

## FEASIBILITY STUDY

### III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS B. Existing Conditions Narratives

#### 1. SITE ASSESSMENT

**GENERAL DESCRIPTION:** The site consists of two primary parcels; one being the existing Howe Memorial Library site at 609 Main Street; the other the former Shrewsbury Credit Union parcel at 615 Main Street (acquired for Library use in 2010). The two parcels are 62,170 SF and 45,291 SF, respectively, for a combined total of 107,461 SF or 2.47 acres. All parcels are under the control of the Town of Shrewsbury.

**ACCESSIBILITY:** The site includes two marked accessible parking spaces which are sufficient for the total of about 48 existing parking spaces; however they appear to exceed the allowable maximum slope of 2% and one of the two must be marked as “van-accessible”. While there is a curb cut at the main entrance drop-off (on the north side of the building adjacent to the parking area), it is located in a depression and collects pooled water and ice during inclement weather.

The other public building entrance, on the Main Street (south) side of the building, is non-accessible as it requires patrons to negotiate stairs. The original 1903 building entrance is no longer utilized as a public entrance and has alarmed exit hardware on the interior. Similar to the other Main Street entrance, it includes stairs as well as a raised step at the door, and would require substantial modifications to achieve accessibility.

**Recommendations:** Under Option 1, the two existing accessible parking spaces should be regraded so as not to exceed 2% in any direction. One should be designated “van-accessible” and have a 96” wide access aisle; both should have new signage installed. Under either Option 2 or 3, if the goal of 100 parking spaces is achieved (by utilizing the adjacent Credit Union parking lot), the total number of accessible parking spaces must be increased to four (at least one of the four being van-accessible).

The curb cut at the main entry should be regraded so as to prevent the accumulation of water and ice. All public entries and exits must be made accessible; therefore a ramp should be provided at the south (Main Street) entrance as part of its proposed reconstruction (refer to miscellaneous exterior envelope item recommendations below). If the historic 1903 Main Street entrance is opened to the public, it too would be required to be



Non-compliant accessible parking and curb cut



Non-accessible south (Main Street) entrance



Historic 1903 main entrance

**FEASIBILITY STUDY**

**III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS**  
**B. Existing Conditions Narratives**

accessible. Given the cost and difficulty in connecting to the ornate masonry stairs at this location, LPA’s recommendation is to maintain this as an exit-only and request a variance based on the building’s historic status.

**Topography:** The site has a total elevation change of about 23 feet, from west to east, and 11 feet from north to south. The slopes are generally in the range of 4-10%; however the area between the Library and former Credit Union has slopes in excess of 40% (or 1 in 2.5).



40% slope next to Credit Union

**Parking/Loading and Vehicular Circulation:** Currently, parking areas for the Library and Credit Union are separate and accessed independently. Library parking is accessed from Boylston Street/Route 140 via an approximately 32.5 foot wide curb cut adjacent to the northern-most property line. The curb cut has one entrance lane and two exit lanes for left or right turns. The Library parking exit lanes sometimes become congested due to stopped southbound traffic on Boylston Street/Route 140 backing up beyond the curb cut; this generally occurs during peak hours of morning and afternoon commutes. The former Credit Union parking is accessed from Main Street via a 24 foot wide curb cut adjacent to the eastern-most property line, with one lane each for entrance and exit. Similarly to the Library, exit from this curb cut can be difficult due to stopped west-bound traffic on Main Street.



Boylston Street/Route 140 vehicular entrance

The Library parking area has about forty-eight (48) parking spaces, while the Credit Union parking area has an additional forty-nine (49) spaces, for a combined current total of approximately ninety-seven (97) parking spaces.

**Recommendations:** Under Options 2 and 3, the Credit Union parking area should be connected to the Library lot by a driveway not exceeding 8% in slope, with appropriate guardrails and/or retaining walls as required. Revised parking areas should comply with the Town’s Zoning Ordinance relative to dimensions, buffer zones and landscaping requirements; however some relief may be requested based on current usage.



Main Street vehicular entrance

## FEASIBILITY STUDY

### III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS

#### B. Existing Conditions Narratives

##### SITE IMPROVEMENTS/FEATURES:

- **Memorials:** The Library site is home to the Veterans War Memorial located in a paved area at the corner of Main Street and Boylston Street/Rt. 140. Other memorial stones are located west and south of the 1979 Addition, and at the southeast corner of the 1903 original building. Several trees are also identified by memorial plaques.
- **Benches:** Benches are located at the main (north) entrance, south entrance, adjacent to Boylston Street/Rt. 140 and at the outdoor patio area outside of the Children's Services area.
- **Bicycle racks:** One steel pipe ground-mounted bike rack, with space for approximately seven (7) bicycles, is located at the main entrance.
- **Railings/Retaining walls:** The eastern edge of the property is defined by granite retaining walls that step down to Main Street and return into the Credit Union site. These walls are approximately three feet high, capped by large flat stones

and are in very good condition. Other site retaining walls exist at the outdoor patio area east of the 1923 Annex, at the south entrance between the 1903 building and 1979 addition, and at the northwest corner of the 1979 addition. These walls are cast-in-place concrete, clad with split-face CMU and precast concrete cap pieces, and range between two to six feet high. The wall at the NW corner of the 1979 addition is in very poor condition, presumably due to surface water from the parking lot finding its way through the wall. Freeze/thaw cycles have cracked and dislodged some of the split-face CMU veneer and precast concrete cap pieces. The outdoor patio area on the east side of the 1923 Annex has a galvanized steel pipe guardrail along its top. Galvanized steel pipe handrails also exist at the south exterior entry stairs.

- **Fencing:** Six foot high chain link fencing surrounds the outdoor patio area and mechanical/electrical equipment on the east side of the 1923 Annex.
- **Trash/recycling containers:** Two small steel dumpsters are located at the east end of the parking area, to the north of the 1923 Annex.
- **Paving:** Existing bituminous paving does not appear to be severely deteriorated. However, due to the introduction of new site utilities and drainage, numerous areas will require



Veterans War Memorial



Retaining walls at Main street



1979 split-face CMU clad retaining wall



Trash/recycling containers at east end of parking area

cutting and patching.

**Recommendations:** All existing memorials should be identified, located on the existing conditions site survey, and assessed for potential impacts (i.e. protection, relocation, other) during the construction phase. Depending on which design option is ultimately pursued, other existing site improvements such as benches, bicycle racks and fencing may remain or be replaced. The existing 1979 split-face CMU retaining wall at the northwest corner of the 1979 Addition should be replaced. If the scope of work includes parking lot realignment or redesign, some type of visual screening (landscaping, solid fencing or walls) is required at trash and recycling containers. Existing bituminous pavement areas should be cold ground, repaved and relined.

**SITE LIGHTING:** The site is illuminated by a combination of decorative pole-mounted fixtures, utility pole-mounted flood lights, and building-mounted wall fixtures. The older floodlight fixtures do not appear to be shielded cutoff-type.

**Recommendations:** Existing site lighting should be replaced with new pole/building-mounted cutoff-type LED light fixtures.

**EMERGENCY GENERATOR:** There is no emergency or back-up power generator.

**Recommendations:** An emergency generator should be provided for life safety and back-up power (data/communications head-end equipment, HVAC controls and circulators, etc.) loads.

#### SITE UTILITIES

- **Water:** The building is served by a 2 inch domestic water service which ties into a 4 inch cast iron line entering the site from Boylston Street/Rt. 140. There is no evidence of a Fire Protection water service.
- **Sanitary:** A four inch sanitary sewer pipe exits the 1903 building and connects to a line in Main Street.
- **Gas:** It was reported that a natural gas line is stubbed into the site from Boylston Street; terminating near the lower level mechanical rooms in the 1923 addition.
- **Fuel oil tanks:** Existing drawings do not indicate any underground fuel oil tanks. Additionally, the Phase I Environmental Site Assessment for the 615 Main Street Credit Union parcel, completed in May 2011, found no evidence of underground fuel oil tanks on that portion of the site.
- **Electric:** The primary electrical service consists of a pair of four inch conduits, encased in concrete under paved areas, which enter the site from Boylston Street/Rt. 140 and terminate at a pad-mounted transformer near the northeast corner of the 1923 Annex.
- **Data/Communications:** Telephone and fire alarm system service conduits enter the site from a utility pole riser at Main Street, between the Library and Credit Union buildings, and terminate into the east side of the 1923 Annex.

**Recommendations:** The existing water service is inadequate for domestic and fire protection use and should be replaced. The existing sanitary pipe should be scoped to determine its condition

## FEASIBILITY STUDY

### III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS

#### B. Existing Conditions Narratives

and replaced if found to be deficient. The existing gas line should be located and utilized. New electrical and data/communications underground duct banks should be installed.

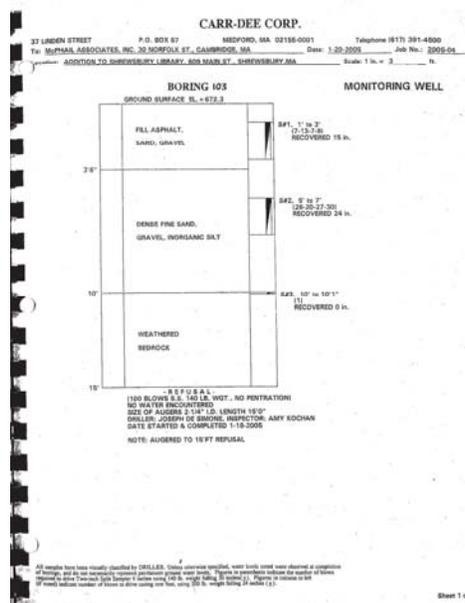
**STORMWATER DRAINAGE:** The Library parking area is graded to drain in a southeasterly direction. Stormwater is intercepted by a series of catch basins, along the north side of the 1979 Addition and 1923 Ward Annex, as well as by yard drains at the main entrances. Unfortunately, surface and roof stormwater flows across pedestrian routes at both major entrances; this makes for difficult access and potential falls during inclement weather.

**Recommendations:** The main entrances should be re-graded to comply with accessibility regulations and to prevent the flow of water across/over them. Existing storm drainage structures should be reset at proper elevations or new structures installed. Design options that increase the amount of impermeable area (roofing, parking, etc.) will require mitigation of runoff by onsite retention systems.

**LANDSCAPING:** The site landscaping includes lawn areas, shrub/flower beds and specimen trees. Several trees are memorialized with plaques. The flower beds are maintained by the Town and Library staff/volunteers.

**Recommendations:** Memorial trees should be protected from excavation within the diameter of their drip line, or moved to new locations with appropriately-sized hydraulic spade equipment. The large Katsura tree at the southwest corner of the 1903 Howe Library should be examined by a professional arborist and pruned/fertilized if necessary.

**SOILS/GEOTECHNICAL:** Two subsurface geotechnical investigation reports were provided by the Town and are attached to this report as Appendices A and B. The first of these, dated January 28, 2005, was performed by McPhail Associates, Inc. and included seven (7) test borings performed in 2005 as well as five (5) test borings from the 1979 addition project. A complete test boring location plan was not available but it is assumed that the explorations were limited to the Library site as of 2005 (not including the Credit Union site). In general, the 2005 test logs indicated a previously filled layer (bituminous pavement, sand, gravel and stones) to a depth of 3.5 to 6.5 feet deep, followed by a layer of dense to very dense glacial till deposits, and finally a layer of weathered bedrock at a depth of 8.0 to 13.0 feet below grade. Auger refusal was typically at about 13.0 to 20.0 feet deep and was assumed to indicate sound bedrock. While no groundwater was encountered during the 2005 test borings, it was noted that conditions may vary



2005 test boring log

depending on seasonal changes, runoff during or after heavy precipitation, or alterations to existing drainage patterns.

The second report was performed by Geotechnical Services Inc. in 2010 and includes the area occupied by the Credit Union building. A total of six (6) test borings were performed; results were similar to the 2005 McPhail report.

**Recommendations:** Given that water seepage was evident in the lower level mechanical rooms at the northeast corner of the 1923 Ward Annex, it is probable that groundwater travels along the topmost levels of the glacial till or weathered bedrock until it reaches an excavation (building, utility pipe, etc.) where it then penetrates the building envelope. Both the 2005 and 2010 reports recommend installation of perimeter foundation and under-slab drainage systems, as well as foundation wall waterproofing, at new below-grade construction. LPA recommends that existing structures to remain, along their north (uphill) exposures, also be waterproofed by excavating to footing level and applying a fluid-applied waterproofing system, rigid board insulation and a composite subsurface drainage system to existing foundation walls.

**HAZMAT/ENVIRONMENTAL:** A Phase I Environmental Site Assessment of the Shrewsbury Federal Credit Union property at 615 Main Street, dated May 23, 2011, was prepared by Lord Associates, Inc. and is attached to this report as Appendix C. Lord Associates, Inc. did not identify any Recognized Environmental Conditions in association with the site and/or surrounding properties.  
**Recommendations:** None.

## 2. BUILDING ASSESSMENT- EXTERIOR ENVELOPE

### MASONRY WALLS:

- The exterior walls of the 1903 Howe Library consist of gray granite base, water-struck yellow/beige brick and sandstone trim (water table, window sills, columns, lintels, cornice, pediment, etc.) over masonry bearing walls. In 1995, the exterior masonry was cleaned, repaired and some portions were repointed. The granite base, with its grapevine mortar joints, is typically in excellent condition; exceptions being a dislodged lintel stone and a few open joints. The yellow/beige brick, distinguished by very narrow vertical and horizontal mortar joints, is in good condition despite some areas in need of repointing. The sandstone trim is generally in good condition although some open vertical joints were observed. Some embedded sheet metal



Granite with grapevine mortar joint



Dislodged stone and open joint

## FEASIBILITY STUDY

### III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS B. Existing Conditions Narratives

wall flashings (i.e. those associated with skylight/roof penetrations) were also reported and observed to leak.

- Masonry at the 1923 Ward Annex is similar to the 1903 building except for the cast stone (instead of natural sandstone) trim elements. This building, compared to the 1903 library, has a greater percentage of brick masonry requiring repointing. Nails and other fasteners were observed in a number of mortar joints.



Open joints at 1923 brick masonry



Granite base, sandstone trim and brick masonry at 1903 Library

- The exterior walls at the 1979 Addition are constructed of yellow-gray brick and split-face CMU veneer over metal stud backup walls. Split-face CMU is inherently very porous and has suffered from water infiltration, exhibiting many cracked/dislodged units as well as chronic moss and algae growth.



Deteriorated split-face CMU masonry and lower level skylights at 1979 Addition



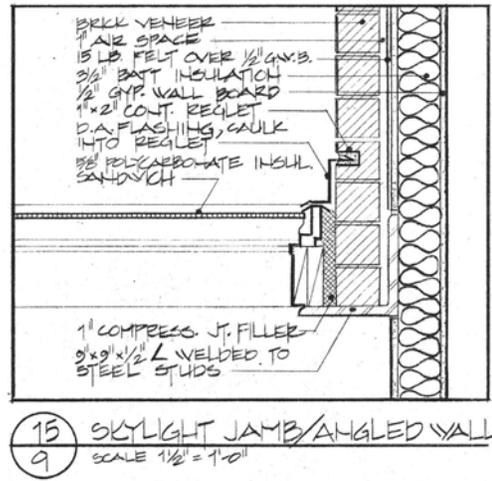
Water damage to 1979 split-face CMU

These problems are most notable at the skylights, the south entrance deck (which is built partially over conditioned interior mechanical space), and locations where the CMU extends below grade; the above conditions are poorly detailed and allow water to splash, accumulate, and find its way behind the masonry veneer.

## FEASIBILITY STUDY

### III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS B. Existing Conditions Narratives

One condition in particular, at the lower level skylight rake flashing, is illustrative of why water infiltration has been a chronic problem for so many years. The 1979 construction drawings detail the jamb/angled wall condition at this location as indicated below. The skylight flashing is simply terminated into a saw-cut reglet in the brick masonry; there is no through-wall flashing tied into the 15# felt cavity wall air/moisture barrier or weep holes to allow moisture to exit the cavity. Any water entering the masonry cavity above the rake flashing travels down the face of the 15# felt and eventually drips off the



Rake flashing detail from 1979 construction drawings indicating no through-wall flashing

steel lintel into the conditioned lower level space. No amount of re-caulking will alleviate this condition. In addition to the water infiltration issues described above, the recessed brick masonry walls adjacent to the lower level skylights are cracked in several places. This brick masonry is shown, on the 1979 construction drawings, as being supported by steel angles welded to the metal wall studs, which in turn are carried by wood glue-laminated beams. The condition of wood structure being supported by masonry is not an ideal condition due to potential for movement, especially if water infiltration is introduced, and this factor has no doubt contributed to the cracking. Refer also to Bolton & DiMartino Structural Existing Conditions Report, attached as Appendix E, for more information.



Rake wall flashing exhibiting lack of weep holes

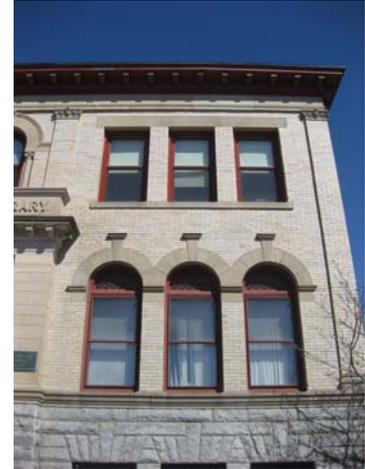
**Recommendations:** Exterior masonry walls at the 1903 and 1923 buildings should be cleaned and selectively repaired/repointed. At the 1979 Addition, LPA recommends that the split-face CMU, brick and precast concrete masonry veneer exterior walls be removed in their entirety. This would at the same time allow replacement of the existing back-up wall assembly with new metal stud, fiberglass-faced exterior gypsum board, air/vapor barrier membrane, rigid board insulation, and through-wall flashing systems.

## FEASIBILITY STUDY

### III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS B. Existing Conditions Narratives

#### WINDOW AND STOREFRONT SYSTEMS

- 1903 Howe Memorial Library:
  - The 1<sup>st</sup> floor typically has the original painted double-hung wood windows with decorative fixed arched-top transoms. Operable sash at most 1<sup>st</sup> floor locations have been replaced or modified to accept insulated glass units; the exception is at the circular projected bay on the west elevation which retains the original curved single-pane glass. Exterior storm panels have been added, at some unknown date, to the operable windows. One of the curved plastic storm panels at the circular bay has fallen off completely; the others exhibit signs of UV aging. Interior window treatments are 3" vertical blinds at most locations.



South (Main Street) elevation of 1903 Library

- The original 2<sup>nd</sup> floor windows have generally been replaced by painted extruded aluminum hung windows with insulated glass units and profiled exterior panning trim. While not historically accurate, they are in good condition and appear to operate properly. Window treatments are horizontal metal mini-blinds or, in some cases, roller shades.



Bay window on west elevation of 1903 Library



East elevation of 1903 Library

- The original lower level windows have been replaced with bronze finish anodized aluminum windows with insulated glass units. The window pictured has been penetrated to allow a condensate drain to exit the building.



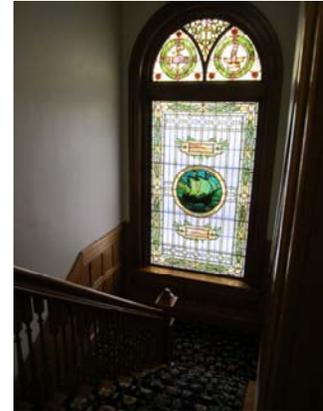
Lower level window

## FEASIBILITY STUDY

### III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS

#### B. Existing Conditions Narratives

- At the stair landing between the 1<sup>st</sup> and 2<sup>nd</sup> floor levels, there is a beautiful stained glass window panel depicting a sailing ship with the phrase “LET YOUR QUEST BE FOR KNOWLEDGE”; also the Latin phrases “CONCORDIA” (HARMONY), and “LABORE ET CONSTANTIA” (WORK AND PERSEVERANCE). Some bowing of the support structure was observed, presumably due to heat build-up between the exterior window and stained glass panel.
- Interior window trim moldings are typically built-up wide quarter sawn oak with stained finish. They are typically in very good condition and were reported to have been restored in the past twenty or so years.
- A bronze finish aluminum single-glazed storefront/entry system was installed, at some unknown point in time, to replace the original exit doors from the main stairway at the mid-level landing between the 1<sup>st</sup> and lower floor levels. The original wood transom was retained, therefore the aluminum doors are only about 74” high and the closer arm extends below that.



Stained glass window at 1903 main stair landing

- 1923 Ward Annex:
  - Most of the windows are similar to the 1<sup>st</sup> floor of the 1903 Howe Library; the original painted double-hung wood windows have been retrofitted with new or modified operable sash with insulating glass units.
  - The remaining windows, at the north elevation facing the parking area, have been replaced by painted aluminum windows with insulated glass units and profiled exterior panning trim.



Anodized 74” high bronze finish aluminum doors at 1903 stair lower level landing



Interior vestibule doors and transom lite at 1903 Main Street entrance

- Interior window trim moldings are typically built-up wide quarter sawn oak with stained finish, except for trim at exposed masonry exterior walls (i.e. at 1<sup>st</sup> floor Adult Fiction and mezzanine level Young Adult Lounge) which is painted.

## FEASIBILITY STUDY

### III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS

#### B. Existing Conditions Narratives

- Anodized bronze aluminum fixed storefronts were installed as part of the 1979 Addition & Alterations
- 1979 Addition:
  - The 1979 windows are painted wood fixed residential-grade windows with insulating glass units. The finger-jointed wood exteriors, particularly on the south elevation, are in very poor condition; paint has peeled, cracks have developed and gaps have opened up between the window and adjacent masonry.
  - Storefront systems at the Lobby are anodized bronze aluminum, medium stile with insulating glass units. The north entry from the parking area has a vestibule with automatic sliding doors; while the south entry from Main Street has no vestibule and a pair of hinged doors. It was reported that the automatic sliding doors malfunction frequently and must be slid open or closed manually.



Deteriorated wood window at 1979 Addition

**Recommendations:** The remaining 1903 original wood windows should be restored rather than replaced. If possible, the operable sash should be fitted with new weatherstripping and either insulating glass units or storm panels to improve thermal efficiency. The aluminum windows, while in relatively good condition, may be subject to replacement under the jurisdiction of the local Historic Commission; this scope should be discussed early in the next design phase. Interior window frame/trim components at these windows should be cleaned and the finish restored where necessary.

The original 1903 stained glass window should be restored to prevent further bowing and provisions made to adequately vent the space between the stained glass and exterior storm panel.

All existing aluminum storefront and entry door systems, as well as associated finish hardware, should be replaced. Electronic access control and intrusion detection capabilities should be provided at all exterior doors.

Bronze aluminum lower level windows at the 1903 Library should be replaced with new wood or aluminum windows that more accurately represent the original features, including divided lites and muntins.

Wood windows at the 1979 Addition should be replaced in their entirety with new aluminum or clad wood units with fluoropolymer exterior coating. These new windows



Anodized bronze finish aluminum sliding glass main entry doors at 1979 Addition

## FEASIBILITY STUDY

### III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS

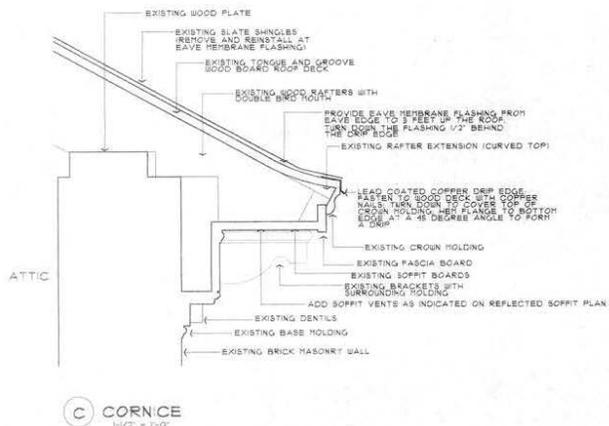
#### B. Existing Conditions Narratives

should also be tied into air/vapor barrier membrane at new exterior wall systems (see above) with self-adhered membrane flashing systems.

#### ROOFING SYSTEMS AND SKYLIGHTS:

- Roofing at the 1903 Howe Library is the original Brownville black slate with copper flashings and hip/ridge caps. The roof is hipped with 24" deep projecting eaves supported by ornamental brackets and moldings. There are no gutters, allowing most rainwater to drip directly on the ground below.

Metal vents were shown, at the underside of the soffits and near the ridge, as part of the 1998 Cornice Repairs project scope of work. These vents, however, were not visible and it is questionable as to whether or not this work was done. The 1998 documents also indicate that a 3' wide strip of eave membrane flashing was provided by removing and reinstalling the bottom 3-4 courses of slate at the eaves; this also could not be verified.



Roof edge detail from 1998 construction drawings

Outwardly, the slate roofing appears to be in good condition although there were limited signs of roof leakage (peeling paint, discoloration, etc.) at the plaster ceiling beneath. There is also some concern that the fasteners may be corroded due to their age; while slate can last for several hundred years the life expectancy of fasteners is typically much less. It would be necessary to remove some slates to check on the condition of the fasteners, underlayment and substrate.

- Roofing at the 1923 Ward Annex is asphalt shingles with copper flashings. Like the 1903 Howe Library the roof is hipped and has no gutters, but projects only about 6-8" beyond the face of brick. It is reportedly less than 10 years old and appears to be in very good condition, but there are no documents detailing the underlayment and other conditions. It was reported that sheet metal flashings (at roofs, skylights and penetrations) have leaked.



Copper roof edge at 1923 Annex

- Roofing at the 1979 Addition is a combination of asphalt shingles and low-slope ballasted single-ply membrane with lead-coated copper fascia and flashings. The asphalt shingles appear to be the same type, age and condition as those used at the 1923 Ward Annex. The

ballasted single-ply roofing was reported and observed to leak severely, especially at the connector above the main entry lobby and connections to skylights.

- Aluminum-framed self-supporting skylights were installed, at several locations, as part of the 1979 Addition & Alteration project. It was reported that water infiltration has been a chronic problem with all of the skylights; this has no doubt contributed to mold-related air quality issues. Three of these skylights are above the Stair, Adult Services and Lobby area (connecting to the 1923 Ward Annex); these are glazed with insulating glass units and have painted wood sun control grilles. During LPA's visits, water was observed leaking onto the floor of the Lobby and the intermediate landing of the 1979 Stair.



Aluminum-framed skylights at 1979 Addition

Two other skylights, providing daylighting to the Lower Level, are glazed with translucent plastic panels. These locations are especially susceptible to water infiltration due to their placement directly under the drip line of the higher roof. Accordingly, they are subjected to a much greater volume of water which falls and splashes on the skylights, flashings and surrounding masonry walls. It was reported that efforts have been made to re-seal all of the skylights over the years without success; the lack of through-wall flashing (described in the Exterior Wall narrative above) undoubtedly contributes to this ongoing problem.



Lower level skylights at 1979 Addition

**Recommendations:** The 1903 slate roofing should be investigated to determine the condition of fasteners, underlayments, and substrate. Unless the fasteners are severely corroded, remedial work can be limited to the areas known to have leaks. In the event that fasteners are in such poor condition as to warrant re-roofing, the existing slates should be removed intact for re-installation.

At the 1923 and 1979 Additions, the asphalt shingle roofing does not require replacement at this time, but should be considered as a future maintenance item. Ballasted single-ply membrane roofing should be replaced with an adhered singly-ply membrane system. Roof drains at low-slope areas should be replaced by combination overflow-type drains with independent overflow piping to exterior wall nozzle(s). The

## FEASIBILITY STUDY

### III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS

#### B. Existing Conditions Narratives

flashings connecting these roof areas to building walls and skylights should be examined and replaced as needed.

The 1979 Addition skylights leak badly, have exceeded their useful life, and should be replaced, along with new flashings properly tied into walls and roofs. Consideration should be given to an insulated translucent fiberglass sandwich panel skylight system that will achieve greater thermal efficiency than the present type systems. New gutters and downspouts should also be installed at the roof edge above lower level skylights to prevent roof runoff from dripping directly onto the skylights.

#### EXTERIOR DOORS, FRAMES AND FINISH HARDWARE

- The original 1903 recessed entry doors facing Main Street are 10-panel quarter-sawn oak and are, due to the alcove's overhead protection from the elements, in relatively good condition. These doors have decorative leaded glass transom/sidelites and retain their original bronze pull plates and hinges. Other exterior doors and frames, at the Children's Room and Technical Services areas, are more recent oak stile and rail construction (glazed and paneled; respectively) and appear to have some water damage.

**Recommendations:** The original 1903 doors require little work other than cleaning and the potential addition of AAB-compliant hardware (dependent upon whether the MA-AAB determines that the original front entry is required to be accessible). The other doors, frames and finish hardware, at the Children's Room and Technical Services areas, should be replaced.



Original 1903 main entry doors

#### MISCELLANEOUS EXTERIOR ENVELOPE ITEMS

- There are several mill finish extruded aluminum louvers at various locations around the building. Most of these are associated with the 1979 addition and alterations and are built into split-faced CMU masonry walls. Without further testing it cannot be concluded that these louvers are the cause of leaks in the mechanical rooms below; however it is clear that they are too close to grade level and frequently subjected to splashing water, built-up snow and other debris.



Louver at 1979 Addition south entrance

## FEASIBILITY STUDY

### III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS

#### B. Existing Conditions Narratives

- The former entrance to the 1923 Ward Annex was modified, as part of the 1979 scope of work, to serve as a book return drop. A second freestanding drop box, for video and DVD media, was added to the right side of the book return. Both must be manually emptied; the book return from the interior of Technical Services and the freestanding drop box from the exterior (this requires library staff to exit and re-enter the building). It was also reported that some library patrons have been observed using the book return as a drive-up, backing their vehicles onto the sidewalk directly in front of the main entrance doors.



Book/media returns at 1979 north entrance from parking lot

**Recommendations:** The 1979 south entry deck (above the lower level mechanical space on the Main Street side of the building) should be rebuilt utilizing a more effective plaza deck waterproofing/insulation system. New extruded aluminum drainable blade exhaust and fresh air intake louvers should be incorporated at a higher elevation above grade; or, another means of exhausting and taking in air should be studied.

The book return and media drop box should be replaced by an automated material handling system operating in conjunction with a new Radio Frequency Identification (RFID) security system. This type of system automatically sorts and conveys returned items into separate bins depending on their destination, and would increase the efficiency of current Library staff.

### 3. BUILDING ASSESSMENT - INTERIORS

#### FINISHES (Floors, Base, Walls and Ceilings)

- Interior finishes at the 1903 Howe Library consist typically of carpeted floors, stained wood trim and painted plaster walls/ceilings. Public areas such as the central hall, stair and reading rooms are richly detailed with quarter-sawn oak



Newel post at 1903 main stair



Public reading area at first floor of 1903 Howe Library interior

elements such as paneled wainscot, columns, crown moldings and highly decorative stair/newel post components. Several rooms have ornate brick masonry fireplaces in their original condition.

## FEASIBILITY STUDY

### III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS B. Existing Conditions Narratives

- The large upper level meeting room has a 15' high coved plaster ceiling with pendant-mounted fluorescent light fixtures. Minor water stains and peeling paint were observed in several places on this ceiling. Unfortunately, exposed piping was installed at some point over the wood base in this space.



Exposed piping



Second floor meeting room at 1903 Library

The original exterior brick and stone masonry walls of the 1903 stack room have been left exposed, while the brick backup walls in this area are painted.

The lower level of the 1903/1923 buildings, utilized for Children's Services, has exposed painted brick masonry walls/piers which, along with the low ceiling height, contribute to this space's catacomb-like atmosphere. It was reported that mold has been an ongoing problem in this area, and numerous dehumidifiers were observed in operation.



Children's Services area at lower level of 1903/1923 building



Exposed brick and stone masonry walls at 1903 stack room

## FEASIBILITY STUDY

### III. EXISTING CONDITIONS EVALUATION AND RECOMMENDATIONS

#### B. Existing Conditions Narratives

- The original stack room, on the north side of the main Howe Library building, has undergone several modifications since its construction in 1903. The Artemas Ward Annex was appended to the north end of the stack room in 1923. In 1962, the original iron and glass floored stack room mezzanine was expanded and a new utilitarian steel stringer/pan stairway added. Most recently, in 1979, the mezzanine's iron and glass flooring structure and stacks were removed and replaced by a new steel joist and concrete slab floor system. The mezzanine space, now utilized as the Young Adult "Loft", is separated from the Adult Fiction and Lobby areas below by a glazed borrowed lite system made of stained red oak.



Young Adult Loft

- Interior finishes in the 1923 Artemas Ward Annex are generally consistent with the 1903 Library, although without the level of detail. Some resilient flooring and base also exist in the Storage/Outreach Services area. Like the 1903 stack area, the Annex underwent modifications in 1962 including creation of a new flooring system at the mezzanine level. This space is currently utilized for Administrative support space.



Mezzanine level Administrative space at 1923 Annex

- 1979 Addition interior finishes include carpet flooring, resilient base and painted gypsum board walls/ceilings. The structural system, consisting of glue-laminated wood beams, columns and tongue and groove wood decking, has been stained and left exposed at the first and lower floor levels. Toilet rooms at the 1979 Addition have ceramic mosaic floor tile and matte glazed wall tile (to a height of about 4'). The main stair has resilient nosings and carpeted treads, risers and landings. The predominant wood throughout the 1979 Addition is red oak with a natural clear finish.

**Recommendations:** Carpet should be replaced throughout the building with new vinyl-backed 6' wide sheet carpet. New resilient rubber stair treads should be provided. Existing painted finishes throughout should be properly prepared, repaired where necessary, and re-painted. Installation of new mechanical/electrical systems will require replacement of some existing hard ceilings with new acoustical ceiling tile systems; however this should be limited to areas other than the 1903

building. In general, the existing 1903/1923 wood finishes are in good condition and will not require wholesale refinishing; they should be cleaned and selectively touched up where necessary. Reconfiguration of toilet rooms, required for accessibility, should include durable and easily maintained finishes such as ceramic tile and solid surfacing.

#### MISCELLANEOUS INTERIOR ITEMS

Other miscellaneous interior items include built-in millwork (i.e. circulation desk, self-check stations, etc.), display cabinets, metal lockers for staff personal effects, recycling bins, display boards (whiteboards and tackboards), metal toilet partitions, window treatments, fire extinguishers and signage.

**Recommendations:** As part of a renovation and/or addition project, the main circulation desk should be replaced with built-in millwork providing better visibility and features allowing enhanced and more efficient staff/patron interaction. Metal toilet partitions should be replaced with solid plastic as part of the Toilet Room reconfiguration required for accessibility. Sun control devices should be replaced or, in the case of the existing 1979 Addition operable wood shutters, repaired and adjusted as necessary. Fire extinguishers should be provided in accordance with applicable requirements. Accessible room signage will be required throughout the building, and consideration should be given to main entrance signage that clearly directs patrons to various program areas (this is especially critical for repairs-only Option 1).

#### INTERIOR FURNISHINGS

Interior furnishings are a combination of original historic pieces (i.e. the oval table in the second floor corner meeting room), more recent wood, metal and upholstered pieces, modular carrels and workstations, book carts, and various types of shelving.

**Recommendations:** Original historic pieces should be restored and preserved. Much of the existing upholstered chairs sag badly and need repairs. Modular carrels, workstations, and carts could be reused but will, in the context of a significant renovation, appear mismatched and out of place and should be replaced if possible. The existing shelving should be replaced with new modular steel standards with the capability to accept various book shelving, media storage and display components.

#### EQUIPMENT/TECHNOLOGY

Equipment and Technology includes the existing Library collection security detection system, desktop/laptop computers, projectors and sound systems, gaming system at the Young Adult area, and various appliances. Currently, presentations in the second floor Meeting Room require setup of a freestanding projector and screen. Presently, there is no assisted listening system in the Meeting Room.

**Recommendations:** The existing collection security system should be replaced with a Radio Frequency IDentification (RFID) system. The RFID system should be interfaced with a new automated material handling system to maximize staff efficiency. Public access computer workstations should be integrated with collection shelving and other locations as required, and a central printing station should be provided for public use. While desktop computer workstations were often utilized for Computer Labs, LPA recommends the use of laptops and/or tablet devices,

in conjunction with a building-wide wireless network system, in order to gain the greatest flexibility. Consideration should be given to storage space and charging requirements for laptops and tablets. The Meeting Room should be equipped with a permanently installed remote-controlled projection screen, interactive projector, and sound system (with assisted listening capabilities). The Staff Work Room should be provided with new appliances.

#### 4. HAZARDOUS MATERIALS

In February of 2005, a report for hazardous materials study was prepared by Universal Environmental Consultants; a copy of that report is included as Appendix D. The scope of work included inspection for Asbestos Containing Materials (ACM), collection/testing of bulk samples, and cost estimates for remediation of ACM. ACM was confirmed at the typical locations for a building of this type/age and included paper under hardwood flooring, vinyl floor tile/mastic, insulation and window glazing caulking. The 2005 report recommended a budget of \$55,000 for remediation. The report does not address potential PCB's in caulking.

**Recommendations:** Further testing should be conducted, at some point, to investigate for the presence of PCB's in caulking. The issue of PCB's has recently come under the construction industry's scrutiny as one with potential for significant impact in terms of cost, schedule and safety. PCB's were used in caulking between the 1950's to late 1970's to enhance flexibility, and have been shown to cause adverse health effects in animals and humans. Due to PCB's ability to migrate deeply into adjacent substrates (brick, concrete, CMU, etc.), the scope of remediation can vary considerably and is impossible to determine without testing. PCB's, and their associated abatement procedures, are regulated by the Environmental Protection Agency (EPA).

#### 5. STRUCTURAL

LPA's consulting Structural engineer, Bolton & DiMartino, Inc., visited the existing Library and adjacent Credit Union buildings. Refer to attached Appendix E for their assessment of existing conditions and recommendations.

#### 6. MECHANICAL

LPA's consulting Mechanical engineer, Seaman Engineering Corporation, visited the existing Library and adjacent Credit Union buildings. Refer to attached Appendix F for their assessment of existing conditions and recommendations.

#### 7. ELECTRICAL

LPA's consulting Electrical engineer, ART Engineering Corporation, visited the existing Library building. Refer to attached Appendix G for their assessment of existing conditions and recommendations.

# Shrewsbury Public Library- Existing Structural Conditions

609 Main Street  
Shrewsbury, Massachusetts  
April 12, 2013

## ***Introduction:***

The Shrewsbury Public Library is a 25,400 ft<sup>2</sup> brick veneered building that is being investigated for a renovation and possible addition to address the aging condition of the building and support an increasing local population. The original 6,600 ft<sup>2</sup> building was constructed in 1903; a 7,200 ft<sup>2</sup> addition was built in 1923, and another extensive renovation and 11,600 ft<sup>2</sup> addition in 1979. It is our understanding that the goal of the current renovation and addition project is to finish with an approximately 40,000 ft<sup>2</sup> building that addresses the current building deficiencies and space limitations. This report will describe the general conditions of the existing structure to aid in planning for a building renovation and addition.

## ***Basis of the Report:***

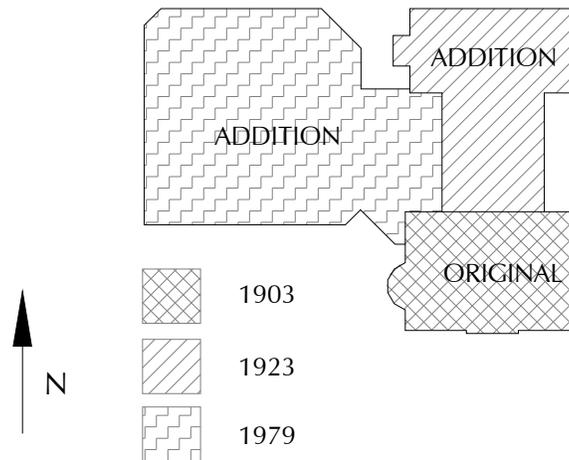
- This report is based on the visible observations during our site visit on March 27, 2013.
- 1903 Original Construction Drawings not available.
- 1923 Addition Construction Drawings not available.
- 1979 Addition Construction Drawings S1 thru S4, "Anderson Notter Finegold, Inc." dated September 1, 1979.

Our observations of the existing building were limited to what was readily visible. We did not evaluate strengths of materials, remove finishes, or take measurements; therefore, we are unable to comment on any structural capacities or deficiencies of the existing structural systems.

## ***Building Description:***

The original two-story structure, with a basement, was built in 1903 and consisted of pale brick veneer, masonry bearing walls, wood framing, and slate covered hip roof. A two-story addition, with a basement, was added to the rear (north) of the original building in 1923 with matching pale brick veneer. The addition was framed with masonry bearing walls, encased steel beams, and structural concrete slabs. The building remained generally unchanged until a significant addition and renovation in 1979. The 1979 work included renovating portions of both original buildings and adding a single-story structure, with a usable basement, on the west side of the 1923 addition. The 1979 addition continued the use a pale brick veneer, but the structure changed to concrete foundation walls, steel stud exterior walls, laminated wood timbers, and laminated wood roof trusses.

Regular maintenance has included patching roof leaks at several skylights/light wells and general maintenance. The interior and exterior of the 1903 & 1923 building/addition are in generally good condition with normal wear and aging. The interior of the 1979 addition appears to be in generally good condition, but the exterior envelope has several deterioration issues that should be addressed whether the renovation/addition project moves ahead, or not.



## FLOOR PLAN

NOT TO SCALE

**Figure 1-Plan**

### **Existing Conditions:**

#### *General Exterior:*

The exterior walls of the 1903 and 1923 buildings are typically granite block veneer at the base with a pale brick veneer above. The veneer is backed up by unreinforced brick masonry bearing walls, and the veneer is generally in good condition. There is some minor thermal cracking and water infiltration at the base of the brick veneer, but overall the veneer is in good condition. At the 1979 building, the veneer is a combination of split face block at the base and brick veneer above. The split face block has been damaged by water infiltration and the freeze/thaw cycles, especially near walkways that have been actively salted during the winter. The brick veneer also has several noticeable horizontal and stepped cracks at the corners of the building near skylights.

#### *General Interior:*

In general, the interior of the building appears to be in good condition, but is showing signs of normal wear. There is active water infiltration at the 1979 skylights and at the basement mechanical room, below the 1979 connector.

### **Original 1903 Building**

The two-story building, with a basement, consists of:

- Foundations:
  - Unknown, assume stone foundation walls.
  - Concrete slab on grade.
- Floors:
  - Wood framed floors. Size, spacing, and details unknown.
- Roof:
  - Wood framing. Size, spacing, and details unknown.
  - Slate roofing.
- Walls:

- Unreinforced brick backup walls at the exterior walls.
- Granite block veneer at base and 4" Brick veneer above.
- Interior brick bearing walls. Steel lintels added during renovations to create openings and usable space in basement.



**Figure 2-1903 Building**

The 1903 structure has remained relatively unchanged from its original construction. A few masonry bearing walls in the basement have been modified with steel lintels to create doors and openings to the 1923 addition, but otherwise the framing appears to be unchanged. The structural framing for the building was not visible due to plaster walls and ceilings throughout the building, and original construction drawings were not available. Based on renovation notes on the 1979 Addition drawings, the floors and roof are framed with traditional wood framing and brick masonry bearing walls.

The exterior walls are granite/brick veneer backed up by brick masonry bearing walls, and they appear to be in good condition with minimal cracking or movement. The interior of the building appears to have remained untouched other than typical plaster repairs. There are a few water stains and plaster cracks at the second floor ceiling, but otherwise the walls and finishes appear to be in good condition. We did not access to the attic space during the walkthrough, but if the project continues, we would recommend at least a visual inspection of the roof framing to verify the integrity of the framing. Based on the condition of the ceiling, we would expect that the roof framing is in good condition. The hip roof is clad with slate shingles, and it is our understanding that the slate will remain.

Since the building contains unreinforced masonry walls, we reviewed several of the Building Code seismic triggers related to masonry walls:

- Parapets: There were no parapets, but there are two chimneys that extend 8-10 feet above the roof and do not appear to be used. If the chimneys are not part of the Architectural features of the building, we would recommend removing the masonry above

- the roof and roofing over the opening. Otherwise, we would recommend inspecting the masonry during the roof inspection to verify the integrity of the masonry.
- Unsupported partitions: Interior and exterior masonry walls appear to be bearing walls and do not appear to be free standing. We were unable to determine actual attachment details due to finishes and lack of structural drawings, but the wood framing appears to be bearing directly onto the walls.
  - Roof diaphragm attachment to masonry walls: We were unable to determine the connection of the roof diaphragm (likely wood boards) to the masonry bearing walls.

### **1923 Addition**

The two-story building, with a basement, consists of:

- Foundations:
  - Rubble stone, concrete, and masonry foundation walls.
  - Concrete slab on grade.
- Floors:
  - Structural concrete (rib slab).
  - Structural Concrete on steel beams.
  - Concrete slab on form deck and steel joists.
- Roof:
  - Wood and steel framing. Size, spacing, and details unknown.
  - Fiberglass shingles.
- Walls:
  - Unreinforced masonry backup walls at the exterior walls.
  - Granite block veneer at base and 4" Brick veneer above.
  - Interior masonry bearing walls and masonry piers.



**Figure 3-1923 Addition**

Similar to the 1903 structure, the building has remained relatively unchanged from its original construction. A few masonry bearing walls in the basement have been modified to provide access to the 1979 addition and exterior courtyard. The structural framing for the first floor was partially visible in the basement area, but we could not determine member sizes and concrete slab reinforcing. The first floor structure appears to consist of unreinforced masonry bearing walls, structural concrete rib slabs in the mechanical area, and structural concrete slabs built

over steel beams in the central area. The second floor is a mix of original 1923 construction, masonry walls and unknown framing, and steel joist and concrete slab that was added in 1979 to replace a glass and steel framed floor assembly. The floors appear to be in good condition. The steel and concrete infill at the second floor was fairly light construction and heel drops could produce noticeable vibrations. The vibrations do not affect the structure, but may be problematic if the space was used for office use, or other vibration sensitive use.

The exterior walls are granite/brick veneer backed up by brick masonry bearing walls, similar to the original 1903 building. The walls appear to be in good condition with minimal cracking or movement. There was some noticeable water damage to the mortar and concrete parge near the courtyard area that should be repaired as part of the maintenance program.



**Figure 4-1923 Courtyard Masonry Requiring Repair**

The roof framing is unknown, but we assume that there is wood framing since the roof is clad with asphalt shingles and a few of the 1979 details appear to show wood decking at this roof.

Since the 1923 building contains unreinforced masonry walls, we reviewed several of the Building Code seismic triggers related to masonry walls:

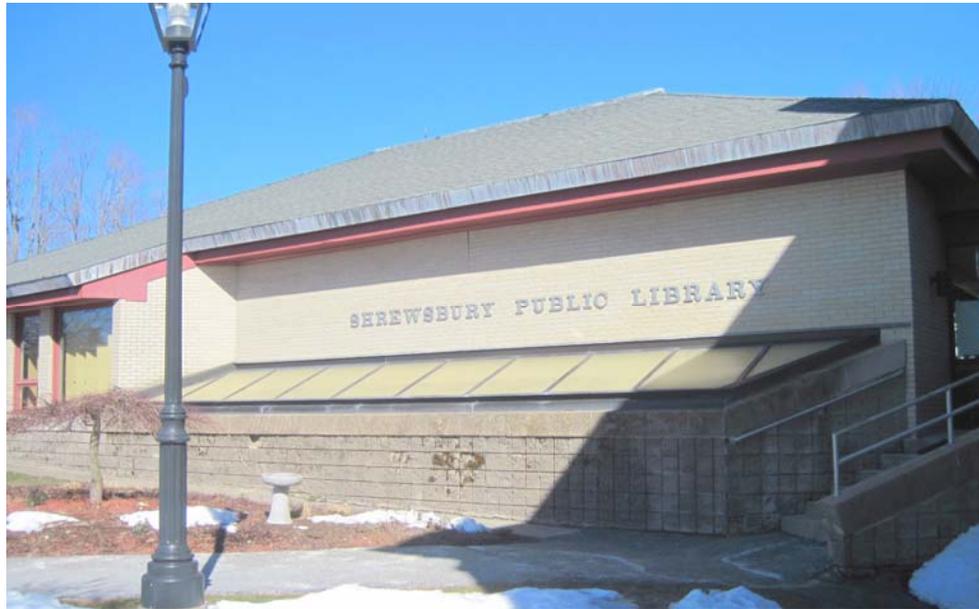
- Parapets: There were no parapets. There is one chimney adjacent to the 1903 building that extends 8-10 feet above the roof. If the chimney is not part of the Architectural features of the building, we would recommend removing the masonry above the roof and roofing over the opening. Otherwise, we would recommend inspecting the masonry during the roof inspection to verify the integrity of the masonry.
- Unsupported partitions: Interior and exterior masonry walls appear to be bearing walls and do not appear to be free standing. We were unable to determine actual attachment details due to finishes and lack of structural drawings. First floor members appeared to bear on the masonry walls, but we did not witness anchorage details.
- Roof diaphragm attachment to masonry walls: We were unable to determine the connection of the roof diaphragm (likely wood boards) to the masonry bearing walls.

### **1979 Addition**

The one-story building, with a basement, consists of:

- Foundations:
  - Concrete walls and spread footings.

- Concrete slab on grade.
- Floors:
  - Glu-lam timber beams and 3" T&G wood deck.
  - Steel joists and concrete slab at connector to 1923 addition.
- Columns:
  - 8<sup>3</sup>/<sub>4</sub>"x9" Glu-lam columns at main addition floor framing.
  - Steel tube columns at steel/concrete framing.
  - Steel tubes at exterior wall supporting roof glu-lam beams.
- Roof:
  - Glu-lam trusses and 3" T&G wood deck.
  - 2x12 wood rafters at infill areas with 1/2" plywood sheathing.
  - Asphalt shingles.
- Walls:
  - Partially reinforced interior CMU bearing wall (bond beam at top).
  - Masonry veneer with steel stud backup walls at exterior walls.



**Figure 5-1979 Building**

The 1979 addition is a mix of exposed glu-lam wood framing and traditional steel and concrete framing. The glu-lam framing includes heavy timber members at the floor level and exposed trusses at the hip roof. The wood members appear to be in good condition, except some local water damage at skylights.

The first floor glu-lam members appear to have been under-designed and have been modified at some point after construction to address loading issues. Design floor live loads were not shown on the original Construction Drawings, but rough beam calculations seem to show a design live load of around 50 psf, which is less than the standard design live load of 100 psf for open spaces and 150 psf for library stack rooms. The modifications to the original framing included adding steel plates to the sides of the existing beams below stack areas and adding columns below overstressed girders. Steel plates were added to both sides of approximately 60% of the floor beams, and 5 glu-lam posts were added to cut the girder spans down to acceptable lengths. The current layout appears to be acceptably supporting the current library loads, but if the loading or layout changes, the framing should be reviewed for the proposed layout.

The roof trusses are exposed in the main 1979 addition area and appear to be in good condition. The wood decking also appears to be in good condition. There are several skylights which appear to be a constant source of leaks and water infiltration. Water damage was noticed at each skylight and also at the basement mechanical room. Any possible renovation option should address the water infiltration.

The exterior walls of the 1979 addition are split face block and brick veneer backed up by 3 ½” steel studs, and the walls do not appear to be in good overall condition. The split face blocks are located at the base of the exterior walls, and have suffered water damage at several locations, including holes through the exterior face at a few locations. The damage appears to be more prevalent near walkways where rain can splash against the blocks, and ice melting chemicals are likely used on the walkways during the winter, exacerbate the freeze/thaw problems.

There are horizontal cracks in the brick veneer at a few locations, mainly corners and near the light well locations. We did not notice any signs of settlement at the foundation walls. The masonry veneer is typically supported on the exterior concrete foundation walls, but at the light wells the veneer appears to be supported by steel angles attached to metal studs on wood floor members, or directly on the wood floor system. Either way, the brick load is supported on the wood glu-lam members below, which would be more likely to move over time and could be causing the horizontal cracks as the wood creeps and the exterior walls remain unchanged on the concrete foundation walls.



**Figure 6-1979 Masonry Cracks at Skylight Area**

***Conclusions and Recommendations:***

The purpose of this report is to identify any structural deficiencies and liabilities that will need to be addressed during any substantial renovation, which we understand, is being considered. The report is based on the premise that the existing building will remain in use as a library. We have reviewed the general conditions of the building, but did not remove finishes or perform computations to determine structural capacities. This report, along with the Building Code Review, shall be used as the basis for the renovation. The following items are meant to highlight structural conditions or deficiencies noted in the report.

General Information:

- Existing building area is 25,400 ft<sup>2</sup>.
  - 1903 Building: 6,600 ft<sup>2</sup>
  - 1923 Addition: 7,200 ft<sup>2</sup>
  - 1979 Addition: 11,600 ft<sup>2</sup>
- Structural members at 1903 and 1923 are generally unknown, but the structure appears to be in good condition.
- Structural members at 1979 addition are in generally good condition after the floor framing was modified.
- Exterior masonry veneer requires regular maintenance at 1903 & 1923 building/addition, especially near courtyard.
- Exterior masonry veneer requires substantial repair at 1979 addition due to water infiltration and movement near skylights.
- Interior and exterior unreinforced masonry bearing walls appear to be in generally good condition.

Christopher Tutlis, PE  
Bolton & DiMartino, Inc.

# Shrewsbury Federal Credit Union- Existing Structural Conditions

615 Main Street  
Shrewsbury, Massachusetts  
April 12, 2013

## ***Introduction:***

The former Shrewsbury Federal Credit Union building is a single-story structure, neighboring the Shrewsbury Public Library, which is being investigated for possible reuse as an addition to the Library. The 4,700 ft<sup>2</sup> building was constructed in the 1950's and underwent an extensive renovation in 1985. This report will describe the general conditions of the existing structure to aid in planning for a building renovation and addition.

## ***Basis of the Report:***

- This report is based on the visible observations during our site visit on March 27, 2013.
- 1950's Original Construction Drawings not available.
- 1985 Renovation Construction Drawings A1 thru A3, "F.W. Madigan Co., Inc." dated October 7, 1985.

Our observations of the existing building were limited to what was readily visible. We did not evaluate strengths of materials, remove finishes, or take measurements; therefore, we are unable to comment on any structural capacities or deficiencies of the existing structural systems.

## ***Building Description:***

The Credit Union building is a rectangular, single-story, shell structure located just to the east of the Shrewsbury Public Library. The building is clad with red brick, white wood trim, and sits slightly lower than the neighboring library. The building is currently vacant, but the interior finishes from the credit union remain in place, hiding most of the structure.

Based on our review of the 1985 Architectural Drawings, the original 1950's structure appears to be exterior masonry bearing walls and a flat, steel framed roof. A mechanical closet allowed us to see the original steel joists, which appeared to be more truss like with tube chord and web members than standard open web joists, and metal roof deck. The original flat roof was over-framed with wood trusses in 1985 to provide a low slope mansard roof. The Architectural Drawings show the wood trusses being installed on the slight masonry parapet and clear spanning between exterior walls creating a small space between the original steel roof and the current wood roof. At the same time the wood trusses were added, a small wood framed entry roof and drive-thru roof were added to the building.

## ***Existing Conditions:***

### ***General Exterior:***

The brick veneer is original from the 1950's and appears to be in generally good condition. The 1985 addition appears to have included infilling several window openings and some minor brick repairs.

### ***General Interior:***

The interior of the building appears to be in good condition, but it should be understood that the roof structure (original steel framing and current wood framing) appears to clear span from exterior wall to exterior wall. The interior metal stud partitions appear to be connected to the original steel roof structure.

### *Building Structure*

The one-story building consists of:

- Foundations:
  - Unknown, assume concrete foundation walls based on age and details.
  - Concrete slab on grade.
- Roof:
  - (Original) Steel joists formed with tube chords and webs. (Roughly 5'-6' o.c.)
  - (Original) Metal roof deck (Appeared to be 1 ½")
  - (Current) Wood trusses (@24" o.c.) with 5/8" plywood sheathing over existing steel roof framing.
- Walls:
  - Brick veneer backed up by exterior masonry bearing walls.

The building structure is relatively hidden, but based on the renovation drawings, the original building was a single-story shell with brick veneer and a flat roof. During the 1985 renovation and conversion to the Credit Union, the wood framed roof appears to have been added to give the building more character. We are not aware of the wood trusses being added for any structural deficiency in the original steel framing.

The masonry exterior bearing walls are hidden by the brick veneer and interior gypsum finishes, so we were unable to view the condition of the walls or the connection of the roof structures to the walls. The renovation drawings show a 4x4 wood plate being added to the top of the masonry walls to connect to the wood trusses. The anchorage and specific details were not indicated on Architectural Drawings.

Since the building contains masonry walls, we tried to review several of the Building Code seismic triggers related to masonry walls:

- Parapets: There were no parapets.
- Unsupported partitions: Interior partitions appear to be metal studs. Exterior masonry walls appear to be bearing walls and appear to be connected to both the steel roof framing and wood roof framing. We were unable to determine actual attachment details due to finishes and lack of structural drawings.
- Roof diaphragm attachment to masonry walls: 1985 renovation details show a wood plate added to the top of the walls, but we were unable to determine/verify the connection of the roof diaphragm to the masonry bearing walls. The steel roof structure is likely attached to the masonry wall, but should be verified as part of a significant renovation.

With interior and exterior finishes in place, we were unable to view the condition of the structure, but we did not notice obvious signs of structural problems. It is our understanding that the Credit Union Building will either be renovated for re-use by the Shrewsbury Public Library or demolished to make way for a future addition to the Library. If the building is to be renovated, we suggest removing finishes at several locations to verify the condition of the existing exterior walls, steel framing, and wood roof over-framing to provide a more complete look at the existing conditions.

The concrete slab on grade details could not be verified during our site visit. If the Credit Union is converted to Library Use, the slab will likely be acceptable to support the slightly higher loading, but the slab thickness and details should be investigated to confirm during the design process.

***Conclusions and Recommendations:***

The former Shrewsbury Federal Credit Union building is a single-story shell building with brick veneer, masonry bearing walls, and wood roof trusses over-framing a former steel framed roof. The structure is mainly hidden, but there is no significant evidence of structural problems and the building appears to be structurally sound. We recommend general upkeep on the maintenance of the building to avoid general deterioration. Due to the long-span roof framing, it should be assumed that the roof layout will remain unchanged during a renovation. New equipment, or banked snow caused by additions, should be avoided at the existing wood roof trusses.

Christopher Tutlis, PE  
Bolton & DiMartino, Inc.



April 14, 2013

Mr. Eric Moore  
Lamoureux • Pagano Assoc., Arch.  
108 Grove Street  
Worcester, MA 01605

Re: Mechanical Systems Survey at the Shrewsbury Public Library in Shrewsbury, MA

Dear Mr. Moore:

The following is a summary report outlining our initial observations and comments regarding the status of the existing mechanical systems supporting the Shrewsbury Public Library in Shrewsbury, MA.

#### **SITE INSPECTION**

On March 27, 2013 we performed a site inspection of the existing building with your office, Mr. Robert Cox – Shrewsbury Public Schools, Mr. Chris Tutlis of Bolton & Dimartino, Inc. (structural engineer) and Mr. Azim Rawji – ART Engineering, Inc. (electrical engineer). Our assessment of building system operating status was limited to visual observations of overall condition and comments provided by Mr. Robert Cox of known operational deficiencies.

#### **GENERAL**

The building is a 2 and 3-story structure with a lower/ground floor level which varies in its below grade depth but for the most part is below grade. The original portion of the building was constructed in 1903 and currently houses a meeting room, a breakroom and children's reading rooms. A 3-story addition to the original structure was constructed in circa 1923, also referred to as the Ward Annex, and contains mechanical space on the lowest level and office space, book stacks and reading areas on the upper floors. The final 2-story addition constructed in 1979 contains the main stack areas, restrooms and lobby. An elevator located in the 1923 portion of the building allows access to all levels of the building.

The building is primarily constructed of masonry brick/block, steel and concrete as well as heavy timber and laminated wood framing. Most windows are of the double pane insulated type glazing.

#### **FIRE SUPPRESSION**

There is no fire suppression system in the building. Installation of such a system may be required based on the extent of any proposed renovations or if any additions are proposed.

Based on current code the building would require building wide fire suppression however its continued use without them may only occur so long as the following take place: 1) Local authorities approve of the buildings continued use without a suppression system, 2) There is no change of use planned for the building, 3) Substantial building improvements are not made, 4) No additions are planned, and 5) No nightclub or similar use.

We noted no kitchen hood or chemical based fire suppression system installed over the breakroom range. The code may require a hood with suppression system and appliance power shut-off device be provided for this range. If required by the local AHJ, this system must be interlocked to shutdown the power supply upon activation as well as alarm to the building fire alarm system. There are exceptions to this requirement such as may be the case for employee break rooms however the local authority having jurisdiction has determination over this rule.

### PLUMBING

#### *Fixtures:*

Additional information on level of proposed future occupancy would be required to ascertain appropriate fixture density. However, based on the current use it appears the current fixtures are somewhat adequate in overall quantity and type to support the buildings occupants. Provisions were made to the fixtures (i.e. height and hardware) to comply with ADA or MA accessibility codes in the main restroom groups on the lower/ground floor level.

Most existing water closets are of the wall mount flush valve type all of which were not of the water conserving 1.6 gallon per flush type as required by current code. The lavatory sinks are of the counter mount wall hung style, but are not metered as required by the current code for public fixtures. Protective insulation on the piping below the counter is absent which is required by current code. Urinals appear adequate in number and configuration to accommodate current code requirements.



*Public Lavatories – Note, no metered faucets or pipe protection.*

To achieve code compliance during a renovation which requires the removal of the fixtures or an addition of fixtures the use of lower flow 1.6 GPF or less water closets would be required. In addition, the building may also require water coolers as well as Janitor's Closet on each floor where currently they only exist on the lowest level.

*Cold Water & Hot Water Service:*

A 2" domestic water line enters the building in the basement level. It runs through a water meter prior to feeding the buildings domestic water loads.

There is no backflow preventer installed on the incoming water service. Depending on proposed space uses that could result in potential sources of cross contamination, a backflow preventer may be required to protect the municipal water supply. There also is no pressure reducing valve which would only be required if the municipal water supply pressure exceeds 80 psig.

Domestic hot water is supplied via a small 40-gallon, 4,500 kW electric water heater located in a lower level mechanical space. Design analysis of proposed future fixtures would need to take place to ascertain required storage and recovery capacity. Although the unit appears to have been replaced within the last few years, typical life expectancy of water heaters of this style is between 7 to 10 years. As such, the Owner should plan on replacing current water heater with

one of large capacity and possibly different fuel source (i.e natural gas) once demand changes or as part of a programmed replacement within the next 7 years.

There is no hot water tempering valve which should be provided to insure elevated tank temperatures (approx. 140°F) to prevent bacterial growth while delivering reduced water temperature to user fixtures. Code requires no greater than 110°F water to public lavatories and 125°F water to service fixtures in this use group. As such, as a minimum we recommend new low flow mixing style lavatory faucets be installed where required throughout the building.

There is no recirculation pump at the water heater. The code requires a hot water temperature maintenance system (recirculation or equal) be provided if fixtures are more than 100 feet from the hot water source. Although this does not appear to be the case in this building, the future use of additional low water flow conservation fixtures may necessitate the need to avoid long delay times for hot water at the remote fixtures.



*Water Heater – Note, no mixing valve*

Due to the age of the building there is a high probability that the water service could have lead containing solder in the fittings or in old brass piping. Although the extent of this piping may not lead to a large source of lead contamination it should be tested and monitored and if found to be a problem the piping should be replaced. In general, there were no outward signs of failure during the day of our site inspection. However, due to the vintage of much of the piping a programmed replacement should be considered to avoid potentially damaging future failures.

*Drainage Systems:*

Most of the sanitary drainage piping is concealed from view however, what we were able to see was primarily of the cast iron hub & spigot and no-hub type. We also noted some PVC piping under a sink in the break room kitchen area. The sanitary sewer lines run within the basement and exit either through the basement wall or below the slab discharging presumable to the municipal sewer system.

Storm water typically spills off the roof edge to grade. In most areas the drip zone around the building has been surfaced and sloped to drain the roof run-off away from the building. However, it was noted that the site does tend to pitch towards the building.

We observed no outward signs of failure in the sanitary sewer or storm drain system were evident during our site inspection.

*Natural Gas Service:*

There is no natural gas serving in the building. However, according to Mr. Cox, the gas company has provided a line off of Boylston Street which runs down the rear of the building (parking lot side) and terminates at a point near the basement mechanical room. The size and capacity of this line is unknown but it is anticipated that it was size to support the building.

HVAC

*General:*

The HVAC system serving the building is a unique type of water source heat pump system that has no supplemental heat source for tempering the condenser water loop. As such the system heat pumps are limited in that once the loop cools to a low point temperature (estimated at 60°F) the heat pump refrigeration cycle is disabled and supplemental electric heaters in the respective heat pumps support the heating needs of the spaces. Since the building has limited internal heat gains, this type of system would result in numerous hours in the heating season where the building systems would need to utilize electric resistance heat as the primary source of heat. Electric resistance heat has a very high cost to heat output ratio when compared to more efficient year-round heat pumps or natural gas based heating systems.

*Condenser Water Distribution:*

Two (2) end suction frame mounted pumps provide for condenser water circulation throughout the building. The pumps are manufactured by Aurora Pump and each have a rated capacity of 275 GPM at 80 ft. head. 10 HP motors on the pumps appeared to have been replaced at some point since the original pump installation.

System water expansion is accommodated through the use of a bladder style expansion tank. The tank does not appear to be ASME rated and as such the system pressure is limited to a relief pressure of 30 psig. Being a low rise structure this pressure limitation should suffice however changes to the system requiring a higher operating pressure would require replacement of the tank.

An evaporative type cooling tower is located adjacent to the building. This tower has a water coil in it in which building condenser water flows through in order to reject heat. The tower utilizes a blower, spray pump and outlet dampers to control the amount of heat rejection from the tower. The system also incorporates a bypass valve to bypass water around the tower during very low heat rejections periods such as in the winter months. The tower is manufactured by Evapco, Inc. and appears to have been replaced in 1996 making it 17 year old.

Condenser water system chemical treatment is accommodated through the use of a shot feeder whereas the cooling tower water has automatic chemical feed pumps and a corrosion testing coupon rack. Both of these types of chemical treatment systems are typical of systems of this nature.



*Cooling Tower*

*Misc. HVAC & Ventilation:*

Water source heat pumps manufactured by Singer and installed in 1979 provide heating, cooling and ventilation of many areas of the building. The 1979 addition is primarily supported by three (3) ducted heat pumps located in lower level mechanical rooms. These heat pumps utilize the mechanical spaces they are in as return air plenums. Outdoor air ductwork to louvers with motorized dampers dump air into the mechanical rooms for mixing with the return air stream. There are several major issues with this type of configuration some of which are as follows:

1. The return air plenums contain storage materials, wiring and other items which are not rated for plenum service. These items can present both a smoke and fire hazard to the building as well as lead to potential odor migration from stored chemicals, mold from ground water infiltration, etc....
2. The configuration allows untempered outdoor air to enter the mechanical rooms where water piping resides thereby potentially causing a freeze concern.
3. The amount of outdoor air is difficult to control due to its configuration. In addition, the building has very limited means for exhausting the outdoor air introduced especially during potential 100% outdoor air economizer cooling cycles.

4. The systems have limited capacity to introduce 100% outdoor air for economizer (free cooling) when outdoor conditions allow as there is no provisions for relief air. Although automatic dampers are provided on outdoor air and return air ducts/grilles it is unclear if they still operate. The current energy code required economizer control for systems of this size.



*Mechanical Room Dampers – Note plenum return with storage*

Another very significant and concerning aspect of the ducted systems within the 1979 addition is that the ground floor stack system as well as the first floor stack system utilize underground ductwork. This ductwork is a mix of Transite (concrete and asbestos) and concrete encased sheetmetal. So long as the Transite ductwork is intact and not friable the concern of asbestos exposure is very limited however, based on the visible signs of moisture infiltration through the structure on the lower level it is evident there is a high ground water issue and/or surface water issue which occurs on site.

This water condition can place water around or in the underground duct system. According to Mr. Cox he noted that water has been present in the underground ducts. Standing water in the duct system cannot only result in degradation of the duct but also lead to potential mold and microbial growth within the duct system which can then become airborne. This makes for an obvious poor indoor air quality condition. Regardless of whether any renovation project occurs this situation should be remediated as soon as possible.

The rest of the buildings (1903 & 1923) heating and cooling needs are primarily supported via console style water source heat pumps. These units sit on the floor of the respective area they serve and incorporate integral thermostats and fan switches. According to Mr. Cox, not all the units operate and one or more is currently being used to support parts replacements for the others.



*Console Style Water Source Heat Pump*

All restrooms have local exhaust fans ducted to the exterior. However, required exhaust was noted as missing in the Janitor's closet as required by code. The condition of these fan systems is unknown however, it is expected that they would require replacement during a renovation to support new ventilation requirements for these areas if not for their vintage alone.

Electric baseboard heaters are provided in each of the lower level restrooms. These units have self-contained thermostatic controls.

There are also three (3) local space exhaust fans supporting the upper level of the 1903 building. One fan supports the smaller Conference Room and the other two support the larger Multi-Use Room. These fans are controlled by wall mounted variable fan speed controls located within the respective spaces.

With the exception of the spaces and systems noted above it was noted that the Ground, First and Second floors of the 1903 and 1923 structure were absent of any provision for outdoor

ventilation air. For several areas with operable windows, technically the operable windows in these areas may satisfy the natural ventilation requirements of the Commonwealth of Massachusetts State Building Code. However, although this may be adequate for lightly populated spaces, for a building such as this, where occupancy can swing greatly, and the need for tighter environmental control for material preservation is important, proper indoor air quality and code compliance can only be achieved through positive outdoor air ventilation. Natural ventilation relies on occupants to control their air quality levels manually by opening and closing windows. Since CO<sub>2</sub> is odorless and colorless as well as many other indoor air pollutants, it is unrealistic to expect occupants to gauge the contamination level of the indoor air and open a window in the cold of winter or heat of the summer.

*Controls:*

Although when first constructed the control system was considered fairly advanced and over the years has been retrofitted somewhat with some energy management components, in its current state the system functionality is primarily limited to only local space temperature control with some limited setback features. According to Mr. Cox of the 30 or more water source heat pumps in the building only 5 or 6 actually communicate to the central controller. As such many indoor air quality and energy management routines such as night setback, optimized start and economizer cooling are not occurring. We highly recommend this system be substantially modified in order to comply with new energy codes and ventilation standards and to optimize energy operating costs.

Being that most of the mechanical systems such as the heat pumps, tower, pumps and piping have met or exceeded their useful expected service life of between 15 to 30 years as defined by the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE). As such, any renovation should seriously consider their replacement. Piping can be tested to verify its integrity as its life can vary based on water quality.

*FORMER CREDIT UNION*

A brief review of the nearby credit union was undertaken. The following is a brief summary of what we found:

*Fire Suppression:*

The credit union building currently has no fire suppression systems. If over 7,500 SF and integrated to the current library building fire suppression would be required.

*Plumbing:*

The credit union building has a 1-1/2" cold water service which reduces to 1" prior to running through the meter and on to support the building loads. Men's and woman's rooms within the building have 1.6 GPF floor mount tank type toilets and wall mounted lavatories with 2 handle faucets. A urinal is also provided in the men's room and is of the 1.0 GPF type.

A 30-gallon electric water heater supports the hot water load for the building fixtures. No tempering system was noted. A natural gas service is provided to the building and supports two (2) heating furnaces.

*HVAC:*

The heating, cooling and ventilation needs of the building are supported by two (2) gas-fired furnaces both of which are 80% efficient. The furnaces each have a DX cooling coil mated to an outdoor condenser to facilitate space cooling. One of the condensers appears to be of original vintage whereas the other one has been replaced within the last several years.

Furnaces are ducted to the space and distribute air via ceiling diffusers and grilles. Minimum outdoor air is provided via ducts connected to each furnaces return air duct and tied to an outdoor air wall louver.

There is also a 1-1/2 ton ductless split system manufactured by Mitsubishi. This system appears to have at one time supported a data room.

Although the systems in the credit union may have supported general office use in the past it is expected that future conversion to library use would require a wholesale change of the systems. New systems would incorporate high efficiency energy efficient technology as well as be able to better deal with the highly fluctuating and diverse loads of a library use.

If you have any questions regarding this report please do not hesitate to call.

Sincerely,  
Seaman Engineering Corporation

Kevin R. Seaman, P.E., LEED® AP  
President

A  
R  
T



# ART Engineering Corp.

ELECTRICAL ENGINEERS

76 Webster Street, Worcester, MA 01603

T. 508.797.0333 F. 508.797.5130

## Existing Electrical Systems Review Shrewsbury Library Shrewsbury, MA

**Date:** April 10, 2013  
**Prepared by:** Azim Rawji, P.E.

### SUMMARY

ART has completed site surveys and reviewed available drawings for the existing 30,225 sq-ft 3-level structure operating as a town Library in Shrewsbury, Massachusetts. We have developed a Good/Fair/Poor rating system for the various electrical systems.

The rating system was developed to give a concise, overall assessment for each system. In general, a system rated "Good" typically is up to date with current codes and well suited for current and future space intent. A "Fair" rated system may have some equipment in need of replacement or portions not suited for current or future space programming. Systems that are rated "Poor," are not well served for current or future space programming, and are outdated or obsolete.

Most of the systems included in this study were found to have poor or fair overall ratings. There are many reasons for this, including the age and systems that do not meet current code requirements. The rating system takes into account the condition of the electrical systems as well as the types of systems, sizing and applicability for their respective spaces.

The Massachusetts State Building Code 780 CMR requires all buildings and structures and all parts thereof, both existing and new, and all systems and equipment therein which are regulated by the State Building Code to be maintained in a safe, operable and sanitary condition. All service equipment, means of egress, devices and safeguards which are required by the State Building Code in a building or structure, or which were required by a previous statute in a building or structure, when erected, altered or repaired, shall be maintained in good working order.

The majority of the electrical distribution network (main service) exceeds 30-yrs old; the life expectancy for a building's main electrical service. It is unknown whether any of the existing systems have been maintained or tested per the manufacturer's recommendations or system standards. The branch circuitry, outlets and lighting exceeds the 20-yr life expectancy for electrical installations.

**BUILDING ELECTRICAL SYSTEMS:**

The existing electrical service is rated 1200A, 208Y/120V, 3-phase, 4-wire and is located in the Mechanical/Electrical Room on the ground floor. The main distribution equipment has been directly exposed to ground water causing corrosion and posing a safety risk. The distribution is fed from a utility company transformer located on the exterior of the building. The transformer is fed from a Shrewsbury Electric & Cable Operations (SELCO) primary distribution system. The utility company metering is off of the primary distribution system. The distribution equipment is by General Electric Company.

**Rating: Poor**

**NORMAL DISTRIBUTION:**

The panelboards in the building are by General Electric Company. The panelboards are located throughout the building and are circuit breaker type. The panelboards are in excess of 30-yrs old and past their useful life. Panel boards in the basement are subjected to high moisture content and exhibited water damage. The wiring methods do not meet today's Massachusetts Electric Code 527 CMR.

**Rating: Poor**

**GENERAL PURPOSE POWER:**

The general purpose power in the building is inadequate given the extensive use of extension cords and power strips.

**Rating: Poor**

**EMERGENCY/STANDBY GENERATOR POWER:**

The building is not equipped with a standby/emergency generator. Egress lighting and life safety is supported by backup battery.

**Rating: N/A**

**EGRESS & EXIT LIGHTING:**

The egress lighting consists of remote batteries with remote lighting units, normally off, located in most pathways of egress. The majority of EXIT signs are backlit by incandescent bulbs, some not lit; the result of a relatively short life-cycle with respect to an LED powered fixture. The EXIT signs do not comply with the graphics requirements in article 1011.5.1 of the State Building Code. NFPA Code requires a 90-minute battery backup system and that it be tested monthly for 30-seconds, and annually for the full 90-minutes. No record of monthly or annual



testing was observed. It does not appear that the EXIT signage and egress lighting comply system is in compliance with article 1011.5.3 of the State Building Code.

**Rating: Poor**

#### LIGHTING AND CONTROLS:

The lighting in the building is a mixture of fixtures with T8/T12, incandescent and metal halide lamps. Fluorescent fixtures with T12 lamps are in a majority of areas; T12 fluorescent lamps are inefficient compared to T5 or T8 lamps.

Prior to the 1978 ban on PCBs, ballasts used for T12 lamps incorporated PCBs in the manufacturing process. After PCBs were banned, magnetic ballasts. The US Department of Energy has since phased out the manufacturing and sale of magnetic ballasts and replaced with electronic ballasts. It is suspected that some of the T12 ballast is of the obsolete magnetic style. It was noted that the general lighting is inefficient and does not meet current energy codes. Lighting control is by wall mounted switches with no automated controls, occupancy or light harvesting sensors. The building's perimeter lighting utilizes pole mounted fixtures and flood lights which produce light pollution and glare. In general, the lighting system does not meet today's LEED requirements for efficiency, controls and light pollution.

**Rating: Poor**

#### TELECOMMUNICATIONS CABLING INFRASTRUCTURE:

The telecommunications system comprises mostly of Category 5 cables for data and voice communications. The system is outdated and does not comply with the BICSI standards for telecommunications infrastructure. Telecommunications equipment is not installed in dedicated rooms or closets and does not comply with clearances required by the BICSI standards. The Users report system slow and barely meets current user requirements.

**Rating: Poor**

#### VOICE COMMUNICATIONS EQUIPMENT:

The communications equipment comprises of an NEC voice PBX located in the mechanical/electrical room. The system supports telephone handsets only in the library. The system appears to be adequate.

**Rating: Fair**

#### FIRE ALARM SYSTEM:

The fire alarm system is by FCI. The fire alarm control panel is non-addressable and is located in the Mechanical/Electrical Room. A fire alarm annunciator is located in the vestibule of the side entrance on the first floor level. The fire alarm panel is functional but is beyond its life expectancy of 20-yrs. The number of visual signaling devices are inadequate and do not comply with NFPA-72 2010 standards for visual notification. Overall coverage of the automatic

fire detection devices is rated poor. Additional automatic detection and signaling devices need to be installed to comply with NFPA-72 2010 standards and the State

**Rating: Poor**

VIDEO SURVEILLANCE, ACCESS CONTROL & INTRUSION DETECTION SYSTEMS

There is no video surveillance, access control system or intrusion detection system at the library.

**Rating: N/A**

Zoning District(s) – Shrewsbury Public Library

Library Building and Credit Union, District 8 (Limited Business)  
Library and Credit Union Parking Lots, District 4 (Residence B-1)

Zoning Restrictions

Limited Business

Front Setback: 15'  
Side Setbacks: 15'  
Rear Setback: 15'

Open Space Percentage of Lot Area: 15%  
Lot Coverage Percent: 50%

Height in Feet: 35'  
Number of Stories: 2½

B-1

Front Setback: 50'  
Side Setbacks: 30'  
Rear Setback: 50'

Open Space Percentage of Lot Area: 25%  
Lot Coverage Percent: 10%

Height in feet: 35'  
Number of Stories: 2½

Section II – Definitions

**Lot, Corner:**

*A lot at the point of intersection of and abutting on two or more intersecting streets. The interior angle of intersection of the street lot lines or in case of a curved street, extended lot lines, shall not be more than one hundred thirty-five (135) degrees.*

**The library property is located at the corner of and abuts both Main Street on the South side of the property and Boylston Street on the West side of the property which intersect each other. It appears that the interior angle of intersection of the street lot lines is less than 135 degrees. By definition, the library sits on a corner lot.**

**Lot, Frontage of:**

*The horizontal distance measured along the front lot line between the points of intersection of the side lot lines or an intersecting street lot line of a corner lot with the front lot line. The minimum required lot frontage shall be provided along one street lot line and cannot be accumulated along two (2) or more streets.*

**The library is situated on the property in such a way that the original 1903 building faces Main Street. As this is the case, the frontage shall be calculated based on the horizontal distance measured along Main Street.**

**Lot Line, Front or Street:**

*The property line defining the lot from the street right of way. On a corner lot all property lines defining a lot from the street or right of way shall be considered a front lot line.*

**By definition, the Main Street (South) and Boylston Street (West) property lines of the library are considered front or street lot lines. Thus, the North and East property lines of the library shall be considered side lot lines.**

**Lot Line, Rear:**

*The lot line opposite and furthest removed from the front lot line except on a corner lot where there shall not be a rear lot line. Corner lots will have only front and side lot lines.*

**See comment for Front Lot Line above.**

**Use Beyond a Boundary Line:**

*Where a district boundary line divides any lot of record existing at the time such line is adopted, any building or use permitted in either district shall be permitted for said lot within a distance not exceeding thirty (30) feet beyond the boundary.*

**The library and credit union buildings are located in a Limited Business District, while the rear parking lots are located in a Residential B-1 District. In the case of this project, as the library is the main building on the property, any addition would be allowed to extend into the B-1 district by a distance of 30 feet.**

Section VII – Development of Site and Location of Buildings and Structures

**Area, Frontages, Yard and Lot Coverage Requirements:**

2. *On a corner lot, in order to provide visibility unobstructed at intersections, no sign, fence, wall, tree, hedge or other vegetation, and no building or other structure more than three (3) feet above the established street grades, measured from a plane through the curb grades on the height of the crown of the street, shall be erected, placed, or maintained within the area formed by the intersecting street lot lines and a straight line joining said street lot lines at points which are twenty-five (25) feet distant from the point of intersection, measured along said street lot line.*

FEASIBILITY STUDY

IV. CODE, REGULATORY AND PERMITTING ISSUES  
A. Local Zoning

Table II (Shrewsbury Zoning Bylaws)

Library Parking & Credit Union  
Parking lots are located within this  
district

TABLE II

DISTRICT	MINIMUM REQUIREMENTS						MAXIMUM CONDITIONS			
	Lot Area <sup>(10)</sup> Sq. Ft.	Lot <sup>(1)</sup> Frontage	Front <sup>(2)</sup> Yard	Side <sup>(3)</sup> Yard	Rear Yard	Add'l Area Per <sup>(5)</sup> Dwelling Unit	Open Space Percent of Lot Area	Lot Coverage Percent	Height Feet	Number Stories
Rural "AA" (added 5/16/2011)										
One Family	45,000	150	50	30	50	--	--	15	35 <sup>(16)(17)</sup>	2-1/2 <sup>(16)</sup>
All Other Uses	45,000 <sup>(15)</sup>	150	50	30	50	--	25	40	40 <sup>(16)(17)</sup>	3 <sup>(16)</sup>
Rural "A" <sup>12</sup> (amended 3/24/03)										
One Family	20,000	125	50	30	50	--	--	20	35	2-1/2
All Other Uses	40,000	150	50	30	50	--	25	10	35	2-1/2
Rural "B" <sup>12</sup> (amended 3/24/03)										
One Family	20,000	125	50	30	50	--	--	20	35	2-1/2
All Other Uses	40,000	150	50	30	50	--	25	10	35	2-1/2
Residence "A" <sup>12</sup> (amended 3/24/03)										
One Family	20,000	125	30	20	40	--	--	30	35	2-1/2
All Other Uses	40,000	150	50	30	50	--	25	10	35	2-1/2
Residence "B-1" <sup>12</sup> (amended 3/24/03)										
One-Family	12,500	100	30	10	40	--	--	30	35	2-1/2
All Other Uses	40,000	150	50	30	50	--	25	10	35	2-1/2
Residence "B-2" <sup>12</sup> (amended 3/24/03)										
One-Family	12,500	100	30	10	40	--	--	30	35	2-1/2
Two-Family	16,000	125	30	10	40	--	--	30	35	2-1/2
All Other Uses	40,000	150	50	30	50	--	25	10	35	2-1/2
Multi-Family Residential <sup>12</sup> (amended 5/22/02)										
One-Family	12,500	100	30	10	40	--	--	30	35	3
Two-Family	16,000	125	30	10	40 <sup>(7)</sup>	--	--	30	35	3
MF-1	16,000	50	50	25	25	4,300	70	--	35	3
MF-2	160,000	50	50	50	50	see VI, Table 1 Footnote 6	70	--	35	2
All Other Uses	20,000	125	25	25	75	--	50	10	35	3
Apartment <sup>12</sup>										
One-Family	12,500	100	30	10	40	--	--	30	35	3
Two-Family	16,000	125	30	10	40	--	--	30	35	3
Multi-Family	16,000	125	25	50	50	2,000	50	8	96	8
All Other Uses	20,000	125	25	50	50	--	50	10	35	3
Limited Business (amended 5/19/04)										
All Uses	12,500	100	15 <sup>(4)</sup>	15*	15*	--	15	50	35	2-1/2
*except 50 when abutting a Residential District										
Limited Commercial-Business (added 5/16/11)										
All Uses	40,000	150	40 <sup>(15)</sup>	15*	25*(7x14)	--	20	50	40 <sup>(13)</sup>	3 <sup>(13)</sup>
*except 100 when abutting a Residential District										
Commercial-Business (amended 11/13/01, 3/24/03, 5/22/08)										
All Uses <sup>(6)</sup>	40,000	150	40	15 <sup>(14)</sup>	25 <sup>(7, 14)</sup>	--	20	50	50 <sup>(13)</sup>	4 <sup>(13)</sup>
Limited Industrial (amended 11/13/01, 3/24/03, 5/22/08)										
All Uses	80,000	50	50	50 <sup>(14)*</sup>	50 <sup>(14)*</sup>	--	20	50	50 <sup>(13)</sup>	4 <sup>(13)</sup>
*except 100 when abutting a Residential District										

Library Building & Credit Union  
Building are located within this  
district

Parking Lot Minimum Spaces

The parking lot design should include a minimum of 55 parking spaces.

**D. Off-Street Parking and Loading Areas:**

1. Off-street parking and loading spaces shall be required as follows:

a. Dwellings and apartments:

One and one-half (1 1/2) parking spaces for each dwelling unit therein and sufficient off-street parking for visitors and employees, provided that, in the case of apartments constructed for the exclusive use of elderly persons upon approval of the Board of Appeals, as provided in Section IX C2 one (1) parking space for each two (2) dwelling units therein shall be sufficient.

b. Permitted home occupations and professional offices in a residence and funeral parlors:

One (1) parking space for each forty (40) square feet of building floor area devoted to such use.

c. Places of public assembly:

One (1) parking space for each three (3) seats therein or one (1) space for each sixty (60) inches of bleachers or benches, plus one (1) space for every two (2) employees thereof.

d. Schools:

One (1) parking space for each classroom and office therein, or one (1) parking space for each three (3) seats in the auditorium whichever is greater. In addition to the foregoing, schools above high school level shall provide one (1) space for every two (2) students enrolled.

e. Hotels, motels and other places providing overnight accommodations: (amended 5/27/09)

One (1) parking space for each room accommodation therein, plus one (1) space for each two (2) employees, and adequate spaces for delivery vehicles. Where applicable additional parking as required in Section VII D, 1, f. The Planning Board may grant a Special Permit to allow the reduction of off street parking requirements related to conference rooms and/or ancillary spaces therein.

f. Hospitals, sanitariums, convalescent or nursing homes and continuing/continuum care retirement communities:

One (1) parking space for each two (2) beds, plus one (1) additional space for each two (2) employees based on the numerically largest shift.

In accordance with Section IX, the Board of Appeals may grant a Special Permit to allow conditionally one (1) parking space for each four (4) beds, plus one (1) additional space for each two (2) employees, based on the numerically largest shift, for nursing homes or continuing/continuum care retirement communities.

Assumed Parking Space requirements: 137 public occupants according to Shrewsbury population = 46 parking spaces for public. 18 full time staff = 9 staff parking spaces. Total: 55 parking spaces required

Parking Lot Design

The minimum space width shall be 9 feet and the depth shall be 19 feet typically. Parallel parking spaces shall be 22 feet minimum depth. The two way circulation aisle shall be 24 feet minimum width. A maximum grade shall be 6% in any direction for net standing and maneuvering areas. Loading spaces shall be a minimum 10 feet wide, 40 feet long, and 14 feet high.

Parking and loading areas shall be screened from all adjoining lots by either: a strip 4 feet wide densely planted with shrubs or trees at least 4 feet high forming a year round screen or a solid wall or fence 5 feet high. Concrete or bituminous curbing of at least 6 inches in height shall terminate all edges of pavements in rear and side yards, preventing drainage to adjacent properties.

Parking lot landscaping requirements include a landscaped buffer strip a minimum 15 feet in width to be provided adjacent to public ways planted with grass, low shrubs, and shade trees with a minimum 2" caliper. One tree shall be planted for every 50 feet of road frontage. Along other property lines, requirements include providing a landscaped buffer strip a minimum 5 feet in width planted with grass, low shrubs, and shade trees with a minimum 2" caliper. One tree shall be planted for every 50 feet of perimeter length. The library parking lot is required to include landscaping for a minimum of 5 percent of the interior of the lot. Storage areas, dumpsters, service and loading areas shall be screened from view from neighboring properties and streets utilizing fences or walls that are complemented with landscaping. Illumination of parking and loading areas shall be required and arranged so as not to shine on adjacent properties.

The following is an excerpt from the Town of Shrewsbury Zoning Bylaws:

2. *Design of Off-Street Parking and Loading Spaces:*
  - a. *Parking areas containing more than five (5) required parking spaces shall comply with the standards specified below. Site plans prepared pursuant to Section VII F shall be submitted sufficient for the Building Inspector, Planning Board, or Board of Appeals to determine if the proposed layout properly complies with these standards.*
    - (1) *Space width shall be at least nine (9) feet.*
    - (2) *Space depth shall be at least nineteen (19) feet for all angle and 90° parking and twenty-two (22) feet for parallel parking.*
    - (3) *Aisle width shall be twenty-four (24) feet for two-way circulation.*
    - (4) *Parking spaces shall be provided and designed to safely accommodate commercial vehicles servicing the site.*
    - (5) *Parking lots shall be designed to permit each motor vehicle to proceed to and from all unoccupied parking spaces without requiring the moving of any other parked motor vehicle. Spaces shall be designed to prevent motor vehicles from backing onto a public street in order to leave the lot. Parking areas shall be designed utilizing channelization devices to prevent short-circuiting of traffic. The net standing and maneuvering areas shall have a maximum grade of 6% in any direction. This maximum grade does not apply to access drives. All required parking spaces shall be provided with unobstructed access to and from a street and shall be properly maintained in such a manner as to permit them to be used at all times.*

*All required parking spaces shall be located on the same lot as the use with which such spaces are connected except that two (2) or more businesses may jointly provide the required spaces on one (1) or more of their lots contiguous to each other. The number of spaces in any such joint facilities shall at least equal the total number required under the provisions of this section for their individual uses.*

*Subject to a Special Permit from the Planning Board unenclosed parking spaces may be located remote from the site but within 200 feet therefrom.*

*Said off-site parking shall be secured by an appropriate deed restriction.*

- b. *Each required loading space shall be at least ten (10) feet wide, forty (40) feet long and fourteen (14) feet high.*
- c. *All off-street parking and loading areas, permitted and/or required, except for dwellings, which are located within or adjacent to a Residence A, B-1 or B-2 District, Garden-Type Apartment or Apartment Districts (whether on the side or rear) shall be screened from all adjoining lots in said district by either:  
(1) A strip four (4) feet wide, densely planted with shrubs or trees, which are at least four (4) feet high at the time of planting and of a type which may be expected to form a year-round dense screen at least six (6) feet high within three (3) years or  
(2) A solid wall or fence not less than five (5) feet high.  
A masonry or bituminous concrete curbing of at least six (6) inches in height shall terminate the edges of all pavements in rear and side yards to prevent drainage therefrom to adjacent properties.*
- d. *Parking Lot Landscaping: (amended 11/1/99)  
All parking areas shall be properly screened and landscaped to protect adjacent property from undesirable effects of parking lots and to preserve the appearance and character of the surrounding neighborhoods. The visibility of parking and service areas from public streets shall be minimized through facility location and the use of topography and vegetation.  
(1) A landscaped buffer strip at least fifteen (15) feet wide, continuous except for approved driveways, shall be provided adjacent to public ways to visually separate parking and other uses from the road. The buffer strip shall be planted with grass, low shrubs, and shade trees with a minimum 2" caliper, with one tree planted for every fifty (50) feet of road frontage. (amended 11/1/99)  
(2) Along other property lines, there shall be provided a landscaped strip at least five (5) feet in width, planted with grass, low shrubs, and shade trees with a minimum 2" diameter caliper, with one tree planted for every fifty (50) feet of perimeter length. (amended 11/1/99)  
(3) For parking lots containing twenty-five (25) or more spaces, a minimum of five (5) percent of the interior of the lot shall be maintained with landscaping. The total amount of landscaping shall be separated into smaller areas to break up the expanse of pavement. (amended 11/1/99)  
(4) Exposed storage areas, dumpsters, machinery, service areas, truck loading areas, utility buildings, and other unsightly uses shall be screened from view from neighboring properties and streets through the use of walls or fences complemented with landscaping. (amended 11/1/99)*
- e. *Required off-street parking and loading spaces shall not thereafter be reduced, nor shall one be counted as or substituted for the other. (amended 11/1/99)*
- f. *Required off-street loading spaces shall have adequate vehicular access to the street, which, along with the areas themselves, must be approved on a site plan in the case of business or industrial uses, see Section VII F. (amended 11/1/99)*
- g. *Except in the case of parking spaces provided for dwellings, off-street parking and loading areas shall be paved to the current specifications required under the Planning Board's Subdivision Rules and Regulations. (amended 11/1/1999)*
- h. *Except in the case of parking spaces provided for dwellings, off-street parking and loading areas used after sundown shall be illuminated, with illumination so arranged as not to shine on abutting properties or on streets. (amended 11/1/99)*

Site Plan Review Process

The site plan review process requires the following steps:

- Filing of 10 copies of the site plan filed in the Town Clerk's office as well as a Notice of the Public Hearing filing in the Worcester Telegram & Gazette once in each of the two successive weeks. A copy of the advertisement shall be mailed to the Planning Board.
- Obtain and certify from the Assessor's Office a certified list of names of all abutters within 300 feet of the property lines. This document shall prove that Lamoureux Pagano Associates has properly notified all abutters by certified mail at least 14 days prior to the public hearing.

The planning board shall file a written decision with the town clerk within 65 days from the close of the public hearing. Approval shall require a simple majority vote of those members who were present at the hearing.

Preparation of the site plan shall include the following requirements:

- The site plan shall be prepared by a professional engineer and professional land surveyor utilizing the most current release of AutoCad. A compact disc containing the AutoCad design shall be submitted to the planning board. Supplemental plans may be prepared by a professional architect or landscape architect.
- Plans shall be at a scale of 1"=40'
- 8 copies of prints, no smaller than 8 1/2" x 11", showing an outline of the site plan indicating all ways, street names and street numbers
- Specific drawing requirements:
  - Location and boundaries of the site
  - Locus, including abutting land use and zoning district
  - Existing and proposed land and buildings uses. Information regarding the ownership of adjacent land shall be provided.
  - Existing and proposed topography and proposed grading for the entire site. This shall include earth removal as defined in Section VII.
  - The location of existing utilities in adjacent streets
  - The location of existing and proposed on-site structures and all buildings within 200 feet of the property lines
  - Driveways and driveway openings
  - Parking and loading spaces
  - Delineation of wetlands or other areas potentially subject to the Wetlands and Rivers Protection Act
  - The location of any proposed structures, streets, ways, walls, hydrants, fences, outdoor lighting, open space areas, recreation areas, egresses, service entries, facilities for waste disposal or storage, snow storage area and parking with individual spaces identified
  - The location, size and sketch of all proposed signs.
  - Landscaping and screening, indicating distinctions between proposed and retained vegetation

- **Water, drainage and sewerage systems**
- **Sufficient data to determine compliance with the rules and regulations of the Architectural Barriers Board for handicapped parking, if applicable, as well as parking schedule requirements based on proposed uses**
- **Sufficient data to determine compliance with the Table of Lot, Area, Frontage, Yard and Height Requirements**
- **Data regarding traffic safety and capacity issues sufficient for the Board to make a determination of whether a traffic impact analysis is necessary**
- **Limit of work area, including proposed tree line**
- **A photometric map showing on-site footcandle information**

From zoning bylaws:

- b. *Ten (10) copies of the site plan submitted for approval by the Planning Board shall be filed in the Town Clerk's office with the appropriate forms. The Planning Board shall hold a public hearing within forty-five (45) days of the date of filing with the Town Clerk. Notice of the public hearing shall be provided according to Section IX F of this bylaw. The Planning Board shall prepare the notice with sufficient identification and shall notify the applicant of the time and place of the public hearing. The applicant shall publish the notice in a newspaper of general circulation in the Town once in each of two (2) successive weeks, the first publication being not less than fourteen (14) days before the day of such hearing. A copy of the advertisement shall be mailed to the Planning Board. It is the applicant's responsibility to obtain and certify from the Assessors Office a certified list of names of all abutters within three hundred (300) feet of the subdivision as they appear on the most recent tax list and prove that the applicant has properly notified all abutters by certified mailing at least fourteen days prior to the public hearing. The Planning Board shall file a written decision with the Town Clerk within sixty-five (65) days from the close of the public hearing. Approval shall require a simple majority vote of those members who were present at the hearing. (amended 11/1/99)*
- c. *The Planning Board's final action shall consist of either (1) disapproval of the site plan if the applicant fails to furnish adequate information required by this bylaw; or (2) approval of the site plan subject to any conditions, modifications and restrictions required by the Planning Board which will insure that the site plan meets the standard of this bylaw.*
- d. *The following standards shall be used by the Planning Board in reviewing all applications for site plan approval.*  
*1) Conformance with all the provisions of the Shrewsbury Zoning Bylaw;*  
*2) Provisions for convenient and safe vehicular and pedestrian movement within the site, for driveway openings that are convenient and safe in relation to the adjacent street network, and for adequate emergency vehicle access;*  
*3) Provisions for adequate parking and loading spaces, and site design that minimizes visual intrusion of these areas from public ways;*  
*4) Landscaping measures taken to screen the appearance of off-street parking areas from abutting properties and to create visual and noise buffers that minimize the encroachment of the proposed use on neighboring land uses;*  
*5) Adequate provision for controlling surface water runoff to minimize impacts on neighboring properties and streets and to prevent soil erosion and sedimentation of the Town's surface waters;*  
*6) Measures taken to minimize contamination of ground water from sewage disposal and operations involving the use, storage, handling, or containment of hazardous substances;*  
*7) The use will not create a nuisance of noise, odor, smoke, vibration, traffic generated, unsightliness or other conditions detrimental to the public good.*
- e. *Persons aggrieved by his or her inability to obtain site plan approval by the Planning Board or any final action by the Planning Board in connection with any site plan shall have the right to appeal to the Zoning Board of Appeals in accordance with the procedures set forth in Section 8 of chapter 40A of Massachusetts General Law and the Zoning Board of Appeals shall have the right to hear such appeals.*
- f. *Contents: (amended 11/1/99)*  
*Site plan requirements are as follows:*  
*1) The site plan shall be prepared by a professional engineer and professional land surveyor and shall be prepared utilizing the most current release of AutoCAD or another Town-approved drawing package. A disk containing the*

AutoCAD design shall be submitted to the Planning Board. Supplemental plans may be prepared by a professional architect or landscape architect.

2) Plans shall be prepared at a scale of 1"=40'.

3) Eight (8) copies of prints, no smaller than eight and one-half by eleven (8 1/2 x 11) inches, showing an outline of the site plan showing all ways, street names and street numbers shall be submitted.

4) The location and boundaries of the site.

5) Locust, including abutting land use and zoning district.

6) Existing and proposed land and buildings uses. Information regarding the ownership of adjacent land shall be provided.

7) Existing and proposed topography and proposed grading for the entire site. This shall include earth removal as defined in Section VII (H).

8) The location of existing utilities in adjacent streets.

9) The location of existing and proposed on-site structures and all buildings within two hundred (200) feet of the property lines.

10) Driveways and driveway openings.

11) Parking and loading spaces.

12) Delineation of wetlands or other areas potentially subject to the Wetlands and Rivers Protection Act.

13) Areas included in any Flood Plain District and areas included in the Aquifer Protection Overlay District.

14) The location of any proposed structures, streets, ways, walls, hydrants, fences, outdoor lighting, open space areas, recreation areas, egresses, service entries, facilities for waste disposal or storage, snow storage area and parking with individual spaces identified.

15) The location, size and sketch of all proposed signs.

16) Landscaping and screening, indicating distinctions between proposed and retained vegetation.

17) Water, drainage and sewerage systems.

18) Sufficient data to determine compliance with the rules and regulations of the Architectural Barriers Board for handicapped parking, if applicable, as well as parking schedule requirements based on proposed uses.

19) Sufficient data to determine compliance with the Table of Lot, Area, Frontage, Yard and Height Requirements.

20) Data regarding traffic safety and capacity issues sufficient for the Board to make a determination of whether a traffic impact analysis is necessary.

21) Limit of work area, including proposed tree line.

22) A photometric map showing on-site footcandle information.

**Introduction:** The Shrewsbury Public Library is a 3-story building originally constructed in 1903 as the Jubal Howe Memorial Library. It has since undergone two additions; the first being the Artemas Ward Annex constructed in 1923 and the second constructed in 1979. Three design options were studied including the following:

1. Renovations only to the existing building.
2. Repairs/renovations to the existing building and construction of an addition in one of the following configurations:
  - a. Retain the existing Library and Credit Union buildings in their entirety, and construct an addition connecting the two buildings.
  - b. Retain the existing Library building in its entirety, demolish the existing Credit Union building; and construct an addition.
3. Repairs/renovations to the existing 1903 Library building; demolition of the 1923/1979 Library additions, and construction of an addition resulting in a solution that meets program requirements.

**Applicable Codes:** Alterations, renovations and additions to the existing Shrewsbury Public Library building are subject to the 8th Edition Massachusetts (MA) State Building Code. The following is a list of codes that apply to the 8th Edition MA State Building Code:

- 2009 International Building Code (IBC)
- 2009 International Existing Building Code (IEBC)
- 2009 International Energy Conservation Code (IECC)
- 2009 International Mechanical Code (IMC)
- 2009 International Fire Code (IFC)
- 780 CMR - MA Amendments to the IBC
- 527 CMR - MA Fire Prevention Regulations and MGL Chapter 148 Section 26G – Sprinkler Protection
- 527 CMR 12.00: MA Electrical Code (2011 National Electrical Code)
- 521 CMR - MA Architectural Access Board Regulations
- 248 CMR - MA Plumbing Code
- 524 CMR - MA Elevator Code (2004 ASME A17.1)

**International Existing Building Code:**

The 2009 International Existing Building Code (IEBC), which has been adopted and amended by Massachusetts, provides for 2 separate compliance methods:

- Work Area Compliance Method
- Performance Compliance Method

This report is based on the Work Area Compliance Method which is, in LPA's opinion, the most likely and best option for the potential scope of work. The Work Area Method further classifies alterations to existing buildings depending on the proposed scope of work as follows:

- Level 1 alterations include the removal and replacement or the covering of existing materials, elements, equipment, or fixtures using new materials, elements, equipment or fixtures that serve the same purpose. Level 1 alterations shall comply with the provisions of Chapter 6 of the IEBC.
- Level 2 alterations include the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment. Level 2 alterations shall comply with the provisions of Chapters 6 and 7 of the IEBC.
- Level 3 alterations apply where the work area exceeds 50% of the aggregate area of the building. Level 3 alterations shall comply with the provisions of Chapters 6, 7 and 8 of the IEBC.

For purposes of this report, it is assumed that the scope of work in the existing building will trigger the threshold for Level 3 compliance and that any new addition will comply with the code for new construction.

**Occupancy Classification:** Per 780 CMR 303.1, the occupancy of the existing building is classified as Assembly Group "A-3" use. There will be **no change to the current Occupancy Classification.**

**Construction Type:** Based on LPA's observations and review of available construction drawings, the original 1903 Howe Memorial Library building and 1923 Artemas Ward Annex are primarily exterior load-bearing masonry construction with combustible, unprotected wood framing. Accordingly, it is assumed to be Construction Type IIIB. The 1979 addition is constructed of heavy timber framing which identifies it as Construction Type IV.

**Height/Area Limitations:** The existing building is not currently sprinklered and is classified with 2 different construction types. Per 780 CMR 102.1, the more stringent construction type applies (Construction Type IIIB). As the total square footage of the building program is estimated to be approximately 38,600 square feet, the footprint of the building will likely be well within the allowable requirements of the code, thus, no fire wall will be required. If an addition is constructed that is **not** separated, the combined existing/new area

**FEASIBILITY STUDY**

**IV. CODE, REGULATORY AND PERMITTING ISSUES**  
**B. MA Building Code**

is subject to height/area requirements for new construction. Section 503.1 refers to Table 503 for allowable height/area limitations as follows (note that these are the **maximum** allowable areas per floor and are based on 78% and 100% open perimeter, with fire sprinkler system throughout the building):

MA Building Code Reference	Use Group "A-3"; Construction Type "IIIB"	
	Height	Area
Table 503 Tabular Value	55'; 2-story	9,500 SF
504.2 Automatic Sprinkler System Increase	0 (existing) 20'; 1-story (with addition)	
506.2 Frontage Increase (assumes 78% of perimeter has at least 30' wide open space in existing and 100% of perimeter has at least 30' wide open space in proposed)		5,035 SF (existing) 7,125 SF (w/addition)
506.3 Automatic Sprinkler System Increase (assumes full fire sprinkler system throughout and more than 1-story above grade plane)		0 SF (existing) 19,000 SF (w/addition)
<b>Total Allowable Height/Area Limitations</b>	<b>55'; 2-story (exist.) 75'; 3-story (with addition)</b>	<b>14,535 SF (existing) 35,625 SF (w/addition)</b>

**Fire Resistance Ratings:** The following table summarizes the required Fire-Resistance Ratings for Building Elements of Type IIIB Construction, based on Table 601 and other applicable code provisions. Note that new stairs, shafts, etc. will be reviewed under the new code.

Building Element	Fire Resistance Rating (in hours)		Notes
	IIIB	IV	
Primary structural frame	0	HT	
Bearing walls – Interior	0	1/HT	
Bearing walls – Exterior	2	2	Not less than per Table 602
Nonbearing walls and partitions - Exterior	0 (see notes)	0 (see notes)	Not less than per Table 602

**FEASIBILITY STUDY**

IV. CODE, REGULATORY AND PERMITTING ISSUES  
B. MA Building Code

Building Element	Fire Resistance Rating (in hours)		Notes
	IIIB	IV	
Floor construction and secondary members	0	HT	
Roof construction and secondary members	0	HT	
Existing Exit Stairways	30-minutes	30-minutes	780 CMR 1016.1 Ex. 4 and IEBC 703.2.1 Ex. 4
Existing MEP Shafts	30-minutes	30-minutes	IEBC 703.2.1 Ex. 4
New and Existing Corridors		0	780 CMR Table 1018.1
New Furnace Rooms with equipment over 400,000 BTU		1; or provide automatic fire-extinguishing system	780 CMR Table 508.2.5 Incidental Accessory Occupancies
New Boiler Rooms with equipment over 15 PSI and 10 HP			
Emergency Electrical Room	2	2	521 CMR 12:00 Article 700.10 modifies the NEC to require a 2-hour rating.
Rooms Containing Fire Pumps in non-high rise buildings		2	1 hour is required when automatic sprinkler system throughout the building is provided.

**Exterior Wall Rating:** Exterior walls of a new addition will need to comply with the requirements of Table 602 – Fire-Resistance Rating Requirements for Exterior Walls Based on Fire Separation Distance (FSD). Existing exterior walls are not required to comply with the requirements for new construction. The following table summarizes exterior wall fire-resistance ratings for various FSD conditions in a Use Group “A-3” building of Type IIIB and IV Construction:

Fire Separation Distance (in feet)	Fire-Resistance Rating (in hours)
$X < 5$	1
$5 \leq X < 10$	1
$10 \leq X < 30$	1
$X \geq 30$	0

**Vertical Openings:** All existing vertical openings connecting two or more floors must be enclosed with 1-hour rated construction and approved opening protectives, unless the openings meet one of the exceptions in IEBC 703.2.1. New vertical openings are required to comply with 780 CMR 708.2. The existing stairs in the original 1903 building and 1923 addition are enclosed. Additionally, the existing stairs in the 1979 addition are enclosed and per IEBC 703.2.1, exception 4, are required to have a 30-minute rating as the building is an “A-3” Use Group. Existing M/E/P shafts are required to have 30-minute enclosures (IEBC 703.2.1, exception 4).

**Finishes:** Interior finishes of Walls and Ceilings in Use Group “A-3” exits and corridors, as well as all new interior finishes, must comply with the following (IEBC 803.3 and IBC Table 803.9):

Building Component	Sprinklered	Unsprinklered
Exit Stair	Class B	Class A
Exit Access Corridors	Class B	Class A
Rooms and Enclosed Spaces	Class C	Class C

**New Floor Finishes:** If the building is equipped throughout with an automatic sprinkler system, traditional floor coverings such as wood, vinyl, carpeting, and other resilient floor coverings passing the DOC FF-1 pill test are allowed throughout the building, including all exits, exit passageways and exit access corridors (780 CMR 804.4.1). If the building is not equipped with an automatic sprinkler system, Class II materials are required in exit enclosures, exit passageways, and corridors (780 CMR 804.4.1).

**Means of Egress:** The means of egress including the number of exits and egress capacity must be sufficient for the number of occupants on all floors (IEBC MA Amendment Section 102.2.2.1). As shown in the following table and detailed calculations, the existing building is compliant with egress requirements.

Floor	Occupant Load	Number of Exits		Exit Capacity with FP	Exit Capacity without FP
		Required	Provided		
Basement	73	2	3	390	259
1 <sup>st</sup> Floor	83	2	6	2,114	1,548
2 <sup>nd</sup> Floor	260	2	2	408	272

**Historic Buildings:** The 1903 Howe Memorial Library portion of the building is listed in the Massachusetts Cultural Resource Information System (MACRIS) and thus is certified as being historically significant. As such, the building is subject to IEBC, Chapter 11: Historic Buildings. The relevant sections of Chapter 11 include:

- **1101.1 Scope-** As the Howe Memorial Library is expected to be repaired and/or altered; this section indicates that the building is subject to Chapter 11.
- **1101.2 Report-** Due to the building needing to meet the requirements of Chapter 11, an investigation and evaluation will be performed. Should the code official require, a report will be prepared and filed with the code official.
- **1102.1 General-** With repairs anticipated to the building, original or like new materials and original methods of construction shall be permitted, subject to provisions of Chapter 11.
- **1103.1 Scope-** With alterations proposed for the building it is subject to this section.
- **1103.2 General-**
- **1103.3 Means of Egress-** The Howe Memorial Library does contain existing door openings, corridors, and stairway widths less than those specified elsewhere in the code. The code official will determine if they may be approved for continued use.
- **1103.5 Interior finishes-** Existing finishes of walls and ceilings shall be accepted when it is demonstrated that they are the historic finishes.
- **1103.6 Stairway enclosure-** As the building is 3 stories or less, the existing exit enclosure construction shall limit the spread of smoke by the use of tight-fitting doors and solid elements. Such elements are not required to have a fire-resistance rating.
- **1103.7 One-hour fire-resistance assemblies-** Where existing wall and ceiling finish is wood or metal lath and plaster, fire-resistance-rated construction is not required as would normally be called for under these provisions.
- **1103.8 Glazing in fire-resistance-rated systems-** Historic glazing materials are permitted in interior walls required to have a 1-hour fire-resistance rating where the opening is provided with approved smoke seals and the area affected is provided with an automatic sprinkler system.

- **1103.9 Stairway railings-** Grand stairways shall be accepted without complying with the handrail and guard requirements. Existing handrails and guards at all stairs shall be permitted to remain, provided they are not structurally dangerous.
- **1103.10 Guards-** Existing guardrails shall comply with requirements of Section 505. The spacing between intermediate railings or openings in existing ornamental patterns shall be accepted. Where there are missing elements or members of a guard, they may be replaced in a manner that will preserve the historical appearance of the building or structure.
- **1103.11 Exit signs-** Where exit sign or egress path marking location would damage the historic character of the building, alternative exit signs are permitted with approval of the code official. Alternative signs shall identify the exits and egress path.
- **1103.12 Automatic fire-extinguishing systems-** It is anticipated that a new fire suppression system will be installed as part of the scope of work for this project. Thus, this section was cited for reference only.
- **1104.1 Accessibility requirements-** It has been determined that the proposed scope of work will require the building to be fully accessible. However, where technically infeasible to meet compliance requirements for accessible routes, entrances, or toilet facilities, the code official may grant a waiver for that element.
- **1104.1.1 Site arrival points-** At least one main entrance into the building will be accessible.
- **1104.1.2 Multilevel buildings and facilities-** An accessible route from an accessible entrance to public spaces on the level of the accessible entrance will be provided.
- **1104.1.3 Entrances-** At least one main entrance into the building will be accessible.
- **1104.1.4 Toilet and bathing facilities-** At least one accessible family or assisted-use toilet room complying with Section 1109.2.1 of the Massachusetts State Building Code will be provided.
- **1105 Change of Occupancy-** There will not be a change of occupancy, thus, this section is not reviewed.
- **1106.1 Structural-** Refer to Structural Analysis by Bolton and DiMartino included elsewhere in this report.

# Shrewsbury Public Library- Building Code Review

609 Main Street  
Shrewsbury, Massachusetts  
April 12, 2013

## ***General:***

This report presents the results of our Massachusetts State Building Code (MSBC) Structural review of the Shrewsbury Public Library for the planned renovations, and possible addition. Our review has been completed in conformance with Chapter 34 of the Eighth Edition of the Massachusetts State Building Code, which became effective August 6, 2010 and the International Existing Building Code, 2009 Edition. Refer to the "Existing Structural Conditions" report for additional building information.

## ***Basis of the Report:***

- This report is based on the visible observations during our site visit on March 27, 2013.
- 1903 Original Construction Drawings not available.
- 1923 Addition Construction Drawings not available.
- 1979 Addition Construction Drawings S1 thru S4, "Anderson Notter Finegold, Inc." dated September 1, 1979.

Our observations of the existing building were limited to what was readily visible. We did not evaluate strengths of materials, remove finishes, or take measurements; therefore, we are unable to comment on any structural capacities or deficiencies of the existing structural systems.

## ***Building Code Review- Structural:***

This review presents our interpretation of the structural requirements of the International Existing Building Code, as modified by the Massachusetts State Building Code. In general, the provisions of The International Existing Building Code are intended to maintain or increase public safety, health, and general welfare in existing buildings by permitting repair, alteration, addition, and/or change of use without requiring full compliance with the code for new construction except where otherwise specified.

## ***Assumptions:***

In order to review the requirements of the Building Code for a renovation to the Shrewsbury Public Library, the scope of the project must be defined. Presently, three design options are being reviewed:

1. General repairs and maintenance.
- 2a. Complete renovation to existing Library buildings, build connector to Credit Union building, and renovate Credit Union for Library use.
- 2b. Complete renovation to existing Library buildings, demolish Credit Union building, and construct addition on Credit Union site.
3. Renovate 1903 Building, Demolish 1923 & 1979 Additions, Demolish Credit Union, and Construct Addition on existing site.

For this Code Review we are assuming that the project would include a complete renovation and addition (Options 2a, 2b, or 3), and would include:

- Complete renovation to interior finishes of existing Buildings (Painting, flooring, wall finishes, etc.)
- New mechanical systems throughout existing Buildings.
- Selective Demolition.
- Structurally isolated Addition (Options 2b & 3).

If Option 1 is chosen, work will need to conform to Code requirements for Level 1 or 2 work, depending on the scope. Refer to Level 1 & 2 requirements below for structural requirements, if Option 1 is chosen.

### **Building Codes:**

- Massachusetts State Building Code, 8<sup>th</sup> Edition.
- International Building Code, 2009 Edition (IBC).
- International Existing Building Code, 2009 Edition (IEBC).

Classification of Work: Level 3 (IEBC Section 405) Work area will exceed 50% of the aggregate area of the building.

### Structural Requirements associate with Level 3 Work:

Level 3 Work is the highest level of Alteration and the Work must conform to the Structural requirements of Levels 1, 2, & 3.

### Level 1 Structural Requirements:

**606.2** Addition or replacement of roofing or replacement of equipment: Where addition or replacement of equipment results in additional dead loads, structural components supporting such reroofing or equipment shall comply with the gravity load requirements of the International Building Code.

- Based on our initial review, there will not be any reroofing at the 1903 building; work will be limited to repair, if required. If there is general reroofing work, the work will not increase the force in the element by more than 5 percent, provided roofing materials do not change. If new equipment or modification to roof openings will increase the forces in elements by more than 5 percent, a review of the element in accordance with the IBC will be required. If the 1923 and 1979 roofs will remain, and are reroofed, they will be reviewed in accordance with the Building Code.

**606.2.1** Wall anchors for concrete and masonry buildings: Where a permit is issued for reroofing more than 25 percent of the roof area of a building assigned to Seismic Design Category B, C, D, E or F with a structural system consisting of concrete or reinforced masonry walls with a flexible roof diaphragm or unreinforced masonry walls with any type of roof diaphragms, the work shall include installation of wall anchors at the roof line to resist the reduced International Building Code level seismic forces as specified in the IEBC.

- The Library is assigned to Seismic Design Category B and the existing walls throughout the 1903 and 1923 buildings are unreinforced masonry walls and will need to conform to the requirements of this section, if the buildings are being reroofed. At this point, the 1903 building will not be reroofed and will not require new attachment to the masonry walls. If the 1903 or 1923 buildings are reroofed, the diaphragm connections will need to be reviewed and possibly upgraded to conform to the anchorage requirements.

**606.3.1** Bracing for unreinforced masonry bearing wall parapets: Where a permit is issued for reroofing for more than 25 percent of the roof area of a building that is assigned to Seismic Design Category B, C, D, E or F that has parapets constructed of unreinforced masonry, the work shall include the installation of parapet bracing to resist the reduced International Building Code seismic forces specified.

- Based on our review, there are no unreinforced masonry parapets that require structural bracing.

**606.3.2** Roof diaphragms resisting wind loads in high wind regions: Where roofing materials are removed from more than 50 percent of the roof diaphragm of a building or section of a building located where the basic wind speed is greater than 90 mph or in a special wind region, as defined in Section 1609 of the International Building Code, roof diaphragms and connections that are part of the main wind-force resisting system shall be evaluated for the wind loads specified in the International Building Code, including wind uplift. If the diaphragms and connections in their current condition do not comply with these wind provisions, they shall be replaced or strengthened in accordance with the loads specified in the International Building Code.

- Design wind speed in Shrewsbury is 100 mph. Reroofing work will not be more than 50% of the roof area, based on our current understanding. If the reroofing work is expanded or includes more than 50% of the roof area, the roof diaphragm connections would need to be reviewed as part of the reroofing work.

## **Level 2 Structural Requirements:**

**707.2** New structural elements: New structural elements in alterations, including connections and anchorage, shall comply with the International Building Code (IBC).

- New structural elements will comply with the IBC.

**707.3** Minimum design loads: The minimum design loads on existing elements of a structure that do not support additional loads as a result of an alteration shall be the loads applicable at the time the building was constructed.

- The renovation will not change the minimum design loads on the structure. Existing design loads are not known for the 1903 and 1923 portions of the building since there are no structural drawings and the member sizes and spacing are not known. Design live loads for 1979 Building are not noted on the Construction Drawings, except the snow loading. The wood framing at the 1979 building first floor does not appear to be adequately designed for library stack loading since columns and steel plates were added after original construction. If the 1979 portion of the building remains, the framing should be reviewed for library live loads in accordance with the building code.

**707.4** Existing structural elements carrying gravity loads: Alterations shall not reduce the capacity of the existing gravity load-carrying structural elements unless it is demonstrated that the elements have the capacity to carry the applicable design gravity loads required by the International Building Code. Exceptions include structural elements whose stress is not increased by more than 5 percent.

- Design loads will be reviewed, but should remain unchanged at the existing structure. Structural elements will be reviewed at altered areas of the structure.

**707.5** Existing structural elements resisting lateral loads: Any existing lateral load-resisting structural element whose demand-capacity ratio with the alteration considered is more than 10 percent greater than its demand-capacity ratio with the alteration ignored shall comply with the structural requirements specified in Section 807.4.

- The existing unreinforced concrete masonry walls provide lateral support for the building. Modifications to the existing building to change wall locations or details will likely increase the demand capacity of the walls by more than 10% and will require an analysis and most likely new structural elements to resist the Code mandated loads. New elements may include reinforced CMU shear walls or structural steel bracing. If the 1923 and 1979 portions of the building are demolished and a new addition built adjacent to the 1903 building, the new building will be structurally isolated from the 1903 building and the 1903 building will be reviewed.

**707.6** Voluntary improvement of the seismic force-resisting system: Alterations to existing structural elements or addition of new structural elements that are not otherwise required by this chapter and are initiated for the purpose of improving the performance of the seismic force-resisting system of an existing structure or the performance of seismic bracing or anchorage of existing nonstructural elements shall be permitted, providing that an engineering analysis is submitted demonstrating the following:

- The altered structure and the altered nonstructural elements are no less conforming with the provisions of this code with respect to earthquake design than they were prior to the alteration.
- New structural elements are detailed and connected to the existing structural elements as required by Chapter 16 of the International Building Code.
- New or relocated nonstructural elements are detailed and connected to existing or new structural elements as required by Chapter 16 of the International Building Code.
- The alterations do not create a structural irregularity as defined in ASCE 7 or make an existing structural irregularity more severe.
- It would be our intention to present improvement options to the Owner as part of a renovation to be included in future work. Improvements to the 1903 and 1923 structures may be cost prohibitive with the current unreinforced masonry bearing wall system, but options could be explored during the design process.

### **Level 3 Structural Requirements:**

**807.2** New structural elements: New structural elements shall comply with Section 707.2.

- New structural elements will comply with the IBC, per 707.2.

**807.3** Existing structural elements carrying gravity loads: Existing structural elements carrying gravity loads shall comply with 707.4.

- The 1903 portion of the building should remain unchanged and structural elements will not change. If the 1923 and 1979 portions of the building remain, we recommend reviewing the 1979 floor structure due to concerns of the gravity load carrying capacity of the elements.

**807.4** Structural alterations: All structural elements of the lateral-force-resisting system undergoing Level 3 structural alterations or buildings undergoing Level 2 alterations as triggered by Section 707.5 shall comply with this section.

- Alterations to the building structure will be reviewed for conformance to this section. If the building undergoes a renovation/addition that includes demolition and modification of the existing structure, the building will need to be analyzed to support the code mandated loads. Should the 1923 and 1979 portions of the building undergo substantial demolition and new construction, the remaining lateral-force-resisting systems will be reviewed. Based on our review of the buildings, the 1923 Addition uses unreinforced masonry bearing walls to resist lateral forces. The 1979 addition does not appear to have a dedicated lateral-force resisting system, but may

use metal stud wall systems to resist loads. Modification to the 1979 structure would require verification of a metal stud system, or providing a new system during the renovation to the structure.

**807.4.1 Evaluation and analysis:** An engineering evaluation and analysis that establishes the structural adequacy of the altered structure shall be prepared by a registered design professional and submitted to the code official.

- Renovation to the interior finishes and systems is acceptable without a detailed analysis, but if interior partitions or portions of the building are subject to demolition, an analysis will need to be completed. It should be understood that the existing lateral force resisting system was not designed or detailed in accordance with the current seismic code in mind. Options 2a and 2b will likely require new seismic force resisting elements in order to conform to the Code. Option 3 will return the 1903 structure to its original layout, except the new masonry openings in the current connector. We would review the existing openings and possibly infill or strengthen the openings with reinforced CMU to meet the original design intent of the structure.

**807.4.2 Substantial structural alteration:** Where more than 30 percent of the total floor area and roof areas of the building or structure have been or are proposed to be involved in structural alterations within a 12-month period, the evaluation and analysis shall demonstrate that the altered building or structure complies with the International Building Code for wind loading and with the reduced International Building Code level seismic forces as specified in Section 101.5.4.2 for seismic loading. For seismic considerations, the analysis shall be based on one of the procedures specified in Section 101.5.4. The areas to be counted toward the 30 percent shall be those areas tributary to the vertical load-carrying components, such as joists, beams, columns, walls and other structural components that have been removed, added or altered, as well as areas such as mezzanines, penthouses, roof structures and in-filled courts and shafts.

- Based on preliminary planning, more than 30 percent of the total floor area of the building will be structurally altered by demolishing portions of the 1923 and 1979 buildings. The remaining portion of the building will remain will be reviewed. With these requirements, we would recommend either demolishing the 1923 & 1979 additions entirely, or installing new reinforced CMU shear walls in the 1923 & 1979 additions if they are partially demolished. If the additions are not demolished, or less than 30 percent of the floor area is demolished, then this requirement does not need to be followed.

**807.4.3 Limited structural alteration:** Where not more than 30 percent of the total floor and roof areas of the building are involved in structural alteration within a 12-month period, the evaluation and analysis shall demonstrate that the altered building or structure complies with the loads applicable at the time of the original construction or of the most recent substantial structural alteration as defined by Section 807.4.2. Any existing structural element whose demand-capacity ratio with the alteration considered is more than 10 percent greater than its demand-capacity ratio with the alteration ignored shall comply with the reduced International Building Code level seismic forces as specified in Section 101.5.4.2. For the purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with sections 1609 and 1613 of the International Building Code with Massachusetts Amendments. For purposes of this section, comparisons of demand-capacity ratios and calculation of design lateral loads, forces, and capacities shall account for the cumulative effects of additions and alterations since original construction.

- The existing systems will be reviewed if there is a limited structural alteration. If the 1923 or 1979 buildings are only partially demolished, we anticipate installing new seismic force resisting elements. If the 1923 and 1979 buildings are completely

removed, the 1903 building will return to its original design and the new addition will be structurally isolated and conform to the current Building Code.

### **Conclusions and Recommendations:**

The purpose of this report is to identify Massachusetts State Building Code requirements that will need to be addressed during a substantial renovation, which we understand, is being considered for the Shrewsbury Public Library. This report, in addition to the "Existing Structural Conditions" report, shall be used as the basis for the renovation. The following items are meant to highlight Building Code requirements triggered by the renovation, but do not limit the work required.

#### General Information:

- Existing building area is 25,400 ft<sup>2</sup>.
  - 1903 Building: 6,600 ft<sup>2</sup>
  - 1923 Addition: 7,200 ft<sup>2</sup>
  - 1979 Addition: 11,600 ft<sup>2</sup>
  - Credit Union: 4,700 ft<sup>2</sup>
- Three schemes are being investigated:
  1. General repairs and maintenance.
  - 2a. Complete renovation to existing Library buildings, build connector to Credit Union building, and renovate Credit Union for Library use.
  - 2b. Complete renovation to existing Library buildings, demolish Credit Union building, and construct addition on Credit Union site.
  3. Renovate 1903 Building, Demolish 1923 & 1979 Additions, Demolish Credit Union, and Construct Addition on existing site.
- The proposed Options 2b and 3 will result in a finished building of approximately 40,000 ft<sup>2</sup>.
- Any structural work associated with Option 1 shall conform to the International Existing Building Code, as amended by the Massachusetts State Building Code, and specifically any additional requirements for Level 1, or 2, work, depending on the scope of work.
- Any structural work associated with Options 2a, 2b, and 3 shall conform to the International Existing Building Code, as amended by the Massachusetts State Building Code, and specifically any additional requirements for Level 3 work.

#### Structural Requirements for Renovation/Addition:

- Geotechnical exploration will be required for any new construction, as well as any structural foundation work to the existing building.
- Roof snow loads:
  - Original: Unknown at 1903 & 1923 Buildings. 1979 Addition snow load was 40 psf.
  - Additions: In accordance with Massachusetts State Building Code.
- Lateral load resisting systems (unreinforced masonry or metal stud walls) at 1903, 1923, & 1979 buildings will need to be strengthened at renovations that have structural modifications.
  - New shear walls or bracing systems may be required at partial demolition areas. If the existing building/addition remains unchanged, the current system may remain.
- Unreinforced masonry walls will need to be reviewed at re-roofing areas for adequate anchorage to the roof diaphragms to resist wind and seismic loads.

Based on our review of the existing conditions, as well reviewing Chapter 34 of the Massachusetts State Building Code, it is our professional opinion that the existing building is capable of being structurally renovated and reused as a library. Changes to the existing unreinforced masonry walls will trigger significant upgrading of the seismic force-resisting system and installing new structural elements.

Christopher Tutlis, PE  
Bolton & DiMartino, Inc.

**NOTE:** LPA narrative commentary to Architectural Access Board (AAB) references is in shaded text.

521 CMR 3.00: **JURISDICTION**

**3.3 EXISTING BUILDINGS**

All *additions* to, *reconstruction*, *remodeling*, and *alterations* or *repairs* of existing *public buildings* or *facilities*, which require a building permit or which are so defined by a state or local inspector, shall be governed by all applicable subsections in **521 CMR 3.00: JURISDICTION**.

For specific applicability of 521 CMR to existing multiple dwellings undergoing renovations, see **521 CMR 9.2.1**.

The existing building is considered to be a public building (see Section 5 Definitions). The proposed work is assumed to include an addition (elevator hoistway and associated spaces), reconstruction, remodeling alterations and repairs.

**3.3.2** If the work performed, including the exempted work, amounts to 30% or more of the *full and fair cash value* (see **521 CMR 5.00**) of the *building* the entire *building* is required to comply with 521 CMR.

a. Where the cost of constructing an *addition* to a building amounts to 30% or more of the *full and fair cash value* of the existing *building*, both the *addition* and the existing *building* must be fully *accessible*.

The assessed value of the building only, per Vision Appraisal card dated 5/17/13, is \$1,538,300. DOR assessment ratio for the Town of Shrewsbury is 0.95. "Full and fair cash value" is therefore \$1,619,263 and the 30% threshold is \$485,779. Accordingly, Section 3.3.2 would apply and the entire building would be required to comply with 521 CMR; or, AAB waivers will be required for specific items.

The assessed value of the Credit Union building only, per Vision Appraisal card date 5/17/13, is \$551,100. DOR assessment ratio for the Town of Shrewsbury is 0.95. "Full and fair cash value" is therefore \$580,105 and the 30% threshold is \$174,032.

**3.9 HISTORIC BUILDINGS**

An historic *building* or *facility* that is listed or is eligible for listing in the National or State Register of Historic Places or is designated as historic under appropriate state or local laws may be granted a *variance* by the *Board* to allow alternate accessibility. If a variance is requested on the basis of historical significance, then consultation with the Massachusetts Historical Commission is required in order to determine whether a building or facility is eligible for listing or listed in the National or State Register of Historic Places. The Massachusetts Historical Commission may request a copy of the proposed variance request and supporting documentation to substantiate the variance request and its effect on historic resources. A written statement from the Massachusetts Historical Commission is required with the application for variance.

The existing building is on the MA Cultural Resource Information System (MACRIS) inventory as well as being located within a Local and National Register District. A Building Demolition Delay Waiver is not required.

**3.12 NON-OCCUPIABLE SPACES**

Spaces accessed only by ladders, catwalks, crawl spaces, or freight (non-passenger) elevators, and frequented only by service personnel for repair purposes, are exempt. Such spaces may include, but are not limited to, elevator pits, elevator penthouses, piping or equipment catwalks.

**5.00 DEFINITIONS**

**ACCESSIBLE ROUTE:** A continuous, unobstructed path connecting all *accessible* elements and spaces within or between *buildings* or *facilities*. Interior *accessible routes* may include corridors, floors, *ramps*, elevators, lifts, and *clear floor space* at fixtures. Exterior *accessible routes* may include parking, *access aisles*, *curb cuts*, crosswalks at vehicular ways, *walks*, *ramps*, and lifts.

**ADDITION:** An extension or increase in floor area or height of a *building* or structure.

**ALTERATIONS:** A change or modification of a *building* or structure, or portion thereof, that requires a building permit. Alterations shall include but not be limited to: *remodeling*, renovation, rehabilitation, *reconstruction*, historic restoration, changes or rearrangements in the plan configuration of walls and full height partitions, and any *repairs* which require a building permit. Ordinary *repairs* as defined in 780 CMR: The State Building Code are not alterations.

**ASSEMBLY AREA:** A room or space accommodating a group of individuals for recreational, educational, political, social, or amusement purposes or for the consumption of food and drink.

**EGRESS, MEANS OF:** A continuous and unobstructed path of travel from any point in a *building* or structure to a public way and consisting of three separate and distinct parts: (a) the exit access, (b) the exit, and (c) the exit discharge. A *means of egress* comprises the vertical and horizontal means of travel and shall include intervening room spaces, doorways, hallways, corridors, passageways, balconies, ramps, stairs, enclosures, lobbies, horizontal exits, courts and yards.

An *accessible means of egress* is one that complies with 521 CMR and does not include stairs, steps, or escalators. *Areas of rescue assistance* or evacuation elevators may be included as part of *accessible means of egress*.

**PUBLIC BUILDING:**

a. A *building* privately or publicly financed that is open to and used by the public, including but not limited to transportation terminals, institutional buildings, educational buildings, commercial buildings, buildings having places of assembly, hotels, motels, dormitories, *multiple dwellings* consisting of three or more units, 5% of the units in lodging or residential facilities for rent, hire or lease containing 20 or more units, public use and common use areas of apartment buildings and condominiums, parking lots of 15 or more automobiles, public sidewalks and ways, funeral homes, and public rest rooms, and public areas of shopping centers and restaurants.

b. A *building* constructed by the Commonwealth or any political subdivision thereof with public funds and open to public use, including but not limited to those constructed by public housing authorities, the Massachusetts Port Authority, the Massachusetts Parking Authority, the Massachusetts Turnpike Authority, the Massachusetts Bay Transportation Authority, and building authorities of any public educational institution or their successors.

**PUBLIC USE:** Describes interior or exterior rooms or spaces that are made available to the general public. Public use may be provided at a *building* or *facility* that is privately or publicly owned.

**ZONE OF REACH:** An operable mechanism is within reach if it meets either criteria outlined in **521 CMR 6.5, Forward Reach** or **521 CMR 6.6, Side Reach**.

Refer to 521 CMR 6

**521 CMR 11.00: COMMERCIAL BUILDINGS**

**11.1 GENERAL**

The design of commercial *buildings* shall comply with 521 CMR, except as specified or modified in 521 CMR 11.00. Commercial *buildings* are *public buildings* as defined in 521 CMR and shall include but not be limited to: the part or parts of *buildings* where a service or product is offered to the public and into which a member of the public may enter including but not limited to: doctors', dentists', and counseling offices, chiropractors', psychologists' and psychiatrists' offices, lawyers', and accountants' offices, insurance companies, veterinarians, realtors, travel agents, as well as city and town halls and *facilities*.

Most of the building may be considered "commercial" as the library's offered services are for the public and thus, the public may enter those spaces. Therefore, the public toilets and telephones (if provided for public use) and transaction areas must comply with 521 CMR as noted below.

**11.4 PUBLIC TOILETS**

Wherever public toilets are provided for customers, visitors or clientele of said businesses, they are

required to comply fully with **521 CMR 30.00: PUBLIC TOILETS**.

Refer to comments under 521 CMR 30 below.

#### 11.5 PUBLIC TELEPHONES

Wherever public telephones are provided for customers, visitors or clientele of said businesses, they are required to comply fully with **521 CMR 37.00: PUBLIC TELEPHONES**.

No existing public telephones were observed.

#### 11.6 TRANSACTION AREAS

Transaction areas in commercial buildings shall comply with **521 CMR 7.2.2 Other transaction areas**.

Refer to comment below in section 12.2.3

### 521 CMR 12.00 EDUCATIONAL FACILITIES

#### 12.1 GENERAL

Educational *facilities* shall comply with 521 CMR, except as specified or modified in 521 CMR 12.00. Educational *facilities* shall include but not be limited to: public and private schools, nurseries, pre-schools, day care facilities, colleges and universities, libraries, galleries, museums, and training *facilities*.

As this is a library, the building shall be considered an “educational facility.”

12.1.1 Applicability: Administrative spaces, instructional spaces, and areas open to students or the general public shall comply with 521 CMR.

#### 12.2 LIBRARIES

Shall comply with the following and **Figure 12a**.

12.2.1 General: All public areas of a library, including but not limited to, reading and study areas, stacks, reference rooms, reserve areas, and special *facilities* or collections, shall comply with **521 CMR 12.00**.

12.2.2 Reading Areas, Study Areas and Computer Workstations: Where tables, study carrels, computer workstations, or fixed seating are provided, at least 5% with a minimum of one of each *element* shall be *accessible*, be on an *accessible route*, and comply with the following:

- a. *Access aisles*: A 36 inch (36" = 914mm) *access aisle* shall be provided between tables and between study carrels. No seating shall overlap the *access aisle*. **See Fig. 12a**.
- b. *Clear floor space* as defined in **521 CMR 5.00: DEFINITIONS** shall be provided at each seating space. Such *clear floor space* shall not overlap knee space by more than 19 inches (19" = 483 mm). **See Fig. 12a**.
- c. *Knee Clearances*: If seating for disabled persons is provided at tables or counters, kneespaces at least 27 inches (27" = 686mm) high, 30 inches (30" = 762mm) wide, and 19 inches (19" = 483mm) deep shall be provided. **See Fig. 12a**.
- d. *Height of Tables or Counters*: The tops of *accessible* tables and counters shall be from 28 inches to 34 inches (28" to 34" = 711mm to 864mm) above the finished floor or ground.

12.2.3 Check-Out Areas: At least one lane at each check-out area shall have a counter a minimum of 36 inches (36" = 914mm) in length and a maximum of 36 inches (36" = 914mm) in height. **See Fig. 7a**.

The existing main circulation counter at the first floor of the 1979 addition and the circulation counter in the basement of the 1923 addition both have counter length and height that meet the requirements.

12.2.4 Security Devices: Any traffic control or book security gates or turnstiles shall not prevent access or *egress* to people in wheelchairs. Security gates shall have a 32 inch (32" = 812mm) *clear opening*. If turnstiles are used, an adjacent *accessible*, unlocked door or gate shall be provided. Any *level* changes created by such devices shall comply with **521 CMR 20.00: ACCESSIBLE ROUTE** and **521 CMR 29.00: FLOOR SURFACES**.

Security devices were observed at both the north and south main entry points of the 1979 addition

and were greater than 32" clear in width.

12.2.5 Card Catalogs: *Clear aisle space* at card catalogs shall be a minimum of 36 inches (36" = 914mm) and comply with **Fig. 12b**. Maximum reach height shall be between 18 inches (18" = 457mm) and 54 inches (54" = 1372mm), with a height of 48 inches (48" = 1219mm) preferred.

12.2.6 Stacks: Aisles between stacks shall have a minimum *clear* width of 36 inches (36" = 914mm) and preferably 42 inches (42" = 1067mm), where possible, as shown in **Fig. 12c**. Shelf height in stack areas is unrestricted.

The existing stacks throughout the library varied in clear width. However, measurements taken at various locations were observed to be not less than 36". Note that not all stack areas were measured.

**521 CMR 14.00: PLACES OF ASSEMBLY**

**14.1 GENERAL**

Places of assembly shall comply with all parts of 521 CMR, except as specified or modified in 521 CMR 14.00. Places of assembly shall include but not be limited to theaters, auditoriums, armories, lecture halls, arenas, stadiums, banquet rooms and conference rooms. Associated, support, or related areas, including but not limited to press boxes, lobbies, ticket offices, seating, stages, backstage areas, dressing rooms, toilet rooms, showers and green rooms, shall also be *accessible*.

The Meeting Room/Assembly area on the Second Floor of the 1903 building is considered a place of assembly

**14.2 NUMBER OF ACCESSIBLE SEATS**

Wheelchair spaces: In places of assembly with fixed seating, the minimum number of *accessible spaces* shall be computed in accordance with the following table:

NA; fixed seating is not provided.

**14.5 ASSISTIVE LISTENING SYSTEMS**

In *spaces* such as concert and lecture halls, playhouses, movie theaters, and meeting rooms, *assembly areas* shall comply with the following:

14.5.1 An *assembly area* shall have a permanently installed assistive listening system if:

- a. the *assembly area* accommodates at least 50 persons, or
- b. if it has an audio-amplification system, and fixed seating.

The 2<sup>nd</sup> floor Meeting Room/Assembly occupant load exceeds 50 (based on 1,167 SF/7 SF per occupant for concentrated non-fixed seating= 167 occupants); a permanently installed assistive listening system is required.

14.5.4 *Signage* shall be installed to notify patrons of the availability of a listening system and shall comply with **521 CMR 41.00: SIGNAGE**.

Provide signage; refer to 521 CMR 41.

**521 CMR 20.00: ACCESSIBLE ROUTE**

**20.1 GENERAL**

An *accessible route* shall provide a continuous unobstructed path connecting *accessible spaces* and *elements* inside and outside a *facility*. *Accessible routes* may include but are not limited to *walks*, halls, corridors, aisles, skywalks, and tunnels. *Accessible routes* may not include stairs, steps, or escalators, even if the stairs and steps are required to be *accessible* under 521 CMR.

Refer to 521 CMR 20.2-12 below for requirements pertaining to accessible route.

**20.2 LOCATION**

Within the boundary of the *site*, an *accessible route(s)* shall be provided from *accessible parking*, *accessible* passenger loading zones, and public streets or *sidewalks* to the *accessible building entrance* they serve. The *accessible route(s)* shall coincide with the route for the general public.

There are multiple existing entry points into the building. The existing main entry is on the 1<sup>st</sup> floor north side of the building, between the 1923 and 1979 additions, near the parking area and is

handicap accessible. However, the remaining existing entry points are not accessible; a ramp or lift is required to comply with 521 CMR if these entrances are to continue as entries. The two existing accessible parking spaces are up against the north side of the 1923 addition but do not appear to meet slope requirements. The Lounge located on the second floor of the 1923 addition is also not accessible.

20.2.1 At least one *accessible route* shall connect *accessible buildings, facilities, elements and spaces* that are on the same *site*.

An outdoor picnic table exists on the south side of the 1979 addition and is currently accessible. Confirmation from Owner needs to be made to determine whether or not it will remain as a public space. Furthermore, the outdoor paved patio space on the East side of the 1923 addition appears to not be accessible as the only door that opens to it is less than 32" clear.

### 20.3 WIDTH

An *accessible route* shall have a minimum *clear* width of 36 inches except at doors and at openings less than 24 inches deep where it shall comply with **521 CMR 26.00: DOORS AND DOORWAYS**

### 20.4 TURNS

If a person in a wheelchair must make a turn around an obstruction, the minimum *clear* width of the *accessible route* shall comply with **Fig. 20a or 20b**

### 20.5 PASSING SPACE

If an *accessible route* has less than 60 inches *clear* width, then passing *spaces* at least 60 inches by 60 inches shall be located at intervals not to exceed 200 feet. A T-intersection of two corridors or walks is an acceptable passing place.

### 20.6 PROTRUDING OBJECTS

Objects shall not reduce the *clear* width of an *accessible route* or maneuvering *space* (see **Fig. 20c**) and must comply with **521 CMR 20.6.1**.

20.6.1 Objects projecting from walls (for example, telephones) with their leading edges between 27 inches and 80 inches above the finished floor shall protrude no more than four inches into walks, halls, corridors, passageways, or aisles and shall not have sharp or abrupt edges. See **Fig. 20d**.

Existing wall-mounted light fixtures at the basement floor by the toilet core of the 1979 addition and by the elevator of the 1979 addition have their bottom edge at 71" and protrude 7" from the wall. This does not meet accessibility requirements. An existing wall-mounted fire extinguisher in the basement by the elevator also does not meet this requirement. Furthermore, the exterior door in the 1903 stairway has a closer located less than 80" above the finish floor.

20.6.2 Objects mounted with their leading edges at or below 27 inches above the finished floor may protrude any distance as long as they do not reduce the *accessible route* below 36 inches. See **Fig. 20e**.

20.6.3 Free-standing objects mounted on posts or pylons may have a maximum overhang of 12 inches measured between 27 inches and 80 inches above the ground or finished floor. See **Fig. 20f**.

### 20.7 HEADROOM

*Walks, halls, corridors, passageways, aisles, or other circulation spaces* shall have a minimum of 80 inches *clear* headroom. See **Fig. 20d**. If vertical clearance of an area adjoining an *accessible route* is reduced to less than 80 inches, a barrier shall be provided to warn blind or visually-impaired persons of the reduced headroom. See **Fig. 20g**.

### 20.8 SURFACE TEXTURES

The surface of an *accessible route* shall comply with **521 CMR 29.00: FLOOR SURFACES**.

Refer to 521 CMR 29

### 20.9 SLOPE AND CROSS SLOPE

An *accessible route* with a *running slope* steeper than 1:20 (5%) is a *ramp* and shall comply with **521 CMR 24.00: RAMPS**. Nowhere shall the *cross slope* of an *accessible route* exceed 1:50 (2%). (Refer to

521 CMR 2.4.4d)

Refer to 521 CMR 24

**20.10 CHANGES IN LEVELS**

Changes in levels along an *accessible route* shall comply with **521 CMR 29.2, Level Changes**. See **Fig 20h**.

Refer to 521 CMR 29

**20.11 EGRESS**

*Accessible routes* serving any *accessible space* or *element* shall also serve as a *means of egress* for emergencies or connect to an *accessible area of rescue assistance*.

20.11.1 All *spaces* or *elements* required to be accessible by 521 CMR shall be provided with no less than one accessible *means of egress*.

a. Where more than one *means of egress* is required under 780 CMR (The Massachusetts State Building Code) from any *accessible space* or *element*, each space or element shall be served by not less than two accessible *means of egress*.

Exception: For the purpose of 521 CMR 20.11, fire escapes shall be exempt.

The Meeting Room/Assembly with an occupant load of 167 will require two accessible means of egress (note that, per 521 CMR, an accessible means of egress may not include stairs). One means of egress leads to a stair and the other to an elevator AND stair, all of which are currently not accessible.

20.11.2 The exit discharge shall provide a continuous path of travel from an *exit* to a public way by means of a *walkway* or a *ramp*.

a. Where public ways are further than 100 feet from an exit, exterior *areas of rescue assistance* complying with 20.12.2 may be constructed along the exit discharge located no closer than 100 feet from the building.

b. in buildings where the grade at the level of exit discharge prohibits construction of either a *walkway* or a *ramp*, a portion of an exterior exit balcony located immediately adjacent to an emergency exit complying with 521 CMR 20.12.2 may be constructed as an *area of rescue assistance*.

**20.12 AREAS OF RESCUE ASSISTANCE**

Shall be provided where an *accessible means of egress* is not provided and shall comply with the following requirements:

Exception: *Areas of rescue assistance* are not required in:

- a. existing buildings undergoing alterations, remodeling, reconstruction
- b. *buildings* or *facilities* having a supervised automatic sprinkler systems
- c. tunnels;
- d. open air parking garages and open air transit stations

Areas of rescue assistance are not required because the existing building will be equipped with a supervised automatic sprinkler system.

**521 CMR 21.00: CURB CUTS**

**21.1 GENERAL**

Whenever *sidewalks*, *walkways*, or curbs on streets and ways are *constructed*, *reconstructed*, or *repaired*, *curb cuts* are required. All *curb cuts* shall comply with the following:

Refer to CMR 521 21 for location, slope, transitions, drainage, width and other details associated with Curb Cuts. The existing main entry on the north side of the 1979 addition has a curb cut at the entrance drop-off, adjacent to the parking area that is located in a depression which collects pooled water and ice during inclement weather.

521 CMR 22.00: WALKWAYS

22.1 GENERAL

Walkways shall include but not be limited to all walks, sidewalks, overpasses, bridges, tunnels, underpasses, plazas, courts and other pedestrian pathways, and shall comply with the following requirements:

Refer to CMR 521 22 for width, grade, level changes, surface, drainage, gratings, intersections, and other details associated with Walkways.

521 CMR 23.00: PARKING AND PASSENGER LOADING ZONES

23.1 GENERAL

Any person who has lawful control of improved or enclosed private property used as off-street parking for businesses, auditoriums, sporting or recreational facilities, cultural centers, or general public use where the public has the right of access as invitees or licensees, shall cause such parking areas, including temporary parking areas to comply with 521 CMR. For parking related to residential and transient lodging facilities, See 521 CMR 8.00: TRANSIENT LODGING FACILITIES and 521 CMR 10.3, Parking Spaces

Refer to CMR 521 23 for Location, Parking Spaces, Sidewalks, Signage, and other details associated with Parking and Passenger Loading Zones. The existing designated handicap spaces do not comply with sloping requirements.

23.2 NUMBER

Accessible spaces shall be provided as follows:

23.2.1 Total Parking in Lot Required	Minimum Number of Accessible Spaces
15-25	1
26-50	2
51-75	3

Only visitor/staff parking spaces are subject to the requirements stated in 521 CMR 23.2 Number above; refer also to 521 CMR 10.3 above. The existing Library parking lot contains approximately 44 standard spaces and 2 non-accessible handicap spaces. The existing Credit Union contains approximately 44 standard spaces and 2 compliant spaces (including 1 van accessible space).

23.2.2 One in every eight accessible spaces, but not less than one, shall be van accessible, See 521 CMR 23.4.7.

At least one space must be van-accessible with an 8' access aisle. None currently provided in existing library parking lot.

521 CMR 24.00: RAMPS

24.1 GENERAL

Any part of an accessible route with a slope greater than 1:20 (5%) shall be considered a ramp and shall comply with the requirements of 521 CMR 24.00.

Refer to CMR 521 24 for Slope and Rise, Width, Landings, Handrails, Cross Slope, Surfaces, Edge Protection, Outdoor Conditions, and other details associated with Parking and Passenger Loading Zones.

521 CMR 25.00: ENTRANCES

25.1 GENERAL

All public entrance(s) of a building or tenancy in a building shall be accessible. Public entrances are any entrances that are not solely service entrances, loading entrances, or entrances restricted to employee use only.

The main public entrance to the library is at the north end of the 1<sup>st</sup> floor 1979 addition. Presently, there is a curb cut from the parking lot to the concrete walkway in front of the entry doors.

Refer to CMR 521 25 for Approach, Vestibules, Mats and Grates, Protruding Objects, Signage, and

other details associated with Parking and Passenger Loading Zones.

521 CMR 26.00: **DOORS AND DOORWAYS**

26.1 **GENERAL**

All doors and openings along *accessible routes* shall comply with the following requirements.

Various doors throughout the entire building do not comply with 521 CMR with regard to width, height, clearances, and hardware. Any doors along accessible routes (connecting public entrances, corridors, elevator, public toilet rooms, and any other spaces open to the public), must comply with this section or AAB waivers will be required for specific items.

Refer to CMR 521 26 for Double-Leaf Doors, Width, Maneuvering Clearance, Doors in Series, Door Opening Force, Door Closers, Thresholds, Door Hardware, and other details associated with Parking and Passenger Loading Zones.

521 CMR 27.00: **STAIRS**

27.1 **GENERAL**

All stairs are required to comply with the following:

27.2 **TREADS AND RISERS**

On any given flight of stairs, all steps shall have uniform riser heights and uniform tread widths. Open risers are not permitted. *See Fig. 27a.*

Existing steps have uniform risers and treads (within each flight). No open risers were observed.

27.3 **NOSINGS**

The undersides of nosings shall not be abrupt. The radius of curvature at the leading edge of the tread shall be no greater than ½ inch. Risers shall be sloped or the underside of the nosing shall have an angle not less than 60 degree from the horizontal. Nosings shall project no more than 1½ inches. *See Fig. 27b.*

Existing risers were observed to be sloped. However, the risers in the stairway of the 1903 building are not.

27.4 **HANDRAILS**

Handrails shall have the following features:

27.4.1 Location: Stairways shall have continuous handrails at both sides of all stairs. The inside handrail on switchback or dogleg stairs shall always be continuous. *See Fig. 27c.*

27.4.2 Height: Top of handrail gripping surface shall be mounted between 34 inches and 38 inches above stair nosings. Handrails shall be measured vertically from the top of the gripping surface of the handrails to the stair nosing.

27.4.3 Extensions: Where handrails terminate at the top and bottom of a stair run, they shall have extensions that comply with the following:

a. At the top, extend at least 12 inches beyond the top riser and parallel with the floor or ground surface. *See Fig. 27d.*

b. At the bottom, extend at least 12 inches plus the width of one tread beyond the bottom riser. The handrail shall continue to slope for a distance of the width of one tread from the bottom riser; the remainder of the extension shall be horizontal. *See Fig. 27d.*

c. Handrail extensions need not extend if it would cause a safety hazard or if *space* does not permit.

Extensions shall comply with **521 CMR 20.6, Protruding Objects.**

27.4.4 Size: Handrails shall have a circular cross section with an outside diameter of 1¼ inches minimum and two inches maximum.

27.4.5 Shape: The handgrip portion of the handrail shall be round or oval in cross-section. *See Fig. 27e.*

27.4.6 Surface: The gripping surface shall be continuous so that a hand can move from end to end without interruption by newel posts or other obstructions, and shall be free of any sharp or abrasive *elements*.

27.4.7 Clearance: When a handrail is mounted adjacent to a wall, the *clear space* between the handrail and the wall shall be 1½ inches (1½" = 38mm). Handrails may be located in a wall recess if the recess is a

maximum of three inches (3" = 76mm) deep and extends at least 18 inches (18" = 457mm) above the top of the rail.

27.4.8 End condition: Ends of handrails shall be either rounded or returned smoothly to floor, wall, or post. Extensions on handrails which are not attached to walls shall be returned smoothly to the floor or a post.

27.4.9 Handrails shall not rotate within their fittings.

The existing handrails do not fully comply with CMR 521. Railings are mounted too low, lack the required extensions at top/bottom, are too large in cross-section, are not continuous, and lack guardrails. Either modifications are required or AAB waivers will be required for specific items.

### 27.6 OUTDOOR CONDITIONS

Outdoor stairs and their approaches shall be designed so that water will not accumulate on walking surfaces.

### 521 CMR 28.00: ELEVATORS

#### 28.1 GENERAL

In all multi-story buildings and facilities, each level including mezzanines, shall be served by a passenger elevator. If more than one elevator is provided, each passenger elevator shall comply with 521 CMR 28. Accessible elevators shall be on an accessible route and located within the space with which it is intended to serve. **Elevators are not required under the following exceptions.**

a. Buildings having only two levels may provide an interior accessible ramp complying with **521 CMR 24.00: RAMPS** in lieu of an elevator.

b. Buildings having only two levels, in which each level serves an unrelated use and in which there is no internal stair, do not require an elevator if each level is accessible.

c. Freight elevators shall not be required to meet the requirements of **521 CMR 28.00** unless the only elevators provided are used as combination passenger and freight elevators for the public and employees.

d. Elevator pits, elevator penthouses, mechanical rooms, and piping or equipment catwalks shall not be required to meet the requirements for elevator access.

e. Where platform lifts are allowed to be installed in lieu of an elevator as per **521 CMR 28.12, Wheelchair Lifts/Limited Use Elevators.**

f. Multiple dwellings where all accessible rooms and all public use and common use spaces are on the accessible level.

g. Transient lodging facilities of less than three stories in height and where all accessible rooms and all public and common use spaces are on the accessible level.

There is an existing elevator between the 1903 and 1923 addition which does not meet minimum cab dimensional requirements and lack hall lanterns. An elevator is required based on the public use and common use spaces being located on several different non-accessible levels.

Refer to CMR 521 28 for Operation, Hall Call Buttons, Hall Lanterns, Door Jamb Markings, Doors, Elevator Car, Car Controls, Car Position Indicators, Emergency Communications, Illumination Levels and other details associated with Elevators.

### 28.12 WHEELCHAIR LIFTS/ LIMITED USE ELEVATORS:

Platform lift devices, shall comply with the following:

28.12.1 General: Vertical wheelchair lift devices and Limited use elevators may be used as a part of an accessible route of travel in lieu of an elevator under any of the following circumstances.

a. To provide an accessible route to a performing area (stage) in an assembly occupancy.

b. To comply with the wheelchair viewing position line-of-sight and dispersion requirements of **521 CMR 14.4.1.**

c. In existing buildings where no other work is being performed, except for the installation of a vertical wheelchair lift.

d. In existing *buildings* of less than three *stories* in height or that have less than 3000 square feet per *story* unless the *building* is a shopping center, a shopping mall, or the professional office of a health care provider.

e. To provide vertical access where the distance between floors is less than a full *story* and where a *ramp* is not feasible.

Use of Wheelchair lift devices and Limited use elevators is not permitted.

28.12.4 Inclined wheelchair lifts may be used as a part of an *accessible route* of travel in lieu of an elevator only under the following circumstances.

a. To provide an *accessible route* to a performing area (stage) in an assembly occupancy.

b. In an existing *building* where no other work is being performed and no other alternative is available such as a vertical wheelchair lift, limited use elevator or a *ramp*.

Use of Inclined wheelchair lifts is not permitted.

#### 521 CMR 29.00: FLOOR SURFACES

##### 29.1 GENERAL

Ground and floor surfaces including floors, *walks*, *ramps*, and *curb cuts* shall be stable, firm, slip resistant, and maintained with materials that ensure continued slip resistance.

521 CMR 29 applies to interior and exterior surfaces along the accessible route.

##### 29.2 LEVEL CHANGES

Ground and floor surfaces shall be of a common *level* throughout, except for the following permitted changes in *level*.

29.2.1 Changes in *level* up to and including ¼ inch may be vertical and without edge treatment. See **Fig. 29a**.

29.2.2 Changes in *level* greater than ¼ inch and less than ½ inch shall be beveled with a slope no greater than one-in-two (1:2) (50%). See **Fig. 29a**.

29.2.3 Changes in *level* greater than ½ inch are not allowed unless a *ramp*, *walkway*, or means of vertical access complying with 521 CMR is provided.

Thresholds are required for ¼" to ½" transitions. Transitions in excess of ½" require a sloped walk, ramp or other means of vertical access (i.e. an elevator). A wooden threshold on the basement floor of the 1979 addition between the Stack area and the stairway is greater than ½".

##### 29.3 CARPET

When carpet or carpet tile is used on a ground or floor surface, it shall comply with the following:

29.3.1 Material: Carpet material shall be high density, non-absorbent, and the maximum pile thickness shall be ½ inch.

29.3.2 Installation: Carpet shall be adhered directly to the floor or shall be stretched tautly and securely fastened to floor surfaces at all edges.

29.3.3 Exposed edges: Edges of carpet exposed to traffic shall have trim along the entire length of the exposed edge. Edges perpendicular to the path of travel shall have edging strips no higher than ¼ of an inch above the floor and shall have a beveled edge with a slope no greater than one-in-two (1:2) (50%).

29.3.4 Padding: If padding is installed, it shall not exceed ¼ of an inch in thickness and shall be secured taut to the floor.

The existing carpet was observed to meet the requirements.

##### 29.4 GRATINGS

If gratings are located in walking surfaces, then they shall have *spaces* no greater than ½ inch wide in one direction. If gratings have elongated openings, then they shall be placed so that the long dimension is perpendicular to the dominant direction of travel. See **Fig. 29b**.

NA

#### 521 CMR 30.00: PUBLIC TOILET ROOMS

**30.1 GENERAL**

Each public toilet room provided on a *site* or in a *building* shall comply with 521 CMR.

a. In each adult public toilet room, at least one water closet and one sink in each location shall be *accessible* to persons in wheelchairs, or a separate *accessible* unisex toilet room shall be provided at each location. Adult water closets shall comply with the provisions of **521 CMR 30.1 through 30.13**.

b. Where children's toilet rooms are provided, at least one water closet and one sink in each location shall be *accessible* to children in wheelchairs, or a separate *accessible* unisex toilet room shall be provided at each location. Children's toilet rooms shall comply with the provisions of **521 CMR 30.14 through 30.20**. For purposes of 521 CMR, pre-kindergarten school is defined as a school which serves children from infancy up until but not including kindergarten. Elementary school is defined as a school which serves grades kindergarten through six.

521 CMR 30 applies to toilet rooms available to the public.

Refer to CMR 521 30 for Vestibules, Doors, Clear Floor Space, Toilet Stalls, Water Closets, Grab Bars, Sinks, Urinals, Mirrors, Dispensers, Controls/Receptacles and other details associated with Public Toilet Rooms.

30.1.1 The installation of unisex toilet room in *lieu* of fully *accessible* men's and women's room is permitted by 521 CMR. *See also 521 CMR 30.2, Location.*

The core toilet rooms located on the basement floor of the 1979 addition as well as the single-user toilet rooms on the basement and first floors of the 1923 addition are not accessible. The core toilet rooms do not meet the door clearance requirements for push/pull and the handicap stalls contained within them also do not meet the door clearance requirements.

**30.2 LOCATION**

*Accessible* toilet rooms shall be on an *accessible route*. Where unisex toilet room(s) are provided, they shall be located in the same area as other toilet rooms.

Single-user public toilet rooms are not accessible as they do not meet door width, door clearance, and clear floor space requirements. Furthermore, they are not located in the same area as other toilet rooms.

**30.4 DOORS TO SINGLE USER TOILET ROOMS**

Doors to single user toilet rooms may swing into the room if the door has a self-closing device and maneuvering space is provided in accordance with **521 CMR 26.6**. The door may swing into the room if there is a clear floor space of 30 inches by 48 inches beyond the swing of the door.

The existing single-user toilet rooms located in the basement and first floor of the 1923 addition do not meet the clear floor space requirements.

**521 CMR 36.00: DRINKING FOUNTAINS**

**36.1 GENERAL**

Drinking fountains shall include water coolers. Drinking fountains, when provided, shall comply with the following requirements.

36.1.1 Where only one drinking fountain is provided on a floor it shall be *accessible*. A single drinking fountain can be installed by the use of a "high-low" fountain; *See Fig. 36a.*

Only 1 drinking fountain was observed throughout the building, located between the Men and Women core toilet rooms on the basement floor of the 1979 addition. Although it was not of the "high-low" type, it met the requirements for accessibility.

36.1.2 Where more than one drinking fountain is provided on a floor, one in each location shall be *accessible* and shall be on an *accessible route*.

**36.2 CLEARANCES**

Shall comply with the following:

36.2.1 Wall and post-mounted cantilevered units allowing only a front approach shall have a *clear knee*

*space* between the bottom of the apron and the floor or ground.

- a. The knee space shall be at least 27 inches (27" = 686mm) high, 30 inches (30" = 762mm) wide, and 17 inches to 19 inches (17" to 19" = 432mm to 483mm) deep. See **Fig. 36b** and **36c**.
- b. These units shall also have a minimum *clear floor space* to allow a person in a wheelchair to approach the unit facing forward. See **Fig. 36b** and **36c**.

36.2.2 Free-standing units not having a knee *space* under them shall have a *clear floor space* that allows a person in a wheelchair to make a parallel approach to the unit. See **Fig. 36d**. This *clear floor space* shall comply with **521 CMR 6.6, Side Reach**.

36.2.3 Built-in units shall comply with the following:

- a. Where a drinking fountain is cantilevered or wall mounted along an *accessible route* it shall comply with the requirements of **521 CMR 20.6, Protruding Objects**.
- b. Where a drinking fountain is cantilevered in a recess, the recess shall be not less than 30 inches (30" = 762mm) wide, and the fountain shall comply with **521 CMR 36.2.1**. See **Fig. 36e**.
- c. Where a drinking fountain is located in a recess and has no knee *space* below, the recess depth shall not exceed the fountain depth and the fountain shall have a *clear floor space* that allows a person in a wheelchair to make a parallel approach to the unit (See **Fig. 36d**). This *clear floor space* shall comply with **521 CMR 6.4, Clear Floor or Ground Space for Wheelchairs**.

### 36.3 SPOUT LOCATIONS

The spouts of drinking fountains and water coolers shall comply with the following:

36.3.1 Spouts shall be located at the front of the unit and shall direct the water flow in a trajectory that is parallel or nearly parallel to the front of the unit.

36.3.2 The spout shall provide a flow of water at least four inches (4" = 102mm) high to allow the insertion of a cup or glass under the flow of water.

36.3.3 On an *accessible* drinking fountain with a round or oval bowl, the spout must be positioned so the flow of water is within three inches (3" = 76mm) of the front edge of the fountain.

### 36.4 SPOUT HEIGHT

Spouts shall be no higher than 36 inches (36" = 914mm), measured from the floor or ground surface to the spout outlet. See **Fig. 36a**.

### 36.5 CONTROLS

Controls shall comply with the following:

36.5.1 Controls shall be front-mounted or side-mounted near the front edge of the drinking fountain.

36.5.2 Controls shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist. Knob-type faucets are not permitted. The force required to activate the controls shall be no greater than five lbs.

36.5.3 Other types of controls may be installed in addition to, but not instead of, hand operated controls.

## 521 CMR 39.00: CONTROLS

### 39.1 GENERAL

Controls and operating mechanisms in *accessible spaces*, along *accessible routes*, or as parts of *accessible elements* shall be *accessible* and shall comply with 521 CMR 39. For example: light switches and dispenser controls shall be accessible and shall comply with the requirements of 521 CMR 39.00.

### 39.2 CLEAR FLOOR SPACE

*Clear floor space* that allows a forward or a parallel approach by a person using a wheelchair shall be provided at controls, dispensers, receptacles, and other operable equipment.

### 39.3 HEIGHT

The highest operable part of controls, dispensers, receptacles, and other operable equipment shall be

placed within at least one of the reach ranges specified in **521 CMR 6.5, Forward Reach** and **521 CMR 6.6, Side Reach**.

39.3.1 Electrical and communications system receptacles on walls shall be mounted between 15 inches (15" = 381mm) and 48 inches (48" = 1219mm) above the floor, measured at the centerline of the lowest receptacle.

Exception: These requirements do not apply where the use of special equipment dictates otherwise or where electrical and communications systems receptacles are not normally intended for use by building occupants.

#### 39.4 LOCATION

All such controls shall be located at least 18 inches (18" = 457mm) from an interior corner.

#### 39.5 OPERATION

Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls shall be no greater than five lbs.

#### 521 CMR 40.00: ALARMS

##### 40.1 GENERAL

40.1.1 N/A

40.1.2 N/A

##### 40.2 AUDIBLE ALARMS

If provided, audible emergency alarms shall produce a sound that exceeds the prevailing equivalent sound level in the room or space by at least 15 dbA or exceeds any maximum sound level with a duration of 60 seconds by 5 dbA, whichever is louder. If an audible alarm in an adjacent space provides the proper decibel level within a room, then only the visual alarm is needed. Sound levels for alarm signals shall not exceed 120 dbA.

##### 40.3 VISUAL ALARMS

At a minimum, visual signal appliances, if provided, shall be provided in *buildings* and *facilities* in each of the following areas: restrooms, meeting rooms, hallways, lobbies, classrooms, and any general usage areas open to the public.

40.3.1 Visual alarm signal appliances shall be integrated into the *building* or *facility* alarm system. If single station audible alarms are provided, then single station visual alarm signals shall be provided.

40.3.2 Visual alarm signals shall have photometric features in accordance with NFPA 72, Section 7.5, 2002.

40.3.3 Visual alarm signals shall be located in accordance with NFPA 72, Section 7.5, 2002.

Visual alarms were not observed in the restrooms.

##### 40.4 AUXILIARY ALARMS

Units and *sleeping accommodations* shall have a visual alarm connected to the *building* emergency alarm system or shall have a standard 110-volt electrical receptacle into which such an alarm can be connected and a means by which a signal from the *building* emergency alarm system can trigger such an auxiliary alarm.

Not applicable

#### 521 CMR 41.00: SIGNAGE

##### 41.1 GENERAL

The following types of *signage* shall be provided:

41.1.1 Signs that designate permanent rooms and *spaces* shall comply with **521 CMR 41.2, 41.5** and **41.6**. These include toilet room signs, room numbers, stair signs, etc.

Exception: *Building* directories, menus, and all other signs that are temporary are not required to

comply.

41.1.2 Other signs that provide direction to, or information about, functional *spaces* of the *building* shall comply with **521 CMR 41.3, 41.4, and 41.6**.

41.1.3 Elements and *spaces* of *accessible facilities* which shall be identified by the International Symbol of *Accessibility* (See **Fig. 41a**) and which shall comply with **521 CMR 41.7, Symbols of Accessibility** are:

- a. Parking *spaces* designated as reserved for individuals with disabilities;
- b. *Accessible* passenger loading zones;
- c. *Accessible entrances* when not all are *accessible* (inaccessible *entrances* shall have directional *signage* to indicate the route to the nearest *accessible entrance*);
- d. *Accessible* toilet and bathing facilities when not all are *accessible*.
- e. *Emergency egress* signs, which are required to be illuminated.

#### 41.2 MOUNTING LOCATION AND HEIGHT

Where permanent identification is provided for rooms and *spaces*, signs shall be installed on the wall adjacent to the latch side of the door. Where there is no wall *space* to the latch side of the door, including at double leaf doors, signs shall be placed on the nearest adjacent wall.

41.2.1 Mounting location shall allow a person to approach within three inches (3" = 76mm) of *signage* without encountering protruding objects or standing within the swing of a door.

41.2.2 Mounting height shall be 60 inches (60" = 1524mm) above the finish floor to the centerline of the sign.

Signage was observed throughout the building; not all complied with 521 CMR 41, particularly the signage mounted on the doors to the Men's and Women's toilet rooms at the basement floor of the 1979 addition.

#### 41.3 CHARACTER PROPORTION

Letters and numbers on signs shall have a width-to-height ratio between 3:5 and 1:1, and a stroke-width-to-height ratio between 1:5 and 1:10.

#### 41.4 CHARACTER HEIGHT

Characters and numbers on signs shall have a width-to-height ratio between 3:5 and 1:1, and a stroke-width-to-height ratio between 1:5 and 1:10.

41.4.1 The minimum height of suspended or overhead characters is three inches (3" = 76mm) and is measured using an upper case X.

41.4.2 Lower case character are permitted.

#### 41.5 RAISED AND BRAILED CHARACTERS AND PICTORIAL SYMBOL SIGNS

Shall comply with the following:

41.5.1 Letters and numerals shall be raised one thirty-second of an inch (1/32" = 0.8mm), upper case, sans serif or simple serif type.

41.5.2 Letters and/or numerals shall be accompanied with Grade 2 *Braille*.

41.5.3 Raised characters shall be at least 5/8" of an inch (5/8" = 16mm) high, but no higher than two inches (2" = 51mm).

41.5.4 Pictograms shall be accompanied by the equivalent verbal description placed directly below the pictogram. The border dimension of the pictogram shall be six inches (6" = 152mm) minimum in height.

#### 41.6 FINISH AND CONTRAST

The characters and background of signs shall be eggshell, matte, or other non-glare finish. Characters and symbols shall contrast with their background: either light characters on a dark background or dark characters on a light background.

#### 41.7 SYMBOLS OF ACCESSIBILITY

Facilities and elements required to be identified as *accessible* by 521 CMR 41.1.3 shall use the international symbol of *accessibility*. The symbol shall be displayed as shown in Fig. 41a.

Only a few signs were observed at required locations.

**41.8 VOLUME CONTROL TELEPHONES**

Telephones required to have a volume control under **521 CMR 37.5**, shall be identified by a sign containing a depiction of a telephone handset with radiating sound waves.

None were observed.

**41.9 TEXT TELEPHONES (TTY)**

*Text telephones (TTY)* required by **521 CMR 37.8, Text Telephones** shall be identified by the international *TTY* symbol (See **Fig. 41c**). In addition, if a facility has a public *text telephone (TTY)*, directional *signage* indicating the location of the nearest *text telephone (TTY)* shall be placed adjacent to all banks of telephones that do not contain a *text telephone (TTY)*. Such directional *signage* shall include the international *TTY* symbol. If a *facility* has no banks of telephones but a public *text telephone (TTY)* is available, the directional signage shall be provided at the entrance (e.g., in a *building* directory).

None were observed.

**41.10 ASSISTIVE LISTENING SYSTEMS**

In *assembly areas* where permanently installed *assistive listening systems* are required by **521 CMR 14.5, Assistive Listening Devices** the availability of such systems shall be identified with *signage* that includes the international symbol of access for hearing loss. See **Fig 41b**.

An assistive listening device is required at 2<sup>nd</sup> floor Meeting Room/Assembly of the 1903 building; signage is required.

**41.11 ILLUMINATION LEVELS (reserved)**

## CONCEPTUAL DESIGN OPTION 1 (Repair/Renovation)

---

### **MANDATORY CODE/REGULATORY REQUIREMENTS AND HIGH-PRIORITY RECOMMENDATIONS:**

- PROVIDE ACCESSIBILITY UPGRADES AND IMPROVEMENTS
- PERFORM HAZARDOUS MATERIALS ABATEMENT
- UPGRADE STRUCTURAL SYSTEM AT 1979 ADDITION IF LAYOUT CHANGED
- PROVIDE FIRE SUPPRESSION SYSTEM THROUGHOUT
- REPLACE BELOW-GRADE SUPPLY/RETURN AIR DISTRIBUTION AT 1979 ADDITION
- IMPROVE SITE PAVING AND DRAINAGE (INCLUDING NEW PERIMETER FOUNDATION WATERPROOFING AND DRAINAGE)

### **RECOMMENDED REPAIRS:**

- UPGRADE PLUMBING, HVAC AND ELECTRICAL/DATA SYSTEMS
- EXTERIOR ENVELOPE REPAIRS (MASONRY, WINDOWS, DOORS, ROOFING)
- PROVIDE NEW INTERIOR FINISHES (CARPET, BASE, PAINT, TILE, CEILINGS)
- PROVIDE NEW SITE UTILITIES TO SUPPORT UPGRADED SYSTEMS
- PROVIDE NEW COMMUNICATIONS AND TECHNOLOGY EQUIPMENT

### **PROGRAMMATIC IMPROVEMENTS:**

- PROVIDE NEW BUILT-IN MILLWORK (CIRCULATION/REFERENCE DESKS, SELF-CHECK STATIONS, DISPLAY, WORK COUNTERS, ETC.)
- PROVIDE NEW MODULAR SHELVING SYSTEM
- REPAIR OR REPLACE FURNISHINGS
- PROVIDE NEW RFID SECURITY AND AUTOMATED RETURN HANDLING SYSTEMS



## CONCEPTUAL DESIGN OPTION 1 (Renovation/Code Upgrades – Not MBLC Grant Eligible)

Total Area: 25,500 sqft

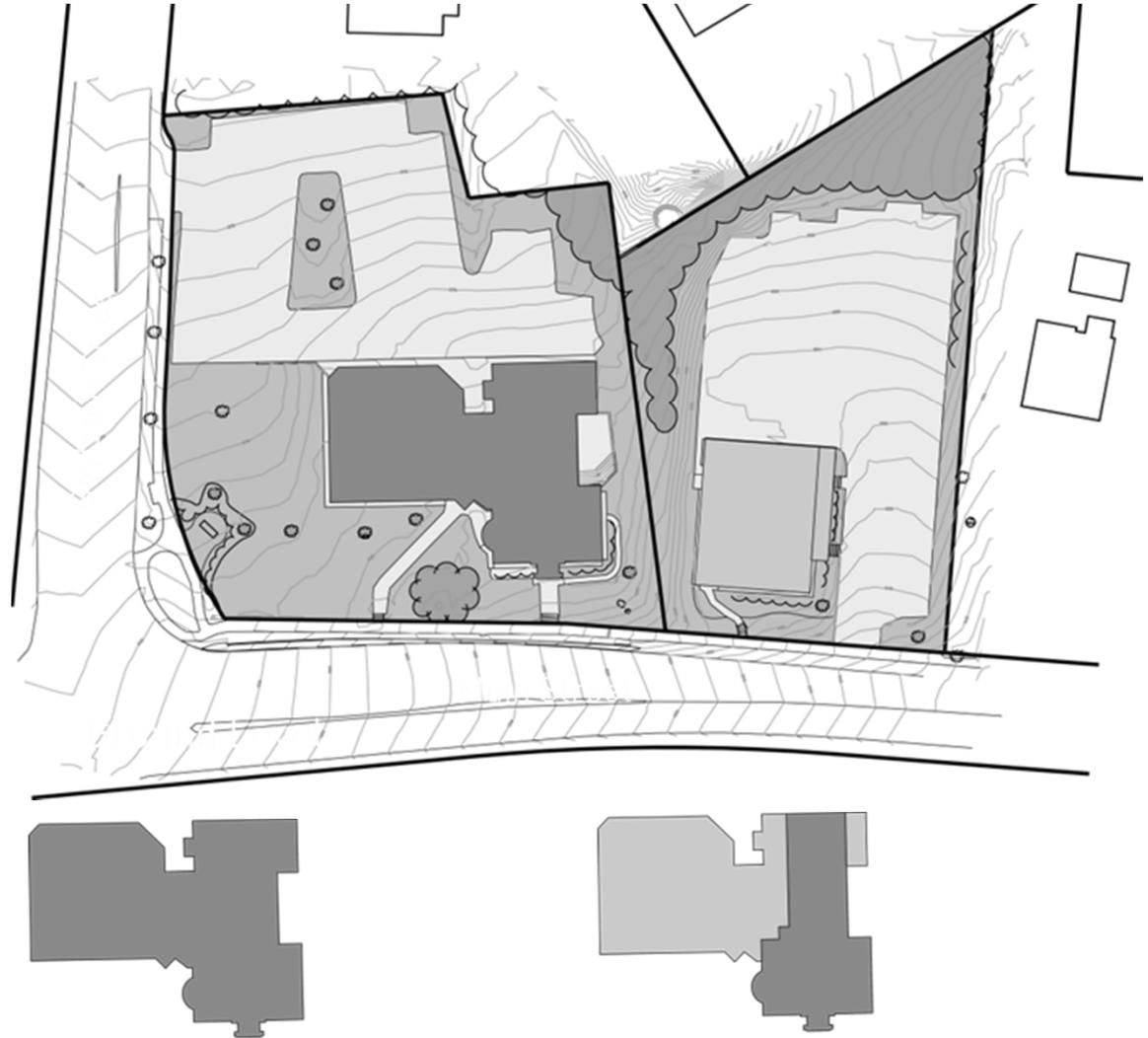
Rec. Const. Budget: \$8,740,000

### Merits:

- Addresses code upgrades and deferred maintenance
- Credit Union available for lease income

### Limitations:

- 100% Town funded
- Current Library program deficiencies not addressed
- Only maintains existing parking
- 1979 addition requires extensive scope and budget for remediation



**Shrewsbury Public Library**  
**Shrewsbury, MA**

May 21, 2013

**GRAND SUMMARY**

OPTION NO.1 - REPAIR

EXISTING 1903 HOWE LIBRARY	6,592	GSF	\$343	2,261,056
EXISTING 1923 WARD ANNEX	7,229	GSF	\$343	2,479,547
EXISTING 1979 ADDITION	11,643	GSF	\$343	3,993,549
EXISTING CREDIT UNION		NIC		
NEW ADDITION		NIC		
SITework		INC. ABOVE		

**TOTAL CONSTRUCTION COST** ----- **\$8,734,152**

OPTION NO. 2A - RENOVATION AND ADDITION

EXISTING 1903 HOWE LIBRARY	6,592	GSF	\$343	2,261,056
EXISTING 1923 WARD ANNEX	7,229	GSF	\$343	2,479,547
EXISTING 1979 ADDITION	11,643	GSF	\$343	3,993,549
EXISTING CREDIT UNION	4,758	GSF	\$343	1,631,994
NEW ADDITION	8,978	GSF	\$450	4,040,100
SITework - ADDITIONAL	1	LS	\$750,000	750,000

**TOTAL CONSTRUCTION COST** ----- **\$15,156,246**

OPTION NO. 2B - RENOVATION AND ADDITION

EXISTING 1903 HOWE LIBRARY	6,592	GSF	\$343	2,261,056
DEMOLISH 1923 WARD ANNEX	7,229	GSF	\$10	72,290
EXISTING 1979 ADDITION	11,643	GSF	\$343	3,993,549
DEMOLISH CREDIT UNION	4,758	GSF	\$10	47,580
NEW ADDITION	20,365	GSF	\$450	9,164,250
SITework - ADDITIONAL	1	LS	\$850,000	850,000

**TOTAL CONSTRUCTION COST** ----- **\$16,388,725**

OPTION NO. 3 - RENOVATION AND ADDITION

EXISTING 1903 HOWE LIBRARY	6,592	GSF	\$343	2,261,056
DEMOLISH 1923 WARD ANNEX	7,229	GSF	\$10	72,290
DEMOLISH 1979 ADDITION	11,643	GSF	\$10	116,430
DEMOLISH CREDIT UNION	4,758	GSF	\$10	47,580
NEW ADDITION	32,008	GSF	\$450	14,403,600
SITework - ADDITIONAL	1	LS	\$850,000	850,000

**TOTAL CONSTRUCTION COST** ----- **\$17,750,956**

**NOTES, EXCLUSIONS AND QUALIFICATIONS:**

- \*assumes a construction start of fall 2014.
- \*assumes CM at Risk chapter 149A.
- \*excludes owners furnishings and equipment.
- \*an allowance of \$200,000 has been carried for hazardous waste removal.
- \*assumes no phasing and building is to be unoccupied.
- \*excludes temporary off site building lease or relocation costs.
- \*assumes construction cost only ( no soft cost included)

PROJECT: Shrewsbury Public Library  
LOCATION: Shrewsbury, MA  
CLIENT: Shrewsbury Public Library  
DATE: 21-May-13

No.: 08076

**CAPITAL REPAIR ESTIMATE UPDATED 2013**

***SUMMARY***

**2008 CAPITAL REPAIR ESTIMATE SCOPE OF WORK**

**BUILDING ENVELOPE**

WATERPROOF FOUNDATION	\$80,638
REDESIGN ROOF BETWEEN ADDITION & ORIGINAL BLDG	\$120,363
REPAIR SLATE ROOF	\$85,838
REPLACE MODULAR SKYLIGHT SYSTEM (2 loc.)	\$203,385

**DEFERRED MAINTENANCE**

REPLACE ENTIRE HVAC INCLUDING NEW GAS SERVICE	\$2,037,811
UPGRADE 1979 ADDITION FLOOR LOADING	\$169,879
REPAIR EXT. WALLS @ CHILDREN'S ROOM COURTYARD	\$8,766
REPLACE SITE DRAINAGE (INCL TIE IN NEW FOUND. DRAIN)	\$236,037
REPAIR AND RESTORE MAINTENANCE SHED	\$47,850
UPGRADE IT SYSTEM	\$263,666
REPLACE/REPAIR BEAM @ CONNECTOR ROOF	\$5,114
REPLACE FRONT WALKWAY AND PROVIDE DRAINAGE	\$32,034
REPLACE/REPAIR CEILING & SUPPORT BEAMS IN ELEV. MACH RM	\$7,305
REPLACE INTERIOR LIGHTING AT 1979 ADDITION	\$124,922
UPGRADE STAFF BATHROOM TO BE HANDICAP ACCESSIBLE	\$32,760
UPGRADE CHILDREN'S BATHROOM TO BE HANDICAP ACCESSIBLE	\$26,893
CONCEAL EXPOSED DATA AND ELECTRIC CABLES	\$7,305
REPAIR RUBBLE FOUNDATION IN 1920 ADDITION	\$18,263
PROVIDE HUMIDIFICATION CONTROL FOR LOCAL HISTORY ROOM	\$22,208
REPOINT AND SEAL BRICK & CONCRETE WORK OF 1979 ADDITION	\$15,871
REPLACE CONCRETE APRON @ 1979 ADDITION	\$0

PAINT WOOD TRIM ON 1979 ADDITION		\$7,232
<u>ACCESSIBILITY</u>		
ADD CURB CUT TO WALKWAY		\$2,669
NEW WALKWAY AND RECONSTRUCT HC PARKING SPACE		\$3,733
REPLACE DOOR CLOSER AT MAIN ENTRANCE		\$6,429
FRONT ENTRANCE - MAKE HC ACCESSIBLE		\$92,048
PROVIDE RECESSED FIRE EXTINGUISHERS		\$6,575
ENLARGE 5 DOOR OPENINGS (PROVIDE 32" WIDTH)		\$14,370
REPLACE 9 DOORS REBUILDING FOR PULL CLEARANCE		\$16,108
REPLACE 9 DOORS REBUILDING FOR PUSH CLEARANCE		\$16,108
UPDATE DOOR HARDWARE (INCL. CLOSER)		\$28,947
UPGRADE STAIRWAYS IN 1920 BUILDING		\$18,410
REPLACE EXISTING ELEVATOR		\$613,403
PROVIDE ADA COMPLIANT FIRE ALARM DEVICES		\$5,552
PROVIDE ACCESSIBLE BATHROOMS		\$32,760
PROVIDE ADA COMPLIANT BOOK STACKS		n/a
PROVIDE ADA COMPLIANT KITCHEN AND STAFF LOUNGE		\$10,958
TOTAL CONSTRUCTION COST		----- \$4,422,212
<b>ESCLATION RATE FOR FALL 2014</b>	30%	1,326,663
<u>ADDITIONAL SCOPE OF WORK BASED ON LPA'S 2013 EXISTING CONDITION ASSESSMENT</u>		
HAZARDOUS WAST REMOVAL		200,000
SPRINKLER SYSTEM		250,000
REPLACE 1979 EXTERIOR WALL		330,000
FRONT SKYLIGHT REPLACEMENT - KALWALL		64,000
SOUTH ENTRY REPLACEMENT		100,000
INCREASE BOOK SORTING COST		200,000
INCREASE LIGHTING REPLACEMENT		75,000
NEW ELECTRICAL SERVICE AND PANELS		153,000

REPLACE ALL FINISHES		637,000
REPLACE ALL PLUMBING		125,000
ADD EMERGENCY GENERATOR		75,000
TOTAL OPT 1 RENOVATION	25,464 /SF	7,957,875
COST PER SF		\$312.51
C.M. AT RISK CONTINGENCY	10%	\$343.77



**SHREWSBURY PUBLIC LIBRARY**  
**Total Project Budget**  
**Renovation Only**

Sept 12, 2013



COST ITEM	Estimated Budget
<b>Feasibility / Schematic Studies</b>	
OPM Feasibility Study / Schematic Support	\$17,100
A&E Feasibility Study	\$45,000
A&E Schematic Study	\$150,000
Env. & Site	
Other	
<b>Feasibility Study Agreement Subtotal</b>	<b>\$212,100</b>
<b>Administration</b>	
Legal Fees	\$20,000
Financing Bond	\$20,000
Advertising	\$10,000
Permitting	\$0
Owner's Insurance	\$13,500
Other Administrative Costs	\$10,000
<b>Administration Subtotal</b>	<b>\$73,500</b>
<b>Owner's Project Manager</b>	
<b>Base Services</b>	\$751,300
<b>Reimbursable Services</b>	
Construction Material Testing	\$21,835
Printing / Document Distribution	\$8,000
Hazardous Materials: Ind Hygienist	\$30,000
Geotech Field Observation	\$0
Commissioning Services	\$52,405
FF&E / Move Consultant	\$25,000
Other Reimbursable Costs	\$7,500
Cost Estimates	\$0
<b>OPM Subtotal</b>	<b>\$896,040</b>
<b>Architecture and Engineering</b>	
<b>Base Services</b>	\$1,050,000
<b>Reimbursable Services</b>	\$10,000
<b>Architectural/Engineering Subtotal</b>	<b>\$1,060,000</b>
<b>Site Acquisition</b>	
Land/Building Purchase	
Land/Building Sale	
Appraisal Fees	
Recording fees	
<b>Site Acquisition Subtotal</b>	<b>\$0</b>
<b>CM @ Risk Preconstruction Services</b>	
Pre-Construction Services	\$100,000
<b>Construction Costs</b>	
Construction Budget - From AMFoguerty estimate of 5/21/13	\$8,734,152
<b>Construction Contract</b>	<b>\$8,734,152</b>
<b>Alternates</b>	
None identified at this time	
<b>Alternates Subtotal</b>	<b>\$0</b>
<b>Miscellaneous Project Costs</b>	
Utility company Fees	\$0
Moving Costs (out from and return to)	\$50,000
Swing Space (modular units)	\$50,000
Storage	\$12,000
Other Project Costs (Mailing, etc.)	\$0
<b>Misc. Project Costs Subtotal</b>	<b>\$112,000</b>



SHREWSBURY PUBLIC LIBRARY  
Total Project Budget  
Renovation Only

Sept 12, 2013



<b>COST ITEM</b>	<b>Estimated Budget</b>
<b>Furnishings and Equipment</b>	
Furniture, Fixtures & Equipment (excludes shelving)	\$542,895
Shelving	\$151,943
Computer Equipment	\$260,350
<b>FF&amp;E Subtotal</b>	<b>\$955,188</b>
<b>Owner's Contingencies</b>	
Owner's Hard Contingency @ 10%	\$873,415
Owner's Soft Contingency @ 2.5%	\$48,901
<b>Owner Contingencies Subtotal</b>	<b>\$922,316</b>
<b>Total Project Budget - sum excludes Feasibility / Schematic Study, previously funded</b>	<b>\$12,853,197</b>