CROSWELL-LEXINGTON COMMUNITY SCHOOLS

MIDDLE SCHOOL HVAC Controls Upgrade

CROSWELL, MICHIGAN
PROJECT NO. 2022-017

APRIL 8, 2022 BID DOCUMENTS

FRENCH associates

architects planners interiors

LIST OF DRAWINGS

MECHANICAL

MECHANICAL ABBREVIATIONS

ABBREV.	DESCRIPTION
AAV	AUTOMATIC AIR VENT / AIR ADMITTANCE VALVE
AD	ACCESS DOOR
AE	AIR EXTRACTOR
AFF	ABOVE FINISHED FLOOR
APD	AIR PRESSURE DROP
ASR	AUTOMATIC SPRINKLER RISER
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BOD	BOTTOM OF DUCT
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNITS PER HOUR
BWV	BACKWATER VALVE
CAP	CAPACITY
CAV	CONSTANT AIR VOLUME
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CIRC	CIRCULATING
CLG	COOLING
CO	CLEAN OUT
CONT	CONTINUATION OR CONTINUED
CONV	CONVECTOR
CUH	CABINET UNIT HEATER
CV	CONTROL VALVE
DB	DRY BULB TEMPERATURE
DEG	DEGREES
DDC	DIRECT DIGITAL CONTROL
DN	DOWN
DTC	DRAIN TILE CONNECTION
DWH	DOMESTIC WATER HEATER
(E)	EXISTING
EA/EXH	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EDB	ENTERING DRY BULB TEMPERATURE
EF	EXHAUST FAN
EJ	EXPANSION JOINT
EL	ELEVATION
ELECT	ELECTRICAL
EMS	ENERGY MANAGEMENT SYSTEM
ESP	EXTERNAL STATIC PRESSURE
EWB	ENTERING WET BULB TEMPERATURE
EWC	ELECTRIC WATER COOLER
°F	DEGREES FAHRENHEIT
FA	FACE AREA (COIL) / FREE AREA (LOUVER)
FC	FLEXIBLE CONNECTION
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FH	FIRE HYDRANT
FHC	FIRE HOSE CABINET
FHR	FIRE HOSE RACK
FHV	FIRE HOSE VALVE
FLA	FULL LOAD AMPS
FLR	FLOOR
FPM	FEET PER MINUTE
FFD	FUNNEL FLOOR DRAIN
FFE	FINISHED FLOOR ELEVATION
FS	FLOOR SINK
FT	FEET
FURN	FURNISHED
FV	FACE VELOCITY
FVC	FIRE VALVE CABINET
GAL	GALLON
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
HB	HOSE BIBB
HO	HUB OUTLET
HP	HORSEPOWER

MECHANICAL ABBREVIATIONS

ABBREV.	DESCRIPTION
HR	HOUR
HTG	HEATING
HYD	HYDRANT
HZ	HERTZ
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IN	INCHES
INST	INSTALLED
INV	INVERT
ISP	INTERNAL STATIC PRESSURE
IW	INDIRECT WASTE
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
LAV	LAVATORY
LBS/HR	POUNDS PER HOUR
LDB	LEAVING DRY BULB TEMPERATURE
LRA	LOCKED ROTOR AMPS
LWB	LEAVING WET BULB TEMPERATURE
MAV	MANUAL AIR VENT
MAX	MAXIMUM
MBH	1000 BRITISH THERMAL UNITS PER HOUR
MCA	MINIMUM CIRCUIT AMPACITY
MECH	MECHANICAL
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MOD	MOTOR OPERATED DAMPER (AUTOMATIC)
MOP	MAXIMUM OVER-CURRENT PROTECTION
N.C.	NOISE CRITERIA
NIC	NOT IN CONTRACT
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NOM	NOMINAL
OA	OUTSIDE AIR
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER / CENTER TO CENTER
OD	OUTSIDE DIAMETER
OED	OPEN ENDED DUCT
ORS	OVERFLOW ROOF SUMP
OS&Y	OUTSIDE SCREW AND YOKE
PD	PRESSURE DROP (FEET OF WATER)
PRV	PRESSURE REDUCING VALVE
PSIA	POUNDS PER SQUARE INCH – ABSOLUTE
PSIG	POUNDS PER SQUARE INCH – GAUGE
PT	PRESSURE / TEMPERATURE PORT
RA	RETURN AIR
RH	RELATIVE HUMIDITY
REQD	REQUIRED
REL.A	RELIEF AIR
RPM	REVOLUTIONS PER MINUTE
RPZ	REDUCED PRESSURE ZONE
RS	ROOF SUMP
SA	SUPPLY AIR
SH	SHOWER
SP	STATIC PRESSURE
SqFt / SF	SQUARE FOOT/SQUARE FEET
SS	SERVICE SINK
TC	TEMPERATURE CONTROL
T & P	TEMPERATURE AND PRESSURE
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORY
UNO	UNLESS NOTED OTHERWISE

MECHANICAL ABBREVIATIONS

ABBREV.	DESCRIPTION
UR	URINAL
VD	VOLUME DAMPER (MANUALLY ADJUSTABLE)
VTR	VENT THRU ROOF
W	WASTE
W&V	WASTE AND VENT
WB	WET BULB TEMPERATURE
WC	WATER CLOSET
WG	WATER GAUGE
WH	WALL HYDRANT

MECHANICAL PIPING SYMBOLS

ABBREV.	DESCRIPTION
	PIPE ELBOW UP
	PIPE ELBOW DOWN
	PIPE TEE DOWN
	DIRECTION OF FLOW
	UNION
	STRAINER
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	EXPANSION JOINT
	FLEXIBLE CONNECTION
	PIPE ANCHOR
	PIPE GUIDE
	PIPE CAP OR PLUG
	ISOLATION VALVE
	CIRCULATING PUMP
	GLOBE VALVE
	BALL VALVE
	BUTTERFLY VALVE
	ANGLE VALVE
	CHECK VALVE (SWING)
	CHECK VALVE (SPRING)
	PLUG VALVE
	NEEDLE VALVE
	OUTSIDE SCREW AND YOKE VALVE (OS&Y)
	PRESSURE REGULATING VALVE
	SOLENOID VALVE
	CONTROL VALVE (2-WAY / 3-WAY)
	CENTRIFUGAL FAN
	AUTOMATIC GAS SHUT-OFF VALVE
	TRAP (PLAN VIEW)
	FLOOR DRAIN / FUNNEL FLOOR DRAIN (PLAN VIEW)
	FLOOR DRAIN / FUNNEL FLOOR DRAIN (ELEVATION)
	ROOF SUMP
CO	CLEAN OUT (IN FLOOR)
CO	CLEAN OUT (IN LINE)
WCO	CLEAN OUT (WALL)
BFP	BACKFLOW PREVENTER
M	WATER METER ASSEMBLY
	HOSE BIBB, WALL HYDRANT
	DIRECTION OF PIPE PITCH
	SPRINKLER HEAD (UPRIGHT)
	SPRINKLER HEAD (SIDEWALL)
FS	FLOW SWITCH
	SIAMESE CONNECTION (YARD)
	SIAMESE CONNECTION (WALL MOUNTED)
	FIRE HYDRANT
	FLOW MEASURING DEVICE
	BALANCING VALVE
	COMBINATION FLOW MEASURING AND BALANCING DEVICE
AAV	AUTOMATIC AIR VALVE
MAV	MANUAL AIR VALVE

MECHANICAL SYMBOLS

ABBREV.	DESCRIPTION
	RECTANGULAR TAKE-OFF (SINGLE LINE)
	RECTANGULAR TAKE-OFF (DOUBLE LINE)
	ROUND TAKE-OFF (SINGLE LINE)
	ROUND TAKE-OFF (DOUBLE LINE)
	SPIN-IN FITTING (WITH VOLUME DAMPER)
	ELBOW (WITH TURNING VANES)
	RADIUS RECTANGULAR ELBOW
	RADIUS ROUND ELBOW
	RECTANGULAR ELBOW UP
	ROUND ELBOW UP
	RECTANGULAR ELBOW DOWN
	ROUND ELBOW DOWN
	CONCENTRIC TRANSITION (DOUBLE LINE)
	CONCENTRIC TRANSITION (SINGLE LINE)
	ECCENTRIC TRANSITION (DOUBLE LINE)
	ECCENTRIC TRANSITION (SINGLE LINE)
R	INCLINED RISE IN DIRECTION OF AIR FLOW (DOUBLE LINE)
R	INCLINED RISE IN DIRECTION OF AIR FLOW (SINGLE LINE)
D	INCLINED DROP IN DIRECTION OF AIR FLOW (DOUBLE LINE)
D	INCLINED DROP IN DIRECTION OF AIR FLOW (SINGLE LINE)
	FLEXIBLE CONNECTION
	FLEXIBLE DUCT CONNECTION TO SUPPLY DIFFUSER
	SUPPLY DIFFUSER
	LINEAR SLOT DIFFUSER
	RETURN OR EXHAUST GRILLE
	TRANSFER GRILLE
	CROSS SECTION OF SUPPLY AIR DUCT
	CROSS SECTION OF EXHAUST OR RETURN AIR DUCT
EXISTING / NEW	FIRE DAMPER (HORIZONTAL)
EXISTING / NEW	FIRE DAMPER (VERTICAL)
EXISTING / NEW	SMOKE DAMPER
EXISTING / NEW	COMBINATION FIRE/SMOKE DAMPER (VERTICAL)
EXISTING / NEW	COMBINATION FIRE/SMOKE DAMPER (HORIZONTAL)
	VOLUME DAMPER (MANUALLY ADJUSTABLE)
M	MOTORIZED DAMPER
SD	SMOKE DETECTOR
CO2	CO2 SENSOR
T	THERMOSTAT OR TEMPERATURE SENSOR
H	HUMIDISTAT OR HUMIDITY SENSOR
	RETURN OR EXHAUST / SUPPLY AIR FLOW

PIPING LEGEND

ABBREV.	DESCRIPTION
CA	COMPRESSED AIR PIPING
CD	CONDENSATE DRAIN PIPING
DT	DRAIN TILE
F	FIRE PROTECTION PIPING
FOR	FUEL OIL RETURN PIPING
FOS	FUEL OIL SUPPLY PIPING
G	NATURAL GAS PIPING
BCW	BOOSTED-DOMESTIC COLD WATER PIPING
BHW	BOOSTED-DOMESTIC HOT WATER PIPING
CW	DOMESTIC COLD WATER PIPING
NPCW	NON POTABLE COLD WATER PIPING
TW	TEMPERED WATER PIPING
HW	DOMESTIC HOT WATER PIPING
HW(140°F)	DOMESTIC 140°F HOT WATER PIPING
HWR	DOMESTIC HOT WATER RETURN PIPING
SAN	SANITARY WASTE PIPING
PSAN	PUMPED SANITARY PIPING
V	VENT PIPING
ST	STORM SEWER PIPING
PST	PUMPED STORM PIPING
RC	RAIN CONDUCTOR PIPING
ORC	OVERFLOW RAIN CONDUCTOR PIPING
CHWR	CHILLED WATER RETURN PIPING
CHWS	CHILLED WATER SUPPLY PIPING
CWR	CONDENSER WATER RETURN PIPING
CWS	CONDENSER WATER SUPPLY PIPING
HHWR	HEATING HOT WATER RETURN PIPING
HHWS	HEATING HOT WATER SUPPLY PIPING
HPLR	HEAT PUMP LOOP RETURN PIPING
HPLS	HEAT PUMP LOOP SUPPLY PIPING
RL	REFRIGERANT LIQUID PIPING
RS	REFRIGERANT SUCTION PIPING
HGB	HOT GAS BY-PASS PIPING
GXHR	GEO HEAT EXCHANGE RETURN
GXHS	GEO HEAT EXCHANGE SUPPLY
STM	STEAM PIPING
HPS	HIGH PRESSURE STEAM PIPING
LPS	LOW PRESSURE STEAM PIPING
CR	STEAM CONDENSATE RETURN PIPING
PCR	PUMPED STEAM CONDENSATE RETURN PIPING
LPC	LOW PRESSURE CONDENSATE PIPING
HPC	HIGH PRESSURE CONDENSATE PIPING
MA	MEDICAL AIR PIPING
N	NITROGEN GAS PIPING
O2	OXYGEN GAS PIPING
VAC	VACUUM PIPING

DRAWING INDEX

DRAWING NOTATION

SYMBOL	DESCRIPTION
1	NEW WORK KEY NOTE NO. 1
1	DEMOLITION KEY NOTE NO. 1
AHU-1	EQUIPMENT TAG
S-1 12x12 150-2	AIR TERMINAL TAG: IE: DIFFUSER TYPE = S-1 NECK SIZE = 12x12 CFM = 150 (TYPICAL FOR 2) S = SUPPLY R = RETURN E = EXHAUST T = TRANSFER
	EXISTING DEVICES OR EQUIPMENT
	NEW OR MODIFIED DEVICES OR EQUIPMENT
	EXISTING SYSTEM COMPONENT TO BE REMOVED
	POINT OF NEW CONNECTION

APPLICABLE CODES AND REGULATIONS

YEAR	CODE
2015	MICHIGAN BUILDING CODE
2015	MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS
2015	MICHIGAN PLUMBING CODE
2015	MICHIGAN MECHANICAL CODE
2015	MICHIGAN UNIFORM ENERGY CODE
2015	INTERNATIONAL FUEL GAS CODE
2012	NFPA 101 WITH BFS AMENDMENTS

KEY PLAN

ISSUE DATE	ISSUED FOR
04/08/2022	BID DOCUMENTS
DRAWN	RPL
CHECKED	MPH
APPROVED	MPH

PROJECT

Croswell-Lexington Community Schools: Middle School HVAC Controls Upgrade

Croswell, Michigan

SHEET

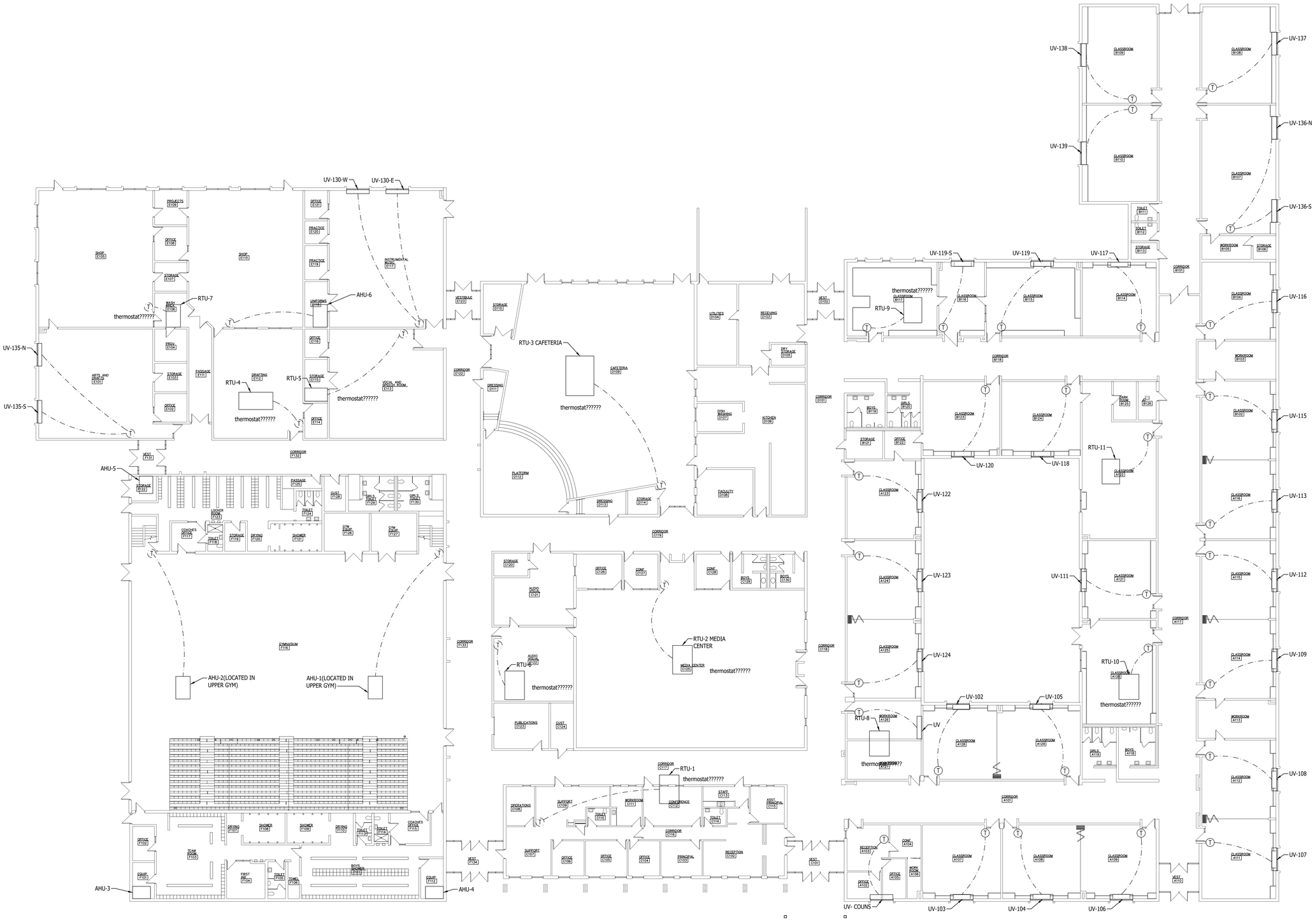
MECHANICAL GENERAL INFORMATION

PROJECT NUMBER

2022-017

SHEET NUMBER

M0.00



MECHANICAL HVAC COMPOSITE NEW WORK PLAN
SCALE: 1/16" = 1'-0"

KEY PLAN

ISSUE DATE	ISSUED FOR
04/08/2022	BID DOCUMENTS
DRAWN	RPL
CHECKED	MPH
APPROVED	MPH

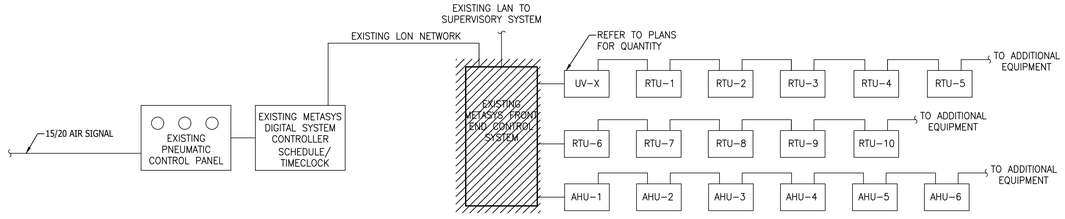
PROJECT
Croswell-Lexington Community Schools: Middle School HVAC Controls Upgrade

Croswell, Michigan

SHEET
MECHANICAL HVAC COMPOSITE NEW WORK PLAN

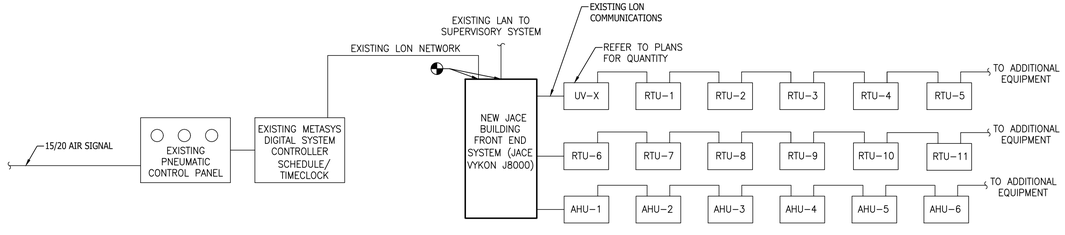
PROJECT NUMBER
2022-017

SHEET NUMBER
M1.10



BUILDING AUTOMATION SYSTEM RISER DIAGRAM DEMOLITION

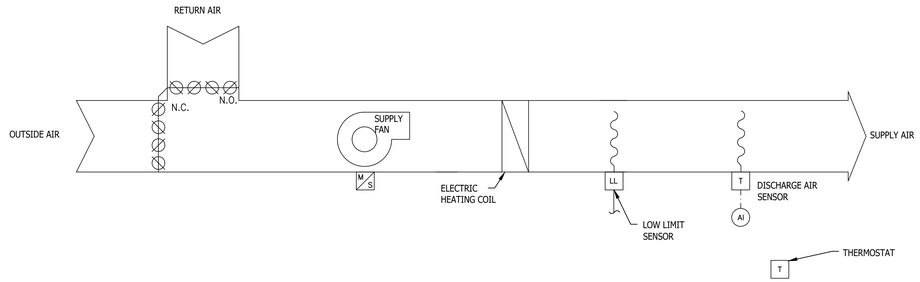
NO SCALE



BUILDING AUTOMATION SYSTEM RISER DIAGRAM NEW WORK

NO SCALE

1. PROVIDE A SYSTEM EQUIPMENT UPGRADE OF THE DISTRICT'S BUILDING AUTOMATION SYSTEM (AKA ENERGY MANAGEMENT SYSTEM) FRONT END SYSTEM (CURRENTLY METASYS/PNEUMATIC) TO BACNET TRIDIUM NIAGARA AX SUPERVISOR VERSION N4 WITH CURRENT PATCHES. PROVIDE FOR BACNET OVER IP LICENSING AND COMMUNICATION FOR THE BUILDING.
2. ALTERNATE M1: PROVIDE BUILDING FLOOR PLANS WITH INTERACTIVE SPACE THERMAL IMAGING INDICATING THE RESPECTIVE EQUIPMENT OPERATION. PROVIDE AN "EMERGENCY MASTER SHUT OFF" OPERATION FOR THE BUILDING MANAGEMENT SYSTEM.
3. TC CONTRACTOR TO DEVELOP A DEFICIENCIES LIST OF EXISTING TERMINAL EQUIPMENT AND RELATED COMPONENTS SYSTEM THAT MAY HAVE ISSUES, ASSUME FOR BIDDING PURPOSES THAT COMMUNICATIONS AND WIRING IS IN TACT. SCOPE OF WORK DOES NOT REQUIRE TO CORRECT ANY IDENTIFIED DEFICIENCIES - ANY POTENTIAL WORK WOULD BE COORDINATED WITH LEXINGTON-CROSELL SCHOOL DISTRICT PERSONNEL ASSOCIATED WITH THIS PROJECT.
4. TC CONTRACTOR TO INCLUDE AN ALLOWANCE OF $5,000 THAT IS TO BE APPLIED TO THE SYSTEM DEFICIENCIES. ANY UNUSED FUNDS SHALL BE RETURNED TO THE OWNER AS A CREDIT.
5. TC CONTRACTOR TO VERIFY ALL ACTUATOR FUNCTIONALITY AT COMMENCEMENT OF CONSTRUCTION. REPORT FINDINGS TO OWNER AND CREATE DEFICIENCIES REPORT FOR REPLACEMENT.



(E)AIR HANDLING UNIT CONTROL DIAGRAM

NO SCALE

1. EXISTING EQUIPMENT CONTROLLER TO REMAIN. THE BUILDING MANAGEMENT SYSTEM (BMS) SHALL GRAPHICALLY SHOW MONITOR AND CONTROL THE FOLLOWING POINTS:
   - 1.1. OUTDOOR AIR TEMPERATURE (°F)
   - 1.2. OCCUPIED COMMAND
   - 1.3. SPACE TEMPERATURE (°F)
   - 1.4. DISCHARGE AIR TEMPERATURE (°F)
   - 1.5. EFFECTIVE SETPOINT (°F)
   - 1.6. OCCUPIED HEATING SETPOINT (°F)
   - 1.7. HEATING OUTPUT COMMAND (% HEATING)
   - 1.8. ECONOMIZER OUTPUT COMMAND (% OPEN)
   - 1.9. ECONOMIZER OA SETPINT (°F)
   - 1.10. UNOCCUPIED HTG SETPOINT (°F)
   - 1.11. STATE OF OPERATION

KEY PLAN

ISSUE DATE	ISSUED FOR
04/08/2022	BID DOCUMENTS

DRAWN	RPL
CHECKED	MPH
APPROVED	MPH

PROJECT

Croswell-Lexington Community Schools: Meyer Elementary HVAC Controls Upgrade

Croswell, Michigan

SHEET

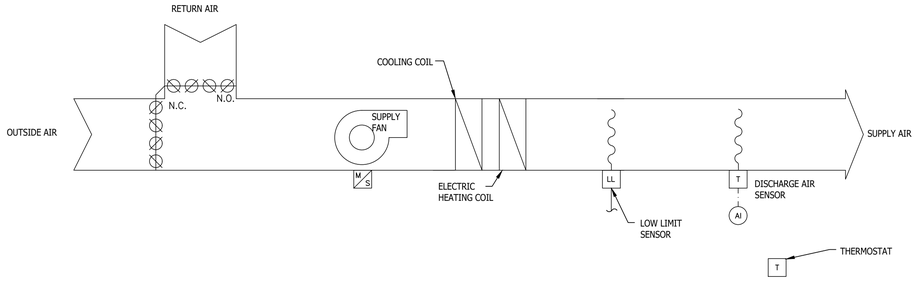
TEMPERATURE CONTROLS

PROJECT NUMBER

2022-017

SHEET NUMBER

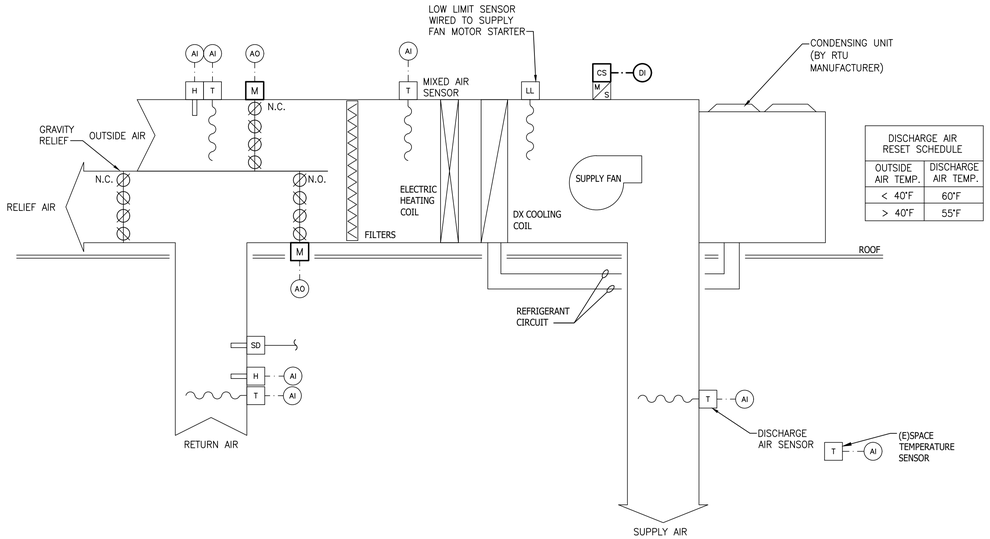
M8.00



(E)UNIT VENTILATOR CONTROL DIAGRAM

NO SCALE

1. EXISTING EQUIPMENT CONTROLLER TO REMAIN. THE BUILDING MANAGEMENT SYSTEM (BMS) SHALL GRAPHICALLY SHOW MONITOR AND CONTROL THE FOLLOWING POINTS:
   - 1.1. OUTDOOR AIR TEMPERATURE (°F)
   - 1.2. OCCUPIED COMMAND
   - 1.3. SPACE TEMPERATURE (°F)
   - 1.4. DISCHARGE AIR TEMPERATURE (°F)
   - 1.5. EFFECTIVE SETPOINT (°F)
   - 1.6. OCCUPIED HEATING SETPOINT (°F)
   - 1.7. OCCUPIED COOLING SETPOINT (°F)
   - 1.8. HEATING OUTPUT COMMAND (% HEATING)
   - 1.9. COOLING OUTPUT COMMAND (% COOLING)
   - 1.10. ECONOMIZER OUTPUT COMMAND (% OPEN)
   - 1.11. ECONOMIZER OA SETPINT (°F)
   - 1.12. UNOCCUPIED HTG SETPOINT (°F)
   - 1.13. UNOCCUPIED COOLING SETPOINT (°F)
   - 1.14. STATE OF OPERATION



DISCHARGE AIR RESET SCHEDULE	
OUTSIDE AIR TEMP.	DISCHARGE AIR TEMP.
< 40°F	60°F
> 40°F	55°F

(E)PACKAGED ROOFTOP UNIT CONTROL DIAGRAM

NO SCALE

(RTU-1 THRU 11)

1. EXISTING EQUIPMENT CONTROLLER TO REMAIN. THE BUILDING MANAGEMENT SYSTEM (BMS) SHALL GRAPHICALLY SHOW MONITOR AND CONTROL THE FOLLOWING POINTS:
   - 1.1. OUTDOOR AIR TEMPERATURE (°F)
   - 1.2. OCCUPIED COMMAND
   - 1.3. SUPPLY FAN COMMAND
   - 1.4. SUPPLY FAN STATUS
   - 1.5. SPACE TEMPERATURE (°F)
   - 1.6. OCCUPIED SETPOINT (°F)
   - 1.7. WARM/COOL ADJUST (°F)
   - 1.8. ACTUAL HEATING SETPOINT (°F)
   - 1.9. ACTUAL COOLING SETPOINT (°F)
   - 1.10. DISCHARGE AIR TEMPERATURE (°F)
   - 1.11. HEATING STAGE 1 COMMAND
   - 1.12. PERCENT HEATING COMMAND
   - 1.13. DX COOLING STAGE COMMAND
   - 1.14. DX PERCENT COOLING COMMAND
   - 1.15. MIXED AIR DAMPER COMMAND
   - 1.16. MINIMUM OA DAMPER POSITION
   - 1.17. ECONOMIZER SETPOINT

KEY PLAN

ISSUE DATE	ISSUED FOR
04/08/2022	BID DOCUMENTS

DRAWN	RPL
CHECKED	MPH
APPROVED	MPH

PROJECT

Croswell-Lexington Community Schools: Meyer Elementary HVAC Controls Upgrade

Croswell, Michigan

SHEET

TEMPERATURE CONTROLS

PROJECT NUMBER

2022-017

SHEET NUMBER

M8.01