - B. Do not deliver more sod than can be laid within 12 hours.
- 1.7 COORDINATION: Coordinate with installation of underground sprinkler system piping and watering heads, other plantings, and seeding operations.
- 1.8 MAINTENANCE SERVICE
  - A. Maintain sodded areas immediately after placement until grass is well established and exhibits a vigorous growing condition. Maintain by mowing, weeding, fertilizing and watering until Final Acceptance.

### PART 2 - MATERIAL

- 2.1 TOPSOIL AT GRASS AREAS: Provide approved sandy loam topsoil for the areas where grass is to be planted. Use a "screened" sandy loam that is free of rocks, roots and debris larger than 1/2 inch to 1 inch. Meet the following specifications for sandy loam topsoil:

Very Coarse Sand	1 - 2 mm	
Coarse Sand	.5 - 1 mm	65% - 70%
Medium Sand	.25 - .5 mm	
Fine Sand	.1 - .25 mm	
Very Fine Sand	.05 - .1 mm	<10%
Silt	.002 - .05 mm	<15%
Clay	<.002 mm	<15%
Soil Ph	6.5-7.0	Max 7.5

Provide a 6-inch layer of sandy loam topsoil adequate for growing Bermuda grass varieties at the project location. If approved by the Owner & the sub-grade soil is of reasonable quality, blend sand into the subsoil to create a sandy loam that will perform well.

- 2.2 APPROVED GRASS VARIETY



- A. TifSport Hybrid Bermuda – Sod Roll
- B. Tifway 419 Hybrid Bermuda – Sod Roll

**PART 3 - EXECUTION**

3.1 GENERAL: Examine the areas and conditions under which work of this Section will be performed, correcting conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

**3.2 PREPARATION OF SUBSOIL**

- A. Prepare sub-soil and eliminate uneven areas and low spots.
- B. Maintain lines, levels, profiles and contours as shown on the grading plan. Make changes in grade gradual by blending slopes into level areas. Do not direct drainage toward building walls.
- C. Remove foreign materials and undesirable plants and their roots. Do not bury foreign material beneath areas to be sodded.
- D. Remove contaminated subsoil.
- E. Scarify sub-soil to a depth of 2 inches where topsoil is to be placed. Remove all rocks, clods, debris and other undesirable materials over 1" in diameter.
- F. Repeat cultivation in areas where equipment and construction activity has compacted subsoil. Loosen soil to a depth of at least 3 inches.

3.3 FINE GRADING: Use laser controlled grading systems to perform final grading on the playing surface when building new sports fields. This type of grading system requires no blue tops as the laser guided system automatically adjusts the blade elevation to keep it on grade. Acceptable tolerances for this type of grade work are generally 1/2 inch or less. All final grading on playing surfaces are to be done with an automatic hydraulically operated laser controlled grading system.

**3.4 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions, at the rate of 10 lbs. per 1,000 s.f.
- B. Apply after smooth raking of topsoil and prior to installation of sod.
- C. Apply fertilizer no more than 24 hours before laying sod.
- D. Lightly water to aid the dissipation of fertilizer.

**3.5 LAYING SOD**

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod immediately after delivery to site to prevent deterioration.
- C. Lay sod tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.
- D. Lay smooth.

- E. Place top elevation of sod soil 1 inch below adjoining edging, paving, or curbs.
- F. On slopes with a vertical rise of 3 inches per foot of horizontal distance and steeper, lay sod perpendicular to slope and secure every row with sod staples. Drive flush with soil portion of sod.
- G. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.
- H. After sod and soil have dried, roll sodded areas with a weighted roller to ensure good bond between sod and soil and to remove minor depressions and irregularities.

## 32 18 24 - BASEBALL FIELD CONSTRUCTION

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all ballfield construction, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.
- 1.5 QUALIFICATION: Approved Contractor must have successfully completed at least 10 sports field construction or renovation projects in the last 2 years. Provide references for all sports field jobs completed in the past 5 years.

### PART 2 - MATERIAL

- 2.1 SKINNED AREA MATERIAL: Provide infield skinned area material is as follows. Provide "soil particle distribution test" upon request.
 

A.	Sand	60%
B.	Silt	20%
C.	Clay	20%
- 2.2 INFIELD CONDITIONER: Supply one of the 2 types of commonly used conditioner, either vitrified clay granules or calcined clay granules.
  - A. Approved Material: Diamond Pro (vitrified) produced in Katy, TX. Provide a minimum 24-ton load on a baseball infield. For softball infields provide a minimum 18 tons.
- 2.3 TOPSOIL AT GRASS AREAS: Provide approved sandy loam topsoil for the areas where grass is to be planted. Use a "screened" sandy loam that is free of rocks, roots and debris larger than 1/2 inch to 1 inch. Meet the following specifications for sandy loam topsoil:
 

Very Coarse Sand	1 - 2 mm	
Coarse Sand	.5 - 1 mm	65% - 70%
Medium Sand	.25 - .5 mm	
Fine Sand	.1 - .25 mm	
Very Fine Sand	.05 - .1 mm	<10%
Silt	.002 - .05 mm	<15%
Clay	<.002 mm	<15%
Soil pH	6.5-7.0	Max 7.5

Provide a 6-inch layer of sandy loam topsoil adequate for growing bermuda grass varieties at the project location. If approved by the Owner & the sub-grade soil is of reasonable quality, blend sand into the subsoil to create a sandy loam that will perform well.
- 2.4 APPROVED GRASS VARIETY
  - A. TifSport Hybrid Bermuda – Sprig or Sod

- B. Tifway 419 Hybrid Bermuda – Sprig or Sod

PART 3 - EXECUTION

- 3.1 GENERAL: Examine the areas and conditions under which work of this Section will be performed, correcting conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INFIELD CONDITIONER: Some of this material is mixed into the top 2 to 3 inches of the skinned area with a tiller or an aera-vator and then a 1/8-inch or 1/4-inch layer placed on top is sufficient.
- 3.3 INFIELD SKINNED AREA CONSTRUCTION: Layout infield grass / skinned area edges with string lines and paint. Install 1/2-inch plywood strips on all edges (to keep skinned area dirt separated from topsoil). Install skinned area dirt in 2-3 inch lifts and compact each lift to approx. 80-85 percent. After skinned area dirt and topsoil layer is in place and compacted, plywood forms can be removed and final grading and compacting can be performed. Total depth of skinned area material should be a minimum of 4 inches compacted, up to 6 inches.
- 3.4 PITCHERS MOUND CONSTRUCTION: Mounds shall be constructed with a material that is similar to the skinned area soil mix. This material shall have a slightly higher content of clay.
- |      |     |
|------|-----|
| Sand | 55% |
| Silt | 20% |
| Clay | 25% |
- A. The material shall be installed in 3 to 4 inch lifts and compacted to 85-90% between each lift. If the material is dry, it may become necessary to wet the material and allow time for the water to "soak in" before compacting.
- B. The "table top" and the landing area of the pitchers mound should have a 2-inch layer of "mound clay" installed and compacted. This will help the mound hold its shape and form during heavy use. The mound clay is available in 50 lb bags and dump trucks.
- 3.5 HOME PLATE CIRCLE & BOXES: The home plate circle should be constructed with the same type of material as used on the infield skinned area. The entire circle should have as light crown or a one-way slope to shed water to a desired area. The batters boxes and catcher's box should have a 2" layer of mound clay installed and compacted in these areas.
- 3.6 WARNING TRACKS: Construct warning track with the same type of material as used on the infield skinned area in a compacted 4-inch layer. Provide material equal to Red Dog warning track conditioner, made from crushed brick (3/8" screened). Normally a 1/4-inch to 1/2-inch layer of Red Dog warning track conditioner is sufficient.
- 3.7 FINE GRADING: Use laser controlled grading systems to perform final grading on the playing surface when building new sports fields. This type of grading system requires no blue tops as the laser guided system automatically adjusts the blade elevation to keep it on grade. Acceptable tolerances for this type of grade work are generally 1/2 inch or less. All final grading on playing surfaces are to be done with an automatic hydraulically operated laser controlled grading system.

## 32 18 25 - POST TENSIONED CONCRETE SLAB TENNIS COURTS

### PART 1 - GENERAL

- 1.1 SLOPE AND ELEVATION REQUIREMENTS: All excavating, filling and grading requirements and compacting work of the subbase shall be performed so that the finished subgrade is 4"-6" above the surrounding ground and slopes not less than 0.83% (1:120) and not more than 0.1% (1:100). Each court must slope in a true plane, preferably from side to side (but from end to end or from corner to corner also are acceptable), or in the shortest direction for good drainage and water runoff. The court shall never be sloped from the net line to the baseline, from the baseline to the netline, from the sides to the centerline or from the centerline to the sides.
- 1.2 APRON: The overall dimension of an individual court shall be 61' x 121' to provide a 6" apron around the court. This additional footage helps prevent vegetation intrusion, facilitates landscape maintenance and adds to the overall cosmetics. Fencing shall remain at 60' x 120'. Fence posts, net posts, sleeves and center anchor shall be installed prior to or during concrete placement. Fencing shall be completed prior to surfacing.
- 1.3 DESIGN CRITERIA: Slabs shall be designed using acceptable engineering practices in accordance with the American Concrete Institute Building Code Requirements for reinforced concrete and the Post-Tensioning Institute's tentative specifications for post-tensioning materials. The soil condition and plasticity index of the court site shall be considered in determining strand spacings and beam requirements. Contractor to provide slab engineering designs & submit shop drawings bearing the seal of a Texas registered engineer. Exact configuration of slab footings to be designed by post-tension engineer & based upon the geotechnical report.

### PART 2 - PRODUCTS

- 2.1 MOISTURE/VAPOR BARRIER: A moisture/vapor barrier, consisting of polyethylene (6 mil. minimum thickness) shall be installed prior to installation of any steel and/or cables. Overlap polyethylene sheets at least 6" and tape joints. Once in place no vehicular traffic shall be allowed on the moisture/vapor barrier nor any other object which could puncture the barrier or otherwise compromise the integrity of the surface. All concrete shall be pumped, not driven onto the court. Excessive loads at any time are unacceptable.
- 2.2 CEMENT: Cement (Type 1 or 1A) shall conform to one of the Standard Specifications for Portland Cement, ASTM C 150 or Specifications for Blending Hydraulic Cements, ASTM C 595, excluding slag cements Types S and SA. Do not use curing compounds.
- 2.3 AIR ENTRAINMENT: Air entrainment by total volume of concrete shall be 4 to 6% for 1 1/2" maximum size coarse aggregate, 5 to 7% for 3/4" or 1" maximum size coarse aggregate, 6 1/2 to 8 1/2% for 3/8" or 1/2" maximum size coarse aggregate.
- 2.4 AGGREGATE: Aggregate shall conform to Standard Specifications for Concrete Aggregates ASTM C 33. For concrete work that is 5" thick, the nominal size of the coarse aggregate shall not exceed 1 1/2" and for concrete work that is 4" thick, the nominal size of the coarse aggregate shall not be greater than 1". Fly ash or other additives are not acceptable.
- 2.5 THICKNESS OF CONCRETE: Concrete work shall be 5" thick if the location of the tennis court is such that it will be subject to more than three freeze/thaw cycles annually. If the location is such that not more than three freeze/thaw cycles occur annually, concrete may be 4" thick.
- 2.6 POST-TENSIONING: Post-tensioning material shall consist of seven wire stress-relieved strands, conforming to ASTM A 416, with an ultimate strength of 270 KSI. Strands shall be coated with a permanent rust preventative lubricant and wrapped with plastic sheathing. If strand sheathing is damaged or removed, it is to be repaired by taping. A maximum of 6" exposed strand is permitted at the anchor. End anchorage devices will conform to Post-Tensioning Institute (PTI) specifications. All dead end anchorages must be power seated. All strands are to be supported on chairs and tied at all intersections or securely supported in beams to prevent

vertical and horizontal movement during concrete placement. Cables shall be laid out in grids no greater than 4' on center. Concrete must be well consolidated, especially in the vicinity of strand anchorages. Strands shall be anchored at 28.9 KIPS, but may be initially stressed at 33 KIPS. A 9" diameter centered on the strand axis by a 36" length shall be allowed for stressing equipment clearance. The stressing process generates tremendous pressures and extreme care shall be taken to prevent injury from operator error or failure of equipment or materials.

### PART 3 - EXECUTION

- 3.1 FORMS: Forms shall be set accurately to the lines and grades indicated on drawings and secured to prevent settlement or movement during placing of concrete. Forms shall remain in place until concrete has taken its final set.
- 3.2 JOINTS: Single courts shall be poured as a monolithic slab. Double courts may have an elastomeric metal construction joint between courts. This joint may also be placed on the net line if needed. Joints shall never be installed in the play areas. Multiple court banks may have an expansion joint between every two courts. Where this occurs, the cables will be "dead ended" on both sides. For multi-court banks, an accepted alternative expansion joint method would be to construct a common expansion joint between every two courts with a T-joint method. The cabling system can be continued through the system to allow for tension to be applied at the end of the total slab distance.
- 3.3 CONCRETE PROPORTIONING AND MIXING: The concrete shall have a compressive strength of not less than 3,000 psi at 28th day after casting. Ready-mixed concrete shall be mixed and delivered in accordance with ASTM C 94, Specification for Ready-Mixed Concrete with a 4" maximum slump.
- 3.4 PLACING AND FINISHING: Concrete shall be placed by pumping method. At least a full court shall be placed in one continuous operation without intervening joints of any kind. Concrete shall be spread, consolidated, screeded, bull-floated and finished in accordance with Section 7.2 of ACI (American Concrete Institute) Standard 302, Recommended Practice for Concrete Floor and Slab Construction. When concrete is sufficiently set to withstand foot pressure with only about 1/4" indentation and the water sheen has left the surface, the slab shall be uniformly finished by power floating and troweling. The final finish texture shall be a medium broom finish unless otherwise specified by the surface manufacturer. No curing compounds shall be used at any time.
- 3.5 SURFACE TOLERANCES: The finished surface of the court shall not vary more than 1/8" in 10' when measured in any direction.
- 3.6 CURING: Immediately after finishing, the concrete shall be kept continuously moist for 7 days by covering with polyethylene film or waterproof curing paper, or by sprinkling or ponding or other acceptable coverings. No curing compounds shall be used at any time. Curing time shall be in accordance with surfacing system manufacturer's recommendations. Timing is critical on all of the above due to the possibility of disturbing the finished surface.

## 32 18 26 - ACRYLIC FINISH FOR TENNIS COURTS

### PART 1 - GENERAL

- 1.1 GENERAL: This section provides minimum standards for the preparation and application of color finish surfaces to impervious tennis courts.
- 1.2 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.
- 1.5 REQUIREMENTS
  - A. Provide a surface properly drained, without depressions exceeding acceptable tolerance.
  - B. Provide a surface of uniform texture, speed of play and desired playing quality.
  - C. Provide a weather-resistant and ultra-violet-resistant, durable, non-glare, protective finish.
  - D. Provide color, contrast and other aesthetic values.
  - E. Color Selection: The available selection of colors enables the owner to select different combinations of multi-tone or single colors. While custom colors are available, the use of standard colors is recommended. Some custom colors may not be colorfast in exterior exposures.
  - F. Playing Lines: Base lines shall not be more than 4" wide and playing lines not more than 2" wide, accurately located and marked in accordance with rules of the United States Tennis Association and painted with a paint recommended or approved by the manufacturer of the color finish material. Use of traffic, oil, alkyd, or solvent-vehicle type paint is prohibited. The painting shall be done by skilled mechanics in a workman like manner in accordance with the manufacturer's standard printed instructions. At no time shall the playing lines or the line dimensions vary more than 1/4" from the exact measurement.

### PART 2 - MATERIALS

- 2.1 EPOXY PRIMER FOR CONCRETE COURTS: Shall be a two-component, 100% solids, solvent-free epoxy primer. Percent Solids by Weight 98% (minimum). Weight 9 lbs./gallon.
- 2.2 COATING MATERIALS: Coating materials shall be 100% acrylic emulsions, formulated with acrylic resins, mineral fillers, color fast pigments and approved silica sand with a minimum of 32% solids by weight. Both filler and finish coats shall be fully pigmented.
- 2.3 COLORED TEXTURE COATS: Pigmented wear-resistant acrylic emulsion. Two coats required. Percent Solids by Weight 49 % (minimum). Weight: 13 (+/- 3) lbs/gallon.
- 2.4 COLOR FINISH: Concentrate finish batch mixture. Pigmented wear-resistant acrylic emulsion. One coat. A finish coat will speed up the surface pace of the court. Percent Solids by Weight 49 % (minimum). Weight: ~9.5 lbs/gallon.
- 2.5 CUSHION COAT:
  - A. First Coat: 100% acrylic emulsion coating fortified with coarse rubber particles.
  - B. Second Coat: 100% acrylic tennis court cushion coating fortified with fine rubber particles.

2.6 LINE MARKINGS:

- A. Primer: 100% acrylic emulsion primer, clear drying. To prime line markings to prevent bleed under for sharp lines.
- B. Paint: Pigmented 100% acrylic emulsion line paint.

2.7 COLOR SELECTIONS: Colors for court, lines and out-of-bounds to be as selected by Architect.

PART 3 - EXECUTION

- 3.1 SURFACE FINISH: Finish of slab to be coordinated with concrete contractor for light broom finish, or finish as required by acrylic finish manufacturer.
- 3.2 SURFACE INSPECTION: Prior to application of a color finish system, the court surface shall be flooded with water and allowed to drain for one hour at 70 degrees Fahrenheit. If there is any remaining water that covers a 5 cent piece (American coin), that area, commonly called a "birdbath", shall be patched and leveled in accordance with recommendations of the manufacturer of the color finish system specified. (Note: If the standing water does not cover a 5 cent piece, it is considered within tolerance and will evaporate within a reasonable time.) Reflooding and patching may be necessary until "birdbaths" are properly minimized.
- 3.3 PREPARATION: Surface course and subsurface materials must have been installed to proper slope requirements (.833% - 1.0%) in accordance with the U.S. Tennis Court and Track Builders Association Construction Guidelines and must be thoroughly cured (a minimum of 14 days for asphalt and 28 days for concrete), before application of any filler or color finish materials. Concrete surface preparation shall include phosphoric acid etching with a thorough rinsing. Priming and patching shall be as recommended by the acrylic surface manufacturer. Based on pavement conditions, porosity and texture, it may be necessary to install an acrylic resurfacer to provide a smooth, dense, uniform texture for subsequent acrylic color coatings.
- 3.4 APPLICATION OF THE COLOR MATERIALS: The coating materials shall be installed in multiple applications in the selected and approved colors, so as to form a true, uniform texture and color. Minor aesthetic differences may be seen when viewing the court from different angles and under different light conditions. Application work shall be performed by skilled mechanics in a workman-like manner and in accordance with the manufacturer's standard printed instructions. No work shall be performed when rain is imminent. Temperature must be 50 degrees Fahrenheit and rising for application. Surface temperatures in excess of 140 degrees Fahrenheit may not allow proper film formation.



## 32 18 27 - POLYURETHANE TRACK SURFACE

### PART 1 - GENERAL

#### 1.1 DESCRIPTION:

- A. Provide all labor and materials necessary and incidental to furnishings and placing a porous, machine-laid polyurethane track surface. The base mat layer is comprised of 80% by weight of cryogenically ground black EPDM rubber granules, of not less than 1mm and not greater than 4mm in diameter. The binding agent is Conipur 322, a mono component polyurethane compounded from Methylene Diphenyl Isocyanate (MDI) and 0.2% Toluylene Diphenyl Isocyanate (TDI) with no solvents added.
- B. Provide all labor and materials necessary and incidental to proper layout, measurements, line striping and lane event markings for all events in accordance with requirements of the governing body in which the school participates.

1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.

1.3 WARRANTY: Surface is warranted for a period of 5 years.

1.4 QUALITY ASSURANCE: Use only qualified personnel thoroughly trained and experienced and completely familiar with the specified products, the manufacturer's methods of installation and the requirements of this work.

1.5 SUBMITTALS: Contractor shall submit product literature & detailed copies of calculations prior to beginning of work. A complete event color code chart shall be submitted to the Owner upon completion of the work.

1.6 MEASUREMENTS: Measurements on straightaway shall be made with a quality steel tape capable of reproducing linear measurements to an accuracy of plus or minus 1/8". Angular measurements on curves shall be made with a surveying instrument capable of reading angles directly to 20 seconds of arc.

### PART 2 - PRODUCTS

2.1 BASE RUBBER GRANULES: Black EPDM rubber cryogenically processed and graded to 1 to 3mm or 1 to 4mm size containing less than 4% dust. Processed rubber shall be packed in suitable bags to protect from moisture during transportation and handling. Total rubber for base mat layer shall be 15.5 lbs. per square yard.

2.2 BASE MAT BINDER: Conipur 322 MDI based mono-component, polyurethane binding agent as manufactured by CONICA Technik AG. Specific gravity for binding agent shall be 1.07 +/- 0.03. Total binder for base mat layer shall be 3.1 lbs. per square yard.

#### 2.3 MINIMUM PHYSICAL PROPERTIES:

Thickness: 1/2" minimum

Color: Black

Hardness (ASTM D-2240): Shore A @ 70 degrees F.- 50 to 60  
@ 140 degrees F.- 45 to 55

@ 35 degrees F.- 55 to 65

Elongation (ASTM D-412): 95%

Tensile Strength (ASTM D-412): 200 PSI @ 70 degrees F.

Compression Set (ASTM D-395): 90% to 95% @ 70 degrees F. over a 25 hour period.

Abrasion Resistance (ASTM D-501): 0.25 to 0.425 grams loss after 1000 cycles.  
 Coefficient of Friction (ASTM D-1894): Dry - 0.70 to 0.75 / Wet - 0.80 to 0.95  
 Resilience (ASTM D-632): 37% to 44%  
 Tear Resistance (ASTM D-624): 50 to 75 psi.

**PART 3 - EXECUTION**

- 3.1 **JOB CONDITIONS:** Contractor shall inspect resilient track surface to insure the suitability of the surface for the work intended. Do not apply paint in rain, snow, fog, mist or when the relative humidity is above 95% or when other conditions would prevent other than a first class product.
- 3.2 **CLEANING:** The entire area to be surfaced shall be clean and free of any foreign or loose material.
- 3.3 **PRIMING:** The entire area to be surfaced shall be primed with a polyurethane primer applied uniformly at a rate of not less than .3 lbs. per square yard. Allow a minimum of thirty minutes curing time before applying the base mat layer.
- 3.4 **BASE LAYER INSTALLATION:** The base mat layer shall consist of 20% Conipur 322 polyurethane binding agent and 80% EPDM rubber granules as set forth above. The mixture shall be prepared in a mechanical mixer which is clean and dry. The base mat layer shall be applied with a Glocker F2S2D 3.5M Sports Paving Machine which has a mechanically heated screed. All joint work shall be flush with the adjacent mat. Joints which have cured shall have their edges primed with binding agent prior to the laying of the adjacent base mat.
- 3.5 **400 METER TRACK STRIPING:**
  - A. Lane lines and event start lines shall be 2" wide. Lane lines shall be white and event starts color coded to event symbols.
  - B. Exchange zone symbols shall be large triangular markings color coded to event start line color.
  - C. Hurdle marks are 1" wide by 6" long, at each side of each lane, color coded to hurdle event.
  - D. Relay acceleration lines are 2" wide by 9" long, in center of lane color coded to relay event.
  - E. Lane numbers are 36" in height with shadow of contrasting color. Three sets of numbers are required.
  - F. Finish line shall be white in color 2" wide.

32 18 28 - SYNTHETIC TRACK SURFACING SYSTEM

PART 1 - GENERAL

1.1 SCOPE

- A. The synthetic surfacing contractor shall furnish all labor, materials, equipment, supervision, and services necessary for the proper completion of all Synthetic Track Surfacing and related work indicated on the drawings and specified herein.
- B. The synthetic surfacing contractor shall refer to the drawings for the required locations of synthetic track surfacing to be installed. All quantities and dimensions shall be field verified by the synthetic surfacing contractor.

1.2 SPECIFIC SCOPE OF WORK

- A. Install an impermeable polyurethane synthetic track system comprised of a base layer of polyurethane bound SBR rubber granules, Polyurethane Binder, an impermeable layer (seal coat) of a two-component urethane, and topped with Polyurethane Binder, a spray-applied coating of single-component polyurethane, and EPDM granules.
- B. Layout and paint all track lines and event markings as required and specified by current IAAF and NCAA rules.

1.3 COORDINATION: The synthetic surfacing contractor shall coordinate the work specified with an authorized and appointed representative of the owner so as to perform the work during a period and in a manner acceptable to the owner.

1.4 CODES AND STANDARDS

- A. Applicable Publications
  - 1. Codes and standards follow the current guidelines set forth by the International Amateur Athletic Federation (IAAF) and the National Collegiate Athletic Association (NCAA), along with the current material testing guidelines as published by the American Society of Testing and Materials (ASTM).

1.5 PERFORMANCE STANDARDS

- A. The synthetic track surfacing system shall exhibit the following minimum performance standards (ASTM):
  - 1. Thickness: (12-13mm) or as specified
  - 2. Force Reduction: 35-50%
  - 3. Vertical Deformation: 0.6mm-2.5mm
  - 4. Coefficient of Friction:  $\geq 0.5$  (47 TRRL Scale)
  - 5. Tensile Strength:  $\geq 0.5$  Mpa
  - 6. Elongation:  $\geq 40\%$

1.6 QUALITY ASSURANCE

- A. Contractor and Manufacturer Qualifications

1. The CONTRACTOR shall have 5 years experience of successfully installing basemat/seal coat/structural spray running tracks and shall have installed a minimum of 10 complete polyurethane running track surfacing systems.
2. The CONTRACTOR shall be able to furnish evidence that they have been in business for a period of not less than 3 years, under the present name, and if required, furnish financial statements for each of the past 3 years.
3. The CONTRACTOR must have installed a minimum of 10 outdoor track facilities in the last 2 years.
4. The MANUFACTURER must offer a minimum of four (4) IAAF Certified Track Systems.

1.7 SUBMITTALS: The following submittals must be received with bid submittal:

- A. Standard printed specifications of the synthetic track surfacing system to be installed on this project.
- B. An affidavit attesting that the synthetic track surfacing material to be installed meets the requirements defined by the manufacturers currently published specifications and any modifications outlined in those technical specifications.
- C. A synthetic track surfacing system sample, 6"x6" of the same synthetic track surfacing system to be installed on this project.
- D. An installation list of outdoor track facilities installed in the last two years, using the exact synthetic track surfacing system specified herein.

1.8 GUARANTEE

- A. Synthetic track surfacing system shall be fully guaranteed against faulty workmanship and material failure for a period of five (5) years from the date of acceptance. Synthetic surfacing material found to be defective as a result of faulty workmanship and/or material failure shall be replaced or repaired at no charge, upon written notification within the guarantee period.

## PART 2 - MATERIALS

- 2.1 Primers: Primers must be polyurethane-based, specifically formulated to be compatible with the paved SBR base and track surfacing material.
- 2.2 Black SBR Granules: The rubber granules for the base mat shall be recycled SBR rubber, processed and chopped to 1-3mm size, containing less than 1% dust.
- 2.3 EPDM Granules: The rubber granules for the Polyurethane Binder structural spray wearing coats shall be EPDM, synthetic rubber containing a minimum 20% EPDM resin, with a specific gravity of  $1.5 \pm 0.1$  g/cm<sup>3</sup>. The EPDM rubber shall be the same color as chosen by the owner for the track surface.
- 2.4 Polyurethane Binder: Binder for the black mat shall be an MDI-based single-component, polyurethane binding agent. The binder shall not have a free TDI monomer level above 0.2% and must be solvent free. The binder must be specially formulated for compatibility with SBR rubber crumb.
- 2.5 Structural Spray Coating: The spray coating shall be Polyurethane Binder, an MDI-based single-component, moisture cured, 100% solids, pigmented polyurethane, specifically formulated for compatibility with EPDM granules. The coating shall be the color specified by the owner. Pigment intergraded in the field shall not be allowed.

- 2.6 Seal Coat: Polyurethane Binder, the two-component polyurethane resin for this application, shall be pigmented to match the color of the wear coat. The material shall be applied by a squeegee to insure that the black mat is sealed.
- 2.7 Line Marking Paint: All line and event markings shall be applied by experienced personnel utilizing a single-component, moisture cured, aliphatic polyurethane paint compatible with the synthetic track surfacing.

### PART 3 - EXECUTION

#### 3.1 SITE CONDITIONS

- A. Installation shall not take place if adjacent or concurrent construction generates excessive dust, abrasives or any other by-product that, in the opinion of the installer, would be harmful to the track material, until completion of such works.
- B. If, in the opinion of the installer of the synthetic material, the weather and/or climatic conditions are detrimental to the proper installation of the surfacing materials, work shall be delayed until conditions are acceptable. Preferred installation temperature is fifty degrees Fahrenheit and rising. Installation shall be executed only in dry conditions.

#### 3.2 INSTALLATION

- A. Subbase: The Synthetic Track Surfacing System shall be laid on an approved subbase. The General Contractor shall provide compaction test results of 95% or greater for the installed subbase and asphalt surface.

For NCAA certification the following criteria must be followed. The track surface, i.e. asphalt substrate, shall not vary from planned cross slope by more than + .2%, with a maximum lateral slope outside to inside of 1%, and a maximum slope of 0.1% in any running direction. The finished asphalt shall not vary under a 10' straight edge more than 1/8".

It should be the responsibility of the asphalt-paving contractor to flood the surface immediately after the asphalt is capable of handling traffic, but within 24 hours. If, after 20 minutes of drying time, there are birdbaths evident, it shall be the responsibility of the architect, in conjunction with the surfacing contractor to determine the method of correction. No cold tar patching, skin patching or sand mix patching will be acceptable.

Any oil spills (hydraulic, diesel, motor oil, etc.) must be completely removed, either by chipping out or removing and replacing with new, keyed in asphalt. The minimum depth of any asphalt replacement shall be one inch. The curing time for the asphalt base is 28 days. It shall be the responsibility of the surfacing contractor to determine if the asphalt substrate has cured sufficiently prior to the application of polyurethane surfacing system.

It shall be the responsibility of the general contractor to determine if the asphalt substrate meets all design specifications, i.e. cross slopes, planarity and specific project criteria. After all the above conditions are met, the synthetic surfacing contractor must, in writing, accept the planarity of the asphalt receiving base, before work can commence.

- B. Thickness: The thickness of the Synthetic Track Surfacing System shall be 13mm.
- C. Equipment: The Synthetic Track Surfacing System components shall be processed and installed by specially designed machinery and equipment. A mechanically operated paver with variable regulated speed and thermostatically controlled screed shall be used in the installation of the base mat. The wearing course shall be installed using automatic electronic portioning, which provides continuous mixing and feeding for an accurate, quality controlled installation.
- D. Base Course: The SBR granules and Polyurethane Binder shall be mixed together on site to regulate the ratio/quantity of SBR, not to exceed 82% by weight in the base mat portion of the system. The Polyurethane Binder shall be mixed with the SBR rubber so that a minimum of 20%, by weight, exists in the final mixture. This mixture is then mechanically installed using the paver.
- E. Seal Coat: The two Polyurethane Binder components are mixed at the prescribed ratio homogeneously with a suitable mixing device. The coating is squeegee applied to the base mat, making it impermeable.

- F.       Wearing Course: The 0.5 to 1.5mm EPDM granules shall be mixed with Polyurethane Binder, the single-component structural spray coating. The structural spray shall be made in two uniform applications.

### 3.3       LINE STRIPING AND EVENT MARKINGS

- A.       6.1- Layout: Line striping and event markings shall be laid out in accordance with current IAAF and NCAA rules.
- B.       6.2- Certification: Upon completion of the installation, the owner shall be supplied with all necessary computations and drawings as well as a letter of certification attesting to the accuracy of the markings.

## 32 31 13 - CHAIN-LINK FENCES & GATES

### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for all Chain-link fencing, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

### PART 2 - PRODUCTS

- 2.1 FENCE FABRIC: "Chain-link" fabric to be hot dipped galvanized #9 gauge wire woven in a 2" mesh, vinyl coated.
- 2.2 FRAME: Frame to be hot dipped galvanized pipe. Fittings to be malleable iron & hot dipped galvanized. Tension wire to be #7 hot dipped galvanized high carbon spring wire. Provide the following frame sizes:
  - A. End & corner posts 3" OD, sched 40;
  - B. Line posts to be 2" OD, sched 40;
  - C. Horizontal rails to be 1.625" OD sched 20;
  - D. Gate frame – see drawings.
- 2.3 GATES: Gates to have 2" OD frame, with hinges, catch stop hasp & padlock.
- 2.4 FENCE SLATS: Equal to Hoover Fence Co. "OptionLock Slats" Non-winged PVC Slats for Chain Link Fences.
- 2.5 OTHER MATERIALS: Furnish and install any supplementary materials, whether or not specifically indicated, required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

### PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Space posts at 10' OC max & mount securely. Attach fabric to posts with bands at 14" OC & to rails & bottom wire at 24" OC. Install materials in accordance with manufacturer's instructions and approved submittals. Install materials in proper relation with adjacent construction and with uniform appearance.
- 3.3 DAMAGE/CLEANING: Restore or replace damaged components. Clean and protect from damage.

## **32 31 14 - OUTDOOR WINDSCREENS FOR TENNIS COURTS**

### **PART 1 - GENERAL**

- 1.1 GENERAL: Provide a 9' open mesh windscreen for the 10' fence. For windscreens 9' and over, air vents shall be placed a minimum of 10' on center and the screens shall be tied, roped or otherwise fastened at the midpoint.
- 1.2 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.3 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.4 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

### **PART 2 - MATERIALS**

- 2.1 MATERIALS AND FABRICATION: Polypropylene windscreens are made of a fabric woven from polypropylene yarns weighing 4.75 oz. or more per square yard. The yarns shall be of a dark color and shall have high ultraviolet light resistance. All hems shall be reinforced and shall have two rows of stitching. Windscreens 9' high shall have a 1 1/4" or larger black polypropylene tape or its equivalent grommets 12" to 18" on center and sewn with two rows of stitching. All hems and seams shall be sewn with a heavy duty weather and ultraviolet light resistant polyester thread or its equivalent. Grommets to be No. 2 or No. 3 solid brass with plain washers, 12" to 18" on center. Provide Air Vents open or flap type, finished or unfinished, with a maximum spacing of 10'.

### **PART 3 - EXECUTION**

- 3.1 FASTENING WINDSCREENS TO FENCES: It is important that all grommets be used when fastening a windscreen to the fence. This distributes the strain evenly. Fasten with "S" Hooks of 1 3/4" zinc coated 3/16" diameter thickness.



## 32 31 19 - DECORATIVE METAL FENCES AND GATES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Ornamental picket fencing and accessories.

#### 1.2 RELATED SECTIONS

- A. Section 11 19 00 Detention Equipment
- B. Section 28 00 00 Security Systems
- C. Section 28 00 00 Special Security Construction
- D. Section 32 31 00 Paving and Surfacing
- E. Section 03 30 00 Cast-In-Place Concrete
- F. Section 04 20 00 Unit Masonry

#### 1.3 SUBMITTALS

- A. Changes in specification may not be made after the bid date.
- B. Shop drawings: Layout of fences and gates with dimensions, details, and finishes of components, accessories and post foundations.
- C. Product Data: Manufacturer's catalog cuts indicating material compliance and specified options.
- D. Samples: Color selection for polymer finishes. If requested, samples of materials (e.g., finials, caps, and accessories).

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURER

- A. Products from qualified manufacturers having a minimum of 5 years experience manufacturing ornamental picket fencing will be acceptable by the architect as equal, if approved in writing, ten days prior to bidding, and if they meet the following specifications for design, size, gauge of metal parts and fabrication.

##### 1. Approved Manufacturers:

- a. Montage Commercial Genesis, 3-Rail, welded steel fence system and Montage Commercial Swing Gates as manufactured by Ameristar
- b. Versai COM Commercial (V2) Fence Systems as manufactured by Fortress Railing and Fence Systems

#### 2.2 ORNAMENTAL PICKET FENCE

- A. Pickets: Square Solid Bar, ASTM A 36, hot rolled structural quality steel, 60,000 psi (372 MPa) tensile strength, 36,000 psi yield strength. Size pickets - 3/4" (75 mm). Space pickets 3-15/16" maximum (100 mm) face to face. Attach each picket to each rail with 1/4" (6 mm) industrial drive rivets. Size 1" long..
- B. Rails: 1-1/2" (38mm) x 1-3/8" (35mm) x 1-1/2" (38mm), 11 gauge [0.120" (3.05mm)] thick galvanized steel "U" channel per ASTM A-653 or ASTM A-607, having a 50,000 psi (344 MPa) yield strength and G90 zinc coating, 0.90 oz/f12 (o.27

kg/M2). Punch rails to receive pickets and rivets and attach rails to rail brackets with 2 each, 1/4" (6 mm) industrial drive rivets. Size # 4 Steel for rail produced under ASTM A446.

- C. Posts: Galvanized square steel tubular members manufactured per ASTM A-787 having a 45,000 psi (310 MPa) yield strength and G90 zinc coating, 0.90 oz/f12.
- D. Accessories: Assembled panels with ornamental accessories attached using industrial drive rivets to prevent removal and vandalism.
- E. Finish: All pickets, channels, posts, fittings and accessories shall be polyester powder coated individually after drilling and layout, to ensure maximum corrosion protection. (Coating of assembled sections is unacceptable). All components are given a 4 stage "Power Wash" pre-treatment process that cleans and prepares the galvanized surface to assure complete adhesion of the finish coat. All metal is then given a polyester resin based power coating applied by the electrostatic spray process, to thickness 3 mils. The finish is then baked in a 4500F (2320C) (metal temperature) oven for 20 minutes. Color as selected by Architect from standard selection.

2.3 GATES: As indicated in the Drawings.

#### 2.4 ACCESSORIES

- A. Rail Attachment Brackets - die cast of zinc (ZAMAK # 3 Alloy) per ASTM B86-83Z 33521. Ball and socket design capable of 30° swivel (up/down-left/right). Bracket to fully encapsulate rail end for complete security.
- B. Industrial Drive Rivets: Of sufficient length to attach items in a secure nonrattling position. Rivet to have a minimum of 1100 lbs. (4894 N) holding power and a shear strength of 1500 lbs. (6674 N).
- C. Ornamental Picket Fence Accessories: Provide indicated items required to complete fence system. Galvanize each ferrous metal item in accordance with ASTM B695 and finish to match framing.
- D. Post Caps: Formed steel, cast of malleable iron or aluminum alloy, weather tight closure cap. Provide one post cap for each post.
- E. Rings: Cast aluminum. Attach ring to top rail by inserting mounting blocks into top rail and riveting through side of rail using 1/4" (6 mm) industrial drive rivet. Hold bottom of ring in place by dowel that protrudes from ring through predrilled hole in bottom rail.

#### 2.5 SETTING MATERIAL

- A. Concrete: Minimum 28 day compressive strength of 3000 psi (20 MPa).
- B. Flanged Posts: Provide flange type base plates with 4 holes for surface mounting of posts where indicated.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify areas to receive fencing are completed to final grades and elevations.
- B. Ensure property lines and legal boundaries of work are clearly established

#### 3.2 INSTALLATION

- A. Install fence in accordance with manufacturer's instructions.
- B. Space posts uniformly at 7'8-3/4" (2356 mm) maximum face to face unless otherwise indicated.

- C. Concrete Set Posts: Drill hole in firm undisturbed or compacted soil. Holes shall have diameter 4 times greater than nominal outside dimension of post, and depths approximately 6" (152 mm) deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36" (914 mm) below surface when in firm, undisturbed soil. Place concrete around post in a continuous pour. Trowel finish around posts and slope to direct water away from posts.
  - 1. Gate Posts and Hardware: Set keepers, stops, sleeves and other accessories into concrete.
- D. Surface mount (wall mount) posts with mounting plates where indicated. Fasten with lag bolts and shields.
- E. Check each post for vertical and top alignment, and maintain in position during placement and finishing operation.
- F. Align fence panels between posts. Firmly attach rail brackets to posts with 1/4" (6 mm) bolt and lock nut, ensuring panels and posts remain plumb.

### 3.3 GATE INSTALLATION

- A. Install gates plumb, level and secure for full opening without interference.
- B. Attach hardware by means which will prevent unauthorized removal.
- C. Adjust hardware for smooth operation.

### 3.4 ACCESSORIES

- A. Install post caps and other accessories to complete fence.

### 3.5 CLEANING

- A. Clean up debris and unused material, and remove from site.

## 32 84 13 - DRIP IRRIGATION

### PART 1 - GENERAL

#### 1.1 INTENT & PROJECT SCOPE

- A. The Basis for Design is Rain Bird low volume dripline irrigation products including Control Zone Kits, XFS and XFD Dripline and compatible fittings.
- B. Provide labor, materials, supplies, equipment, tools, and transportation, and perform all operations in connection with and reasonably incidental to the complete installation of the drip irrigation system, and guarantee/warranty as specified herein.
- C. Work under this section includes the design & installation of a complete drip irrigation system at all landscape planted beds.
- D. Work under this section includes the design & installation of a complete drip irrigation system at all landscape planted beds. The Specifications indicate and specify a complete and efficient landscape irrigation system which will operate in accordance with the specified equipment manufacturer's recommendations and with state and local codes and regulations. Items not specified, but found to be necessary for a complete system, shall be furnished under this Contract

#### 1.2 SUBMITTALS

- A. Deliver four (4) copies of submittals to Owner's Representative within ten (10) working days from date of Notice to Proceed. Furnish information in 3-ring binder with table of contents and index sheet. Index sections for different components and label with specification section number and name of component. Furnish submittals for components on material list. Indicate which items are being supplied on catalog cut sheets when multiple items are shown on one sheet. Incomplete submittals will be returned without review.
- B. Materials List: Include dripline and low-volume irrigation components, control zone components, shop drawings and other components shown on drawings and installation details or described herein. Quantities of materials need not be included.
- C. Manufacturers' Data: Submit manufacturers' catalog cuts, specifications, and operating instructions for equipment shown on materials list.
- D. Shop Drawings: Submit shop drawings called for in installation details. Show products required for proper installation, their relative locations, and critical dimensions. Note modifications to installation details as part of shop drawing documentation. Include the seal of a licensed irrigator on all design documentation.

#### 1.3 FLUSHING AND TESTING

- A. Schedule testing with Owner's Representative a minimum of three (3) days in advance of testing.
- B. Provide clean, clear water, pumps, labor, fittings, and equipment necessary to conduct line flushing and testing procedures.
- C. Recommended Dripline and Emitter Lateral Flushing Procedures.
  - 1. Flush the system every two weeks for the first six (6) weeks and check the water that is flushed out for cleanliness. Establish a regular system flushing schedule for the future based on results from the initial six-week flushing schedule.

2. Flush the system completely after any repairs are made and monitor system operation closely under regular system flushing schedule.
3. Check the pressure at the supply and flush headers on a regular basis and compare with the pressure readings taken after installation.

D. Recommended Dripline and Emitter Lateral Leakage Testing Procedures.

1. Subject installed dripline tubing and emitter lateral piping to water pressure equal to specified operating pressure for ten (10) minutes. Test with control zone components and dripline flush valve components installed.
2. Partially backfill buried pipe and tubing to prevent movement under pressure. Expose couplings, fittings, and valve components.
3. Visually inspect valve assemblies and fittings for leakage and replace defective pipe, fitting, joint, valve, or appurtenance. Repeat test until test segment is free from leaks. Cement or caulking to seal leaks is prohibited.

E. Recommended Dripline and Emitter Lateral Operational Testing Procedures.

1. Activate each dripline and emitter lateral control zone valve in sequence from controller. Provide either one additional person with radio or use handheld remote to activate remote control valves from controller. Manually activating remote control valve using manual bleed mechanism at remote control valve is not an acceptable method of activation. Owner's Representative will visually observe operation, water application patterns, and leakage.
2. Replace or adjust defective valve, fitting, dripline segment, emitter lateral segment, or appurtenance to correct operational and coverage uniformity deficiencies.
3. Repeat test(s) until each dripline or emitter lateral test segment passes testing procedures. Repeat tests, replace components, and correct deficiencies at no additional cost to Owner and/or Owner's Representative.

#### 1.4 CONSTRUCTION REVIEW

- A. The purpose of on-site reviews by Owner's Representative is to periodically observe work in progress, Contractor's interpretation of construction documents, and to address questions with regard to installation.
- B. Schedule reviews for dripline layout and system testing with Owner's Representative as required by these specifications.
- C. Impromptu reviews may occur at any time during project.
- D. A review will occur at completion of irrigation system installation and Project Record Drawing submittal.

#### 1.5 GUARANTEE/WARRANTY AND REPLACEMENT

- A. The purpose of guarantee/warranty is to ensure that Owner receives irrigation materials of prime quality, installed and maintained in thorough and careful manner.
- B. Contractor is responsible for providing guarantee/warranty of irrigation materials, equipment, and workmanship against defects for period of one (1) year from formal written acceptance by Owner's Representative. Fill and repair depressions. Restore landscape, utilities, structures and site features damaged by settlement of irrigation trenches or excavations.

Repair damage to premises caused by defective items. Make repairs within seven (7) days of notification from Owner's Representative.

- C. Replace damaged items with new and identical materials, using methods specified in contract documents or applicable codes. Make replacements at no additional cost to contract price.
- D. Guarantee/warranty applies to originally installed materials and equipment, and replacements made during guarantee/warranty period.

- 1.6 SYSTEM DESIGN: For all work under this section, provide the services of a licensed irrigator to design a complete & functional system. Prior to beginning any work, submit to the architect drawings to completely depict the proposed design. Do not proceed with any work until the design has been accepted by the architect.

## PART 2 - MATERIALS

### 2.1 QUALITY

- A. Provide and install specified equipment and materials, delivered new to the site in unopened containers and confirmed to be without flaws or defects.

### 2.2 LATERAL PIPE AND FITTINGS

- A. Use rigid, unplasticized polyvinyl chloride (PVC) 1120, 1220 National Sanitation Foundation (NSF) approved pipe, extruded from material meeting requirements of Cell Classification 12454-A or 12454-B, ASTM Standard D1784, with integral belled end suitable for solvent welding.
- B. Use Class 200, SDR-21, rated at 200 PSI (13,8 bar), conforming to dimensions and tolerances established by ASTM Standard D2241. Use PVC pipe rated at higher pressures than Class 200 in the cases where small nominal diameters are not manufactured in Class 200.
- C. Use Schedule 40, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784 for PVC pipe. Use primer approved by pipe manufacturer. Solvent cement to conform to ASTM Standard D2564, of type approved by pipe manufacturer.
- D. Use PVC Schedule 80 nipples and PVC Schedule 40 or 80 threaded fittings for threaded pipe connections.
- E. Threaded joint sealant: Use non-hardening, nontoxic pipe thread sealant formulated for use on threaded connections and approved by pipe fitting or valve manufacturer.

### 2.3 DRIP IRRIGATION COMPONENTS

- A. Dripline Components
  - 1. Drip Control Zone Kits
    - a. Provide control zone kits as manufactured by Rain Bird.
    - b. Control zone kit assemblies for dripline irrigation zones must include control valve, filtration, and pressure regulation components sized to meet the hydraulic demands and flow requirements of the zones that they service.
  - 2. Dripline Tubing

- a. Provide flexible dual-layered pressure-compensating inline XFD Series Dripline for on surface installations or XFS Series Dripline for sub-surface installations as manufactured by Rain Bird. Contractor shall determine emitter spacing and dripline row spacing as needed for each dip zone.
- 3. Dripline Tubing Insert Fittings
  - a. Provide 17MM insert fittings manufactured by Rain Bird that are compatible with inline emitter tubing.
  - b. Insert fitting specifications and features include:
    - i Constructed from brown acetyl plastic for long-term, leak free connections
    - ii Intended for use with polyethylene tubing with ID of 0.536" (13,6 mm), including Rain Bird XF Dripline and XF Series Blank Tubing
    - iii Operating pressure range is 0 to 50 PSI (0 to 3,5 bar)
- 4. Air Relief Valves.
  - a. Provide air relief valves to each drip as per the manufactures recommendations.
- 5. Flush Valves.
  - a. Provide flush valves to each drip as per the manufactures recommendations.

### PART 3 - EXECUTION

#### 3.1 INSPECTIONS AND REVIEWS

- A. Pre-construction Site Inspection
  - 1. Verify construction site conditions and note irregularities affecting work of this section. Report irregularities in writing to Owner's Representative prior to beginning work. Commencement of work implies acceptance of existing site conditions.
- B. Utility Locates ("Call Before You Dig")
  - 1. Arrange and coordinate Utility Locates with local authorities prior to construction.
  - 2. Repair underground utilities that are damaged during construction. Make repairs at no additional cost to contract price.

#### 3.2 DRIPLINE LAYOUT OF WORK

- A. Stake out dripline irrigation system. Items staked include manifold/header pipe and tubing, sleeves, control zone assemblies, flush valves, air relief valves, and check valves.
- B. Dripline Irrigation System Layout Review: Dripline irrigation system layout review will occur after staking has been completed. Notify Owner's Representative one week in advance of review. Modifications will be identified by Owner's Representative at this review.

#### 3.3 DRIPLINE EXCAVATION, TRENCHING, AND BACKFILL

- A. Excavate and install pipes at minimum cover indicated in specifications. Excavate trenches at appropriate width for connections and fittings.
- B. Minimum cover for dripline components (distance from top of pipe to finish grade):
  1. Buried PVC manifold and supply header pipe to dripline grid layouts: 12" to top of pipe.
  2. Buried dripline lateral pipe downstream PVC manifold and supply header pipe: 4" to top of pipe
  3. On-grade dripline lateral pipe downstream PVC manifold and supply header pipe: Secure to finish grade with approved tubing stakes. Install and test prior to installation of landscape fabric and mulch.
- C. Backfill only after buried lines have been reviewed, tested, and approved.
- D. Excavated material is generally satisfactory for backfill. Use backfill free from rubbish, vegetable matter, frozen materials, and stones larger than 2" in maximum diameter. Remove material not suitable for backfill. Use backfill free of sharp objects next to pipe.
- E. Dress backfilled areas to original grade. Incorporate excess backfill into existing site grades. Dispose of excess backfill off site.
- F. Contact Owner's Representative for trench depth adjustments where utilities conflict with irrigation trenching and pipe work.

#### 3.4 ASSEMBLING PIPE AND FITTINGS

- A. General:
  1. Keep pipe free from dirt and debris. Cut pipe ends square, debur and clean as recommended by pipe manufacturer.
  2. Keep ends of assembled pipe capped. Remove caps only when necessary to continue assembly.
- B. PVC Pipe and Fittings:
  1. Use only strap-type friction wrenches for threaded plastic pipe.
  2. PVC Solvent Weld Pipe and Fittings:
    - a. Use appropriate primer and solvent cement. Join pipe in manner recommended by pipe and fitting manufacturers and in accordance with accepted industry practices.
    - b. Cure for thirty (30) minutes before handling and twenty-four (24) hours before pressurizing or installing with vibratory plow.
    - c. Snake pipe from side to side within trench.
  3. PVC Threaded Connections:
    - a. Use only factory-formed threads. Field-cut threads are not permitted.



- b. Apply thread sealant in manner recommended by component, pipe and sealant manufacturers and in accordance with accepted industry practices.

C. Dripline Tubing and Fittings:

- 1. Use only Rain Bird XF-Series Insert Fittings for Rain Bird XF-Series dripline tubing connections or transitions as recommended by the Manufacturer's representative for the specific site and system conditions.
- 2. Dripline Insert Fittings:
  - a. Install dripline tubing and fittings in manner recommended by manufacturer and in accordance with accepted industry practices.

### 3.5 INSTALLATION OF DRIPLINE IRRIGATION COMPONENTS

A. Control Zone Kit Assembly:

- 1. Flush mainline pipe before installing Control Zone Kit assembly.
- 2. Locate at a location approved by the Architect. Connect control wires to remote control valve wires using specified wire connectors and waterproof sealant. Provide connectors and sealant per manufacturer's recommendations.
- 3. Install a maximum of four (4) Low Flow or Medium Flow Control Zone Kits per standard rectangular valve box. Install a maximum of one (1) Medium Flow Commercial Control Zone Kits per standard rectangular valve box. Install a maximum of one High Flow Commercial Control Zone Kits per jumbo rectangular valve box.
  - a. Locate valve boxes at least 12" from, and align with, nearby walls or edges of paved areas.
  - b. Group Control Zone Kit assemblies together where practical. Align grouped valve boxes in uniform patterns. Allow at least 12" between valve boxes.
  - c. Brand controller letter and station numbers on valve box lid in 2" high letters.

B. Lateral Piping and Dripline Tubing:

- 1. Install lateral piping and dripline tubing at locations and in grid patterns in strict accordance with manufacturer recommendations.
- 2. Thoroughly flush PVC lateral piping, supply headers, and dripline tubing immediately upon installation.

C. Air Relief Valve Kit Assembly: Install at all high points in dripline tubing grid in strict accordance with manufacturer recommendations.

D. Flush Point Assembly: Install in flush header or at ends of each dripline zone segment in strict accordance with manufacturer recommendations. Install at least 12-inches from and align with adjacent walls or edges of paved areas.

### 3.6 PROJECT RECORD (AS-BUILT) DRAWINGS

- A. Document field changes from original design and construction documents. Maintain on-site and separate from original construction documents, one complete set of documents labeled "Project Field Documents". Keep documents current. Do not permanently cover work until accurate "as-built" information is recorded.

- B. Record pipe network alterations on a daily basis. Record work that is installed differently than shown on construction documents. Record accurate reference dimensions, measured from at least two permanent reference points, of each control zone kit assembly, each dripline zone boundary, each air relief valve assembly, each flush point assembly, and other dripline irrigation components enclosed within valve box.
- C. Provide "Record Drawings" in hardcopy & PDF format. Completion of Record Drawings is required prior to final construction review at completion of irrigation system installation as per 30 TAC 344.63(4).

### 3.7 WINTERIZATION AND SPRING START-UP

- A. Winterize irrigation system in fall following completion, or partial completion, of irrigation system construction. Start-up irrigation system in spring following completion, or partial completion, of irrigation system construction. Repair any damage caused in improper winterization at no additional cost to Owner. Coordinate winterization and start-up with landscape maintenance personnel.

### 3.8 MAINTENANCE

- A. Maintain irrigation system for duration of 30 calendar days from formal written acceptance by Owner's Representative. Make periodic examinations and adjustments to irrigation system components in order to achieve the most efficient and uniform application of water.
- B. Following completion of Contractor's maintenance period, Owner will be responsible for maintaining system in working order during remainder of guarantee/warranty period, for performing necessary minor maintenance, for protecting against vandalism, and for preventing damage after landscape maintenance operation.

### 3.9 CLEANUP: Remove from site machinery, tools, excess materials, and rubbish upon completion of work.

## 32 84 23 - UNDERGROUND SPRINKLER IRRIGATION

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.
- 1.2 RELATED WORK
  - A. Section 32 92 19 - SEEDING
  - B. Section 32 93 00 - LANDSCAPE PLANTING
  - C. Section 32 92 23 - SODDING
- 1.3 INTENT & PROJECT SCOPE: The Specifications indicate and specify a complete and efficient landscape irrigation system which will operate in accordance with the specified equipment manufacturer's recommendations and with state and local codes and regulations. Items not specified, but found to be necessary for a complete system, shall be furnished under this Contract.
- 1.4 PROJECT RECORD DOCUMENTS
  - A. Prepare and maintain record documents for the project to accurately reflect the construction as built.
  - B. Upon completion and conditional acceptance of the Work and all corrections, prepare a reduced schematic diagram of the system showing mainline and quick coupler locations
  - C. Provide record drawings on reproducible media.
    1. Include dimensional locations of major components from permanent, fixed points such as buildings, walls, corners, sidewalks, curbs, etc.
    2. Show 2 actual measurement dimensions with a minimum of 75 degrees between the lines of measurements to each major item of the system, such as quick couplers, mainline shut-off valves, backflow preventer, etc.
    3. Since pipe routing indicated on the Drawings is schematic by nature, actual routing shall be clearly indicated on the record drawing.
- 1.5 QUALIFICATION OF INSTALLER: A Texas licensed landscape irrigator in good standing, approved by the Owner or his agent, with a minimum of 5 years continuous experience in installing systems of this type, and who is regularly engaged in installing landscape irrigation systems shall be employed for this Work.
- 1.6 PERMITS: Obtain necessary permits and pay any related fees and taxes required by governing agencies.
- 1.7 JOB REQUIREMENTS AND CONDITIONS: Prior to permanent pavement or erection or placement of other hard, solid objects, install and stub water lines and/or sleeves as necessary for later connection. Bores shall be required under all existing concrete paving unless specifically allowed otherwise on the Drawings. GC/CM to coordinate & verify all sleeve placement.
- 1.8 WARRANTY AND MAINTENANCE: All materials and equipment shall be warranted in writing for a period of a minimum of one (1) year against defects in materials and workmanship from their respective manufacturers. Underground Work, including piping, joints, valve placements, etc. shall be inspected and approved by the Owner and Landscape Architect for correctness and completeness before backfilling. Verify all finish grades within the Work area in order to ensure the proper soil coverage (as specified) of the sprinkler system pipes and proper height of all heads and risers.
  - A. All installation Work shall be warranted for a period of one (1) year against defective workmanship and handling by the installer.

- B. Replace defective material and repair Work at no expense to the Owner during the first year, following Final Acceptance, except for repairs or replacements necessitated by damage of any kind not of the Contractor's making.
  - C. Raising and lowering valves and valve boxes to proper height, filling trenches that have settled, packing the earth firmly around the quick couplers will be considered part of warranty Work and will be done at no charge to the Owner for one year after acceptance of the system.
  - D. Warranties shall become effective on the day the system is given Final Acceptance by Owner.
- 1.9 DAMAGE TO PROPERTY: Repair or replace any property damage inflicted in the course of the irrigation installation, without additional charge and before final payment. Included are damages to building, paving, structures, equipment, piping, pipe covering, utilities, sewers, walls, signs, sidewalks and landscaping. The Irrigation Installer is responsible for damage caused by leaks in the piping systems and shall make repairs without charge. The Irrigation Installer is not responsible for damage to the system caused by others.
- 1.10 EXISTING CONDITIONS: Field verify all existing site conditions. The Contractor acknowledges that he/she has satisfied himself/herself as to the nature of the Work and to the quality of surface and subsurface materials or obstacles insofar as this data is reasonably ascertainable from an inspection of the site. Any failure by the Contractor to acquaint himself/herself with the available information will not relieve himself/herself from responsibility for estimating properly the difficulty or cost of successfully performing the Work. Verify water supply pressure and volume as adequate prior to system installation. Report inadequacies immediately to the Owner and Landscape Architect for resolution.
- 1.11 EQUIPMENT TO BE INSTALLED: All materials and equipment shall be new and unused.
- 1.12 SUBSTITUTIONS: All substitutions of materials or methods described in this specification must be approved prior to their implementation. The Contractor must show that any substitution is equal to or better than the specified material, product or method, and that the use of the substituted equipment will not require redesign of the system.

## PART 2 - PRODUCTS

### 2.1 PIPE AND TUBE

- A. Irrigation lines:
  - 1. PVC Pipe: All polyvinyl chloride (PVC) pipe shall be continuously and permanently marked with the following information: manufacturer's name, production control number, class of schedule number, type and grade of material and pipe size.
    - a. Use ASTM D 1785 Schedule 40 for mainline piping.
    - b. Use Schedule 40 pipe for all under-pavement sleeves.

### 2.2 CONNECTIONS

- A. PVC Fittings: Use molded PVC fittings of the same material and pressure rating or schedule as the adjoining PVC pipe. Use fittings suitable for solvent weld, slip-joint ring connections, or screwed connections, as required, to properly join PVC pipe.
- B. Use PVC solvent primer (color-treated) on all PVC joints in preparation for the solvent weld.
- C. Use solvent cement of a type approved by the pipe manufacturer on all PVC connections.

### 2.3 SWING JOINTS

- A. All quick coupler valves shall receive triple swing joint riser assemblies. Schedule 80 PVC horizontal nipple connection attached to the main line side-outlet shall be a minimum of six inches (6") in length. Swing joints shall be as manufactured by King Brothers, Inc., or approved equal.

- B. Sprinklers installed on swing joints may have triple swing joint assemblies or use flexible pipe connections.

## 2.4 VALVES

- A. Gate Valves: As manufactured by Nibco, or approved equal.
- B. Quick Coupling Valves: As manufactured by Rainbird, Inc., Toro, Champion, or approved equal. Provide valve with 2-piece heavy cast bronze body and rubber cover. Provide 2 single-lug bronze keys with compatible swivel hose ells.

- 2.5 BACKFLOW PREVENTION DEVICES: Provide double-check, FEBCO Model 805Y, or approved equal, sized according to manufacturer's specifications for safe operation.

- 2.6 VALVE BOXES: Provide ten-inch (10") (or larger as required) lockable plastic valve box for enclosure of all valves, as manufactured by Amtek or approved equal.

- 2.7 GRAVEL: Provide and place gravel, 1/2" to 3/4" in diameter, beneath each valve and within valve boxes for a depth of 6 inches from the bottom of the valve assembly. Leave 2" below valve to top of gravel for work access.

- 2.8 SPRINKLERS: Provide new heads and nozzle assemblies as manufactured by Rainbird, Hunter, or approved equal.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Water Supply:
  - 1. Connect ground level system to existing irrigation water supply on the site.
  - 2. Coordinate the availability of temporary water service.
- B. Standard Installation: Perform all Work and provide material in accordance with the local codes and ordinances in force at the job site. Where provisions of these Specifications exceed such requirements, these specifications shall govern.
- C. Layout:
  - 1. Installer is responsible for locating valves, piping and fittings. The Drawings show a schematic layout only - adjustments required by existing field conditions shall be made as necessary, with the least variation to the Drawings as possible.
  - 2. Should a discrepancy in the Drawings become apparent at this time, in regard to size and shape of areas to be watered, such discrepancy shall be pointed out to the Landscape Architect before the installation is started.
  - 3. Work shall not proceed until design changes have been approved.
  - 4. Should such changes create extra cost, a Change Order for extra compensation shall be obtained in writing from the Owner before commencing work.
  - 5. Should such changes create a savings in cost, a written reduction in the contract price shall be approved by the Owner in writing before commencing Work.
  - 6. All materials shall be installed in strict accordance to the manufacturers' installation specifications.
  - 7. All layout is to be based on final locations of planting beds, tree locations, etc. Coordinate with landscape contractor before installing these areas.

### 3.2 EXCAVATION

A. Trenches:

1. Dig trenches no wider than is necessary to lay pipe, provide free working space around work installed, and provide ample room for backfilling and tamping. Compact trench bottoms to provide a uniform bearing surface the full length of the line.
2. Provide trenches of sufficient depth to provide a minimum cover above the top of pipe as follows: Over main lines: 15 inches. Over lateral lines, 12".
3. Backfill and hand tamp any over-excavation prior to installing the pipe.
4. If rock is encountered, remove the rock to a depth 2 inches below the bottom of the pipe.
5. A minimum of 2 inches of sand bedding shall be installed completely around the pipe. Backfill the next 4 inches of trench with a select backfill free from rocks and debris, then water settle. Complete remaining backfill with the material remaining on site.
6. Keep trenches free of debris that would damage pipe, such as rocks, soil clods and debris.
7. Clearly and visibly flag all open trenches, holes and depressions until adequately filled or repaired.
8. Generally route trenching for pipes along backs of curbs or other recent cuts

3.3 PIPE FITTING AND ASSEMBLY

- A. Keep ends of pipe securely closed when Work is not in operation to prevent water and other matter from entering the lines.
- B. The routing of the pressure supply lines as indicated on Drawings is diagrammatic. deviate where necessary and install lines to provide coverage without off-setting assemblies from pressure supply lines.
- C. Clean interior of pipe thoroughly; remove dirt and foreign matter before lower the pipe in to trench; keep clean during operation by plugs or other method.
- D. Clearances: Maintain the following clearances between lines:
  1. Pipe 2 inches and smaller: 4 inches
  2. Other services: 12 inches
  3. Maintain minimum 1 inch vertical clearance between lines crossing at an angle greater than 45 degrees.
- E. Piping Erection:
  1. General. The Installer is responsible for being familiar with any and all methods of assemblage, joining and installation of various types of pipe to be used. Adhere in strict accordance with the manufacturer's recommendations.
  2. Polyvinyl chloride (PVC) pipe:
    - a. Exercise care in handling, loading, unloading and storing plastic pipe and fittings.
    - b. Snake pipe in trench from side to side to allow for expansion and contraction of same. Do not lay pipe when there is water in trench or when temperature is 32 degrees Fahrenheit or lower.
    - c. Make all changes in direction of pipe with fittings, not by bending pipe.

- d. Solvent joints. Make sure pipe is cut square and all connecting surfaces are properly cleaned and dry. Apply an even coat of solvent to the outside and inside of the fitting. Insert the pipe quickly into the fitting and turn pipe approximately 1/4 turn to distribute the solvent and remove air bubbles. Hold the joint for approximately 15 seconds so the fitting does not push off the pipe. Using a clean rag, wipe off all excessive solvent to prevent weakening at joint. Exercise care in going to the next joint so that the pipe is not twisted, thereby disturbing the last completed joint. Allow at least 15 minutes set-up time for each solvent welded joint before moving.

F. Thrust Blocks

1. Provide 1 c.f. thrust block at each 45 degree or greater angle of change of direction in the main line.
2. Provide 1 c.f. thrust block in each direction at T's in the mainline.

3.4 VALVES

- A. Install valves in a plumb position with sufficient clearance for service and operation. Install remote control valves plumb to within 1/8 of an inch.
- B. Install valves so that the top of the valve assembly is no more than six inches below the top of the valve box. Adjust normal installation in accordance with standard practices as needed.
- C. Install valves in ten inch (10") minimum size locking plastic valve boxes. Valve box lids to be install flush with proposed grades.

3.5 BACKFLOW PREVENTION DEVICES

- A. Install backflow prevention device as per requirements of Local Plumbing Code at location determined by Owner and shown on Drawings.
- B. Place valve and associated gate valves within a 24" locking plastic valve box.

3.6 SLEEVES

- A. Provide new sleeves for all locations where new sleeves are needed as directed by Owner and Landscape Architect. Install new sleeves prior to pavement or wall installations.
- B. Where sleeves are needed under existing pavement and which cannot be blown or jetted into place, cut and patch asphalt in a method acceptable to the Owner.

3.7 INSPECTION, TESTING AND APPROVAL

- A. Do not enclose or cover any Work until it has been inspected, tested and approved.
- B. Hydrostatic Piping Test:
  1. In the presence of the Owner and Landscape Architect, hydrostatically test the main line piping system in place before backfilling. Test to a minimum psi of 100. Test period shall not be less than 4 hours. Pipe may be tested in sections to expedite the work.
  2. Test is acceptable if no leakage occurs during test period.
  3. Repair all leaks and retest system for another 4-hour period if necessary. Continue this procedure until all leaks are repaired.
- C. Operation Test:

1. After all equipment is installed, test the system for coverage, flow and pressure in the presence of the Owner and Landscape Architect.
  2. Test is acceptable if system operates satisfactorily, with adequate pressure and flow and if all irrigated areas are receiving proper coverage with no overspray onto pavement or buildings.
  3. After completion of grading, seeding or sodding and rolling of grass areas, adjust valve box heights so they will be flush with not more than 1/4 inch above finish grade.
  4. After all required adjustments are made, coordinate any required inspections.
- D. Final Acceptance: Final Acceptance may be given when all punchlist items are satisfactorily completed and the governing authority has approved the job (with all comments completed).

### 3.8 CLEANUP

- A. Maintain a clean work area during the progress of the Work within reasonable limits of the installation area. Periodically remove all rubbish, debris, etc., from Work site and dispose legally.
- B. Upon completion of the Work, remove all construction and installation equipment from the premises; make ground surface level where it has been affected by irrigation system installation; and remove excess materials, rubbish and debris.
- C. Immediately replace and thoroughly hand water any plant material and groundcover which may be displaced during installation.



## 32 92 13 - HYDRO-MULCHING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Description. Provide and install temporary & permanent seeding for erosion control to all areas regraded by construction or demolition activities.

### PART 2 - PRODUCTS

- 2.1 Seed. Provide seed from the previous season's crop meeting the requirements of the Texas Seed Law, including the testing and labeling for pure live seed (PLS = Purity x Germination). Furnish seed of the designated species, in labeled unopened bags or containers to the Engineer before planting. Use within 12 mo. From the date of the analysis. When Buffalograss is specified, use seed that is treated with KNO<sub>3</sub> (potassium nitrate) to overcome dormancy. Use the appropriate seed mix and rates as specified by TxDOT.
- 2.2 Fertilizer. Use fertilizer in conformance with TxDOT specifications.
- 2.3 Vegetative Watering. Use water that is clean and free of industrial wastes and other substances harmful to the growth of vegetation.
- 2.4 Mulch.
  - A. Straw or Hay Mulch. Use straw or hay mulch in conformance TxDOT specifications.
  - B. Cellulose Fiber Mulch. Use only cellulose fiber mulches that are on the approved list published in "Field Performance of Erosion Control Products," available from the TxDOT Maintenance Division.
  - C. Submit 1 full set of manufacturer's literature for the selected material. Keep mulch dry until applied. Do not use molded or rotted material.
- 2.5 Tacking Methods. Use a tacking agent applied in accordance with the manufacturer's recommendations or a crimping method on all straw or hay mulch operations. Tacking agents must be approved before use, or specified on the plans.

### PART 3 - EXECUTION

- 3.1 CONSTRUCTION. Cultivate the area to a depth of 4 in. before placing the seed unless otherwise directed. When performing permanent seeding after an established temporary seeding, cultivate the seedbed to a depth of 4 in. or mow the area before placement of the permanent seed. Plant the seed specified and mulch, if required, after the area has been completed to lines and grades as shown on the plans.
- 3.2 BROADCAST SEEDING. Distribute the seed or seed mixture uniformly over the areas shown on the plans using hand or mechanical distribution or hydro-seeding on top of the soil. When seed and water are to be distributed as a slurry during hydro-seeding, apply the mixture to the area to be seeded within 30 min. of placement of components in the
- 3.3 EQUIPMENT. Roll the planted area with a light roller or other suitable equipment. Roll sloped areas along the contour of the slopes.
- 3.4 STRAW OR HAY MULCH SEEDING. Plant seed according to TxDOT specifications, "Broadcast Seeding." Immediately after planting the seed or seed mixture, apply straw or hay mulch uniformly over the seeded area. Apply straw mulch at 2 to 2.5 tons per acre. Apply hay mulch at 1.5 to 2 tons per acre. Use a tacking method over the mulched area.

- 3.5 CELLULOSE FIBER MULCH SEEDING. Plant seed according to TxDOT specifications Section 164.3.A, "Broadcast Seeding." Immediately after planting the seed or seed mixture, apply cellulose fiber mulch uniformly over the seeded area at the following rates:
  - A. Sandy Soils with slopes of 3:1 or less—2500 lb. per acre.
  - B. Sandy Soils with slopes greater than 3:1—3000 lb. per acre.
  - C. Clay Soils with slopes of 3:1 or less—2000 lb. per acre.
  - D. Clay Soils with slopes greater than 3:1—2300 lb. per acre.
- 3.6 Cellulose fiber mulch rates are based on dry weight of mulch per acre. Mix cellulose fiber mulch and water to make a slurry and apply uniformly over the seeded area using suitable equipment.
- 3.7 DRILL SEEDING. Plant seed or seed mixture uniformly over the area shown on the plans at a depth of 1/4 to 1/3 in. using a pasture or rangeland type drill. Plant seed along the contour of the slopes.
- 3.8 STRAW OR HAY MULCHING. Apply straw or hay mulch uniformly over the area as indicated on the plans. Apply straw mulch at 2 to 2.5 tons per acre. Apply hay mulch at 1.5 to 2 tons per acre. Use a tacking method over the mulched area. Apply fertilizer in conformance with TxDOT specifications Article 166.3, "Construction." Seed and fertilizer may be distributed simultaneously during "Broadcast Seeding" operations, provided each component is applied at the specified rate. When temporary and permanent seeding are both specified for the same area, apply half of the required fertilizer during the temporary seeding operation and the other half during the permanent seeding operation. Water the seeded areas at the rates and frequencies as shown on the plans or as directed.

## 32 92 19 - SEEDING

### PART 1 - PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions, Requirements and Procedures, and City requirements apply to the work of this section.
- 1.2 WORK INCLUDED: Establishment of turf by seeding, fertilizing and mulching, and includes providing and placing topsoil, preparation of the seeding bed, fertilizing, seeding, mulching and watering, guarantee and all labor, materials, equipment and incidentals needed to complete the work.
- 1.3 REFERENCE STANDARDS: ASTM Sieve Analysis Standards
- 1.4 RELATED WORK
  - A. Section 02441 - 32 84 23 - UNDERGROUND SPRINKLER IRRIGATION
  - B. Section 32 93 00 - LANDSCAPE PLANTING
  - C. Section 32 92 23 - SODDING

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Imported topsoil shall be a fertile, loose loam, dark brown or black in color, and typical of cultivated topsoil available locally. It shall be reasonably free of subsoil, stones larger than 1" in diameter, earth clods, sticks, roots or other objectionable and extraneous matter of debris. The pH shall be between 5.0 and 7.5, and it shall have at least 3% to 5% organic material by dry volume. The Contractor is to provide reports from a testing agency verifying these requirements. The Seeding Contractor will be responsible for providing a weed-free final product, regardless of the topsoil source or provider.
- B. Fertilizer shall be complete fertilizer, at least 50% of the nitrogen of which is derived from natural organic sources of ureaform. It shall contain the following percentages by weight:
  1. Nitrogen (N) 10
  2. Phosphorus (P) 20
  3. Potash (K) 10
- C. Superphosphate: Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes containing not less than eighteen percent (18%) available phosphoric acid.
- D. Fertilizers, unless otherwise specified, shall be delivered mixed as specified, in standard size, unopened containers, showing weight, analysis and name of manufacturer. They shall be stored in a weatherproof storage place and in such a manner that the fertilizer will be kept dry and its effectiveness not impaired. If and when bulk delivery and spreading of fertilizer is authorized, the Contractor shall provide the Owner or Owner's Representative with a notarized written affidavit certifying weight and analysis of the fertilizer.
- E. All pesticides shall be used in accordance with the specifications of the prevailing Public Health Authority.
- F. Grass seed shall be fresh, clean, new crop seed composed of the following varieties mixed in the proportion by weight shown and testing the minimum percentages of purity and germination:

Kind of Seed	<u>% Purity</u>	<u>% Germination</u>
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Bermuda "Princess 77"	98%	85%
Buffalo Grass	98%	85%
Annual Ryegrass	95%	90%

- G. Cellulose Fiber Mulch shall be natural cellulose fiber mulch produced from grinding clean, whole wood chips with a labeled ash content not to exceed 7%. The mulch shall be designed for use in conventional mechanical planting or hydraulic mulching of grass seed, either alone or with fertilizers and other additives. The mulch shall be such that when applied, the material shall form a strong, moisture-retaining mat without the need of an asphalt binder.

H. SEED MIXTURES AND SEEDING DATES FOR REVEGETATION

1. March 15 - October 15 - Permanent Turf Type

a. Seed Mixture #1

Bermuda or Buffalo:	6 lbs. pls / 1,000 s.f.
10-20-10 Homogenized Fertilizer:	10 lbs. / 1,000 s.f.
Wood Cellulose Fiber Mulch:	45 lbs. / 1,000 s.f.

2. October 15 - April 15 - Temporary Turf Only

a. Seed Mixture #2

- i Unhulled Common: 6 lbs./1,000 s.f.
- ii Annual Ryegrass: 15 lbs. / 1,000 s.f.
- iii Fertilizer: 7 lbs. / 1,000 s.f.
- iv Wood Cellulose Mulch: 45 lbs. / 1,000 s.f.

3. Should project timing require the application of a temporary turf, it shall be followed during the April to October planting season with the permanent turf mixes as specified. The base bid shall include all permanent turf establishment, regardless of whether the temporary seeding is applied.
4. Grass seed for revegetation shall be placed in all areas regraded by construction operations.

PART 3 - EXECUTION

3.1 GENERAL

A. Bed Preparation

1. Remove all weeds from areas to be seeded prior to fine grading. All visible weeds shall be killed and grubbed before seeding may commence.
2. After subsoil grading is completed according to the grades shown on the grading plans, all areas to be seeded shall be cultivated to a depth of 2 inches where the subsoil has been compacted. Till the soil sufficiently to reduce the soil to a state of grad tilth when the soil particles on the surface are small enough and lie closely enough together to prevent the seed from being covered too deeply for optimum germination. All rock or debris over 1" in diameter and all weeds shall be removed.

3. Four inches (4") topsoil shall be added and uniformly spread over all disturbed areas. Topsoil shall be compacted as needed to maintain the surface and all slopes, but not to a degree which creates a hard surface. Soil shall be raked to a smooth bed. The areas should be moistened but not thoroughly wetted before spraying hydromulch.
- B. Commercial fertilizer may be directly applied to topsoil used on the project, in the amounts recommended by the soils testing agency. The fertilizer shall be immediately applied to the lawn area by mechanical distributor and thoroughly and evenly incorporated with the soil to a depth of two inches (2") by disking or other approved methods. In areas inaccessible to power equipment, it shall be incorporated with the soil by hand tools.
- C. Fertilizer may be applied as a part of the hydromulch mixture.
- D. Seeding may be done immediately after bed preparation and fertilization, provided the bed has remained in a good, friable condition and has not become muddy or hard. If it has become hard due to rain, drying or other reason, it shall be tilled to a friable condition again.

### 3.2 SEEDING OPERATIONS

- A. Seeding may be done whenever the weather and soil conditions are favorable or as otherwise authorized by the Owner or Owner's Representative and with the consent of the Contractor.
- B. Seeding shall be accomplished by any accepted method such as cultipacker, hand broadcast, drill type, or the hydraulic method.
- C. Seeding and restoration shall begin prior to final completion of all improvements, and may occur in phases as portions of the project become ready and will no longer be disturbed.
- D. Cellulose Fiber Mulch Seeding
  1. The seed or seed mixture shall be uniformly distributed over the area shown on the plans or where directed by the Owner or Owner's Representative.
  2. Fertilizer and mulch may be applied as a single slurry mix.
  3. All areas not to receive the hydromulch mixture will be protected from direct or over-spray. Remove and clean all hydromulch from buildings, trees, shrubs, curbs, pavement, fire hydrants, light and utility poles, and other site improvements.

### 3.3 MAINTENANCE AND PROTECTION

- A. The installing contractor shall be responsible for all turf maintenance as outlined below.
- B. Maintain lawn areas until Final Acceptance by watering, cultivating, weeding, spraying, replacing as necessary to keep turf in a vigorous, healthy condition.
- C. Watering: All grass areas shall be watered by the Contractor as necessary to establish a stand of grass and to keep the top 2" of soil moist. Watering shall occur at least every 5 days during the first two months after planting, more often if weather conditions require. Rainfall occurrences of one-half inch or greater shall substitute for one Contractor watering.
- D. Any lawn areas not showing sufficient growth in a 3-4 week period shall be prepared and re-hydromulched as originally specified.
- E. Mow newly planted grasses weekly or as deemed necessary by Owner or Owner's Representative or Owner until final acceptance as a part of the base bid cost.

- F. Remove weeds and foreign grasses from newly planted lawn at least once a week. A contact herbicide may be used provided new grass is not damaged.
- G. Acceptance will be granted when newly seeded grass areas have achieved 95% coverage, with no bare areas larger than five square feet, and grasses have been of sufficient height to mow at least one time. The Contractor will at that time provide the Owner with a brief but complete maintenance schedule outlining watering and mowing needs and a fertilization and reseeding schedule.

### 3.4 INSPECTION AND ACCEPTANCE

- A. The Owner or Owner's Representative shall inspect the lawns upon written request by the Contractor. The request shall be received at least 10 days before the anticipated date of inspection.
- B. Inspection and acceptance of seeded areas may be requested and granted in part, provided the area for which acceptance is requested is relatively substantial in size with clearly definable boundaries.
- C. Responsibility of treated areas: Until the project is finally accepted, the Contractor will be required to repair or replace any seeding or mulching that is defective or becomes damaged or is unacceptable due to weed growth.

### 3.5 CLEANING

- A. Leave the site in a clean and orderly condition.
- B. Remove from the site all equipment, unused materials, clippings of plant materials, packaging, and stone or rubble uncovered during seeding operations.
- C. Clean and remove all hydromulch over spray from pavement, buildings, fences, light poles, plant foliage and trunks, etc.

## 32 92 20 - GRASSLAND RESTORATION SEEDING

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions, Requirements and Procedures, and City requirements apply to the work of this section.
- 1.2 WORK INCLUDED: Establishment of turf by seeding, fertilizing and mulching, and includes providing and placing topsoil, preparation of the seeding bed, fertilizing, seeding, mulching and watering, guarantee and all labor, materials, equipment and incidentals needed to complete the work.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Composted Mulch shall be mechanically chipped on-site trees & vegetative matter that has been stockpiled for a sufficient time to become completely composted..
- B. Fertilizer shall be complete fertilizer, at least 50% of the nitrogen of which is derived from natural organic sources of ureaform. It shall contain the following percentages by weight:
  1. Nitrogen (N) 10
  2. Phosphorus (P) 20
  3. Potash (K) 10
- C. Fertilizers, unless otherwise specified, shall be delivered mixed as specified, in standard size, unopened containers, showing weight, analysis and name of manufacturer. They shall be stored in a weatherproof storage place and in such a manner that the fertilizer will be kept dry and its effectiveness not impaired. If and when bulk delivery and spreading of fertilizer is authorized, the Contractor shall provide the Owner or Owner's Representative with a notarized written affidavit certifying weight and analysis of the fertilizer.
- D. All pesticides shall be used in accordance with the specifications of the prevailing Public Health Authority.

#### 2.2 SEED MIXTURES

- A. Permanent revegetation "Meadow Mix" equal to Native American Seed • Junction, Texas • 1-800 728-4043 • E-mail: info@seedsource.com
  1. Plant 25% of designated area in "Comanche Mix" Item #1800, at a planting rate of 20 lbs. per acre, containing:
    - a. Greenthread
    - b. Huisache Daisy
    - c. Indian Blanket
    - d. Lazy Daisy
    - e. Prairie Verbena
    - f. Texas Bluebonnet
    - g. The perennial wildflowers can be planted in spring or fall.
  2. Plant 75% of designated area in "Caliche Mix" Item #2860, at a planting rate of 15 lbs. per acre, containing:
    - a. Blue Grama
    - b. Buffalograss
    - c. Green Sprangletop
    - d. Indiangrass
    - e. Little Bluestem

- f. Prairie Wildrye
  - g. Sand Lovegrass
  - h. Sideoats Grama
  - i. Sand Dropseed
  - j. Texas Cupgrass
  - k. Cane Bluestem
  - l. Curly Mesquite
  - m. Warm season native grass seeds germinate when soil temps are above 65° F. The best time to plant native grasses is late spring in normal rainfall years. However, successful plantings may be made up until 90 days before frost.
3. Permanent revegetation of periodically wet areas, such as detention ponds, plant "Drainfield Mix" Item #2861, at a Planting Rate of 30 lbs. per acre, containing:
  - a. Big Bluestem
  - b. Cereal Rye Grain
  - c. Eastern Gamagrass
  - d. Green Sprangletop
  - e. Prairie Wildrye
  - f. Switchgrass
  - g. Bushy Bluestem
  - h. White Tridens
4. October 15 - April 15 - Temporary Turf Only, "Cereal Rye Grain" Item #8050. For use as a nurse crop with native grasses, when planting on relatively level ground, a seeding rate of 25 lbs / acre of cereal rye grain to provide cool season winter vegetation. If the area is a highly erodible slope or in a waterway, a rate up to 100 lbs / acre to provide cool season, quick, short-term vegetation. Use full planting rates of other native seeds.
  - a. Should project timing require the application of a temporary turf, it shall be followed during the April to October planting season with the permanent turf mixes as specified. The base bid shall include all permanent turf establishment, regardless of whether the temporary seeding is applied.
5. Grass seed for permanent & temporary revegetation shall be placed in all areas regraded by construction operations.

### PART 3 - EXECUTION

#### 3.1 GENERAL

##### A. Bed Preparation

1. Remove all weeds from areas to be seeded prior to fine grading. All visible weeds shall be killed and grubbed before seeding may commence.
2. After subsoil grading is completed according to the grades shown on the grading plans, all areas to be seeded shall be cultivated to a depth of 2 inches where the subsoil has been compacted. Till the soil sufficiently to reduce the soil to a state of grad tilth when the soil particles on the surface are small enough and lie closely enough together to prevent the seed from being covered too deeply for optimum germination. All rock or debris over 1" in diameter and all weeds shall be removed. The least amount of soil disturbance will have the most favorable results, unless other objectives such as breaking hard clay sub-soils or incorporating organic matter and minerals are desired.



3. Two inches (2") of on-site harvested composted mulch shall be added and uniformly spread over all disturbed areas. Compost shall be compacted as needed to maintain the surface and all slopes, but not to a degree which creates a hard surface. Soil shall be raked to a smooth bed. The areas should be moistened but not thoroughly wetted before spraying hydromulch.
- B. Commercial fertilizer may be directly applied to topsoil used on the project, in the amounts recommended by the soils testing agency. The fertilizer shall be immediately applied to the grassland area by mechanical distributor and thoroughly and evenly incorporated with the soil to a depth of two inches (2") by disking or other approved methods. In areas inaccessible to power equipment, it shall be incorporated with the soil by hand tools.
- C. Seeding may be done immediately after bed preparation and fertilization, provided the bed has remained in a good, friable condition and has not become muddy or hard. If it has become hard due to rain, drying or other reason, it shall be tilled to a friable condition again.

### 3.2 SEEDING OPERATIONS

- A. Seeding may be done whenever the weather and soil conditions are favorable or as otherwise authorized by the Owner or Owner's Representative and with the consent of the Contractor. Mix fluffy or small seeds with a "carrier" for even distribution. Carriers such as coarse sand, perlite, rice hulls or other extenders aid in keeping seeds in suspension. Take half the seed mixture and spread it evenly over the whole area. Then cross back in opposite directions and spread the rest. Most seeds should never be buried more than twice their diameter. Do not bury small seeds at all. One of the most common reasons that seeds fail to come up is that they have been planted too deeply. Some seeds will be visible on the ground.
- B. Seeding shall be accomplished by any accepted method such as cultipacker, hand broadcast, drill type, or the hydraulic method. Achieve good seed to soil contact. Spread seed by hand, like "feeding the chickens". A broadcast spreader or a seed drill is good for larger areas. A diligent effort should be made to press the seeds into the soil. A firm seed-to-soil contact is very important.
- C. Seeding and restoration shall begin prior to final completion of all improvements, and may occur in phases as portions of the project become ready and will no longer be disturbed.

### 3.3 MAINTENANCE AND PROTECTION

- A. The installing contractor shall be responsible for all turf maintenance as outlined below.
- B. Maintain grassland areas until Final Acceptance by watering, cultivating, weeding, spraying, replacing as necessary to keep turf in a vigorous, healthy condition.
- C. Watering: All grass areas shall be watered by the Contractor as necessary to establish a stand of grass and to keep the top 2" of soil moist. Watering shall occur at least every 5 days during the first two months after planting, more often if weather conditions require. Rainfall occurrences of one-half inch or greater shall substitute for one Contractor watering. Keep up with your watering until plants are established. For germination, water lightly and frequently to prevent top of soil from drying out. Rain gauges placed throughout the seeded areas can help you monitor daily waterings. When wildflower seedlings are about 1 inch tall or grass seedlings have 3 to 5 blades per sprout, reduce the frequency of waterings to 2 or 3 times weekly. Increase water per application to achieve greater soaking depths for development of healthy root systems. Alternate soil moisture from good deep soakings to moderately dry in between waterings. Roots need a balance of oxygen. Reduce frequency of waterings over time as plants become established. Supplemental water may be discontinued as seasonal rains return.

- D. Any grassland areas not showing sufficient growth in a 3-4 week period shall be prepared and replanted as originally specified.
- E. Acceptance will be granted when newly seeded grass areas have achieved 95% coverage, with no bare areas larger than five square feet, and grasses have been of sufficient height to mow at least one time. The Contractor will at that time provide the Owner with a brief but complete maintenance schedule outlining watering and mowing needs and a fertilization and reseeding schedule.

#### 3.4 INSPECTION AND ACCEPTANCE

- A. The Owner's Representative shall inspect the grassland upon written request by the Contractor. The request shall be received at least 10 days before the anticipated date of inspection.
- B. Inspection and acceptance of seeded areas may be requested and granted in part, provided the area for which acceptance is requested is relatively substantial in size with clearly definable boundaries.
- C. Responsibility of treated areas: Until the project is finally accepted, the Contractor will be required to repair or replace any seeding or mulching that is defective or becomes damaged or is unacceptable due to weed growth.

#### 3.5 CLEANING

- A. Leave the site in a clean and orderly condition.
- B. Remove from the site all equipment, unused materials, clippings of plant materials, packaging, and stone or rubble uncovered during seeding operations.

## 32 92 23 - SODDING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Requirements and Procedures.

#### 1.2 DESCRIPTION

- A. Work included: furnishing all sod, topsoil, fertilization and watering as necessary to establish sod in the areas identified on the plans.

#### 1.3 SECTION INCLUDES

- A. Fertilizing.
- B. Sod installation.
- C. Maintenance.

#### 1.4 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. No separate payment shall be made for topsoil, fine grading, removal of weeds and soil rubble, square yards of sod, fertilization, soil filler, rolling, watering or maintenance until final acceptance. Include all such costs in the base bid.

#### 1.5 REFERENCES

- A. ASPA (American Sod Producers Association) - Guideline Specifications to Sodding.

#### 1.6 DEFINITIONS

- A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

#### 1.7 MAINTENANCE DATA

- A. Operation Data: Submit for continuing Owner maintenance.
- B. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer; and water requirements and seasonal schedule.

#### 1.8 QUALITY ASSURANCE

- A. Sod: Minimum age of 12 months, with full coverage and root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.
- B. Submit sod certification for grass species and location of sod source.

#### 1.9 QUALIFICATIONS

- A. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience, and certified by the State of Texas.

#### 1.10 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition and handling.

#### 1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sod on pallets. Protect exposed roots from dehydration.
- B. Do not deliver more sod than can be laid within 12 hours.

#### 1.12 COORDINATION

- A. Coordinate with installation of underground sprinkler system piping and watering heads (if applicable).
- B. Coordinate with installation of all pavement, including walks, curbs, ramps, walls and pavers.
- C. Coordinate with installation of all other plantings and seeding operations.

#### 1.13 MAINTENANCE SERVICE

- A. Maintain sodded areas immediately after placement until grass is well established and exhibits a vigorous growing condition. Maintain by mowing, weeding, fertilizing and watering until Final Acceptance.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Sod: Field grown; cultivated grass sod; type indicated on Drawings; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000 sq. ft.
  - 1. Tif-Sport hybrid bermuda rolled grass; must be grown on a sand base.
- B. Topsoil: Imported topsoil shall be a fertile, loose loam, dark brown or black in color, and typical of cultivated topsoil available locally. It shall be reasonably free of subsoil, stones larger than 1" in diameter, earth clods, sticks, roots or other objectionable and extraneous matter of debris. The pH shall be between 5.0 and 7.5, and it shall have at least 3% to 5% organic material by dry volume. The Contractor is to provide reports from a testing agency verifying these requirements.
- C. Fertilizer: Type recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil as indicated in analysis to the following proportions: nitrogen 10 percent, phosphoric acid 20 percent, soluble potash 10 percent.
- D. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.

#### 2.2 ACCESSORIES

- A. Sod Staples: Biodegradable, sufficient size and length to ensure anchorage of sod on slope.
- B. Herbicide: Roundup, Penate, or approved equal.

**2.3 HARVESTING SOD**

- A. Machine cut sod and load on pallets in accordance with ASPA Guidelines.
- B. Cut sod in area not exceeding 16 inches by 24 inches, with minimum 1/2 inch and maximum 3/4 inch topsoil base.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Verify that prepared soil base is ready to receive the work of this section.
- B. Fine grade base as needed to ensure a smooth final surface with no bumps, rolls or depressions.
- C. Remove all visible weeds and root systems.

**3.2 PREPARATION OF SUBSOIL**

- A. Prepare sub-soil and eliminate uneven areas and low spots.
- B. Maintain lines, levels, profiles and contours as shown on the grading plan. Make changes in grade gradual by blending slopes into level areas. Do not direct drainage toward building walls.
- C. Remove foreign materials and undesirable plants and their roots. Do not bury foreign material beneath areas to be sodded.
- D. Remove contaminated subsoil.
- E. Scarify sub-soil to a depth of 2 inches where topsoil is to be placed. Remove all rocks, clods, debris and other undesirable materials over 1" in diameter.
- F. Repeat cultivation in areas where equipment and construction activity has compacted subsoil. Loosen soil to a depth of at least 3 inches.

**3.3 PLACING TOPSOIL**

- A. Spread topsoil to a minimum depth of 2 inches over area to be sodded.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.
- E. Install edging at where indicated on the planting plan in straight lines to consistent depth.

**3.4 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions, at the rate of 10 lbs. per 1,000 s.f.
- B. Apply after smooth raking of topsoil and prior to installation of sod.

C. Apply fertilizer no more than 24 hours before laying sod.

D. Lightly water to aid the dissipation of fertilizer.

### 3.5 LAYING SOD

A. Moisten prepared surface immediately prior to laying sod.

B. Lay sod immediately after delivery to site to prevent deterioration.

C. Lay sod tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.

D. Lay smooth.

E. Place top elevation of sod soil 1 inch below adjoining edging, paving, or curbs.

F. On slopes with a vertical rise of 3 inches per foot of horizontal distance and steeper, lay sod perpendicular to slope and secure every row with sod staples. Drive flush with soil portion of sod.

G. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.

H. After sod and soil have dried, roll sodded areas with a weighted roller to ensure good bond between sod and soil and to remove minor depressions and irregularities.

### 3.6 MAINTENANCE

A. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.

B. Neatly trim edges and hand clip where necessary.

C. Water to prevent grass and soil from drying out.

D. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

E. Immediately replace sod to areas which show deterioration or bare spots.

F. Protect sodded areas with warning signs during maintenance period.

G. Areas which settle and do not drain shall be stripped of sod and have topsoil added as needed to create positive drainage. New sod shall then be laid again.

H. Maintenance shall continue until the sod has been given Final Acceptance.

### 3.7 CLEAN UP

A. Remove all sod scraps, soil, palettes, stakes and other materials from the site upon completion of the work. Clean soil and clippings from all pavement.

## 32 93 00 - LANDSCAPE PLANTING

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS: Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section. Provisions of the General and Supplementary Conditions supersede provisions of this section and the Drawings in the case of a conflict.
- 1.2 WORK INCLUDED: The Work covered in these Specifications shall include the furnishing of all labor, equipment, materials and services necessary for delivery and installation of all new plant materials, and fine grading of landscape areas in accordance with the Specifications and Drawings. The Contractor shall direct all landscape oriented activities to the swift completion of this Work.
- 1.3 QUALITY ASSURANCE
  - A. Refer to Section 01400 - Quality Control Service and, Section 01 78 23 - OPERATION AND MAINTENANCE DATA.
  - B. Provide documentation of all products which Contractor intends to use, to the Owner and Architect. The Owner and Architect reserve the right to request additional information on any product or on any method of operation. Invoices, shipping lists, tags, or other documentation for all materials, including plants and fertilizer, shall be supplied as a means to verify plant species, quantities and sizes, and general conformance with the Drawings and Specifications.
  - C. Plant names indicated comply with "Standardized Plant Names" as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties not listed conform generally with names accepted by the nursery trade. Provide stock true to botanical name and legibly tagged.
  - D. Stock furnished shall be at least the minimum size indicated. All sizing and grading standards shall conform to the latest edition of the 'American Standard for Nursery Stock' by the American Association of Nurserymen. A plant shall be dimensioned as it stands in its natural position.
- 1.4 MAINTENANCE & PROTECTION: Maintain all landscaping until Final Acceptance of the Project.
- 1.5 JOB REQUIREMENTS AND CONDITIONS: The Contractor is responsible for providing adequate security for any materials stored at the site.
- 1.6 SITE INVESTIGATION: The Contractor acknowledges that he/she has satisfied himself/herself as to the nature of the Work and to the quality of surface and subsurface materials or obstacles insofar as this data is reasonably ascertainable from an inspection of the site. Any failure by the Contractor to acquaint himself/herself with the available information shall not relieve himself/herself from responsibility for estimating properly the difficulty or cost of successfully performing the Work.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Topsoil
  1. Imported topsoil shall be a fertile, loose loam, dark brown or black in color, and typical of cultivated topsoil available locally. It shall be reasonably free of subsoil, stones larger than 1" in diameter, earth clods, sticks, roots or other objectionable and extraneous matter of debris. The pH shall be between 5.0 and 7.5, and it shall have at least 3% to 5% organic material by dry volume. The Contractor is to provide reports from a testing agency verifying these requirements.
  2. Stockpiled site topsoil may be used only after being tested by a recognized testing agency and soil amendments added as recommended. Such topsoil shall have a pH of 5.0 to 7.5, contain at least 4% organic material, and shall be within normal laboratory recommended limits for other minerals and elements, or shall be amended as recommended by the testing agency to achieve the specified pH and organic requirements. While stored on site, such topsoil shall be covered with a dark plastic covering to keep seeds and debris from mixing

- with the topsoil, and to kill as many existing weed seeds as possible, or by an alternative method approved by the Owner.
  3. Use of on-site topsoil shall not relieve the Contractor from providing a weed-free planting area or from removing all visible weeds from new plantings during the period of maintenance.
- B. Fertilizer: Fertilizer shall be an organic type, preferably a complete and slow release fertilizer, uniform in composition, in pelletized or granular form, dry and free-flowing, at least 50% of the elements of which are derived from organic sources. It shall contain the following percentages by weight:
1. Nitrogen (N) 13% Phosphorus (P) 13% Potash (K) 13%
- C. Fertilizers, unless otherwise specified, shall be delivered mixed as specified, in standard size, unopened containers, showing weight, analysis and name of manufacturer. They shall be stored in a weatherproof storage place and in such a manner that the fertilizer shall be kept dry and its effectiveness not impaired. If and when bulk delivery and spreading of fertilizer is authorized, the Contractor shall provide the Owner and Landscape Architect with a notarized written affidavit certifying weight and analysis of fertilizer.
- D. Lime: Ground limestone for raising the pH level shall be an approved agricultural limestone containing not less than 85% of total carbonates. Limestone shall be ground to such a fineness that 50% shall pass a 100 mesh sieve and 90% shall pass through a 20 mesh sieve.
- E. Backfill Soil planting mixture shall be a prepared mixture of topsoil, sand and compost. It may be premixed or prepared on the site to the following proportions:
1. 2 parts topsoil
  2. 2 part sharp sand
  3. 3 part composted soil conditioner
- F. Stakes: Stakes for supporting trees shall be of wood of uniform size, reasonably free of knots and capable of standing in the ground at least two years, and they shall be nominally 1 3/4" x 1 3/4" square and not less than 30" in length. Stakes for supporting small trees, under ten feet (10') tall, shall be 1 3/4" square or two inches (2") in diameter, and not less than eight feet (8') in length.
- G. Wire: Wire for tree bracing and guying shall be pliable Number 12 gauge galvanized soft steel wire.
- H. Cable Fittings: Cable shall be 3/16" diameter, 7 strand, and cadmium plated. Cable clamps and turnbuckles shall be of galvanized steel, of size and gauge to provide tensile strength equal to that of the cable. Turnbuckle opening shall be a minimum of three inches (3").
- I. Tree Ties: Cinch tie, or equivalent; hose, if used, shall be 2-ply, fiber bearing garden hose, not less than 1/2" inside diameter.
- J. Wrapping Material: Wrapping material shall be first quality, heavy, waterproof crepe paper manufactured for this purpose.
- K. Anti-Desiccant: Anti-desiccant shall be "Wilt Pru" or "Cloud Cover" or equal, delivered to site in manufacturer's containers and used according to the manufacturer's instructions.
- L. Mulch: mulch for all planting beds and tree saucers shall be shredded hardwood bark.
- M. Water: A water source for this work, planting and maintenance, will be available after the installation of an irrigation main line and quick couplers by the Irrigation Contractor. Refer to the Irrigation Plan for line and connection locations. Water necessary for Work completed before this system is available shall be the responsibility of the Contractor performing the Planting. Verify with the General Contractor any restrictions on the use of the water source.



- N. Compost: Compost shall be thoroughly mixed organic materials including animal manure, wood shavings, seed hulls, hay, etc., and shall be reasonably free of weed seeds, nematodes, stones, clods, sticks, roots, harmful pathogens, or other objectionable and extraneous matter of debris. Heat caused by biological activity should reach 160 degrees Fahrenheit or more for a period of eight (8) weeks or longer, and compost pile shall be turned several times during this period to promote aerobic composting. Compost shall be equal to 'Dillo Dirt' or Gardenville Compost.
- O. Pesticides: All pesticides shall be used with an Integrated Pest Management plan and in accordance with the Specifications of the prevailing Public Health Authority. Use of any pesticide on the site shall not be allowed without prior written permission from the Owner.
- P. Steel Edging: New steel curb, 1/8" x 4" factory painted black as manufactured by Joseph Ryerson Co., Inc., of Houston, Texas, including all companion stakes, or approved equal. Install edging as per manufacturer's Specifications and as shown or noted on the Drawings. Planting bed edging shall be set with the top edge a minimum of one inch (1") above finished grade.
- Q. Soil Separator: "Weed-Chek" landscape mat or other approved material.

## 2.2 PLANT MATERIALS

- A. Furnish and install all plants shown on the Drawings as specified, and fulfilling the Specifications listed on the plant materials list. The botanical name shall be used to determine species and variety over the common name. Plant Materials shall mean trees, shrubs, vines and plants of all descriptions. Should discrepancies occur between the quantities of plants indicated in the plant list & as indicated on the plan, the quantities on the plan shall govern.
- B. All plants shall be nursery grown in a recognized commercial nursery. Trees which are specified to be Container Grown shall have been grown in containers for at least two years. All nursery grown or provided plants shall be tagged with weatherproof tags indicating the common and botanical name of the plant.
- C. Bare-root or root-bag plants shall not be allowed.
- D. Plants shall be No. 1 grade nursery stock, exceptionally heavy, symmetrical tightly knit, trained to be superior in form, number of branches, compactness and symmetry.
- E. Substitutions shall not be permitted without prior written authorization from the Owner and Landscape Architect. If proof is submitted that specific plants or sizes are unobtainable, proposal shall be considered for nearest equivalent size of variety with equitable adjustment of Contract price.
- F. Type and quality:
  - 1. All plants shall be hardy under climatic conditions similar to those in the locality of the Project. Sources for field-grown trees must be within 100 miles of the project site. Plants shall have been grown under similar climatic conditions as the location of this Project for at least 2 years prior to award date of the Contract.
  - 2. All plants shall be typical of their species or variety and shall be sound, healthy and vigorous, well-branched, well shaped, and densely foliated when in leaf. Trees shall not be formed with narrow crotch splits when single leaders are normal. Club-foot specimens shall not be acceptable. They shall be free of disease, insect pests, eggs, or larvae, sun scalds, fresh abrasions or other objectionable disfigurements. They shall have healthy, well established root systems.
  - 3. Plant materials shall conform to American Standard for Nursery Stock, sponsored by American Association of Nurserymen, Inc. Plant materials shall be of standard quality true to name and type and first class representatives of their species or variety.
  - 4. Plant names and Labels: The nomenclature used in the Drawings and Specifications consists of both Common and Botanical names. The Botanical name shall be the overriding specification in instances where there is more than one common name, or where there is question about the common name. All plants shall be tagged with official nursery tags indicating both common and botanical names.

5. Plants to be planted in rows shall be matched in form, height, and overall character.
  6. Container Stock: All plant material grown in containers shall be well established in the container. The plants shall have tops which are of good quality and in a healthy growing condition. Each plant shall have been grown in its container sufficiently long enough for new fibrous roots to have developed so that the root mass shall retain its shape and hold together when removed from the container. No plants shall be loose in the container. Container size to plant size ratio shall be in accordance with the standards set forth in the current edition of American Standard for Nursery Stock, sponsored by the American Association of Nurserymen, Inc.
  7. Balled and Burlapped plant materials shall have been dug with their roots of sufficient size in firm, natural balls of soil sufficient to encompass the fibrous roots necessary for continued growth. The ball of soil shall be compact and firmly wrapped in burlap so that the soil in the ball is still firm and compact about the roots. No plant shall be accepted if the ball of soil is cracked or broken or loose about the roots of the plant.
- G. Measurement: Dimensions of trees and shrubs shall conform to the American Standard for Nursery Stock, latest approved edition, and shall be measured in units of the average caliper, height or spread.
1. Multi-trunked trees shall be measured as follows: at a point 6 inches above where each stem branches from the main trunk or other stems, the caliper of the largest stem shall be measured; to this add 1/2 the caliper inches of all remaining stems to achieve the total caliper inches of the tree.
  2. Trees specified by height shall be calculated as the average height of the top of the canopy, and not by the height of the tallest single stem.
  3. Trees taller than six feet shall be measured in caliper inches. For trees smaller than and up to 4" caliper, this measurement shall be taken at 6" above the ground level. For trees larger than 4" caliper, this measurement shall be taken at 12" above the ground level.
  4. Plants larger than specified in the plant list may be used if approved by the Owner or Owner's representative, but use of such plants shall not increase the Contract price. If the use of larger plants is approved, the spread of roots, container or ball of earth shall be increased in proportion to the size of the plant.
  5. Plants which have been cut back from larger grades to meet certain specified requirements shall be rejected.
  6. Combining two or more separately grown plants to meet size Specifications shall not be allowed.
  7. Plants lacking compactness or proper proportions, plants which are weak or thin, or plants injured by too close planting shall not be accepted.
- H. Handling of Plant Stock
1. All plant stock shall be handled with reasonable care and skill to prevent injuries to the trunk, branches and roots, and shall be either ball and burlap or container grown plants to insure delivery and installation of healthy condition.
  2. Trees shall not be moved or manipulated by the trunk or branches.
  3. Cover root balls of balled & burlapped plants which cannot be planted within 8 hours of delivery with moist soil or mulch or other protection from drying winds or sun.
  4. Water on-site stored plants as necessary. Protect from wind.
  5. All plants root systems shall be kept free of any undesirable weeds or grasses.
- I. Plants noted "Pot" on the plant list shall be pot-grown with well established root systems. Pot sizes shown refer to inside diameter of the pot. The plants must have been growing in the specified pot for a minimum of three months and a maximum of one year prior to delivery.

- J. All balled and burlapped plants which cannot be planted immediately upon delivery or digging shall be set on the ground and shall be protected with soil, wet peat moss or other acceptable material.
- K. Handling and Protection of Plants during Transport: All plants shall be properly protected during shipment by a tarpaulin or other method during delivery to prevent excessive drying out and wind-related damage to the root systems and plant canopies.

## 2.3 INSPECTION AND ACCEPTANCE OF PLANT MATERIALS

- A. Plants are subject to inspection and approval at the place of growth or upon delivery for conformity to specification requirements as to quality, size and variety. In lieu of observation at the growing site, the Landscape Architect may elect to observe 2 representative samples of each plant material type and size at the job site. Such approval shall not impair the right of inspection upon delivery at the site or during the progress of Work, or right of rejection of any plant materials due to damage suffered in handling or transportation. Rejected plants shall be removed immediately from the site by the Contractor.
- B. Acceptance of materials to be used on job: When materials such as plants, fertilizer, topsoil, compost, peat, etc., are brought on the job they must be accepted as meeting Specifications or rejected within a reasonable time. Notify the Owner and Landscape Architect at least 24 hours in advance of delivery of materials to the site. Plants and materials installed prior to inspection are subject to rejection due to size, form or species irregularities.
- C. Submit samples of topsoil, compost, mulches, soil separator fabrics and any other miscellaneous materials in accordance with Section 01300 - Submittals.

## PART 3 - EXECUTION

### 3.1 PLANTING OPERATIONS

- A. Seasons for Planting:
  - 1. Plants shall preferably be planted in a dormant condition and when temperatures are not expected to be below freezing or when authorized by the Owner and Landscape Architect and with the consent of Contractor.
  - 2. Do not plant shade and ornamental trees from March 1st through October 1st unless authorized by the Owner and/or Landscape Architect.
  - 3. Do not plant any material between July 1st and September 15th without the irrigation system being operational unless provisions for hand watering have been approved and authorized by the Owner or Landscape Architect.
- B. Bed Preparation
  - 1. Grade Level Plantings: Rough grading to within four inches (4") of finished grade in planting beds and to two inches (2") in sodded areas, and to four inches (4") in hydromulched areas. Pocket-planted plants to be backfilled with planting mix, well-compacted and watered to removed any air cavities.
  - 2. Tree Plantings: Tree pits shall be generally circular, and shall be excavated two feet greater than the diameter of the root ball or spread of roots and sufficiently deep to allow for a six inch (6") thick layer of the planting mixture beneath the ball or roots. Sides of pits shall not be smooth but shall be scarified to a depth of 1".
  - 3. Fertilization: Fertilize all beds prior to placement of mulch with an organic fertilizer or compost at rate recommended by manufacturer. Thoroughly mix into planting mix.
  - 4. Plants shall be set in center of pits, plumb and straight, at a level such that after settlement the crown of the plant shall be no more than one inch (1") lower than the surrounding finish grade and no more than 2" above the surrounding grade, and planted on a regular, triangular spacing arrangement.

5. Construct a saucer of soil five inches (5") in height around trees and four inches (4") in height around individually planted shrubs (not in mulched beds) to facilitate the containment of water.
6. Backfill the roots of trees with 90% native soil and 10% composted soil conditioner.
7. Provide 2" - 3" pre-mixed organic planting medium.
8. Planting mixture shall be compacted around bases of tree balls to fill all voids. All burlap, ropes or wires shall be removed from the top of balls. No plants shall be planted if the root ball is cracked or broken, either before or during the installation process. After plants are set, muddle planting soil mixture around bases of root balls and fill all voids, adding additional soil mixture as needed.
9. Space ground cover plants in accordance with indicated dimensions. Adjust spacing as necessary to evenly fill planting bed with indicated quantity of plants. Plant to within 2' of trees within planting bed and to within 12" of edge of bed unless specifically noted.
10. Follow graphic indications on the plans for triangular or square shrub layout.

C. Pruning and Mulching

1. Each tree and shrub shall be pruned in accordance with the National Arborist Association standards to preserve the natural character of the plant.
2. All dead wood or suckers and all broken or badly bruised branches shall be removed.
3. Pruning shall be performed with clean, sharp tools. Cut back branches at branch bark ridge. All cuts larger than 1" diameter shall be painted with a protective tree paint manufactured specifically for this purpose.
4. Immediately after planting operations are completed, all planting bed areas, including watering basins, shall be covered with a uniform 2" layer of shredded hardwood mulch.
5. Each tree and shrub shall maintain specification requirements after pruning is completed. Over pruned, damaged plants are unacceptable and will be replaced.

D. Setting, Guying, Staking and Wrapping Trees:

1. Set trees plumb by adjusting root ball.
2. Tamp soil solidly around the ball and roots, then stake and guy.
3. Stake and guy all trees within 24 hours of planting.
4. Trees 2 1/2" caliper and under:
  - a. Locate and drive 2 stakes at equally spaced intervals outside the tree pits.
  - b. Run guy wire through hose chafing guard from each stake to encircle trunk at 40% and 50% of the trees' height.
  - c. Slightly tighten wire to hold trunk firmly, but under no circumstances is tree to be plumbed by extreme tautness of ties.
5. Trees 2 1/2" caliper and over:
  - a. Three ground anchors to be located and driven at 120d intervals outside tree pit.
  - b. Eye bolts located 12" either side of trunk.

- c. Guy wires encircle trunk inside hose chafing guard to protect trunk at first branch. If first branch is unusually high, substitute 5/16 inch X 2 inch galvanized eye-bolts at a height of approximately 5' to 7' above grade.
- 6. Wrapping: Promptly after planting, wrap trunks of trees spirally to a height of the second branches; tack or staple securely in place. Wrap only those trees so designated on the plant material schedule.

### 3.2 STEEL EDGING

- A. Install steel edging as per manufacturer's recommendations, as shown on the Drawings & around all tree saucers.
- B. Set top one inch (1") above the finished grade, or even with adjacent hardscape surfaces. Install straight and plumb without visible bends or kinks; provide all steel stakes.

### 3.3 OBSTRUCTIONS BELOW GROUND

- A. In the event that rock or underground construction Works or obstructions are encountered in any plant pit excavation Work to be performed under this Contract, alternate locations may be selected by the Owner and Landscape Architect. Where locations cannot be changed, the obstructions shall be removed to a depth not less than three feet (3') below grade and no less than six inches (6") below bottom of ball or roots when plant is properly planted at the required grade.

### 3.4 UNDERGROUND UTILITIES

- A. The Contractor shall request, and the Owner shall furnish, plans showing locations of underground utilities. Refer to the approved General Permit plans for these locations
- B. In the event any underground utilities are disturbed, the Contractor shall immediately notify the appropriate utility, the Owner and Landscape Architect.

### 3.5 MAINTENANCE

- A. Maintenance Period: Extend from start of planting operations and continue until Final Acceptance.
- B. Provide sufficient supervision, equipment, materials, manpower to keep plants in healthy growing condition by watering when necessary, removing dead or dying branches, removing sprouts, tightening, repairing and replacing guys and wrapping; provide sufficient supervision, equipment, materials and manpower to keep plants in healthy growing condition by mowing weeding, mulching and restaking. Perform these tasks regularly to keep the site looking neat and maintained at all times.

### 3.6 SUBSTANTIAL COMPLETION

- A. An inspection of the trees, shrubs and ground covers shall be made by the Landscape Architect upon request for Application for Substantial Completion by the Contractor. Provide notification of at least five (5) Working days before requested inspection date. At that time, a punchlist of all inadequacies or adjustments required shall be prepared and distributed by the Contractor.

### 3.7 GUARANTEE PERIODS

- A. Plants, materials, and labor shall be guaranteed to remain alive, healthy and thriving, by the Contractor for one year after Final Acceptance. The Contractor shall not be responsible for loss of plants or other damages due to Owner's neglect, theft, vandalism, or acts of God.

### 3.8 PLANT REPLACEMENTS

- A. All replacements for punchlist or warranty corrections shall be plants of the same type and size as specified in the plant list. They shall be furnished and planted as originally specified. The cost shall be borne by the Contractor except for possible replacements resulting from removal, loss or damage due to the occupancy of the Project, physical damage by

animals, vehicles, fire, etc., or losses due to curtailment of water by local authority. Floods, cyclones, hurricane force, hail, exceptional or untimely freeze are not normal and the damage they inflict cannot be calculated in a bid. The Owner in all cases shall assume the risk of such "Acts of God", provided it can be shown by the Contractor that such loss of plants was not any result of inadequate care in planting or due to inferior plant materials.

- B. Replace, in accordance with the Drawings and Specifications, all plants that are dead or, as determined by the Landscape Architect, are in an unhealthy or unsightly condition, and have lost their shape due to dead branches, or other causes such as bark abrasions and misuse of chemicals, due to Landscape Contractor's negligence. The cost of such replacements is at the Contractor's expense. Warrant all replacements for an additional 90 days for all shrubs and 1 year for trees after replacement.
- C. Make periodic inspections as necessary during warranty period to determine what changes should be made to Owner's maintenance program.
- D. Submit in writing to Owner any recommended changes in plant maintenance program.
- E. Warranty and replacement requirements do not apply to transplanted trees.

### 3.9 FINAL COMPLETION

- A. An inspection of the trees shrubs and ground covers shall be made by the Landscape Architect upon request for Final Completion by the Contractor. All punchlist items must be satisfactorily completed and all landscape items must be acceptable to the City Inspector.

### 3.10 WARRANTY INSPECTION

- A. At end of warranty period, the Landscape Architect shall inspect the landscape and prepare a list of replacements for dead, unhealthy or non-vigorous plantings.
- B. Upon completion and re-inspection of repairs or renewals necessary in the judgment of the Landscape Architect at that time, the Landscape Architect shall certify in writing to the Owner as to the acceptance of the Work.

### 3.11 CLEANING

- A. On a daily basis, the Contractor shall leave the site in an orderly and clean condition removing all equipment, unused materials, clippings of plant materials, packaging, and soil, stones or rubble uncovered during planting operations.

**DIVISION 33 – UTILITIES**

**33 44 16 - UTILITY TRENCH DRAINS**

**PART 1 - GENERAL**

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for Trench Drain System, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section.
- 1.3 SUBMITTALS: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit complete product information to the Architect for review.

**PART 2 - PRODUCTS**

- 2.1 MANUFACTURE: Provide system equal to K100S Channel ACO Polymer Products, Inc. <http://www.acousa.com/drain.htm>.
- 2.2 PREFAB TRENCH DRAIN SYSTEM: by ACO Polymer Products, Inc. General purpose, pre-sloped, trench drain with integral edge. System consists of pre-cast channels manufactured from either corrosion resistant polymer concrete or fiberglass, together with grates from a variety of materials for all loading uses. The system also includes catch basins, closing end caps, outlet closing caps, locking systems, and other accessories.
- 2.3 GRATE

Load Class	Part No	Description	Grate Length	Grate Locking
A	ACO	Stainless	39.37"	814
15psi		perforated	1000mm	
3,500lbs	451			

- 2.4 OTHER MATERIALS: Furnish and install any supplementary materials, weather or not specifically indicated, required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

**PART 3 - EXECUTION**

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- 3.2 INSTALLATION: Install materials in accordance with manufacturer's instructions and approved submittals. Install materials in proper relation with adjacent construction and with uniform appearance.

### 33 32 14 - PACKAGE GRINDER LIFT STATION

#### PART 1 - GENERAL

- 1.1 DESCRIPTION: Furnish all labor, materials, tools, & equipment as required for Package Grinder Lift Station, as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- 1.2 DESCRIPTION: Rising water level activates the pump start sensor switch, starting the pump. the grinder pump grinds up debris and pumps the wastewater and debris up to the drain fields or municipal sewage main. when the lowering water level drops below the pump stop sensor switch the pump stops. if a malfunction occurs and the rising water reaches the high water float switch, the alarm horn will sound.
- 1.3 RELATED DOCUMENTS: The drawings, General Conditions, Supplementary Conditions, and requirements of Division 1 apply to work of this section. The requirements of other sections may effect the work under this section.
- 1.4 COORDINATION: Cooperation by Contractor for work of this section with all other trades is mandatory so that all phases of work may be properly coordinated without delays or damage to any parts of the work.
- 1.5 WARRANTY: Five years on fiberglass sump. Warranty on the pump and control panel is offered by the pump manufacturer.

#### PART 2 - PRODUCTS

- 2.1 LIFT STATION: The lift station shall be a package grinder pump lift station and have a grinder pump with the pump sized per the building requirements. The lift station shall be constructed by a manufacturer in the business of making package grinder lift stations for a minimum of five years. The sump shall be made from fiberglass reinforced polyester and have the control panel attached to it. The pump shall be a signal phase, 230V submersible grinder pump. The pump station controls shall be integral to the lift station, designed and manufactured by the lift station manufacturer. The controls shall start and stop the pump automatically and sound local and remote horns upon the level reaching a high water level. There shall be one ball check valve and one ball gate valve for each pump in the station discharge pipe. Provide standard depth sump from 70" – 80". The package grinder pump station shall be a SureLift Package Grinder Pump Station manufactured by Enviromation, Inc., Ashland, Virginia (804) 798-7717, or approved equal.
- 2.2 MATERIALS: The sump is formed in corrosion-proof fiberglass-reinforced polyester resin. All piping, valves, and fittings are heavy PVC. The electrical enclosure is rated NEMA 4. The sump shall be two foot in diameter formed from corrosion-resistant fiberglass reinforced resin with integral control enclosure attached.
- 2.3 PUMP: The pump shall be a 230V single phase, 2 PH grinder pump.
- 2.4 ELECTRICAL: The electrical service to the pump shall be 230 volts single phased feed by a size 10 copper wire. A seperate two conductor size 14 copper wire is required for the remote alarm.
- 2.5 SUPPLEMENTARY MATERIALS: Furnish and install any supplementary materials, weather or not specifically indicated, required for a complete and proper installation, as selected by the Contractor subject to the acceptance of the Architect.

#### PART 3 - EXECUTION:

- 3.1 SURFACE CONDITIONS: Examine the areas and conditions under which work of this Section will be performed. Correct condition detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected. Coordinate this work with interfacing work to ensure proper sequencing.
- 3.2 INSTALLATION: The fiberglass sump is installed in the ground with the top of the sump a maximum of three inches above finish grade. The inlet pipe must enter the sump above the anti-flotation ring (see diagram above). The sewage discharge piping shall



have a fall from the building/septic tank of one inch per ten foot of run. The total depth of the sump is determined by the depth of the inlet pipe. A hole is required to the depth of the sump minus three inches for the installation of the sump. After the hole is dug and the bottom established, set the fiberglass sump (with the anchor bar in place) and pour three bags of Sacrete concrete mix around the sump covering the anchor bar. Backfill with clear fill and tamp above the anti-flotation ring. Install inlet and outlet piping and electric service. Finish backfill and tamp with clear fill. Install pump, piping and level sensor.

- 3.3 CONNECTIONS: The sewer connection shall be made up to a lift station located between the building and drain field/municipal sewage main.

# 33 71 16 - PRESTRESSED CONCRETE ELECTRICAL UTILITY POLES

## PART 1 - GENERAL

### 1.1 SCOPE

- A. This specification is to establish design and quality standards for static cast concrete poles for power distribution or lighting. All pole design structural calculations are prepared by a registered engineer experienced in prestressed concrete design.

### 1.2 GENERAL

- A. The concrete poles furnished under these specifications are designed and manufactured in accordance with requirements and/or recommendations of the American Concrete Institute Standard "Building Code Requirements for Reinforced Concrete" (ACI 318 - Latest Edition).
- B. Poles shall be designed in accordance with the Prestressed Concrete Institute "Guide for Design of Prestressed Concrete Poles."
- C. Approved manufacturer; Lonestar Prestress Mfg., Inc., Houston, Texas.

### 1.3 QUALITY CONTROL

- A. Tests shall be made and records shall be maintained in accordance with the requirements of Prestressed Concrete Institute MNL-116, "Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products."

### 1.4 DRAWING AND DESIGN INFORMATION

- A. Furnish detailed design drawings and computations for the poles, including but not limited to the following:
  - 1. Total weight and center of gravity of each pole.
  - 2. Calculations of cracking and ultimate moment capacities at not more than 5 foot intervals.
  - 3. Dunnage and pickup points, including both one-point and two-point pickup locations.
  - 4. Detail of cross section and all points where reinforcing changes.

## PART 2 - PRODUCTS

### 2.1 PHYSICAL CHARACTERISTICS

- A. All poles shall be prestressed concrete and suitable for direct embedment into the ground without special foundations.
- B. Shape and Length: Poles shall be square in cross-section, with chamfered corners, and shall have a standard taper of 0.162 inch per foot. Cross-sectional dimensions shall not deviate by more than 3/8". The allowable tolerance shall be +3 inches and -2 inches in overall length. For square cross-sections, the width of the bottom face of the pole as it is cast may be less than the top face. Octagonal poles shall have a standard taper of 0.122 inch per foot. The allowable tolerance shall be +3 inches and -2 inches in overall length.

- C. Finish: The pole shall have a smooth uncolored finish with no cracks. The top surface of each pole shall be troweled until all projections, depressions, and irregularities have been removed and the entire surface has a smooth texture and neat lines. Square corners and sharp edges shall be tooled to form smooth, chamfered corners. All small cavities shall be cleaned, saturated with water and then filled with mortar. A small cavity is defined as one larger than ¼ inch but smaller than ¾ inch in diameter, and less than 3/8 inch deep. Larger non-structural cavities and spalls shall be repaired by opening the side of the damaged area on a 1 to 1 slope using a mechanical grinder, cleaning thoroughly and filling with a high-strength non-shrink concrete repair material. Poles with other defects may be repaired only upon authorization of, and using the method prescribed by the Design Engineer.
- D. Sealing Steel Strands: The end of each steel reinforcing strand (in the top and butt) shall be burned back to a minimum depth of ½ inch. The holes left by the removal of the strand shall be thoroughly cleaned of any loose residue. The holes shall then be completely filled with non-shrink grout and smoothed evenly with tip or butt surface.
- E. Cover: The prestressing strands shall have a minimum concrete cover of 1 inch. The centerline axis along the faces of the poles shall be clear of embedded steel except for stirrups, spiral reinforcement and fabrication devices, so that ¾ inch diameter holes may be drilled without interference from the strands.
- F. Sweep: Sweep is the deviation of a pole from straightness. A straight line joining the edge of the pole at the butt and the edge of the pole at the top shall not be distant from the surface of the pole at any point by more than 3/8 inch for each 10 feet of length.
- G. Hole Drilling Poles shall be drilled in accordance with approved drawings. The location of holes shall not deviate by more than 3/8 inch holes drilled after removal from molds shall be drilled from both sides of the pole and shall be uniform in entrance and exit. Holes drilled from opposing sides of the pole must be in the same plane and be centered on both faces.
- H. Cable Entrances: Two cable entrances with couplings shall be cast in all poles 90 degrees to the handhole unless otherwise specified by the customer.

## 2.2 MATERIALS

- A. Chloride Content: The chloride content of concrete mix, including all ingredients, shall be 0.4 pounds per cubic yard, or less.
- B. Corrosion Resistance: All inserts or attachments, if required, shall be of noncorrosive material or galvanized.
- C. Concrete: Concrete used in poles shall have a compressive strength at transfer of not less than 4,000 PSI, and a 28-day compressive strength of not less than 7,000 PSI, unless otherwise specified.
- D. Materials shall comply with the most recent revision of the following ASTM Standards:
  - 1. Portland Cement                      ASTM C105
  - 2. Admixtures                            ASTM C494
  - 3. Aggregates                            ASTM C33 or C330
  - 4. Reinforcing Bars                      ASTM A615
  - 5. Cold-Drawn Spiral Wire            ASTM A82
  - 6. Pre-stressing Strand, 270K        ASTM A416

## 2.3 STRENGTH REQUIREMENTS

- A. Poles of each standard type, unless otherwise specified, shall be designed to withstand the rated design (cracking) and ultimate strength shown in the following tables with modifications to accommodate allowance for handling, transportation and erection. The rated strength is that load which, if applied, in a direction perpendicular to the pole axis 2 feet below the pole tip and with the bottom of the pole (ten percent of it's length plus two feet from the butt) held firm, will produce the first sign of hairline cracks. The ultimate strength is the load at which point failure occurs.
- B. All poles shall be capable of withstanding single point pickup from the horizontal position when lifting from a point 30% of the overall length down from the tip.

## 2.4 GROUNDING

- A. A PVC conduit for customer to pull a ground wire through can be cast in poles if required by the customer and included with bid to customer as specified on the drawings.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Poles shall be supported and protected during site storage, lifting and setting to prevent damage to the pole. Spalls or other damage incurred during these operations shall be repaired to restore the pole to "as new" condition.

## DIVISION 40 – PROCESS INTERCONNECTIONS

### 40 23 23 - POTABLE WATER PROCESS PIPING

#### PART 1 - GENERAL

- 1.1 SECTION INCLUDES: Potable water piping, fittings, and accessories from 5' outside building to municipal main and connection of potable water system to municipal water system.
- 1.2 RELATED SECTIONS:
  - A. Section 31 10 00 - SITE CLEARING;
  - B. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete type for blocking, etc.
- 1.3 REGULATORY REQUIREMENTS: Conform to applicable code for materials and installation of the Work of this Section. SUBMITALLS: Submit shop drawings under provisions of Section 01300. Submit shop drawings indicating dimensions, layout of piping, gradient of slope between corners and intersections, locations and elevations of clean-outs. Submit product data under provisions of Section 01300. Submit product data for pipe, pipe accessories and jointing. Submit manufacturer's installation instructions under provisions of Section 01 33 23.
- 1.4 PROJECT RECORD DOCUMENTS: Submit documents under provisions of Section 01 77 00 - PROJECT CLOSEOUT PROCEDURES, accurately record location of pipe runs, connections, and elevations and identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

#### PART 2 - PRODUCTS

- 2.1 MANUFACTURERS: Johns-Manville. Substitutions under Provisions of Section 01 25 00 - SUBSTITUTIONS PROCEDURES.
- 2.2 PIPE AND PIPE FITTING MATERIALS: Polyvinyl Chloride (PVC) Pipe: AWWA C900 for sizes 4" through 12"; Class 200. Fittings: Ductile-iron complying with AWWA C110, cement lined, with rubber gaskets conforming to AWWA C111. Polyvinyl Chloride (PVC) Pipe: ASTM D 1785, Schedule 40 for sizes 1/2" through 3". Fittings: PVC, Schedule 40 socket-type, solvent cement joints; or elastomeric gasketed joints. Gate Valves: Provide as indicated, gate valves, AWWA C500, 175 psi working pressure. Provide threaded, flanged, hub or other end configurations to suit size of valve and piping connection. Provide inside screw type for use with curb valve box, iron body, bronze-mounted, double disc, parallel seat, non-rising stem.

#### PART 3 - EXECUTION

- 3.1 EXAMINATION: Examine areas and conditions under which potable water system's materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.
- 3.2 PREPARATION: Hand trim excavations to required elevations. Correct over excavation with fill material of lean concrete. Remove large stones or other hard matter, which could damage drainage tile or impede consistent backfilling or compaction.
- 3.3 INSTALLATION - PIPE AND VALVES: Polyvinyl Chloride Pipe: Install in accordance with manufacturer's installation instructions. Depth of Cover: Provide minimum cover over piping of 12" below average local frost depth or 18" below finished grade, whichever is greater. Install valves as indicated with stems pointing up. Provide valve box over underground valves.
- 3.4 FIELD QUALITY CONTROL: Piping Test should be conducted before joints are covered, and after thrust blocks have sufficiently hardened. Fill pipeline 24-hrs. prior to testing, and apply test pressure to stabilize systems. Use only potable water. Hydrostatic Tests should test at not less than 1 - 1/2 times working pressure for 2-hrs. Test fails if leakage exceeds 2-qts per hour per 100 gaskets or joints, irrespective of pipe diameter. Increase pressure in 50 psi increments and inspect each joint between increments. Hold at test pressure for one hour, decrease to 0 psi. Slowly increase again to test pressure and hold for one more hour.

- 3.5 ADJUSTING AND CLEANING: Disinfection of Potable Water System should consist of flushing pipe system with clean potable water until no dirty water appears at point of outlet. Fill system with water-chlorine solution containing at least 50 ppm of chlorine. Valve off system and let stand for 24-hrs. minimum. Flush with clean potable water until no chlorine remains in water coming from system.
- 3.6 PROTECTION: Protect finished installation under provisions of Section 01500. Protect pipe and filter aggregate cover from damage or displacement until backfilling operation is in progress.

## 40 23 40 - SANITARY WASTEWATER PROCESS PIPING

### PART 1 - GENERAL

- 1.1 SECTION INCLUDES: Sanitary drainage piping, fittings, and accessories from 5' outside building to municipal main, connection of sanitary sewage system to municipal sewers, and cleanout access.
- 1.2 RELATED SECTIONS:
  - A. Section 31 10 00 - SITE CLEARING;
  - B. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Concrete type for cleanout base pad construction.
- 1.3 REFERENCES: ANSI/ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings; ASTM B3213: Elastomeric gasket joints for PVC pipe.
- 1.4 REGULATORY REQUIREMENTS: Conform to applicable code for materials and installation of the Work of this Section.
- 1.5 SUBMITTALS: Submit shop drawings under provisions of Section 01 33 23. Submit shop drawings indicating dimensions, layout of piping, gradient of slope between corners and intersections, locations and elevations of cleanouts. Submit product data under provisions of Section 01300. Submit product data for pipe, pipe accessories and jointing. Submit manufacturer's installation instructions under provisions of Section 01 33 23.
- 1.6 PROJECT RECORD DOCUMENTS: Submit documents under provisions of Section 01 33 23, accurately record location of pipe runs, connections, cleanouts, and invert elevations, and identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

### PART 2 - PRODUCTS

- 2.1 MANUFACTURERS: Johns - Manville. Substitutions under provisions of Section 01 25 33.
- 2.2 SEWER PIPE MATERIALS: Plastic Pipe: ANSI/ASTM 3034, Type PSM, Polyvinyl Chloride (PVC), SDR-35, material inside nominal diameter as shown on plans. Bell and spigot style gasketed end joints.
- 2.3 PIPE ACCESSORIES: Fittings should be Elastomeric gaskets molded or formed to suit pipe size and end design, in required 'T', bends, elbows, cleanouts, reducers, traps, and other configurations required.
- 2.4 CLEANOUTS: Cap: Brass construction, removable lid, closed lid design. Base Pad: Cast-in-place concrete of type specified in Section 03300.
- 2.5 FILL MATERIAL: Reference Section 32 01 30

### PART 3 - EXECUTION

- 3.1 EXAMINATION: Verify that trench cut is ready to receive work, and excavations, dimensions, and elevations are as indicated on Drawings. Beginning of installation means acceptance of existing conditions.
- 3.2 PREPARATION: Hand trim excavations to required elevations, correct over excavation with fill material of lean concrete, and remove large stones or other hard matter which could damage drainage tile or impede consistent backfilling or compaction.
- 3.3 INSTALLATION – PIPE: Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal joints watertight. Lay pipe to slope gradient noted on drawings with maximum variation from true slope of 1/8 inch in 10 feet. [Bed and Backfill pipe and trench in accordance with Section 02225, Trenching](#). Connect to building sewer outlet and municipal sewer system.
- 3.4 FIELD QUALITY CONTROL: Field inspection will be performed under provisions of Section 01 45 23. Request inspection by Architect/Engineer and municipality prior to and immediately after placing filter aggregate cover over pipe.

- 3.5 PROTECTION: Protect finished installation under provisions of Section 01 50 00. Protect pipe and filter aggregate cover from damage or displacement until backfilling operation is in progress.
- 3.6 SCHEDULE: Sanitary Sewer Main: From 5 feet beyond east building wall, to municipal sewer.



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# FOOD SERVICE SECTIONS

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MEP SECTIONS

CIVIL SECTIONS

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# ASBESTOS ABATEMENT PLAN

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# GEOTECHNICAL REPORT

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