

Building Envelope Evaluation
Newton Health Department Building
Newton, MA

APPENDIX IV – CONSULTANT’S REPORT

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September 28, 2007

Ms. Kaja Savasta
CSS Architects, Inc.
Building 2, Suite 300
107 Audubon Road
Wakefield, Massachusetts 01880

Re: Building Envelope Evaluation
Newton Health Department Building
Newton, Massachusetts

Dear Ms. Savasta:

We report herewith our findings, conclusions, and recommendations resulting from our evaluation of the roofs and facade at the Newton Health Department Building at 1294 Centre Street, Newton, Massachusetts.

The next sections of this report give the results of our condition survey. Sections I and II describe our observations of interior and exterior conditions, and Sections III and IV present our comments and recommendations for corrective work. Appendix A contains photographs showing some of the conditions observed. Appendix B contains marked-up elevation drawings showing the conditions observed.

II. INTERIOR OBSERVATIONS

Interior inspections were made in the attic space beneath the roofs and on the ground floor. The following comments summarize our observations.

- A. Water stains were observed on the bitumen coating on the interior surface of the terra cotta unit back-up wall on the west elevation, starting behind the roof rafters abutting the wall. The wood blocking below the louver was water-stained.
- B. Water stains and heavy efflorescence were observed on the bitumen-coated brick at the chimney.
- C. Water stains were observed on the wood siding and framing of the wall abutting the chimney.
- D. Water stains were observed on the rood framing and boards on the walls beneath the louver in gables on the south elevation. Plant debris was observed in the space between the interior face of the louver and the interior screen.

- E. Water stains were observed on the wood framing and wood decking of the roofs at the valleys of the two gables and in the area around the chimney on the south elevation.
- F. Water stains were observed on the wood framing and wood decking of the fan roof above the original main entrance at the valleys tying the fan roof to both the north and west steep sloped roofs. At one location, 5-gallon pails were placed on the attic floor. The interior of the pails was dry but water stained.
- G. Water stains were observed on the plaster near the west wall of the north wing near the original entryway.

III. EXTERIOR OBSERVATIONS

As part of our evaluation, we inspected the conditions of the slate roofs from a lift and a ladder. Examinations of the brick and stucco walls were made from the ground using field glasses and from a ladder. Photographs showing some of the conditions observed are included in Appendix A. The following comments summarize our observations.

A. BRICK MASONRY WALLS

The brick masonry walls are located at the north end wall of the north wing and the northwest and south elevations of the west half of the east-west wing of the building, starting at the entryway on the north elevation and terminating just beyond the entrance on the south elevation. The following observations were made:

- 1. The chimney has a vertical crack on the west elevation, a vertical crack on the south elevation, and a horizontal crack in the flue cap extension.
 - a. Spalled bricks were located in the corner of the chimney.
 - b. Many voids were observed in mortar joints from the roof line up on the chimney on all four sides.
- 2. At the main entry between the north wing and east-west wings:
 - a. Cracks and voids were observed in the vertical mortar joints at the obtuse corners between brick wall sections.
 - b. Missing mortar was observed in the brick wall above the copper roofing on the entryway where the roofing continues into the brick wall.

3. At all window openings in the brick wall:
 - a. Hairline cracks were observed in some of the joints within the rowlock brick at the window sill.
 - b. The joint between the rowlock and the wall below is cracked, with efflorescence on the wall below that joint.
 - c. Below the window opening in the north end wall of the north wing, cracks were observed in the mortar joints in the five courses of brick below the rowlock.
 - d. At the large window in the north elevation of the west wing, the lintel above the window is bowed down, with rust scale observed on the top surface of the bottom leg. The mortar is missing where the lintel is embedded in the brick masonry beyond the jambs of the window opening. Step cracking was visible in the mortar joints in the wall beyond the ends of the angle.
4. Cracked and missing mortar was observed at the cap stones on the ends of the west end wall on the west wing.
5. Cracked mortar joints were observed between abutting stone units and between stone units and the surrounding brick masonry at ground level.
6. The surfaces of all of the mortar joints are slightly weathered back so that the surface of the joints has a raised-aggregate texture.
7. Voids and hairline cracks observed in the field of the brick walls at locations other than those detailed above represent about 1% of mortar joints.
8. A few bricks which have been patched with mortar are located next to the metal coal chute door at ground level on the south elevation. The bottom of this door is covered with soil in an area of landscaping.
9. Openings were observed between deteriorated sections of the wood rake trim and the top of the brick wall above the south entryway.
10. Metal inserts were observed in the brick masonry wall on the north wall of the north wing.

B. STUCCO WALLS

Stucco walls are located on the east and west elevations of the north wing; on the north, east, and south elevations on the east half of the east-west wing; as an infill on the wall above the window opening in the north end wall of the north wing; and at a dormer wall on the south elevation. The following observations were made:

1. Hairline cracks were observed at the corners of windows and between the tops of the window openings and the ends of the roof rafters exposed at the top of the wall.
2. Horizontal cracks were observed in the stucco walls near the base of the stucco wall on the south elevation, north elevation, and the east elevation of the north wing.
3. Cracks were observed between the stucco and brick rowlocks at the window openings.
4. Horizontal hairline cracks were observed in the stucco wall at the south elevation entryway.
5. At an area adjacent to the step on the east elevation of the north wing, the stucco finish coat was eroding from the base coat.
6. At an area where the stucco was broken away, the underlying brick masonry was visible.
7. A few small loose spalled areas were observed in the stucco.
8. Voids were observed in the caulking bead at the vertical joint between the stucco wall and chimney.
9. Cracks were observed at horizontal and vertical joints between stucco and brick sills, bands, and walls.

C. ENTRYWAY CANOPY

1. Holes were observed in the flat-seam copper barrel roof on the main entryway.
2. The copper barrel roof is constructed into the brick wall.

D. SLATE ROOFS

The slate roofs were designed and constructed with decreasing exposure of slate. The following observations were made:

1. A number of slates in various locations on the roof have eroded surfaces.
2. Broken and loose slates were observed along the valleys between abutting roof areas.
3. Roofing cement was observed covering the copper flashing in the valley at the north elevation of the chimney.
4. A few missing slates were observed in the fields of the roofs.
5. Exposed nail heads and failed roofing cement were observed at some locations along roof ridges.
6. Pitted copper flashing was observed in the apron/valley flashing at the intersection of three roof lines on the south elevation.
7. Eroded copper flashing was observed at the base of a plumbing vent.
8. The snow-guard fences along the eaves of the roof are rusting on the east elevation of the north wing and on the north elevation above the door in the east half of the east-west wing.
9. Copper gutters were observed at the eaves of all of the slate roofs, except for the front entryway. Sections of the gutters were observed to be damaged. The bottom elbows of some of the drain pipes for the gutter were missing. Sections of the gutter were filled with leaves and other debris from the surrounding trees.
10. The steel cap flashings covering the brick end walls at the ends of the gables were covered with rust.

E. PLANTINGS

1. Tree limbs are in contact with sections of the building.
2. Vines were observed clinging to sections of the building walls.
3. On some walls, pieces of vines which had been removed were still clinging to the wall.

IV. COMMENTS

Based on the results of our inspections, we have the following comments relative to the condition of the Newton Public Health Building envelope.

A. BRICK MASONRY WALLS

1. The following locations in the brick walls require rebuilding:
 - a. The chimney, due to vertical cracks and deteriorated mortar joints.
 - b. The brick wall above the bowed lintel on the north elevation of the west wing.
 - c. The brick wall above the copper barrel roof at the entryway.
 - d. The rowlocks at the large window opening and the brick wall below for several courses on the north elevation.
2. Approximately 4% of the mortar joints require repointing due to voids and hairline cracks.

B. STUCCO

1. Cracks and openings occur at the brick rowlocks and stucco below window openings and on top of the brick band at the base of the east wall on the north wing. These cracks and voids require repair.
2. The step cracks in the stucco on the south elevation of the east half of the east-west wing correspond to the top edge of the concrete foundation shown on the original architectural drawings. These cracks require repair.
3. Spalled and deteriorated stucco is located along and adjacent to sidewalk areas, generally between the brick band and the stucco wall above in the area of the steps and sidewalk along the east side of the north wing. These areas require repair.
4. The majority of hairline cracks in the stucco wall at window perimeters and at roof rafter locations do not require repairs.

C. ROOFS

1. Because it contains holes, the copper barrel roof above the main entryway needs to be replaced. Since the roof is built into the brick wall, the masonry above this roof will have to be opened as part of the roof replacement.
2. Water leakage stains were observed on the roof frame and wood decking at valleys between adjoining roof lines and where the valleys intersect the chimney on the south elevation. Stains were observed on the back of the west wall. The flashings along valleys and the step flashing need to be replaced.
3. A number of slates on the roofs are delaminating. A number of broken and missing slates were also observed. Replacement slates were visible in some areas on the roofs.

As a rule of thumb, if 30% or more of the slates are damaged or deteriorated, the slate roofing should be entirely replaced. Based on sample areas consisting completely of slate, deteriorated slate constitutes 10% of 15% of the roof area.

D. METAL CAP FLASHINGS

The metal cap flashings located at three gables are rusting and should either be repainted or replaced. The rusting of the caps results in rust staining on the walls below the caps. On the roof side of the cap flashing, copper step flashing is covered by the edge of the cap flashing. The rusted surface allows water to pond on the steel, and also allows rust from the cap flashing to wash down onto the copper flashing, which causes accelerated deterioration from galvanic action.

E. ATTIC VENTS

The interior of the wood framing and boarding for the exterior wall is water stained. No pan flashing was noted at the base of the louver opening to collect water blown in through the louvers and direct it to the exterior.

F. COPPER GUTTERS AND DOWNSPOUTS

Damaged sections of copper gutters should be replaced. Missing and deteriorated sections of the downspouts should be replaced.

G. SNOW GUARDS

The snow-guard fences are rust covered and should be repainted to prevent rust-staining. The fastening attachments to the roofs should be checked and repaired as necessary.

V. RECOMMENDATIONS

As a result of our findings, we recommend that a repair program be undertaken to correct the deficiencies noted in this report. The repairs should include at least the following steps.

RECOMMENDATION A – BRICK MASONRY WALL

Rebuild the brick chimney from the lowest roof line up; repair the brick wall and steel lintel which has bowed; as part of the barrel roof repair, install new counterflashing and through-wall flashing in the brick wall; rebuild the wall area at the scrolled capstones; and repoint defective mortar joints, using the following procedures.

1. BRICK CHIMNEY
 - a. Photograph the chimney so that the reconstruction can replicate the existing. Review the original architectural drawings for dimensions.
 - b. Remove the capstone and dismantle the chimney down to the lowest roof deck.
 - c. Install a 16-ounce copper or stainless steel, two-piece counterflashing/step flashing with a detachable 4" front leg where the flashing covers the top of the new flashing at the roof edge, terminated with a 3/4" hemmed drip edge. Field-measure the horizontal leg of the counterflashing, including a receiver. The interior leg of the counterflashing shall be 2" in height and constructed to fit snugly against the flue tiles. Fully solder all seams. Fill all seams between overlapping steps with Dow 790 silicone sealant. Install a minimum of one fastener in the back leg of the flashing. Install counterflashing/step flashing above each intersecting roof line. End dam the end of the counterflashing/step flashing within the chimney.
 - d. Install Perm-A-Barrier membrane flashing along the counterflashing/step flashing in the following manner:
 - i. Apply primer to the interior wythe of brick and the copper counterflashing/step flashing to a point 1/4" behind the front edge of the flashing.
 - ii. Install Perm-A-Barrier membrane wall flashing starting on the flue liner and continuing down on the back leg of the counterflashing/step flashing, and terminating on the horizontal surface of the counterflashing/step flashing.

- iii. Hold the front edge of the Perm-A-Barrier flashing 1/4" back from the finished face of the brick wall. Press the flashing into place with a hand-roller. Seal the top edge and seams in the flashing with Liquid Membrane.

- e. Install a protective cover over the front leg of the step flashing and the roof below the wall opening. Rebuild the brick walls and flue liners of the chimney using brick to match the original chimney and Type N mortar. Tool all mortar joints to produce a dense, concave surface. Set pre-manufactured weeps on only those step flashings with end dams. Use clean sand and burlap to remove excess mortar from the face of the brick.

- f. Remove any mortar residue from the surface of the brick, following the manufacturer's instructions for the use of Sure Klean 600 detergent.

2. LINTEL REPAIRS

Remove the face brick from above the bowed lintel angle above the large window on the north elevation of the west half of the east-west wing and make repairs in the following manner:

- a. Photograph the existing brick pattern above the lintel for replication.

- b. Remove the equivalent of four courses of brick above the lintel angle and up to two feet beyond the jambs of the window opening.

- c. Provide temporary support for the brick above the opening.

- d. Remove rust scale and clean or replace bowed lintels at window openings. Coat salvaged lintels with a rust-inhibiting paint.

- e. Install a 16-ounce lead-coated copper drip edge on the lintels bedded in polyurethane sealant.

- f. Install Carlisle CCW-705-TWF or Grace Perm-A-Barrier self-adhering flashing membrane, starting 8" up on the second wythe of brick surface above the horizontal leg of the lintel at the base of the wall opening and at the counterflashing. Apply primer to all substrates. Adhere the flashing using hand-rollers. Mechanically fasten the top edge of the flashing to the second wythe of brick. Seal all edges and seams with liquid membrane. Recess the front edge of the flashing in the brick walls 1/4" away from the counterflashing. Pan all ends of the flashing to a minimum of 2" in height.

- g. Install new brick to match the existing brick and the surrounding coursing, with 3/8" diameter weep holes set directly on top of the flashing and spaced at 16" on center.

3. FLASHING IN BRICK ABOVE BARREL ROOF

- a. Remove three courses of brick from the exterior wythe of brick starting a minimum of 8" above the barrel roof.
- b. Support the brickwork above the openings.
- c. Remove the existing mortar from the surface of the stucco or the second wythe of brick. Fill all openings in the surface of the second wythe to create a smooth surface.
- d. Install a two-piece 16-ounce copper or stainless steel counterflashing with a pan in the wall, with a 2" high back leg and end dams, and with a front leg apron flashing terminated in a hemmed drip edge to interlock with the pan once the barrel roof is installed. Bed the pan flashing in the wall opening in Dow 790 silicone sealant.
- e. Install Carlisle CCW-705-TWF or Grace Perm-A-Barrier self-adhering flashing membrane, starting at the top of the opening in the terra cotta or the second wythe of brick above the counterflashing. Apply primer to all substrates. Adhere the flashing using hand-rollers. Mechanically fasten the top edge of the flashing to the terra cotta or brick. Seal all edges and seams with liquid membrane. Recess the front edge of the flashing in the brick walls 1/4" away from the counterflashing. Pan all ends of the flashing to a minimum of 2" in height.
- f. Install new brick to match the existing brick and the surrounding coursing, with 3/8" diameter weep holes set directly on top of the flashing and spaced at 16" on center.
- g. Once the new barrel roof is completed, install the front leg on the counterflashing.

4. DETERIORATED MORTAR JOINTS

Rebuild the brick wall area at the rowlocks and the courses below where the mortar is deteriorated below the large window on the north elevation of the north wing, in the following manner:

- a. Remove the rowlocks and sections of the five courses of brick below the rowlocks, where the mortar has deteriorated.

- b. Support the window sill above the openings, depending on the condition of the wood sill.
- c. Remove the existing mortar from the surface of the terra cotta or brick. Fill all openings in the surface of the terra cotta or brick to create a smooth surface.
- d. Rebuild the brick wall up to the rowlock course with matching brick and Type N mortar.
- e. Install Carlisle CCW-705-TWF or Grace Perm-A-Barrier self-adhering flashing membrane, starting 6" up on the second wythe of brick surface above the horizontal leg of the cap flashing at the base of the wall. Apply primer to all substrates. Adhere the flashing using hand-rollers. Seal the top edge, seams, and anchors with liquid membrane. Recess the front edge of the flashing in the brick walls 1/4" away from the counterflashing. Pan all ends of the flashing to a minimum of 2" in height.
- f. Install new rowlock brick to match the existing brick, with 3/8" diameter weep holes set directly on top of the flashing and spaced at 16" on center.

5. REBUILD WALL AREAS BELOW SCROLLED CAPSTONES

- a. Remove the scrolled capstones from the west end wall and store in a protected area on pallets.
- b. Remove loose brick from the wall and the existing copper counterflashing. Remove all mortar from the surfaces of the remaining masonry on the wall.
- c. Lay brick in Type N mortar to match the original brick.
- d. Install a copper or stainless steel flashing covering the vertical and horizontal surfaces of the brick wall where the capstones are to be installed. The flashing shall have caps on the pins for the cap stones.
- e. Reinstall the capstones in Type N mortar. Rake the mortar back 3/8".
- f. Install bond breaker tape, primer, and sealant. Dry tool the sealant in the joints. Provide a 1" wide opening in the sealant in the horizontal joint as a weep hole.

6. DEFECTIVE MORTAR JOINTS

Repair all defects (cracks, voids, etc.) in the mortar joints in the brick masonry walls using the following procedure:

- a. Rake back all mortar from the joints to a minimum depth of 3/4" from the exterior face of the brick or where deteriorated mortar is greater than 3/4" in depth, until sound mortar is reached. Take care to avoid damaging the brick. Use compressed air to remove all loose material from the joints. Do not use power chisels or jack hammer-type devices to cut back mortar at joints.
- b. Wet the surface of each joint prior to the installation of the pointing mortar. Allow no standing water on the brick surface during pointing.
- c. Pack Type N mortar in thin layers not exceeding 1/4" in depth. Tool the joints to match the surrounding wall.
- d. As the work proceeds, use clean sand, burlap, or a brush to remove most of the mortar from the surface of the brick before it sets.

RECOMMENDATION B – STUCCO

Repair cracks at joints between the brick rowlocks below windows or brick bands and the stucco walls; repair step cracks in the stucco wall on the south elevation; and repair damaged/deteriorated stucco areas, using the following procedures:

1. JOINTS BETWEEN ROWLOCKS

Repair cracked/deteriorated joints between the brick rowlocks below windows or brick bands and the stucco walls in the following manner:

- a. Mask off the work area below the joint to be repaired.
- b. Cut back the joint between the brick and stucco to 3/4" deep by 3/8" wide. Take care to avoid damage to brick and stucco. Use compressed air to remove all loose material from the joints.
- c. Wet the surface of each joint prior to the installation of pointing mortar. Allow no standing water on the brick/stucco surface during pointing.
- d. Pack Type N mortar in thin layers not exceeding 1/4" in depth. Tool the joints to match the surrounding wall.

2. STEP CRACKS

Repair step cracks at the base of the stucco wall along the south elevation of the east wing in the following manner:

- a. Enlarge the cracks to 1/2" wide by 1" deep. Use compressed air to remove all loose material from the enlarged crack.
- b. Clean the surfaces of both substrates with a proper cleaning solvent. Prime the substrates with a primer recommended by the sealant manufacturer.
- c. Install closed-cell back-up rod in the enlarged crack.
- d. Install Sonneborn NP 2 multi-part polyurethane sealant in the enlarged crack. Dry tool the sealant into place. While the sealant is still fresh, broadcast sand onto the surface of the sealant to match the stucco finish.

3. DAMAGED/DETERIORATED STUCCO

- a. Draw a square/rectangle around the perimeter of the damaged/deteriorated stucco with level and plumb lines. Mask the wall area around the marked perimeter.
- b. Saw-cut along the lines of the damaged area to be removed, making the cuts 1" deep and undercut on a slope of 7° to form a larger diameter patch area at the surface of the masonry than at the back of the stucco.
- c. Cut back the stucco to the masonry. Remove all loose material from the surface.
- d. Install a three-coat plaster system using the requirements of ANSI/ASTM: C 924. Finish the stucco surface flush with the existing finish.
- d. Moist-cure the stucco for a minimum of 48 hours.

RECOMMENDATION C – COPPER BARREL ROOF

Remove and replace the existing copper barrel roof in the following manner:

1. PREPARATION

Prior to roof replacement:

- a. Clean the brick wall to remove all organic growths from the wall between the roof and the new counterflashing.
- b. Parge the surface of the brick wall and fill the openings above the copper which enters the wall.
- c. Photograph the roof.

2. COPPER ROOF REPLACEMENT

- a. Cut the existing copper off at the base of the brick wall. Remove the copper roof, taking care to remove the roof in such a manner that templates can be taken for the new roof.
- b. Replace all deteriorated wood framing and decking.
- c. Install Grace Ultra (formerly Vycor Ultra) self-adhering membrane in the following manner:
 - i. Apply Bituthene Primer to the roof and the parging on the brick wall.
 - ii. Install a 9" wide sheet of Grace Ultra between the roof deck and the brick wall.
 - iii. Install the Grace Ultra membrane overhanging the edge of the roof deck by 1", covering the entire roof deck, and turning up the parged wall to the counterflashing. Press the membrane into place to achieve maximum adhesion. Apply Liquid Membrane to all seams.
- d. Install one 30-pound or two 15-pound felts and rosin-sized paper over the membrane.
- e. Install 16-ounce copper cleats along the roof edge and vertically up the wall.
- f. Install a 20-ounce copper flat-seam roof with all seams soldered. The back-up leg shall extend 7" above the roof deck.
- g. Install the front leg on the counterflashing and lock in the

RECOMMENDATION D – SLATE ROOF

Replace valley flashings in the slate roofs. Replace step flashings at the gable ends of the roof. Replace cracked, delaminated, or missing slate.

1. Replace the valley flashings at each valley between the intersections of the various roof lines in the following manner:
 - a. Coordinate the valley flashing replacement with step flashing replacement and the rebuilding of the chimney to prevent damage to newly installed flashings and slate.
 - b. Remove slate along each valley to expose a minimum surface of 48" on each side of the valley and the same distance above the top of the valley.
 - c. Provide temporary waterproofing protection at all times when work is not being performed.
 - d. Remove the existing copper valley flashings, cleats, and nails. Remove only as much of the roofing felts as needed to expose the roof deck. Always leave a minimum of 12" of existing roofing felts beyond the side of the slates along the perimeter of the slate removal area.
 - e. Repair all defects/deterioration in the wood roof decking.
 - f. **Membrane Flashing**
 - i. Apply Bituthene Primer on the roof deck along the valley for a distance of 36" from the center of the valley. Install Grace Ultra membrane centered over the valley. The membrane shall conform to the surface of the decking along the valley, without bridging the valley. Press the membrane into place using a hand-roller.
 - ii. Install two second sheets of membrane, with the edges located at the center of the valley, covering the underlying membrane, and extending the width of the membrane (36") out onto the roof deck. Press the membrane into place using a hand-roller. Extend the membrane 36" above the top ends of the valleys where the valley does not reach the peak of one of the roofs.
 - iii. At the wall of the chimney, apply a 6" strip of Grace Ultra membrane between the roof deck and chimney wall, followed by a second sheet starting at the underside of the counterflashing in the chimney, covering the wall, and turning out onto and covering the deck. Press the membrane into place with a hand-roller. Mechanically fasten the membrane to the wall along its top edge.

g. Copper Flashing

At apron and roof edge areas, install 20-ounce copper apron flashings, with a continuous cleat on the front edge and a hemmed edge to lock onto the front edge. At the intersection with the chimney, turn the apron flashing a minimum of 8" up the wall. Fasten the back edge of the copper to the roof deck.

h. Install new 30-pound roof felt across the valley, lapped beneath the existing felts on the roof decks.

i. Re-slate the roofs with a random color pattern similar to that which occurs on the body of the roof, and with the same exposure pattern shown on the original drawings. Install step valley flashing of 20-ounce copper beneath each course of slate, following the recommendation for step flashing in closed valleys of slate roofs in the *Roofing and Waterproofing Manual* from the National Roofing Contractors' Association.

2. Replace step flashing at the gable ends of the roofs using the following procedures:

a. Carefully remove the metal cap flashings from the gable. See Recommendation E for repairs to the cap flashing.

b. Remove slate from along the gable ends to expose 24" of the roof deck.

c. Provide temporary waterproofing protection when no work is being performed.

d. Repair all defective/deteriorated areas of wood decking and blocking on the roof deck and on the gable parapet wall.

e. Apply Bituthene Primer on the roof deck, up the parapet, and across the top of the parapet. Install a 12" wide piece of Grace Ultra centered over the joint between the roof deck and the parapet wall. The membrane shall conform to the surface of the deck and wall. Press the membrane into place using a hand-roller. Apply a second layer of Ultra membrane to cover 24" of the roof deck, the interior surface of the parapet, and the top of the parapet, terminating the membrane 1" below the top edge of the top course of brick on the exterior surface of the wall. Press the membrane into place using a hand-roller.

f. Replace deteriorated copper apron flashing at the roof eaves with 20-ounce copper to match the existing profile.

- g. Install slate shingles and new 20-ounce copper step flashing along the roof at the gable ends in the following manner:

 - i. Install two courses of slate shingles at the eaves with either a wired-on wood cant or the type of cant which matches the existing on the adjacent roof area.
 - ii. Fasten all slate shingles in place with two nails. Set the heads of the nails within the center sunken area around the holes in the slate. Do not drive the nails in a manner that applies pressure from the nail head onto the slate. The joints between slate shingles between proceeding courses shall be 3" or greater, but never less than 3".
 - iii. At the ridge cap, cover the nail head with slater's cement.
 - h. Following repairs to the cap flashing, reinstall the flashings on the gable ends and anchor them as they were previously.
3. Replace deteriorated missing and damaged slate in the following manner:
- a. Remove broken and deteriorated slates, cut the nails, and remove any remaining small pieces of slate.
 - b. Insert the new slate and nail it through the vertical joints of the slates in the overlying course, approximately 5" from the head of the slate, or 2" below the tail of the second course of the slate above.
 - c. Cover the nail holes in the new slate with a piece of copper approximately 3" wide by 8" long. Insert the piece of copper under the course above, lengthwise, so that it will extend a minimum of 2" under the succeeding course. Form and install the copper piece so that it is mechanically held in place.
 - d. Seal exposed nail heads. Cover heads of exposed nails with bituminous plastic cement.

RECOMMENDATION E – CAP FLASHING

Repair the cap flashing in the following manner:

1. Remove the rust from the cap flashing.
2. Apply Topcoat MP-300 Rust Inhibitor by GAF.
3. Seal all holes with Flashing Grade Sealant and Topester Fabric Reinforcing trowelled into the sealant.
4. Apply a base coat of Topcoat Gray to the cap flashing, followed by a finish coat of pigmented Topcoat White.
5. Reinstall the cap flashings and anchor as originally anchored to the tops of the gable walls.

RECOMMENDATION F – ATTIC VENTS

Install a flashing system at the attic vents that will collect and direct water to the exterior of the building, using the following procedure:

1. Carefully remove the exterior trim and wood vent from the wall opening. Remove all plant debris from the opening.
2. Remove and replace deteriorated wood framing and sheathing in kind where required.
3. Install a 16-ounce copper pan flashing in the bottom of the wall opening with an interior leg 2" in height at the back and sides. The front leg of the pan flashing shall be 2" in width, terminating in a 3/4" hemmed drip edge; the depth of the pan shall be 1" deeper than the wall opening; and the horizontal bottom of the pan shall be sloped to the exterior.
4. Apply Bituthene Primer to the wood framing and masonry along the jambs and head of the wall opening. Install Perm-A-Barrier flashing up the jambs of the wall opening, overlapping the end dams on the pan flashing and terminating at the head. Locate the outer edge of the flashing beneath the trim boards, and terminate the inner edge at the interior surface of the framing. Press the membrane into place using a hand-roller. Install a sheet of flashing at the head of the opening in a similar manner to that installed on the jambs.
5. Reinstall the vents in the wall openings on plastic shims along the jambs.

- f. Install interior and exterior beads of one-part polyurethane sealant with back-up rod between the perimeter of the louver vent and the flashing. At the sill of the louver, leave two 1" weep slots in the sealant.
- g. Install trim pieces on the exterior perimeter of the louver frames.

RECOMMENDATION G – COPPER GUTTERS AND DOWNSPOUTS

Repair or replace gutter sections which are damaged or deteriorated, and remove and replace damaged downspout sections, using the following procedures.

1. GUTTER REPAIRS

Gutter repairs should be made using Topcoat products.

- a. Remove all corrosion in the gutter.
- b. Line the gutter using Flashing Grade Sealant followed by the installation of Topester reinforcing fabric pressed into the sealant.
- c. Apply Topcoat Gray base coat and pigmented Topcoat White finish coat in the gutter.

2. REPLACEMENT COPPER GUTTERS

- a. Replacement copper gutters shall meet the following conditions:
 - Constructed of 20-ounce copper.
 - All seams soldered.
 - Spacing of downspouts no greater than 50 feet.
 - Appearance shall replicate existing gutters.
- b. Remove a 3-foot wide strip of slate coursing along the eaves of the roof.
- c. Remove the existing gutters and cut back the roofing felts.
- d. Replace or repair deteriorated roof decking.
- e. Apply Bituthene Primer to the wood roof deck along the eave. Install a sheet of Grace Ultra to the eave which is 4" wider than the gutter nailing flange.

THE THOMPSON & LICHTNER COMPANY, INC.

**CSS Architects, Inc.
Wakefield, Massachusetts**

As posted on the Newton CP website, these elevations are grouped with floor plans from an earlier section of this report.

EVALUATION OF BUILDING ENVELOPE

**Newton Health Department Building
Newton, Massachusetts**

APPENDIX B

MARKED-UP ELEVATION DRAWINGS