

# Lawrence Memorial Library Scope of Work

December 28, 2024

Current system is a ~25 yr old oil boiler EK System 2000 with flat plate Hx serving a buffer tank with aquastat. Buffer tank serves radiant 'staple-up' hydronic distribution with hot water (~120 degF LWT observed). Radiant heat pipes under main floor are poorly placed not in contact with floor and poorly insulated with reflective bubble wrap. Basement radiant floor pipes are not observable and appear placed between 2x4 'on flat' sleepers. Assume same reflective bubble wrap is under tubes.

## Building Envelope Improvements

1. Thermal Envelope: Thermal imaging to be done prior to work and/or past reports to be referenced to identify specific problem areas
  - a. Exterior Walls (~1000 ft<sup>2</sup> net area) of front section to be insulated using dense pack cellulose. It is quite possible some of this can be done from the attic since the walls are "balloon-framed" and open to the attic.
  - b. Attic (~1900 sf) to be comprehensively air sealed and cellulose installed to at least R-50
    - i. Back section of the old attic still has wood flooring, ~700 sf.
      1. Option1: dense pack cellulose in floor cavity
      2. Option2: remove wood flooring, air seal, and insulate to R-50. This method would make the space unusable for storage.
      3. Attic hatch is located in this section and is to be properly dammed and an air tight, weatherstripped and insulated to minimum R-30 hatch to be installed.
  - c. Basement Sill Beams: Sill beams at the top of the foundation should be insulated with R-19 closed-cell insulation, with an ignition barrier.

## HVAC and Mechanical Upgrades

1. Heating: New ENERGY STAR rated condensing Propane gas boiler installed to replace oil boiler (include removal of old system and oil tank)
2. Cooling/Partial Heating:
  - a. Main level: New ENERGY STAR for northern climate rated ductless air source heat pumps, two (2) 24k high wall cassettes on main floor
  - b. Lower level: New ENERGY STAR for northern climate rated Ductless air source heat pumps, one (or two) 15k (or 9k) high wall cassettes in lower level
  - c. Note: Exterior heat pump compressor(s) to be located in back (East) or back/side corner (SouthEast).
3. Ventilation: Ducted Heat/Energy Recovery ventilation system with SRE >70%; one each per floor

- a. Main level: To be located in space above office/quiet room (or above bathroom if adequate space and access) with 'simple' ducting to ventilate from the location of the unit out into the general space. See scope of work for the quiet room for mechanical room enclosure requirements.
  - b. Lower level: To be located in mechanical room and ducted to the main children's area and to the back classroom. Minor carpentry will be needed to enclose ductwork.
4. Lighting improvements that impact the attic to be coordinated with attic air sealing work HVAC and Mechanical Upgrades.

### Quiet Room Renovation:

Renovate the existing storage area to be fully functional for the purpose of using the space as a "quiet room" and additional space for patrons. Move the current storage into other areas of the building. The concept is illustrated in the attached document titled "Lawrence Memorial Library Accessibility Study". The scope includes, but is not limited to, the following:

1. Carefully remove and salvage a portion of the existing library casework in the stack area as shown in the document noted above. The library casework to be removed will be the newer casework - all original casework to remain (there is a clear definition that can easily be observed.) The existing cornice trim millwork shall be carefully removed and salvaged for reinstallation in place after other work is complete. Some modification of this millwork may be required due to other construction.
2. Carefully remove and salvage the existing interior wood door and frame.
3. Carefully remove and salvage all of the casework in the storage room as shown in the document noted above.
4. Install a new chase of sound resistant construction to extend new ducts at floor level to stack area (return) and to quiet room (return and high supply).
5. Install new 7'-8" +/- high glass partition and door (1/4" thick clear tempered glass) with closer and accessible door pull/push plate.
6. Create built-in hinged accessible desk surface, mounted to wall.
7. Provide new electrical and data outlets per code and as directed by the library staff. Provide new LED lighting.
8. Provide the quiet room with a sound-rated new ceiling. This will likely be done in conjunction with the floor/ceiling assembly provided by the new mechanical room above. If the new mechanical room is located elsewhere, a new sound-rated ceiling is to be provided as part of the enclosure of the quiet room.

### New Mechanical Room:

1. Upper Mechanical Room: Install a new sound-rated floor/ceiling assembly above the new quiet room. Build a new wall enclosure to align with current wall of similar construction. Install drywall on resilient channels on the mechanical room side to dampen any noise.
2. Install new access door from room above librarian office to new mechanical room.

## New Window:

1. Carefully remove and salvage existing wood exterior door, frame and trim at new Quiet Room. Remove and dispose of existing aluminum storm door.
2. Install new clad wood triple-glazed window in old door opening to be of similar size, character and finish to existing adjacent windows. Install new insulated infill wall of thickness to match existing finishes interior and exterior below new window. Provide new sill, head and jamb flashing to tie-in new window to existing wall in a weather-tight and air-tight manner. Provide new interior and exterior finishes at infill to match existing.

## Existing Windows:

1. Window sashes to be sealed at top, bottom and edges by installing bronze v-shaped weather-strip. Top and bottom weather-strip can be installed on the window casing where the top and bottom sash close, with sash in place. As an alternate, fixing the upper sashes and applying sealant could be considered for upper sashes.
2. Install narrow-profile Allied storm windows with operable lower sashes for ventilation and custom designs for transom and other specialty windows.

## Airsealing:

1. Air sealing the tops of partition walls and exterior walls as identified in infrared scans.

## Miscellaneous:

1. Extend open air walls to the ceiling, install a fire alarm activated automatic door closer for the Children's Room.

## Alternates:

1. Heating
  - a. Alternate 1a: Improve radiant heat distribution by adding 4-6" insulation under the floor – in the ceiling of the basement.
2. Cooling/Partial Heating
  - a. Alternate 2a: Main level: Provide new ENERGY STAR for northern climate rated compact ducted air source heat pump(s) located in space above the office/quiet room and/or the bathroom. Simple short duct runs to be used. Heat/Energy recovery ventilation units to be integrated with ducts of heat pumps.
    - i. Note: Exterior heat pump compressor to be located in back (East) or back/side corner (SouthEast).
  - b. Alternate 2b: Main level: Provide new ENERGY STAR for northern climate rated fully ducted heat pump located in the attic space and ducted to distribute heating, cooling and ventilation air throughout the main floor area through ceiling registers. Heat/Energy recovery ventilation unit to be integrated with ducted heat pump.

- i. Note: Exterior heat pump compressor to be located in back (East) or back/side corner (SouthEast).
    - ii. Note: Thermal Envelope alternative required for this alternate to be feasible.
  - c. Alternate 2c: Lower level: Provide combination heat pump heating/cooling and heat recovery ventilation using an “all-in-one” unit like EPOCHA, Build Equinox CERV, Minotair or equivalent. To be located in crawlspace behind the lift and ducted along the ceiling/wall of the classroom adjacent to hallway and boxed in.
    - i. Note: minor carpentry work is associated with hiding the ductwork
    - ii. Note: NO outdoor heat pump compressor is needed for this technology
- 3. Ventilation:
  - a. All Cooling/Partial Heating alternatives integrate the ventilation system with the ducting of the heat pump units.
- 4. Thermal Envelope - To accommodate Cooling/Partial Heating Alternate 2b.
  - a. Alternate 4a: Attic insulation to be removed and new insulation boundary to be defined at the roof slope by installing 7” (R-49) closed cell spray foam directly to the underside of the roof sheathing creating a conditioned attic space suitable for a ducted heat pump air handler and ductwork.
  - b. Alternate 4b: Attic insulation to be removed and new insulation boundary to be defined at the roof slope by padding down rafters to create a cavity depth of ~13”. Install dense pack cellulose directly to the underside of the roof sheathing in the cavity. Install air-tight vapor-variable membrane (Intello or equal) in direct contact with insulation creating a conditioned attic space suitable for a ducted heat pump air handler and ductwork.
  - c. Alternate 4c: Create an insulated mechanical room within the attic space creating a conditioned attic space suitable for a ducted heat pump air handler.
    - i. Note: this is additive to the base level attic improvements while other alternatives are instead of base condition
    - ii. Note: ductwork would have to be insulated, airtight and buried in the cellulose insulation.