MENDON PUBLIC LIBRARY

MECHANICAL, ELECTRICAL, & PLUMBING SYSTEMS STUDY

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INTENT

The intent of this study is to review the existing mechanical, electrical, and plumbing systems within the church, for the purposes of determining the extent to which they can be re-used and adapted for the proposed library, as well as to provide recommendations for the new systems. The total gross area of the existing church is approximately 6,500 sq.ft.

LIMITATIONS

The recommendations herein are generally based on providing functional systems within a reasonable budget. Systems with greater functionality are available, such as mechanical systems which have heating and cooling temperature control in every space, however it is assumed that such functionality is generally beyond the budget of this project.

The mechanical systems recommended herein do not have active humidification control, as is desired by many libraries, especially those with archives which would ideally remain within a specific relative humidity range throughout the year. The air conditioning systems (if provided) will provide dehumidification when operating, however such operation will not necessarily maintain the relative humidity of any of the spaces in the building within a specific humidity range.

For the purposes of this review, it is assumed that the existing systems to remain are either operable or are capable of being made operable; the operability of the existing systems was not verified during our walk-thru. Similarly, any condition of existing systems and equipment indicated herein is based on visual inspection only. Where recommendations herein including keeping and/or modifying existing systems, the conditions of such systems should be verified.

This study does not include review of the systems in the existing Rectory. However, as some of those systems will likely continue to serve the Library, it is assumed that those systems are either operable or are capable of being made operable.

MECHANICAL SYSTEMS

Existing

The existing heating and ventilating system generally consists of two oil fired furnaces. One of the furnaces serves the basement, the other serves the first floor. As the recommendations herein include replacing the furnaces, further details regarding the furnaces are not included.

Two oil tanks in the basement of the space connecting the Church to the Rectory serve the furnaces. The pump which circulates oil from the tanks to the furnaces is located in the Church mechanical room. The oil pump, as well as the accessories for the pump, appear to be in good condition, and therefore should be re-usable.

Combustion air for the furnaces is provided via a combustion air louver in the mechanical room.

Most of the ductwork is concealed. However the ductwork in the mechanical room is sheet metal, so it is assumed that the ductwork throughout the building is also sheet metal.

The supply air ductwork for the furnace serving the first floor is in the attic, and the ceiling diffusers are built into the existing woodwork at the ceiling. The return air ductwork for the furnace serving the first floor is in the basement at the ceiling, with wall mounted return grilles located below the first floor windows. There is a dedicated outside air louver for this furnace.

The supply air ductwork for the furnace serving the basement is at the ceiling of the basement, with soffit mounted supply air registers. The return air grille for the furnace serving the basement is in the partition between the mechanical room and the occupied areas. There is a dedicated outside air louver for this furnace also.

There are several ceiling mounted paddle fans located on the first floor, controlled by wall mounted speed controllers.

The exhaust system consists of ceiling mounted exhaust fans in the restrooms, ducted to either wall caps or louvers.

There is no air conditioning in the building.

The temperature controls consist of a manual (non-programmable) thermostat for each furnace.

Proposed

The existing furnaces will be demolished. The existing oil tanks and the oil pumping system will remain.

A new cast iron sectional type oil fired boiler (similar to Buderus Model G215/6, 86.0% AFUE) will be provided in the mechanical room. The boiler will be vented via the existing chimney, and combustion air for the boiler will be via the existing combustion air louver. A new pumping plant will circulate hot water to the new terminal heating units; if the budget allows, redundant pumps will be provided. The heating plant will be provided with controls which reset the hot water temperature inversely proportional to the outside air temperature, for both better control and for minimizing energy consumption.

Two new air handlers will be provided in the mechanical room. Each air handler will be provided with a direct expansion (DX) refrigerant coil for air conditioning, a hot water coil, and a grade

mounted condensing unit (optional or future). The capacities of the systems will be somewhat dependent upon the improvements to the thermal envelope (if any); the greater the improvements to the envelope the smaller the systems. The system serving the basement will likely be in the 5 to 6 to ton range, and the system serving the first floor will likely be in the 7-1/2 to 10 ton range.

The existing supply air and return air ductwork will be re-used to the greatest extent possible, though some of the ductwork may be repurposed; that is, the supply air ductwork may be re-used as return air ductwork and the return air ductwork may be re-used as supply air ductwork. The outside air ductwork system will be reconfigured so as to be capable of providing up to 100% outside air for economizer cooling purposes. In order for the economizers to function properly, a system of relief louvers will be provided to maintain the proper pressurization of the building when the air handlers are in economizer cooling mode.

Smaller spaces, such as the first floor office, genealogy room, restroom, etc., will be provided with hot water baseboard or wall mounted hot water convectors. Stairwells and vestibules will be provided with hot water cabinet unit heaters.

A new exhaust system, generally consisting of a single exhaust fan and ceiling mounted exhaust grilles, will be provided for the restrooms. Alternatively, if the budget allows, an energy recovery ventilator will be provided instead of an exhaust system. The ventilator will exhaust air from the restrooms, and in the process with transfer energy to (in the winter) and from (in the summer) the outside air entering the air handlers, thereby decreasing the energy consumption of the building.

The elevator machine room will be provided with an exhaust fan to prevent overheating.

The ceiling mounted paddle fans will remain, and the speed controllers will be relocated as necessary.

Controls will generally consist of wall mounted programmable thermostats with temporary occupied override functionality, such that any space can be used during normally unoccupied hours without requiring reprogramming.

ELECTRICAL SYSTEMS

Existing

The Church and the Rectory are served by a single 200 amp single phase service in the Church. The disconnect for the service is located at northeast corner of the Church in the basement, at the location of the new proposed egress stair.

The meter, as well as the (200 amp) panel serving the basement and the mechanical room and two disconnects (60 amp and 100 amp), are located within the mechanical room. The panel in the basement is located below existing ductwork, and therefore is not in accordance to current code.

The 60 amp disconnect in the mechanical room likely serves the 100 amp panel located in the Sacristy, and this panel serves the first floor of the Church. The 100 amp disconnect in the mechanical room likely serves the two existing 125 amp panels in the Rectory.

The fire alarm system generally consists of pull stations at the outside doors, heat detectors throughout the facility, and horns in several locations throughout the building. The fire alarm panel was serving both the Church and the Rectory is located in the basement of the Rectory.

The emergency lighting system consists of a battery powered central unit in the basement serving numerous remote units in the basement and two remote units on the first floor.

Exit signs are located at the exterior doors.

The existing lighting systems are not included in this review, as they likely will be replaced during the remodel.

There are no security, cable, or phone systems.

There is minimal site lighting, generally consisting of a couple of lights facing the rear of the property and lights at the exterior doors.

Proposed

The numerous issues with the location and the installation of the existing power system indicate that the existing service and power distribution system should be replaced. As both the new elevator and the new air conditioning systems will likely require three phase power, the new service will need to be a three phase service.

The existing single phase panels in the Rectory will remain, and they will be connected to the new three phase service.

The lighting systems throughout will be new; types and controls to be determined during the design phase.

A new addressable fire alarm system will be provided to meet code. The system will include smoke detectors for automatic shutdown of the HVAC equipment.

A new battery operated emergency lighting system will be provided.

The existing exit signs will be demolished and new exit signs will be provided as required to meet code.

A new site lighting system will be provided; system type to be determined during the design phase. The controls for the site lighting system will generally consist a combination time clock and daylight sensor system.

PLUMBING & SPRINKLER SYSTEMS

Existing

Hot water and cold water are supplied to the Church from the Rectory. The water supply for the Rectory is a well. There is no hot water recirculation pump serving the system.

There is an existing sump pump in the mechanical room. The purpose of this pump was not determined during the walk-thru.

As the recommendations herein include replacing the plumbing fixtures, further details regarding the existing plumbing fixtures are not included.

There is no sprinkler system serving the building.

Proposed

The capacity of the well serving the Rectory was not determined during the walk-thru. However, the number and types of plumbing fixtures in the remodel will be similar to those of the existing building. Therefore, assuming that the existing water and sanitary services are sufficient for the existing fixtures, and taking into account that the new plumbing fixtures, unlike the old, will be the low flow type, the existing water and sanitary systems should be sufficient to serve the remodeled facility. However the capacity of the existing water and waste systems should be reviewed during the design phase.

The existing hot water, cold water, sanitary waste, and vent piping will be modified to serve the new plumbing fixtures. A new hot water recirculation pump will be provided in the Rectory, and a new recirculating hot water pipe will be provided between the Rectory and the Library.

The new plumbing fixtures will be low flow in accordance to code. The lavatories, water closets, and urinals (if provided) will be vitreous china, and the sinks will be stainless steel. Accessories, including faucet types, will be determined during the design phase, Where required, plumbing fixtures will be accessible.

If a sink is provided towards the front entrance (per the 3-27-12 preliminary layout), a new cold water pipe will be provided to the sink, an electric resistance instantaneous type water heater will be provided at the sink, a sanitary waste pumping station will be provided below the sink in the basement - either above grade or recessed into the floor, and a new pumped sanitary drain line will be provided from the pumping station to the sanitary main at the rear of the building.

If it is determined that the existing sump pump in the mechanical room is not necessary, the installation will be demolished and the sump backfilled and the floor repaired.

If it is determined that the building classification requires a sprinkler system, a new sprinkler system will be provided. There is no water main in the street, therefore if a sprinkler system is required a water storage tank and a fire pump will be required.