

MEMORANDUM

DATE: OCTOBER 28, 2025
TO: WESTON & SAMPSON
100 FOXBOROUGH BLVD, SUITE 250
FOXBOROUGH, MA 02035
ATTN: MR. MIGUEL PIMENTEL
PROJECT DESIGNER III
CC: LANCE ROBSON, BET
FROM: GRAHAM CARR, PE
RE: ROOF & EXTERIOR RESTORATION
UPTON TOWN HALL
1 MAIN ST, UPTON, MA 01568

BET
PROJECT NO: 25083

Dear Mr. Pimentel,

Building Envelope Technologies, Inc. (**BET**) has been retained by Weston & Sampson (WSE) to provide building enclosure investigation and schematic design services for repair/restoration of the Upton Town Hall property to address ongoing water leak concerns. **BET** visited the property on October 9, 2025 to perform an initial visual review of the roof, fenestrations and exterior walls. The following report summarizes our observations, conclusions and recommendations.

BACKGROUND

- The Upton Town Hall is an historic structure dating to circa 1884. The building is a 1- to 4-level above grade mass masonry and timber framed structure with 13:12 slope roof system. The existing asphalt shingle roof system was reportedly installed in 2000.
- Town Offices were relocated to another building in the late 2000's, during which time an exterior and interior renovation was planned and completed. Construction Documents (dated March 2013) indicate that several exterior envelope restoration items were completed, including:
 - Modification of an exterior entrance/stair to be enclosed with a new vestibule at the North elevation, which now serves as an employee entrance.
 - Localized roof repairs, gutters and downspouts.
 - Targeted louver, window and door replacement.

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- Painting of roof cornices, soffits, various trim and windows.
- Targeted fieldstone, granite, brownstone and brick restoration.
- 9" thick open cell spray foam insulation at the existing roof rafters, to convert the attic from unconditioned to conditioned mechanical space.
- Upton Facilities reported to **BET** that a ceiling structure in the auditorium was removed, causing movement of the auditorium roof arches; which was later augmented by structurally tying the arches.
- The following leak concerns were reported by Town of Upton Facilities:
 - Periodic leaks at the North elevation employee entrance door and transom windows. Ice reportedly also forms on the ground in front of the entrance in the winter.
 - Periodic leaks at the Town Clerk's office window, located at the 1st floor, South elevation, Southeast corner.
 - Periodic leaks at the Northwest corner of the building, near the exterior shed and auditorium vestibule. Ice reportedly forms on the ground in front of the door in the winter.
 - Periodic leaks at the South elevation window/foundation wall in the Veteran's Agent office (Room 013, Ground Floor). The leaks are reportedly aligned with a deteriorated section of fieldstone foundation.

METHODOLOGY

The observations and recommendations provided herein are based on an initial survey of the roof, exterior walls and limited fenestrations. **BET** also reviewed select drawings from the 2013 renovation. **BET** was provided with (20) drawings from the renovation, of which various exterior details, elevations and the roof plan were used for this condition assessment. The documents used for this study include:

1. A1.5 – Roof Plan by MK&A (Dated March 5, 2013)
2. A2.1 – East Elevation by MK&A (Dated March 5, 2013)
3. A2.2 – South Elevation by MK&A (Dated March 5, 2013)
4. A2.3 – West Elevation by MK&A (Dated March 5, 2013)
5. A2.4 – North Elevation by MK&A (Dated March 5, 2013)
6. A3.7 – Stair Section Looking West by MK&A (Dated March 5, 2013)
7. A6.2 – North Entry Details by MK&A (Dated March 5, 2013)

Preliminary cost estimates were also provided by WSE for this study.

OBSERVATIONS

The following observations were noted during our visit to the property on October 9, 2025:

Roofing

The roof system of Upton Town Hall uses asphalt shingles of the dimension and depth to resemble slate roofing. Roofing products include a combination of architectural shingles installed in 2000 and 2013. Aluminum K-style gutters are present at several roof edges. Valleys are a combination of closed-cut valleys and open metal valleys. The asphalt shingles are generally aged and worn as expected for the age of the roof. Loose, damaged and lifted shingles were noted in various areas around roof edges and transitions.



South elevation – lifted shingles at bottom of a valley, and damaged shingles at a dormer rising wall.

Also note heat trace wiring installed to prevent ice dams.

The building design incorporates several cheek walls, rising walls, shed dormers and stepped roofs. **BET** observed that there are no kick-out flashing details present at any eaves where step flashing ends along cheek walls. Several steep slope roof edges do not have gutters, and drain over the edge onto the ground, or onto lower roof areas.



West elevation , Northwest corner – overview of roof conditions.

Note the upper roof drains over the roof edge onto a lower roof below.

Also note that there is no kickout flashing present, and masonry is deteriorated / previously repairs below.

The roof step flashing includes lead flashing and older painted metal (terne) flashing. Lead flashing appears to have been installed over the original step flashing by cutting mortar joints, tucking the metal into the joints and sealing with elastomeric sealant.

New step flashing placed over old flashing is a possible indication that the 25-year-old shingle roofing may have been installed over original underlayment or roofing materials. Occasionally this approach is taken to avoid removing siding or trim, such as along dormer walls, however we also noted areas where step flashing was incorrectly installed over trim. **BET** observed no signs that two (2) layers of roofing exist at the eaves, however both findings suggests that modern rubberized asphalt underlayment (i.e. 'Ice & Water Shield') is not present along rising walls.



Shed dormer cheek with step flashing poorly placed over rake trim.



Peeling / failed paint at eaves. Note that the roof in this area drains directly over the edge with no gutter.

Roof edge details include drip edge flashings with painted tin soffits, corbels, and molding details. Paint was last applied during the 2013 restoration project, and is in fair condition overall. Peeling/blistered paint was noted on various soffit and molding details. Limited soffits are vented, however these appear to have been abandoned by insulating the roof deck during the attic mechanical conversion in 2013. Rotted wood nailers, gaps, and deterioration were noted in select detail areas. Generally poor detailing related to gaps in roof transitions were also noted as shown in the following pictures.



North elevation – roof area below valley and above North alcove roof. Note the following compounding conditions:

Poorly detailed flashing, gaps in flashing.

Loose/displaced shingle.

Concentrated / bulk water from valley.

No kick-out flashing provided at gutter-to-cheek wall.



Wood corner board trim at dormer wall – note that the step flashing is incorrectly placed over the trim, and the trim is aged / deteriorated in high moisture areas.



Deteriorated wood trim / nailing.

Step cracks in masonry.

Leaks were noted by WSE to **BET** at the South elevation window and foundation wall above Room 013. The fieldstone foundation is deteriorating and crumbling in this area. Cracked bricks, displaced/uneven brick coursing and step cracks are present in the masonry. The deterioration and leaks are attributed to the two roof planes above this area, one of which discharges over the roof edge, and the other which has no kickout flashing.

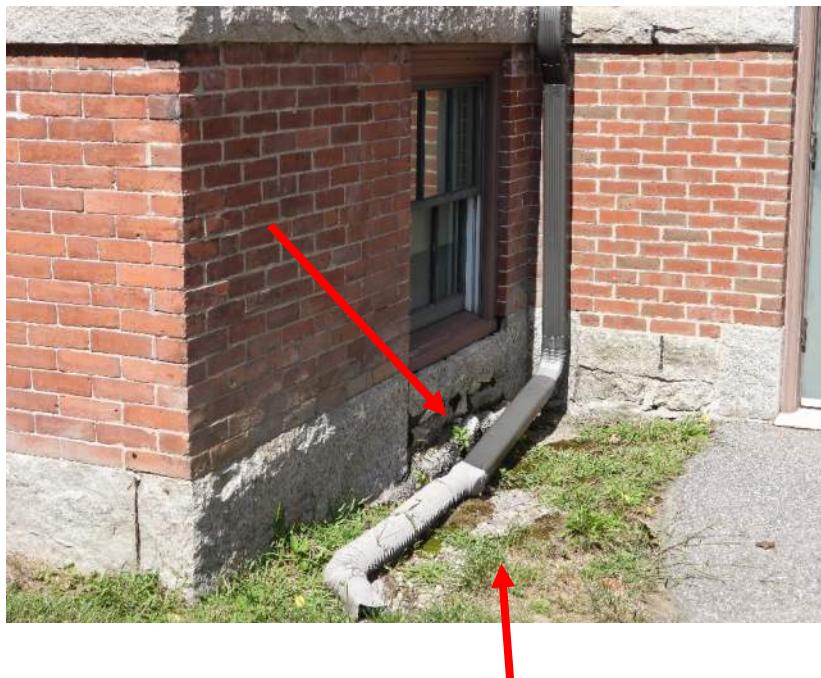


South elevation return wall – roof drainage concerns above deteriorated masonry wall and foundation wall.

Upper roof drains over edge onto wall and lower roof plane.

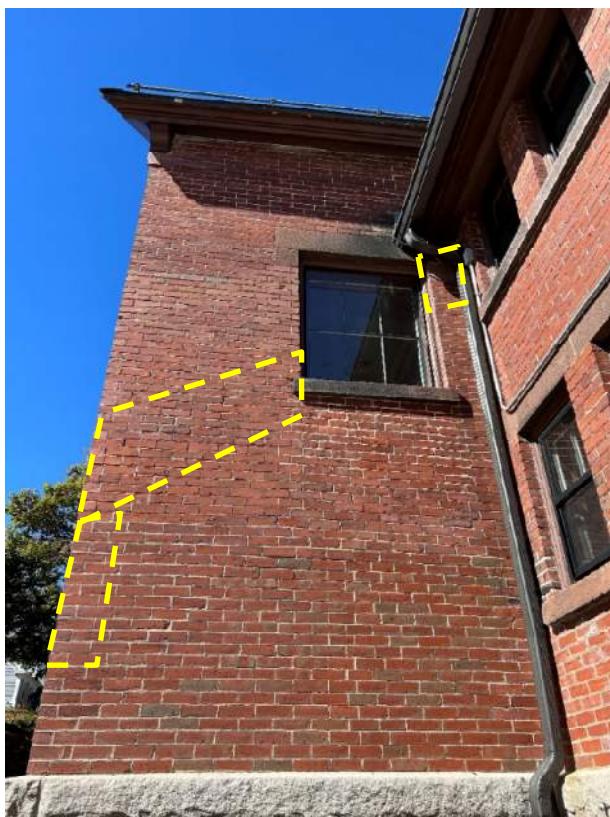
No kick-out flashing.

Note the staining on masonry and brownstone, likely due to splashing effects of roof drainage.



South elevation return wall – loose/deteriorated fieldstone.

Note that the upper roof plane drains onto the ground – splash marks can be seen on the masonry.

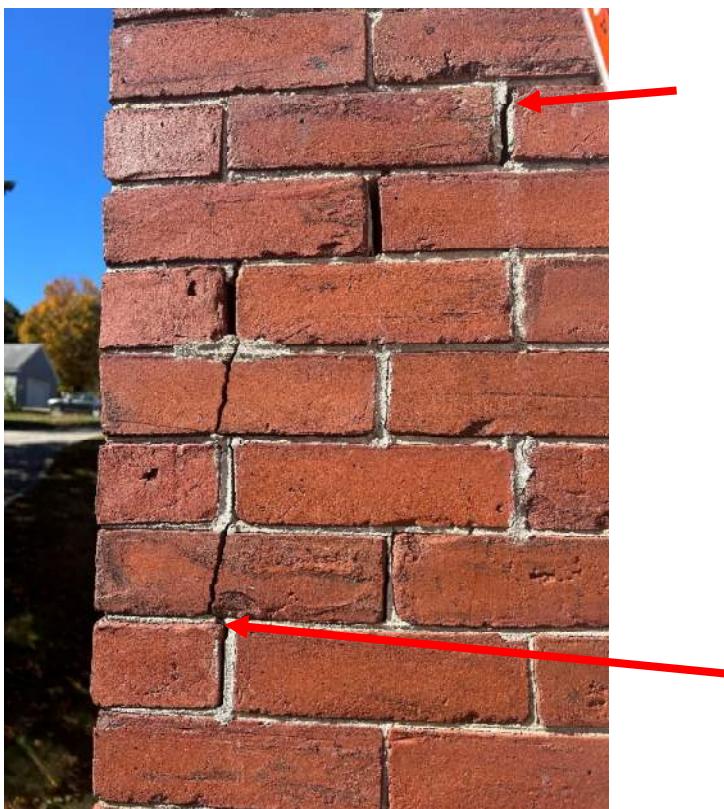


Overview of South elevation return wall

Masonry mortar joints are generally deteriorated.

Yellow areas indicate fresh step cracks and vertical cracks. Previous crack re-pointing has been completed.

Cracking patterns and uneven coursing indicate settlement and/or downward displacement of the masonry above the deteriorated fieldstone foundation wall.



South elevation return wall – detail view of step cracks and vertical cracks at corner.



South elevation, Southeast corner.

Roof edge located directly above the Clerk's office window.

Periodic leaks have been reported at the Clerk's Office window, located at the South elevation, Southeast corner on the first floor. Exterior conditions above this window include a hip roof with no gutters. Roof-to-cheek wall detailing includes lead step-flashing that ends above the window with no kick-out flashing. Bulk water freely drains directly onto the window head from the hip roof. This condition is compounded during wind driven rain from the South / Southeast directions.



South elevation, Southeast corner.

Note that there is no gutter/kickout flashing above the window in question.



West elevation, Southwest corner.

Main roof drainage appears to bypass the gutter by drainage off of the upper roof plane, compounded by a lack of kick out flashing.

Masonry step cracks and moss growth were noted below this roof condition.

A freestanding shed was added to the property at the West elevation of the building in 2013, positioned closely the building wall. The shed coincides with the area of reported leaks near the auditorium vestibule. The main 13:12 slope roof in this area drains over the roof edge to a lower 5:12 sloped roof plane, and then into a gutter. Moss/organic growth, deteriorated mortar and step-cracks are present on the masonry, indicating that water splashes off of the lower roof plane and onto the walls, the shed roof, and the ground.



West elevation, Southwest corner.

Moss growth and staining on inaccessible masonry wall behind shed, aligned with the shed roof eave height.



Masonry step cracks at West elevation, Southwest corner, North of the shed.

A slight, though detectable lean (out of plumb) is present in the South elevation wall adjacent to the auditorium door. Based on discussions with Town of Upton Facilities this may be attributed to past issues related to movement of the auditorium roof structure.



West elevation, Southwest corner. Side-by-side view of shed and exterior wall.



Gaps between valley and gutter.

Note that there is no secondary metal flashing between the valley and gutter.

Gutters on the Upton Town Hall roof are inconsistent and poorly detailed. Long runs of gutters and complex roof geometry often present challenges with installing gutters on buildings that were built without these considerations in mind. **BET** observed various roof edges with $1/2" \pm$ gaps between the gutters and drip edge – this likely allows water to bypass the gutter during a wind driven rain. Industry standards for roof gutter drainage imply a minimum slope of $1/8"$ per linear foot – as longer sections of gutters produce a lower discharge point for the gutter, roof drip edges are typically fitted with a secondary metal flashing that extends into the gutter. Various roof edges also have no gutters, including the East (front) elevation facing Main Street.



Gap between drip edge and gutter.

Note that there is no secondary metal flashing between the valley and gutter.

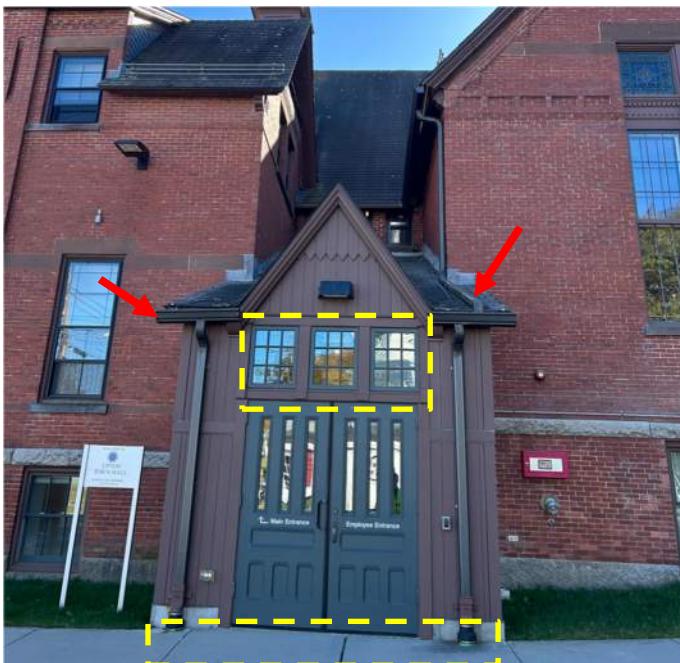


West (front) elevation.

The main roof drains over the roof edge, introducing bulk water onto the walls, windows and foundation walls below.

The North employee entrance includes a steep slope roof alcove draining to (2) 3'-0"± long K-style aluminum gutters with downspouts to below grade piping. The following concerns were noted with the gutter configuration:

- The gutter West of the employee entrance door receives a downspout from the main roof as shown below. This configuration exceeds the gutter capacity during a rain event, and apparently overflows onto the door, transom and sidewalk below.
- The gutter East of the entrance is reverse-sloped.
- The North alcove roof reportedly holds snow and ice for an extended period of time in the winter. Snow guards and heat trace cables are present at select eave locations. Upton Facilities reported to **BET** that snow accumulation and ice dams have been an issue in the past.
- Downspouts connect to below-grade piping which could not be inspected as part of this evaluation.



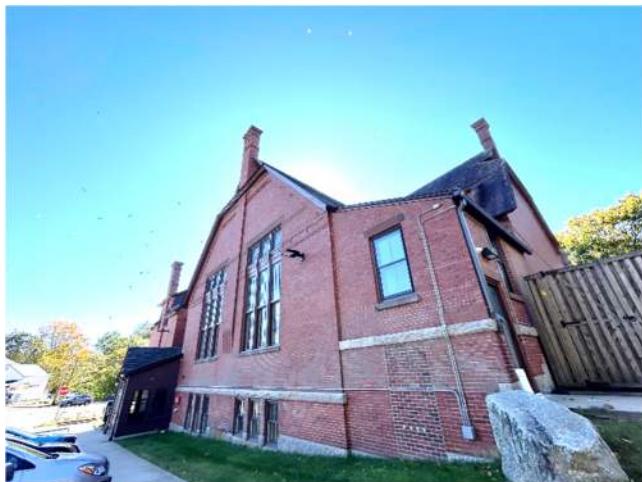
North elevation – employee entrance.

Gutter section to the left of the door is reverse pitched.

Gutter section to the right of the door receives discharge from the upper roof downspouts.

Leaks were reported at the transom window. Ice accumulation is also reported on the sidewalk in front of the door.

Exterior Walls

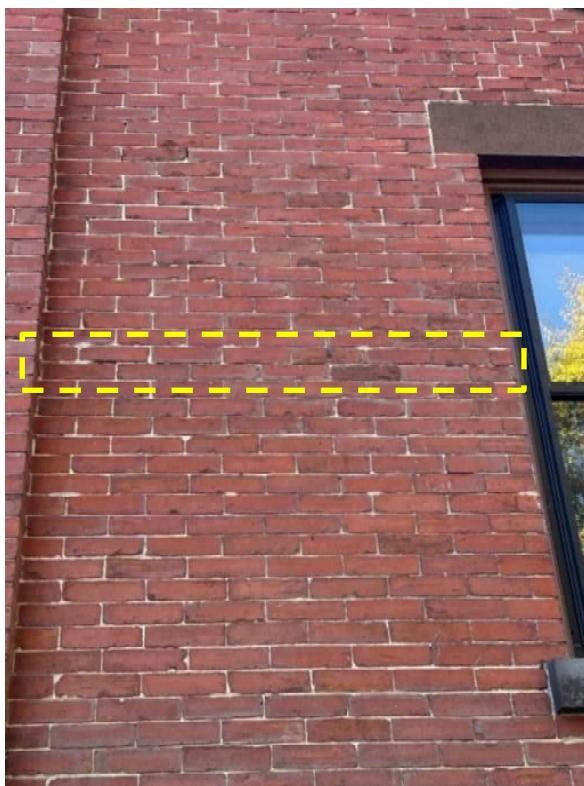


Overview of North elevation.

The exterior walls of Upton Town Hall are multi-wythe brick masonry with slate shingle accents, granite bands, brownstone window detailing and fieldstone foundations. Deterioration was observed relative to the brick masonry, brownstone elements, fieldstone and the mortar joints of each. Overall, the masonry defects observed by **BET** are scattered and concentrated below windows, roof edges and other areas of bulk water. These defects are primarily related to (1) areas without gutters or (2) roof edges without kick-out flashing at an intersecting wall.



Deteriorated and discolored brick below a gutter with no kickout flashing.

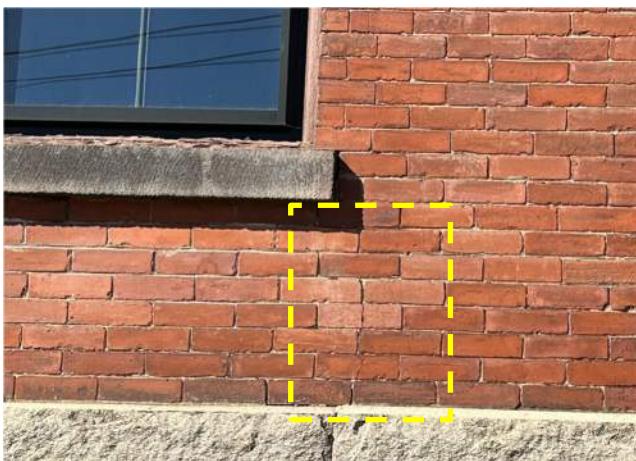


Scattered mortar joint deterioration and past pointing at North elevation.

Yellow area indicates a cracked/deteriorated bed joint.

The masonry walls at Upton Town Hall are multi-wythe brick set in a running bond. Based on a visual inspection, there are no apparent header courses in the wall construction. Headers (i.e. bricks rotated 90 degrees) are used in mass masonry to interlock and structurally connect wythes across the collar joint plane. Walls that do not have header courses generally have a weaker collar joint, and rely on the collar joint mortar and friction to mitigate movement of the outer wythe.

The exterior mortar joints are generally in fair condition. Past re-pointing is evident as indicated by different color mortars and joint depths. Mortar joints vary in width but are generally narrower than modern masonry joints. **BET** observed several cracked bricks, step cracks and deteriorated mortar in select areas.



Vertical cracks extending from a window corner at East elevation.

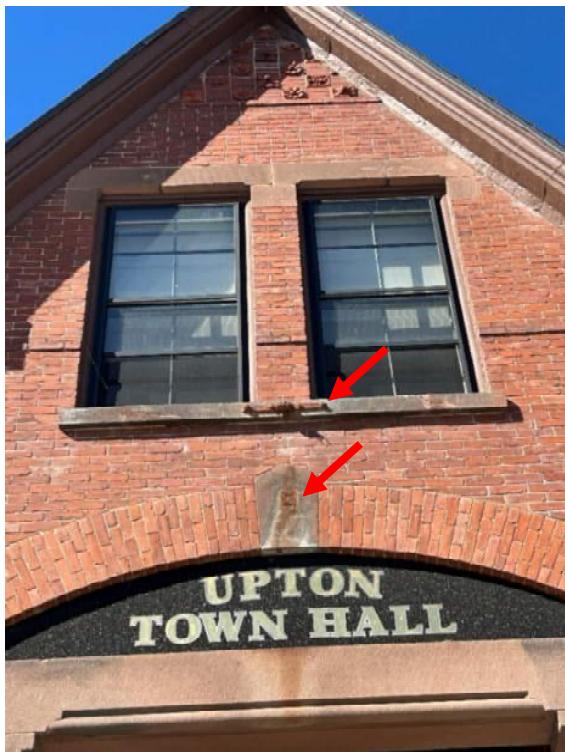


Deteriorated mortar joints at North elevation.

Base wall areas near ground level are typically subject to increased moisture levels due to capillary action and moisture accumulated and later released the masonry. When roof drainage is allowed to flow onto the ground and spray/splash onto walls, this substantially increases moisture and freeze-thaw related damage to the wall.



Deteriorated mortar joints at base of front (East) elevation wall. Note that the roof drains over the edge on to the wall and the ground in this area, increasing the moisture in base wall areas, and accelerating deterioration.



Corroded / abandoned mounting brackets and associated rust staining above main entrance to the building.

Defects were noted associated with brownstone and granite elements on the building. Cracked/spalled stone elements are present at select windows. The main entrance has corroded, abandoned steel brackets and fasteners mounted to stone accents above the entrance. Granite mortar joints at the ground level rain tables are generally deteriorated. Mortar joints around brownstone windowsills are similarly deteriorated. Overall the stone elements on the property are in good condition with select items in poor condition.



Delaminated / cracked brownstone lintel.



Concentrated area of spalled brick, apparently from previous mounting / attachment anchors that have been removed.

Spalled bricks were noted in select areas of past re-pointing and repairs. Portland cement-based mortars are harder and have a higher compressive strength than historic lime mortars. Material compressive strength incompatibility can cause bricks and adjacent mortar to spall and deteriorate.



Spalled face bricks in area of past re-pointing.

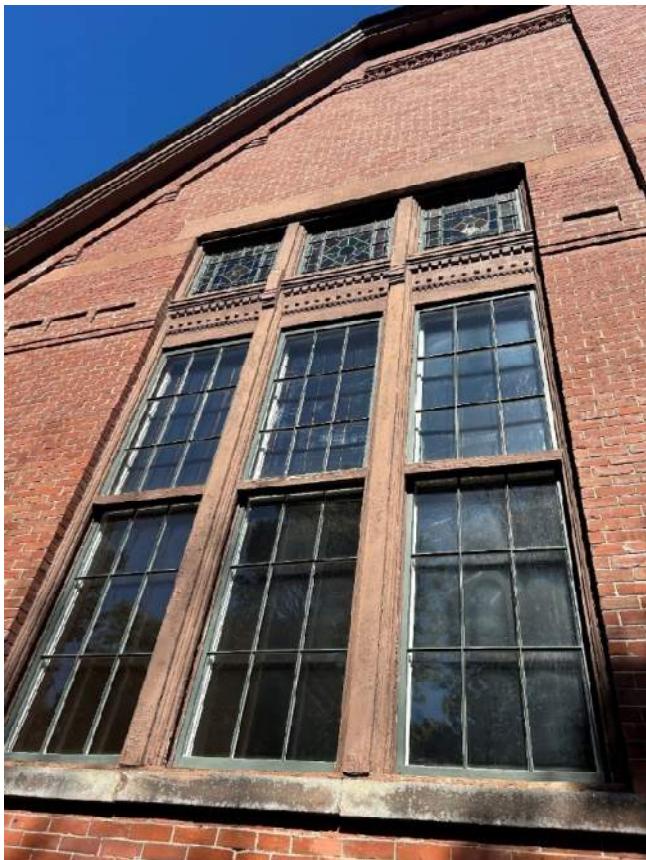
Attention is required to use appropriate mortar and materials for re-pointing historic brick.



*Deteriorated head joints
between granite bands.*



*Deteriorated bed joints at top of
brick rain table.*



Overview of an auditorium window at the South elevation.

Various windows were replaced during the 2013 renovation project and remain in good condition. Several windows were painted and restored in 2013. **BET** observed that the auditorium windows on the North and South elevations are aged, peeling, and have deteriorating joinery in the wooden windows and trim. Upton Facilities reported that stained glass transom windows above the auditorium have concerns of deforming/racking from impacts of basketballs. One window is shattered at the South elevation, ground floor level.



Detail view of auditorium window sill condition at South elevation. Note the peeled paint and deteriorated joinery.



Deteriorated wood window details and peeled paint.



Shattered window at ground floor (South Elevation).



Failed sealant between window and brick.

BET observed several sealant joints associated with the 2013 windows, louvers, penetrations and doors which were poorly installed, and failing prematurely as a result.



Poorly detailed and failed sealant between louver frame and granite band.

The West elevation of the building contains a mechanical unit well with concrete paving, fence enclosure, a site retaining wall and a steeply back-sloped site. Grading directs surface runoff towards the building, and the ground floor is entirely below grade at this side of the property. Upton Facilities was unsure whether a below-grade French drain system is present at this side of the site.

Loose/dislodged fieldstone units were noted at ground level in the mechanical well area. No leaks were reported to **BET** in this area, however it should be monitored due to the deteriorated foundation, and moss/moisture accumulation on the slab nearby.



Deteriorated fieldstone foundation below louver.



Loose/dislodged fieldstone units in mechanical well at West elevation.

CONCLUSIONS AND RECOMMENDATIONS

The roof systems at Upton Town Hall utilize poor detailing that has contributed to leaks and deterioration of the building. The leaks reported to **BET** for this study are attributed to roof areas with no kickout flashings, downspouts discharging into gutters, and roof eaves with no gutters. Overall, the roof system is approximately 25-years old and is aged accordingly. Roof areas that receive drainage from larger upper roof planes and valleys show signs of more advanced deterioration.

The exterior walls of Upton Town Hall are generally in good condition, with limited items in poor condition. Masonry defects are primarily in areas of bulk moisture and roof drainage issues. Granite and brownstone accents are in fair condition but require pointing and crack repairs. Similarly, the older/original wood windows, trim and siding not updated in 2013 require maintenance or replacement.

BET proposes the following roof and exterior wall repairs:

1. Remove and replace roof systems on the building, including the following considerations.
 - a. Roofing, underlayment and flashings should be replaced 100% using similar style architectural shingles, asphalt underlayment, step flashing, valleys and penetration flashings.
 - b. Siding, slate shingles, corner boards and above-roof trim on dormers and rising walls must be removed to install new roof underlayment and step-flashing.
 - c. Paint cupolas, window trim, cornices and other items above the roof line that are to remain. Miscellaneous sheathing replacement, rot repairs, sealant and painting above the roof should be addressed during the roof project. Lead and/or ACM testing may be required.
 - d. Gutters, snowguards, heat trace elements and other accessories must be removed and replaced.
 - e. Re-route the upper roof downspout at the employee entrance into the main downspout leader.
 - f. Install kick-out flashings at locations where a roof eave intersects a wall. Detail kick-out flashings continuously with new step flashing.
 - g. Install gutters and downspouts at roof eaves which currently drain over the roof edge to the ground. New downspout leader locations must be coordinated with the site to avoid ice/water accumulation. Consultation with a site/civil engineer may be required.
 - h. Siding and trim at dormer cheek walls will need to be removed to terminate new roofing and step flashing. Miscellaneous pointing and repairs will be required at rising walls to replace step flashing.
 - i. Below grade downspout leaders and French drains around the building (if any) should be cleaned and inspected.

2. Perform targeted exterior wall restoration project include the following considerations:

- a. Replace cracked bricks and perform targeted pointing around windows, doors, granite accents, base wall areas, leak areas and roof transitions.
- b. Reinforce cracks with signs of structural distress using helical masonry ties. Install masonry ties at the exterior wythe of wall areas that exhibit bulging, settlement or movement.
- c. Re-point chimneys, cheek walls, rising walls and other masonry areas above the roof line 100% which receive step flashing for the roof.
- d. Repair cracks and re-set stone units in deteriorated fieldstone foundation walls. Excavation and removal of interior finishes are expected for the fieldstone repair at the South elevation return wall.
- e. Repair and paint auditorium windows and miscellaneous wood windows that pre-date the 2013 restoration project.
- f. Perform targeted spall and crack repairs in the brownstone sills and window elements. Replace mortar joints around windowsill stones and granite rain tables with sealant.
- g. Replace sealants around windows, doors and penetrations.

BUDGET CONSIDERATIONS

BET has reviewed the preliminary budget estimate by Tortora Consulting for the project. The estimate is a high-level rough order of magnitude (ROM) based on industry standard unit prices and allowances. It is our opinion that the exterior façade estimate seems high, as a full 100% re-pointing effort is not required for the property at this time. However the façade estimate does not explicitly capture fieldstone repairs, masonry ties, above-roof walls, sealants etc. in a line-by-line estimate. Roofing cost line items also seem high in our opinion, but may likely be warranted based on the complexity of the roof, gutters and flashing details. Overall the cost estimate appears to be slightly conservative but serves as a starting point for preliminary budgeting.

If, following your review, you should have any questions or if we can be of any further assistance to you in this matter at this time, please do not hesitate to contact us.

Respectfully Submitted,



Graham Carr, P.E.
Project Manager