



2022 Existing Conditions and Revision Recommendations Lake Bluff Public Library Lake Bluff, Illinois Visit Date: September 9, 2022

HVAC

Existing Conditions

There is no central heating or cooling plant.

HVAC System Serving West Side of Building (Library)

The west side of the building is heated, cooled, and ventilated by a Variable Volume/Temperature system consisting of a central air handling unit and zone dampers for individual temperature control. The zone dampers vary the air volume to the space in response to room thermostats and communicate the space's desire for heating or cooling to the air handling unit which responds by changing from heating to cooling status based on the temperature automation software algorithms weighing demands from all spaces. The air handling unit can only provide heating or cooling at any one time.

The air handling unit is a custom Bruckner variable air volume unit located in the lower level mechanical room installed in 2006. It consists of a flat filter section, DX cooling coil, and a New York Blower plug/plenum supply fan. Heating is provided by (2) Modine DFP300 gas fired duct furnaces located in the discharge duct of the air handling unit, each installed in 2016 with 300 MBH input. Cooling is provided by a Carrier model 38AH028 air cooled condensing unit located at grade on the south side of the building. It has a nominal capacity of 25 tons, was installed in 2006, and utilizes R22 refrigerant. Air handling unit supply fan speed is controlled by a Yaskawa variable frequency drive installed in 2006. The system has a Nortec GSTC humidifier utilizing a duct mounted steam distribution tube. It has a capacity of 100 lbs/hr and was installed in 2006.

The air distribution system serves 20 Titus DESV single duct variable air volume boxes installed in 2006 which individual temperature control to various spaces. These boxes serve as zone dampers only and provide no heating.



HVAC System Serving East Side Lower Level (Library)

The east side lower level is heated, cooled, and ventilated by a single zone constant volume system consisting of a Carrier 58MCA100 downflow gas furnace unit with DX cooling coil. The furnace is located in the first floor fan room and was installed in 2001. The associated air cooled condensing unit is a Carrier 38HDC06 located at grade on the south side of the building. It was installed in 2001, has a nominal capacity of 5 tons, and utilizes R22 refrigerant.

HVAC System Serving East Side First Floor (Museum)

The east side first floor is heated, cooled, and ventilated by a single zone constant volume system. The air handling unit is a Carrier 40RM-012 vertical arrangement with flat filter and DX cooling coil installed in 2001. Heating is provided by a Sterling QVSD150 gas duct furnace located in the discharge duct of the air handling unit. It was installed in 2001 and has input capacity of 150MBH. The associated air cooled condensing unit is a Carrier 38AKS014 located at grade on the south side of the building. It was installed in 2008, has a nominal capacity of 12.5 tons, and utilizes R22 refrigerant.

HVAC System Serving East Side Mezzanine (Museum)

The east side Mezzanine is heated, cooled, and ventilated by a single zone constant volume system consisting of a Carrier 58MCA100 upflow gas furnace unit with DX cooling coil. The furnace is located in a fan room on the mezzanine and was installed in 2001. The associated air cooled condensing unit is a Carrier 38HDC06 located at grade on the southeast side of the building. It was installed in 2001, has a nominal capacity of 5 tons, and utilizes R22 refrigerant.

Miscellaneous Heating

Electric baseboard heaters are installed at the east side of the building on the lower level and first floor. Perimeter single user toilet rooms and the front entry area have electric wall heaters.

Server Room

The Server Room has no dedicated cooling unit or method of removing heat.

Exhaust Fans

Toilet rooms and the elevator equipment room are exhausted by ceiling mounted exhaust fans.

Temperature Controls

A Delta Controls Building Automation System provides temperature control for the HVAC system serving the west side of the building. It was installed in 2006. The HVAC systems serving the east side of the building are controlled by dedicated digital programmable thermostats.

Revision Recommendations

HVAC System Serving West Side of Building (Library)

The HVAC system serving the west side of the building is a Variable Volume/Temperature system which does provide individual temperature control, but is limited in that the air handling unit can only provide heating or cooling at any one time. Since the entire west side of the building is open from the lower level

to the upper level (3 stories), the lower level is always cold and the upper level is always warm. However, since the system can only be in heating or cooling, one of these two areas will suffer. If there are temperature control issues, consideration could be given to adding heat into the VAV boxes and converting the system to a VAV system so that any space could be heated or cooled at any time.

The custom Bruckner air handling unit is 16 years old and shouldn't need replacing for another 20 years. The (2) Modine gas fired duct furnaces located in the discharge duct of the air handling unit are 7 years old and should be scheduled for replacement in the next 13 years. The Carrier cooled condensing unit is 16 years old and should be scheduled for replacement in the next 4 years. It utilizes R22 refrigerant which will require replacement of the refrigeration piping and the DX cooling coil in the air handling unit as well. The Yaskawa variable frequency drive is 16 years old and should be scheduled for replacement in the next 4 years. The Nortec humidifier is 16 years old and was not in operation at the time of our visit. Humidifiers require much maintenance and if the humidifier has been out of service for some time and no adverse space conditions have been apparent, consideration should be given to removing the humidifier.

HVAC System Serving East Side Lower Level (Library)

The Carrier downflow furnace unit serving the east side lower level is 21 years old, at the end of its useful life, and should be scheduled for replacement in the next 2 years. The associated Carrier air cooled condensing unit is 21 years old, utilizes R22 refrigerant, and is also at the end of its useful life. It should be scheduled for replacement in the next 2 years along with the refrigerant piping.

HVAC System Serving East Side First Floor (Museum)

The Carrier air handling unit serving the east side first floor is 21 years old and should be scheduled for replacement in the next 15 years. The associated Sterling gas duct furnace is 21 years old, at the end of its useful life, and should be scheduled for replacement in the next 2 years. The associated Carrier air cooled condensing unit is 21 years old, utilizes R22 refrigerant, is at the end of its useful life, and should be scheduled for replacement in the next 2 years along with the refrigerant piping.

HVAC System Serving East Side Mezzanine (Museum)

The Carrier upflow gas furnace serving the east side mezzanine is 21 years old, at the end of its useful life, and should be scheduled for replacement in the next 2 years. The associated air cooled condensing unit is 21 years old, utilizes R22 refrigerant, is at the end of its useful life, and should be scheduled for replacement in the next 2 years along with the refrigerant piping.

Miscellaneous Heating

Electric baseboard heaters and electric wall heaters should be replaced as they fail.

Server Room

The Server Room has no dedicated cooling unit or method of removing heat. If the heat generated is excessive, an exhaust fan could be installed to remove the heat. Alternatively, a dedicated duct free split system air conditioning unit could be added if the load was sufficiently high.

Exhaust Fans

Ceiling mounted exhaust fans serving toilet rooms and the elevator equipment room should be replaced as they fail.

Temperature Controls

Currently the Delta Controls Building Automation System only serves the HVAC system at the west side of the building. It was installed in 2006, is currently one update behind, and should be scheduled to receive this update within the next 2 years. In addition, we recommend that a yearly preventative maintenance agreement be entered into with Delta Controls in order to keep the system operating properly. When the HVAC systems serving the east side of the building are replaced, we recommend that they be provided with communicating thermostats and included on the Delta system.

PLUMBING

Existing Conditions

A single 4" water main enters the building on the north side and splits inside the building to serve both domestic water and the automatic fire protection sprinkler system. The domestic and fire protection water services are located in a small room on the lower level, this room is a dedicated space for the water services. The domestic water service consists of 1 1/2" cold water copper piping with a 2" water meter. There is no backflow preventer on the domestic water service. The fire protection sprinkler service consists of a single riser protected by an Ames model 4000SS Reduced Pressure Zone type backflow preventer, (SN. 106267). The backflow preventer is tested and certified with the last test date September 22, 2020.

Domestic water is distributed from the service with copper domestic water piping. The domestic cold and hot throughout the building all appears to be copper piping.

The domestic water heater for the building is located in lower level mechanical room. The domestic water heater is a 40 gallon A.O. Smith, Model FCG-40 (SN: MH02-1868210-248), 38,000 BTU gas fired tank type water heater. The water heater was manufactured on August 12, 2002. There was no domestic hot water circulation system associated with this water heater.

Sanitary drainage for the original building, where exposed, is mainly cast iron piping. Piping is in good condition and waste flows well under normal conditions. There are three small submersible pump systems, one located in the lower level mechanical room of the original 1974 building and one located in the water service room in the 1999 addition. The pump system in the 1974 building also has a battery back-up system, Pro Series model 2400, battery level indicated at 100% at the time of survey. The third pump is located in the elevator shaft.

Public toilet room plumbing fixtures are of mixed types, residential floor mounted tank type water closets are used in the 1974 original building while floor mounted water closets with flush valves are used in the 1999 addition. All fixtures appeared to be in good working condition. All lavatories were wall hung china with battery manual quarter turn faucet. The toilet rooms in the original 1974 building do not have floor drains while the toilet rooms in the 1999 addition are equipped with floor drains.

Single height electric water coolers with bottle fillers are located at two locations. There is also a single height drinking fountain unit located on the main floor level in the 1999 addition. There are various sinks located throughout the building for general use. These sinks are stainless steel sinks with gooseneck and swing spout faucets. The lower level mechanical room in the 1974 building has a service sink for general building cleaning.

There is an external irrigation connection with 3/4" RPZ type backflow preventer, Zurn Wilkins model 975XL, located on the north wall for general site irrigation purposes.

Revision Recommendations

The existing domestic water heater is past its typical life cycle and should be replaced.

The building does not have a domestic hot water recirculating system to reduce the wait time for hot water at the lavatories. A recirculation pump and associated piping could be added for quicker hot water to the sinks and lavatories.

The lavatories do not have thermostatic protection to limit the hot water to 110 degrees. Provide point of use thermostatic mixing valves at all lavatories in public toilet rooms.

The main domestic water service does not have a backflow preventer. A reduced pressure zone backflow preventer should be added when required by the local authority having jurisdiction.

The plumbing fixtures throughout the building are functioning, however the fixtures are old and worn. Replace all public toilet room fixtures and utilize hands free sensor operated fixtures where applicable. Renovation of the toilet rooms may also require some of the cold water piping to be resized to accommodate the flow requirements of the fixtures and to comply with current state plumbing code.

FIRE PROTECTION

Existing Conditions

The 1999 addition is protected by an automatic wet sprinkler system per the rules and guidelines of NFPA-13. The original 1974 building is not protected by the sprinkler system. Sprinkler heads are mainly semi-recessed sprinklers with chrome escutcheon plates. Exposed areas and mechanical rooms have upright and sidewall sprinklers as required for full coverage. Sprinklers appear to be in good condition.

The fire protection water service enters the building from the north side with the water service located in a lower level "water service" room. The water main enters the building as a 4" in size and also serves the domestic water supply system. The fire protection water service is served by a 4" Ames Model 4000SS (SN. 106267) reduced pressure zone backflow preventer.

There is a single 4" fire protection riser located in the same room as the backflow preventer. Zone piping is provided with valves, switches, pressure gauges, drains and connections to fire alarm system as required by NFPA and fire codes.

Spare head cabinet with additional replacement sprinklers and sprinkler wrench is located adjacent to the main fire protection risers in accordance with NFPA requirements.

The fire department connection is located on the north side of the building adjacent to the main entrance. Fire department connection is a free standing siamese type with (2) 2-1/2" connections.

Revision Recommendations

Extend existing automatic wet sprinkler system to the original 1974 building for complete sprinkler coverage throughout the building.

Various sem-recessed pendent heads were missing their escutcheons at the ceiling tile, provide escutcheons at all missing locations.

ELECTRICAL

Existing Conditions

Electrical Service

The building is served by (3) electrical services. The first electrical service is rated 400A, at 208/120V three phase and is located in the East Storage room on the lower Level. The second electrical service serving electric heating loads and is located in the same room. The electric heat service is rated 200A, at 208/120V three phase. The last electrical service is rated 400A, at 208/120V three phase and an exterior meter-C/T cabinet with main disconnect is located on the south west corner of the '99 addition. The exterior meter feeds a panel located in the Storage Room near the elevator machine room in the '99 addition. All three services are fed from a pad mounted utility transformer located at the south side of the building.

Electrical Power Distribution

Power from the three services is fed throughout the building via a system of distribution and branch circuit panels.

The majority of panels are located in the East Storage Room on the lower level. The distribution panel in the East Storage room feeds a panel on the main level located in the Janitor Closet.

The main electrical distribution panel serving the 1999 Addition is located in the Storage room near the Elevator Machine Room. This panel feeds the elevator and also serves a panel on the main level located in the Mechanical Closet located between the Library Directors Office and the Museum Office/Storage.

All of the electrical panels in the original building are manufactured by Erikson. The two electrical panels in the '99 addition are manufactured by Siemens.

Overall the electrical distribution system is in good condition. However, the electrical panel "1-L-1" located in the original building in the Janitor Closet is missing a few circuit breakers, with the openings covered by a piece of cardboard.

Lighting

There are varying styles of luminaires inside the building including lay-in troffers, strip lights, recessed round downlights, track lights, decorative pendants, linear pendants, etc. The majority of the fixtures are fluorescent and the decorative pendants appear to be incandescent. Overall, the interior lighting appears to be in good condition and provides adequate light levels throughout the building.

Exterior lights are installed around the outside of the building including wall packs, bollards, flood light for flag, and one decorative pole light fixture near the main sidewalk. The majority of exterior lighting are HID source. The exterior lights appear to be in fair condition.

Exit signs and emergency lighting appears to be adequately provided throughout the building. Exit signs and emergency egress lighting is battery powered.

Interior lighting throughout the building is controlled via standard lighting switches.

Fire Alarm System

The building is protected with an Silent Knight model 5820XL fire alarm system. The fire alarm system is comprised of audio/visual notification devices and the entire building is protected via detectors and manual pull stations. In addition, the fire alarm system monitors the elevator in the building. There is a fire alarm annunciator panel located in the main entrance. The fire alarm system was installed in 2001 and is in good condition.

Telecommunication System

The main communication rack is located in East Storage room on the lower level. The horizontal structured cabling is CAT 5E. The system appears to be functional and in good condition.

Revision Recommendations

Thermal imaging service is recommended in the original building due to age of the electrical system. It is also recommended the remainder of the electrical equipment be thermally scanned as a preventative measure to ensure all connections are secure and properly terminated.

There is no signage indicating the presence of multiple electrical services serving the building. Signage should be provided at each electrical service to clearly indicate which part of the building is served by which service and that the building has multiple services.

The cardboard covering the exposed electrical bus for electrical panel "1-L-1" should be removed and proper panel filler plates should be installed to properly protect and conceal live internal electrical bussing.

At the southeast corner of the building, an irrigation system had been plugged into an exterior receptacle that has a standard weatherproof cover. The plug prevent the cover from completely closing and the cover appears to be damaging the cord due to friction. The cover should be replaced with a "while-in-use" cover that would allow for the cover to be closed for better weather protection and also protect the electrical cord from being damaged by the cover.

Replace antiquated interior light fixtures with long life LED energy efficient light fixtures. Additionally, we recommend adding occupancy sensors and automatic controls for reduced energy costs.

Replace the exterior light fixtures around the building with LED fixtures for longer lamp life and energy efficiency.

Provide exterior, weatherproof heads connected to emergency egress battery lighting fixture at exterior doors to illuminate path of egress away from building in the event of power failure.