Julia A. Stark Elementary School

Exterior Façade Investigation

398 Glenbrook Road
Stamford, CT 06906

Final Report
September 19, 2019

Prepared by:
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Mr. Michael E. Handler
Director of Administration
City of Stamford
Stamford Government Center
888 Washington Boulevard, 10th Floor
PO Box 10152
Stamford, CT 06904

Re: Stark Façade Investigation

Dear Mr. Handler:

As directed by the Stamford Mold Task Force, we present to you the results of our investigation of the current conditions and observations of the façade of Stark Elementary School in Stamford, CT.

Objective

To investigate potential moisture infiltration location through the façade of the building which may be contributing to mold growth within the building. Based on our observations we will make recommendation to correct observed deficiencies in the building's façade.

Description of Building

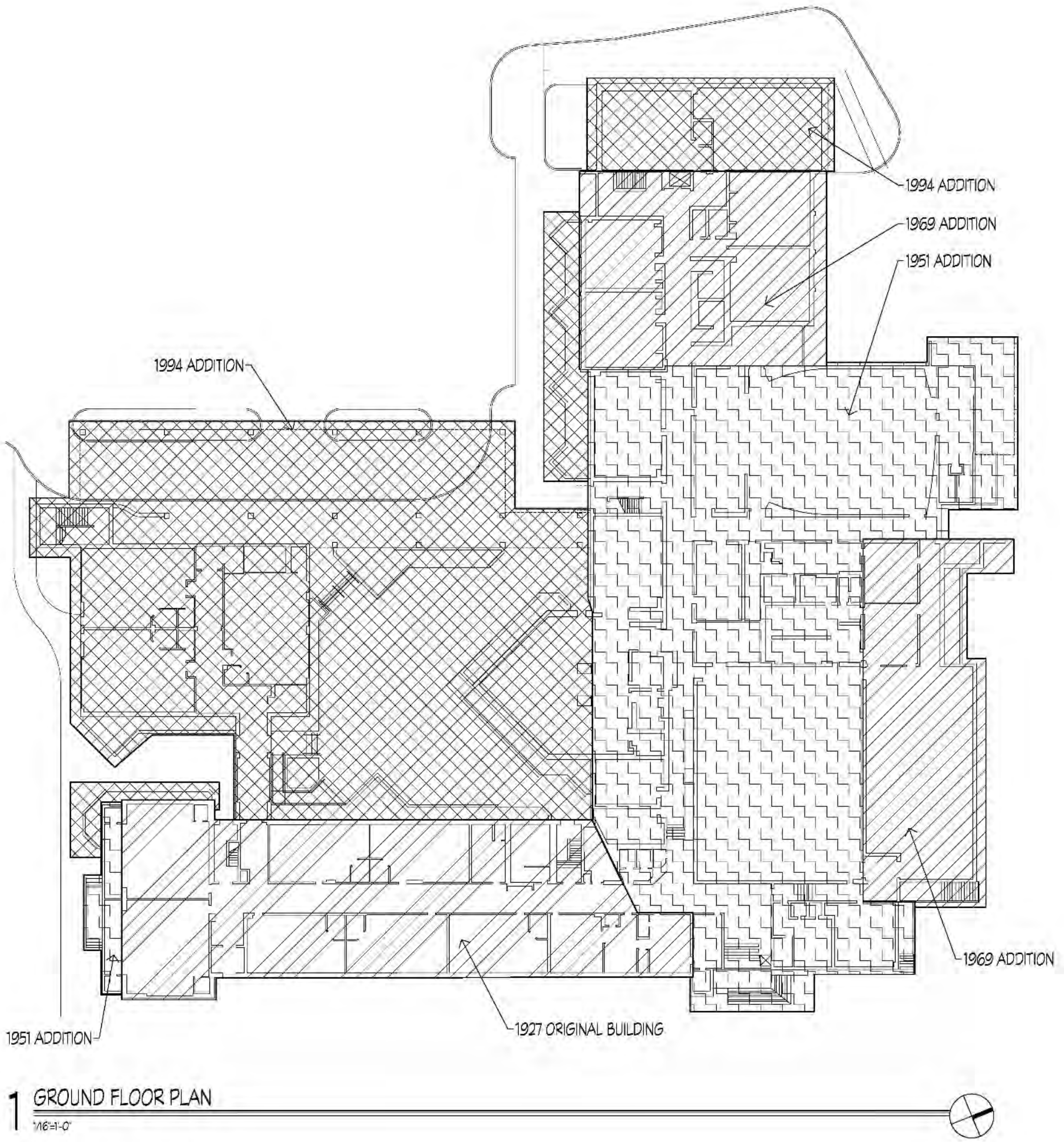
The school was original constructed in 1927. In 1951 a two-story addition was made to the North end of the building consisting of two stories of classrooms and an auditorium and gymnasium/cafeteria on the first story. The corridor at the second floor has a series of clear story windows that are above the gym and auditorium roofs. At the same time a small one-story addition was made to the south side of the original building. In 1969 a second addition was made to extend the two stories of classrooms to the west, beyond the auditorium, add a cafeteria, and extend the kitchen and custodians office on the north side of the gym. The third addition was made in 1994. This addition extend the two story classroom wing further to the west, increased the size of the media center with a one story addition, and a two story classroom addition off the south west end of the original building and connecting to the 1951 addition, via a bridge, to the second floor. This addition created a courtyard at the center of the school which and a covered let-off with the classrooms overhead.

The 1927 building is 2 stories with a basement, constructed of a brick foundation and above grade walls of multi-wythe, solid brick masonry construction. The floor construction is wood joists with T&G diagonal sheathing. The roof is hipped with a 10-foot-wide flat area along the center and is constructed of wood framing. The sloped portion of the roof is constructed slat roof shingles. The roof is drained by a perimeter gutter and downspouts. The exterior walls and the corridor walls create the main load bearing elements of the building with roof and wall framing spanning from exterior wall to corridor wall.

The 1951 first addition connected to the original school's corridor at the north end and continued the new corridor to the west, placing a new stair at the west end. The first-floor corridor is about 3 feet lower than the original buildings and the second-floor corridor is about 2 feet lower than the original buildings. There is a stair and ramp to make the transition. The gym and auditorium stage have a direct connection from the corridor. The auditorium seating area is access by a corridor leading to the north between the gym and auditorium. There is a lobby space at the north end of the auditorium with a grand staircase ascending from the parking area. This building is constructed of a load bearing steel frame, open web floor joists, and concrete filled corrugated metal deck. The roof is a low slope, a fully adhered, epdm membrane with tapered insulation and interior roof drains. Gym roof is constructed of steel trusses and acoustical decking. The exterior walls infill between the steel structure and are three wythes of brick.

The 1969 second addition extended the 1951 corridor to the west and added classrooms and bathrooms on two floors. A stair and elevator were placed at the end of the corridor. A cafeteria was added to the north side of the gym and has a slightly lower roof elevation than the gym. The kitchen and custodian's room were increased in size to accommodate the larger student population. A loading dock and storage room, access from the driveway on the north side of the building, was created outside of the expanded kitchen. This addition is constructed substantially similar to the 1951 addition. The exterior walls are constructed of one layer of brick veneer with a CMU block backup.

The 1994 third addition extended the classroom wing of the building with two classrooms on two stories to the west. At the south end of the original building, an L-shaped addition with three new kindergarten classrooms on the first floor and seven more classrooms on the second floor were added. This addition created a courtyard in the center of the building. The west side of the L-shaped addition is only at the second floor creating a covered let-off and on grade access into the courtyard. The floor levels of this portion of the addition have the same floor elevation as original building. At the second-floor connection of the north end of the L to the 51' addition, a ramp slopes down to connect the two different floor elevations. A one-story media center addition projects to the south, into the courtyard, from the south face of the 51' addition. This addition is constructed of a load bearing steel frame with wide flange beams supporting the 5-¼" composite steel and concrete floor decking. The steel frame is infilled with concrete block and clad with a brick veneer cavity wall.



Field Observations

Observations are based on visible conditions at time of visit. Not all interior spaces were accessible at the time of visit. Work was underway at the time of the visit which was removing mold impacted drywall. Mold was present between the interior face of the drywall and the vinyl wall covering which represented the typical finish of the wall surfaces throughout the building. Damaged interior wall finishes at the exterior wall have been repaired and the extent of damage prior to the repair work was not able to be observed. Exterior observations were made from grade or roofs. Probe observations were made from lifts or ladders when not accessible from grade.

Interior Observations

1. Water stains were found at the intersection of the gym roof to the corridor wall. The staining is also adjacent to a roof drain. At this location the corridor wall extends above the gym roof and has clearstory windows into the corridor.
2. Extensive water staining of the gypsum wall board around the entire window opening at room 170 (1969).
3. Water staining of the interior face of concrete block of room 170, just below the second floors beam. Block is exposed above the ACT (1969).
4. At Janitors Closet next to room 252, exposed concrete block wall at exterior wall had vertical cracks, floor to ceiling, at three locations along the wall (1969).

Exterior Observations

Typical Across All Buildings

1. Seals between IG window panes are failing.
2. Sealant around windows openings is cracked and failing.
3. Control/Expansion joints are cracked and failing.

Façade - 1927 Building

4. Several head joints around room 104 are missing mortar.
5. Mortar is missing at the head joints and under the stone windowsills at rooms 104 and 105.
6. Mortar is missing from the top corners of window openings at room 104 and 105.
7. At rooms 104 and 105 the precast parapet cap has shifted, and mortar is missing from its head joints and below the cap. Efflorescence on face of brick. Brick at parapet elevation is shifting.
8. Mortar joint at rooms 104 and 105 between 1927 and 1951 addition is open.

9. A vertical crack has propagated from the intersection of the 1927 and 1951 buildings up to the parapet cap at room 105.
10. At room 105 a vertical crack has propagated from the head of the windows on the west elevation to the parapet cap. And a diagonal crack from the right top corner nearly to the parapet cap.
11. Efflorescence is forming at approximately the roof level across the west elevation of room 105.
12. Vegetation is growing from the roof over Rooms 104 & 105.
13. There is water staining of the main roof's soffit around the entire building.
14. Mortar of the joint between the mosaic tile and brick is deteriorated.
15. At the main office, the joint of the mosaic tile and brick at the right side of the masonry opening is open from sill to head (2 stories)
16. Masonry opening at basement access door on the east elevation has large gap around door opening and sealant is open.
17. Door frame at basement access door on the east elevation is rusted through at the base and is open to the interior.
18. Retaining wall to basement access is bowed and leaning.
19. Brick mortar joints below windows of main office require repointing.
20. Hose bib on east elevation is not sealed at the penetration of the brick.
21. There is a sink hole forming next to the stair that exits into the courtyard, across from the main office.

Façade – 1951 Building

22. Sheetmetal coping at chimney is missing.
23. Concrete of front entrance stairs is spalling and needs repair. Stair treads are uneven and need to be reset. Stair risers are inconsistent.
24. HC ramp to front main entrance has spalled large areas of concrete at railing posts.
25. Vegetation is growing out of cracks at the top of the wall outside of nurse's room.
26. Efflorescence on north and east elevations between first and second floor windows and at the north end of east elevation below first floor windows.
27. Steel lintels at the head of the first-floor and basement windows on the east elevation have a substantial amount of rust and appear to have the original steel lintel still above a newer one. The original steel lintel is delaminating and may be contributing the large sage observed across the three window openings.
28. Gaps in sealant between granite and brick finishes on east elevation.
29. Corner of granite wall on east elevation requires repair.
30. Mortar missing at joint of masonry window sill.
31. Planter wall outside of Auditorium is pushed out and is need of repair.
32. Asphalt paving at landing of stairs outside of Auditorium is not level with stair treads and must be repaired.
33. Effloresce on wing wall outside of Auditorium.
34. Lintel paint is peeling and must be cleaned and repainted.
35. Canopy outside of stair near room 249 is deteriorated and must be repaired.

Façade – 1969 Building

36. Handrail posts at stairs outside of Cafeteria are rusted and broken.
37. Railing at stair outside of Cafeteria should be a guardrail and does not meet the requirements for a guardrail.
38. Brick above stairs outside of Cafeteria is uneven.
39. Unprotected opening in brick at junction box at east wall of Cafeteria.
40. Break metal cap at top of pilaster at north elevation of Cafeteria are pitched back towards the building.
41. Control joint between 1969 & 1951 buildings near room 252 is open rigid and delaminating from the brick.
42. Control Joint between room 256 of the 1994 building and room 254 of the 1969 building is dried out and cracked.

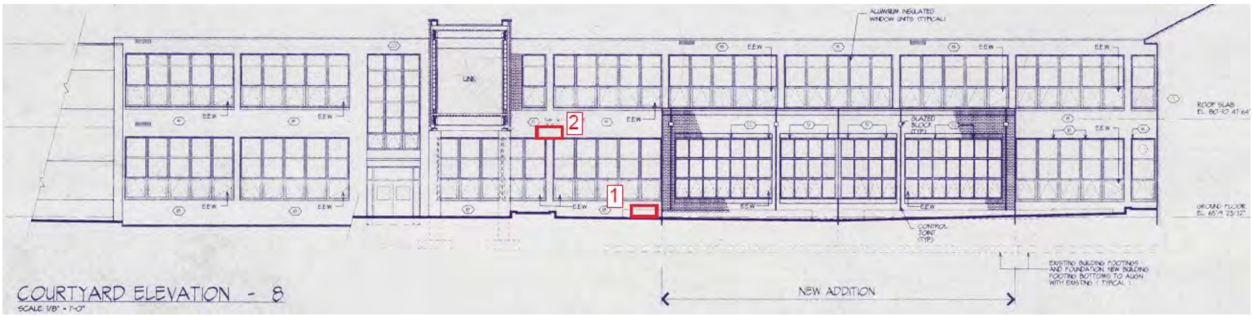
Façade – 1994 Building

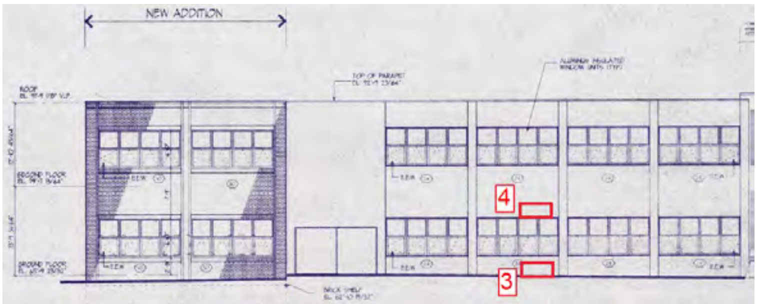
43. Sealant around windows in this building addition is split and open.
44. Brick at roof elevation over room 205 is projecting out beyond the course below.
45. Blue medallion between rooms 203 & 204 is popping off building.
46. Masonry at top of column across the hall from room 205 is cracked.
47. Control joint sealant is cracked and dried out. Typical around building.
48. At room 212, masonry at the inside corner, top of wall, is cracked.
49. At room 212, masonry between control joint and inside corner is out of plane with the rest of the wall.
50. Sealant at the right side of the window of room 212 appears to be missing.
51. At second floor janitors closet, near room 212, masonry between control joint and inside corner is out of plane with the rest of the wall.
52. Landing slab at double door into first floor hallway, near room 117, has unsealed openings at the bottom corners of the door opening.
53. Fibers are coming out of the bottom weep holes outside of rooms 201 through 205.
54. Grade is above the floor elevation outside of room 101 and adjacent stair and there are no weeps observed at these areas.

Exterior Probes

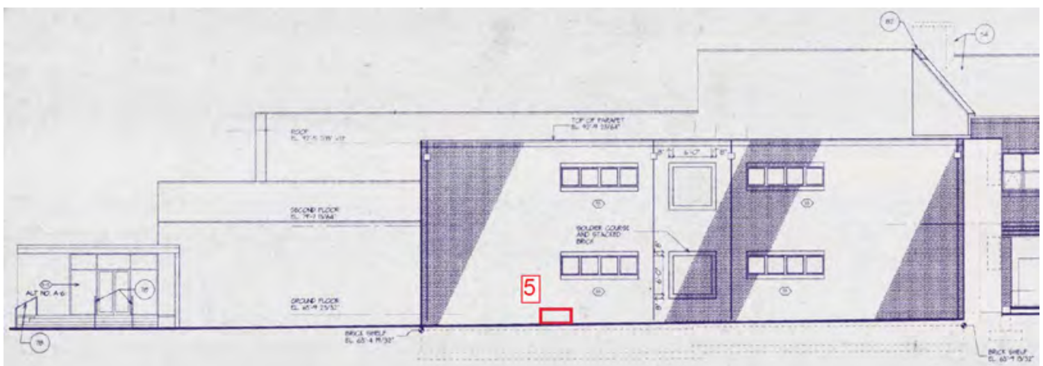
Brick was removed at various locations and conditions around the 1997 addition and renovations. These conditions were reviewed for quality of work, condition of building materials and adherence to the details.

In all probe locations the water resistive barrier is a 30# building felt that was loose laid over the substrate. In some areas it was observable that the water resistive barrier was secured in place with hex head screws. There is no mortar netting in the brick veneer cavity to help prevent the weeps from becoming clogged.

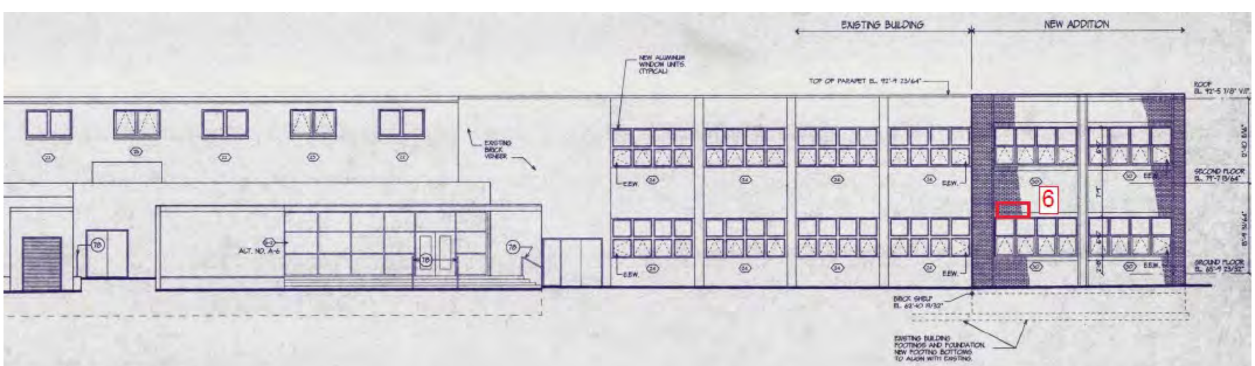




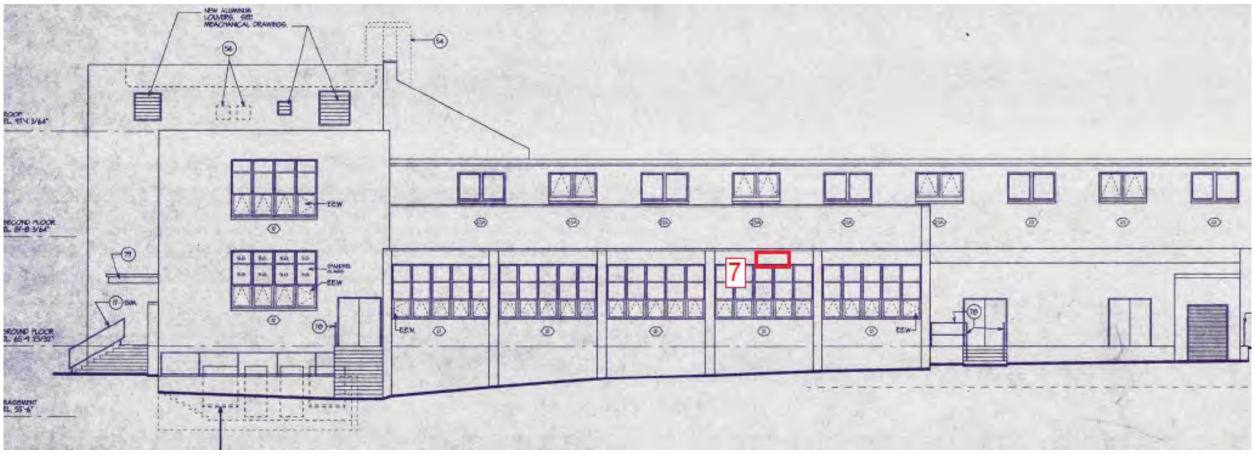
South Elevation at Parkinglot



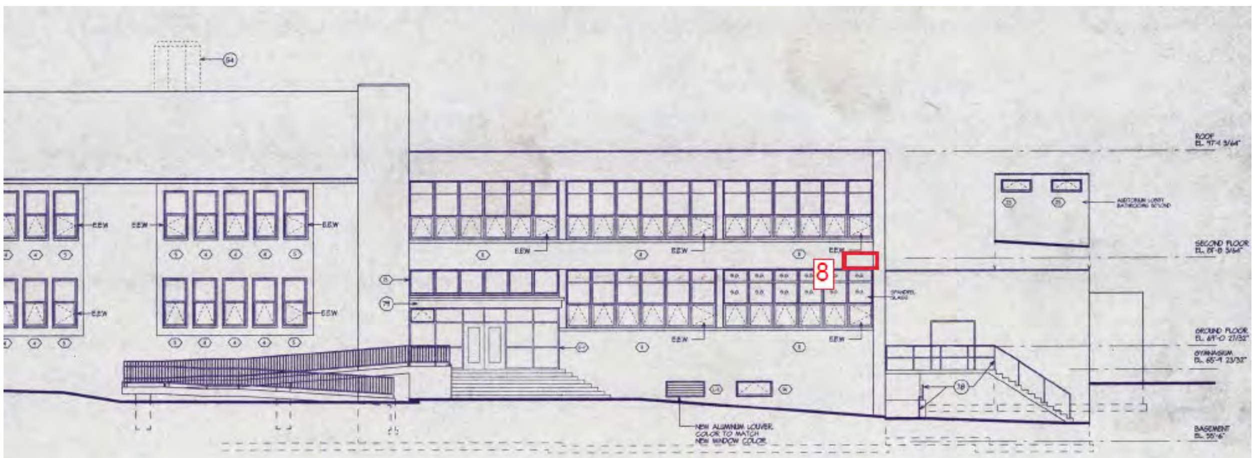
Partial West Elevation



Partial North Elevation



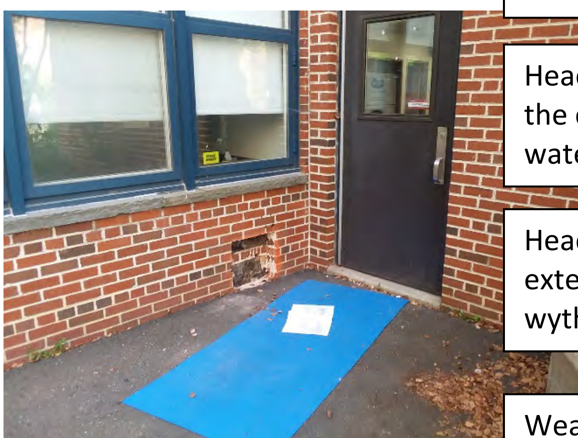
Partial North Elevation



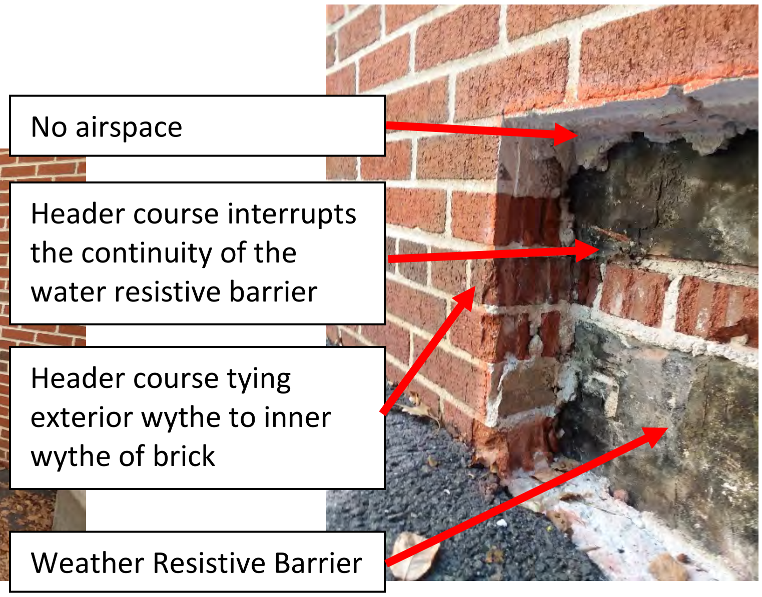
Partial East Elevation

Probe 1 (1951)

The exterior wall construction appears to be at least 2 wythes of solid brick masonry with no air space between the layers of the brick. There is a weather resistive barrier between the exterior wythe and second wythe of brick. The WRB is interrupted by a header course at this location, three bricks above grade. There is a header course at every sixth brick course. This brick coursing is typically called Common Bond and helps tie the two wythes of brick together. The WRB is rigid but appears to be intact. There are no through wall flashing and no weeps at this part of the building.



P1-1

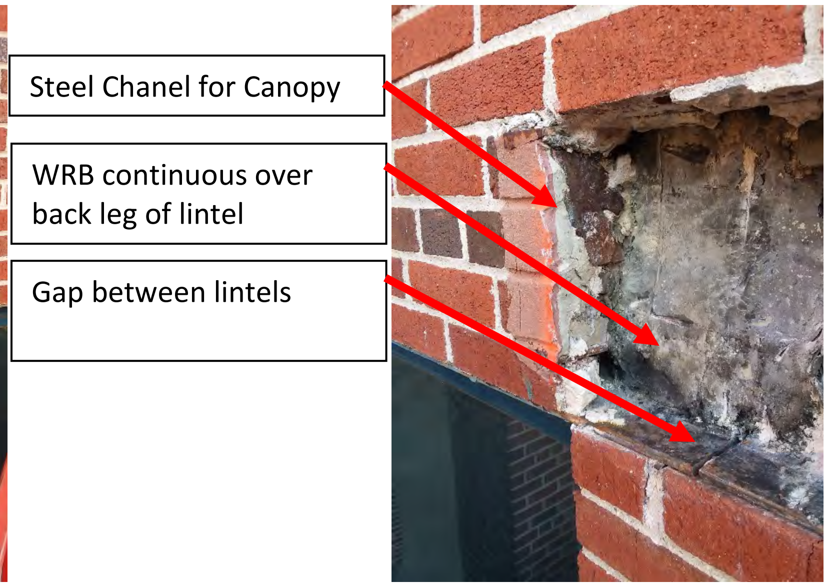


P1-2

Probe 2 (1951)

Steel lintels above windows looks to be in good condition with minimal rust. They have been painted in the past to match the window color and need to be repainted. There are no weeps above the window lintels. The WRB runs behind the exterior wythe of brick (similar to Probe 1) and continues over the back leg of the lintel. The WRB is rigid but seams in the material are well sealed. Lentils are not sealed from one to another at brick piers between windows. Remnants of steel channels are buried in the exterior brick wythe. Concrete is packed in around the steel channel, tooled and colored to look like brick. The steel channels may have been for a canopy used to shade the south facing windows. The channels are bolted to a steel beam behind the brick.

P2-1



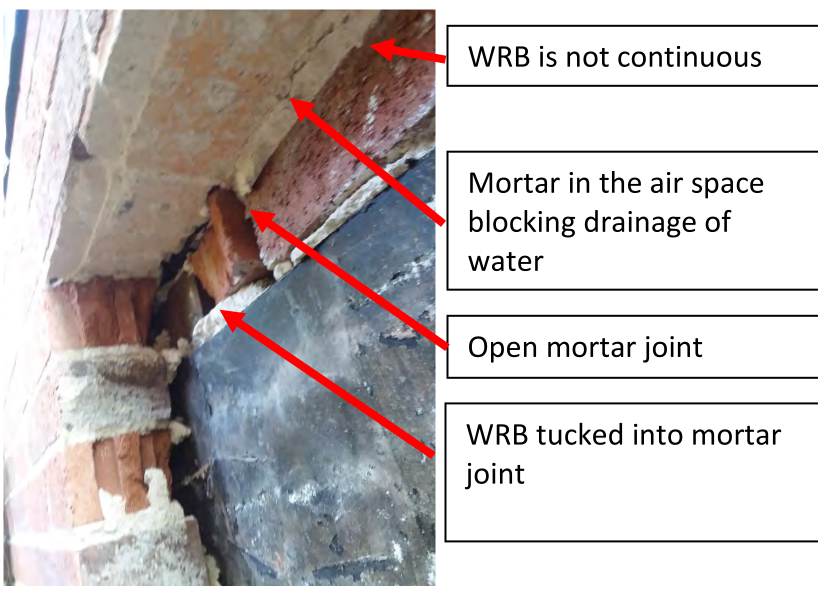
P2-2

P2-3

Probe 3 (1969)

The exterior wall construction appears to be at least 2 wythes of solid brick masonry with a three-quarter inch air space between the layers of the brick. There is a weather resistive barrier between the exterior wythe and second wythe of brick. The WRB is interrupted by a header course that is one course below grade. This brick coursing is a variation on the Common Bond where the header and the stretcher alternate at every sixth course of brick. The header brick extends back into the second brick wythe and helps tie the two wythes of brick together. The WRB is tucked into the mortar joint below the header course. The WRB is rigid but appears to be intact. There is an open mortar joint. There are no through wall flashing and no weeps observed at this area of the building. The floor elevation of the classroom is below the finished grade elevation of the planter. Mortar droppings within the air space can prevent proper drainage of water.

P3-1



P3-2

P3-3

Probe 4 (1969)

Wall construction is similar to Probe 3. Steel lintels above windows looks to be in good condition with minimal rust. They have been painted in the past to match the window color and need to be repainted. There are minimal tube type weeps at the window lintels and are spaced 40"-48". The WRB runs behind the exterior wythe of brick (similar to Probe 3) and continues over the upward leg of the lintel. A second sheet of WRB material extends to the front edge of the horizontal leg. It is assumed that the WRB stops where the header course happens at course 5 above the window head and starts again above it. The WRB is rigid but is in good condition with no obvious tears or gaps. There is minimal mortar droppings at the lintel. There is a piece of steel that penetrates the WRB and is welded to the lintel. Mastic seals the penetration around the steel.

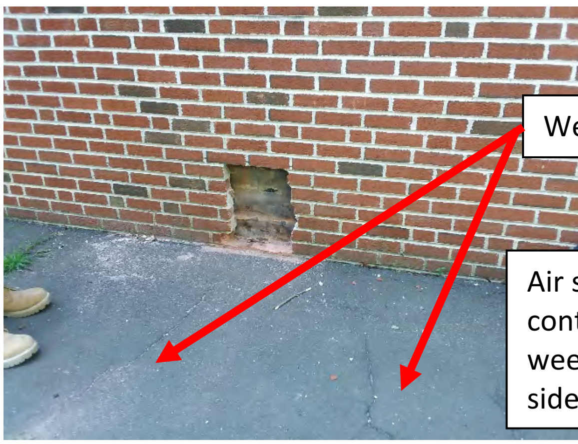
P4-1

P4-2

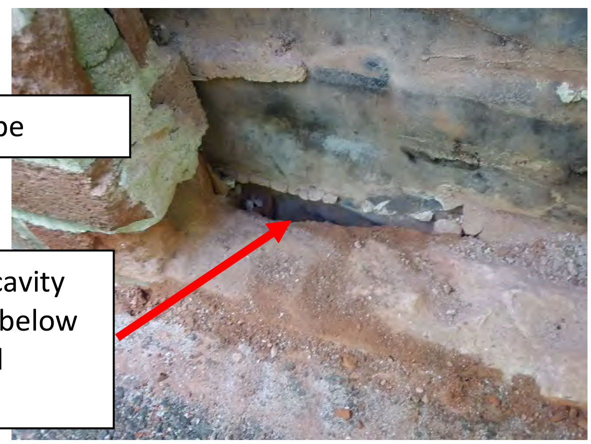
P4-3

Probe 5 (1994)

Wall construction at this area is a 4” brick veneer with an approximately three-quarter inch air space. There are no masonry anchors observable from this probe location. There is a rubberized WRB within the cavity. The WRB is in good condition and is not adhered to the concrete block back up. Sheets of WRB are lapped approximately 8 inches and are lapped properly to prevent water draining within the cavity from getting behind the membrane. Sheets of the WRB are not spliced together. There are weeps one course above the sidewalk surface and spaced 24” o.c. As the sidewalk slopes the weep holes remain about 1 course above the sidewalk surface. There is no through wall flashing or turn out of the WRB at the weep holes to direct water within the cavity out of the weep holes. The air space continues below the sidewalk elevation and the bottom of the cavity could not be determined. The flange of the steel column behind the WRB was able to be located. The CMU block is set into the web of the steel column. The waterproofing membrane runs continuously across the CMU backup and covers the steel column. There is no drainage mat or other material to prevent mortar droppings from entering the airspace.



P 5-1



P 5-2

P 5-3

P5-4

Probe 6 (1994)

There is an approximately two-and-a-half-inch air space which consists of 1 1/2 inches of rigid insulation, adjustable masonry anchors embedded in the CMU backup mortar joints, pea gravel mortar drop type netting, and a rubberized WRB membrane. Weep tubes are spaced 16 inches o.c. above the window. The steel angle lentil is in generally good condition. Lentil does not extend into masonry at either side of window opening. Rubberized flashing is turned into the mortar joint at 8 in above the window head. Two pieces of steel angle are visible and welded to the window lintel, transferring the load of the brick veneer the floor framings steel beam, running parallel to the exterior wall at the floor line. Rubberized waterproofing is cut around the steel angles, compromising the Integrity of the waterproofing membrane. There is no waterproofing membrane behind the rigid insulation. There is no observable WRB on the CMU. There is a gap between the two steel angles which is open. It appears that the concrete blocks interior face is continuous across the gap between the steel angles.

P 6-1

P 6-2

P 6-3

P6-4

Probe 7 (1969)

Probe is over the cafeteria window. Some of the weeps at the window lintel have been sealed. The steel lintel is slightly rusted and pitted. The airspace is approximately 1 1/2 inches. The bottom of the airspace is full of mortar for approximately one brick course high. The WRB is in relatively good condition. The bottom edge turns out over the horizontal leg of the steel lintel. One corrugated brick tie was found within the airspace. WRB on top of the window lintel is no longer adhered to the steel. Fasteners used to anchor the window frame are slightly penetrating the top of the steel lintel. Windows appear to have been moved back into the masonry opening approximately 1 inch based on white staining observed on the brick piers between windows. With the windows in its original location it would have been approximately 1 inch beyond the front edge of the window lintel. Some portions of the existing WRB are still well adhered to the steel lentil.

P7-1

P7-2

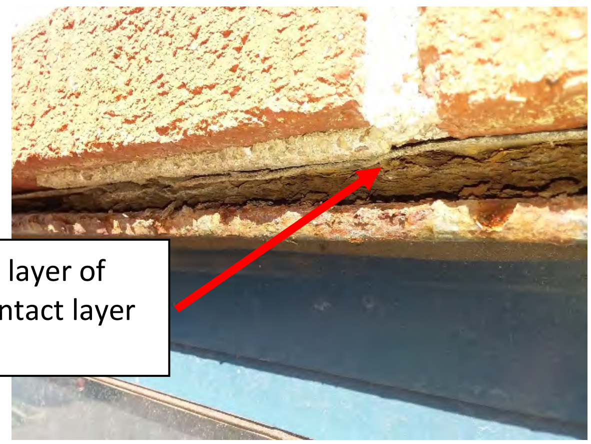
P7-3

P7-4

Probe 8 (1951)

The exterior wall construction appears to be at least 2 wythes of solid brick masonry with no air space between the layers of the brick. There is a weather resistive barrier between the exterior wythe and second wythe of brick. The WRB is interrupted by a header course just above the probe opening and the WBR is tucked into the mortar joint of the inner brick wythe. The WRB at the far-right corner, near the pier, appears continuous up in between the first and second wythes of brick. The WRB turns out, over the top of the steel lintel and is well adhered to it. There appear to be no weep holes above any of the windows at this location. Steel lintel is let into the pier at either side of the window. Area of lintel over the second from right window has started to show signs of significant rust. It appears that an original lentil may have been left in place and a new lintel placed underneath it. The original lentil is heavily rusted and is delaminating. Delamination increases the thickness of the steel and pushes against adjacent materials. This phenomenon may be why the new lentil is sagging and can also cause brick to crack.
Moving up to the second-floor windows, the steel lentils are in much better condition and not showing significant signs of rust but need to be repainted.

P8-1



P8-2

P8-3

No end damn at end of through wall flashing.

P8-4

Document Review

Architectural drawings or other design documentation for the original building, first and second additions were not provided for review.

A partial set of civil, architectural, structural, mechanical, plumbing & fire protection drawings were provided to us for the 1994 addition. There were no electrical drawings provided. Portions of the existing buildings were renovated as part of the 1994 scope of work including the installation of a sprinkler system and ductwork throughout the buildings. The architect of record is Fuller and D'Angilo P.C. with civil engineering provided by Parsons Associates, structural engineering provided by Wayman C. Wing, and MEPFP provided by John L. Altieri Consulting Engineers.

Adherence of Construction with Design Documents

When comparing the design documents with the field observations and probes, the building façade is in general conformance with the design documentation. Outlined below are conditions that are not in conformance with the design documents.

Probe 1: This area was part of the 1951 addition and was not altered by the renovations of the 1994 addition, therefore there are no drawings available to compare the construction to.

Probe 2: Detail 20 on Sheet A702 - This area was part of the 1951 addition. Renovations of this area during the 1994 addition included replacement of the existing window, wire brushing and painting of the exposed surfaces of the steel window lintel.

Probe 3: This area was part of the 1969 addition and had the planting bed added to this area during the 1994 addition. Details showing how the grade would be built up to an elevation above the finished floor elevation, against the existing exterior wall, were not located.

Probe 4: Detail 28 on Sheet A702 - This area was part of the 1969 addition. Renovations of this area during the 1994 addition included replacement of the existing window, wire brushing and painting of the exposed surfaces of the steel window lintel.

Probe 5: Section 4 on Sheet A303 – This area was part of the 1994 addition. Weep tubes are located only one course above finished grade. Damp proofing of the foundation wall was not able to be observed on the foundation wall. Fabric flashing does not turn out into the brick grout joint at the masonry weeps. There is no pea gravel within the cavity space. No rigid insulation was able to be observed at this location.

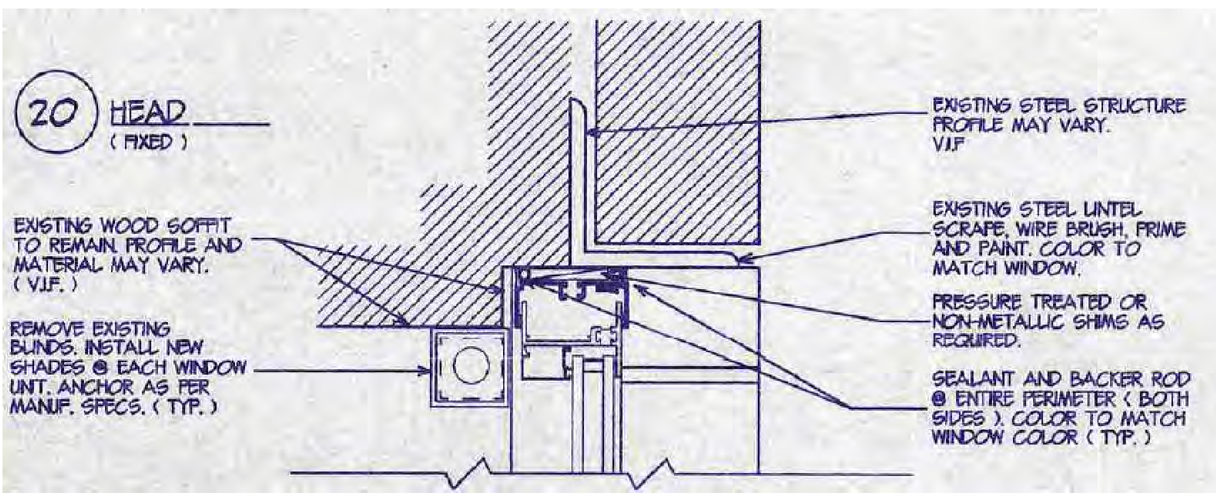
Probe 6: Section 5 on Sheet A303, 34 on A703, 2 on S4 – This area was part of the 1994 addition. The construction of this area matches the construction documents. During construction the fabric flashing was cut around the structural steel supporting the steel angle window lintel.

Probe 7: Detail 28 on Sheet A702 - This area was part of the 1969 addition. Renovations of this area during the 1994 addition included replacement of the existing window, wire brushing and painting of the exposed surfaces of the steel window lintel.

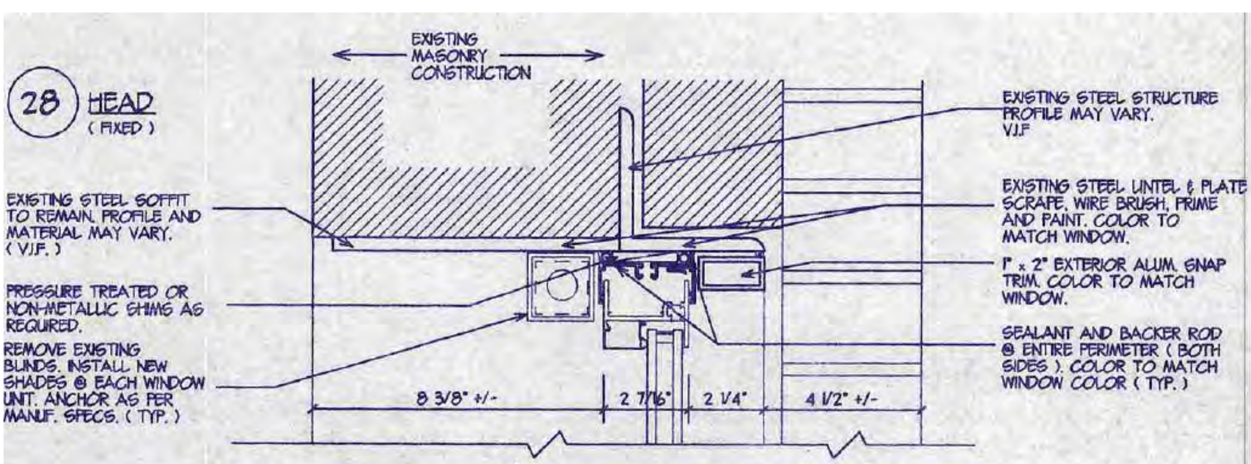
Probe 8: Detail 20 on Sheet A702 - This area was part of the 1951 addition. Renovations of this area during the 1994 addition included replacement of the existing window, wire brushing and painting of the exposed surfaces of the steel window lintel.

Fabric through wall flashing at many of the observed locations did not extend fully to the exterior face of the brick veneer. Due to the flashing not reaching the outside face of the brick, water being pushed to the exterior by the flashing my not reach the exterior and get absorbed by the brick or precast concrete below it. I one case the flashing stopped short of the holes cast into the middle of the brick allowing water to pool within this hole.

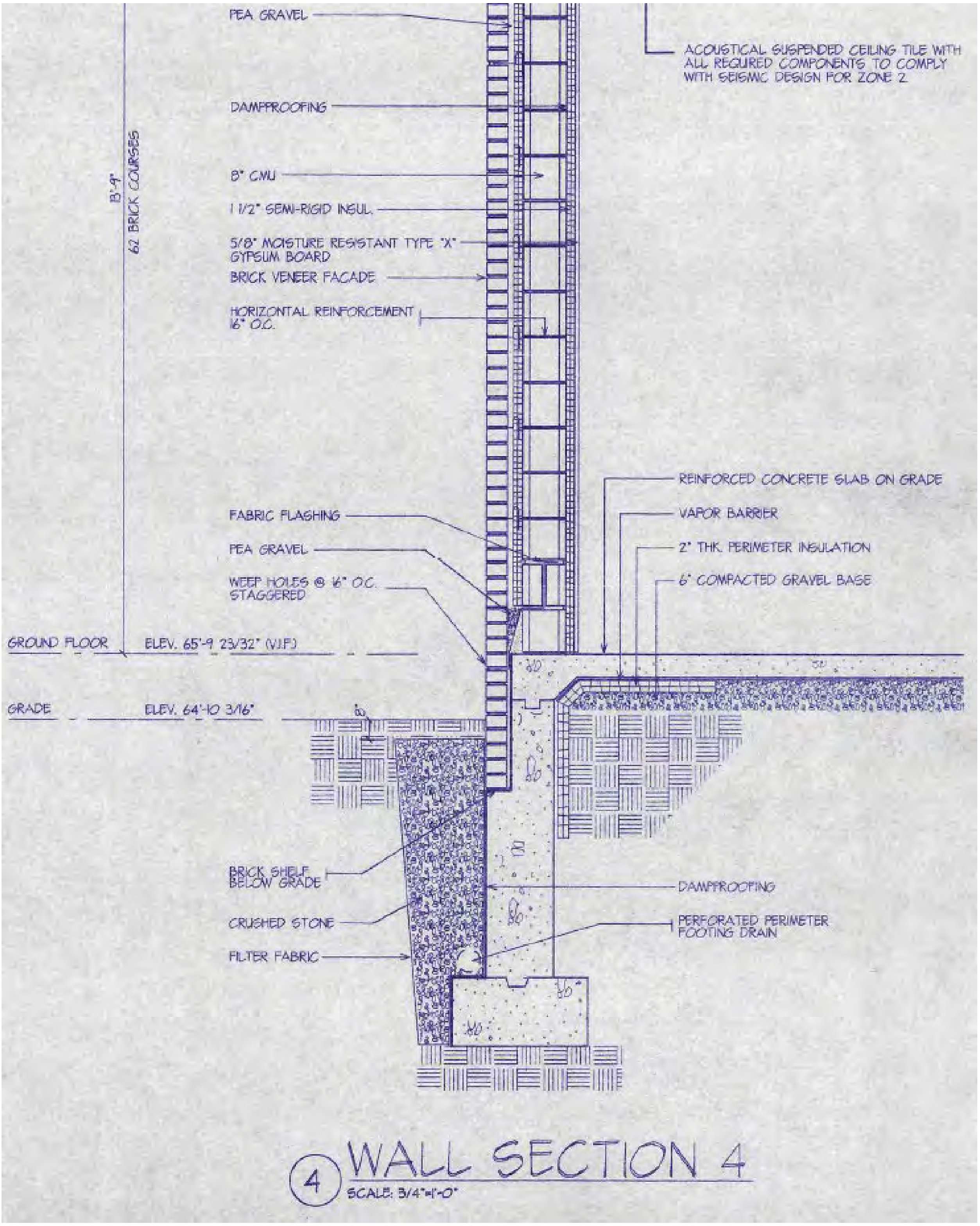
Drawing details show steel lintels below and extending to within 1" of the front edge the precast concrete window headers. There is a piece of fabric flashing indicated behind concrete window header daylighting at the front edge of the precast header. The project was built without the steel lintel and the through wall flashing was not observed to be daylighting.



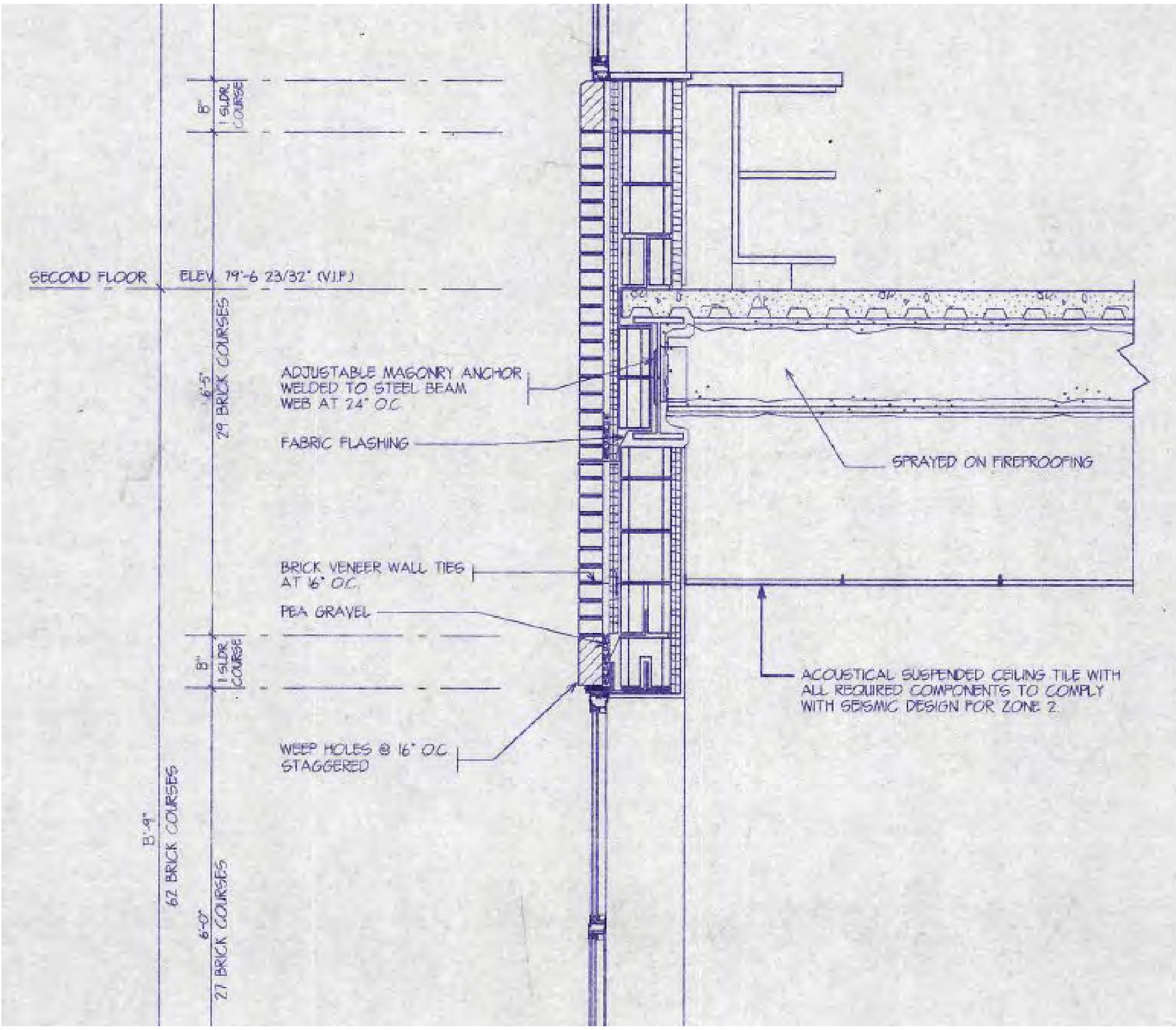
Detail 20 on Sheet A-702



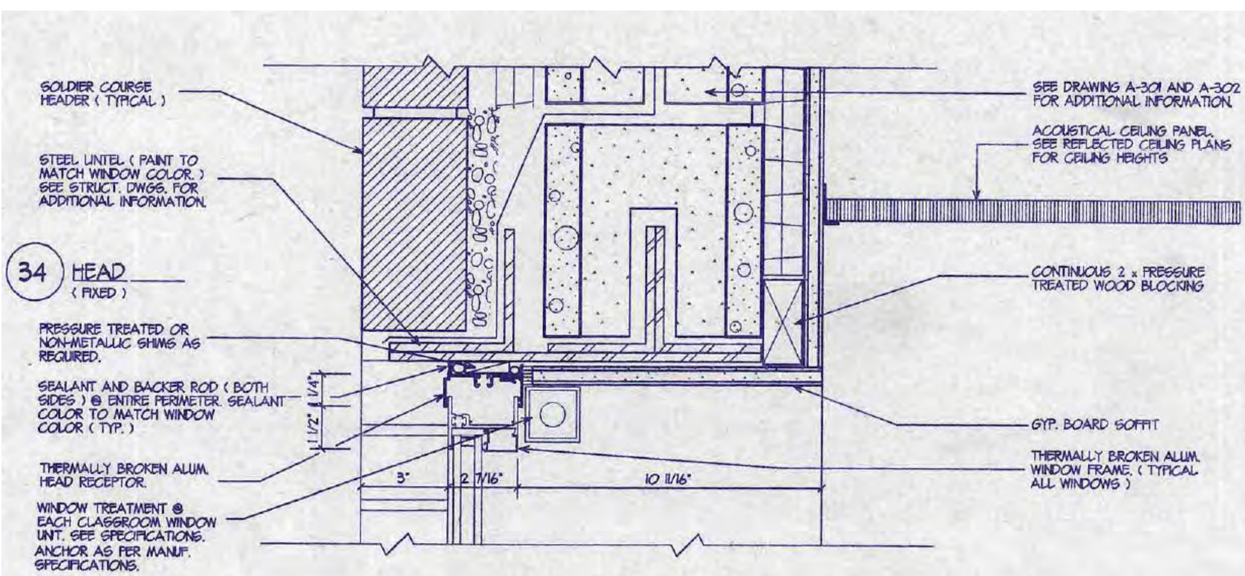
Detail 28 on Sheet A-702



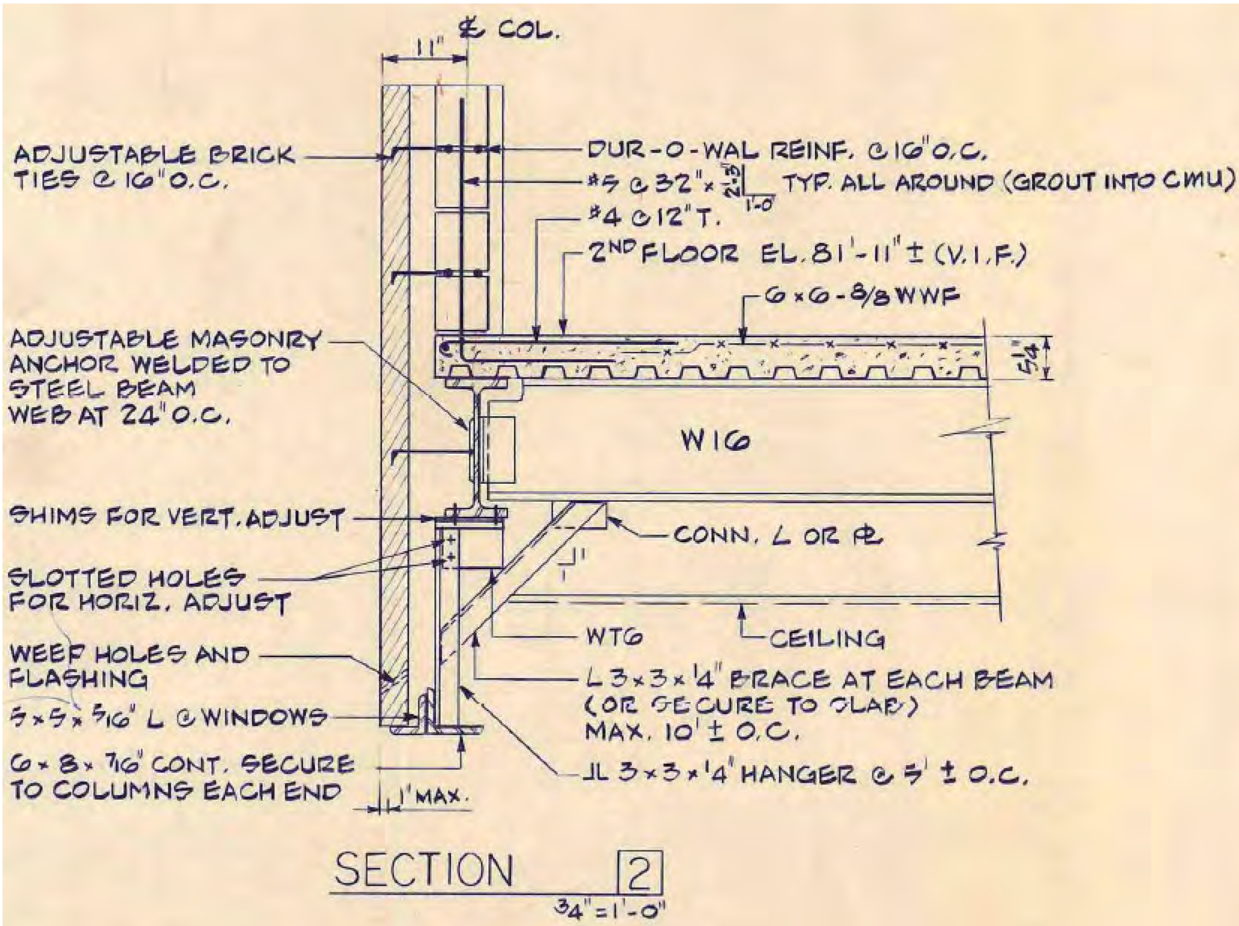
Wall Section 4 on Sheet A-303



Wall Section 5 on Sheet A-303



Detail 34 on Sheet A-703



Section 2 on Sheet S-4

Discussion

The exterior walls of the Original Building, 1951, and 1969 buildings are a solid load bearing masonry wall. These wall systems consist of several layers of brick. Each layer of brick is tied to the subsequent layer in a variety of ways. We have found that these three generations of buildings are 3 layers of brick with intermittent courses of brick turned to tie each layer of brick together. Where the brick is turned, the sheet of water resistive barrier found between the exterior layer and subsequent interior layer of brick, is interrupted. Due to the thickness of the wall and the limited area where there is no WRB, there is a limited amount of water that can migrate to the interior of the building. The WRB was found to extend over the top leg of the window lintel creating a proper drainage path for any water that may find it way into the wall system.

Due to the porous nature of brick, the way in which brick dries is an important factor to consider when insulating these types of exterior walls. Sold masonry bearing wall systems rely on the heating of the interior spaces of the building to warm the brick during winter, driving the moisture that has been absorbed by the brick, out of the wall assembly. Introducing too much insulation to this wall system would slow the drying of the brick and could lead to face pops and prematurely deteriorating mortar joint due to the freeze thaw cycle during winter.

The exterior walls on the 1994 addition are a brick masonry veneer/cavity wall system. This type of wall system anticipates that some water will penetrate the exterior cladding and uses through-wall flashing to drain that water out of the cavity to the exterior. In current construction, this type of wall is a “rain screen” system that typically also includes a dedicated continuous water resistive barrier (WRB) inboard of the wall cladding and covers the structural back-up wall (typically a self-adhered sheet or fluid-applied product). This WRB provides a waterproofing and drainage plane on the wall to protect the back-up wall from water infiltration that can flow to the interior, especially at large voids or penetrations. When installed well and with the WRB integrated properly with through-wall sheet metal, membrane flashings, and fenestration framing, this type of system has an established track record of long-term reliable performance.

The design of Stark’s WRB behind a brick veneer is consistent with accepted industry standards of the time. The interaction of the structural system and the WRB at the window heads was not fully considered in the design of the wall system and lead to the WRB needing to be cut to allow structure to pass through the membrane. These penetrations could have been sealed using mastic therefore maintaining the continuity of the WRB. The wall sections show the location of dampproofing on the interior face of the CMU block. This location is not recommended and would be expected to be placed on the exterior face of the CMU block.

While some of the lapping of building materials to promote the movement of liquid water to the exterior of the brick veneer were not executed properly during construction, the majority of the locations observed did have a through wall flashing installed to promote the expulsion of water from the cavity. Sealing of penetrations through the WRB are an important part of preventing water from getting to the interior of the building. The penetration of the masonry anchors, structural steel support, through wall vents, piping, etc. through the WRB create areas where liquid water within the brick cavity can get behind the WRB and enter the interior of the building. Where observed, these types of penetrations were not sealed creating areas where the wall is vulnerable to liquid water intrusion.

Weep holes are present at all through wall flashing locations, but the older portions of the building had mortar droppings within the cavity that prevent the movement of liquid water within the cavity from exiting through the weeps to the exterior of the wall. Improper weeping of liquid water from the cavity could lead to brick faces popping off, mortar cracking and falling out of masonry joints, or pushing of the veneer away from the building. All of these symptoms are caused by the expansion and contraction of the materials when they wet and dry and the damage is exacerbated during cold weather because of the freeze and thaw cycle.

Another concern that has become more well understood and incorporated into today’s veneer wall systems is the movement of air-born moister or water vapor. Water vapor condensing into liquid water happens when warm moist air moves to an area that is cold. When the air cools and reaches its dew point the vapor will condense on the materials within that area. During the summer, if moisture laden air leaks into the building through unsealed penetrations or disjointed building paper it will increase the chance of condensation forming within the building. The understanding of the dewpoint of moist air moving through the buildings thermal profile is an important consideration when designing the air or vapor barrier in today's veneer wall building. This analysis informs the way the layering of insulation and vapor/air barriers within a building exterior assembly should be configured. Within our climate the movement of moist air must be considered during both the summer as well as the winter. Moist air will move from the interior to the exterior during the winter and from the exterior to the interior during the summer. Because there is no continuity to this building's building paper, there is no air or vapor barrier to stop the movement of moisture in either direction through the wall assembly. Based on the building's exterior wall assembly the dew point happens within the stud cavities batt insulation in both cases.

Throughout the façade and roofs, sealants were observed to be dried out, rigid, open and debonding. Mortar joints have cracked and fallen out joints between the masonry. These conditions increase the amount of water that can enter the wall cavity, increasing the wall's potential for leakage.

Information from Others

EMG Report

Facilities Needs Assessment of Julia A. Stark Elementary School dated August 29, 2009 was prepared by EMG. Many of the recommendation included within the report are still necessary as of the date of this report.

Simpson Gumpertz & Heger Report

Building Enclosure Investigation and Consulting Services dated 14 January 2019, was prepared by Simpson Gumpertz & Heger. Investigation focused on window and door water infiltration of the 1994 addition. It was found that the primary source of water leakage is through the deteriorated sealants around the doors and windows. Sill receptors of the windows lacked proper end dams and did not contain the water properly. Flexible flashing membrane above the windows and doors is not made of a durable, reliable through-wall flashing material. The membrane that is there is penetrated by the steel structure at the window heads. There is no WRB and the CMU back-up wall is discontinuous at the steel structure.

Roof Report

Infrared Thermographic Roof Moisture Analysis, dated May 8 & 9, 2019 was prepared by IR Analyzers / Vector Mapping. Finding identified two areas of suspected wet insulation in the top layer of roofing. Wet Area #1 is located at the flat roof area of the 1927 building. Wet Area #2 is located at the roof to wall transition between the cafeteria and gym. These findings suggest that there is water bypassing the WRB systems and that these areas should be investigated further to identify the penetration of the WRB.

Recommendations

All building areas

1. Due to the age of the building the WRB between brick wythes should be tested for hazardous materials if it will be impacted by construction activities.
2. Building should be surveyed for all areas needing repointing.
3. All existing sealants should be raked out and provided with new sealant.
4. Steel lintels need to be replaced and/or scraped and painted.
5. Window should be replaced with new, thermally broken, windows and frames.
6. Proper window sill receptors must be provided to prevent water infiltration into the building.
7. Seal penetrations in façade.
8. Where grade rises above the interior finished floor elevation, provide proper waterproofing of the exterior wall.
9. Walking surfaces should be surveyed and corrected to meet egress and accessibility requirements
10. Asphalt walking surfaces should be replaced with a more durable material.
11. All areas showing efflorescence should be investigated for water infiltration near these areas.
12. All roofing metals, such as parapet caps, fascia, counter flashings, etc. should be surveyed for potential infiltration locations and repaired.

1927

13. The flat roof area and roof edge flashing need to be replaced. Slate roofing should be removed, WRB be placed on the sheathing and slate shingles be reinstalled. Roof edge flashing should be repaired, and gutters be reinstalled to capture water that is getting to the soffit.
14. Gaps between the exterior brick of this building and the 1951 addition, Rooms 104 and 105, need to be addressed.
15. Stairs and handrails outside of Rooms 104 and 105 must be repaired.
16. Brick on the East and West elevations of Rooms 104 and 105 need to be repaired. Conditions causing efflorescence on these walls must be corrected. Areas of repointing is needed at most windowsills and in various locations around this portion of the building.
17. Vegetation growing out of the roof must be removed and ballasted roof be repaired.
18. Mortar joints between decorative terracotta tile and brick must be fixed.
19. Retaining wall and ramp leading to lower level must be replaced.
20. Sink hole forming outside Stair 2 in the courtyard must be filled and pavement repaired.

1951

21. All flexible through wall flashings, such as at door & window heads, roof to wall connections, relieving angles, and wall base, should be replaced with a more durable material.

22. Front entrance stairs and handrails must be repaired.
23. Stone veneer walls need to be repaired.
24. Masonry weeps must be cleared of obstructions preventing water from weeping out of the cavity.
25. Steel protruding from the brick at the top corners of the south facing windows should be cut further back into the building to allow new face brick to be patched into these locations.

1969

26. All flexible through wall flashings, such as at door & window heads, roof to wall connections, relieving angles, and wall base, should be replaced with a more durable material.

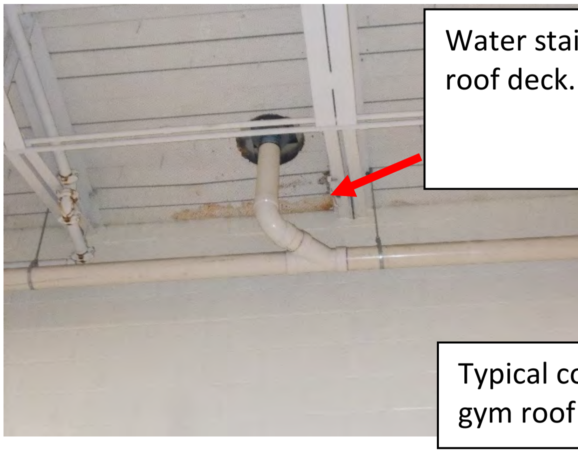
1994

27. A continuous water resistive membrane should be placed on the exterior side of the CMU backup walls. Gaps between CMU and structural steel should be sealed and the WRB run continuously across structure.
28. All flexible through wall flashings, such as at door & window heads, roof to wall connections, relieving angles, and wall base, should be replaced with a more durable material.
29. At Exterior door openings, gaps between the exterior door landing and the brick façade must be sealed to prevent infiltration.
30. Provide additional vertical brick control joints at inside and outside corners.
31. Provide proper exterior vertical expansion joint at the bridge connection to the 1951 addition.

Photographs

Photograph numbers correspond to Field Observation section numbering.

Interior Observations



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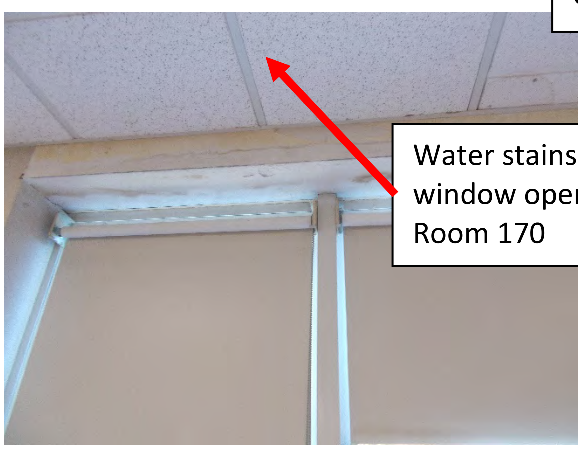

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Exterior Observations

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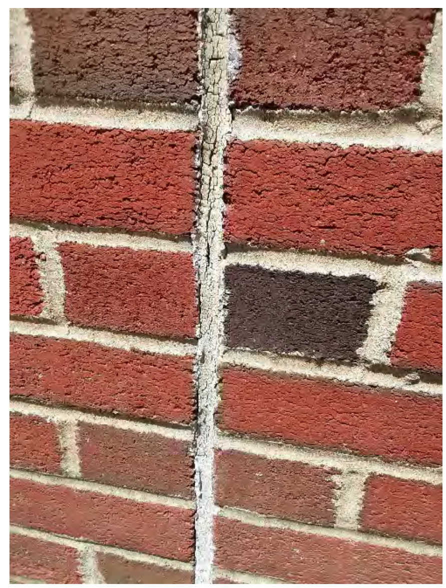

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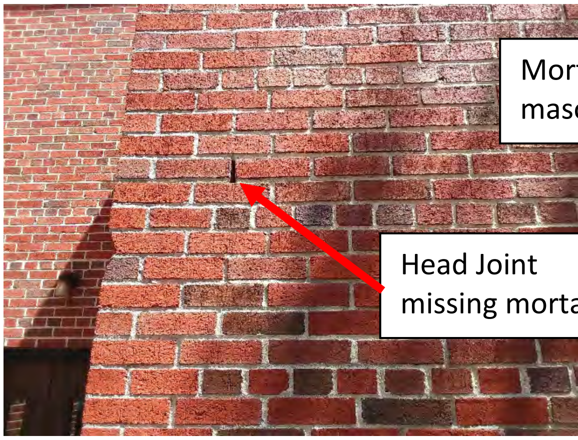

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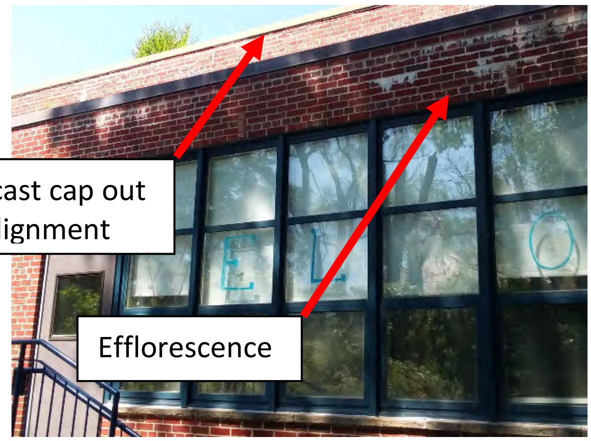

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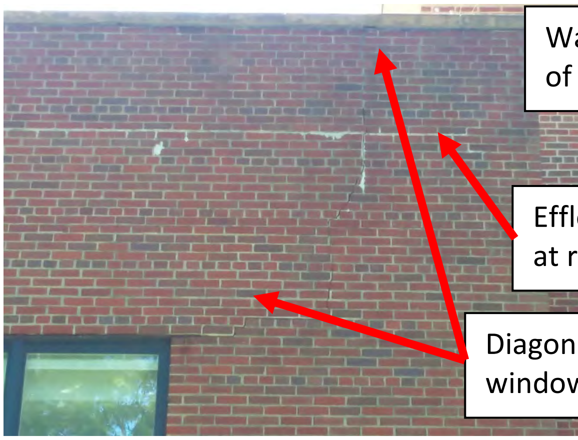

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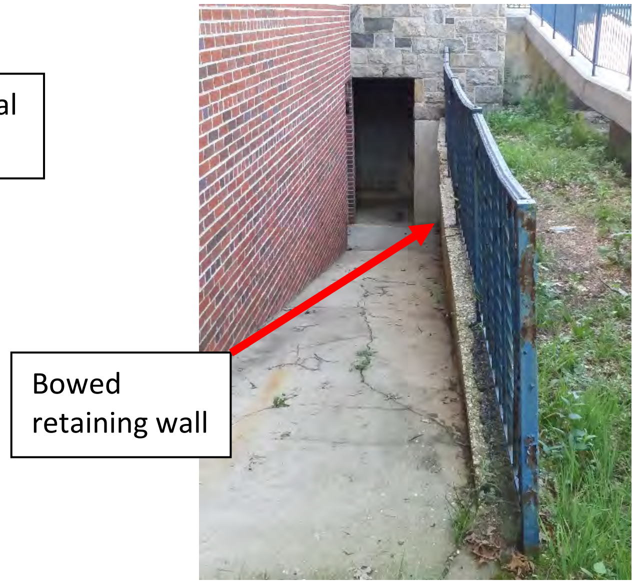

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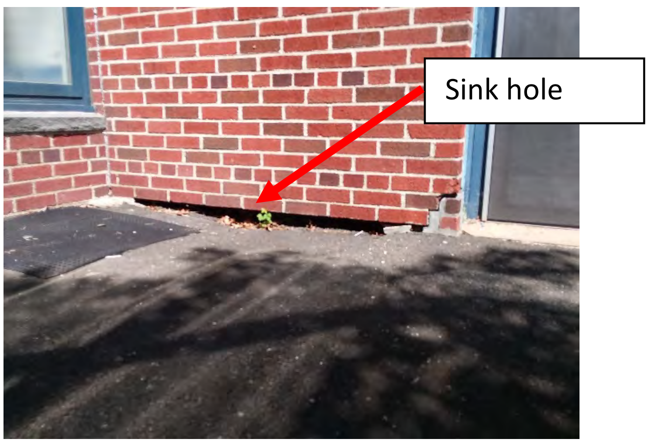

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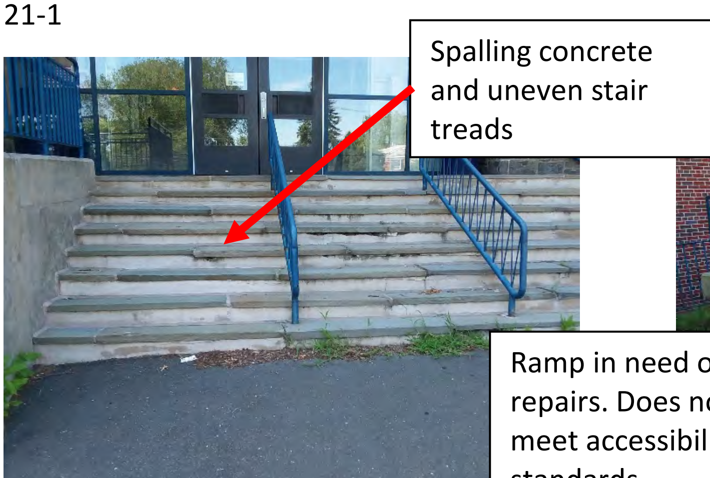

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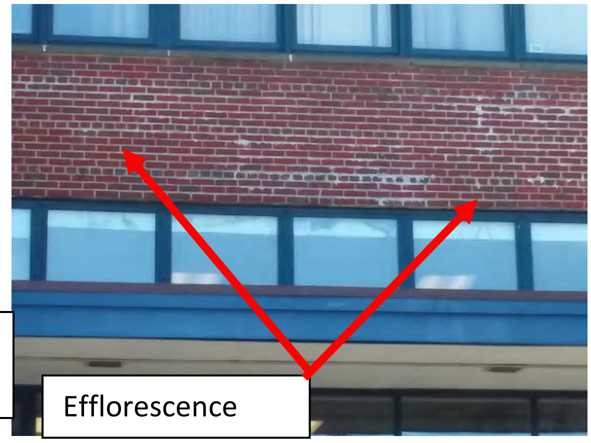

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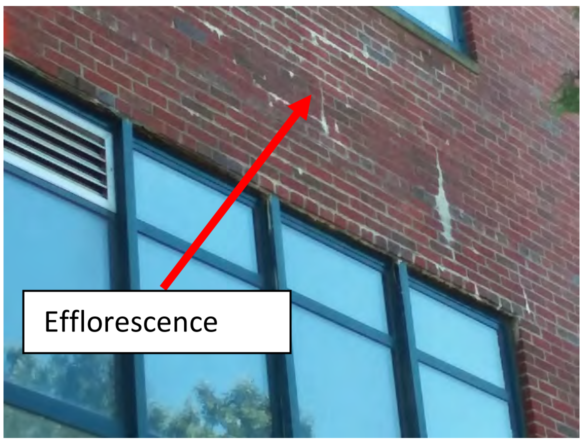

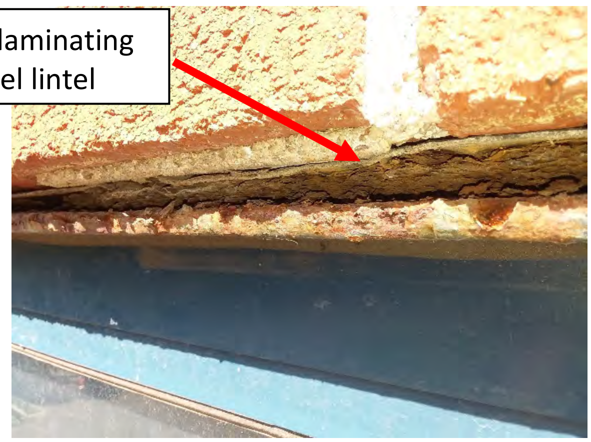

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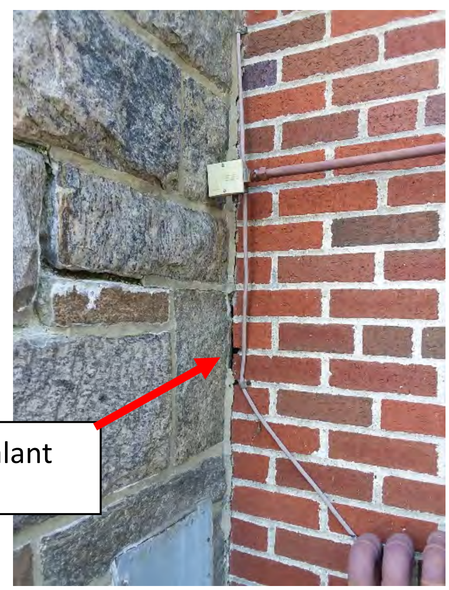

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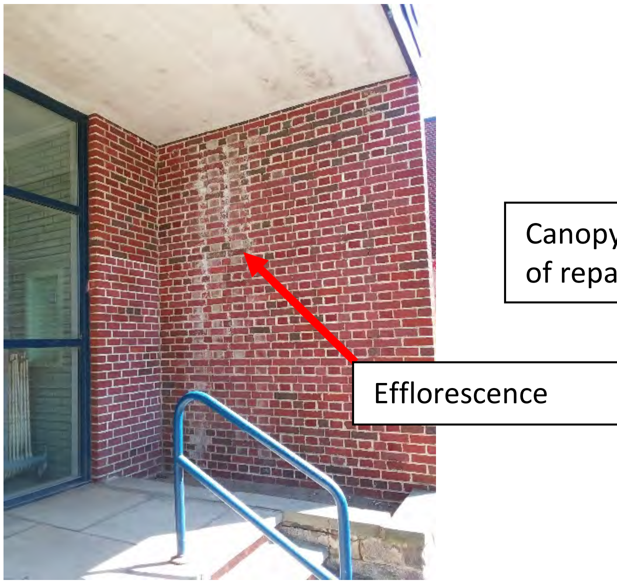

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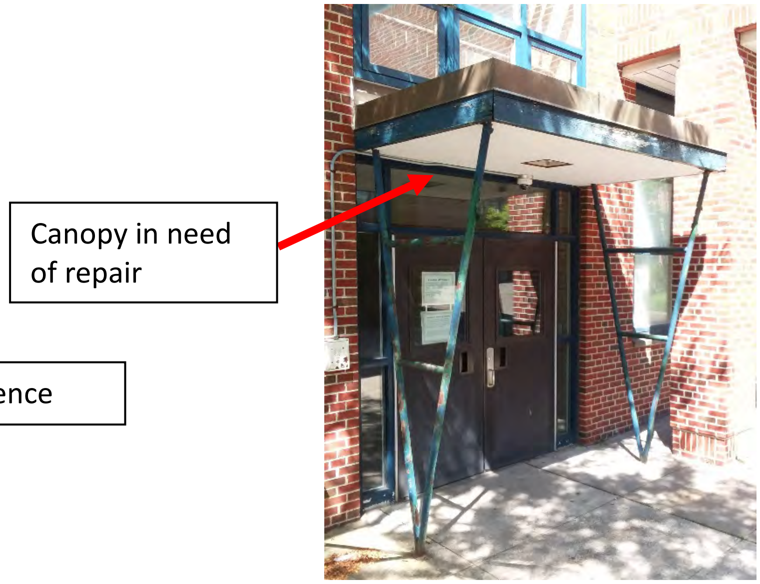

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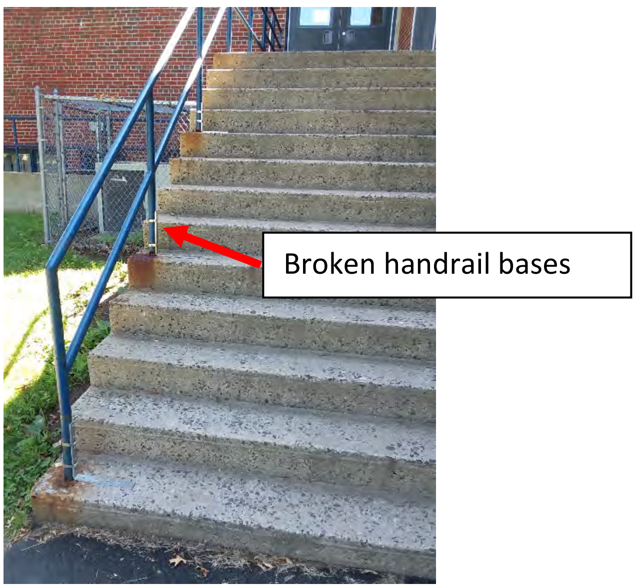

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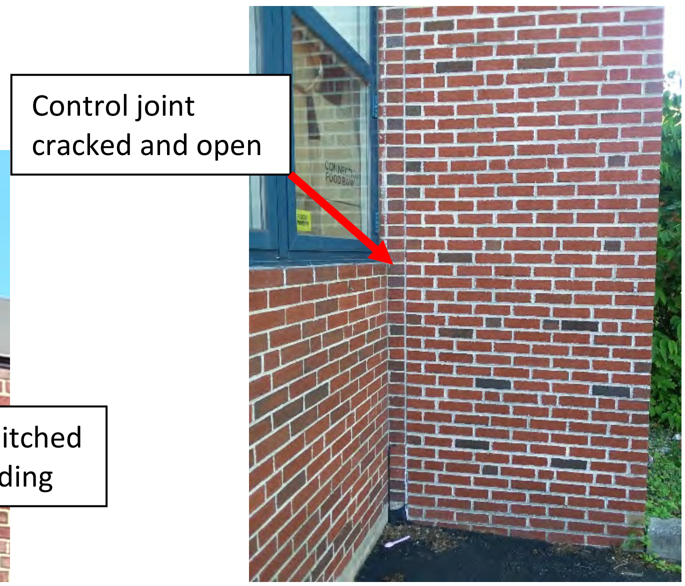

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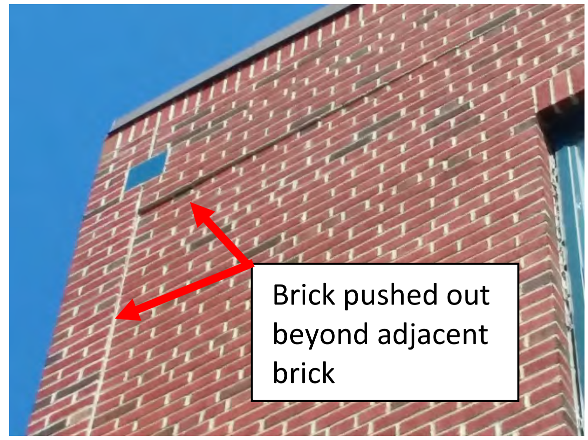

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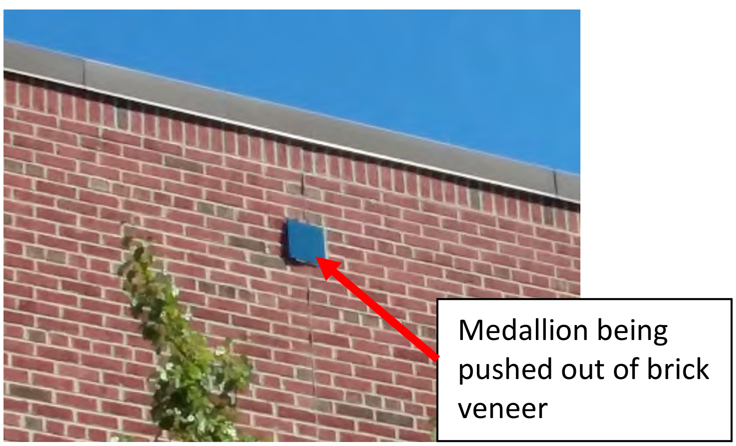

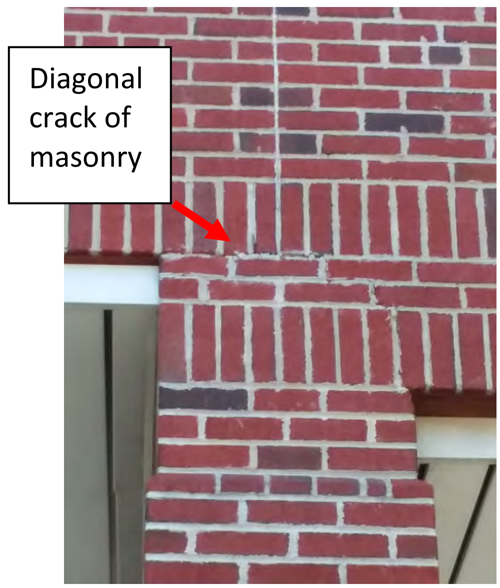

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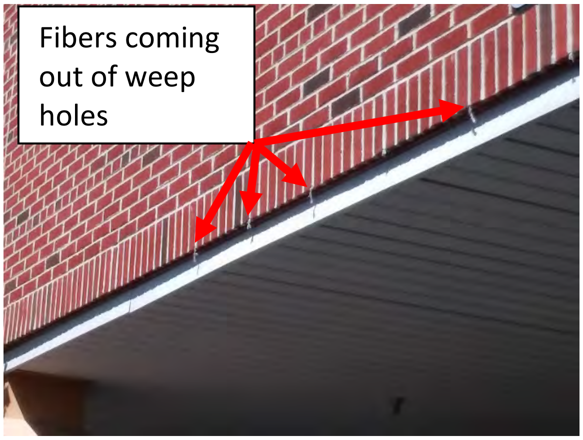

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