PART ONE – EXISTING CONDITIONS (STRUCTURAL)

A. GENERAL STRUCTURAL OBSERVATIONS

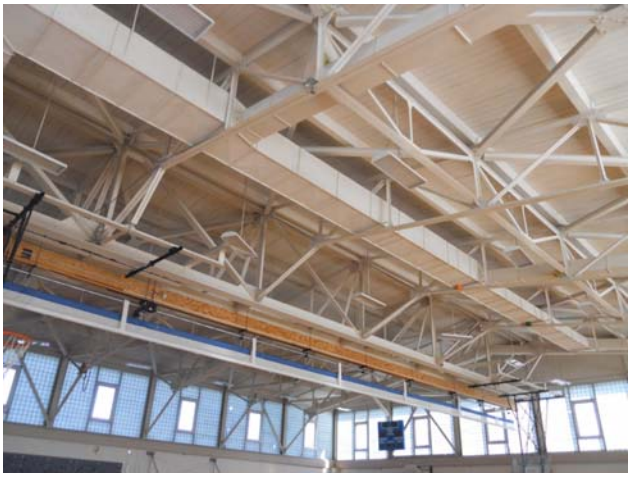
A-Wing – Gymnasium:

The existing gymnasium at the east end of the school was constructed in 1952 along with the adjacent southern two story classroom wing and connector. The gymnasium is a two story structure with the first floor level (lower level) consisting of a concrete slab on grade. The first floor consists primarily of locker/shower rooms, with the actual gymnasium space occurring on the second floor. The second floor structure consists of a two-way reinforced concrete waffle slab system supported by reinforced concrete columns and spandrel beams. The gymnasium roof structure consists of open web steel trusses supported at the perimeter by a braced steel beam and column frame. The steel roof trusses are supported at the ridge line by a clear spanning steel girder truss. Heavy timber wood purlins support the structural wood roof decking and span between the main steel roof trusses. The exterior walls at the first floor level and the lower portion of the second floor gymnasium are brick veneer with concrete masonry unit (CMU) backup. The exterior walls for the upper portion of the gymnasium are glass block.

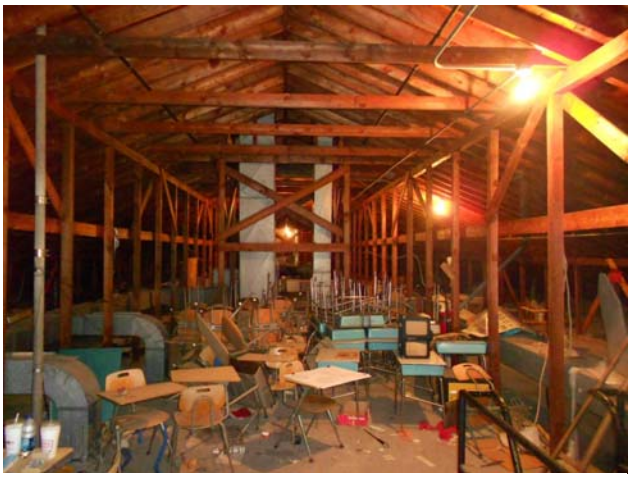
A-Wing – Classroom and Connector:

The southern classroom wing and connector portion of the A-wing was constructed at the same time as the adjacent gymnasium. Both the classroom wing and connector portion of this building are two story structures. The classroom wing has a gable roof while the connector to the gymnasium has a flat roof. There is a shallow crawl space with a dirt floor below the classroom portion at this wing of the building. There is also a large attic space above the classroom wing. The first and second floor structures (including the attic floor and presumably the roof of the connector) are one way reinforced concrete slabs supported by reinforced concrete beams and columns (or possibly steel beams and columns encased in concrete). The gable roof of the classroom area consists of conventionally framed 2x8 rafters supported at the exterior walls, and by four interior wood beam and columns lines that run the long axis of the building. The exterior walls for both the first

Two-way, reinforced concrete waffle slab system at second floor (gymnasium).



Structural wood decking, wood purlins, and clear span steel roof structure at gymnasium roof.



Conventionally framed gable roof above attic of classroom wing (A-Wing).

and second floors consist of brick veneer with concrete masonry unit (CMU) backup.

B-Wing – Original 1917 Building:

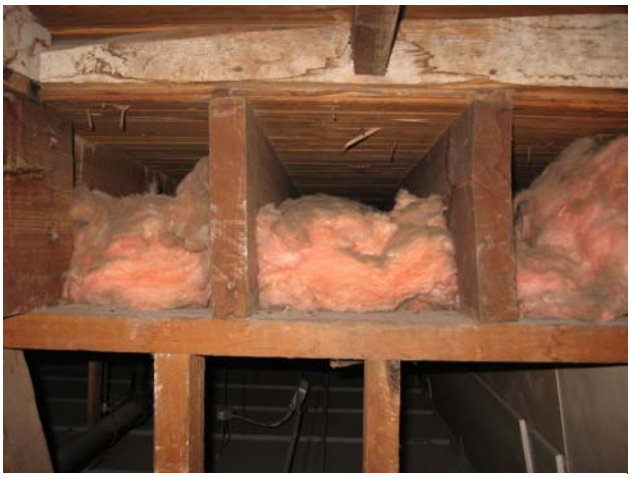
The original building constructed in 1917 is a three story structure. The lowest level is partially below grade (referred to as the ground level) leaving just two and a half stories of building exposed above grade. Nearly all of the structural framing is concealed behind finish materials. However, from my site visit and review of available drawings, it is clear that the structural framing consists of wood framed joists that span in the north/south direction. The joists are supported at the exterior walls and by the two interior bearing walls between the corridor and classrooms. The exterior walls appear to be 12" solid brick masonry and the interior bearing walls are a combination of wood stud in some locations, and solid brick masonry in others. The interior walls that are of brick masonry appear to occur at the locations of the original brick chases, probably for heating and ventilation.

The typical floor joists appear to be approximately 2"x12" and clear span from the corridor wall to the exterior wall. The exception to this is at the first floor level where an additional beam line was added in the boiler room/storage room to reduce the span of the joists. This was probably done to support the loads of the Library which was originally located directly above. Subsequently, the Library was moved and this location is the area of the current administration offices.

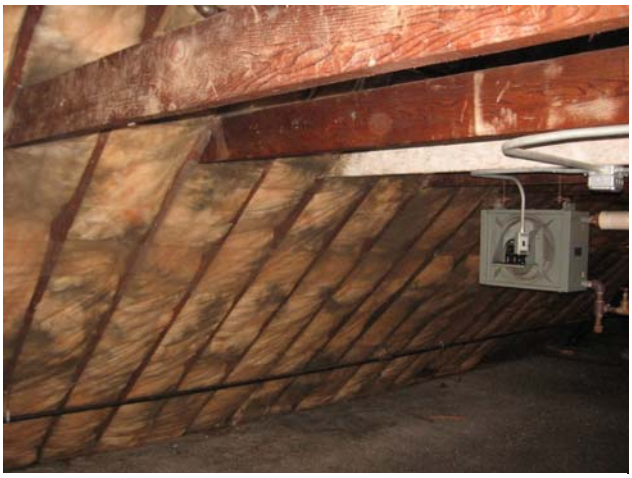
The roof of the original 1917 building was a flat roof which still remains and can be seen from the attic. The original roof framing was similar to the floors consisting of 2x12 joists spanning from the north and south exterior walls to the same two interior bearing lines. In the 1931 renovation, a gable roof was placed over a portion of the original flat roof. The gable roof extends from the front north wall to the second interior bearing wall on the south side of the corridor. The original flat roof and rafters remain from this wall over to the south exterior wall.

B-Wing – East Classroom Wing (1931):

This wing of the building was constructed in 1931 and is a three story structure similar to the original building. Nearly all of the structural framing is concealed behind finish materials. However, from my review of the 1930 drawings, the structural framing consists of structural wood decking spanning between 4x12 wood joists spaced at approximately four feet on center. The joists are supported by the exterior masonry walls and by two interior masonry bearing walls. In some areas the joists

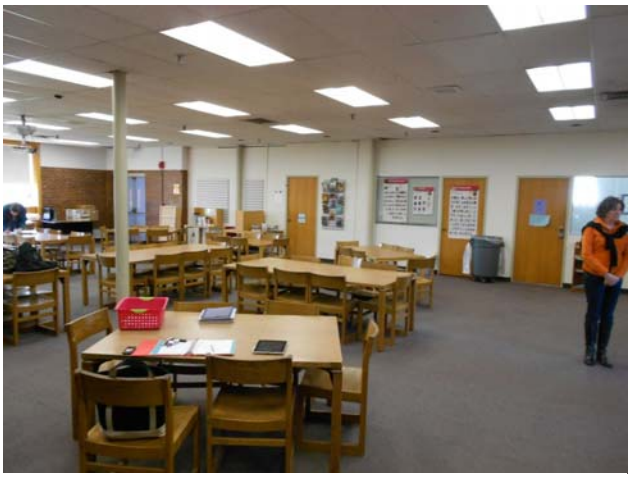


Wood joists supported on wood studs -typical floor framing at B-Wing (1917 Building).



Conventionally framed gable roof over original flat roof (1931 renovation).

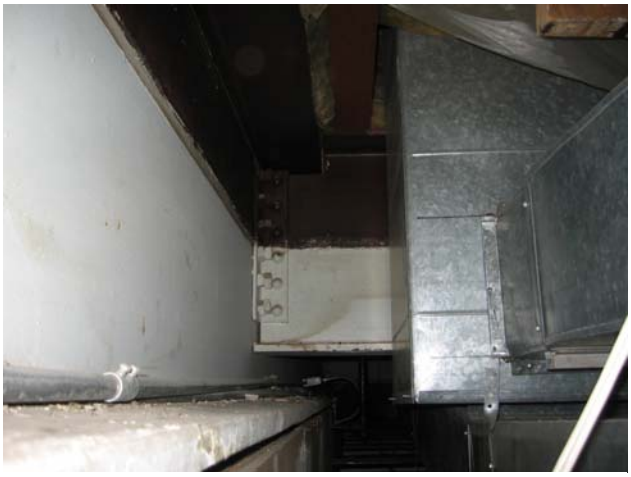
are supported by steel beams that clear span the classroom spaces. The steel beams are also supported by the exterior and interior masonry bearing walls therefore there are no steel columns in this wing of the building. The exterior walls, along with the interior bearing walls appear to be 12" solid masonry. The type of backup masonry for the face brick (brick, block, or hollow clay tile) is not indicated on the drawings.



Columns added in Resource Center to support new second floor infill (1974 renovation).

B-Wing – West Wing (1931 Gymnasium/Auditorium):

This wing of the building was constructed in 1931 with the east classroom wing and originally was a two story structure with a Kitchen/Cafeteria on the ground floor and a Gymnasium/Auditorium on the first floor. In 1974, this wing was renovated and the first floor gymnasium/auditorium was changed to the current Resource Center. The balconies and stage were removed and another floor was added to create the current second floor classrooms and Learning Center. Nearly all of the existing structural framing is concealed behind finish materials. However, from my review of the 1930 and 1974 drawings, the structural framing consists of structural wood decking spanning between 4x12 wood joists spaced at approximately 3'-6" on center. The joists are supported by the exterior masonry walls and interior steel beams. The steel beams are also supported at the exterior by masonry bearing walls and at the interior by several steel columns. The first floor originally had only four interior columns and the roof beams clear spanned over the gymnasium/auditorium space. When the second floor Learning Center was added, additional columns were added on the first floor to support the new second floor. The roof continues to clear span as before allowing the Learning Center to be mostly column free. The exterior walls, along with the interior bearing walls appear to be 12" solid masonry, except for the original two story auditorium/gymnasium space which has 16" thick walls. The type of backup masonry for the face brick (brick, block, or hollow clay tile) is not indicated on the drawings.



Clear span steel girders over original gymnasium (currently the Learning Center).

C-Wing:

This classroom wing was the most recent addition and was added in 1959. It is a one story structure with a small one story connector that joins into the west end of B-Wing. The roof structure consists of an interior cantilevered steel truss supported at the interior corridor by CMU walls and piers. The cantilevered truss supports light steel beams that span from the end of the truss out to the exterior walls where they are supported by 3x3 steel tube columns. With the majority of the loads being supported at the interior walls via the cantilevered truss, the exterior columns were able to be very slender. Structural wood decking spans the 6'-0"

Structural wood decking on typical cantilevered roof trusses at C-Wing.

spacing between the steel building frames. The majority of the first floor appears to be slab on grade, but there is a portion of the first floor at the center of the building (appears to be below the corridors) where there is a crawl space for mechanical equipment. The floor over this area is a concrete slab supported on metal decking.

B. OBSERVED STRUCTURAL DEFICIENCIES

Because almost all of the structural elements are concealed by finish materials, the number of structural deficiencies that were observed during my site visit are very limited. The deficiencies listed below do not include those items that may be required for any potential future renovation or change of use to the building. Those structural issues will be identified in a separate study and report. The deficiencies listed below are those items that in my opinion will eventually require repair for the continued use of the building regardless of any major renovation or change of use.

A-Wing – Deteriorating steel in Gym glass block wall:

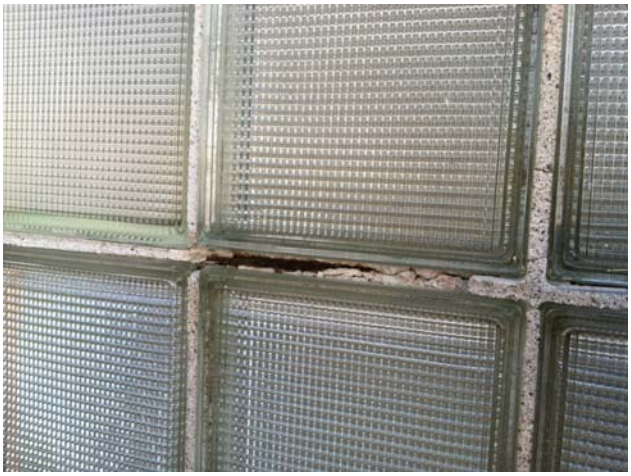
The structural steel that supports the glass block wall construction in the gymnasium is deteriorating. The rust jacking of the steel is beginning to cause localized spalling of the mortar between blocks and will eventually cause damage to the glass block units. The existing glass block needs to be removed and replaced with new glass block and new steel wall framing members, or with a new translucent wall panel system.

A-Wing – Deteriorated egress stairs:

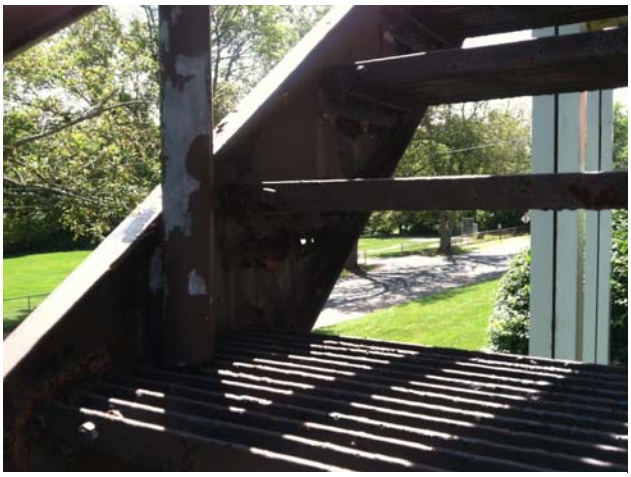
Both exterior egress stairs on the east end of the gymnasium are in very poor condition. The steel stringers, treads, and railings are not galvanized and are deteriorated. In some areas, the deterioration is so severe that it extends through the full thickness of the steel. The existing stairs need to be removed and rebuilt in their entirety.

A-Wing – Rusting Lintels:

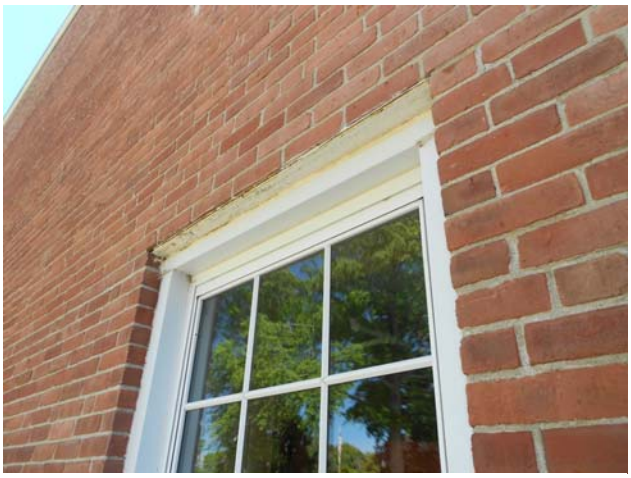
The existing exterior window and door lintels at the gymnasium, classroom wing, and connector are not galvanized and are starting to rust. There were no signs of significant rust jacking and therefore, it is assumed based on visual assessment alone that these lintels can just be cleaned and painted. The existing lintel conditions do not represent an immediate structural deficiency, but something that should be addressed within the next few years.



Rusting steel supports in glass block mortar joints at upper gymnasium wall (A-Wing)



Deteriorated steel stringers and treads at gymnasium east egress exterior stairs.



Peeling paint and rusting lintel at A-Wing.

A-Wing – Cracks in Interior Walls:

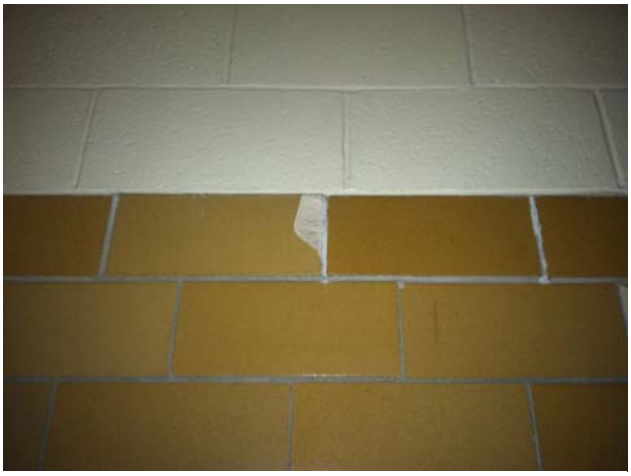
There are numerous areas where there are cracks and spalling of the interior glazed block wall. These walls are not load bearing. The locations observed with spalling at the interior face do not appear to be related to any structural or moisture issue. The spalling occurs randomly and even occurs in areas with very little structural loading (such as under a window). It is my opinion that the spalling is not a structural issue and may be caused by a material flaw.

The cracks in the glazed block appear to be caused by several factors. The first is building movement. At locations where there are connections between two larger building masses, there does not appear to have been any allowance made for building movement. The building movement can be caused by changes due to thermal stresses or by small differential movements caused by lateral forces. There are also some cracks that appear to be caused by floor deflections. The observed deflections do not appear to be out of the range of normal behavior for floor structures, but was probably caused by the initial floor deflections when loads were added to the structure for the first time.

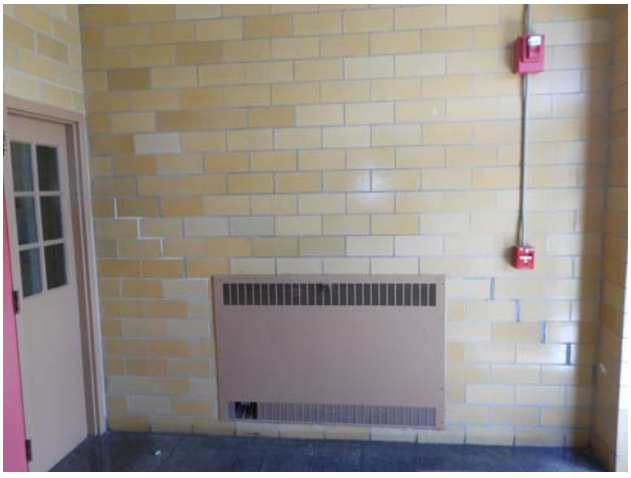
None of the cracks that I observed were significant structurally. The spalled areas can be replaced with new units to match the existing. The areas with cracks can be repointed and cracked units replaced with new units to match the existing. In some areas that are the result of thermal stresses, it may be more suitable to repoint with a flexible material between adjacent units.

B-Wing - Snow Drifting on Existing 1917 Roof Joists:

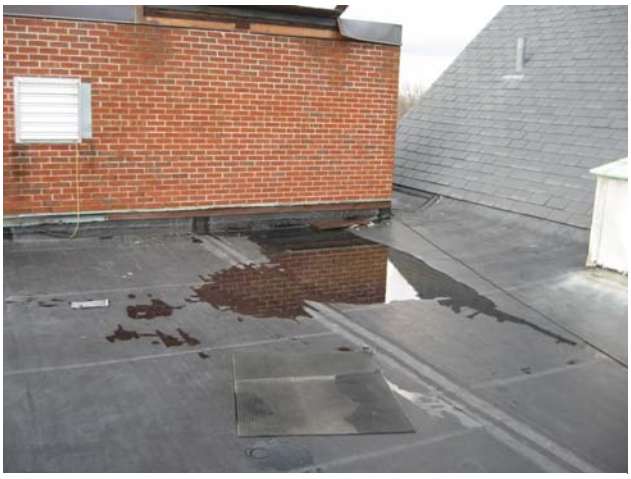
When the gable roof was constructed over the existing flat roof in 1931, it created a significant potential increase for drifting snow load on the adjacent existing flat roof joists on the south side of the building. Along the west edge of this roof there is also a vertical projection created by the elevator mechanical room that was added with the 1974 renovation. This vertical wall also creates the potential for significant localized drifting snow. Based on my observation of existing conditions and my review of the structural drawings for the 1931 and 1974 renovations, the additional drifting caused by these two conditions does not appear to have been addressed. In many cases, older codes did not address drifting conditions at all. Based on the current code, the additional drift potential is approximately 50 pounds per square foot above and beyond the base design snow load requirement of 35 pounds per square foot. This creates an increase in stress on the existing flat roof



Random spalling of interior face of glazed block.



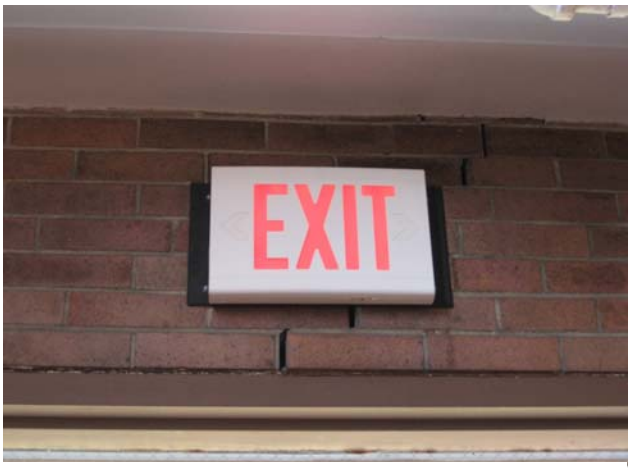
Cracks in glazed block caused by building movement (floor deflection).



Vertical roof projection – added snow drifting.

rafters of nearly twice the allowable in the area immediately adjacent to the mechanical room projection.

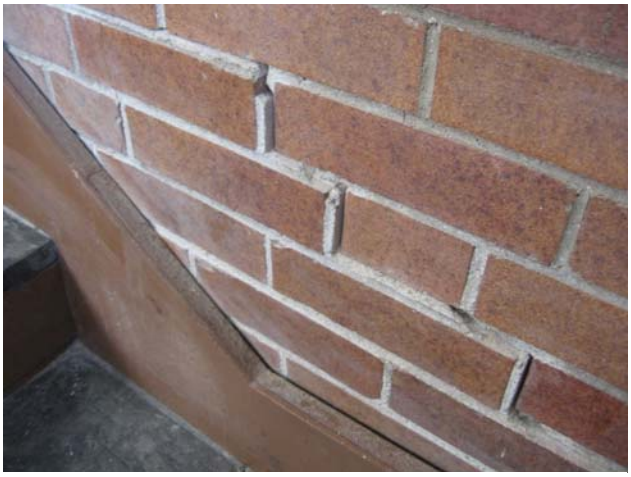
This condition is very significant structurally and so it is my recommendation that this portion of the roof framing be reinforced by sistering each of the existing rafters with 2x12 LVL's. This work should be done regardless of any future renovation to the building. Until this work has been completed, the snow should be removed from the lower roof during the winter so that the depth of snow on the existing flat roof never exceeds 12 inches.



In-plane cracks over door in southwest stair (B-Wing).

B-Wing - Cracks in Southwest Stair Walls of West Wing:

Several significant cracks were observed in the interior masonry walls of the southwest stair. The cracks varied in thickness from hairline to approximately ¼" in thickness. In some areas, there has been out of plane movement on opposite sides of the crack. There are a couple of possible causes for these types of cracks. The diagonal cracking could be the sign of differential settlement. However, there do not appear to be any other typical indicators that settlement is a problem in the building. Also, settlement typically occurs early in the life of the building and these cracks appear to be much more recent. Settlement cracks also are not typically out of plane. Based on this, it is my opinion that the more likely cause of these cracks is that they are result of water infiltration into the wall. With this type of solid masonry wall, water infiltration can cause severe damage. If the water gets trapped and freezes, it causes the walls to crack and push out resulting in out of plane movement. It appears that the most likely entry point for water getting into the walls was with the original belt course detail near the top of the wall. This was removed and replaced during the most recent façade renovation and so it is likely that previously deteriorated belt course was allowing water into the wall. The cracks above the entry door are most likely related to failure of the flashing over the entry canopy roof which was also repaired during the 2006 façade renovation.

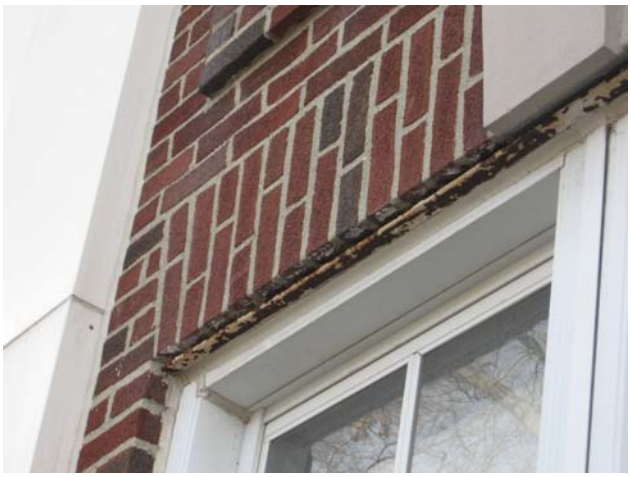


Out of plane cracks adjacent to southwest stair (B-Wing).

It is my recommendation that the masonry walls in this stair be repaired by removing localized portions of the cracked interior face and reconstructing. These existing conditions do not represent a severe structural deficiency, but something that should be addressed within the next couple of years.

B-Wing - Deteriorating Lintels:

During the 2006 exterior renovations that were made to the building, many of the original exterior lintels over windows were replaced with new galvanized lintels. However, it was noted during my site visit that there were many existing lintels that were not replaced as part



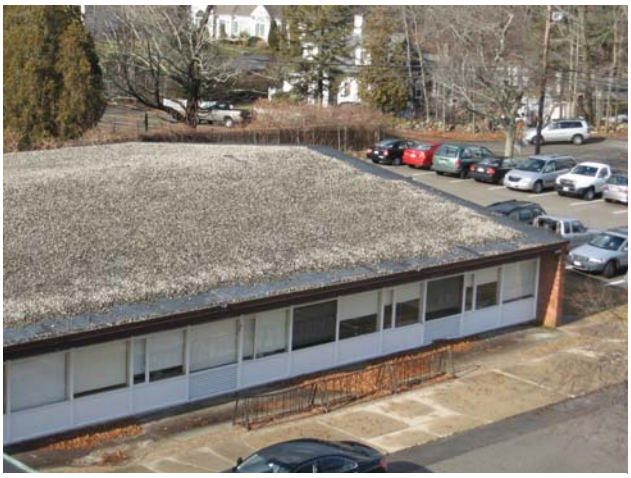
Deteriorating lintel at B-Wing.

of this work. The original lintels are not galvanized nor painted (See photo 2.3). The lintels over these windows are currently exposed bare steel and will deteriorate over time if left unattended.

It is my recommendation that these lintels at the very least be cleaned and painted. Eventually, they will need to be replaced with galvanized steel angles. The existing lintel conditions do not represent an immediate structural deficiency, but something that should be addressed within the next couple of years.

C-Wing – Inadequate roof ballast at edges of roof:

The ballast for the roof membrane has been removed from the edges of the existing roof. The roof edges are the areas with the highest amount of wind uplift. Ballast roof systems are not recommended in high wind areas. The existing roof system should be replaced with a new adhered or mechanically fastened roof system.



Missing roof ballast along roof edges (C-Wing).