


Photo 47 – Other isolated roof areas and canopies were observed to have single-ply elastomeric roof systems located at the north and south elevations. At both locations, the roof membrane terminates with a termination bar and sealant.

3.4.2 Flat-Seam Copper Roof System and Skylight

Photo 48 – Overall view of low-slope, flat-seam, copper roof system with soldered joints. Maintenance records indicate that this roof was replaced during November 1999 to September 2000 roof repairs. It includes a hipped glass skylight and copper ventilator. Ponding water was observed.

Photo 49 – Partial view of hipped skylight and edge metal at copper roof. Previous flashing repairs were observed at the skylight. The arrow indicates failed glazing seals that were observed. It also appears that some of the glazing has been previously replaced.

3.5 Exterior Wall System Photos

3.5.1 Multi-Wythe Masonry Walls

Photo 50 – Overall view of the east elevation. At the original structure, the above-grade exterior masonry walls are primarily constructed of 3-wythes of brick masonry. The main upper level elevation includes coursed granite water table, corbeled brick string course, brick roman arches, marble string course, and terra cotta and marble cornice. Lower level window openings (not shown) have granite sills and lintels. Upper level window openings have marble sills and either marble lintels or brick roman arches. The painted wood entrance portico appears to be in fair condition.

Photo 51 – The exterior brick masonry wythe is laid in a running bond. Isolated areas of cracked, spalled, and delaminated brick were observed throughout. Efflorescence, metal anchors, and vegetative growth were also observed.

Photo 52 – The exterior mortar joints have a concave profile with a primary mortar type that appears to be original mortar. The secondary mortar type appears to be repair mortar. Overall, the original mortar appears to be in fair condition, however, isolated areas of open or debonded mortar and step cracking were observed.

Photo 53 – Partial view of coursed granite water table and foundation. Overall, the granite and mortar appeared in good condition. The granite water table has a concentrated area of mortar deterioration at sky facing bed joints.

Photo 54 – Partial veiew of corbelled brick string course and roman arches. Weathered lead coated copper flashings were observed above the corbeled brick string course and roman arches. The string course has a concentrated area of mortar deterioration along its entire length.

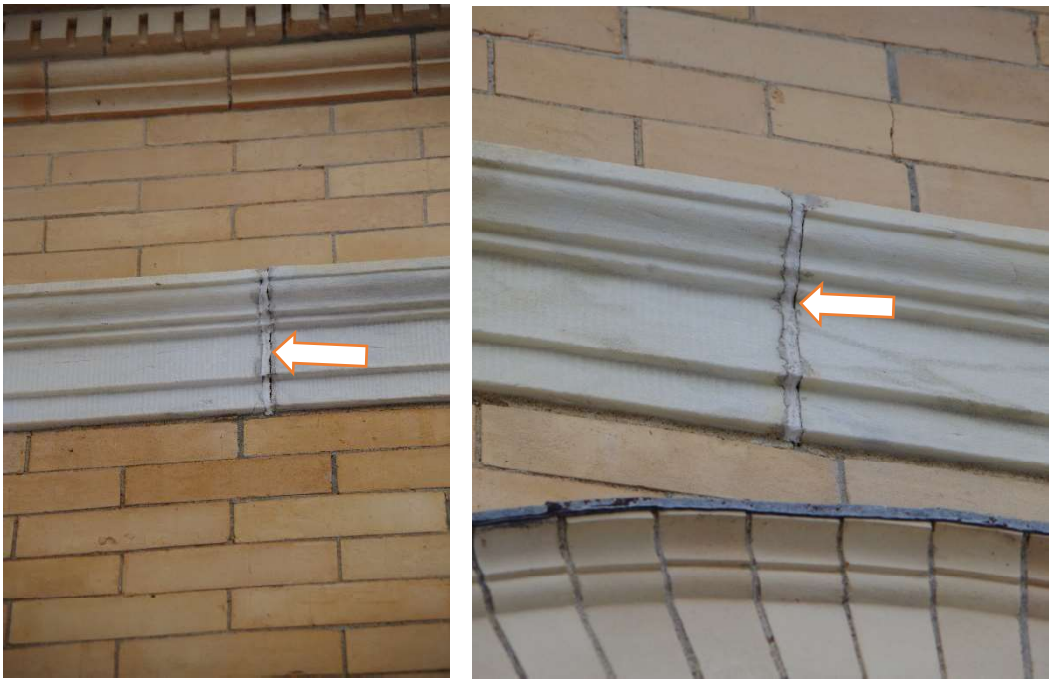

Photo 55 – Partial view of marble string course where mortar deterioration was observed at the head joints.

Photo 56 – Partial view of marble cornice where cracked and discolored stone was observed. Isolated areas of mortar deterioration were observed at both the marble and terra cotta elements of the cornice.

Photo 57 – Partial view of entrance portico's wood entablature tansitioning to the stone and brick entablature of the east elevation. This is also where the wood gutter with copper lining transitions to the hanging copper gutter.

Photo 58 – Lower level windows appear to be wood, single-glazed, double-hung units with exterior painted wood brick mold. Window hardware appeared in poor condition and window sashes did not appear locked. Fixed exterior storms were observed at three lower level windows on the south elevation, for additional insulation and weather protection. Six upper level windows are wood, single-glazed, single-hung arch tops with exterior painted wood brick mold. Interior storm windows were installed at these window units for additional insulation. Exterior paint coatings appeared to be weathered and beginning to fail in several locations. Failed exterior perimeter sealants were observed at most locations.

Photo 59 – Upper level wood, single-glazed, clerestory window with six lights and exterior painted wood brick mold appear to be in fair condition. Interior storm windows were installed at these window units.

3.5.2 Masonry Cavity Walls

Photo 60 – The above-grade exterior masonry walls are primarily constructed of a brick or precast concrete veneer and CMU backup wall. At the west elevation, the lower level is a coursed precast concrete veneer with precast concrete water table. The middle and upper levels are brick veneer and include precast concrete string courses, corbelled brick string courses, and a corbelled brick and fiberglass cornice.

Photo 61 – The primary area of the exterior brick veneer is laid in a running bond and concave mortar profile. Secondary areas are laid in a Flemish or basket weave bond. Overall, the brick units were observed to be in good condition with isolated areas of deterioration including step cracks and efflorescence.

Photo 62 – Isolated areas of cracked or open mortar joints were observed at the areas of precast concrete veneer, particularly at the window sills.

Photo 63 – Sheet metal flashings shown on the original design drawings are not visible from the exterior and may be embedded within the masonry mortar joints at typical locations throughout the building including above window heads, stringer courses and transitions between the brick masonry and precast veneer. Weep holes were observed above the precast stringer courses, indicating likely flashing locations.

Photo 64 – *Mortar cants/washes are installed a*bove the corbelled brick stringer courses in several locations to shed water off of the horizontal surfaces. At isolated areas, this mortar cant/wash is cracked or spalled. Other areas were observed to have lead coated copper flashings atop the corbelled masonry in lieu of the mortar wash.

Photo 65 – Aluminum framed windows consist of fixed and project out casement operation with insulated glazing. Embedded steel lintels to support the masonry veneer components above the window were not partially visible and consist of galvanized steel. Weep holes and moisture stains observed above lintels appear to indicate the presence of embedded flashings.

4 Discussion and Recommendations

4.1 Steep-Slope Roof Systems

4.1.1 Ice Dams and Attic Conditions

Ice dams were reported to be the main source of moisture infiltration and deterioration of building components related to the roof system on the 1893 building. Ice dams are typically the result of heat loss from the conditioned building space, which can raise the temperature of the cold roof deck, causing snow and ice to melt, refreeze, and back-up under the slate shingles and underlayments.

Previous interior renovations to the building included increasing attic insulation above the finished ceiling within the 1893 Library Building as well as installing HVAC ducts within the attic above the insulation. Locating the ducts above the insulation system may reduce thermal efficiency of the building and allow transfer of heat from the conditioned spaces into the attic. The 1893 Library building has mass masonry walls below the roof eaves with less thermal resistance value than the attic insulation, allowing for heat loss through the walls that may increase the potential for ice damming on the roof system. To combat the issue of ice dams, industry standards typically recommend installing additional insulation to separate the warm interior environment from the cool exterior environment, especially at the roof eaves.

Additionally, attic spaces between the original building and the addition are thermally connected and have non-continuous insulation with numerous thermal penetrations. Particulaly, the multi-story void between the original building and addition observed on the north side of the building (photos 13-15), attic stairwell, interior skylight, and utilities penetrations all represent penetrations of the thermal barrier between the interior conditioned space and the unconditioned attic, causing significant thermal loss of conditioned air to the attic spaces, which in turn, raises the temperature of the roof deck and promotes ice dam formation on the roof.

The multi-story void on the north elevation appears to create a heat stack effect, drawing heat from the occupied spaces below and also appears to be the location of severe moisture moisture infiltration as it is aligned with the poorly configured roof expansion joint and flashings.

Ventilation of the attic spaces is minimal including a manually operated passive turbine vent in the skylight at the original library building and isolated louvered vents in the vertical walls of the mansard roof system. Based on the inconsistent thermal and ventilation conditions observed within the attic spaces, it appears there are several factors contributing to ice dams and associated moisture infiltration. Industry standards recommend installing ice and water shield membrane a minimum of 3’-0” beyond the plane of the exterior walls below the eave in a well insulated and ventilated building. Due to the conditions observed, GRLA recommends GPL consider installing ice and water shield (a self-adhered modified bitumen underlayment) a minimum of 6’-0” up slope from the eaves to provide greater protection against moisture infiltration from ice dams.

Further detailed evaluation is recommended to develop a specific scope of repairs to improve thermal efficiency of the building. Improving thermal efficiency will not only reduce ice damming potential, but may also allow the building HVAC system distribute heat to the building more evenly and effficiently. Other options to improve thermal efficiency include installing insulation above the roof deck; however this may alter the exterior appearance of the building by increasing the height of the roof fascia.

4.1.2 Slate Shingles

The slate roofing system at the original Groton Library Building is approximately 125 years old. In general, the existing slate roof system appears to be in fair condition; however, the slate shingles shown signs of age related deterioration including isolated cracked, broken, and missing shingles.

Historically, slate roof systems have an average lifespan of 60-125 years; however, some slate roof systems have been known to last 200 years or longer. The lifespan of the slate roof system is determined by the quality, fabrication, installation, and maintenance of the material.

The slate shingle roof system on the 1893 library building appears to be mostly original to the building. Maintenance repairs noted in Section 2.1 above included the removal and replacement of sheet metal flashings and the installation of ice and water shield at several gutters and valleys as well spot replacement of broken or missing shingles. Repairs indicate approximately 2.5 courses of slate were removed at the valleys and eaves to install the ice and water shield to protect against leaks from ice dams, which would indicate that the ice and water shield membrane extend 1'-6" to 3'-0" above the flashings.

The National Parks Service Preservation Briefs strongly recommend the repair of historic slate roofs rather than replacement whenever possible and that roof replacement on historic structures be considered a last resort. The preservation briefs also recommend that if more than twenty percent of a slate roof system requires repair, it is typically more cost effective to replace the entire slate shingle roof system than to perform spot repairs.

Based on the conditions noted above, the removal of slate shingles at the roof eaves around the perimeter of the building and valleys is recommended to install ice and water shield membrane further up the roof slope (6'-0" minimum) to protect against moisture infiltration. Other repairs that should be considered include the removal and replacement of isolated cracked, missing, or otherwise deteriorated shingles. As this work will likely approach approximately 20% of the slate shingles, it is recommended that the slate roof system be considered for replacement. Removal and reinstallation of the slates could be considered, however, based on the advanced age of the shingles, the slates may become damaged upon removal or may not have enough service life remaining to make reinstallation cost effective as replacement can be expected to have a longer service life than reinstallation repairs.

4.1.3 Synthetic Slate Shingles

The existing sloped roof system on the 1999 library addition appears to consist of fiber cement based synthetic slate shingles. Although GPL reported no leaks below the synthetic slate roof system, the existing synthetic slate shingles appear to be in poor condition with large scale discoloration of the shingles, cracked and broken shingles, as well as large areas of vegetative growth on the shingles.

During our review of the underside of the roof deck at the 1999 addition, water staining was observed in isolated areas on the plywood roof deck and wood rafters near the roof eaves. Ice and water shield could not be visually observed through our evaluation but was indicated in the addition construction documents to extend approximately 3'-0" up slope at the roof eaves and 18" at valleys. Moisture staining on the attic roof rafters were measured 4'-0" from the roof fascia in some locations, seemingly indicating that previous ice dams extended farther up the roof slope than the ice and water shield protection below.

Based upon the specifications from the construction documents for the 1999 library addition, Continental Design Slate Shingles as manufactured by Eternit, Inc. of Pennsylvania were the basis of design; however,

the manufacturer of the specific shingles installed on the building are unknown to GLRA. Notably, Eternit, Inc. went out of business in the early 2000's.

Synthetic slate is a term the covers a wide variety of imitation slate roofing materials. They intend to mimic the look and performance of the natural slate material while providing a cost saving and often an environmentally friendly alternative. Synthetic slates are commonly made of plastic, rubber, or fiber cement composite material that varies by manufacturer and can include recycled materials. These materials are, for the most part, lighter than the traditional slate, which reduces the dead load on roof framing components, and can be considered less labor intensive for transporting and installing the materials onto the roof. Many of the synthetic slate manufactures offer warranties on their products up to 50 years.

However, some of the drawbacks associated with most synthetic slates is that they rely on dyes or coloring agents to provide the aesthetic appearance desired. Additionally, the main concern with synthetic slate shingles is their limited track record. Early synthetic slate shingles consisted of asbestos cement, which was later replaced with fiber cement starting in the 1980s. The change to fiber cement shingles resulted in many issues with performance including, cracking, crazing and discoloration, leading to warranty claims and class action lawsuits. Following these failures, several companies went out of business or changed their method of manufacturing these products. Many of the newer synthetic slate shingles offered have been on the market for less than 20 years, and therefore their long-term performance cannot be verified in comparison with their marketed warranty.

GRLA recommends removal of the existing synthetic slate roofing system and replacement with a new steep slope roof system. Several roof system replacement options may be considered including, but not limited to slate shingles, synthetic slate shingles, asphalt shingles, or sheet metal roofing. Due to the historic designation of the attached original library building, replacement roof system options for the Library addition may fall under review by the local historical commission. In addition to aesthetic considerations for the replacement roof system, structural conditions may affect which replacement roof system is most desired as differences in dead load between the existing and new roof systems may affect structural dead load or wind uplift capacity of the roof system. As a preliminary recommendation, replacement with new slate shingles will be considered for the construction cost estimate.

4.1.4 Sheet Metal Flashings

Sheet metal flashings throughout the original 1893 building primarily consist of plain red copper flashings that are approximately 18 years old. Sheet metal flashings at the 1999 addition primarily consist of lead coated copper and are original to the construction of the addition.

In general, flashings appear to be in good condition throughout much of the roof. Many of the ridge and valley flashings appear to have lapped seams in lieu of soldered seams and isolated areas appeared to have voids in the seams that may allow moisture infiltration. Exposed fasteners at the copings show signs of corrosion and deterioration in several areas.

Roof expansion joint flashings consist of lead coated copper and extend through the synthetic slate roof close to the tie-in to the 1893 roof at the valleys. Valleys at the connection of the buildings also consist of lead coated copper. On the north elevation, the expansion joint, valley flashing, and gutter all meet at the eave. On the south elevation, the expansion joint terminates into the valley a few feet above the eave. Based on moisture staining below the expansion joint, this area appears to be the source of several interior leaks observed as referenced in the photos of this report. GRLA recommends reconfiguration of these components to provide a more water tight connection.

GRLA recommends the removal and replacement of the sheet metal flashings in conjunction with the replacement of the steep slope roofing systems recommended.

4.1.5 Gutters and Downspouts

Both steep slope roof systems are drained by sheet metal gutters and downspouts. The gutter systems of the original building and the addition operate separately and abut each other, but do not align vertically where they meet near the building expansion joint. The connection appears to consist of several overlapping pieces of both copper and lead coated copper flashings. The overlapping pieces of sheet metal gutter, valley flashing, and roof expansion joint flashing are suspected as the sources of moisture infiltration as daylight could be viewed at these intersections when viewed from the building interior. The gutters have been reported by GPL to overflow in these areas and may infiltrate the building when the gutters become clogged or exceed flow capacity.

Gutter dimensions between the original building and the addition appear to vary. Gutters at the addition appear to be built into the fiberglass cornice, which could be viewed from the attic. Failed seams in the gutter may be allowed to infiltrate to the building interior.

Spacing between downspouts at the addition also appear to exceed industry recommended standards and may contribue to overflowing gutters. Additional downspouts are recommended to be installed and should be coordinated with building aesthetics and drainage at grade level. Several broken downspout joints were observed throughout the building and are recommended for repair or replacement. Broken downspouts may displace uncontrolled water to unwanted locations and may result in premature deterioration of exterior wall components.

At the west elevation entrance, a broken downspout joint and leaking downspout at the canopy appear to be contributing to detrioration of the canopy ceiling components.

Broken gutter straps near valleys were also observed and may be caused by sliding snow. Downspout maintenance and additional gutter straps are recommended in these areas.

Based on the select deteriorated gutter and downspout observations listed in this report and the recommendation to remove and replace the steep slope roof systems on the building, GRLA recommends the removal and replacement of the sheet metal gutters and downspouts in conjunction with the replacement of the roof system.

Drainage calculations are recommended to determine appropriate gutter and drain leader sizing and if additional drain leaders may be required.

4.1.6 Snow Management System

Areas of the steep slope roof systems have a snow management system installed in the form of three-rail pipe style snow guards. The snow guards are typically installed at areas of the roof directly over adjacent pedestrian walkways below on the North, West and South Elevations of the building. The snow guard system shows signs of deterioration, including bent and displaced rails at joints between rail sections, which is a safety hazard if not addressed as loading on the rails may cause failure and allow snow or rails to fall to areas below.

Pipe-rail snow guards consist of brackets that are generally installed not more than four feet apart horizontally. The brackets are designed to hold one, two, or three pipes and typically have the appearance of a fence or a barricade. Base plates are typically mechanically secured to the structural roof

framing to transfer loading to the roof structure. At the Groton Public Library, snow guard base plates were observed to be attached through the decking, rather than to the roof rafters or intermediate framing, which may impose greater loading on the roof decking and lead to deterioration of the roof deck.

With pipe style snow guards, snow will accumulate at the rails and has the potential to allow moisture to back up under the roof shingles and as the snow guards are typically installed about 1'-0" above the roof eave, it is recommended that the ice and water shield extend a minimum of 3'-0" above the limits of the snow guard base, and a minimum of 1'-0" below to reduce the potential of ice damming water infiltration. Extents of the ice and water shield is recommended to be greater if air infiltration or heat loss through the attic insulation is suspected, such as that found at GPL.

Pipe style snow guards are a reliable snow retention system that has historically performed well over time and is most effective with heavy snow loads. However, one issue with these systems is that because they act as a "fence," large amounts of snow can build up directly above the rails. Also, due to the pitch of the roof, deep snow or drifts may still bypass the top rail, resulting in some snow slide.

GRLA recommends removal and replacement of the pipe style snow guard system at the Groton Public Library with new stainless steel or brass pipe style snow guards with attachment designed by a qualified licensed structural engineer, which may include adding additional wood blocking support between rafters.

4.2 Low-Slope Roof Systems

4.2.1 Single-Ply Elastomeric (EPDM) Roof System

A low slope, single-ply elastomeric (EPDM) roof system is installed in the center of the building over the 1999 addition and appears original to the construction of the addition. Although no leaks were reported by GPL, isolated defects and potential sources of moisture infiltration were observed including, open seams in the membrane at several locations as well as punctures in the membrane near the roof-to-wall expansion joint. Clogged drain strainers were also observed, resulting in ponding water throughout much of the roof surface.

As the roof system is near the end of its useful service life and several potential sources of moisture infiltration were observed, GRLA recommends GPL consider the replacement of the low-slope roof system. Repairs to the existing low-slope roof system could be considered to extend the service life of the existing roof system approximately 5 to 10 years; however, GRLA recommends the low-slope roof system be replaced in conjunction with the replacement of the steep slope roof systems to reduce construction traffic on the roof surfaces from multiple construction projects and to coordinate flashing tie-ins between the two systems.

4.2.2 Flat-Seam Copper Roof System and Skylight

A flat seam copper roof system is located over the center of the 1893 roof system and was reportedly replaced during the November 1999 to September 2000 roof repairs. Depressions in the sheet metal roof system have allowed water to accumulate on the roof surface. GRLA recommends removal and replacement of this roof area in conjunction with the slate roofing system to coordinate connection of flashings between the roof areas, provide continuity in the age of sheet metal flashings throughout the roof system, and to provide positive roof slope to reduce ponding water potential. GRLA further recommends restoration or replacement of the skylight at this roof area to reduce moisture infiltration.

4.3 Exterior Wall Systems

4.3.1 Multi-Wythe Masonry Walls

At the original structure, the above-grade exterior masonry walls are primarily constructed of 3-wythes of brick masonry. The main upper level elevation includes coursed granite water table, corbeled brick string course, brick Roman arches, marble string course, and terra cotta and marble cornice. Lower level window openings have granite sills and lintels. Upper level window openings have marble sills and either marble lintels or brick Roman arches.

The exterior brick masonry wythe is laid in a running bond. Brick masonry units measured approximately 8" (length) x 3-1/2" (width) x 2-1/2" (height). Isolated areas of cracked, spalled, and delaminated brick were observed throughout. Efflorescence, metal anchors, and vegetative growth were also observed.

The exterior mortar joints have a concave profile and measured approximately 1/8" to 1/4" wide. The primary mortar type appears to be original mortar (lime and sand). The secondary mortar type appears to be replacement mortar (Portland cement) from previous repairs. Overall, the original mortar appears to be in fair condition, however, isolated areas of open or delaminated mortar and step cracking were observed. The water table, string courses, and cornice appear to have the most concentrated areas of mortar deterioration.

Other deteriorated conditions that could be considered for repair to reduce potential moisture infiltration include the following:

- Weathered lead coated copper flashings were observed above the corbeled brick string course and Roman arches.
- Deteriorated mortar was observed at the head joints of the marble cornice and marble string course.
- Cracked and discolored stone was observed at the marble cornice.
- The wood entrance portico appears to be in fair condition. Areas of peeling paint were observed.

4.3.2 Wood Windows at Multi-Wythe Masonry Walls

At the exterior multi-wythe masonry walls, window units appear to be original hung and fixed, single glazed wood windows. Failed paint was observed at exterior wood brick molds and sills. Failed exterior perimeter sealant was observed at most window locations. At three ground floor locations, aluminum storm windows were fastened directly to the exterior wood trim. At several upper floor locations, interior storms were installed. Perimeter sealants were not observed at any (exterior or interior) storm window locations. Paint appeared in good condition at interior wood trim, stools, and aprons. Isolated windows appeared to have failed or broken hardware resulting in the windows to be left partially open.

GRLA recommends restoration of the wood window components, including replacement of paint coatings, sealants and hardware. Interior storm windows appear to be in good condition and may remain. Exterior storm windows are recommended to be considered for replacement.

4.3.3 Masonry Cavity Walls

At the 1999 addition, the above-grade exterior masonry walls are primarily constructed of a brick or precast concrete veneer and CMU backup wall. At the main elevation, the lower level is a coursed precast concrete veneer with precast concrete water table. The middle and upper levels are brick veneer and

include precast concrete string courses, corbelled brick string courses, and a corbelled brick and fiberglass cornice. Lower level window openings have precast concrete sills and lintels. Upper level window openings have precast concrete sills and either precast concrete or corbeled brick lintels.

The primary area of the exterior brick veneer is laid in a running bond. Secondary areas are laid in a Flemish or basket weave bond. Brick masonry units measured approximately 7-3/4" (length) x 3-5/8" (width) x 2-1/2" (height). Overall, the brick units were observed to be in good condition with no major defects. Isolated areas of efflorescence were observed.

The exterior mortar joints have a concave profile and measured approximately 3/8" wide. Overall, the mortar (Portland cement) appears to be in fair condition, however, isolated areas of open or delaminated mortar and were observed. The precast concrete coursing, precast concrete water table, corbelled brick string courses, and corbelled brick cornice appear to have the most concentrated areas of mortar deterioration.

Brick masonry expansion joints in the veneer did not appear to be spaced per industry standards and may be responsible for isolated step cracking in the veneer. Industry standards recommend vertical expansion joints be placed in the brick masonry veneer approximately every 20 to 25 feet to reduce the potential for cracking and displacement of mortar. GPL may wish to consider adding brick masonry expansion joints near building corners and at windows with signs of step cracking. GRLA recommends stabilizing the masonry on each side of the joint with additional reinforcement prior to cutting new expansion joints.

Sheet metal flashings appear to be embedded in the mortar joints at select locations evidenced by weep hole openings at window heads and similar locations. Flashings do not extend out beyond the plane of the brick veneer, which may allow moisture to bypass below the flashing and infiltrate other areas of the wall cavity or building interior.

Flashing configurations could not be verified visually at the areas of precast concrete veneer. Leaks were observed above the windows at isolated first floor locations at the west elevation rotunda, which may be related to either flashing configurations or precast anchor penetrations through the back-up wall. Further evaluation is recommended at these locations, including select removal of the precast veneer components.

The fiberglass cornice at the top of the masonry cavity wall was observed to have failed sealant at joints between sections as well as staining and discoloration, which appears to relate to the gutters above.

4.3.4 Aluminum Windows at Masonry Cavity Walls

At the exterior masonry cavity walls, window units are aluminum casement and fixed windows. Exterior casings and sills are also aluminum. No exterior paint defects were observed at the window units, casings, or sills. Interior casements and stools were primarily wood. However, interior gypsum returns were also observed at some locations. Failed exterior perimeter sealants were observed at most window locations. Isolated areas of water staining were observed at these interior finishes.

GRLA recommends the removal and replacement of window perimeter sealants at these window units.

4.3.5 Below Grade Leaks

An isolated leak was reported on the lower level foundation wall below grade within the Children's Room. Grade-level drainage was reported to be an issue at this location. Additionally, sub-grade drainage was observed to extend below the concrete walkway slab. Specific design detailing at this location was not

clear, however, it appears that there may be discontinuity between the wall flashing and foundation waterproofing, which could result in moisture infiltration through the concrete foundation walls. Further evaluation is recommend including removal of interior wall finishes and excavation of the concrete walkway and removal of masonry veneer components to observe the configuration and condition of the in wall and below-grade flashing connections.

4.4 Recommended Scope of Work

At the Groton Public Library, there are several conditions contributing to the ongoing moisture infiltration, including, but not limited to the following:

4.4.1 Roof Systems:

1. Removal and replacement of the existing slate roof system, flat seam copper roof system, sheet metal flashings and gutters at the 1893 Library Building.
    a. Consider improving insulation distribution within the attic or relocating continuous insulation above the roof deck.
    b. Consider adding ventilation of the roof deck to reduce ice damming potential.
    c. Consider installing additional ice and water shield membrane further up roof slope.
2. Removal and replacement of the existing synthetic slate roof system with a new slate roof system, sheet metal flashings, and gutters at the 1999 building addition.
    a. Re-work expansion joint configurations to improve water infiltration resistance
    b. Re-work valley and gutter connections at transition to original library building to reduce moisture infiltration.
    c. Install additional downspouts and size gutters in accordance with industry standards.
    d. Remove and replace snow retention systems. Coordinate snow retention system design with structural engineer to supplement structural framing based on anticipated loading.
3. Removal and replacement of the single-ply, low slope roof systems down to the structural deck.
    a. Coordinate flashing tie-ins with slate roofing systems and adjacent walls.
4. Removal and replacement of skylights in conjunction with roof system replacement.

4.4.2 Wall Systems:

5. Perform spot masonry repairs of brick masonry and deteriorated mortar at the 1893 library building.
    a. Consider removal and replacement of existing flashings.
6. Perform spot repointing repairs of brick masonry and deteriorated mortar at the 1999 Library Addition.
    a. Review condition and configuration of embedded flashings for potential sources of leaks.
7. Add new masonry expansion joints at masonry cavity wall areas in accordance with industry standards. Stabilize masonry on each side of the new joints with helical ties.
8. Perform additional exploratory of lower level window head leaks related to the precast concrete veneer and associated flashing and anchors.

4.4.3 Window Systems:

9. Restoration of the wood window components, including replacement of paint coatings, sealants and hardware.
    a. Exterior storm windows are recommended to be considered for replacement.
10. Removal and replacement of window perimeter sealants.

4.4.4 Foundation Waterproofing Systems:

11. Perform further exploratory of foundation waterproofing and wall flashing leaks on north elevation near children's room.

4.4.5 Historic Considerations:

Due to the historical significance of the Library building, GRLA recommends review of all proposed exterior alterations and repairs by the local historical commission during the design phase of repairs prior to contractor bidding and selection.

4.4.6 Structural Considerations:

GRLA recommends that the structural abutment of the original 1893 building and 1999 addition at the north corner be reviewed by a licensed structural engineer. The multi-story void is negatively impacting the performance of the steep slope roof system. GRLA is also concerned that there is insufficient structural reinforcement where the new roof framing ties into the original roof deck at this location, potentially being a public safety hazard. Overall, the structural capacity of the roof is critical to the selection of a replacement roof material.

Further evaluation of repair options should be reviewed in the next evaluation/design phase, which may depend on the scope of work selected.

5 Preliminary Cost Estimate

This preliminary evaluation is based on visual observations at representative locations where active leaks were reported by the Groton Public Library (GPL). Recommendations are based upon assumptions of similar conditions throughout the building envelope. Based on our findings, GRLA's preliminary order-of-magnitude estimate of construction costs to complete repairs are as follows:

Slate Roof System (1893 Building and 1999 Addition)	**$870,000**
Low Slope Roof System (1999 Addition)	**$110,000**
Masonry Repairs	**$100,000**
Window Repairs	**$45,000**
TOTAL	**$1,125,000**

Estimates are based on 2018 public sector pricing and include 20% contingency in the event of unforeseen conditions are encountered either during the design development or construction phases of the project. These estimates are based on performing the work during normal business hours while the building remains occupied. Before proceeding with repair design or procurement, GRLA recommends an evaluation of the existing structural components supporting the slate roof be performed. Costs associated with major structural renovations are not included in this preliminary estimate. GRLA does not recommend using these order-of-magnitude estimates for sensitive budgeting.

These estimates also exclude the following:

- Evaluation and design of repairs to related structural systems.
- The testing/removal of hazardous materials.
- Costs for permitting.
- Owner's administration of the project.
- Architectural/Engineering fees for additional evaluation, design, and bidding services of other related building assemblies/systems (GRLA's preliminary fees for waterproofing included in signed proposal) or construction phase services.

6 Next Steps

GRLA recommends proceeding with planning for a comprehensive building envelope repair project including replacement of the roof systems and repair of the masonry and window systems.

As part of the planning and design process, GRLA recommends additional destructive testing and review of as-built configurations to further understand the conditions and to obtain the required information to generate biddable repair documents. The additional destructive testing will likely involve removing and replacing isolated areas of the exterior wall components, roofing, walkways and representative areas of interior wall finishes at several locations to expose concealed conditions. Following additional evaluation of these components and depending upon the conditions observed and repairs recommended, GRLA recommends coordination of the design of these repairs.

We hope this report suits your needs at this time. We are happy to discuss the findings of this report in more detail and can discuss options for additional evaluation and repair recommendations upon request.

Respectfully submitted,

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G | R | L | A
Gorman Richardson Lewis Architects

Project Name : Groton Public Library
Project Number: 2017054.01
Date: 02/07/2018
Client: Groton Public Library

PRELIMINARY COST ESTIMATE

SUMMARY

Scope of Work	Direct Costs	General Conditions	Mobilization	Bonds & Insurance	Overhead & Profit	Subtotal	Contingency	Total
		10%	10%	3%	15%		20%	
Steep Slope Roofs	$520,543	$52,054.30	$52,054.30	$15,616.29	$78,081.45	$718,349	$143,669.87	**$870,000**
Low Slope Roof	$67,057	$6,705.66	$6,705.66	$2,011.70	$10,058.49	$92,538	$18,507.62	**$110,000**
Masonry Repairs	$60,600	$6,060.00	$6,060.00	$1,818.00	$9,090.00	$83,628	$16,725.60	**$100,000**
Window Repairs	$26,670	$2,667.00	$2,667.00	$800.10	$4,000.50	$36,805	$7,360.92	**$45,000**
Total	$674,870	$67,486.96	$67,486.96	$20,246.09	$101,230.44	$931,320	$186,264.01	**$1,125,000**

Notes:

Totals for this preliminary estimate are rounded to the nearest $5,000 increments.

Estimates are based on 2018 public sector pricing and include 20% contingency in the event of unforeseen conditions are encountered either during the design development or construction phases of the project. These estimates are based on performing the work during normal business hours while the building remains occupied. Before proceeding with repair design or procurement, GRLA recommends an evaluation of the existing structural components supporting the slate roof be performed. Costs associated with major structural renovations are not included in this preliminary estimate. GRLA does not recommend using these order-of-magnitude estimates for sensitive budgeting.

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Gorman Richardson Lewis Architects

Project Name : Groton Public Library
Project Number: 2017054.01
Date: 02/07/2018
Client: Groton Public Library

PRELIMINARY COST ESTIMATE

Slate Roof Replacement	Quantity	Unit	Unit Price	Total
Demolition	3,500	SF		
Slate Shingles	3,500	SF		
Synthetic Roof Underlayment	3,500	SF		
Self-Adhered Modified Bitumen	1,500	SF		
Copper Flashings				
Ridge (16 oz.)	135	LF		
Hip (16 oz.)	125	LF		
Valley (16 oz.)	90	LF		
Deck Repair (5%)	150	SF		
Subtotal				**$194,650**
Synthetic Slate Roof Replacement	**Quantity**	**Unit**	**Unit Price**	**Total**
Demolition	3,000	SF		
New Slate Shingles	3,000	SF		
Synthetic Roof Underlayment	3,000	SF		
Self-Adhered Modified Bitumen	1,500	SF		
Copper Flashings				
Ridge (16 oz.)	20	LF		
Hip (16 oz.)	90	LF		
Valley (16 oz.)	135	LF		
Edge (16 oz.)	426	LF		
Deck Repair (5%)	150	SF		
Subtotal				**$174,820**
Flat Seam Copper Roof Replacement	**Quantity**	**Unit**	**Unit Price**	**Total**
Demolition	125	SF		
Copper Pans (20 oz.)	125	SF		
Self-Adhered Modified Bitumen	125	SF		
Copper Flashings				
Edge (16 oz.)	60	LF		
Deck Repair (5%)	8	SF		
Subtotal				**$4,873**
Roof Drainage System Replacement	**Quantity**	**Unit**	**Unit Price**	**Total**
Demolition	690	SF		
Demolition	170	LF		
6" Hanging Copper Gutter (20 oz.)	665	SF		
6" Built-in Copper Gutter (20 oz.)	25	SF		
5" Copper Downspouts (20 oz.)	170	SF		
Subtotal				**$75,820**
Snow Management System Replacement	**Quantity**	**Unit**	**Unit Price**	**Total**
Demolition	690	LF		
Three Pipe Snow Rail System	690	LF		
Subtotal				**$70,380**
Subtotal				**$520,543**

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Project Name : Groton Public Library
Project Number: 2017054.01
Date: 02/07/2018
Client: Groton Public Library

PRELIMINARY COST ESTIMATE

Single Ply Elastomeric Roof Replacement	**Quantity**	**Unit**	**Unit Price**	**Total**
Demolition	2,000	SF		
Roof System (Membrane, coverboard, insulation)	2,000	SF		
Roof System at Walls	2,000	SF		
Copper Flashings				
Edge (16 oz.)	190	LF		
Coping (16 oz.)	45	LF		
Expansion Joint				
Horizontal	48	LF		
Vertical	16	LF		
Subtotal				**$67,057**

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Gorman Richardson Lewis Architects

Project Name : Groton Public Library
Project Number: 2017054.01
Date: 02/07/2018
Client: Groton Public Library

PRELIMINARY COST ESTIMATE

Masonry Repairs	Quantity	Unit	Unit Price	Total
Stone Repairs	12	EA		
Mortar Replacement	2,730	SF		
Add Masonry Expansion Joints	200	LF		
Subtotal				**$60,600**

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Project Name : Groton Public Library
Project Number: 2017054.01
Date: 02/07/2018
Client: Groton Public Library

PRELIMINARY COST ESTIMATE

Window and Door Repairs	**Quantity**	**Unit**	**Unit Price**	**Total**
Wood Window Restoration	374	SF		
Repaint Wood Windows	124	SF		
Window and Door Perimeter Sealants	1,600	LF		
Subtotal				**$26,670**

Fall 2018 Town Warrant Article: $66,000

Final Investigation, Design, and Bid Services for New Library Roof and Drainage Systems

The Library has been experiencing water infiltration into the building in all areas since the 1999 renovation and addition. After years of fixing each issue separately (with a total cost exceeding $100,000), the Library Trustees (with CPA and State Aid funding) hired Building Envelope Scientists from Gorman Richardson Lewis Architects (GRLA) to do a thorough study of the building systems to make an overall recommendation on what needs to be done. GRLA's evaluation is that the library is experiencing widespread failure of the existing steep slope synthetic slate and original slate roofing systems, associated flashings, and gutters resulting in moisture infiltration throughout the building. Based on their findings, they are recommending complete replacement of all roofs (including the central low-slope EPDM roof with skylights), gutters, and drainage systems, as well as masonry and window repairs.

We are requesting $66,000 for additional investigation, design, and bid services for the recommended work. The design will include every part of the building envelope, from the roof deck to the foundation. We will be provided with all construction drawings, technical specifications, and other bid documents, and quoted services include administration of all phases of the bidding process.

Partial view of the steep-slope, slate shingle roof system. The yellow line indicates the approximate limits of the slate roof area on the original library building. The roof system consists of gray slate shingles in a uniform pattern with open copper valleys and copper ridge and hip caps. Generally, the slate shingles appear to be in fair condition, however, cracked, broken, displaced, and missing slate shingles were observed throughout the roof.

Partial view of the steep-slope, synthetic slate shingle roof system. Overall, the synthetic slate appears to have a fairly uniform size and exposure throughout the roof surface. Most of the color has faded or worn off, leaving the base material color exposed. Sheet metal flashings consist of lead coated copper and are installed at the hips and ridges. The roof has open sheet metal valleys and lead coated copper gutters. A three-rail, pipe-style, snow guard system is installed along the majority of the building perimeter of the addition.

Building Envelope Sciences
G | R | L | A
Gorman Richardson Lewis Architects
239 South Street Hopkinton, MA 01748
T - 508.544.2600 F - 508.435.0072
www.grlarchitects.com

July 18, 2018

PROPOSAL FOR SERVICES

Groton Public Library
99 Main Street, Groton, MA 01450

Prepared for:

Ms. Vanessa Abraham
Library Director
Groton Public Library
99 Main Street
Groton, MA 01450

Prepared by:

The Building Envelope Sciences Group of:
Gorman Richardson Lewis Architects, Inc.
239 South Street
Hopkinton, MA 01748

Gorman Richardson Lewis Architects, Inc. (GRLA) is pleased to submit this Proposal for Services at The Groton Public Library in Groton, MA.

The Groton Public Library (GPL) consists of approximately 17,000 sq. ft. of finished space enclosed in an 1893 portion facing Main Street and a 3-story addition completed in 1999. Both sections of the building have yellow brick masonry exterior walls with perimeter steep slope slate (1893) and synthetic-slate (1999) roofs, as well as a central low-slope EPDM roof with skylights. There are wood and aluminum-framed windows.

GRLA completed a preliminary visual study of the exterior building envelope components in December 2017 to identify sources of ongoing water leakage and deterioration. There are several areas of stained and damaged interior finishes, and GPL reports water leakage during rain and snow storms throughout the year, including ice dam-related leaks during the wintertime. GRLA issued our findings, recommendations preliminary construction cost estimates in our January 24, 2018 report.

Based on our February 6, 2017 and July 10, 2018 meetings with representatives of the GPL and the Town of Groton, GRLA understands that GPL wishes to proceed with design development of repairs based upon the recommendations presented in our report as well as perform additional study of conditions recommended for further observation and exploratory openings.

Please accept this proposal for additional evaluation, design and bid period services related to the scope of work described herein.

Scope of Services

Scope	GRLA Fees	Contractor/Consultant Fees
Additional Evaluation – Foundation Waterproofing GRLA will coordinate with a masonry contractor to perform additional exploratory evaluation of leak conditions impacting the children's room. The intent will be to further identify sources of moisture infiltration to develop the scope of repairs. The proposed evaluation is assumed to consist of removal and reinstallation of a section of the concrete walkway at the building exterior at an area directly above the reported leak location and removal and reinstallation of associated exterior masonry wall components to review cavity wall and through wall flashing configurations. GRLA assumes 1 day of field review and documentation of these conditions; however, contractor services may take longer than 1 day. Reimbursable expenses include masonry contractor services and expenses as defined in the Terms and Conditions Section of this proposal.	$3,500	$10,000
Additional Evaluation – Roofing Configurations GRLA will coordinate with a roofing contractor to perform exploratory openings at representative steep slope and low slope roof areas to compare and verify the as-built configuration with the original design. The intent will be to further identify existing configurations and conditions to reduce risk of unforeseen conditions during construction. Materials removed will be reinstalled or patched following GRLA's review of the components. GRLA assumes 1 day of field review and documentation of these conditions and configurations. Reimbursable expenses include roofing contractor services and expenses as defined in the Terms and Conditions Section of this proposal.	$3,500	$2,750

Scope	GRLA Fees	Contractor/Consultant Fees
Field Measurements and Documentation GRLA will visit the site to perform additional visual observations and take measurements as required to facilitate the design of the recommended roofing, masonry and window repair project. Observations and measurements will be taken from ground level and roof levels accessible through the attic. GRLA assumes 1 day for these additional design documentation and measurement services. Reimbursable expenses include expenses as defined in the Terms and Conditions Section of this proposal.	$3,000	$250

Design Phase
 	
Our scope of work for the Design Phase includes the following:
 	
• Preparation of Construction Drawings suitable for competitive bidding by qualified contractors.
  o Drawings will include a roof plan, elevations and specific detail drawings with approximate dimensions based on the 1999 design drawing set.
• Preparation of Division 1 and technical specifications for the replacement of the roof systems, flashings, masonry repairs, and window repairs.
  o GRLA will update the front-end documents (Division 0) provided by the Owner.
• Submissions to the Groton Public Library for review and comment at the 50% and 95% completion stages (drawings and specifications).
• Meeting with GPL to review the 50% and 95% design documents.
• Consultation by phone and email as needed.
• 1 hard copy and 1 electronic copy (PDF file) of documents (drawings and specifications) at the 50% and 95% completion stages.
• Finalize drawings and specifications to 100% Construction Documents.
• Upon approval of the 100% Construction Documents from GPL, GRLA will finalize the drawings for contractor bidding. Our bid document package will include: drawings, specifications, a draft standard AIA A107 agreement between Owner and Contractor and bid form. We will provide an electronic copy (PDF file) of all documents to GPL.
 	
Reimbursable expenses include structural engineer evaluation of proposed roof options and expenses as defined in the Terms and Conditions Section of this proposal.
	$26,000	$5,500

Scope	GRLA Fees	Contractor/Consultant Fees
Bid Phase • GRLA will provide the bid advertisement and post the Contract Documents for online contractor bidding. • Conduct a pre-bid meeting on site with contractors to review the scope of work. • Answer bidder questions and issue addendum as needed. • Bid Opening will be performed electronically. • Review contractor bids, check references and provide a bid recommendation letter. Reimbursable expenses include online bidding services and expenses as defined in the Terms and Conditions Section of this proposal.	$4,000	$1,250
Subtotal	$40,000	$19,750
***Total Fee** (with estimated reimbursable expenses)*	**$59,750**	

The design documents described above include the following scope of work assumptions:

Steep Slope Roof systems

- Removal of the existing slate and synthetic slate sloped roof systems, including all underlayments, flashings, gutters, downspouts and snow retention systems down to the structural deck.
- Repair/Replacement of deteriorated wood roof deck in-kind.
- Installation of new roof underlayments and sheet metal flashings.
- Installation of new copper gutters and downspouts sized configured to accommodate industry standard drainage requirements.
- Installation of new slate roof shingles to replicate the historic appearance of the original roof system at the 1893 and 1999 steep slope roof areas.
- Coordination with a Structural Engineer sub-consultant for review of proposed roof loading conditions associated with the replacement of slate shingles at all steep slope roof areas.

Low Slope Roof Systems

- Removal of the existing single-ply low slope roof system, including all insulation down to the structural deck.
- Coordinate extensions for all rooftop mechanical equipment, drains, vent pipes, etc. as required for the new roof system.
- Install new single-ply thermoplastic low slope roof system with tapered insulation as required to meet the current Massachusetts State Energy Code and provide slope to drain around existing rooftop penetrations to minimize ponding.

Masonry Repairs

- Perform spot masonry repairs of individual cracked and spalled brick masonry units.
- Perform spot masonry repointing repairs at areas of deteriorated mortar joints.
- Perform spot flashing replacement above arched windows on 1893 building and at isolated leak locations on the 1999 building.
- Sawcut new masonry expansion joints at select locations in accordance with industry standards. Stabilize brick masonry on each side of the new joints with helical ties.

Window Repairs

- Remove and replace window perimeter sealants at all windows.
- Restore historic wood window components, including replacement of paint coatings, sealants and window hardware.
- Replace select storm window units at 1893 building.

Exclusions:

- Structural Engineering Design of roof augmentation due to increased roof loading from new roof systems or snow retention systems. Scope of design to be determined following the Structural Engineer's review of the existing conditions as an Additional Service.
- Repairs associated with foundation waterproofing at areas of existing leaks. As the extent of the existing conditions and required repairs is unknown at this time, the scope of repair and design can be performed as an Additional Service following completion of the optional exploratory observations proposed.
- Exploratory openings at leaking window heads at first floor of 1999 Rotunda to be coordinated as Additional Services based on additional visual review of existing components by GRLA during the Field Measurements and Documentation Phase noted above. During this phase, GRLA will d determine feasibility of test cut openings to develop the scope of repairs at this isolated condition, which can be performed as an Additional Service.
- Coordination of design options with the local historical commission. As the extent of this scope is undefined, GRLA can perform this service and attend meetings as an Additional Service.
- For additional exclusions refer to the Terms and Conditions included with this proposal.
- Fee for Construction Phase Services to be determined based on approved scope of work and anticipated construction schedule.

Schedule

(preliminary milestone schedule to be updated with GPL upon notice to proceed)

Additional Study/Measurements	Fall 2018
• 3 days	Fall 2018
Design and Documentation Phase	Winter 2018/2019
• 50% Design Development Set	December 2018
• 95% Design Development Set	January 2019
• Bid Documents	February 2019
Bid Phase	Spring 2019
Construction Phase	Summer 2019

*Dates based on authorization to proceed within 60 days of issuance of proposal and can be adjusted upon request

Next Steps

If you are prepared to proceed with the scope as described, please sign below and return a copy to GRLA.

If you have questions, comments or concerns, please contact me directly at 508-544-2723 or cpaszko@grlarchitects.com. On behalf of Gorman Richardson Lewis Architects, Inc., thank you for the opportunity to be of service.

Accepted and agreed to by the Groton Public Library:

Signature _____ Date Oct 2, 2018

David Zeiler — GPL Trustees, Chair

Printed name — Title

Respectfully submitted,
GORMAN RICHARDSON LEWIS ARCHITECTS, INC.

Christopher Paszko, P.E.
Director, Building Envelope Sciences

PROPOSAL TERMS AND CONDITIONS **2018**

1. The Proposal above and these Terms and Conditions represents the entire and integrated Agreement between **Groton Public Library** (the Client) and **Gorman Richardson Lewis Architects** (the Consultant). The proposed fee includes the scope as described.

2. **Initial Information**: This Agreement is based on the Initial Information as described in the Project Understanding section (above) of this Proposal Letter.

3. **Assumptions and Exclusions:** On additional site evaluation, design and bid phase services are assumed to be performed during normal business hours. Access will be provided to the exterior walls and roof of the site from both the interior and exterior sides of the building during additional site evaluation. The following services are **excluded** from our proposal – these services can be provided as an additional service if so requested by the client:
   a. Structural Engineering design services
   b. Mechanical Engineering, Civil Engineering, Landscape design or site survey services
   c. Commissioning – whether MEP Systems or Building Envelope Systems
   d. Geotechnical investigation and borings
   e. Independent Engineering Peer Reviews
   f. Independent material testing and inspection
   g. Life Cycle costing
   h. Presentations
   i. Construction Phase Services

4. **Standard of Care**: The Consultant agrees to perform services in a professional manner consistent with the degree of skill and care ordinarily exercised by other members of the profession under similar circumstances, at the same time and in the same or a similar locale. The Consultant makes no warranty, express or implied, as to its professional services rendered under this Agreement. The Client and Consultant are aware of the risks, rewards and benefits of the project and the Consultant's total fee for services. The risks have been allocated such that the Client agrees that, to the fullest extent permitted by law, the Consultant's professional total liability to the Client for any and all injuries, claims, losses, expenses, damages or other claims expenses arising out of this Proposal from any cause or causes shall not exceed the total amount of the fee or amount of available insurance. Such causes include but are not limited to the Consultant's negligence, errors and omissions, strict liability or breach of contract.

5. **Meetings and Site Visits:** The following meetings, on-site meetings and site visits are included in the proposed fee – **additional meetings if so requested will be billed on an hourly basis:**

▪ **Field Measurements:**	**0 Meeting**	**3 Site Visits**
▪ **Design Development:**	**2 Meetings**	**0 Site Visits**
▪ **Bid Phase :**	**1 Meeting**	**0 Site Visits**
TOTAL:	**3 Meetings**	**3 Site Visits**

   ▪ **Teleconferences**: Teleconferences are included in this proposal to the extent that the quantity and length are reasonable.

- **Meeting Minutes:** The Consultant will attend and participate in construction meetings. Meeting minutes will be recorded and prepared by the Contractor.

- **Site visits:** The Consultant will prepare a written and photo summary of all site visits during construction, filing same with the Client and the governing authority having jurisdiction.

6. **Additional services:** Revisions due to client requested changes in scope, quality or budget will entail additional services. If the project or Consultant's scope of services are changed materially or additional services are requested, the Consultant will prepare an Additional Services Authorization (ASA) for client approval prior to commencing additional services. For additional services where no scope of work can be clearly defined, the services will be provided on an hourly basis and reflected in an applicable ASA. Refer to the attached Summary of Fees and Charges.

7. **Services After the Completion of Scope of this Proposal:** If services are required of Consultant by Client for any reason whatsoever, at any time after the completion of the Consultant's services as set forth in this Proposal, those services shall be considered additional services for which the Consultant shall be compensated based on a new proposal or an hourly basis at the Consultant's then existing rates.

8. **Duration of Services Under this Proposal:** If the services covered by this Agreement have not been completed within twelve (12) months of the date of this Agreement, through no fault of the Consultant, extension of the Consultant's services beyond that time shall be compensated as Additional Services.

9. **Reimbursable expenses:** Reimbursable expenses include (but are not limited to): Independent laboratory testing costs, Structural Engineering Consulting, Vehicle mileage, photographs, vendor and in-house document reproduction, phone calls and facsimile transmissions archival charge, and other incidentals necessary to complete the scope as described. The Consultant shall be reimbursed for expenses incurred in the interest of the project, plus an administrative fee of fifteen percent (15%) unless a specified dollar amount is identified in this proposal.

10. **Mediation**: In an effort to resolve any conflicts that arise during the design and construction of the Project or following the completion of the Project, the Client and the Consultant agree that all disputes between them arising out of or relating to this Agreement or the Project shall be submitted to nonbinding mediation. The Client and the Consultant further agree to include a similar mediation provision in all agreements with independent contractors and consultants retained for the Project and to require all independent contractors and consultants also to include a similar mediation provision in all agreements with their subcontractors, subconsultants, suppliers and fabricators, thereby providing for mediation as the primary method for dispute resolution among the parties to all those agreements.
    - If the parties do not resolve a dispute through mediation, the method of binding dispute resolution shall be litigation in a court of competent jurisdiction.

11. **Termination:** In the event of termination of this Agreement by either party, the Client shall within fifteen (15) calendar days of termination pay the Consultant for all services rendered and all reimbursable costs incurred by the Consultant up to the date of termination, in accordance with the payment provisions of this Agreement.
    The Client may terminate this Agreement for the Client's convenience and without cause upon giving the Consultant not less than seven (7) calendar days' written notice.

Either party may terminate this Agreement for cause upon giving the other party not less than seven (7) calendar days written notice for any of the following reasons:

a. Substantial failure by the other party to perform in accordance with the terms of this Agreement and through no fault of the terminating party;
b. Assignment of this Agreement or transfer of the Project by either party to any other entity without the prior written consent of the other party;
c. Suspension of the Project or the Consultant 's services by the Client for more than ninety (90) calendar days, consecutive or in the aggregate;
d. Material changes in the conditions under which this Agreement was entered into, the Scope of Services or the nature of the Project and the failure of the parties to reach agreement on the compensation and schedule adjustments necessitated by such changes.

In the event of any termination that is not the fault of the Consultant, the Client shall pay the Consultant, in addition to payment for services rendered and reimbursable costs incurred, for all expenses reasonably incurred by the Consultant in connection with the orderly termination of this Agreement, including but not limited to demobilization, reassignment of personnel, associated overhead costs and all other expenses directly resulting from the termination.

12. **Right of entry:** The Client agrees to furnish right of entry and permission for the Consultant to perform field investigation, photography, field measurements, and review of existing buildings in accordance with permission to access areas by Client.

13. **Hazardous Materials Exclusion**: No hazardous material investigation or remediation is part of this proposal. If Asbestos-Containing Material or other Hazardous Materials are encountered or suspected the Consultant will notify the Client. However the Consultant has no liability whatsoever for Hazardous Materials whether noted or not on the property.

14. **Costs of Collection:** The Client hereby agrees to pay all costs of collection of overdue accounts including all legal and court costs and related reimbursable expenses; and to reimburse the Consultant for time which he and his staff expend in the collection of overdue accounts at the then standard hourly rate stipulated by the then most current schedule of fees and services, unless such amounts are overdue as a result of a legitimate dispute in which case the costs of collection shall be deemed not to include costs incurred as a result of the Client pursuing his rights.

15. **Cost Estimates:** Since the Consultant has no control over the cost of labor, materials, equipment, or services furnished by others, or over the Contractor's methods of determining prices or over competitive bidding or market conditions, any opinion of construction cost provided for herein are made on the basis of the Consultant's cost estimating consultant's experience and qualification and represent the Consultant's best judgment; but the Consultant does not guarantee that proposals, bids or actual construction costs will not vary from opinions of probable cost prepared by the Consultant or his cost estimating consultants. The Client agrees that the Consultant shall not be held liable for differences between estimates and actual costs.

16. **Consequential Damages**: Notwithstanding any other provision of this Agreement, and to the fullest extent permitted by law, neither the Client nor the Consultant, their respective officers, directors, partners, employees, contractors or subconsultants shall be liable to the other or shall make any claim for any incidental, indirect or consequential damages arising out of or connected in any way to the Project or to this Agreement. This mutual waiver of consequential damages shall include, but is not limited to, loss of use, loss

of profit, loss of business, loss of income, loss of reputation and any other consequential damages that either party may have incurred from any cause of action including negligence, strict liability, breach of contract and breach of strict or implied warranty. Both the Client and the Consultant shall require similar waivers of consequential damages protecting all the entities or persons named herein in all contracts and subcontracts with others involved in this project.

17. **Jobsite Safety**: Neither the professional activities of the Consultant, nor the presence of the Consultant or its employees and subconsultants at a construction/project site, shall impose any duty on the Consultant, nor relieve the General Contractor of its obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending and coordinating the Work in accordance with the Contract Documents and any health or safety precautions required by any regulatory agencies. The Consultant and its personnel have no authority to exercise any control over any construction contractor or its employees in connection with their work or any health or safety programs or procedures. The Client agrees that the General Contractor shall be solely responsible for jobsite and worker safety and warrants that this intent shall be carried out in the Client's contract with the General Contractor. The Client also agrees that the General Contractor shall defend and indemnify the Client, the Consultant and the Consultant's subconsultants. The Client also agrees that the Client, the Consultant and the Consultant's subconsultants shall be made additional insureds under the General Contractor's policies of general liability insurance.

18. **Instruments of Service**: If the Client terminates the Consultant for its convenience under Section 9.5 of B104, or the Consultant terminates this Agreement under Section 9.3 of B104, the Client shall pay a licensing fee as compensation for the Client's continued use of the Consultant's Instruments of Service solely for the purposes of completing, using and maintaining the Project as follows: fifty percent (50%) of the remaining fee for Consultant's services prior to termination, or ten thousand dollars ($10,000), whichever is less.

19. **Payment terms**: Services will be billed via a monthly invoice. No deposit or initial payment is required. Payments are due and payable upon receipt of the Consultant's invoice. Amounts un-paid (60) days after the date of invoice shall bear interest at the rate of one-and-one half (1.5%) percent per month, eighteen (18%) percent per annum. The Consultant reserves the right to stop services should invoices or any part thereof remain unpaid for (60) days or more from the date of invoice.

20. **Third-Party Beneficiaries**: Nothing contained in this Agreement shall create a contractual relationship with or a cause of action in favor of a third party against either the Client or the Consultant. The Consultant's services under this Agreement are being performed solely for the Client's benefit, and no other party or entity shall have any claim against the Consultant because of this Agreement or the performance or nonperformance of services hereunder. The Client and Consultant agree to require a similar provision in all contracts with contractors, subcontractors, subconsultants, vendors and other entities involved in this Project to carry out the intent of this provision.

Gorman Richardson Lewis Architects
Fees and Charges - 2018

Architectural and Interiors Personnel

Principal	$220.00
Associate	$180.00
Senior Project Manager	$170.00
Project Manager	$150.00
Assistant Project Manager	$140.00
Job Captain	$130.00
Designer IV	$120.00
Designer III	$110.00
Designer II	$100.00
Designer I	$90.00
Administrative	$90.00

Building Envelope Group

Group Director	$210.00
Senior Project Manager	$190.00
Project Manager	$180.00
Assistant Project Manager	$150.00
Field Technician II	$130.00
Field Technician I	$110.00
Administrative	$90.00

EXPENSES

Mileage: $0.621 per mile

Expenses: Incurred by the Architect on behalf of the Client: Cost Plus 15%

- Photographs
- Postage/overnight delivery
- Courier services
- Telecommunications
- Plotting and printing
- Color plots/mounting
- Tolls/parking fees
- Permits

Consultants: Charges to the Architect. Cost Plus 15%

Rates subject to review annually

Town of Groton, Massachusetts

Proposed Capital Plan
FY 2020 - 2024

TOWN OF GROTON
173 Main Street
Groton, Massachusetts 01450-1237
Tel: (978) 448-1111
Fax: (978) 448-1115

Town Manager
Mark W. Haddad

December 31, 2018

Honorable Select Board:
Honorable Finance Committee:

Pursuant to Section 6-6 of the Town of Groton Charter, I am pleased to present the proposed Five-Year Capital Plan for Fiscal Years 2020 through 2024 for the Town of Groton, Massachusetts. Specifically, the Charter states that the Town Manager shall submit a Capital Improvement Plan to the Select Board and Finance Committee at least 6 months before the start of the fiscal year. This Plan is being submitted in compliance with the Charter.

As you know, this Plan allows for careful, critical review of major expenditures, while also giving us the ability to move up or delay expenditures should an imminent need arise. By scheduling expenditures, it allows for a more even distribution of costs, thereby providing greater budget stability. During our most recent bond issue to finance the Senior Center, Lost Lake Fire Protection and Radio Project, S&P Global Direct reviewed our finances and budgeting and maintained our Bond Rating at AAA with a Stable Outlook. Part of their review focused on our Capital Planning. In their Rating Document, they stated that *"Groton also maintains a strong focus on long-term capital planning, evidenced by a five-year capital improvement plan (CIP) that identifies projects and costs across all departments. The Town updates its CIP annually and details pay-as-you-go funding and bond financing of all capital projects."* The Finance Team and I are very proud of this recognition as they understood how seriously we take our Capital Planning.

That said, this year will mark a departure from past Capital Plans as we are adding a new section that provides an additional five (5) year lookout on our Municipal Building needs through Fiscal Year 2030. We believe adding this new section will aid the Select Board and Finance Committee in understanding the long-range needs of our buildings and allow the Finance Team to plan for any major projects that may require long term debt planning.

In addition, the Select Board has developed and approved a definition of what constitutes a Capital Budget Item. We are including this new language in our proposed Plan this year. Specifically, the definition is as follows:

Capital Budget Items, both tangible and intangible, are defined as future projects, programs, improvements and acquisitions having an estimated useful life of at least three (3) years and an initial cost of at least twenty-five thousand dollars ($25,000). Examples of Capital Items include but are not limited to land (e.g., open space, parks, athletic fields, cemeteries, etc.); municipal buildings and building improvements (all types); vehicles (all kinds); machinery (all types); equipment (all types, including office); computer hardware and software (all types); communication systems (e.g., two-way radios and systems, digital communications networks, antennas, etc.); and infrastructure (e.g., roads, bridges, dams, water and sewer lines, cisterns and other water holding tanks, etc.)

In developing this plan, I worked closely with all Department Heads and attempted to identify capital improvement projects that represented major, non-recurring expenditures and prioritized them. We have balanced the immediate and long-term capital needs of the Town given available resources. I am proposing the following items from the Capital Plan be funded in FY 2020:

Department	Item	Amount	Funding Source
Fire and EMS	Engine 3 Replacement	$ 140,875	Ambulance Fund
Fire and EMS	Service 1 Replacement	$ 60,000	Ambulance Fund
Highway	Building Upgrade	$ 4,000,000	General Obligation Bond
Highway	Brush Mower/Field Mower	$ 45,000	Capital Asset
Highway	Dump Truck	$ 40,000	Capital Asset
Highway	Backhoe	$ 95,000	Capital Asset
Town Facilities	IT Infrastructure/Computer Purchase	$ 40,000	Capital Asset
Town Facilities	Dispatch Upgrade	$ 60,000	Capital Asset
Town Facilities	Municipal Building Exterior Repairs	$ 25,000	Capital Asset
Town Facilities	Paint Police Station/Roof Repairs	$ 20,000	Capital Asset
Transfer Station	Tractor Trailer Unit/Trash Trailer	$ 40,000	Capital Asset
Library	Roof Repair	$ 1,125,000	General Obligation Bond
Police	Police Cruisers	$ 109,845	Capital Asset
Country Club	Pool Improvements	$ 15,000	Capital Asset
Country Club	Cart Path Repairs	$ 10,000	Capital Asset
Country Club	Triplex - Greens Mower	$ 5,100	Capital Asset
Water Department	Water Meter Replacement Program	$ 75,000	Water Revenue
Sewer Department	Wastewater Treatment Plant Upgrades	$ 1,250,000	Sewer Revenue
GDRSD	Annual Regional School Capital	$ 479,011	GDRSD Capital
	Total Requested	**$ 7,634,831**	

To fund this proposed Capital Plan in FY 2020, I am proposing that the following amounts be appropriated from the following sources:

General Obligation Bond	$ 5,125,000
Capital Asset Fund	$ 504,945
Ambulance Fund	$ 200,875
Water Revenue	$ 75,000
Sewer Revenue	$ 1,250,000
GDRSD Capital Fund	$ 479,011
Total	**$ 7,634,831**

I wish to acknowledge and thank all of the Department Heads and Staff for their efforts in producing this document.

I look forward to the opportunity to discuss this proposed plan in more detail.

Sincerely,

Mark W. Haddad
Town Manager

Town of Groton, Massachusetts
CAPITAL PLAN
2020 - 2024

FUNDING SUMMARY

	2020	2021	2022	2023	2024	Five Year Total
GENERAL FUND	$ -	$ 40,000	$ 40,000	$ 40,000	$ 40,000	**$ 160,000**
BOND	$ 5,125,000	$ -	$ 70,000,000	$ -	$ -	**$ 75,125,000**
CAPITAL ASSET	$ 504,945	$ 901,240	$ 696,535	$ 725,031	$ 513,632	**$ 3,341,382**
WATER REVENUE	$ 75,000	$ 75,000	$ 3,375,000	$ -	$ -	**$ 3,525,000**
SEWER REVENUE	$ 1,250,000	$ -	$ -	$ -	$ 14,500,000	**$ 15,750,000**
AMBULANCE FUND	$ 200,875	$ 464,655	$ 137,215	$ 132,335	$ 451,880	**$ 1,386,960**
GDRSD CAPITAL	$ 479,011	$ 368,472	$ 445,894	$ 554,878	$ 553,408	**$ 2,401,663**
TOTAL	**$ 7,634,831**	**$ 1,849,367**	**$ 74,694,644**	**$ 1,452,244**	**$ 16,058,920**	**$ 101,690,005**

Town of Groton, Massachusetts
CAPITAL PLAN
2020 - 2024

LISTING OF PROJECTS BY FUNDING SOURCE

GENERAL FUND

Page	Program	Description	Cost 2020	Cost 2021	Cost 2022	Cost 2023	Cost 2024	Funding Source
16	Town Facilities	IT Infrastructure/Computer Purchase		$ 40,000	$ 40,000	$ 40,000	$ 40,000	General Fund
Subtotal			**$ -**	**$ 40,000**	**$ 40,000**	**$ 40,000**	**$ 40,000**	

BOND

Page	Program	Description	Cost 2020	Cost 2021	Cost 2022	Cost 2023	Cost 2024	Funding Source
27	Library	Roof Repair	$ 1,125,000					Bond
14	Highway	Building Upgrade	$ 4,000,000					Bond
46	GDRSD	Florence Roche Elementary School			$ 65,000,000			Bond
22	Town Facilities	Prescott School			$ 5,000,000			Bond/CPA
Subtotal			**$ 5,125,000**	**$ -**	**$ 70,000,000**	**$ -**		

LIBRARY

Town of Groton, Massachusetts
CAPITAL PLAN
Fiscal Years 2019 - 2024

Page	Description	APPROVED FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Five Year Total	Funding Source
LIBRARY									
26	Carpet Replacement				$ 30,000			$ 30,000	Capital Asset
	Emergency Exit Walkway Safety Improve	$ 40,000						$ -	Capital Asset
27	New Roofing and Drainage Systems		$ 1,125,000					$ 1,125,000	Bond
28	Upgrade Building Alarm System			$ 20,000				$ 20,000	Capital Asset
29	Repaint Library Interior				$ 60,000			$ 60,000	Capital Asset
30	Redo Interior Lighting					$ 40,000		$ 40,000	Capital Asset
31	Reconstruct Parking Lot			$ 80,000				$ 80,000	Capital Asset
32	AV System for Sibley Hall						$ 25,000	$ 25,000	Capital Asset
Subtotal		**$ 40,000**	**$ 1,125,000**	**$ 100,000**	**$ 90,000**	**$ 40,000**	**$ 25,000**	**$ 1,380,000**	

TOWN OF GROTON CAPITAL PLAN - PROJECT DETAIL SHEET

Project Title: **New Roofing, Drainage System and Water Protection**

Department: **Library**

Reason for Need:

We knew there were water and ice dam issues, but were told they were related to the gutters being undersized, not tying together, and poor flashings. Water infiltration into the building was visible through exterior efflorescence in the 1999 building and in the ice dams in the eaves in the 1893 building. Only when the building envelope assessment was completed did we understand the extent the entire needs for this building. This project would address all envelope issues at the same time: new slate roof (1893 & 1999 bldgs); new rubber roof (HVAC); new copper gutters, downspouts; new snow & ice shield; new snow guard system; new 1999 skylights; protect 1893 skylight; exterior masonry repointing, sealing, and adding joints; exterior window re-sealing & repair.

RECOMMENDED FINANCING

	SOURCE OF FUNDS	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	TOTAL COST
A. Feasibility Study							$ -
B. Design							$ -
C. Land Acquisition							$ -
D. Construction							$ -
E. Furnishings and Equipment							$ -
F. Departmental Equipment	GB	$ 1,125,000					$ 1,125,000
G. Contingency							$ -
H. Other							$ -
TOTAL:		**$ 1,125,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 1,125,000**

Sources of Funds Legend:

(OR) Operating Revenues
(GB) General Obligation Bond
(CA) Capital Asset Fund
(ST) Stabilization Fund
(EMS) EMS Fund Fees
(FC) Free Cash/Other
(SE) Sewer Enterprise Fund Fees
(WE) Water Enterprise Fund Fees