BUILDING FEASIBILITY REPORT

FOR

NOYES CULTURAL ARTS CENTER

927 NOYES ST.
EVANSTON, IL 60201

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Project #: 2022-02501-00
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Volume 1: Due Diligence Report

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1. INTRODUCTION

Salas O'Brien was commissioned by the City of Evanston in response to RFP 22-04 to perform the "Noyes Cultural Arts Center HVAC Feasibility Study"

Our team for this project includes the following participants:

Prime Consultant & MEP/FP/TECH Engineer	Salas O'Brien
Architectural Services	McGuire Igleski
Structural Services	RME Engineers
Verification of Existing Conditions	BTR Engineers
Energy Modeling & Life Cycle Loss Analysis	Cyclone Energy Group
Cost Estimating	Vistara Construction Services

This project includes feasibility planning for a future HVAC renovation of the existing Noyes Cultural Arts Center at 927 Noyes Street in Evanston. The project includes the total replacement of existing HVAC equipment with new, plus developing a roadmap for getting this facility to achieve carbon neutrality by 2035.

Our thanks to the following for assistance in facilitating the site survey work on this project:

City of Evanston, Parks, and Recreation
City of Evanston, Administrative Services
City of Evanston, Public Works Agency

The purpose of this report is a building wide assessment for the Noyes Cultural Arts Center located at 927 Noyes St. in Evanston. The opinions expressed by Salas O'Brien in this report were based on the visual observations at the building and a review of existing drawings and documents, as well as discussions with the facilities operating, maintenance and administrative personnel.

This due diligence report is the first step in planning the feasibility of renovating the existing facility. While HVAC is the primary focus of this project, with a goal of creating a roadmap of achieving Carbon Neutrality in all city facilities by 2035, there are other systems that must also be considered.

All of the existing HVAC equipment and systems will definitely be replaced with new eliminating all gas fired appliances. There will be a shift towards electricity for heating and cooling and that will necessitate a thorough evaluation of the buildings incoming electric service and distribution. The addition of these major new electric loads will most likely necessitate a new larger incoming electric service.

This study is the ideal time to evaluate all of the building's systems: Mechanical, Electrical, Plumbing, Fire Protection and Technology. Many of the systems are older and in need of upgrades. This study will provide a prioritized list of recommended upgrades that will meet the City's carbon reduction goals and result in modern workable systems for all disciplines.

STUDY SCOPE

As a first step of this study, we will conduct a physical survey of 927 Noyes, St. Evaluate mechanical, electrical, technology, plumbing and fire protection systems with on-site observations and review of available building record drawings. The building's Architectural features will also be given a cursory review, including roofs, windows, doors, walls, insulation, etc.

The following are activities associated with the initial physical site surveys:

A. Review of existing HVAC, Electrical, Technology, Plumbing and Fire protection:

1. Conduct assessment in terms of age, condition and expected remaining useful life.
2. Identify code violations encountered.
3. Assess installations in terms of good engineering practices and maintainability.
4. Gather equipment data:

    a. Record nameplate information
    b. Record condition of equipment
    c. Photograph each item
    d. Review available as-built drawings
    e. Review maintenance record with current service contractor and owner.

5. Assess equipment and systems
6. Create an energy model of the existing building and reconcile it against actual utility bills for this site.
7. Prepare a written summary report of the existing conditions observations.
8. Provide recommendations of necessary system upgrades.

B. Once this due diligence phase of the study is completed, we will move into a cost analysis phase. For each of the recommended upgrades, a preliminary cost estimate of probable construction costs will be made, based on current construction costs.

   Using this preliminary information, a life cycle cost analysis will be done for each of the recommended HVAC system upgrades, to identify the options that present the best value for the City of Evanston.

   Undoubtably, the complete package of recommendations for system replacements and upgrades will represent a very substantial cost. The task will also be to make recommendations for how best to phase the work into manageable pieces working towards the Carbon Neutrality goal of 2035. A multiphase, multiyear project will most likely be required.

C. Also, included in this study are some preliminary investigations as to what sources might be available for Grants and Incentives that could help to lower the construction costs projected.

EXISTING CONDITIONS & CODE SUMMARIES

ARCHITECTURAL

The Noyes Cultural Art Center, formerly the Noyes Street School, was originally designed and constructed in 1892 by B. H. Burnham and Company. It was constructed of brick with Italianate detailing and a hipped roof. The building consists of a basement, first and second floors, with an unoccupied attic. Subsequent additions were constructed in 1902 and in 1948 to include an auditorium and gymnasium (designed by Perkins and Will). The building became an Evanston Landmark in 1982, and while not a National Register Landmark, it is eligible to become one.

Due to its status as a landmark, any exterior changes to the building (including windows, doors, roof, equipment, etc.) would need to receive a Certificate of Appropriateness (COA) and would need to be approved by the Evanston Preservation Commission. The Evanston Historic Preservation Guidelines outline the efforts to maintain the integrity of the community.

Although constructed later, the 1940's addition is also historic (older than 50 years of age) and was designed by prominent architects. The whole building shall be considered historic and improvements between the different areas of the exterior should not be treated differently. For example, installation of visible equipment would not be considered more appropriate on the 1940's addition.

The Evanston Preservation Commission and the Environment Board and Utilities commission adopted joint guidelines for "Sustainable Historic Preservation," in November 2020 which address requirements for installing solar and green roof installations on historic buildings. In summary, the goal is to retain the original roof character, install discreetly, install where visibility from the street or public way is minimal, on flat roofs or on non-primary facades. (Note: There are roof areas on the west elevation that are not visible from the public way).

Roof

All building roofs were replaced in 2013. Steep sloped roofs were replaced with new asphalt shingles, and low slope roofs were replaced with a modified bituminous system. Design documents indicate a minimum value of R-25 for the main roof system.

Ceiling insulation was installed in the 1940's addition in 2001.

The roofs generally appear to be in good condition. Observations were made from grade only.

Windows

In the 1892/1902 parts of the building, the windows were replaced with aluminum thermal break windows with double glazing, in double hung and awning configurations. The glazing light patterns match the historic configurations. These windows were installed in 1993.

In the 1940's addition, the windows were replaced with aluminum thermal break windows with double glazing in fixed and casement configurations. The glazing light patterns match the historic configurations. These windows were installed in 2001.

The windows generally appear to be in good to fair condition, although a detailed analysis of each window was not completed. At approximately 30 years installed, the windows are nearing the end of their usable life, but replacement is not required at this time. Some operable windows are permanently locked shut, the reason for this is unknown, especially when operable windows appear to be the primary source of ventilation air for much of the building.

Doors

The primary doors are fiberglass, they are half-glazed with double glazing. Date of installation is unknown.

The rear and basement doors are metal with no glazing. Date of installation is unknown.

Then north door on the 1940’s addition is metal and three-quarter glazed. Permits indicate this door was installed in 2008.

The doors generally appear to be in good condition in terms of thermal performance, with appropriate weatherstripping generally observed. Door finishes require maintenance.

STRUCTURAL

The structural system of the main building and additions, except for the auditorium is of wood framing of all the floors and attic floors. The roofs are also constructed of wood trusses and wood joists.

The building envelope is constructed of multiple wythes of brick with penetrations for windows and doors.

In evaluating the updating of the various building systems, the cost will be affected by the mechanical unit's weights being placed on the existing floor framing as well as any units hanging from the ceiling and upper roof framing. The existing framing will have to be evaluated for structural capacity and reinforcing will most likely be necessary.

Where mechanical units might be replaced in kind in the same location, an evaluation would need to be done comparing the existing unit weights and sizes to the new.

Changing the toilet room fixtures and equipment and other discipline changes such as duct and pipe risers through the floor areas will also require evaluation of the structural systems and may possibly require reinforcing or framing for new shafts, etc..

APPLICABLE BUILDING CODES

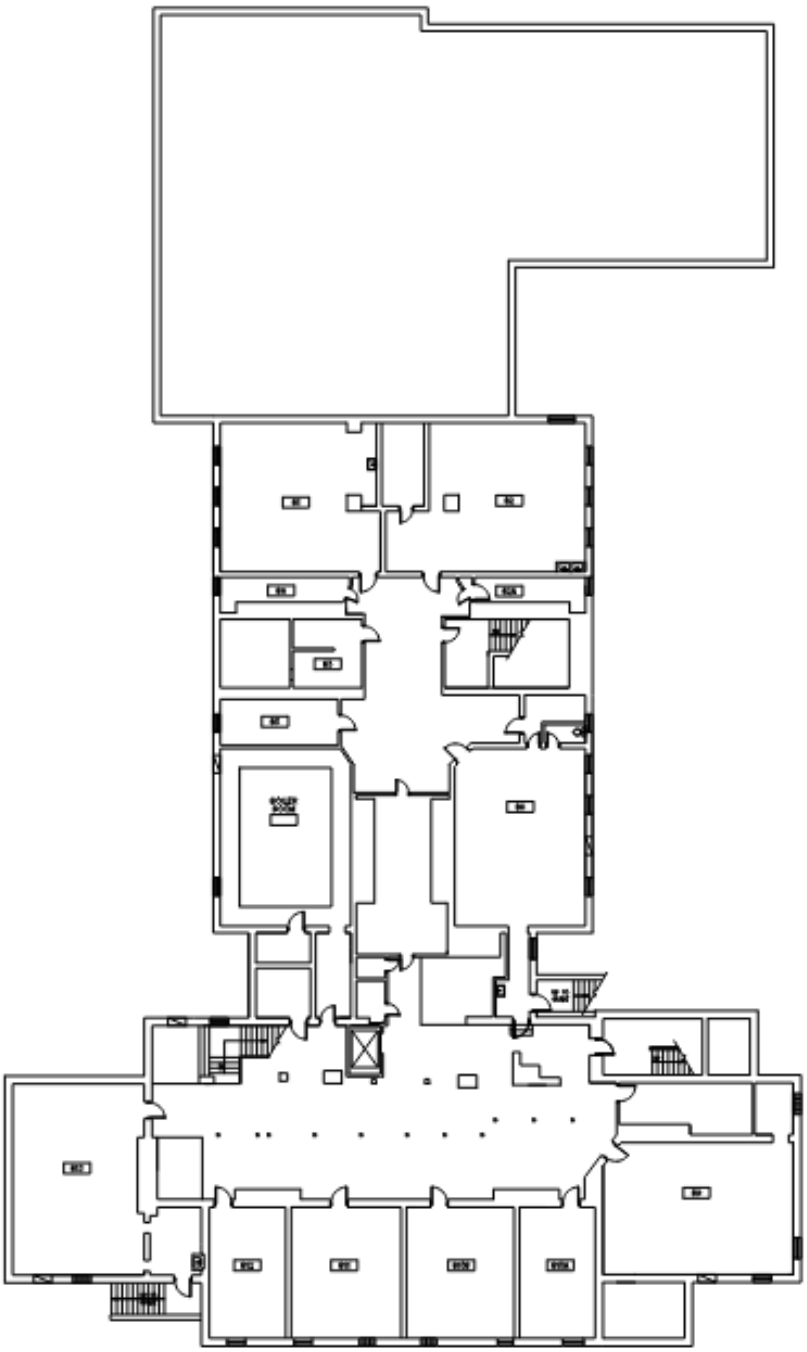
- 2021 International Building Code (IBC)
- 2021 International Mechanical Code
- 2021 International Fuel Gas Code
- 2020 National Electric Code (NFPA 70)
- 2021 NFPA Life Safety Code 101
- 2021 International Fire Code
- 2021 International Property Maintenance Code
- Illinois Plumbing Code/ Illinois Administrative Code Title 77 Part 890
- Illinois Energy Conservation Code/ Illinois Administrative Code Title 71 Part 600
- Illinois Accessibility Code/ Illinois Administrative Code Title 71 Part 400

Existing Conditions

The Noyes Cultural Arts Center is well maintained and performing adequately in support of the current uses throughout the facility. The building was built in 1892 and consists of a lower level, first and second floor levels and an attic. A gymnasium and theater were incorporated to the building through later additions. The steam boilers were replaced in 1999 and a small renovation to the office rooms on the first floor was done in 2001.

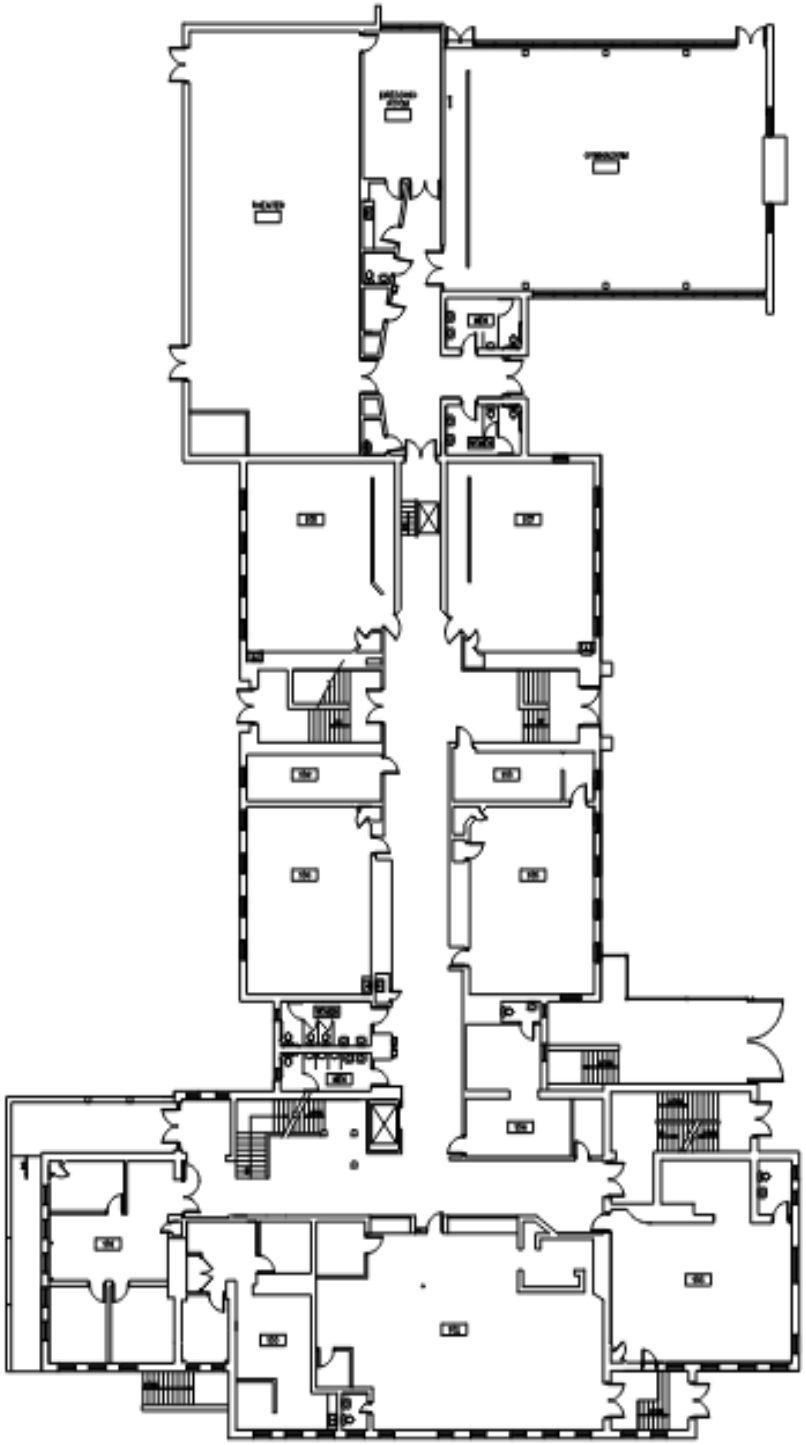
Note: The existing steam boilers were found to be defective at Fall startup for the 2022 heating season while this due diligence study was in progress. As an emergency project two of the three existing boilers were replaced in kind with new steam boilers.

For a building with this age, there is significant wear and tear on most of the MEP/FP systems which may need to be replaced. Equipment left to remain should be brought to meet the current building codes.



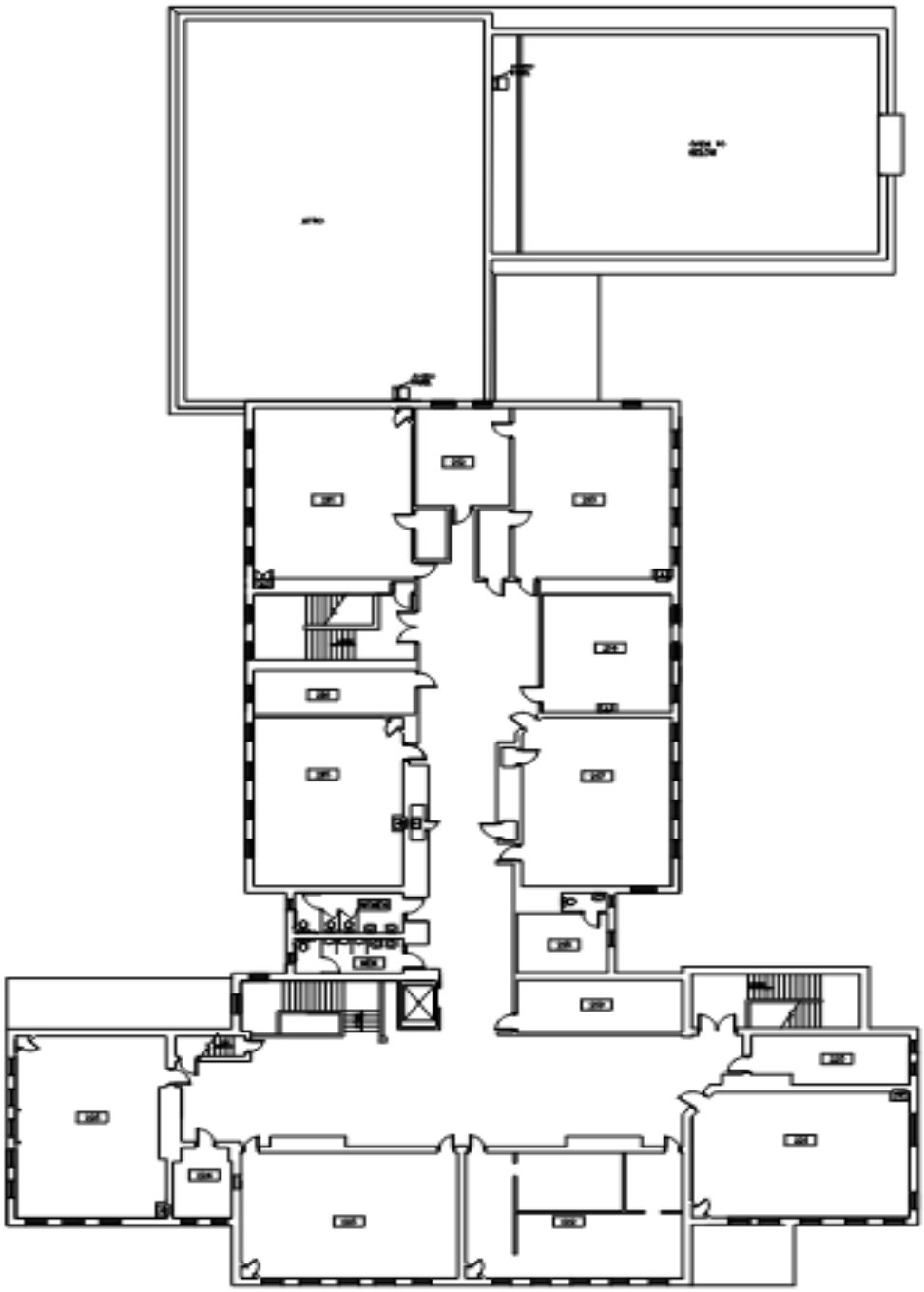
BASEMENT

15,000 SF



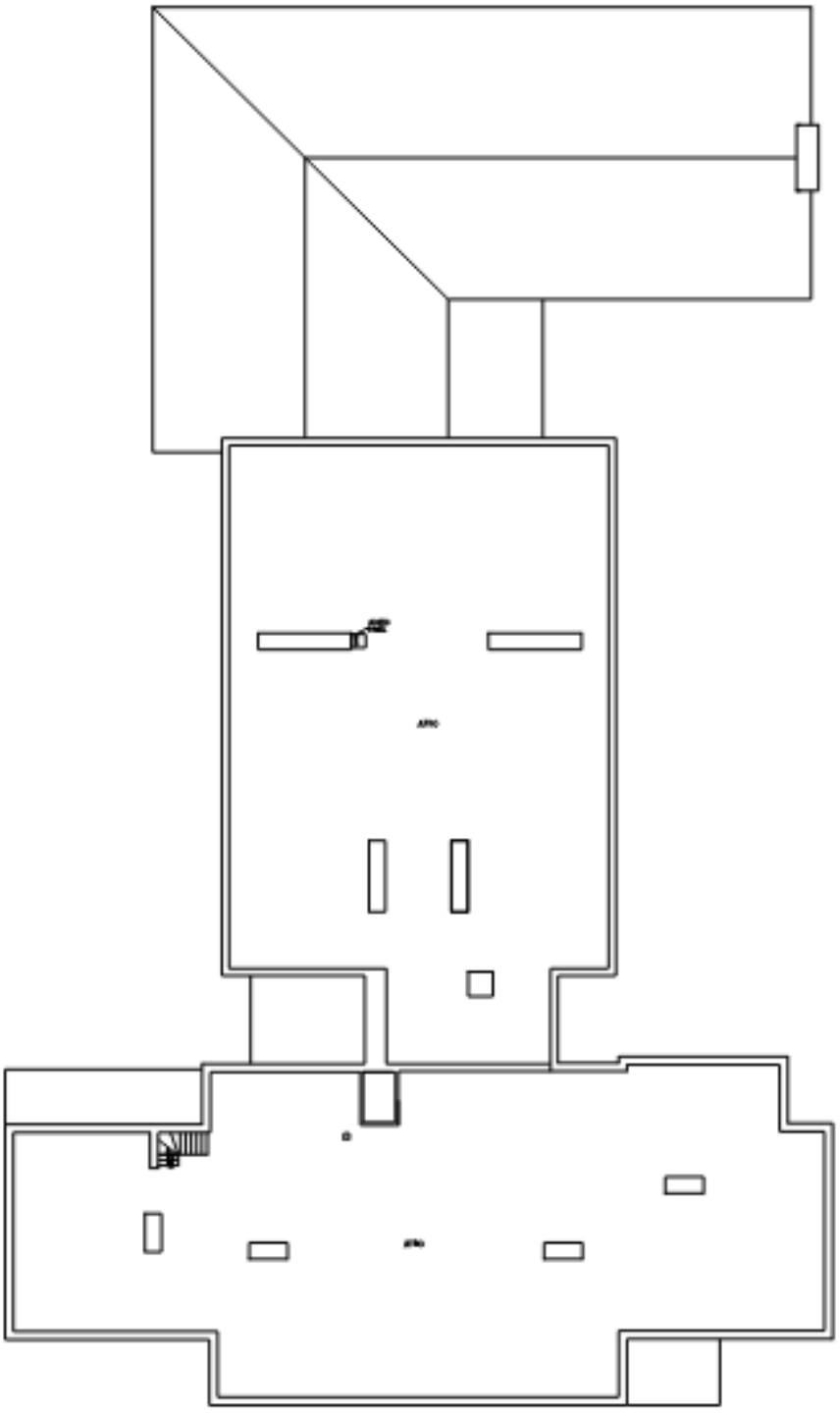
FIRST FLOOR PLAN

24,600 SF



SECOND FLOOR PLAN

16,250 SF



ATTIC FLOOR PLAN

14,500 SF

MECHANICAL

A. Heating Systems

1. Boilers

a. There are three natural gas-fired, low pressure steam boilers installed in the basement level.

Burnham Boilers; capacity: 1,110 lbs/hr @ 15 psi, installed circa 1998

All boilers appear to be in a fair working condition with no sign of maintenance or operations issues reported from staff. There is evidence of some debris build up and possible rust formation in the gas burner connection door to the boiler. Steam boilers in this size typically have an expected useable life span of ± 25 years. So, these units are at the end of their expected useable life span.

NOTE: The existing steam boilers were found to be defective at the Fall startup for the 2022 heating season. As an emergency project, two of the three existing boilers were replaced in kind with new steam boilers. All of the existing ancillary systems were reused in this emergency project.

b. The boiler feed water system was installed in 1999 with the replacement of the older boilers and consists of a feedwater tank and
(2) two pumps.

Boiler Room:
Bell & Gossett model:
2.0-CMHD-2.0-C35
Marathon Electric
3/4 HP pumps @ 37 GPM,
20 psi with a 65 gallon
receiver tank capacity

The tank and pumps are in fair working condition. The boiler feed water system typically will have an expected useable life span of ± 25 years.

c. The building currently utilizes steam for the following loads:
1. Steam radiators in all 1st and 2nd floor rooms.
2. Miscellaneous stair and corridor steam cabinet heaters and radiators.
3. Steam heating coils in existing air handling units.

B. Air Handling Systems

1. Air Conditioning Unit – AHU– Theater

a. There is a horizontal DX split system air-conditioning unit in the ceiling space of the theater with an air-cooled condensing unit situated outside at grade.

Indoor Unit:
McQuay, Model CE560A34-225L-111
153,758 Btuh nominal cooling capacity
285,124Btuh nominal heating capacity
Heating coil served by 15 psig steam

Outdoor Unit:
McQuay, Model CAH008FDAC
(2) compressors, (2) ½ HP condenser fans
Utilizing R-22 refrigerant

b. The indoor and outdoor units appear to have been installed around the mid 1990's. Air-conditioning units and air- cooled condensing unit of this type and size typically have an expected useable life span of ± 20 years.
c. There is no duct insulation on the supply/return air ductwork.
d. The steam pipe insulation is in very poor condition.
e. The outdoor condensing unit has degraded significantly over time and utilizes R-22 refrigerant which is no longer produced and not acceptable by the current energy code.
f. The outdoor refrigeration pipe insulation is in poor condition.
g. Code required outdoor air is provided to the AHU through a louver in the building exterior.
h. Code required exhaust air for the theater is provided by a dedicated exhaust fan. (Refer to the equipment data sheets for further details)
i. Heating for the theater is provided by a steam heating coil in the air handling unit and perimeter steam heaters.
j. No sign of air side economizer observed for the AHU as required by the current energy code.

2. Air Conditioning Unit – AHU-1 & AHU-2 – Gymnasium

a. There are two vertical DX split system air-conditioning units in an elevated floor area of the Gymnasium with air cooled heat pump condensing units situated outdoors on the lower flat roof area.

Indoor Units:
Aspen, Model CE560A34-225L-111
57,000 Btuh nominal cooling (nominal 4.75 tons) capacity
55,000 Btuh nominal heating capacity

Outdoor Units:
Bosch, Model BOVA-60HDN1-M18M
(1) compressor (ea.)
(1) 1/3 HP condenser fan (ea.)
Utilizing R-410A refrigerant

b. The indoor and outdoor units appear to have been installed circa 2007. Air-conditioning units and air-cooled heat pump condensers of this type and size typically have an expected useable life span of ± 20 years.
c. The outdoor condensing units are in very good shape.
d. The outdoor refrigeration pipe insulation is in good shape as well.
e. There was no sign of any mechanical outdoor air to the AHU's serving this space.
f. Code requires outdoor air for the gymnasium.
g. There was no sign of any mechanical exhaust for the gymnasium. The system appears to be strictly 100% recirculation.
h. Provide code required exhaust and makeup air for the gymnasium.
i. All heating for the gymnasium is served by the heat pump AHU's. There are no supplemental heating units.

3. Air Conditioning Unit – AHU - Office

   a. There is a vertical DX split system air-conditioning unit in a dedicated closet serving the Office Rooms 100 and 101 with an air-cooled condensing unit outdoors at grade.

      Indoor Unit:
      Carrier Model 40RM-007-B610HC
      72,000 Btuh cooling capacity (Nominal 6 tons)

      Outdoor Unit:
      Carrier 38ARZ007---501
      (2)Compressors,
      (2) 0.9 FLA condenser fans
      R-22 refrigerant

   b. The indoor and outdoor units appear to have been installed circa 2001. Air-conditioning units and air-cooled condenser of this type and size typically have an expected useable life span of ± 20 years.
   c. The outdoor condensing unit has degraded significantly over time and utilizes R-22 refrigerant which is no longer produced and not acceptable by the current energy code.
   d. The outdoor refrigeration pipe insulation is in poor condition.
   e. There was no sign of any mechanical outdoor air to the AHU. The system is 100% recirculation.
   f. Code requires outdoor air for an office occupancy.
   g. There was no sign of any mechanical exhaust for any of the rooms served by the AHU.
   h. Code requires exhaust air for an office occupancy.
   i. No sign of air side economizer observed for the AHU as required by the current energy code.
   j. All heating for the rooms is served by perimeter steam radiators. There is no heat in the AHU, it is cooling only.

4. Air Conditioning Unit – AHU – Piven Theater

   a. There is a vertical DX split system air-conditioning unit in a dedicated closet serving the Piven Theater with air cooled condensing unit outside at grade.

      Indoor Unit:
      Carrier Model 40RM-012-B600HC
      120,000 Btuh cooling capacity (Nominal 10 tons)

      Outdoor Unit:
      Carrier Model 38AKS012---501
      (1) compressor,
      3/4 HP condenser fan
      Utilizing R-22 refrigerant

   b. The indoor and outdoor units appear to have been installed circa 1998. Air-conditioning units and air-cooled condensers of this type and size typically have an expected useable life span of ± 20 years.
   c. The outdoor condensing unit has degraded significantly over time and utilizes R-22 refrigerant which is no longer produced and not acceptable by the current energy code.

d. The outdoor refrigeration pipe insulation is in poor condition.
e. There was no sign of any mechanical outdoor air to the AHU. The system is 100% recirculation
f. Code requires outdoor air for ventilation of a theater.
g. There was no sign of any mechanical exhaust for the theater.
h. Code requires exhaust air for the theater.
i. No sign of air side economizer observed for the AHU as required by current codes.
j. All heating for the theater served by perimeter steam radiators.

5. Miscellaneous Air Conditioning - Class rooms on 1st and 2nd floor.

   a. There are a wide range of packaged air terminal (PTAC) units and unit ventilators situated in various locations of the classrooms on the first and second floors.
   b. The conditions of the equipment vary from poor to good. (Refer to the individual equipment data sheets in the appendix)
   c. PTAC units have an expected useable life span of ± 10 years.
   d. Some classrooms are conditioned by Mobile AC units.
   e. The condition of the equipment varies from poor to good. (Refer to the equipment data sheets)
   f. Two rooms were observed to have either a purifier or humidifier in them. (Refer to the equipment data sheets)

6. Corridor Exhaust Fans

   a. There are two exhaust fans situated in the attic space serving as exhaust for the corridor on the 2nd floor.

      North Corridor: Cook
      Model SQN-B-225
      7,000 CFM
      1.97 BHP, 3 HP motor

      South Corridor: Cook
      Model SQN-B-225
      7,000 CFM
      1.97 BHP, 3 HP motor

   b. The exhaust fans appear to have been installed circa 2001 and are in relatively good condition.
   c. There was no sign of any mechanical outdoor air to the corridor. Some of the classroom AC systems have capability of bringing in outside air for ventilation, plus the windows are operable. OA brought into the classrooms is relieved to the corridors and exhausted via the corridor exhaust fans.

      These attic fans are also used to exhaust excess heat from the attic. There is no dedication heating or cooling system for the attic space.

7. Attic Supply Fans

   a. There are two supply fans situated in the attic space that condition the attic.
   b. The supply fans appear to have been installed circa 2001 and are in relatively good condition.

      North Corridor:
      Penn Barry
      Model SX225BC
      1.5 HP, 1775 RPM

South Corridor:
Penn Barry
Model SX225BC
1.5 HP, 1775 RPM

These attic fans are used to supply and exhaust air to the attic in order to alleviate excess heat buildup in the attic. There is no dedication heating or cooling system for the attic space. Winter conditions could be excessively cold in the attic.

8. Miscellaneous Exhaust Fans and Louvers

    a. There are (9) exhaust fans that serve the various toilet rooms throughout the building. (4) of these fans are wall mounted serving the 1st and 2nd floor restrooms. (2) fans serve the gymnasium toilet rooms and are situated on the roof. The (3) other fans serve the basement, Piven theater, and room 218 toilet rooms. All fans are in fair condition and are starting to show signs of aging.
    b. There is a roof mounted down blast fan serving the pantry room area adjacent to the main theater.
    c. There is a roof mounted down blast fan, in fair condition serving the theater dressing room.
    d. There is a roof mounted down blast fan, in fair condition serving the theater exhaust. The fan does not appear to be sized for full economizer for the theater.
    e. There is one centrifugal fan in the South Attic serving the boiler room exhaust. The equipment is in good shape, given its life span of ± 20 years.
    f. There is an intake louver in the boiler room, providing combustion air for the room. The damper at this louver was not in operation during site visit. Verify that motor actuator for the damper is working properly. Louver appeared to be fairly worn down and recommend replacing it, as required, depending on the future use of the space.
    g. There are 4 miscellaneous wall mounted exhaust fans in various of the basement rooms all in fair condition and still in operation.

C. Air Side Distribution

1. All larger areas of the buildings are served by individual AHU's already noted.

    a. The AHU serving the Theater has ducted supply and return. No insulation or sign of duct lining was observed.
    b. The AHU's serving the Office, Piven Theater and Gymnasium have ducted supply and direct return off the bottom of the unit. No insulation or sign of duct lining was observed.

2. There was no sign of any economizer operation for any of the indoor AHUs.
3. No fire and smoke dampers are installed in any of the ductwork distribution. Provide life safety dampers as required, verify with architect. Confirm which partitions are fire rated.

D. Piping Systems

1. Steam & Condensate System

    a. Most of the indoor steam and condensate return piping was concealed from view as it is within walls or above ceilings. The piping visible in the basement and 1st floor theater ceiling exhibited some external corrosion due to age and had missing/damaged sections of insulation. This was most prevalent at the condensate return pumps.
    b. Condition of steam traps could not be verified.

2. Perimeter heating systems

    a. The 1st Fl perimeter radiators and recessed wall vestibule heaters are of steam type. The vestibule heaters are provided with recirculated blowers to assist with warm air distribution.
    b. The 2nd FL heating was also served by perimeter steam radiators and corridor heaters.
    c. Miscellaneous steam heaters were situated in the stair landings of all the stairs.

E. Gas Service

1. Building is supported by what appears to be a 3-inch medium pressure gas service, with a 14” wc pressure regulator in the SW corner of basement. The gas service is routed to the basement mechanical boiler room. Regulators are vented to the outdoors.

    NiCor is the gas utility company.

2. The gas meter is situated outside at the SW corner of the building.

F. Controls

1. The building has a mixture of controls for the various HVAC systems.

    a. Most controls are pneumatic type.
    b. All controls for the AHU systems are stand-alone type.
    c. There is no overall building automation system, that would be consistent with current city requirements for their facilities.

ELECTRICAL

A. Utility Services

1. The service is an overhead lateral, originating on a pole with pole mounted transformers located north of the building.
2. Building is served by an 800 Amp, 120/208V service.
3. The incoming service is metered by a ComEd CT and meter mounted on grade at the building exterior.

B. Electrical Distribution

1. The main switchboard serving the building is MDP-1. MDP-1 is a 2-section, 800A, 120/208V, 3 phase, 4 wire Switchboard with fusible switch distribution. MDP-1 is located in the Basement electrical room, adjacent to the boiler room. This equipment contains a surge suppression device.
2. The service appears to lack a code compliant disconnecting means, which would consist of a single disconnect or up to six switches for a sequenced service.
3. MDP-1 contains the following overcurrent devices (fusing is unknown):

   (9) 200A Switches serving LP-8, LP-7, LP-3, LP-J, LP-6, LP-5, LP-4, LP-2 and Elevator.
   (2) 200A Switches serving LP-1 and “Panel”
   (8) 60A Switches serving LP-10, Vend, Kiln, A/C Piven, Studio 221, Actors, Gym and Office AC.

4. Basement electrical distribution includes the following branch panelboards:
   LP-4
   LP-5
   LP-6
   LP-7
   EM
   45KVA transformer and branch panelboard deriving 240V power for outlets in room B13.

5. The following electrical equipment is located on Level 1 of the facility:

   LP-8 and Theatrical switching panel in Theater.
   LP in Actor’s Gym
   LP-3 in corridor
   AOP-1 in Office Area
   LP-10 in Piven Theater
   Vending Panel near SW entrance.

6. The following electrical equipment is located on Level 2 of the facility:
   Panel LP-2 in Corridor
   Studio 221 Panel LP-1 in South Attic

7. Observation of feeders and branch wiring was limited. With a building of this age and size, older cloth or rubber insulated cables may be present. This wiring should be replaced as it is encountered due to potential deterioration. The same applies to older aluminum cables.

8. We are told that the present building electrical distribution is inadequate for its current use and new distribution to new branch panelboards should be considered throughout even independent of the future HVAC project.

C. Emergency Power

1. Emergency Egress Lighting and Exit Signs are equipped with unit battery equipment.
2. Fire Alarm equipment has battery backup.

D. Other Equipment

1. Fire Alarm System

a. The manufacturer of the building Fire Alarm System is FireLite/ Honeywell. The main Fire Alarm Control Panel is located in the Basement. The Fire Alarm Annunciator is located on Level 1.
b. System initiating devices consists of smoke and heat detectors, pull stations and waterflow switches.
c. Notification consists of horn strobes in restrooms and corridors. Most classroom type spaces lack adequate notification, as required by code.

2. Lighting and Lighting Controls

a. Lighting consisted largely of suspended fluorescent fixtures throughout the facility.
b. Lamping consisted of mixture of T8 with some T12 interspersed.
c. Fixtures in the corridors are newer. Most classroom fixtures appear >40 years old and are missing louvers and have deteriorated reflecting surfaces.
d. Single and two-lamp incandescent lamp fixtures were located in closets, stairs and back of the house spaces. Many of these have been fitted with screw in compact fluorescent lamps.
e. There are exterior fixtures lighting the building façade. Lamping appears to be metal Halide.
f. With the exception of occupancy sensors in restrooms, lighting controls are all manual.
g. The two theater spaces contain theatrical lighting control systems.

PLUMBING

A. Water Service

1. Building is supported by a 6-inch combination fire protection/domestic incoming water service which enters the basement level at the east end of the building and serves the entire building.

B. Building Domestic Water

1. A 4-inch domestic water line splits off from the incoming combined water service, in the incoming water room through a dual 2-inch domestic meter manifold and is routed through the ceiling of the basement serving all areas of the building. There is no code required reduced pressure backflow preventer on the domestic water service. The building does not have a domestic water booster pump. There is not currently enough water pressure to supply 35 PSI to newer low flow plumbing fixtures.
2. Building hot water for the entire building, except the office space on the first floor, is supported by a single 50- gallon, 4.5 KW electric water heater that was replaced in 2021 and is in good condition. There is no hot water recirculation system or hot water recirculation pump for the building. As currently designed, the most remote sink on the second floor, which is located about 130 feet away from the water heater in the basement, would have a significant wait time for hot water. This does not comply with current energy code requirements which state that public lavatories shall have a continuous hot water supply within 2 feet of the fixture and sinks must have a continuous hot water supply within 43 feet. In addition, the water piping to the water heater is not insulated which also does not meet energy code requirements.
3. There is a point of use 2.5-gallon, 1.5 KW electric water heater under the cabinet in the office space (Room 100) on the first floor that serves the sink in that room only. The water heater appears to have been installed in 2001 when this area was renovated. This water heater is past its life expectancy of 10 years.
4. Most of the water distribution piping appears to be galvanized steel, except for areas that have been renovated with the installation of new copper piping. Most of the piping appears to be original piping, which was installed around 1959, and is now past its life expectancy.
5. There are three (3) hose bibs located on the outside of the building. Two are exposed type hose bibs and the third is a flush mounted wall hydrant box type. The exposed hose bibs are in fair condition and the wall hydrant is in good condition.

C. Building Storm Drainage

1. Roof drainage consists of gutters and exterior downspouts located around the perimeter of the building. Per the existing drawings, the roof, gutters, and downspouts were all replaced in 2013. The exterior downspouts appear to be in good condition.

D. Building Sanitary Drainage and Vent Piping

1. The main building sanitary and vent stacks and main sewers appear to be original to the building and comprised mostly of hub and spigot cast iron piping. The exception is areas that have been renovated over the recent years which are comprised of PVC piping and galvanized steel. Most of the piping is at least 50 years old and is past its life expectancy.
2. There is a duplex self-priming sewage ejector located in the Basement Boiler Room. This sewage ejector serves the floor drains and subsoil storm drainage for the Boiler Room only. Per code, a sewage ejector handling sewage shall not also receive subsoil drainage.
3. The elevator shaft has a 30 GPM submersible type pump in the elevator pit sump. Per

the current elevator code, a 50 GPM is required for all elevators.

4. All the plumbing fixtures on the basement level are connected by gravity to the building sanitary sewers. These plumbing fixtures have the potential of sewage back up if the main sewer is clogged since they are the lowest fixtures on the main.

E. Plumbing Fixtures and Trim

1. Basement Room B1
   a. Sink is a free-standing laundry tub type sink. This room is being used as storage, so the sink was not completely visible.
2. Basement Room B2
   a. Sink is a wall mounted double bowl stainless steel sink with a single handle lever faucet. Waste piping for the sink is PVC and looks newer. The waste piping connects above the floor to the main sewer line leaving the building. Sink is in fair condition.
3. Basement Room B6
   a. Toilet room has a floor mounted tank type toilet with an elongated open front toilet seat. There is no lavatory, nor a floor drain in this bathroom. Per code, there should be a lavatory for hand washing in all toilet rooms.
   b. Sink is a free-standing single bowl cast iron sink with a two-handle lever faucet located in the entry of this room. Sink is in poor condition.
4. Outside Room B6
   a. There is a free-standing cast iron service sink with a wall mounted two-handle lever faucet. Faucet is in poor condition. Sink is in fair condition.
5. Outside Room B11
   a. There is a wall-mounted cast iron service sink with a deck mounted two-handle lever faucet with a hose attached. Sink is in fair condition.
6. Basement Room B13
   a. Sink is a free-standing double bowl sink with two hot and cold hose bib faucets. Sink is in fair condition.
7. First Floor Office 100
   a. Sink is a single bowl, stainless steel sink with a two-lever high-arc faucet. Sink is in good condition.
   b. There is a point of use 2.5 gallon water heater located under the counter that serves this sink only. Per the existing drawings, this water heater was installed in 2001.

8. First Floor Auditorium 102 Toilet Room

   a. Toilet is a floor mount flush tank type with a closed round toilet seat and cover. Toilet is in fair condition.
   b. Lavatory is a pedestal type with a residential type two handle faucet. The lavatory does not have the code required automatic safety water mixing device to protect against scalding. Lavatory and faucet are in fair condition.
   c. There is no floor drain in this room.

9. First Floor Corridor

   a. Service sink is a wall hung white sink with a wall mounted two-handle faucet. Service sink is in fair condition.
   b. Drinking fountain is an Elkay bi-level wall hung drinking fountain with push button activation bars. Drinking fountain is in good condition.

10. First Floor Restrooms

    a. Toilets are floor mounted, 1.6 gallons per flush (GPF) with manual flush valves and open front elongated toilet seats. Toilets are in fair condition. The toilet seat is most likely not an antimicrobial seat as required by code.
    b. Urinals are floor mounted, 1.0 gallons per flush, with manual Sloan flush valves. Urinals are in fair condition and do not meet current water conserving requirements of 0.5 gallons per flush or less.
    c. Lavatories are wall hung with two-handle push button metering type faucets by Chicago Faucets. P-traps and water supplies are exposed under the lavatories and do not meet current ADA accessibility protective covering requirements. Lavatories do not have code required automatic safety water mixing devices to protect against scalding. Flow rate of the faucet is unknown but may not meet the code required minimum flow rate of 0.5 GPM or less for public use faucets.
    d. Floor drains have been installed in each restroom.
    e. Existing drawings indicate these restrooms were updated to meet ADA requirements in 1998.

11. First Floor Classroom/Toilet Rooms:

    a. Classroom 103: There is a wall hung lavatory with separate hot and cold-water faucets with cross handles. The toilet has been covered up with a wood enclosure and was not observable. The room is being used as storage, so the plumbing fixtures are not in use. Per code, plumbing fixtures not in use shall be disconnected, removed, and sealed. Piping should be removed back to its source.
    b. Classroom 104: The toilet room has a floor mounted tank type toilet and a wall hung lavatory. The room is being used for storage, so the exact condition of the plumbing fixtures was not observable. There is a service sink in the room adjacent to the toilet room. This room is also being used for storage, so the exact condition of the sink was not observable. Per code, plumbing fixtures not in use shall be disconnected, removed, and sealed. Piping should be removed back to its source.
    c. Classroom 106: Sink is a single bowl, stainless steel sink with a two-handle lever kitchen faucet. Sink is paint splattered but in good condition otherwise.
    d. Classroom 107: Sink is a single bowl, white sink with a two-handle lever kitchen faucet. Sink is paint splattered and in fair condition.
    e. Classroom 108: Sink is a single bowl, stainless steel sink with a two-lever high arc kitchen faucet. Sink looks like it has been recently installed and is in good condition. P-trap and waste piping is PVC.

12. First Floor Theater Area Men's and Women's Restrooms

    a. Toilets are American Standard, floor mounted, 1.6 gallons per flush (GPF) with battery operated, sensor activated Sloan flush valves and open front elongated toilet seats. Toilets are in fair condition. The toilet seat is most likely not an antimicrobial seat as required by code.
    b. Urinals are American Standard, floor mounted, 1.0 gallons per flush, with manual Sloan flush valves. Urinals are in fair condition and do not meet current water conserving requirements of 0.5 gallons per flush or less.
    c. Lavatories are wall hung with two-handle push button metering type faucets by Chicago Faucets. P- traps and water supplies are exposed under the lavatories and do not meet current ADA accessibility protective covering requirements. Lavatories do not have code required automatic safety water mixing devices to protect against scalding. Flow rate of the faucet is unknown but may not meet the code required minimum flow rate of 0.5 GPM or less for public use faucets.

d. Floor drains have been installed in each restroom.

13. First Floor Theater Area Dressing Room Pantry and Toilet Room

    a. Pantry sink is single bowl, white enameled finish with a two-lever handle kitchen faucet. Sink and faucet are in fair condition. P-trap and waste piping are PVC and appear to have been replaced recently.
    b. Toilet is a wall hung flush tank type. The toilet seat has yellowed and is in fair condition.
    c. Lavatory is wall hung with a single handle faucet. The P-trap and water supplies are exposed under the lavatory and do not meet current ADA accessibility protective covering requirements. The lavatory does not have the code required automatic safety water mixing device to protect against scalding.
    d. Toilet room has a floor drain.

14. First Floor Theater Area Corridor

    a. Drinking fountain is an Elkay EZH20 single user combination wall-hung drinking fountain with a bottle filler. It looks like it has been installed recently and is in good condition.
    b. Service sink is wall hung with a wall mounted two-handle lever faucet. Sink is in very poor condition.

15. Second Floor Restrooms

    a. Toilets are floor mounted, 1.6 gallons per flush (GPF) with battery operated, sensor activated Sloan flush valves and open front elongated toilet seats. Toilets are in fair condition. The toilet seat is most likely not an antimicrobial seat as required by code.
    b. Urinals are wall-hung with battery operated; sensor activated Sloan flush valves. The flow rate of the urinals is not known. Urinals are in fair condition. Urinals may not meet current water conserving requirements of 0.5 gallons per flush or less.
    c. Lavatories are wall hung with two-handle push button metering type faucets by Chicago Faucets. P- traps and water supplies are exposed under the lavatories and do not meet current ADA accessibility protective covering requirements. Lavatories do not have code required automatic safety water mixing devices to protect against scalding. Flow rate of the faucet is unknown but may not meet the code required minimum flow rate of 0.5 GPM or less for public use faucets. Lavatories are in fair condition.
    d. Floor drains have been installed in each restroom.
    e. Existing drawings indicate these restrooms were updated to meet ADA requirements in 1998.

16. Second Floor Room 211

    a. Sink is a single bowl, white sink with a two-handle lever kitchen faucet. Sink is stained and in fair condition. P-trap and waste piping is PVC.

17. Second Floor Room 213

    a. Sink is a single bowl, white sink with a two-handle lever kitchen faucet. Sink is stained and in fair condition. P-trap and waste piping is galvanized steel.

18. Second Floor Room 214

    a. Sink is a single bowl, stainless steel sink with a two-handle lever kitchen

faucet. Sink is in fair condition. Waste piping was not accessible.

19. Second Floor Room 215

    a. Sink is a single bowl, white sink with a two-handle lever kitchen faucet. Sink is in good condition.

20. Second Floor Room 218

    a. The toilet room was not accessible during the survey. Maintenance indicated that this toilet room is not being used other than for storage. As previously stated, per code, plumbing fixtures not in use shall be disconnected, removed and sealed. Piping shall be removed back to its source.

21. Second Floor Room 221

    a. Sink is a single bowl, white sink with a two-handle lever kitchen faucet. Sink is in poor condition. P- trap and waste piping is galvanized steel and is starting to corrode.

22. Second Floor Room 225

    a. Sink is a single bowl, white sink with a two-handle lever kitchen faucet. Sink is in poor condition. P- trap looks like it was replaced recently with PVC but the waste piping is galvanized steel otherwise.

23. Second Floor Corridor

    a. Service sink is cast iron sink with a deck mounted two-handle faucet. Service sink is in poor condition.
    b. Drinking fountain is an Elkay bi-level wall hung drinking fountain with push button activation bars. Drinking fountain is in good condition.

FIRE PROTECTION

A. Water Services

1. The existing incoming water service is a combined plumbing/fire service with a 6” for the sprinkler system in meter room B9. The meter room is located in the southeast corner of basement.
2. The backflow device for the fire protection is a 6” RPPA (reduced pressure principle assembly). Recent test papers indicate a static water pressure of 50 PSI.

B. Fire Pump Assembly

1. The building is not provided with a fire pump.

C. Sprinkler systems/Fire Suppression System

1. The building is not fully sprinklered and the sprinkler system appears to have been installed in the 1950’s. All rooms that are part of the 1950’s building addition are not sprinklered except the stage and dressing room.
2. Most sprinklers are original, and the sprinkler system is a pipe schedule system, not hydraulically calculated.
3. The entire sprinkler system is a dry system. The dry valves are located in the incoming water service room.
4. The dry inspectors test is located in the attic and is not accessible. According to building personnel, the system has not been tested in years and this is not acceptable by the city, and they want the inspectors test connection (ITC) relocated to an accessible location. For past years, Evanston Parks and recreation staff handled the fire system inspections and tests. Some of these records are not available. Recently, the responsibility for this testing has shifted over to Evanston Facilities Management. We understand that the system has already been tested this year. Further, Facilities Management is working with their Fire Protection vendor to identify and correct any such deficiencies.
5. Both quick opening devices (QOD) are out of service per the trip test tag dated 06/01/06. Facilities Management is in the process of getting this tested.
6. Both the QODs and dry pipe valves indicate a manufacturers date of 1959-1960.
7. A Siamese fire department connection is located on the southeastern exterior wall of the building with a horn strobe directly above it.

D. Fire Extinguishers

1. Fire extinguishers were found on all floors and were typically located in surface mounted cabinets. Some areas appear to exceed the NFPA #10 75’ travel distance requirements between fire extinguishers. Facilities Management is working to get this corrected.

TECHNOLOGY

A. Incoming Services

1. The current IT infrastructure at 927 Noyes Street is comprised of a 12-strand fiber cable from the Noyes Splice Hole. This is an outdoor manhole in the front yard of the building. This is where the fiber from the building connects to the outside service fiber.
2. An additional Coax connection is provided into a PBX which provides analog to VOIP conversion for the building.

B. Distribution

1. The MDF is located in the basement in room 104 and comprises of a wall mounted rack approximately 16RU in height. Equipment in the rack includes the following:

    a. 2RU UPS located inside of rack
    b. Horizontal Cable Management.
    c. 110-Style CAT6 punch down patch panel
    d. Cisco 3850 Series Switches (Both POE enabled gigabit ports and Fiber trunks)
    e. Commercial ISP provided router.
    f. FDU – Fiber Distribution Unit

2. The MDF provides all data connections for the entire building. It was noted a single Netgear switch, and standalone UPS was found in room 104. It appears that this switch along with UPS and floor mounted server are a separate and independent system from the main structured cabling system.
3. POE powered WAPs were noted in all major hallways. Cabling was noted as installed in surface mounted raceways with occasional penetrations into the plaster work. Data cabling in the basement is run along plumbing pipes.

C. Security Cameras

1. Security Cameras are in all major hallways and are Hikvision cameras. Cameras are powered via POE and connected to a separate patch panel located within the MDF rack.
2. Cameras are wall mounted on a standoff mount

D. Access Control

1. Access control was noted to be only present on the Admin door in the form of a Cypher lock (num pad)

E. Intrusion Detection

1. Surface Mount IR sensors were noted as being located all around hallways and major corridors. These IR motion sensors included red activation lights on the front cover. These devices are tied into the security alarm system for the building.

F. Audiovisual

1. Gymnasium: Audiovisual Equipment includes the following

    a. Audio Mixer – Allen and Heath ZED USB Series Analog console
    b. Wireless Microphone – Shure Wireless 1-CH wireless microphone system
    c. Powered Speaker – QSC 12” PA speaker (QTY 2) flown

2. Theater: Audiovisual Equipment Includes:

    a. Audio Mixer – Behringer X32 Digital Mixer
    b. Shure Wireless Microphone System (4-CH wireless)
    c. ion lighting console

3. Room 102:

    a. Audio Mixer – Analog Mixer- Mackie Mixer
    b. Strand lighting console

AVAILABLE BUILDING OPTIONS

MECHANICAL: As was seen in the previous section of the report much of the HVAC equipment/systems are old, outdated, in fair condition at best and in many cases do not meet current ventilation and/or energy codes. Replacement with new equipment and systems is the best solution. Replacement is also the only way to transition the facility to meeting the City's carbon reduction goals.

A. Heating System

1. DOAS unit heating.
    a. Provide electric boiler and required accessories to provide acceptable heating hot water temperature to the heating coil serving the DOAS unit.
    b. Provide an electric heating coil element for the DOAS unit.
2. The heating for the Main Theater, Gymnasium, Office and Piven Theater is to be done by individual AHUs described in the air handling systems section below.
3. The heating for the classrooms is to be done by indoor units described in the indoor unit's section below.
    a. Provide supplemental electric heating elements within indoor units for option requiring an outdoor condensing unit, as supplemental backup.
4. Supplemental electrical baseboard, cabinet, and unit heaters to be situated for storage rooms, mechanical spaces, corridors, entries, and stair ways, etc.

B. Air Handling Systems

1. Propose replacing the AHU serving the Main Theater as this unit is past its useable life span, utilizes steam, and not code compliant as they are utilizing R-22 refrigerant.
    a. Provide new unit with economizer mode as required by code for any AHU having a cooling capacity larger than 54,000 btu/h.
2. Existing AHU-1 & AHU-2 serving the Gymnasium to remain for the initial phases of the project, as they are in good condition and up to date with code required refrigerant. These will be replaced in a later phase of construction.
3. The indoor AHU serving the Office and Piven Theater appear to be in a fair condition given their age. The only deficiency to these pieces of equipment is the poor condition of the outdoor units which utilize R-22 refrigerant.
    a. An option for these AHUs would be to replace the equipment in their entirety with new indoor and outdoor units utilizing R-410A refrigerant. Provide equipment with electrical heating element and economizer mode as required to meet current codes.
    b. Alternatively replace condensing units and add electric heating coil for heating purposes as needed, within the existing AHU's.
4. Provide code required outside air ventilation for the interior spaces via a dedicated outside air (DOAS) unit.
    a. Provide units with energy recovery wheel utilizing toilet exhaust as source of heat recovery option.

C. Indoor Units

HVAC Scenarios 1: Electric Boiler and ASHP with electric resistance backup

DOAS was modeled with an energy recovery wheel (50% latent and sensible heat effectiveness) with outdoor air of 9,500 cfm. DOAS has a hot water coil receiving hot water

from the electric boiler and DX cooling with a compressor COP of 4.5. The unit also has VFD on the fan and DCV control.

Each room is served by an air source heat pump (ASHP) with a heating COP of 3.22 rated at 47F and a cooling COP of 4. Electric resistance backup is provided when outside air drops below 35F. Compressors are shut off at 2F then electric resistance should provide the full capacity of heating. The ASHPs have EC motors that are capable of two-speed operation.

HVAC Scenario 2: Electric Boiler and Low Ambient Air Source VRF with electric backup

DOAS is modeled with an energy recovery wheel (50% latent and sensible heat effectiveness) with outdoor air of 9,500 cfm. DOAS has a hot water coil receiving hot water from the electric boiler and DX cooling with a compressor COP of 4.5. The unit also has VFD on the fan and DCV control.

Each room is served by an air source variable refrigerant unit (ASVRF) with a heating COP of 3.5 rated at 47F and a cooling COP of 4.5. The VRFs should have full capacity at -13F. Electric resistance backup is assumed if outside air drops below -13F. The ASVRFs should have EC motors that are capable of at least two-speed operation.

HVAC Scenarios 3: Electric Boiler and Water Source VRF with geo loop

DOAS is modeled with an energy recovery wheel (50% latent and sensible heat effectiveness) with outdoor air of 9,500 cfm. DOAS has a hot water coil receiving hot water from the electric boiler and DX cooling with a compressor COP of 4.5. The unit also has VFD on the fan and DCV control.

Each room is served by a water source variable refrigerant unit (WSVRF) coupled with a geothermal loop. The unit has a heating COP of 4 and a cooling COP of 7.5. The WSVRF's should have EC motors that are capable of at least two-speed operation.

The electric boiler should be sized for additional capacity in event of geo loop inefficiency.

HVAC Scenario 4: Electric Boiler and Water Source HP with geo loop

DOAS is modeled with an energy recovery wheel (50% latent and sensible heat effectiveness) with outdoor air of 9,500 cfm. DOAS has a hot water coil receiving hot water from the electric boiler and DX cooling with a compressor COP of 4.5. The unit also has VFD on the fan and DCV control.

Each room is served by a water-to-air heat pump (WAHP) coupled with a geothermal loop. The unit has a heating COP of 3.8 and a cooling COP of 7. The WAHPs should have EC motors that are capable of at least two speed operation.

The electric boiler should be sized for additional capacity in event of geo loop inefficiency.

The above 4 HVAC scenarios will be further evaluated in the Life Cycle cost exercise done in Volume 2 of this study.

ELECTRICAL

A. Utility Services

1. The current service configuration provides approximately 5W/ft2. This will be inadequate for the projected reuse of the facility. An additional 10W/ft2 would be required for proposed HVAC revisions and electrification of the facility.
2. The recommended service size would be approximately 1,000A at 480V, 3 phase. A 208V service is also an option but would result in much larger equipment footprint and less efficient wiring to HVAC loads. If supplied at 208 volt the service size would be approximately 2,000A.
3. It is anticipated that service and distribution modifications be implemented during a major renovation to minimize impact on building usage. This would be one of the first upgrades to be done.

B. Electrical Distribution

1. Due to the age MSB-1, replacement is appropriate. The challenges to replace the switchboards will be identifying all the existing loads, identifying capacity to confirm if distribution can be consolidated, identifying loads that need to remain functional during a shutdown, developing phasing and cutover plans, and meeting space and clearance requirements.
2. Panelboards serving mechanical equipment, lighting, and power should be assessed on a case-by-case basis. Distribution equipment in locations not impacted by the revised program could be replaced in kind.
3. Smaller panelboards impacted by demolition or equipment with residential or light commercial type duty should be replaced with new appropriately selected panels.
4. As part of the project, a power system study and arc flash analysis should be conducted. With replacement of the main switchgear, new switchboards will require short circuit labeling per current code requirements which include the results from the power system study.
5. Essentially all of the electrical distribution in the building will be replaced with new.

C. Other Equipment

1. The fire alarm system should be updated as part of the infrastructure upgrades. Existing initiation devices, where compatible with the new system, may be retained on a case-by case basis. It is anticipated that this work be implemented during a major renovation to minimize impact on building usage.
2. Lighting and Lighting Controls should be replaced throughout. LED fixtures for interior and exterior will be required to improve efficiency. Digital controls for time scheduling, occupancy and vacancy sensing and daylighting are required to meet current energy codes. Lighting controls could be installed with wired or wireless controls and sensors. Wireless systems have a much lower installed cost but allowance should be made for 10 year batter replacement.

FIRE PROTECTION

A. Sprinkler systems/Fire Suppression System

1. Change the existing 2.5” x 2.5” fire department connection to a new Storz type as required by the Evanston Fire Department.
2. Original sprinklers shall be replaced and provided with quick response throughout.
3. The inspectors test connection (ITC) shall be relocated to an accessible location.
4. Due to the age of piping and not testing in several years, Salas O’Brien recommends flushing all piping and hydrostatically test the system to verify no leaks. Samples of piping should be taken tested/inspected and verified that no corrosion is present. For past years, Evanston Parks and recreation staff handled the fire system inspections and tests. Some of these records are not available. Recently, the responsibility for this testing has shifted over to Evanston Facilities Management. We understand that the system has already been tested this year. Further, Facilities Management is working with their Fire Protection vendor to identify and correct any such deficiencies.
5. Apart from the attic, Salas O’Brien recommends to convert the existing dry pipe system to a wet pipe system after testing and verifying the existing piping is adequate or provide a new wet system throughout the building.
6. The attic will remain as a dry pipe system.

B. Fire Extinguishers

1. Recommend providing additional fire extinguishers/cabinets on all floors to meet NFPA #10 travel distance requirements. Facilities Management is currently working towards getting this corrected.

TECHNOLOGY

A. IT Options

1. Remove all analog cabling not in use and re-label patch panels to have a consistent labeling scheme
2. Replace wall mounted MDF rack with free standing floor rack for future expansion. Provide new data cabling with adequate slack to reach new MDF free standing rack.

B. Security Options

1. Security Cameras

   a. Replace existing Hikvision cameras with Axis or similar camera as Hikvision cameras are known to have security vulnerabilities.

2. Access Control

   a. Add Access control card readers to strategic door locations, including, but not limited to:

      i Exterior Doors
      ii Admin Offices
      iii Classrooms
      iv Other Locations as deemed necessary

3. Intrusion Detection

   a. Replace existing IR motion sensors with more modern sensors, add new security system head end in accordance with the current City of Evanston standards.

C. Audiovisual Options: Note, much of the AV equipment in the Theater and the Gym are owned and maintained by the tenant. In those cases, the items below are suggestions only.

1. Gymnasium:

   a. Replace Existing Audio Mixer with a digital mixer with iPAD connectivity
   b. Clean up existing mixing position with proper cable management and small AV rack for proper equipment organization.
   c. Add Assisted Listening System in compliance with ADA requirements.
   d. Re-work wireless microphone system to allow easy addition of additional wireless microphone channels as required for larger productions, etc.

2. Theater

   a. Add AES50 enabled snake for connection to X32 mixer rather than analog snake connection
   b. Add Assisted Listening System in compliance with ADA requirements.

3. Room 102

   a. Provide Digital mixer to replace analog Mackie mixer currently installed
   b. Provide digital audio snake to front of stage
   c. Provide Assisted Listening system in compliance with ADA requirements.

PRIORITIZED RECOMMENDATIONS

MECHANICAL

A. Heating System

1. DOAS unit heating.

   There are 4 HVAC scenarios being presented. Each of those scenarios will include DOAS units. Within that, there are two DOAS options being considered.

   a. Of the two options presented, the least first cost DOAS option would be to provide the DOAS unit with an electric heating coil. The option of the electric boiler will require the installation of pumps, pump accessories and water piping to feed the hydronic heating coil within the DOAS unit. These systems need to be evaluated in terms of their respective life cycle costs. This will be done in the next phase of the study.

2. The steam heating system is past its life span and all equipment including boilers, pumps, tanks, etc. shall be disconnected and removed.
3. All existing steam radiators and heaters to be demolished, all future heating to be electric to achieve the carbon neutrality goal.

B. Air Handling Systems

1. Propose replacing the AHU serving the Main Theater as the unit is past their life span, utilizes steam for heating and are not code compliant as they are utilizing R-22 refrigerant.

   a. Provide airside economizer on all air handling units as indicated by the energy code. (all units larger than 54,000 btu/h in cooling capacity)

2. Existing AHU-1 & AHU-2 serving the Gymnasium to remain for the initial phases of the renovation.
3. Recommend replacing the AHU serving the Office and Piven Theater as the units are past their life span, had no indication of being equipped with heating and utilize R-22 refrigerant which is not code compliant.

   a. Provide airside economizer on all air handling units as indicated by the energy code. (all units larger than 54,000 btu/h in cooling capacity)

4. Provide code required outside air ventilation and exhaust to all rooms as required by the international mechanical code.
5. Provide mechanical ventilation for first and second floor occupied rooms through a Dedicated Outside Air Unit (DOAS).

C. Indoor units

1. Of the 4 HVAC options presented herein, Option #1 and #2 are very similar in efficiency and in cost. The first option has an energy use intensity (EUI) of 33 and utilizes Air Source Heat Pumps to condition the rooms. The second option has an EUI of 32 and utilizes Air Source VRFs to condition the room. The first option will require a separate outdoor condensing unit for each Heat Pump, while the second option will require fewer outdoor condensing units, since more than one VRFs can be coupled to a condensing unit. The benefit of the second option is that it provides a heat recovery option, allowing zones to be in heating or cooling simultaneously.
2. The following two options, #3 and #4 are very similar to one another, as they both utilize geothermal loop as their reservoir for energy transfer. Option three has an EUI of

26, which is slightly lower than the EUI of 29 for the WSHP with geothermal loop. As in the comparison of the first two options, option three WSVRF has a better efficiency since it comes with a heat recovery option between indoor VRF units.

3. Of the four HVAC options Option #3 is the most efficient but may have the largest up-front cost. If the decision is not to go with a geothermal loop, then both Option 1 and 2 are as equally as good. Option #2 has the benefit of have less outdoor units and doing simultaneously heating and cooling, through the VRF heat recovery system.
4. All PTAC and mobile AC units in the classrooms are to be disconnected and removed. Units that have an age less than ± 10 years may be salvaged for possible reuse at another city facility.

D. Air Side Distribution

1. Provide life safety (fire and smoke) dampers in mechanical systems as needed, verify with architect for locations of all fire rated partitions.

E. Piping Systems

1. All steam and condensate piping to be demolished and properly disposed of, including pipe, valves, specialties, hangers, traps, insulation, etc.

2. Provide new hydronic and/or refrigerant piping based on the HVAC option selected.

F. Gas Service

1. Demolish all gas piping, meters, and regulators throughout the building.

2. At the end of the conversion, the NiCor gas service can be disconnected and removed.

G. Controls

1. Provide a totally new DDC control system for the building, integrating all new and existing mechanical equipment, including air-handling units and any perimeter heating.

2. New control system shall be as manufactured by Schneider Electric per City of Evanston standards.

ELECTRICAL

A. Utility Services

1. Provide new 480V, 3 phase electrical service as building infrastructure is upgraded. Anticipated size is 1000A, but actual size will depend on final building program.

B. Electrical Distribution

1. Replace all obsolete electrical equipment. Provide new interiors where enclosures are in good condition.
2. Remove or replace residential grade panelboards. Remove panelboards from classrooms where appropriate.
3. Provide all new electrical distribution to panelboards and to connected loads.
4. Provide new circuits and feeders for mechanical equipment.
5. Provide Arc Flash Study.

C. Other Equipment

1. The fire alarm system should be updated as part of the infrastructure upgrades.
2. Replace lighting and lighting controls throughout the facility so that the building will have all new LED light fixtures and Code compliant lighting controls.

PLUMBING

To bring the building up to code, the following plumbing items should be considered a priority:

1. Install a reduced pressure backflow preventer after the water meters per code requirements.
2. Replace all plumbing fixtures in the Level 1 and Level 2 core restrooms and the Theater Area Men's and Women's restrooms with water saving models. All new plumbing fixtures shall bear the Watersense label where applicable as per the City of Evanston's Plumbing Amendments.

    a. All toilets shall have a maximum flow rate of 1.28 GPF. All toilets shall have anti-microbial, self-sustaining open front toilet seats to meet current code requirements.
    b. All urinals shall have a maximum flow rate of 0.5 GPF or less. Recommend wall hung urinals if installation allows on the Level 1 Men's and Theater Area Men's Rooms for easier maintenance and cleaning.
    c. All lavatories shall have metering or self-closing faucets with a maximum flow rate of 0.5 GPM or less. All lavatories shall have code required point of use automatic safety water mixing devices to protect against scalding and protective coverings for the P-trap and water supplies to meet current accessibility requirements.

3. Replacement of the plumbing fixtures in the restrooms will require the addition of a domestic water booster pump after the reduced pressure backflow preventer to provide a minimum of 35 PSI at the 2nd floor to support new low flow plumbing fixtures. Locate booster pump in the basement in an adjacent room next to the water service room where space is available.
4. Add hot water return piping to all the core restrooms, Theater Area restrooms and other active plumbing fixtures to comply with the current energy code so that hot water is circulated to within 2 feet of all public lavatories and within 15 feet of the sinks. Provide a dedicated hot water return riser to connect all new individual floor level hot water return branches into. Take all hot water return piping back to the building water heater in the basement and install hot water recirculating pump.
5. Insulate all new hot water return domestic water piping to comply with the current energy code.
6. As a short-term solution, in lieu of replacing all water piping, insulate all exposed existing water piping located in the basement and serving the water heater to comply with the current energy code.
7. Replace existing elevator pit pump with new 50 GPM pump to meet current elevator code requirements. The existing discharge piping shall be replaced and shall route indirectly to an existing floor drain in the Boiler Room.
8. Replace the toilet and lavatory in Room 102. Provide toilet with an anti-microbial, self-sustaining open front toilet seat. Provide lavatory with code required point of use automatic safety water mixing device to protect against scalding. Install floor drain in toilet room as required by code. Toilet shall be 1.28 GPF and the lavatory faucet shall be 0.5 GPM maximum and both labeled Watersense.
9. Install new lavatory in Room B6 next to toilet or remove toilet if not being used. Cap all piping if toilet is removed.
10. Clean, flush and inspect via camera existing building sanitary sewers to review conditions and suitability for continued use. We recommend taking a sample pipe evaluation of existing sanitary piping as well.
11. Clean, flush and inspect via camera existing underground storm drainage to confirm conditions and proper operation.

12. We recommend taking a sample pipe evaluation of the existing domestic hot and cold-water piping to determine continued use since the piping is past its life expectancy.

The following plumbing items should be considered within the next 5 years:

1. Replacement of all existing sanitary and vent piping in place since it is past its life expectancy.
2. Replacement of all existing domestic water piping in place since its past it is life expectancy. Replacement could be staged to only replace in heavily used areas such as the core bathrooms first before replacing in other areas.
3. Replace existing sewage ejector with new duplex self-priming sewage ejector to serve all boiler room floor drains.
4. We recommend that all below grade plumbing fixtures be connected to the new sewage ejector in the Boiler Room to prevent sewer back-up at these fixtures.
5. Provide a separate duplex self-priming sump pump in the boiler room to serve subsoil drainage and divorce it from the sanitary system as required by code.
6. Replace sinks in all classroom areas with new sinks and faucets with a flow rate of 1.5 GPM flow rate. All faucets shall bear the Watersense label as per the City of Evanston's Plumbing Amendments. Since these rooms are used for arts and crafts, we recommend providing solids interceptors under the sinks to prevent debris from entering the sewer system.
7. Replace all service sinks on all levels including the sinks that are still in use in the basement. Provide with service sink faucets with integral vacuum breakers for hose connections as required by code.
8. All plumbing fixtures not currently in use shall be disconnected, removed, and sealed and should have the plumbing piping serving those areas removed back to active source to avoid dead ends. This would include at minimum Rooms B1, 103, 104 and 218.

FIRE PROTECTION

The following items should be considered a priority:

1. Provide additional fire extinguisher cabinets on all floors to meet NFPA 10 travel distances.
2. Change the existing 2.5” x 2.5” fire department connection to a new Storz type as required by the Evanston Fire Department
3. Because the existing sprinkler system has been in service much longer than its average life expectancy, Salas O’Brien recommends to replace the existing system with a new NFPA 13 wet and dry systems. A dry pipe system will only serve the attic space. All other parts of the building shall be served by new wet pipe sprinklers.

TECHNOLOGY

1. Remove all analog cabling not in use and re-label patch panels to have a consistent labeling scheme.

   Existing Cable management is messy and does not lend itself to easy management. While the end goal may be to replace the entire MDF rack and its associated cabling, the best first step with relatively low cost is to tidy the existing rack by updating the label scheme and removing cabling that is not used. Per NEC code, cabling that is abandoned must be removed per NEC Sections 800.2, 800.52 (A) and 800.53 (B)(1). Taking this step first will allow for future expandability down the road once budgeting allows.

2. Add Access control card readers to strategic locations, including, but not limited to

   a. Exterior Doors
   b. Admin Offices
   c. Classrooms
   d. Other Locations as deemed necessary.

   Existing access control is accomplished via keys distributed to personal as required. Keys come with the following risks:

   a. Loss
   b. Theft
   c. Lack of automatic auditing – (cannot trace when the key was last used)

   Adding a keycard system would provide the following benefits:

   a. Instant deactivation of proximity cards in the event of loss or theft
   b. Full auditing of people entering the building
   c. Tie into a new video surveillance system for positive identification when people access the building.
   d. Dynamic permissions to rooms as required – no need to assign new sets of keys need to be issued to users.

3. Replace existing IR motion sensors with more modern sensors, add new Simplex security system head end in accordance with City of Evanston.

   Existing IR Sensors are old, large, and prone to false alarms caused by insects, etc. The replacement of the old sensors with new more modern sensors will facilitate the integration with a modern Simplex access control system in accordance with standards set by the City of Evanston.

4. Addition of Assisted Listening System per ADA requirements in the Gymnasium

   Per ADA requirements any place of assembly that has voice amplification is required to have an assisted listening system. During our visit, we did not see an assisted listening system (ALS) and therefore recommend that a system be added in accordance with ADA regulations.

5. Addition of Assisted Listening System per ADA requirements in the Theater

   Per ADA requirements any place of assembly that has voice amplification is required to have an assisted listening system. During our visit, we did not see an assisted listening system (ALS) and therefore recommend that a system be added in accordance with ADA regulations.

6. Addition of Assisted Listening System per ADA requirements in the Room 102

   Per ADA requirements any place of assembly that has voice amplification is required to have an assisted listening system. During our visit, we did not see an assisted listening system (ALS) and therefore recommend that a system be added in accordance with ADA regulations.

APPENDICES

A. DRAWINGS

Drawings highlighting major pieces of MEPFP equipment relevant to the due diligence report are listed below and included in the proceeding pages:

M1.0	Basement Floor Mechanical Plan
M1.1	First Floor Mechanical Plan
M1.2	Second Floor Mechanical Plan
M1.3	Attic Mechanical Plan
M1.4	Roof Mechanical Plan
E1.0	Basement Floor Electrical Plan
E1.1	First Floor Electrical Plan
E1.2	Second Floor Electrical Plan
E1.3	Attic Electrical Plan
P1.0	Basement Floor Plumbing Plan
P1.1	First Floor Plumbing Plan
FP1.0	Basement Floor Fire Protection Plan
FP1.3	Attic Fire Protection Plan
T1.0	Basement Floor Structured Cabling Plan
T1.1	First Floor Structured Cabling Plan
T1.2	Second Floor Structured Cabling Plan

B. EQUIPMENT DATASHEETS

Equipment Datasheets relevant to the due diligence are listed below and included on the proceeding pages.

MDS-01	B-1 Boiler
MDS-02	B-2 Boiler
MDS-03	B-3 Boiler
MDS-04	BF-1
MDS-05	BFP-1
MDS-06	BFP-2
MDS-07	CP-1
MDS-08	CP-2
MDS-09	AHU - Theater
MDS-10	CU - Theater

MDS-11	AHU-1 Gymnasium
MDS-12	CU-1 Gymnasium
MDS-13	AHU-2 Gymnasium
MDS-14	CU-2 Gymnasium
MDS-15	AHU - Office
MDS-16	CU - Office
MDS-17	AHU - Piven Theater
MDS-18	CU - Piven Theater
MDS-19	PTAC - 105
MDS-20	Air Purifier - 105
MDS-21	PTAC - 106
MDS-22	PTAC - 107
MDS-23	PTAC - 108
MDS-24	Mobile AC - 109
MDS-25	PTAC - 110
MDS-26	Mobile AC - 211
MDS-27	PTAC - 213
MDS-28	Mobile AC - 213
MDS-29	PTAC - 215
MDS-30	PTAC - 217
MDS-31	PTAC - 221
MDS-32	PTAC-1 - 222
MDS-33	PTAC-2 - 222
MDS-34	PTAC - 223
MDS-35	PTAC - 225
MDS-36	Dehumidifier - B09
MDS-37	EF-0.1 - B2A
MDS-38	EF-0.2 - B10B
MDS-39	EF-0.3 - B11
MDS-40	EF-0.4 - B13
MDS-41	EF-1.1 - 1st Flr. Men’s Restroom
MDS-42	EF-1.2 - 1st Flr. Women’s Restroom
MDS-43	EF-1.3 - Piven Theater Restroom
MDS-44	EF-1.4 - 103 Restroom
MDS-45	EF-2.1 - 2nd Flr. Men’s Restroom
MDS-46	EF-2.2 - 2nd Flr. Women’s Restroom
MDS-47	EF-2.3 - 218 Restroom
MDS-48	EF-1 Attic
MDS-49	SF-1 Attic
MDS-50	EF-2 Attic
MDS-51	SF-2 Attic
MDS-52	Boiler Fan - Attic
MDS-53	EF-1 Women’s Restroom

MDS-54	EF-2 Men’s Restroom
MDS-55	EF-1 Dressing Room
MDS-56	EF-2 Theater
MDS-57	EF-3 Pantry
EDS-1	Fire Alarm Control Panel
EDS-2	MSB- Main Electrical Service
EDS-3	CT- Metering Transformer Cabinet
PDS-01	WH-1 Domestic Hot Water Heater
PDS-02	SE-1 Duplex Ejector Pump
PDS-03	EP-1 Elevator Pit Pump
PDS-04	WH-2 Domestic Hot Water Heater
PDS-05	AC-1 Air Compressor with tank
FDS-01	Backflow Preventer
FDS-02	Dry Valve #1
FDS-03	Dry Valve #2
FDS-04	Quick Opening Device #1
FDS-05	Quick Opening Device #2
FDS-06	Air Compressor – Fire Protection Dry System
TDS-01	AMP-01 Audio Amplifier
TDS-02	MIX-01 Audio Mixer
TDS-03	MIX-02 Audio Mixer
TDS-04	MIX-03 Audio Mixer
TDS-05	MS-01 Motion Sensor
TDS-06	SWH-01 Network Switch
TDS-07	SPK-01 PA Speaker
TDS-08	CAM-01 IP Security Camera
TDS-09	INT-01 Audio Interface
TDS-10	WAP-01 Wireless Access Point