Existing Conditions Report and Concept Design Structural Narrative
August 23, 2016

BUILDING DESCRIPTION

The building consists of two portions constructed at different times. The original portion ranges from two to four stories with a basement and was constructed in 1927. An addition, constructed in 1991, is two stories with a basement. The two portions are structurally connected at the transition.

EXISTING CONDITIONS

Dan Foiles of RSE Associates visited the Jones Library in Amherst, MA on August 11, 2016 to observe the existing condition of the structure. The survey was limited to visual observations only without exposing structure covered by architectural finishes. In addition to the site visit, we studied the original structural drawings for the 1927 portion (dated June 18, 1927) and the architectural and structural drawings for the 1991 addition (dated April 11, 1990). The focus of the investigation was on the 1927 portion because the 1991 portion is proposed to be demolished.

A10 FOUNDATIONS/ BASEMENT

The original foundations consist of concrete foundation walls and spread footings. During construction of the 1991 addition, the 1927 foundations were reinforced with concrete underpinning at several locations at the northeast of the 1927 portion.

- The concrete foundation appears to be in generally good condition with only isolated cracking (Photo 1).
- We observed several areas with signs of water infiltration at exterior foundation walls (Photo 2 and 3).
- In a storage room on the east side of the building we identified one spot of concrete deterioration consisting of spalled concrete exposing corroded reinforcing (Photo 4).

B10 SUPERSTRUCTURE

The floor framing consists of steel beams supporting either concrete pan-joists or concrete joists with terracotta infill between joists. The roof framing consists of steel trusses supporting a concrete flat slab.

- The general condition of the superstructure is unknown because of the inability to directly observe the steel framing or the concrete pan-joist floors. We did not observe any indirect signs of distress or other signs that the superstructure has deteriorated such as excessive deflection or cracking of the architectural finishes.
- We observed several locations with signs of water infiltration (Photo 5). Several instances were at the exterior of the building and one was at the transition from the 1927 portion to the 1991 portion.
- We observed deterioration of the underside of the porch roof on the east side of the building (Photo 6).
- We identified one location with rotted exterior trim (Photo 7) which appears to have been temporarily patched.
C10  MASONRY BEARING WALLS

The masonry bearing walls consist of either solid brick or solid brick with a stone veneer. The masonry bearing walls support the steel floor framing.

- The stone wall veneer is in good condition with very limited signs of cracking or grout deterioration (Photo 8).
- The brick walls are in generally good condition with isolated areas of deteriorated grout (Photo 9).

REHABILITATION OF EXISTING STRUCTURE

This section identifies the work recommended to rehabilitate the existing structure and address the issues identified during the existing conditions.

A10  FOUNDATIONS/ BASEMENT

- At areas with signs of water infiltration, we recommend that the concrete be sounded to identify any delaminated concrete. If delaminated concrete is discovered, the affected concrete should be repaired.
- The spalled concrete in the storage room on the east side of the building should be repaired. During the repair the full extent of concrete deterioration should be identified by sounding the concrete adjacent to the repair.

B10  SUPERSTRUCTURE

- At areas with signs of water infiltration, the architectural finishes (plaster, wood trim, etc.) should be removed to expose and allow direct observation of the structure. The structure should be evaluated to determine if there is any deterioration due to the water (corrosion of the steel frame and delaminated or spalled concrete).

C10  MASONRY BEARING WALLS

- Where the brick mortar is deteriorated, the brick should be repointed.

PROPOSED ADDITION AND RENOVATION STRUCTURAL NARRATIVE

The proposed work consists of demolition of the 1991 portion of the building and the northwest wing of the 1927 building. The drawings produced by Finegold Alexander Architects and dated July 27, 2016 provide the basis for the concept design of the proposed addition and renovations of the existing 1927 building to remain.

A10  FOUNDATIONS/ BASEMENT

The new foundation will consist of cast-in-place concrete walls and footings and a concrete elevator pit. The basement floor will be slab on grade. We do not anticipate the need for any underpinning of the existing structure.
B10 SUPERSTRUCTURE

The new superstructure will consist of steel framing with moment frames for the lateral force resisting system. The steel framing will support concrete on metal deck floors and roof. The steel beams will be composite with the concrete on metal deck.

There are several openings in the existing 1927 building that will be infilled. The openings will be infilled with concrete on metal deck supported by steel framing connected to the existing structure.

D10 IMPACT ON EXISTING STRUCTURE

The proposed alterations to the existing structure fall under the code classification “Alteration - Level 2.” This does not require an analysis of the structures lateral load carrying capacity. However, the demolition of the northwest wing of the 1927 portion reduces the lateral load carrying capacity of the structure. Our preliminary analysis indicates that the remaining structure has sufficient lateral capacity to resist the reduced current code-level seismic forces, as required by the Massachusetts State Building Code, 8th Edition.

The new structure will be seismically isolated from the existing structure to eliminate interaction between the new and existing structures. If the new and existing structures were connected, the variation between the structures’ stiffness and response to a seismic or high wind event would result in damage to the existing structure before the lateral system of the new structure could engage.

PHOTOS
Photo 1 – Example of isolated crack in concrete foundation wall over door.

Photo 2 – Signs of water infiltration on the concrete foundation wall.
Photo 3 – Signs of water infiltration on the concrete foundation wall in the mechanical room.

Photo 4 – Spalled concrete exposing corroded reinforcing.
Photo 5 – Sign of water infiltration at the west perimeter of the 1927 building.

Photo 6 – Deterioration on the underside of the porch roof overhang on the east elevation.
Photo 7 – Isolated location of rotted exterior trim with temporary patch.

Photo 8 – General condition of stone veneer.
Photo 9 - Example of an isolated location with deteriorated grout.
The Jones Public Library
Amherst, Massachusetts

MECHANICAL AND ELECTRICAL SYSTEMS

SECTION 21000 - FIRE PROTECTION
(Filed Sub-Bid Required)

Existing Fire Protection Systems

The service enters the site via post indicator valve (PIV) was installed at the front of the building entry. A 6" fire protection service enters the building's main mechanical room to provide the fire protection needs. A 6" double check valve is provided with a 6" dry alarm check valve. In this set up, compressed air fills the piping system and seals a check valve; upon activation of a sprinkler head activates the check valve and the piping is charged with water. It is assumed that this system was selected as much of the piping was run within areas of the building that are susceptible to freezing. The system is provided with (1) zone and is comprised of copper piping with soldered fittings and black steel piping with a combination of threaded and roll grooved fittings. A check valve is provided along with a Siamese fire department connection at the front of the building. Sprinkler heads and piping was a combination of exposed and concealed. No standpipes were provided in the building.

Given the scope of the proposed renovations, it is not anticipated for the existing systems to be reused.

Proposed Fire Protection Systems

The building will be provided with a new automatic fire sprinkler and standpipe systems. The fire sprinkler systems will provide coverage for 100% of the building interior spaces. The existing 6" fire protection service will be evaluated for its potential reuse for the intent of this report, all systems shall be considered new. All fire sprinkler systems will be designed and installed in accordance with NFPA-13. All standpipe systems will be designed and installed in accordance with NFPA-14.

The sprinkler systems for the building will be automatic, wet pipe systems that will provide coverage for 100% of the new building interior spaces with the exception of the heated spaces. All concealed spaces made of exposed combustible construction will be provided with sprinkler head coverage in accordance with code. Attic spaces, if constructed with exposed combustible construction, will be provided with automatic dry pipe sprinkler systems as the attic areas will be unheated. The new fire sprinkler systems and standpipe systems in the building will be supplied via a new underground fire service main connected to the site water main. The new underground fire service main will be brought up into the sprinkler room within the building. The new fire service main will be provided with a new double check valve backflow preventer at the point of entry into the sprinkler room of the building. A new single wet system alarm check valve will be located on the sprinkler system side of the backflow preventer. This wet system alarm check valve and riser will supply all of the sprinkler/standpipe systems in the building. A fire department connection will be located on the outside of the building and at a point of vehicle access. The fire department connection piping will be provided with a check valve in accordance with NFPA-13. An electric alarm bell will be provided on the outside of the building adjacent to the fire department connection. A master water flow switch will be provided on the sprinkler/standpipe riser in the sprinkler room. The fire department connection will have the ability to charge all of the sprinkler and standpipe systems in the building.
The sprinkler systems in the building will be supplied via a combination standpipe and sprinkler riser that will be located in a main egress stairway of the building. Each floor will be on a separate sprinkler zone and an isolation zone valve, check valve, flow switch and pressure gauge will be provided on the sprinkler main serving the sprinkler systems of each floor of the building. In this way, each floor of the building will be on a separate sprinkler zone with dedicated isolation and annunciation for that zone. A fire department hose valve will be provided on the combination standpipe and sprinkler riser and will be located for each floor in the stairway. The fire department hose valve will be a 2 1/2 inch threaded hose end valve with a 1 1/2 inch threaded hose end reducing fitting, cap & chain. An inspectors test and drain valve will be provided at each floor zone station. A drain riser will be provided and will collect the test and drain valves on each floor and will discharge to outside the building. In addition to the combination standpipe / sprinkler riser, an additional standpipe riser will be provided in the second egress stairway of the building. This standpipe riser will be provided with a fire department hose valve at each floor as described above. Both the combination standpipe / sprinkler riser and the standpipe riser shall be provided with an isolation valve at the base of the riser.

All sprinkler and standpipe systems will be designed, tested and installed in accordance with the applicable sections of the Massachusetts State Building Code 8th edition and NFPA-13, NFPA-24 and NFPA-14 latest accepted editions as well as the regulations and guidelines of the local authority. All piping systems will be seismically braced in accordance with the Massachusetts State Building Code 8th edition and NFPA-13. All sprinkler systems will be designed, tested and installed by a sprinkler contractor licensed and experienced in Massachusetts for fire sprinkler systems. The new underground fire service main shall be installed, tested and flushed in accordance with NFPA-24. All sprinkler heads, piping, fittings, devices, valves and all materials associated with the fire sprinkler systems shall be UL listed and / or FM approved for fire protection systems and shall be rated at 175 psi working pressure. All isolation valves shall be electronically supervised.

Rooms that house items of particularly valuable or historic shall be provided with a non-water based suppression system. In this manner no water based piping will be supplied to the room. In the event of a fire a heat/smoke interlock system shall trigger activation of a gaseous suppressant.

This report assumes that the water available in the city water supply is sufficient to provide the automatic fire sprinkler and standpipe systems with the flows and pressures required by NFPA without the need for a fire pump. This report assumes that no fire pump will be required.
SECTION 22000 – PLUMBING
(Filed Sub-Bid Required)

Existing Plumbing Systems

Plumbing Fixtures
Water closets are wall mounted commercial fixtures with 1.6 gpf flush valve operation. Lavatories are wall mounted fixtures with top mounted faucets. (1) Shower was observed in the building.

Plumbing fixtures were generally in poor condition and are showing signs of age and are not water conservation type, it noted that many of these fixtures were ADA compliant.

Domestic water
Domestic cold water is brought into the building via a 2" domestic cold water service which enters the building through the basement mechanical room.

Hot water is produced via (1) tank type gas fired 50 gal. hot water heater. A domestic hot water recirculation system was provided for the building along with a recirculation pump.

Sanitary system
The building’s sanitary system is conveyed thru the building thru copper/cast iron piping. Fixtures are collected together above the ceiling and brought down thru the basement. The exact size and location of this line is unknown.

Storm Drain System
Rain water is conveyed thru exterior gutters and downspouts. Flat areas of the roof are provided with roof drains which run internal and underslab to the storm drain.

Natural Gas system
The natural gas system is supplied by a 2" gas main and meter located at the front of the building. This main supplies the heating boilers and hot water heater with gas.

In general the existing plumbing systems were showings signs of wear and approaching the end of their expected lifetime. Given the scope of the proposed renovations, it is not anticipated for the existing systems to be reused.

Proposed Plumbing Systems

The plumbing existing plumbing utilities will be evaluated for their potential reuse, for the intent of this report all systems for the building will be entirely new and dedicated for the building.

Plumbing Fixtures
All plumbing fixtures shall be code mandated water conservation type. Water closets in shall be Wall mounted fixtures with concealed carriers or floor mounted with floor outlets as required to match the architectural design of the interior spaces in the building. Water closets shall utilize a low water consumption system consisting of 1.28 gpf manual flush valve or flush tank device as required to match the water closet types installed throughout the building. Lavatories shall be wall mounted fixtures with concealed wall carriers and exposed piping beneath the fixture or counter mounted fixtures as required to match the architectural design of the interior spaces in the building. Faucets for all lavatories in private bathrooms shall be single lever metering type with 0.5 gpm operation for water conservation. Lavatories in public bathrooms shall be single lever mixing / metering type with 0.5 gpm operation for water conservation and anti-scall protection. All lavatory faucets shall be field adjustable to produce a maximum of 110 degrees F hot water to prevent scalding. All water coolers shall be ADA compliant.
stainless steel finish double bowl, Hi-Low type with electric chiller. Urinals shall be wall mounted with concealed carriers and shall utilize 1.0 gpf manual flush valve devices. Floor drains shall be provided in all public toilet rooms and mechanical rooms as required by code. ADA accessible plumbing fixtures shall be located in the toilet rooms as required by the architectural drawings and in accordance with code. A floor outlet mop basin will also be provided on each level of the building.

Sanitary
The sanitary piping system shall service all of the plumbing fixtures for the building. The sanitary drains shall be collected together and extended to the building foundation wall where they will be connected to the existing sanitary building drain. Cleanouts will be provided in the sanitary piping system in accordance with code. Vent systems will be collected together as much as possible and continued up through the roof thru the roof is available. Floor drains will be provided in toilet rooms and mechanical rooms as required by code. All floor drains in the building shall be provided with trap primer systems. All plumbing fixtures shall be provided with properly vented traps for water seal.

Storm
Drainage piping shall be extended from roof drains and down through the building. The storm drains shall be collected together and extended to the building foundation wall where they will be connected to the existing storm system building drains. Cleanouts will be provided in the storm drain piping system in accordance with code. Cleanouts in underground piping shall be flush with the finish floor. Cleanouts in above ground piping shall be located above ceilings or within walls and shall be provided with access panels.

Cold Water
Cold water will be supplied via a new domestic water service that will be provided from the city water main in the street to the building mechanical room. A new water meter and shut off valves will be provided in accordance with code. All plumbing fixtures will be provided with cold water in accordance with State plumbing code. There will be non-freeze wall hydrants located around the existing building, the non-freeze wall hydrants will be a flush mounted lock-shield type with integral vacuum breakers. Cold water hose bibbs shall be located in all public toilet rooms in accordance with code. All cold water shall be potable. All water outlets (hose bibbs, wall hydrants) shall be provided with backflow devices to protect the potable water supply. All plumbing fixtures shall be of the water conservation type. All plumbing fixtures in the building will be water conservation type.

Cold water connections to all plumbing fixtures or other equipment requiring cold water shall be protected against cross-contamination of the building domestic water system via code approved air gaps, air breaks, integral fixture air gaps or air breaks or approved backflow prevention devices.

Hot Water
Hot water shall be provided with new domestic hot water heater. The hot water supply piping system shall be provided with a dedicated circulating loop which will be connected to the new water heater and provided with a pump and controls to maintain the temperature in the hot water supply system. All of the water piping and fittings in this hot water supply and return loop system shall be insulated. All of the water piping in this supply and return loop system shall be labeled to indicate service and if the piping is a supply or return line.

Natural Gas
A new gas service will be brought to the building. Coordination with the gas company will be performed to insure that the gas supply at the site is sufficient to provide the building with adequate gas volume and pressure for the new proposed equipment and appliances. All gas piping shall be black steel and shall service all heating, plumbing or similar appliances that require natural gas.
SECTION 23000 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)
(Filed Sub-Bid Required)

Existing HVAC Systems

The existing heating, ventilating and air conditioning systems consist of a central hot water plant, a cooling water plant, air handling units, fan coil units, hot water heaters and general exhaust fans. These systems provide cooling and ventilation to all occupied spaces in the building and heating for the entire building.

The central hot water plant is comprised of four gas fired hot water boiler modules (Utica model BOP-77 rated for 260.9 MBH net output); hot water circulating pumps, P-1 and P-2 rated for 109 GPM @ 38' TDH, that provide heating hot water to heating only piping system and to the dual temperature loop pumping system; the dual water circulating pumps, P-7 and P-8 rated for 53 GPM @ 40' TDH, that serve the building fan coil units; air separator; and expansion tank located in lower level mechanical space. The hot water is supplied through distribution piping to the fintube radiation, cabinet heaters, fan coil units, duct mounted reheat coils and heating terminal equipment throughout the building.

The cooling water system includes a 75-ton water cooled chiller evaporator (York model TCW22.2JN/406PA), circulation pumps and expansion tank located in the lower level mechanical room; and a BAC closed circuit fluid cooler at grade interconnected to chiller with underground piping. The cooling water is supplied through the chilled water pumps, P-3 and P-4 rated for 180 GPM @ 52' TDH, and distribution piping to air handling units AC-1, AC-2 and AC-7 serving the occupied spaces in the building; and the dual water circulating pumps, P-7 and P-8 rated for 53 GPM @ 40' TDH, and piping system that serve the building fan coil units. The condenser water pumps, P-6 rated for 257 GPM @ 87' TDH, and piping system provides condenser water to the chiller; and water pumps, P-5 rated for 30 GPM @ 34' TDH, and piping system provides condenser to the water to air heat pumps AC-3, AC-4, AC-5 and AC-6.

The Original Building, except the Trustees Room, is provided with heating and cooling by exposed vertical fan coil units and the dual water distribution piping system located along the building perimeter; and heating only cabinet heaters in vestibules, stairs, etc. and the heating water distribution piping system. Ventilation to the original building, except the Trustees Room, is provided through operable window.

Heating, Ventilating and Air Conditioning for the Trustees Room in the original building is provided by AC-7 and a duct mounted hot water reheat coil.

AC-7: HVAC-7 (2,000 cfm) is a MagicAire model 60-BHW-4 heat pump located in an adjacent attic space and interconnected to the condenser water distribution piping system. The unit serves the Trustees Room through a duct distribution system, outdoor intake louvers/ductwork, a supply air duct mounted hot water heating coil and a wall mounted thermostat for space zone control.

The air handling units and associated return fans, where applicable, provide ventilating and air conditioning to the 1982 Building Addition through a supply air duct distribution system. Each unit is provided with a wall louver outdoor air intake for building ventilation.

AC-1/RF-1: AC-1 (12,350 cfm) is an Airtherm unit provided with chilled water cooling coil and variable speed drive. The unit is located in a lower level mechanical room and serves the South side of the two level 1992 Building Addition and is provided with pneumatic air valves for zone control; each air valve is provided with a wall mounted pneumatic thermostat for space zone control. RF-1 is the Twin City utility type return fan with variable speed drive, interlocked with AC-1.
AC-2/RF-2: AC-2 (11,135 cfm) is an Airtherm unit provided with chilled water cooling coil and variable speed drive. The unit is located in a lower level mechanical room and serves the North side of the two level 1992 Building Addition and is provided with pneumatic air valves for zone control; each air valve is provided with a wall mounted pneumatic thermostat for space zone control. RF-2 is the Twin City utility type return fan with variable speed drive, interlocked with AC-2.

AC-3: AC-3 (1,600 cfm) is a CommandAire model 514-EA heat pump located in an adjacent attic space and interconnected to the condenser water distribution piping system to provide heating, air conditioning, ventilation, humidification and dehumidification. The unit serves the Special Collections Exhibit Area through a duct distribution system and a supply air duct mounted hot water heating coil and a wall mounted space temperature sensor and wall mounted space humidity sensor for space zone control. Ventilation is provided to the return side of the unit by HV-1. Note: The controls in this area have been upgraded to DDC in 2010.

AC-4: AC-4 (1,200 cfm) is a CommandAire model 414-EA heat pump located in an adjacent attic space and interconnected to the condenser water distribution piping system to provide heating, air conditioning, ventilation, humidification and dehumidification. The unit serves the Special Collections Area through a duct distribution system and a supply air duct mounted hot water heating coil and a wall mounted space temperature sensor and wall mounted space humidity sensor for space zone control. Ventilation is provided to the return side of the unit by HV-1. Note: The controls in this area have been upgraded to DDC in 2010.

AC-5: AC-5 (1,200 cfm) is a CommandAire model 414-EA heat pump located in an adjacent attic space and interconnected to the condenser water distribution piping system to provide heating, air conditioning, ventilation, humidification and dehumidification. The unit serves the Special Collections Stack Area through a duct distribution system and a supply air duct mounted hot water heating coil and a wall mounted space temperature sensor and wall mounted space humidity sensor for space zone control. Ventilation is provided to the return side of the unit by HV-1. Note: The controls in this area have been upgraded to DDC in 2010.

AC-6: HVAC-6 (350 cfm) is CommandAire model SWP-BHW-4 heat pump serving the Communication Room and interconnected to the condenser water distribution piping system. The unit is controlled by a wall mounted thermostat.

HV-1: HV-1 (1,800 cfm) is Airtherm unit provided with unit mounted hot water heating coil and Nortec model NHTC 020 (7.5KW) duct mounted humidifier to provide outdoor air for ventilation to AC-3, AC-4 and AC-5. The unit is ducted to each unit with a motor operated damper interlocked with unit operation and bypass air duct back to the inlet side outdoor air ductwork of the unit for constant volume operation of the unit. Note: Location of the humidifier in the HV-1 ductwork into the return air side of AC-3, AC-4 and AC-5 has proven been to be ineffective in controlling space humidification.

Heating for the 1992 Building Addition is provided by hot water fintube radiation interconnected to the hot water heating distribution piping and the zone pneumatic thermostat.

The restroom, janitor's closets and other required locations are exhausted through roof mounted fans. The elevator machine rooms have been vented to the hoistways but have not been provided with space temperature control provisions.
Existing automatic temperature controls are pneumatic; the ATC duplex air system compressor is located in the lower level mechanical room. The pneumatics have failed in several areas and have resulted in poor automatic temperature control.

The system components are original construction and have exceed their anticipated operational life; all existing heating, ventilating and air conditioning systems will be removed in their entirety as part of this renovation.

**Proposed HVAC Systems**

Existing HVAC systems are to be removed in their entirety.

It is proposed that a new heating and cooling plant be provided to supply hot and chilled water to a four-pipe hyrdronic distribution to terminal units and coils in the existing and proposed spaces throughout the building. The new high efficiency boilers, evaporative chiller (or heat exchanger), hyrdronic specialties, circulating pumps and controllers shall be located within the mechanical space designated on the lower level of the proposed addition. Space on the roof of the proposed addition will be utilized for the fluid cooler, the energy recovery air handling units, the condensing unit for the dedicated split system serving the historic collection area, as well as any additional dedicated or split system equipment.

The proposed heating plant will be comprised of three (3) gas fired hot water boilers, three (3) boiler circulation pumps, two (2) hot water system circulating pumps, low loss header, expansion tank, chemical treatment, hyrdronic piping, combustion air intake piping, vent piping and automatic controls. The boilers will be high efficiency, copper fin tube design with direct vent, each sized with an input capacity of 1,300 MBH based on a redundancy of 50% of the total calculated building heating load. The circulation pumps shall have EC motors or variable frequency drives controlled to maintain differential pressure in the distribution and water flow rates through the boilers. All heating system components and distribution piping shall be insulated in accordance with the current edition of the International Energy Conservation Code and Massachusetts Stretch Code requirements. The heating plant shall be fully monitored and provided with advanced controls including but not limited to occupancy setback, night-time setback, outdoor air reset and modulating/cascading operation.

The cooling system for the building will be provided by a new 180 ton air cooled, evaporative chiller located at grade or on the roof of the proposed addition. Two chilled water circulating pumps, water specialties and automatic controls shall be located in the mechanical space. The circulation pumps shall have EC motors or variable frequency drives controlled to maintain differential pressure in the distribution piping loop and water flow rates through the chiller. All cooling system components and distribution piping shall be insulated in accordance with the current edition of the International Energy Conservation Code and Massachusetts Stretch Code requirements. The cooling plant shall be fully monitored and provided with advanced controls including but not limited to occupancy setback, night-time setback, outdoor air reset and economizer operation.

Ventilation air will be provided by three (3) roof mounted energy recovery ventilators capable of 4,500 CFM supply and exhaust airflows, with insulated duct distributions down through the building via vertical shafts branching horizontally to the various spaces. All vertical shafts shall be fire rated and provided with fire dampers or combination fire/smoke dampers at duct penetrations as appropriate and as required by the International Mechanical Code. Individual fan coil units and vertical shafts will be located on each side of the building to limit the horizontal duct distributions within the building. Insulated hydronic piping shall be extended from the building distribution to heating and cooling coils within each energy recovery unit to condition air being supplied to the building. The proposed new rooftop equipment should be provided with concealment/acoustical sound screening to minimize any objectionable noise transmission or sight lines to neighboring buildings.

The individual occupied areas shall be provided with heating, ventilation and air conditioning through four
pipe fan coil units to maintain a minimum space temperature of 70°F during heating mode and 75°F during cooling mode. Hot water and chilled water coils in each fan coil unit shall be fed by branch piping extended from the building hydronic distribution piping. Ventilation air shall be ducted from the energy recovery units to the return air connection of each fan coil unit, to be mixed and tempered with the return air then circulated to the space through supply ductwork and diffusers. Fan coils shall have fully ducted supply distributions within each space and utilize plenum returns unless prohibited by sound transmission or other constraints. The fan coil units shall be located above ceilings or in vertical cavities/closets, accessible at the common area through lockable panels, doors or the ceiling grid. Units shall be sized for low speed operation to minimize noise transmission to the occupied space. Each unit shall also be provided with an insulated condensate drain pan, overflow sensor and drain pipe, terminating to a location in compliance with the Massachusetts Uniform State Plumbing Code. Each occupied space shall be monitored by a wall temperature sensor, an occupancy sensor and where noted a carbon dioxide sensor. These devices shall be utilized to provide fully automatic and adjustable space temperature control, with 5°F setbacks during unoccupied periods and 10°F setback during night-time periods, and shall be accessible through the facility management system.

Stairwells and entry vestibules shall be provided with heating and air conditioning from a concealed type four pipe fan coil unit to maintain a minimum space temperature of 65°F during heating mode and 80°F during cooling mode. Hot water and chilled water coils in the fan coil units shall be fed by branch piping extended from the building hydronic distribution piping. Each unit shall also be provided with an insulated condensate drain pan, overflow sensor and drain pipe, terminating to a location in compliance with the Massachusetts Uniform State Plumbing Code. These spaces shall be monitored by a wall temperature sensor. These devices shall be utilized to provide fully automatic and adjustable space temperature control, with 10°F setback during night-time periods, and shall be accessible through the facility management system.

Each Restroom shall be provided with fin tube radiation to maintain a minimum space temperature of 70°F during heating mode with hot water fed by branch piping extended from the building hydronic distribution piping. These spaces shall be monitored by a wall temperature sensor. These devices shall be utilized to provide fully automatic and adjustable space temperature control, with 10°F setback during night-time periods, and shall be accessible through the facility management system. Restrooms shall also be provided with a minimum of 75 CFM of exhaust air per fixture (water closet, urinal or shower). The exhaust air shall be ducted through the building to the energy recovery units and discharged directly to the outdoors.

Each Janitor Closet shall be provided 75 CFM of exhaust, ducted through the building to the energy recovery units or a roof mounted general exhaust fan and discharged directly to the outdoors.

The Sprinkler Room will be provided with an electric unit heater to maintain a minimum space temperature of 50°F. The unit shall be operated through an integral thermostat and accessible through the facility management system. The Sprinkler Room shall also be provided with a minimum of 0.5CFM of exhaust per square foot of floor area, ducted to the energy recovery units or a roof mounted general exhaust fan and discharged directly to the outdoors.

The Elevator Machine Room shall be provided with a split heat pump system consisting of an indoor evaporator unit and an outdoor air-source heat pump unit to maintain the space temperature requirements of the electronics located in the space. The unit shall be provided with an insulated condensate drain pan, overflow sensor and drain pipe, terminating to a location in compliance with the Massachusetts Uniform State Plumbing Code. The unit shall be operated through a wall mounted thermostat and accessible through the facility management system. The room shall also be vented into the hoistway in accordance with applicable code requirements. The automatic temperature control system shall monitor the status of hoistway vent motorized damper (provided by GC) through the facility management system.
The Tel/Data Room shall be provided with a split system air conditioning system consisting of an indoor evaporator unit and an outdoor air-cooled condensing unit to maintain the space temperature requirements of the electronics located in the space. The unit shall be provided with an insulated condensate drain pan, overflow sensor and drain pipe, terminating to a location in compliance with the Massachusetts Uniform State Plumbing Code. The unit shall be operated through a wall mounted thermostat and accessible through the facility control system.

The Electric Room will be provided with an electric unit heater to maintain a minimum space temperature of 50°F. The unit shall be operated through an integral thermostat and accessible through the facility control system. The Electrical Room shall also be provided with outdoor air intake and exhaust directly to the outdoors, both sized based on the heat rejection/dissipation of equipment (such as transformers) to maintain a maximum space temperature of 95°F. The exhaust and outdoor air intake shall be ducted to roof ventilators or louvers, with a dedicated general exhaust fan operated through a reverse acting space thermostat.

The Historic Collections Room shall be provided with a dedicated environmental control system consisting of an indoor evaporator unit with heating, air conditioning, ventilating, humidification and dehumidification capability; and an outdoor condensing unit to maintain the space temperature and humidity requirements of the sensitive items located in the space. The unit shall be provided with an insulated condensate drain pan, overflow sensor and drain pipe, terminating to a location in compliance with the Massachusetts Uniform State Plumbing Code. The unit shall be operated through a wall mounted thermostat/humidistat and accessible through the facility control system.

Miscellaneous spaces, such as storage rooms, mechanical rooms, etc. shall be provided with heating through horizontal or cabinet unit heaters with hot water fed by branch piping extended from the building hydronic distribution piping and controlled by a wall mounted space thermostat. An exhaust air system shall be provided in accordance with applicable code requirements and ducted to the energy recovery units or a general exhaust fan and discharged directly to the outdoors.

The building heating, ventilating and air conditioning system shall be provided with direct digital automatic temperature controls that shall be capable of being monitored/controlled through a facility management system. The facility management system shall be provided with an operator's station, to be located within the mechanical space on the lower level of the proposed addition, as well as accessible through a web-based interface.
SECTION 26000 - ELECTRICAL
(Filed Sub-Bid Required)

Existing Electrical Systems

Normal Power
The existing electrical service is an 800 amp, 277/480 volt 3-phase, service that originates from a National Grid Padmounted transformer. (The transformer is located adjacent to the library.) The KVA size of the transformer was not indicated on its exterior cover. The transformer is a 13.8 KV primary/480 volt secondary 3-phase transformer. The service feeds an 800 amp Current transformer cabinet, in the basement main electrical room (along with the utility meter) via underground feeders. The main electrical room contains an existing 800 amp, 277/480 volt Main Distribution Panelboard (MDP) which contains (4) 100 amp, (2) 250 amp and (1) 300 amp circuit breakers. These breakers feed (3) elevators, panel HG1, the chiller and a 225KVA dry-type transformer. There is a 225 KVA 480 volt/208 volt 3-phase dry-type transformer in the room that feeds an 800 amp, 120/208 volt Distribution Panel. The equipment was manufactured by General Electric, was in good condition, and should be utilized for the proposed renovation/addition. The existing service appears to be appropriately sized for the proposed addition/renovation.

Emergency Power
There are no existing emergency generators on site. There is an Illuminator Lighting Inverter Cabinet, reported to be approximately 5 years old, and appears to be in good working condition and should be considered for re-use.

Exterior Lighting
There were building mounted bracketed, acrylic lensed decorative fixtures with finials and metal banding; and matching fixtures on concrete poles. Incandescent recessed downlights underneath the back door have surpassed their life expectancy. The fixtures are showing signs of aging, contain inefficient metal halide lamps, one lens was cracked, and should be replaced during this proposed renovation/addition.

Interior Lighting
Existing interior lighting consists of a variety of light fixtures. Some rooms contain fluorescent recessed or pendant-suspended light fixtures. The stack areas are illuminated with either inefficient T8-lamped fluorescent linear indirect/direct fixtures, or indirect linear fluorescent fixtures. There are existing rows of inefficient incandescent track lights. Other fixtures include: 2-lamp T-8 industrials in mechanical rooms and basement areas; 1' x 4' fluorescent surface acrylic wraparounds, 1-lamp fluorescent wall-mounted acrylic wrap fixtures in basement hallway; decorative suspended acrylic bowls that are outdated and contain 200 or 400 watt metal halide lamps; fluorescent recessed downlights at the ramp level. The majority of these fixtures are inefficient, approaching the end of their expected life and should be replaced. The Woodbury Room in the basement contains 2' X 2' LED dimmable fixtures that may be considered for re-use. The decorative fixtures may be considered for re-use. Exit signs appear to be LED-type exit signs, wired to the Illuminator Lighting Inverter mentioned above.

Lighting Control
Existing lighting control consists mostly wall switches, only a few wall-mounted occupancy sensors. There are presently no daylight sensors controlling fixtures during the day. There is no building-wide lighting control system. There is a bank of dimmer switches in the Woodbury room controlling/dimming the 2 x 2 fixtures mentioned previously.

Fire Alarm
There is an existing conventional zoned Simplex 4002 fire alarm control panel located in the existing
electrical room. The fire alarm panel is monitored through an independent alarm-monitoring company which contacts the Amherst Fire Department, via a dedicated phone line. Fire alarm devices include break-glass manual pull stations, horns/lights, smoke detectors throughout. There is an inadequate quantity of fire alarm devices throughout the building. There are required strobes missing from bathrooms. The existing fire alarm devices and system are antiquated and should be replaced.

Communications

The existing telephone communications system enters the building via conduits in the basement, from a Bell System Telephone manhole. The existing telephone and computer system wiring is terminated on one central rack in the basement. The existing wiring should be replaced with new wiring.

Proposed Electrical Systems

Preliminary calculations result in an 800 amp 277/480 volt three phase service being required. The existing service equipment can be reused due to its size and relatively good condition and age. The existing breakers in the 480 volt distribution panel and the 208 volt distribution panel could be used to feed new panels on the various upper floors, he newly proposed elevator(s), a new mechanical panel dedicated to new mechanical equipment.

Power shall be distributed throughout the building from the main switchboard to panel boards located on each floor. New electrical closets shall be required for the floor’s panel boards and other electrical items. The closets should be stacked over each other, if the architectural plan will allow. Installing feeders to each floor’s panels is most economically installed when the rooms are located over each other. The panel boards shall contain circuit breakers that provide overcurrent protection for branch circuits needed for receptacles, lighting, HVAC equipment, plumbing equipment, telephone/data equipment. Any larger electrical loads such as elevators, chillers, electric water heaters shall be connected directly to the 480 volt distribution panelboard.

Rooms shall be provided with receptacles for computers and general-purpose outlets. Offices and conference rooms shall be provided with (1) outlet per wall. All toilet rooms shall be provided with a GFI type receptacle on a dedicated 20 amp, 120 volt circuit.

It is recommended to replace the inefficient lighting with new fixtures throughout. The new lighting fixtures shall be energy-efficient LED-type fixtures. Classrooms, offices and conference rooms shall be provided with indirect/direct pendant fixtures where ceiling heights allow, or recessed indirect/direct fixtures. Fixtures provided on the interior perimeter of the building, will be provided with day-light sensors that will automatically turn fixtures off if daylight is providing a pre-set foot-candle level. Utility rooms and small storage areas will be provided with LED industrial strip fixtures with wire guards. Stairwells shall be provided with wall mounted LED fixtures to facilitate maintenance.

Emergency lighting and egress lighting shall be provided to meet the Mass. State Building Code, Articles 1023.0 and 1024.0. New LED energy efficient exit signs shall be provided at all exit ways. A percentage of "normal" lighting fixtures would be connected to the existing emergency inverter system. Quantity of fixtures connected to the inverter system would achieve a minimum of 1 footcandle of lighting as is required at all means of egresses.

A lighting control system shall be provided to meet Chapter 13: Energy Conservation of the Mass. State Building Code. Fixtures in hallways and common areas shall be controlled from the Lighting Control Panel. Smaller offices, classrooms, utility rooms will be provided with wall- or ceiling-mounted occupancy sensors to control fixtures while the room is occupied. Override Control points will be
provided in strategic locations (main office, main entrance) to control lights during off hours. The lighting control panel would contain programming capability to control lighting based on hours of operation and/or through occupancy sensors. As mentioned above, some fixtures shall be provided with daylight sensors which will control fixtures based on a certain pre-set lighting level.

A completely new addressable fire alarm system shall be provided, that meets the Mass State Building Code, Paragraph 917.0, NFPA 72, Life Safety 101 and Americans with Disability Act (ADA) as well as any local Fire Department requirements. In general, pull stations will be provided at all exit doors within 5'-0", visual alarms will be provided in all rooms, conference rooms, common areas, corridors, mechanical rooms and toilet rooms. Audio Alarms will be provided in all mechanical rooms, rooms, common areas and corridors.

Smoke detectors shall be installed in all corridors, storage closets, elevator machine rooms and at the top of all stairwells. Duct-smoke detectors shall be provided in duct work of all air-handling systems rated for 2000 CFM or more. A smoke detector connected to the elevator recall shall be located in all elevator lobbies. A heat detector shall be located in the elevator machine room. The sprinkler system shall also be connected to the fire alarm control panel through tamper and flow switches. The entire system shall be monitored via a dedicated phone line to an independent monitoring company, as presently monitored.

It is recommended that a new main communications closet be supplied with plywood backboards for the installation of equipment provided by the utility and owner. Dedicated receptacles will be provided for equipment and the room will be air conditioned to maintain a proper temperature. Smaller IT closets should be provided on each floor. Maximum distance between any data device and a closet is 295 linear feet of cable. 4" conduits will be provide between the main communication closet and smaller closets.

Telephone and data shall be wired from each data location to an ICC/MCC (Intermediate cross connection/main cross connection) closet. Devices shall be RJ45 with Cat 6 cables. Telephone cables shall be punched down on 110 blocks; data devices shall be terminated on 48 Port Patch panels. 110 blocks shall be located on plywood backboards within the telephone closets; Cat 3 telephone cable shall be run between each ICC provided for owner hub and server equipment. Devices shall be provided per room, office and conference room.

It is recommended that Wireless Access Points (WAP's) be provided throughout the library for possible wireless communication.