Associated Consulting Engineering, Inc.

340 South Phillips Avenue · Sioux Falls, SD 57104-6319 · Tel: 605.335.3720 · FAX: 605.335.6220

February 6, 2018

Mr. Tim Graf, Superintendent of Schools
Milbank School District
1001 East Park Avenue
Milbank, SD 57252

Re: Koch Elementary Mechanical and Electrical Review

Dear Tim:

Attached you will find a copy of the mechanical and electrical existing systems descriptions for the referenced project. The report includes an overview of each system, recommendations for each system and statements of probable cost. We also have included a list of systems that were not reviewed during this process. These would include roofs, structural systems, ADA deficiencies and upgrades required, elevators, glazing systems, building and fire separation walls and exiting from the building.

It is not the intent of these reports to give recommendations as to what the long term usage of this school might be, but to outline the condition and possible upgrades that may be needed for the mechanical and electrical systems within this facility.

If you have any questions regarding any of the recommendations, costs etc., please feel free to contact me.

Sincerely,

ASSOCIATED CONSULTING ENGINEERING, INC.

Norm deWit

Norm deWit, P.E.

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January 2, 2018

MECHANICAL EXISTING SYSTEMS DESRIPTION

KOCH ELEMENTARY SCHOOL
Milbank, SD

A. OVERVIEW:

1. SYSTEMS NOT REVIEWED:
   a. Roofs – indications are that roof replacement is required soon.
   b. Structural systems.
   c. ADA deficiencies and upgrades.
   d. Elevators – ongoing service and replacement.
   e. Glazing systems.

2. ORIGINAL BUILDING CONSTRUCTED IN 1955.
   a. Cast iron waste, vent and roof drain piping. Roof drains go to splash blocks.
   b. Galvanized cold, hot and recirculating hot located in tunnels.
   c. Fuel oil steam boiler with steam and condensate return located in perimeter tunnel system.
   d. Classroom unit ventilators with steam coils located in each classroom and steam radiation in corridors, restrooms and support areas.
   e. Floor mounted urinals and wall mounted toilets and lavatories.
   f. Building does not have sprinklered fire protection.

3. 1965 ADDITION
   a. Cast iron waste, vent and roof drain piping. Roof drains go to splash blocks.
   b. Galvanized cold, hot and recirculating hot water located in tunnels.
   c. Steam and condensate return piping in tunnel.
   d. Classroom unit ventilators with steam coils located in each classroom with steam radiation in corridors, restrooms and support areas.
   e. Additional fuel oil steam boiler was added with a new underground tank.
   f. Building does not have sprinklered fire protection.
   g. Plumbing fixtures similar to original building.

4. 1998 ADDITION
   a. Cast iron waste, vent and roof drain piping. Roof drains go to splash blocks.
   b. Copper cold, hot and recirculating piping. Cold water service connects to existing cold water piping and service.
   c. Existing steam boilers, piping and unit ventilators were removed and replaced with a geo-thermal heat pump system. Individual compressorized heat pumps are installed in each classroom and similar spaces. Heat pumps are tied together with a CPVC piping system that is coupled with a large exterior geo-thermal well system. The piping system was originally PVC but was replaced due to overheat resulting in piping failure.
   d. Building does not have sprinklered fire protection.

B. RECOMMENDATIONS:

1. PLUMBING SYSTEMS: The original building and the 1965 addition have cast iron waste and vent, and galvanized steel water piping. These systems, along with the fixtures are near the end of their useful life and will require replacement in the not too distant future. The 1998 addition plumbing systems are approximately 20 years old and will be serviceable for an estimated additional 20 years.

2. FIRE PROTECTION SPRINKLER SYSTEMS: There are no fire protection sprinkler systems installed in the existing building. Consideration should be given to installing these systems for the purposes of life safety and reduced insurance premium costs.

3. HEATING, VENTILATING AND AIR CONDITIONING (HVAC): Systems for the entire building were replaced at the time the 1998 addition was built. These systems have been in service for approximately 20 years and are beginning to experience compressor failures. We expect the heat pumps could be serviced for another 10 years however the frequency of failure will continue to increase. The heat pump loop piping along with the well field piping appears to be in good repair and should be serviceable for another 20-30 years. The well field piping could also be utilized for any replacement geo-thermal based systems or for new facilities located adjacent to the well field.

C. STATEMENTS OF PROBABLE COST:

1. PLUMBING SYSTEM UPGRADES:
   a. 1-5 Years – Original and 1965 Building Plumbing System Replacement – probable cost $285,000.00 plus $75,000.00 to $100,000.00 of general construction to remove and replace concealed piping systems.
   b. 5-10 Years – Ongoing maintenance.
   c. 10-20 Years – Ongoing maintenance.

2. FIRE PROTECTION SYSTEMS (this system would have many exposed pipes):
   a. 1-5 Years – $219,000.00 – not required but would reduce insurance costs.
   b. 5-10 Years –
   c. 10-20 Years –

3. HVAC SYSTEMS:
   a. 1-5 Years

      Option 1: $756,000.00 to replace existing heat pumps with like units in same location.
      Option 2: $1,386,000.00 mechanical costs for a fully replaced system with a central geo-thermal heat pump in conjunction with variable air volume (VAV) air handling units and fan powered VAV boxes serving each classroom and/or space. An additional $300,000.00 to $400,000.00 of electrical and general construction costs would be required to convert to VAV systems with central plant heating and cooling equipment.

   b. 5-10 Years – Ongoing maintenance.
   c. 10-20 Years - Ongoing maintenance.

D. CONCLUSION:

The existing elementary building is mostly 50 to 60 years old. The building has been reasonably well maintained. We believe that the building can continue to be serviceable. We observed no serious structural deficiencies at this time, however, a structural engineer should be employed to provide a more in-depth review of this aspect. It does, however, have some inherent inefficiencies. The multiple levels, stairs and overall layout make the building more difficult to maneuver and staff. The multiple level open areas and restricted ceiling plenum areas make it difficult to install modern day mechanical systems, as outlined in Option 2. The roof structure also provides angles and joints that are difficult to seal and maintain.

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January 2, 2018

ELECTRICAL EXISTING SYSTEMS DESRIPTION

KOCH ELEMENTARY SCHOOL
Milbank, SD

A. OVERVIEW:

1. ORIGINAL BUILDING CONSTRUCTED IN 1955.
   a. A 400A, 240Δ/120V, 3-Phase (with wild leg) Cutler-Hammer electrical service was installed, with distribution and branch circuit panels located throughout the facility.
   b. A combination of fluorescent and incandescent light fixtures were used for general illumination.
   c. A "zoned" type fire alarm system was installed.
   d. A centralized hard-wired clock system was installed.
   e. A building paging & intercom and program bell system was installed.

2. 1965 ADDITION
   a. Additions and modifications were made to the existing Cutler-Hammer electrical distribution system.
   b. A combination of fluorescent and incandescent light fixtures were added for general illumination.
   c. Additions and modifications were made to the existing fire alarm system.
   d. Additions and modifications were made to the existing centralized clock system.
   e. Additions and modifications were made to the existing paging & intercom and program bell system.

3. 1998 ADDITION
   a. The existing utility transformer was removed and replaced with a 480Y/277V, 3-Phase pad mounted transformer. A new 1600A, 480Y/277V, 3-Phase, 4W Square-D electrical service was installed with provisions for 400A of generator supplied emergency power. The existing electrical service was back-fed from the new service.
   b. An indoor 300KW, 480Y/277V, 3-Phase, 4W Kohler emergency standby generator was installed, connected to the building via a 60A/3P automatic transfer switch for Life Safety loads and a 1200A/3P automatic transfer switch for equipment loads. We were not able to test the generator under normal conditions to verify capacity.
   c. A majority of the existing light fixtures within the building were removed and replaced with fluorescent light fixtures utilizing T8 lamp technology.
   d. The existing zoned fire alarm system was removed and replaced with a new "addressable" fire alarm system throughout the building utilizing digital versus analog technology.
   e. The existing hard-wired clock system was removed and replaced with a synchronized wireless type clock system, with program interface capability with the new paging & intercom system.
   f. The existing paging & intercom and program bell system was removed and replaced with a new digitally controlled paging & intercom system.

B. RECOMMENDATIONS:

1. POWER SYSTEMS:
   a. The original building and the 1965 addition have Cutler-Hammer switchgear and panelboards that, while still functional, may be obsolete in terms of replacement parts, etc. Consideration should be made to replace this original equipment as part of any applicable proposed renovations of the spaces where this equipment is located. New Square-D switchgear and

panelboards were added with the 1998 addition. This equipment is approximately 20 years old and will be serviceable for an estimated additional 25 years.

b. The existing indoor 300KW Kohler generator was added with the 1998 addition. This equipment is approximately 20 years old and will be serviceable for an estimated additional 10 years. Loads testing should be conducted to verify if the capacity of this unit is sufficient for supplying power to the facility under normal operating conditions. Also, consideration should be made to replace this generator with an outdoor unit that will increase safety (with the unit being remote from the building versus inside it), improve sound considerations while running and improve emissions (based on current emissions standards).

2. LIGHTING SYSTEMS: Generally, lighting for the entire building was replaced at the time the 1998 addition was built. These lighting systems are generally fluorescent and have been in service for approximately 20 years and are more than likely beginning to experience frequent ballast failures. With proper maintenance, we would expect these lights could be serviceable for another 10 years. However, the frequency of failure will continue to increase. For maintenance purposes and for energy efficiency purposes, consideration should be made for replacing the existing fluorescent lighting systems with LED lighting systems, either with a phased replacement approach or all at one time.

3. FIRE ALARM SYSTEMS: New fire alarm systems were installed with the 1998 addition. This equipment is approximately 20 years old and will be serviceable for an estimated additional 10 years.

4. CENTRALIZED CLOCK SYSTEMS: New wireless clock systems were installed with the 1998 addition. This equipment is approximately 20 years old and will be serviceable for an estimated additional 15 years.

5. PAGING & INTERCOM SYSTEMS: New paging & intercom systems were installed with the 1998 addition. This equipment is approximately 20 years old and will be serviceable for an estimated additional 15 years.

C. <u>STATEMENTS OF PROBABLE COST:</u>

1. POWER SYSTEMS:
   a. 1-10 Years – Original and 1965 Building Switchgear Replacement. Probable cost $48,000.
   b. 1-10 Years – 1998 Building Switchgear – Ongoing maintenance.
   c. 10-20 Years – Ongoing maintenance.
   d. 10-20 Years – Generator Replacement (500KW). Probable cost $120,000.

2. LIGHTING SYSTEMS:
   a. 1-5 Years – Replace fluorescent lights with LED – not required but would reduce energy costs. Probable cost $340,000.
   b. 5-10 Years – Minimal maintenance.
   c. 10-20 Years – Minimal maintenance.

3. FIRE ALARM SYSTEMS:
   a. 1-5 Years – Ongoing maintenance.
   b. 5-10 Years – Ongoing maintenance.
   c. 10-20 Years – System will be reaching the end of its service life. Consideration should be made for system replacement. Probable cost $64,000.

4. CENTRALIZED CLOCK SYSTEMS:
   d. 1-5 Years – Ongoing maintenance.
   e. 5-10 Years – Ongoing maintenance.
   f. 10-20 Years – System will be reaching the end of its service life. Consideration should be made for system replacement. Probable cost $38,000.

5. PAGING & INTERCOM SYSTEMS:
   g. 1-5 Years – Ongoing maintenance.
   h. 5-10 Years – Ongoing maintenance.
   i. 10-20 Years – System will be reaching the end of its service life. Consideration should be made for system replacement. Probable cost $85,000.