Thornton Tomasetti
Building Solutions

Project

St. Paul's School
Garden City, NY

Building Envelope and Structural Condition Assessment Report

Prepared For

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1.00 INTRODUCTION

1.01 PURPOSE

Thornton Tomasetti, Inc. (TT) was retained by the Village of Garden City to perform a structural and building envelope condition assessment of St. Paul's School, located at 289 Stewart Avenue, Garden City, New York. The intent of the Village of Garden City is to reposition St. Paul's School, previously housing a boarding school constructed in the late 1800's, which has been vacant for approximately 25 years.

The rehabilitation will include renovating and expanding the existing structure to create a recreational and cultural center for the community, upgrading the existing building to meet current code requirements, repairing and/or replacing existing deteriorated elements and expanding the building by incorporating new structure and repurposing existing materials to create approx. 200,000 sf of programmable space.

Some of the most pressing needs of the building include addressing priority conditions and stabilizing the elements of the building, as well as achieving a watertight building envelope.

1.02 EXECUTIVE SUMMARY

Priority 1 – Immediate Action

A. Mansard Roof – Shoring/ repair underlying structure and apply roof patches to open sections.
B. Wood Floor Joists – Shore/ repair joist framing.
C. Windows – Temporarily infill missing glass
D. Ivy – Remove ivy growing up façades.
E. Missing Downspouts and Scuppers – Repair/ replace broken downspouts and scuppers.
F. Loose/ Unstable Elements – Quarantine areas around potentially unsafe conditions. Remove unsafe elements and repair to stable condition.

Priority 2 – Early Action

A. Mansard Roof – Replace all mansard roofing.
B. Flat Roof – Replace all flat roof membranes.
C. Flashings – Replace all sheet metal flashing.
D. Gutters and Downspouts – Replace all sheet metal gutters and downspouts.
E. Windows – Replace all aluminum windows and potentially restore historic wood windows.
F. Brick Masonry – Locally repair deteriorated mortar joints and cracked brick masonry.
G. Stone Masonry – Locally repair stone as required.
G. Biological Growth – Remove all moss growing on masonry walls.
H. Fire Escapes – Review if exterior fire escapes will be part of future building egress, if not remove fire escapes.

Priority 3 – Maintenance

A. Terra Cotta Tympanum Panels – Remove sheet metal panel and reinstalled tympanum panels at localized areas.
B. Building Cleaning – Full cleaning of all masonry façade elements.

1.03 TEAM AND METHODOLOGY

The information for this report was gathered and prepared by the technical staff of Thornton Tomasetti. On-site observations of the building's systems were performed and available drawings were reviewed. The survey work was performed on May 31, 2019. The condition of the building envelope was observed primarily from the ground. A portion of the roof was observed as well but access was limited do to potentially hazardous conditions on the upper floors (conditions described later in the report). Findings are described in the narrative below, photos and locations of conditions are in the appendixes.

1.04 DESCRIPTION OF BUILDING

St. Paul's School, constructed between 1871 and 1883, is an imposing collegiate-style building located in the suburbs of Long Island. The building is listed on the U.S. National Register of Historic Places and is part of the A. T. Stewart Era Buildings national historic district.

The three-story building (four stories at towers) was built as a memorial to the founder of Garden City, Alexander Turney Stewart, by his wife Cornelia. It was designed by John Kellum and Henry G. Harrison in a style referred to as gothic revival. The main axis of the building is orientated east-west with three large wings projecting towards the north giving the building an E-shaped plan. Standout features of the building are the highly ornate twin porticos (one on the south façade and one on the east), the clock tower at the northeast corner of the structure and the chapel that dominates the central wing in the E-shaped plan.

The building is constructed of red brick masonry with brownstone elements such as pilasters, engaged columns, pointed arches, finials, cornices, and window sills. It also features terra cotta ornamental elements at window/door surroundings, gables and building spandrels. There are Tiffany stained glass windows in the chapel. The original slate shingles topping the monumental mansard roof were replaced with asphalt shingles. Among the interior features, there is a monumental cast iron central staircase, oak wainscoting and terra cotta moldings in corridors.

The building originally had roughly five hundred rooms including laboratories, classrooms, libraries, dining halls, kitchens, large reception parlor, permanent workspaces for staff, chapel, dormitories for 300 students and spacious teacher apartments at the top floors. The grounds cover 53 acres and reflect the connection to the garden city planning movement. The building is currently abandoned and not in use.

1.05 USAGE

The school was originally opened in 1883 as a military school for boys, owned by the Cathedral of the Incarnation in the Episcopal Diocese of Long Island. In 1893 it was used as a college preparatory academy, modeled in the British tradition.

In 1988 St. Mary’s School for girls closed, and the female students moved into St. Paul’s School, giving the building a new name: The Cathedral School of St. Mary’s – St. Paul’s. This was the first time that St. Paul’s was co-educational. The school closed in 1991 due to a loss of funding, and since then has been left unused and neglected.

1.06 MAINTENANCE OVERVIEW

The façades of St. Paul's appears to be in fair condition overall even though maintenance appears to have been minimal for many years. The roof, on the other hand, is in an advanced state of deterioration.

The roofs of the building are a combination of flat (low slope) and mansard (high vertical pitch). In the 1970's the original slate roof of the mansards was removed and replaced with asphalt shingles. It is unknown if there have been subsequent roof replacement programs of the mansard roofs since the 1970's, but asphalt shingles generally have a service life of 20 years. The current poor condition of the asphalt shingle roof would indicate that they date from the 1970's and are well past their expected service life. In addition, there are numerous large unprotected holes in the mansard roof that allows water to enter the building. This water infiltration is causing significant deterioration of the underlying roof structure and requires immediate corrective action.

Many of the windows at St. Pauls appear to be original to the 1870's, and given their age are generally in fair condition; about 60% are replacement aluminum windows. Broken and missing glass was observed at localized areas around the building which has provided access to bird infestation. Large quantities of bird guano have made areas of the upper floors a health hazard. The openings in the fenestration need to be sealed, the birds removed and their excrement abated before permanent structural repairs can be made to the roofs.

The façades are generally in good condition except for localized areas of deterioration which generally correlate to inadequate storm water management, ie broken downspouts and failed scupper assemblies. Storm water management needs to be reconstituted to slow down freeze-thaw deterioration in these areas, and these façade areas should be repaired as soon as possible to reestablish a cohesive barrier to the exterior elements. Observed façade deficiencies were weathered mortar, cracked brick and stone masonry and deteriorated brownstone. At numerous locations the lack of maintenance has caused a loss of cohesion in masonry resulting in loose/missing brick masonry.

The exterior metal components, including railings and fire escapes, which play the role of fall guards or emergency egress out of the building, are in an advanced state of deterioration, unsafe and as such unusable.

1.07 WORK NOT INCLUDED

The following topics, in general, are beyond the scope of this assessment and report, except where noted, or as they may affect life safety issues.

A. Accessibility and compliance with the Americans with Disabilities Act of 1990 (ADA).

B. Identification of Hazardous Materials such as asbestos, lead, mold, bird guano, or toxic liquids.

C. Detailed review for compliance with the Building Code having jurisdiction.

D. Inspection or review of any system components which are buried, concealed, or hidden from view.

E. Outbuildings and landscape, except where they may affect the condition of the

building being assessed.

1.08 PRIORITIES

Recommendations in this report are divided into three categories of priorities, according to their degree of urgency. The type of work recommended in each category may require repair, replacement, testing, cleaning or other corrective actions. Category titles do not limit the kinds of actions listed thereunder.

A. Priority 1: Immediate Action

Conditions requiring corrective measures most urgently are listed first under "Priority 1: Immediate Action." These conditions are generally life-safety hazards, code violations, problems which will lead to rapid and serious deterioration of the building's systems and structure, or are related to the lack of watertightness of the building, and allow birds to enter unimpeded.

B. Priority 2: Early Action

Conditions requiring corrective measures as soon as possible, within 1 - 2 years, are listed under "Priority 2: Early Action." These conditions are generally less serious than those in the first priority but, nevertheless, aggravate deterioration of the building's fabric and systems. They require prompt attention to prevent further damage to the building's integrity and associated increases in repair costs.

C. Priority 3: Maintenance

Conditions requiring corrective measures within 5 - 10 years are listed under "Priority 3: Maintenance." These conditions are less serious than those in the first and second priority but, nevertheless, aggravate deterioration of the building's fabric and systems, such as masonry soiling and biological growth. They will require future attention to prevent damage to the building facades and associated increases in repair costs in the long run.

1.09 LIMITATIONS

This report is intended to document our findings regarding the structural evaluation of St. Paul's school (main building) at 295 Stewart Avenue.

Thornton Tomasetti's professional services have been performed in accordance with the standards of skill and care generally exercised by other professional consultants acting under similar circumstances and conditions at the time the services were performed. Our findings, conclusions and opinions are based on our visual observations, review of the available documents and professional experience.

This report is issued solely for the use of the Village of Garden City in evaluating the present conditions at the subject properties. Thornton Tomasetti disclaims liability for use by any other persons or entities. No other warranty, expressed or implied, is made as to the findings presented in this report.

While TT's findings are summarized as of the date of field visit (May 31, 2019), should new

information or additional documentation become available, TT reserves the right to amend or revise its opinions and recommendations accordingly.

2.00 BUILDING ENVELOPE - OBSERVATIONS AND RECOMMENDATIONS

Thornton Tomasetti (TT) visited the site on May 31, 2019 to examine the condition of the exterior envelope of St. Paul's School. The findings presented in this report are correct and appropriate to the best of our knowledge. The observations, and related recommendations, are necessarily limited to those portions of the systems and structure of the building that were visible when those observations were made, and to the limits of access afforded to our personnel. Some areas of the building's facades were covered by ivy and as such could not be observed. Within these limits, in excess of 90 percent of the building facades were adequately observed.

In general, the condition of St. Paul's School varies from fair to very poor, the range depending on the location and susceptibility of particular components to water infiltration. The examination revealed numerous conditions that require immediate action. Critical repairs consist of significant remedial work, accompanied by substantial maintenance actions directed to typically conspicuous flaws. The following is a summary of the findings according to discipline and specialty.

2.01 DESCRIPTION OF ARCHITECTURAL SYSTEMS

A. Roofs:

The building is topped by monumental mansard roofs, currently covered by replacement asphalt shingles, and flat roofs covered by what appears to be modified bitumen membrane coated with aluminum asphalt. Sheet metal flashing includes ridge, hip, valley and counter flashings. Projecting window dormer roofs are generally copper clad expect of the chapel dormers which are asphalt shingle. Copper gutters sit at the top of the stone cornices and downspouts/leaders are also generally made of copper. The clock tower has a textured thin slate roof and capped with an ornate copper sheet metal finial.

B. Facades:

The building facades are a combination of red brick masonry, brownstone, some other form of tan stone (potentially limestone) and terra cotta. Window openings are highly ornate with stone lintels at the cellar and 1st floor level and pointed arched stone lintels of alternating color at 2nd, 3rd and 4th floor levels (the 1st floor at the towers also have alternating stone arched windows). Window at the towers are flanked with stone pilasters or engaged columns. Stone water tables extend around the building at the 1st and 2nd floor window sill level. A shallow cornice with small brackets is at the 3rd floor window sill level and a larger cornice with deeper brackets is at the 4th floor sill level (at towers). The main entrance is located on the south façade and defined by an ornate portico with buttresses, engaged columns, square towers at the outer corners capped with stone finials and a wrought iron and brass railing. A secondary drive-thru portico (of similar scale) is on the east façade with even more ornamentation including terra cotta tympanum. A clock tower is located at the northeast corner of the building.

2.02 PRIORITY 1 – IMMEDIATE ACTION

A. Mansard Roofs:

The condition of the mansard roofs were observed to be in an accelerated state of disrepair. The roofing membrane and underlying sheathing were none-existent in several locations which have exposed the structural rafters to the exterior elements. These rafters, which make up the supporting roof structure, were observed to be in an advanced state of deterioration and in danger of failing. TT first reported this to the Village on December 5, 2017 (Appendix E). See Section 3 of the report for structural observations.

The current state of the mansard roof is a combination of poor planning and deferred maintence. A building of this scale should not have had its slate roof replaced with asphalt shingles. This is a decision taken back in the 1970's based on short term economic planning. The asphalt roofing probably started to fail about the time the school was closed in the late 1980's. Since then the Village has implemented several temporary repair programs which have utilized tarps strapped down with wood battens or EPDM patches which are incompatible with asphalt, and being temporary, both approaches probably failed within a few years of implementation.

Recommendation:
Repair holes in the mansard roof immediately. This may require the abatement of bird excrement at the interior so contractors can access the inboard side of the mansard roofs. Immediate shoring will then need to be installed to brace the roof structure. Then the interior finishes around the open holes will need to be removed (and also potentially abated) so the adjoining rafters can be reviewed. Once stable undamaged section of roof structure are found then the repair area can be defined. Existing rafters will then either be removed and replaced or sistered with new rafters. Then replacement sheathing should be installed to receive the temporary waterproofing patch to protect the building.

B. Windows:

Numerous broken or missing glass lites were observed at window openings. The missing glass has allowed a large number of birds to infest the interior of the building. The bird infestation has led to a hazmat condition on the upper floors of the building where bird guano covers large expanses of the floor (abatement of this is discussed above).

Recommendation:
Temporally block broken or missing window glass to eliminate the bird infestation and create a watertight condition. Coordinate with plans to replace or refurbish windows.

C. Storm Water Management:

Downspouts and scuppers were observed missing, broken or failed. This is allowing large quantities of water to saturate the masonry of the façade in localized areas. Water exposure isn't necessarily bad for a solid masonry walls but rather the freeze thaw action that occurs to saturated masonry during the cold winter months. This is a particular problem where scuppers have failed above brownstone. Brownstone is very porous and not the most suitable stone material for the New York climate. The brownstone below failed scuppers is in an advanced state of deterioration.

Recommendation:
The failed or missing downspouts should be repaired to reconstitute the storm water management system. Failed scupper assemblies should be repaired which may require new scupper pipes being installed through the wall and the sheet metal pans behind the scupper pipe lined with a reinforced PMMA membrane.

D. Ivy:

Large areas of the building's façade were covered in ivy. The ivy observed on the façades at St Pauls is destructive to the building fabric. The aerial roots that cling to the building façade, allowing the ivy to grow vertically, work their way into the façade masonry prying open cavities where water can infiltrate. Once water has infiltrated the building walls then freeze-thaw action can occur. The ivy can also conceal other façade deficiencies.

Recommendation:
To remove the ivy the vines need to be cut at grade, cutting off the ground roots from the vines will lead to the vines drying out. Once the vines are dry the ivy can be easily pulled off the wall. If the ground roots are not cut then trying to remove the living vines could cause additional damage to the façade.

E. Loose/ Unstable Conditions:

1. Brick Masonry:

Numerous locations of loose and unsecured masonry was observed around the building. Most of these deteriorated areas correlate to the failed storm water management system.

Recommendation:
All areas around potentially loose material should be quarantined off to protect people below from falling objects. Once access is provided, all loose façade material should be removed and repaired.

2. Brownstone Elements:

Significant exfoliation of localized brownstone elements was observed around the building with some of the units so severely deteriorated that their structural integrity appears to be questionable. Most of these deteriorated areas correlate to the failed storm water management system.

Recommendation:
Areas of brownstone that appear to be structurally deficient, ie in danger of failure, should be removed and/or temporarily shored.

3. Terra Cotta Elements:

Some terra cotta elements around the building were observed potentially loose.

Recommendation:
All areas around potentially loose material should be quarantined off to protect people below. Once access is provided, all loose façade material should be removed and repaired.

4. Sheet Metal Infill Panels:

Several sheet metal panels which were installed over (or in place of) the terra cotta panels above the windows were observed loose and dislodged.

Recommendation:
Loose panels should be removed or re-anchored in place.

2.03 PRIORITY 2 – EARLY ACTION

A. Mansard Roof:

The asphalt shingle roofing on the mansard roofs are well beyond their expected service life and are failing in virtually all areas. The mansard roofs require a comprehensive replacement program include new ridge, hip and valley flashings. It should be assumed that a large quantity of roof sheathing will also require replacement.

Recommendation:
We believe that there are three potential options for replacing the mansard roofs, 1) asphalt (as it is now), 2) slate (as it originally was) or 3) faux slate. Asphalt would be the most cost effective short term strategy, while real slate would provide a long term strategy but could prove cost prohibitive. A potential good intermediate could be faux slate which has a convincing slate appearance at a lower cost. Flashings should be copper sheet metal do to its workability and the historic context.

B. Flat Roof:

The existing roofing on the flat roofs appears be modified bitumen type membrane with aluminum asphalt coating. The membrane appears to be well past its expected service life. At several locations, the membrane was torn off. The base flashings appeared to be significantly deteriorated and/or inadequate.

Recommendation:
We recommend replacing the modified bitumen roof membrane with an SBS base layer with PMMA polyester reinforced liquid membrane cap sheet. We have found that for historic buildings that this combined system is ideal for achieving multiple objects while minimally effecting aesthetic. The SBS acts like a vapor barrier to resist vapor drive from below while the PMMA provides a robust outer membrane that seamlessly ties into the base flashings and can also line any built-in gutter system.

C. Clock Tower Roof:

The slate of the clock tower roof has failed in large areas. The hip flashing is also missing in several sections. The copper finial is probably at the end of expected service life; the finial is a stamped element soldered together from different stampings.

Recommendation:
Considering the small scale of the roof area, it may be beneficial to replace (or remove and reinstall the remaining slate if it's still in good condition) instead of just repairing the broken and missing elements. The copper finial may also need to be replaced, though repairs off site may be possible to extend its service life.

D. Roof Insulation:

St. Pauls is a National Landmarked building and as such is not required to meet Energy Code. This exemption in the Code is intended to protect the character of historic buildings. Installing insulation outboard of the roof sheathing would clearly destroy the aesthetic character of the building but there is plenty of space on the inboard side the sheathing to install insulation. We believe in the spirit of the Code and in the best interests of the Village that insulation should be installed on the back side of the roof sheathing.

We recommend two options for insulation on the backside of the roof sheathing:

1. Spray-on closed-cell foam insulation. This is the best option considering ease of installation, environmental goals and thermal values. In addition, the only downfall of using this insulation is that the interior spaces need to be vacated for 48 hours after installation do to off gassing, St Pauls is already vacant so there should be no issues. This will also require the application of compatible intumescent paint.

2. Mineral wool insulation installed between roof rafters. This is a good second option with good environmental qualities and thermal values. Installation is relatively simply but not as easy as spray-on. In addition, since the mineral wool is installed between the wood rafters then the rafter should have polyiso thermal caps installed over their exposed ends since the wood rafters act as thermal bridges (the Code requires this).

E. Flashings:

The original copper sheet metal flashings have outlived their expected service life and any flashing installed in the 1970's, when the roof was reported to have last been replaced, appear to be poorly installed. Missing ridge, valley and counter flashings were typically observed. Substantial interior leaks appear to align with flashing areas above.

Recommendation:
The flashings need to be replaced in their entirety. We would recommend replacing them with copper not only for historic accuracy but also because copper is a malleable material easy to shape and has a lower cost of labor (to form the shapes) which generally offsets its higher material costs. All counter flashings need to be installed one wythe of brick into the masonry wall to properly protect the building.

F. Gutters and Downspouts:

The gutters and downspouts are well past their expected service life and need to be replaced; the gutters are copper and appear to be original to the 1870's construction.

Recommendation:
Gutters and downspouts should be replaced in kind with copper to match original profile and shape. The downspouts feed into subsurface piping and these pipes should be chased to verify that they are still functioning.

G. Windows:

1. The wood windows and other wood features appear mostly to be original construction. Deferred maintenance has resulted in deterioration of some components such as window sashes and frames, ornamental trim, and general construction.

   Recommendation:
   A comprehensive refurbishment, including reattachment of loose material, replacement of missing and rotted elements, replacement of broken glass and old glazing compound, along with proper refinishing, potentially could restore the windows to satisfactory condition. A few of the more neglected windows may require more extensive reconstruction.

2. At some point in time about 60% of the wood windows were replaced with aluminum windows. It is uncertain if the wood frames remain buried below the aluminum panning (which is common for its cost effectiveness) with the aluminum frames anchored directly to the old wood frames. In any case the aluminum windows appear to be fairly cheap replacement units with a short service life. They were probably installed as a means to achieve better energy efficiently but probably never amounted to any meaningful returns.

   Recommendation:
   Replace all aluminum windows.

3. Depending on the energy goals of the client, replacing all the windows on the building with high performing replacement units may be desirable. Current recreation of historic profiles could provide a fairly good aesthetic match to the originals while providing excellent insulating values.

H. Skylights:

There are two double-pitched skylights on the roofs, one over the central stair hall and the other over the connector spanning between the central stair hall and the chapel. Though the skylights were not reviewed, it can be assumed, based on their age and the minimal maintence the building has seen in the past 40 years, that they will require major restoration. The one in the stair hall appears to be failing, see Section 3 for structural review of skylights.

Recommendation:
Restore skylights or replace as required.

I. Brick Masonry:

The brick masonry appears to be generally in good condition with only localized areas requiring repair. Most of the deterioration appears to correlate with failed downspouts or failed scupper assemblies. Vertical masonry cracks were observed in several locations below window sills and at façade corners. Stepped cracks which

follow the mortar joints and spalled bricks were observed at localized areas around the building.

Recommendation:
All cracked bricks should be replaced with severe-weather rated bricks that match the aesthetic qualities of the original. Pinning of the façade may also be required in some localized areas.

J. Mortar Joints:

The mortar joints around the building generally appear to be deteriorated or weathered to a point where they should be repointed.

Recommendation:
Deteriorated or weathered mortar joints to be repointed with natural cement mortar (we assume the mortar is natural cement and not Portland cement based on its age). The historic mortar should be tested to verify aggregate size/ color, composition of aggregate to cement to lime and performance characteristics; all replacement mortar should match the historic in all respects (especially since the original mortar appears to have performed well). All cutting of joints should be performed with hand tools only as grinder wheels could cause irreversible damage to the bricks. Grout injection may be required for deep deterioration, a specialty formulated low viscosity grout should be specified. For estimating purposes, assume 75% of the joints should be repointed

K. Stone Elements:

The stone elements on the building appear to be generally in good condition with the exception of elements adjacent to broken or discontinuous downspouts or failed scupper assemblies. At these locations, the adjacent brownstone is subjected to large quantities of water which saturate the permeable stone. When the temperature drop below freezing, the wet stone is subjected to freeze thaw action; the water trapped inside the stone freezes, expanding in mass, and as such breaking apart the stone (aka mechanical weathering). In addition to the broken downspout areas, other locations where brownstone exfoliation was observed were window sills, engaged columns, arches and the underside of the portico. In addition, several cracks were observed at localized brownstone elements. Several brownstone finials were observed missing, including an entire chimney coping (likely limestone) over the central tower.

Recommendation:
Brownstone is particular susceptible to freeze thaw action because it is a porous stone but with good water management there's no reason the stone can't perform well. As far as repairing the brownstone, if it has minor exfoliation then repairing it with a compatible patching compound from Cathedral Stone or Edison Coating should reconstitute the fabric. If the deterioration is deeper and/or the element is structural in nature, then a stone dutchman may be required or replacement of the entire unit.

Some minor cracking was observed at some of the joints at the window arches. This cracking should be repaired with a combination of repointing and deep grout injection to reconstitute the arch. For cracks in stone lintels, retrofit anchors may be required to reconstitute the span, such as a customer designed grout-sock with stainless steel rod by Cintec.

L. Terra Cotta:

The terra cotta ornamental elements on the facade were observed to be in generally good condition. This is most likely because the terra cotta installed on this building are not tied back by iron anchors; iron anchor corrosion tends to be one of the main causes of terra cotta failure. The terra cotta is most likely relying on a combination of chemical bond from the mortar in the collar joint and compression between elements which restrains any lateral movements; however the terra cotta is supported, its worked well for over 150 years. The detailing of the terra cotta also seems to be well throughout where the terra cotta is laid deep inside the wall where it is protected from water and as such protected from freeze thaw degradation.

Recommendation:
Repair locally as required.

M. Stone Steps:

The stone steps at the main entrance of the south façade were observed to be displaced. The displacement is probably caused by a combination of poor water management and freeze thaw action.

Recommendation:
The steps should be removed and reset with a waterproofing membrane below.

N. Biological Growth:

Biological growth (such as moss) was observed on the north façade and in areas where sunlight can't dry out the façade material. This growth is harmful to the façade fabric and should be removed.

Recommendation:
Removing this growth may require a combination of bio-wash (non-acidic cleaner) and joint repointing.

O. Fire Escapes and Railings:

Fire escapes were observed in an advanced state of deterioration. Many components of the stairs were observed to be corroded, displaced, unsecure and/or missing. Further review to verify if fire escapes are repairable is required. The wrought iron railing over the main entrance was observed with localized deterioration.

Recommendation:
The exterior fire escapes should be evaluated concerning future egress needs; if the fire escapes are not required for future egress then they should be removed. In the short term the fire escapes should be roped off to protect people from loose and falling debris. Wrought iron railing over main entrance should be removed and send to a metal shop that specializes in wrought iron restoration.

2.04 PRIORITY 3 – MAINTENANCE

A. Terra Cotta Tympanum Panels:

Some of the original wooden windows were replaced with aluminum sash windows. The original terra cotta ornamental tympanum panels were replaced (or over clad) with sheet metal panels.

Recommendation:
The loose sheet metal panels should be removed and the original façade fabric restored/ replaced.

B. Building Cleaning:

Brick and stone masonry was observed with dark soiling throughout the building, and efflorescence, mainly below cornices (which would indicate failed gutters). Efflorescence is caused by a combination water migration through a masonry assembly and the masonry assembly having some form of inherent salts; the salts are pulled to the surface by the water migrating through it.

Recommendation:
All masonry surfaces should be cleaned of biological growth, especially the stone work. The Village should consider a general cleaning of the exterior, which is very soiled, to be performed in conjunction with other masonry repairs (Priority 2). This would help mitigate the difference between new and existing stones where replacements are necessary. A good potential cleaning option may be the Quintek Rotec Vortex low-pressure micro-abrasive designed for sensitive restoration, though final cleaning methodology will require mockups to verify what type of cleaning is successful. Ultimately several different cleaning processes may be required to remove all types of soiling.

To stop efflorescence from blooming the water migration needs to be corrected, ie replace gutters. Once the water issues are resolved then the salts can be removed from the masonry surface by a soft stiff brush (which does not damage the masonry surface) and vacuum; since salts are soluble, attempting to wash them away won't remove them. This process of brushing/ vacuuming may take several attempts to remove all the salts.

3.0 STRUCTURE – OBSERVATION AND RECOMMENDATIONS

3.1 BUILDING OVERVIEW

As noted in Section 1.04, St. Paul's school is a three-to-four-story historic structure constructed in the late 1890s. It operated as a military school than a private boarding school until the school was closed in the early 1990s. The building has been unoccupied since the school closed and is currently owned by the Village of Garden City.

The existing structure consists of wood joist floor framing spanning to, and bracing, interior and exterior masonry bearing walls. The mansard roof consists of wood trusses also spanning to, and bracing, exterior bearing walls. There is a full basement and partial sub-basement under the center Chapel wing.

Currently, the Village is investigating possible adaptive reuse programing schemes for St. Paul's which will dictate which portions of the structure are restored and which are repurposed.

3.2 ASSESSMENT DESCRIPTION

The purpose of this structural condition assessment is to evaluate the condition of the current building structure as it relates to the temporary protection plan and recommend temporary remediation measures to stabilize the building and prevent further deterioration. This report focuses on the building structure itself as the assessments of the façade and roofing envelopes are discussed in sections 1.0 and 2.0. The remediation of the envelope, as described in the facades report will be critical to preventing further damage to the existing structure.

Penetrations observed on the façade due to the deteriorated state of the building envelope has allowed for water infiltration over the course of many years. This water exposure has created conditions where the structural wood framing, most notably (but not exclusively) at the roof, has deteriorated. Continued ongoing exposure can cause localized failures of the structural support framing and lead to compounding instabilities to the building at which point, repairs will become exponentially more complex and costly. These penetrations in the building envelope should be remediated immediately to prevent any further deterioration of the structural frame.

This report describes several conditions where structural integrity was observed to be compromised, due to building envelope fractures, and will require immediate repair to ensure ongoing stability of the building. The conditions noted in this report are based on what could be visually observed during multiple site visits in August, October, and November 2018 and most recently on May 31, 2019. Please note, this evaluation is not representative of a full structural frame conditions assessment as much of the base building structure is not accessible or exposed at this time. As more of the existing structure is uncovered during subsequent phases of future renovation/construction, there will likely be more structural conditions that require remediation. If requested by the Client, TT can evaluate and provide additional direction as needed.

The recommendations described in this report may be applied to additional locations uncovered as they are encountered at the roofing/structure interface while roofing is being repaired and replaced.

3.3 WOOD FLOOR JOISTS – OBSERVED FROM FIRST FLOOR FRONT ROOM

The floor joists in the west room adjacent to the main entry are exposed and severely deteriorated at their bearing connection point to the masonry wall. Refer to Appendix D for overall location of condition. Refer to Figures 1 and 2 for interior condition.

Recommendations:

- Immediate shoring of this floor framing for temporary stability.
- Eventual removal of additional ceiling finishes to expose sound joist structure. (Perform required abatements, as necessary, prior to removal of finishes)
- Remove deteriorated joists locally such that new joist can be sistered to remaining joists. Recreate full bearing connection at façade bearing wall.

Figure 1: Compromised Floor Joist to Bearing Wall Connection: Front Room, West of Main Entrance

Figure 2: Joist to Bearing Wall Connection

3.4 MANSARD ROOF FRAMING AT SKYLIGHT – CENTER HALL STAIRCASE

TT observed deterioration of the wood framing at the mansard roof below the skylight at the center hall staircase (See Figure 3). This condition was previously noted in a letter to the Village dated 12/5/17, included as Appendix E. Refer to Appendix D for overall location of this condition.

The wood roof structure is visibly deteriorated within the exposed area, particularly at the rafter and sill connection at the masonry wall. Much of the interior finish in this area has failed and fallen rubble has accumulated on the stair landing below. During the May 31st walk through, substantial puddles were observed on the stair and the landing in this area. The weight of a continued accumulation of debris can have compound effects on the stability of the stair. Furthermore, the roof structure works to brace the façade walls, if this connection fails, the wall would become unbraced and may cause a localized collapse of the structure.

Recommendations:
Similar to our previous report, we continue to recommend immediate shoring in this area to temporarily stabilize the wood frame from further deterioration and collapse. In addition, TT recommends the following structural remediation plan to be executed concurrently with the building envelop recommendations described in Section 2.00 of this report.

- Remove accumulated debris from the staircase and hanging skylight framing above.
- Stabilize remaining skylight and window elements, as required, for preservation.
- Remove remaining interior finishes to expose structural wood rafter framing and jamb/sill/lintel conditions around the window such that they can be evaluated and the full repair area defined. (Perform required abatements, as necessary, prior to removal of finishes)
- Replace deteriorated timber elements as required by sistering new joists in kind.
- Restore positive bearing connection between roof structure and bearing wall

structure

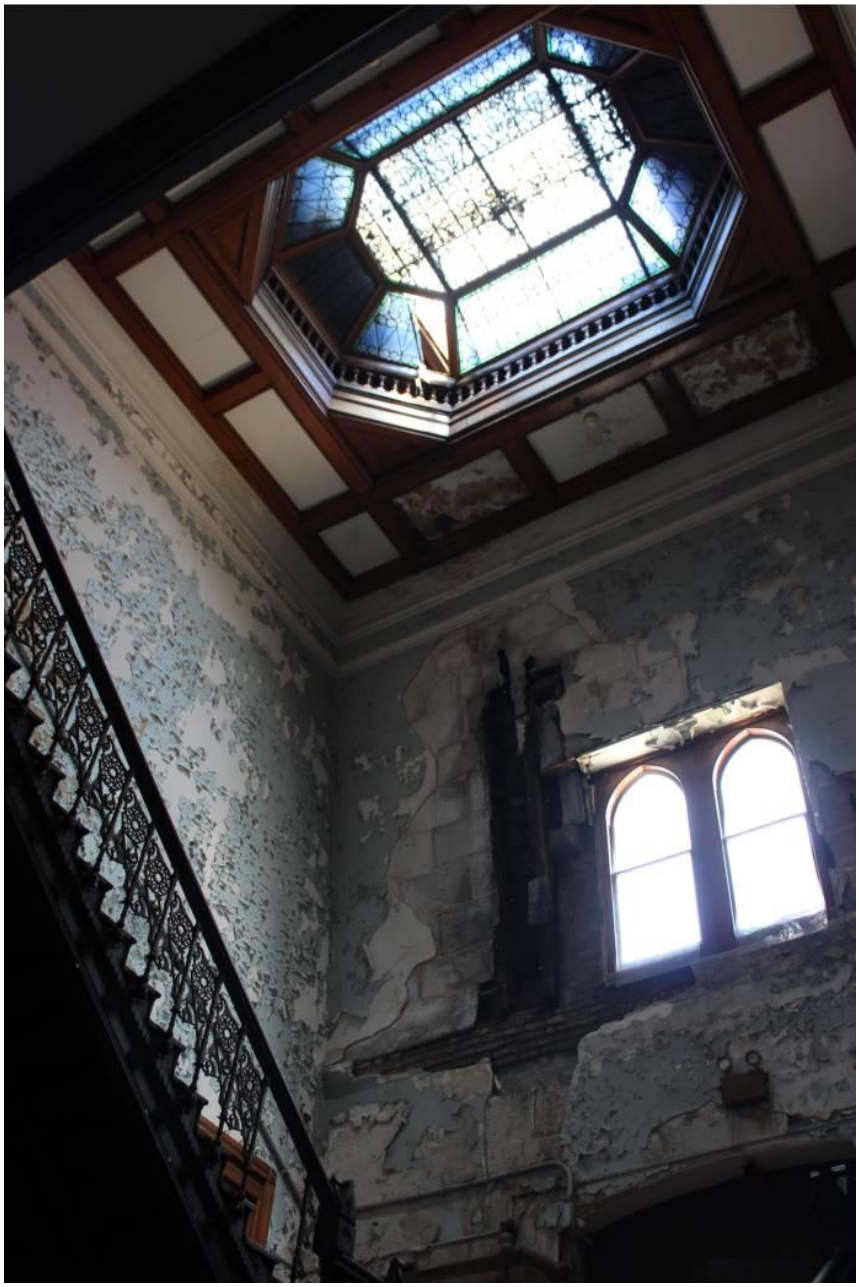


Figure 3: Deteriorated Mansard Roof Framing at Skylight

Figure 4: Exposed Roof Structure at Main Hall

3.5 MANSARD ROOF FRAMING – EAST FACE OF WEST WING

At the east face of the West Wing (see Appendix D for overall location), the condition of the structural wood rafters was observed from both the exterior and interior. From the exterior (Figure 5), the structure is completely deteriorated and does not provide a suitable structural substrate to attach a new roofing patches. The extent of this deterioration is unclear and existing surrounding roofing should be removed in order to uncover undamaged structure.

From the interior, it was observed that the bearing connection of the rafter adjacent to the window is completely dislodged and the lintel around the window is compromised (Figures 6 and 7) . Both conditions should be immediately addressed.

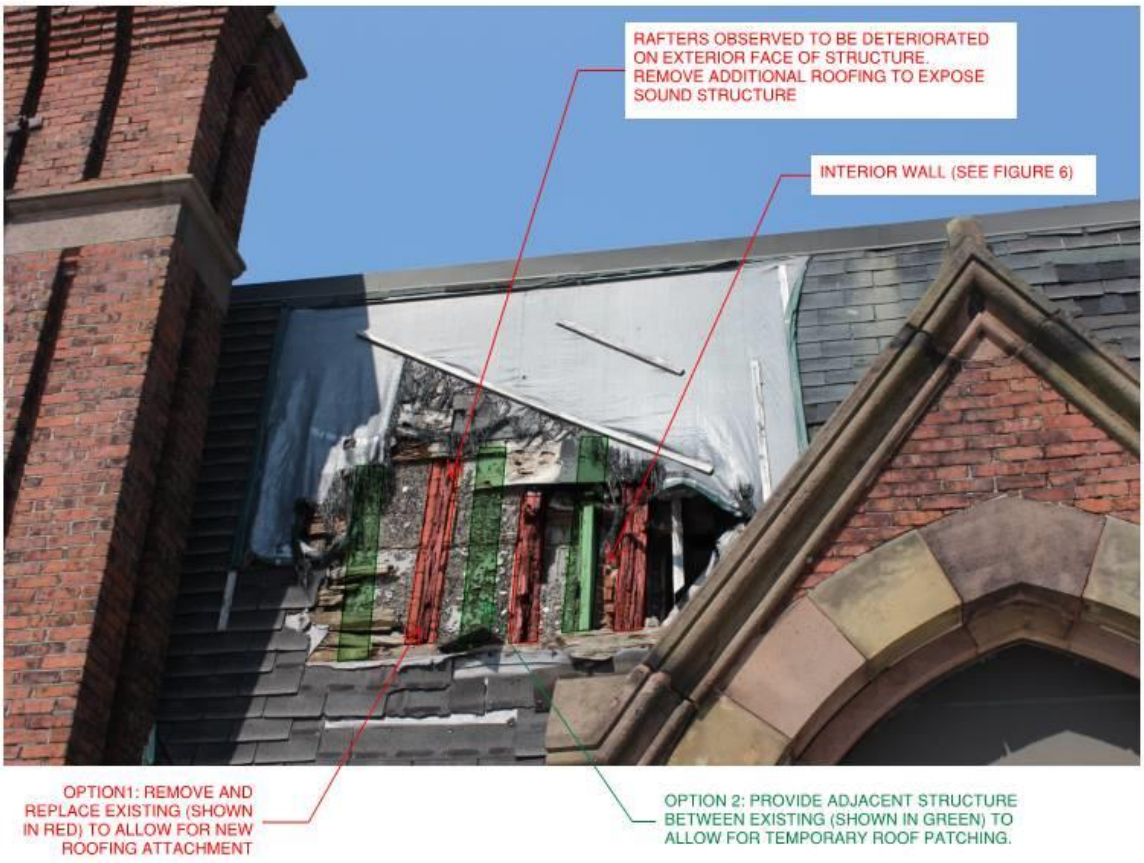


Figure 5: East Face - West Wing

Recommendations:

- Shoring should be provided to stabilize both the lintel and rafter conditions.
- Remove remaining interior finishes to expose surrounding structure such that they can be evaluated and the full repair area defined. (Perform required abatements, as necessary, prior to removal of finishes)
- Depending on the conditions both on the exterior and interior faces of the structure, new rafters may either be placed between the existing framing to allow the existing to be removed. Alternatively, the new framing may be sistered to existing framing. Either

option will provide both structural stability and a sound surface for roofing installation (see Figure 5).

- At the location where the bearing connection is deteriorated (see Figure 6 and 7), a new rafter shall be sistered in kind to the existing and full bearing restored between the roof and the masonry wall.

Figure 6: Interior Structure - West Wing, East Roof Face

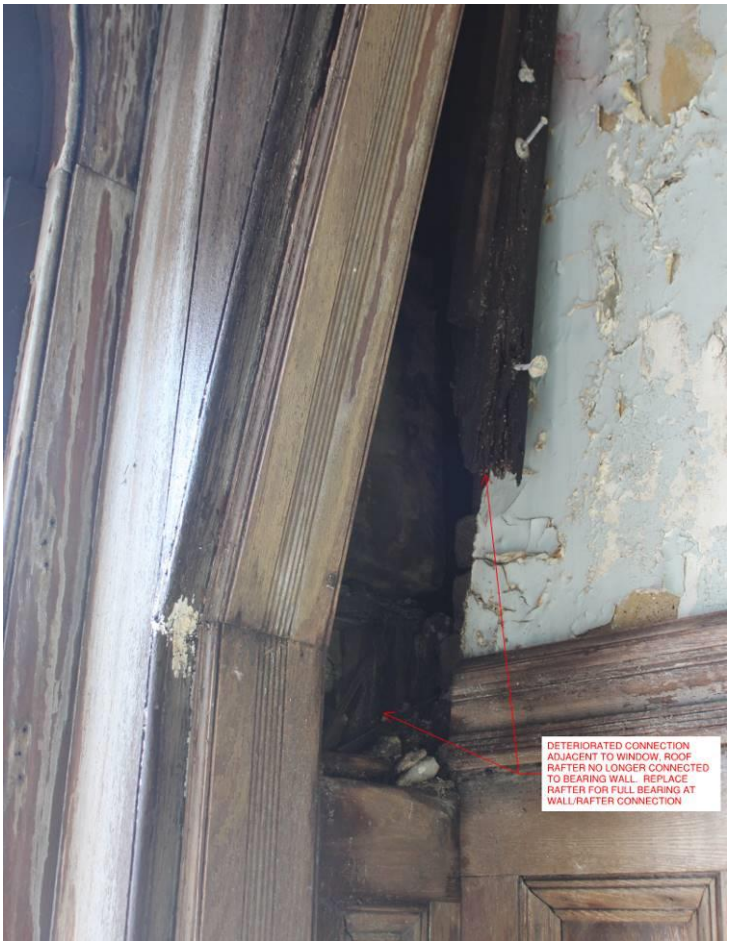


Figure 7: Roof Framing Connection

3.6 MANSARD ROOF FRAMING – EAST ELEVATION AT ROCKAWAY AVE. ENTERANCE

Another major breach in the building envelope and exposure of the underlying support structure is visible on the east façade roof above the building entrance along Rockaway Avenue (see Appendix D for overall location). Figures 8 and 9 below show both the exterior and interior conditions.

From our observations to date, this condition appears to be predominantly a loss of roofing. The timber rafters, observed on the interior (Figure 9), appear to be in sound condition. Roofing replacement is required and should proceed per sections 1.00 and 2.00. As construction continues, any uncovered structural deficiencies observed in this area can be reviewed and evaluated as needed.

Figure 8: East Facade - Rockaway Avenue

Figure 9: East Facade Roof Penetration - Interior Condition

Appendix A

Photo 1. East façade: Open mortar joints in brick masonry. Stone surface delamination.

Photo 2. East façade: Open mortar joints in brick masonry. Stone surface delamination.

Photo 3. East façade: Vertical crack in brick masonry. Cracked stone.

Photo 4. East façade: Cracked glass. Stone surface delamination.

Photo 5. East façade: Open mortar joints in brick masonry. Stone surface delamination.

Photo 6. East façade: Missing glass. Detached roofing patch.

Photo 7. East façade: Open mortar joints in brick masonry. Vertical crack in brick masonry.

Photo 8. East façade: Open mortar joints in brick masonry. Stone surface delamination.

Photo 9. East façade: Open mortar joints in brick masonry. Stone surface delamination. Efflorescence.

Photo 10. East façade: Open mortar joints in brick masonry. Stone surface delamination. Stone cracks.

Photo 11. East façade: Open mortar joints in brick masonry.

Photo 12. East façade: Open mortar joints in brick masonry. Biological growth.

Photo 13. East façade: Open mortar joints in brick masonry. Stone surface delamination. Efflorescence. Deformed scupper.

Photo 14. East façade: Open mortar joints in brick masonry. Stone surface delamination. Rusted and damaged downspout.

Photo 15. East façade: Open mortar joints in brick masonry. Stone surface delamination. Efflorescence.

Photo 16. East façade: Stone surface delamination.

Photo 17. East façade: Efflorescence. Stone surface delamination.

Photo 18. East façade: Efflorescence. Stone surface delamination. Weathered joints in brick masonry.

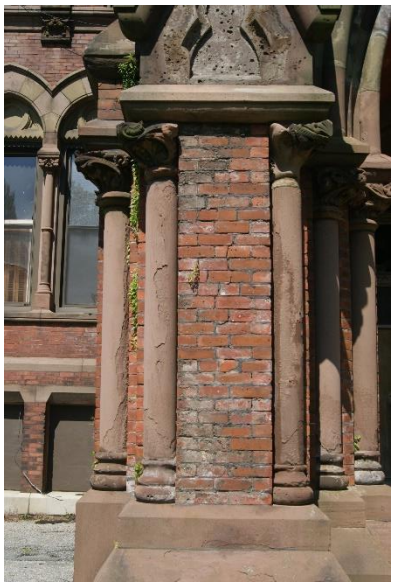


Photo 19. East façade: Efflorescence. Stone surface delamination. Weathered joints in brick masonry.

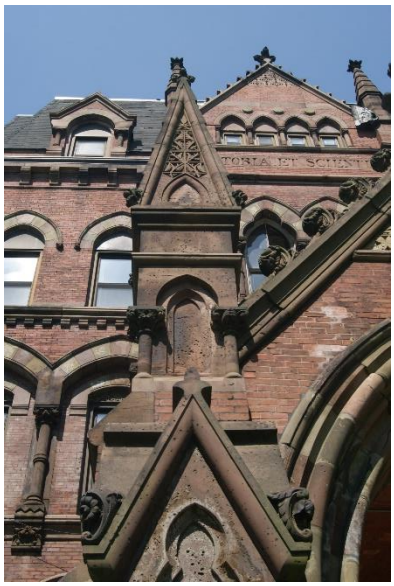


Photo 20. East façade: Efflorescence. Stone surface delamination.

Photo 21. East façade: Biological growth. Weathered joints in brick masonry.

Photo 22. East façade: Efflorescence. Stone surface delamination. Weathered joints in brick masonry.

Photo 23. East façade: Efflorescence. Stone surface delamination. Weathered joints in brick masonry.

Photo 25. East façade: Efflorescence. Stone surface delamination. Weathered joints in brick masonry.

Photo 24. East façade: Efflorescence. Stone surface delamination. Weathered joints in brick masonry.

Photo 26. East façade: Efflorescence. Stone surface delamination. Weathered joints in brick masonry. Step cracks in brick masonry.

Photo 27. East façade: Efflorescence. Stone surface delamination. Weathered joints in brick masonry.

Photo 28. East façade: Efflorescence. Stone surface delamination. Weathered joints in brick masonry.

Photo 29. East façade: Stone surface delamination. Weathered joints in brick masonry. Deteriorated wood door frame.

Photo 30. East façade: Stone surface delamination. Weathered joints in brick masonry.

Photo 31. East façade: Stone surface delamination. Weathered joints in brick masonry.

Photo 32. East façade: Stone surface delamination. Weathered joints in brick masonry.

Photo 33. East façade: Stone surface delamination. Weathered joints in brick masonry. Efflorescence.

Photo 34. North façade: Soiled masonry. Stone delamination. Efflorescence. Weathered mortar joints.

Photo 35. North façade: Cracked window glass. Soiled masonry. Missing downspouts.

Photo 36. North façade: Missing and cracked window glass. Soiled masonry.

Photo 37. North façade: Missing window glass. Cracked masonry. Stone delamination.

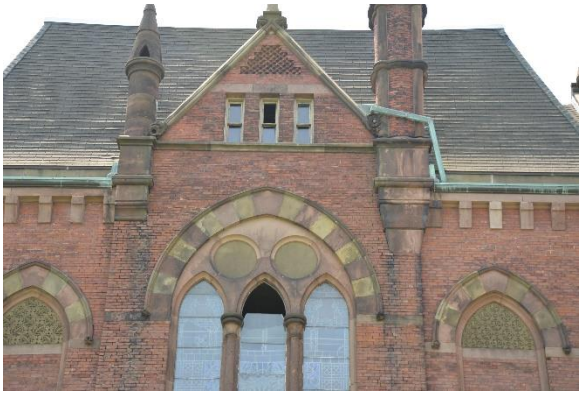


Photo 38. North façade: Missing window glass. Soiled masonry. Stone delamination. Displaced downspouts.

Photo 39. North façade: Roof patches. Missing window glass. Soiled masonry. Deteriorated wood window frames.

Photo 40. North façade: Soiled masonry.

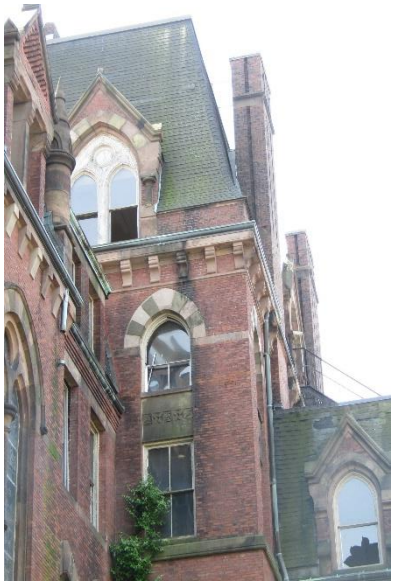


Photo 41. North façade: Missing and cracked window glass. Damaged window frame. Soiled masonry.

Photo 42. North façade: Open mortar joints. Soiled masonry.

Photo 43. North façade: Soiled masonry. Stone delamination.

Photo 44. North façade: Open mortar joints. Loose brick masonry. Missing brick.

Photo 45. North façade: Open mortar joints. Loose brick masonry. Missing brick.

Photo 46. North façade: Open mortar joints. Loose brick masonry. Efflorescence. Stone delamination.

Photo 47. North façade: Missing window glass. Soiled masonry. Stone delamination.

Photo 48. North façade: Soiled masonry. Stone delamination. Stone spall.

Photo 49. North façade: Soiled masonry. Open mortar joints. Deteriorated wood window frame.

Photo 50. North façade: Stone delamination. Soiled masonry.

Photo 51. North façade: Corroded fire escape.

Photo 52. North façade: Corroded fire escape.

Photo 53. North façade: Displaced fire escape steps.

Photo 54. North façade: Efflorescence. Cracked stone lintel.

Photo 55. North façade: Stone delamination.

Photo 56. North façade: Re-opened previous crack repair. Soiled masonry.

Photo 57. North façade: Missing window glass. Replacement metal arch panel and aluminum window.

Photo 60. West façade: Open mortar joints. Deteriorated stone sill. Soiled masonry. Open mortar joints. Bio-growth.

Photo 58. North façade: Efflorescence. Open and weathered mortar joints. Soiled masonry.

Photo 61. West façade: Soiled and delaminated stone. Replacement metal arch panel and aluminum window.

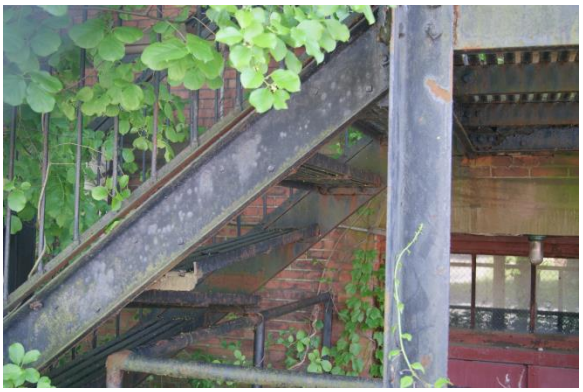


Photo 59. North façade: Failed paint and corrosion at fire escape. Displared fire escape steps.

Photo 62. West façade: Stone delamination. Soiled masonry. Open mortar joints.

Photo 63. West façade: Stone delamination. Soiled masonry. Open mortar joints.

Photo 66. West façade: Stone delamination. Soiled masonry. Open mortar joints.

Photo 64. West façade: Stone delamination. Soiled masonry. Open mortar joints.

Photo 67. West façade: Stone delamination. Soiled masonry. Open mortar joints.

Photo 65. West façade: Stone delamination. Soiled masonry. Open mortar joints. Replacement metal arch panel and aluminum window.

Photo 68. West façade: Stone delamination. Soiled masonry. Open mortar joints. Chipped stone.

Photo 69. West façade: Stone delamination. Soiled masonry. Open mortar joints.

Photo 70. West façade: Stone delamination. Soiled masonry. Open mortar joints. Spalled stone.

Photo 71. West façade: Stone delamination. Soiled masonry. Open mortar joints. Loose masonry. Efflorescence.

Photo 72. West façade: Stone delamination. Soiled masonry. Open mortar joints. Efflorescence. Biological growth.

Photo 73. West façade: Stone delamination. Soiled masonry. Open and weathered mortar joints. Efflorescence.

Photo 74. West façade: Stone delamination. Soiled masonry. Open and weathered mortar joints. Cracked stone. Bio-growth.

Photo 75. West façade: Stone delamination. Soiled masonry. Open and weathered mortar joints. Cracked stone.

Photo 76. West façade: Stone delamination. Soiled masonry. Open and weathered mortar joints.

Photo 77. West façade: Stone delamination. Soiled masonry. Open and weathered mortar joints. Bio-growth.

Photo 78. West façade: Stone delamination. Soiled masonry. Cracked stone.

Photo 79. West façade: Stone delamination. Cracked stone.

Photo 80. West façade: Stone delamination. Efflorescence. Cracked stone. Open mortar joints.

Photo 81. West façade: Stone delamination. Soiled masonry. Cracked stone. Loose brick masonry. Open mortar joints.

Photo 82. West façade: Stone delamination. Weathered mortar joints.

Photo 83. West façade: Stone delamination. Soiled masonry. Efflorescence. Open mortar joints.

Photo 84. West façade: Stone delamination. Cracked stone. Open mortar joints.

Photo 85. West façade: Stone delamination. Soiled masonry. Cracked downspout. Open and weathered mortar joints. Loose brick masonry. Biological growth.

Photo 86. West façade: Soiled masonry. Open and weathered mortar joints. Loose brick masonry. Biological growth.

Photo 87. West façade: Stone delamination. Soiled masonry. Efflorescence. Weathered mortar joints.

Photo 88. West façade: Stone delamination. Soiled masonry. Open and weathered mortar joints. Loose brick masonry. Efflorescence.

Photo 89. West façade: Stone delamination. Cracked stone. Soiled masonry. Open and weathered mortar joints. Loose brick masonry. Efflorescence.

Photo 90. West façade: Deteriorated wood window frame.

Photo 91. West façade: Step crack in brick masonry. Stone delamination. Weathered mortar joints.

Photo 92. West façade: Cracked and spalled stone.

Photo 93. West façade: Open and weathered mortar joints. Loose brick masonry. Efflorescence. Missing wood window.

Photo 96. South portico: Open and weathered mortar joints. Efflorescence. Missing wood window.

Photo 94. West façade: Open and weathered mortar joints. Efflorescence. Deteriorated woodwork. Stone delamination.

Photo 97. South portico: Open and weathered mortar joints. Efflorescence. Deteriorated woodwork. Stone delamination.

Photo 95. South portico: Efflorescence. Soiled masonry. Deteriorated woodwork. Stone delamination. Deteriorated wood ceiling.

Photo 98. South portico: Open and weathered mortar joints. Loose brick masonry. Efflorescence. Deteriorated woodwork. Stone delamination.

Photo 99. South portico: Open and weathered mortar joints. Efflorescence. Stone delamination. Deteriorated wood ceiling.

Photo 100. South portico: Weathered mortar joints. Efflorescence. Stone delamination.

Photo 101. South portico: Open and weathered mortar joints. Stone delamination.

Photo 102. West façade: Brick masonry crack. Failed previous crack repair.

Photo 103. West façade: Cracked stone. Spalled stone. Missing decorative terra cotta panel. Cracked mortar.

Photo 104. West façade: Brick masonry crack. Open and weathered mortar joints.

Photo 105. West façade: Brick masonry crack. Open and weathered mortar joints. Stone surface delamination.

Photo 106. West façade: Stone surface delamination.

Photo 107. West façade: Stone surface delamination. Open and weathered mortar joints. Soiled masonry. Deteriorated wood window frames. Missing window glass.

Photo 108. West façade: Stone surface delamination. Open and weathered mortar joints. Soiled masonry. Deteriorated wood window frames. Missing window glass.

Photo 109. West façade: Stone surface delamination. Open and weathered mortar joints. Soiled masonry. Deteriorated wood window frames. Cracked stone. Cracked brick masonry. Miscellaneous weep.

Photo 110. West façade: Stone surface delamination. Open and weathered mortar joints. Soiled masonry. Cracked stone. Cracked brick masonry. Miscellaneous weep.

Photo 111. West façade: Stone surface delamination. Open and weathered mortar joints. Soiled masonry. Cracked stone. Cracked brick masonry. Miscellaneous weep.

Photo 112. West façade: Stone surface delamination. Soiled masonry.

Photo 115. West façade: Stone surface delamination. Open and weathered mortar joints. Deformed scupper.

Photo 113. West façade: Stone surface delamination. Open and weathered mortar joints. Soiled masonry. Efflorescence.

Photo 114. West façade: Stone surface delamination. Weathered mortar joints. Soiled masonry. Deteriorated wood window frames. Cracked brick masonry. Miscellaneous weep.

Photo 116. West façade: Stone surface delamination. Open and weathered mortar joints. Soiled masonry. Cracked stone. Cracked brick masonry.

Photo 117. West façade: Open and weathered mortar joints. Soiled masonry. Cracked stone. Cracked brick masonry.

Photo 118. South façade: Stone surface delamination. Open and weathered mortar joints. Soiled masonry.

Photo 119. South façade: Stone surface delamination. Open and weathered mortar joints. Soiled masonry. Replacement metal arch panel.

Photo 120. South façade: Stone surface delamination. Weathered mortar joints. Soiled masonry.

Photo 121. South façade: Stone surface delamination. Weathered mortar joints.

Photo 122. South façade: Stone surface delamination. Cracked stone.

Photo 123. South façade: Cracked brick.

Photo 124. South façade: Stone surface delamination. Weathered mortar joints. Soiled masonry.

Photo 125. South façade: Stone surface delamination. Open and weathered mortar joints. Loose brick masonry.

Photo 126. South façade: Open and weathered mortar joints. Soiled masonry. Missing window glass. Brick masonry crack.

Photo 127. South façade: Stone surface delamination. Weathered mortar joints. Soiled masonry.

Photo 128. South façade: Stone surface delamination. Weathered mortar joints. Soiled masonry.

Photo 129. South façade: Stone surface delamination. Weathered mortar joints. Soiled masonry. Loose brick masonry.

Photo 130. South façade: Stone surface delamination. Open and weathered mortar joints. Soiled masonry. Efflorescence. Cracked brick.

Photo 131. South façade: Open mortar joints. Loose brick masonry. Soiled masonry. Damaged downspout.

Photo 132. South façade: Open mortar joints. Loose brick masonry.

Photo 133. South façade: Open mortar joints.

Photo 134. South façade: Stone surface delamination.

Photo 135. South façade: Stone surface delamination. Open and weathered mortar joints.

Photo 136. South façade: Stone surface delamination. Cracked stone. Cracked brick masonry. Open and weathered mortar joints.

Photo 137. South façade: Open and weathered mortar joints.

Photo 138. South façade: Stone surface delamination. Cracked stone.

Photo 139. South façade: Stone surface delamination. Open mortar joints.

Photo 140. South façade: Step crack in brick masonry. Weathered and open mortar joints.

Photo 141. South façade: Stone surface delamination. Spalled stone. Open mortar joints.

Photo 142. South façade: Open mortar joints. Cracked brick masonry.

Photo 143. South façade: Cracked brick masonry. Weathered mortar joints.

Photo 144. South façade: Open and weathered mortar joints.

Photo 145. South façade: Open and weathered mortar joints. Stone surface delamination.

Photo 146. South façade: Open and weathered mortar joints. Stone surface delamination.

Photo 147. South façade: Cracked stone. Stone surface delamination.

Photo 150. South façade: Stone surface delamination.

Photo 148. South façade: Open and weathered mortar joints. Stone surface delamination.

Photo 151. South façade: Stone surface delamination.

Photo 149. South façade: Stone surface delamination.

Photo 152. South façade: Stone surface delamination.

Photo 153. South façade: Stone surface delamination.

Photo 156. South façade: Stone surface delamination.

Photo 154. South façade: Stone surface delamination.

Photo 157. South façade: Open and weathered mortar joints. Stone surface delamination.

Photo 155. South façade: Stone surface delamination.

Photo 158. South façade: Open mortar joint. Stone crack. Stone surface delamination.

Photo 159. South façade: Open and weathered mortar joints. Soiled brick masonry.

Photo 162. South façade: Weathered mortar joints. Stone delamination.

Photo 160. South façade: Spalled brick. Weathered mortar joints.

Photo 163. South façade: Weathered mortar joints. Cracked stone.

Photo 161. South façade: Weathered mortar joints. Soiled masonry.

Photo 164. South façade: Stone surface delamination. Cracked stone. Open and weathered mortar joints.

Photo 165. South façade: Stone surface delamination. Cracked stone. Open and weathered mortar joints.

Photo 166. South façade: Stone surface delamination. Cracked stone. Open and weathered mortar joints.

Photo 167. South façade: Stone surface delamination. Cracked and open mortar joints.

Photo 168. South façade: Stone surface delamination.

Photo 169. South façade: Stone surface delamination. Cracked and open mortar joints. Efflorescence. Soiled masonry.

Photo 170. South façade: Stone surface delamination. Cracked and open mortar joints.

Photo 171. South façade: Stone surface delamination. Cracked stone. Cracked and open mortar joints.

Photo 174. South façade: Stone surface delamination. Weathered and open mortar joints. Soiled masonry.

Photo 172. South façade: Stone surface delamination. Open mortar joints.

Photo 175. South façade: Stone surface delamination.

Photo 173. South façade: Stone surface delamination. Cracked stone. Cracked and open mortar joints.

Photo 176. South façade: Stone surface delamination.

Photo 177. South façade: Stone surface delamination.

Photo 178. South façade: Stone surface delamination. Weathered mortar joints.

Photo 179. South façade: Stone surface delamination. Cracked and open mortar joints.

Photo 180. South façade: Stone surface delamination. Cracked and open mortar joints. Step crack in brick masonry.

Photo 181. South façade: Stone surface delamination.

Photo 182. South façade: Missing railing section. Deformed downspout. Soiled masonry.

Photo 183. South façade: Weathered and open mortar joints. Deformed downspout. Stone delamination.

Photo 184. South façade: Weathered and open mortar joints. Stone delamination.

Photo 185. South façade: Weathered and open mortar joints. Stone delamination. Efflorescence. Biological growth.

Photo 186. South façade: Biological growth. Open mortar joints.

Photo 187. South façade: Stone delamination.

Photo 188. South façade: Weathered and open mortar joints. Stone delamination. Loose brick masonry.

Photo 189. South façade: Stone delamination. Open and weathered mortar joints.

Photo 192. South façade: Missing glass. Stone delamination.

Photo 190. South façade: Missing railing section.

Photo 193. South façade: Weathered and open mortar joints. Efflorescence. Biological growth.

Photo 191. South façade: Stone delamination.

Photo 194. South façade: Efflorescence. Weathered and open mortar joints. Stone delamination.

Photo 195. South façade: Open mortar joints. Efflorescence. Biological growth.

Photo 196. South façade: Open sealant joints and displaced entry steps.

Photo 197. South façade: Stone delamination. Open mortar joints. Efflorescence. Loose brick masonry. Soiled masonry.

Photo 198. South façade: Weathered and open mortar joints. Stone delamination. Step crack in brick masonry. Soiled masonry. Replacement metal arch panel.

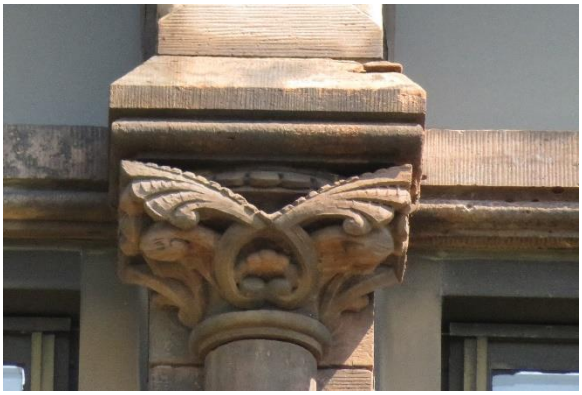


Photo 199. South façade: Spalled stone.

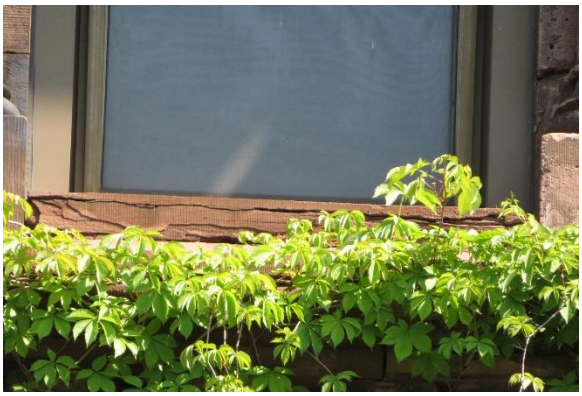


Photo 200. South façade: Stone delamination. Stone spall.

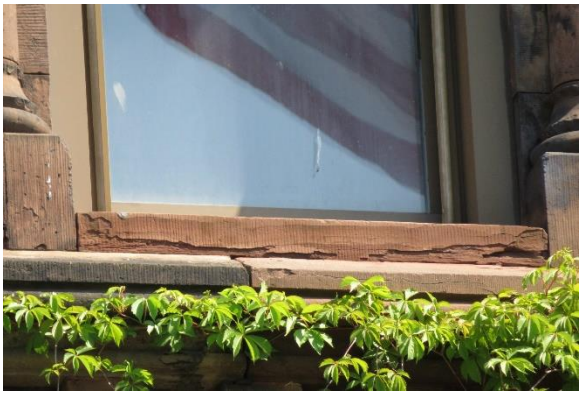


Photo 201. South façade: Stone delamination. Stone spall.

Photo 204. South façade: Stone delamination. Stone spall.

Photo 202. South façade: Stone delamination. Stone spall.

Photo 205. South façade: Efflorescence. Stone delamination. Soiled masonry.

Photo 203. South façade: Stone delamination.

Photo 206. South façade: Stone delamination. Open mortar joints.

Photo 207. South façade: Stone delamination. Stone crack.

Photo 208. South façade: Stone delamination. Open mortar joints.

Photo 209. South façade: Stone delamination. Open mortar joints.

Photo 210. South façade: Stone delamination.

Photo 211. South façade: Stone delamination.

Photo 212. South façade: Stone delamination. Open mortar joints.

Photo 213. South façade: Stone delamination. Open mortar joints.

Photo 214. South façade: Stone delamination.

Photo 215. South façade: Stone delamination. Open mortar joints.

Photo 216. South façade: Stone delamination. Open mortar joints.

Photo 217. South façade: Stone delamination. Stone crack. Deteriorated mortar joints.

Photo 218. South façade: Stone delamination. Open mortar joints.

Photo 219. South façade: Stone delamination. Open mortar joints. Replacement metal arch panel.

Photo 220. South façade: Stone delamination. Open mortar joints.

Photo 221. South façade: Stone delamination. Open mortar joints.

Photo 222. South façade: Stone delamination. Open mortar joints.

Photo 223. South façade: Stone delamination. Spalled stone. Open mortar joints. Cracked brick.

Photo 224. South façade: Missing flashing. Soiled masonry. Spalled brick.

Photo 225. South façade: Soiled masonry. Weathered mortar joints. Stone delamination.

Photo 228. South façade: Stone delamination. Open mortar joints.

Photo 226. South façade: Stone delamination. Open and weathered mortar joints.

Photo 229. South façade: Stone delamination. Spalled stone. Open mortar joints.

Photo 227. South façade: Open and weathered mortar joints. Stone delamination.

Photo 230. South façade: Stone delamination. Open mortar joints.

Photo 231. South façade: Stone delamination. Open mortar joints.

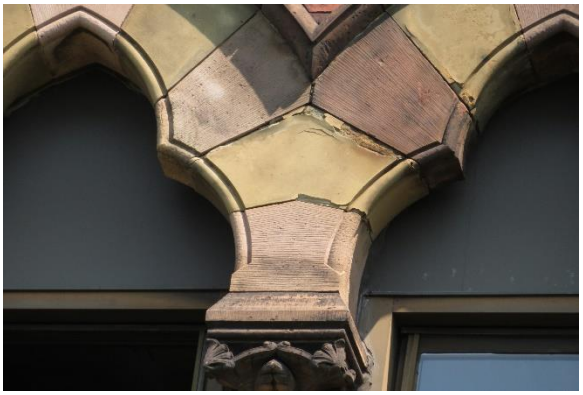


Photo 234. South façade: Stone delamination. Open mortar joints.

Photo 232. South façade: Stone delamination. Spalled stone. Open mortar joints.

Photo 235. South façade: Stone delamination. Open mortar joints. Spalled stone.

Photo 233. South façade: Stone delamination. Open mortar joints.

Photo 236. South façade: Efflorescence. Open and weathered mortar joints.

Photo 237. South façade: Efflorescence. Open mortar joints.

Photo 240. South façade: Open and weathered mortar joints. Efflorescence.

Photo 238. South façade: Stone delamination. Spalled stone. Open mortar joints. Efflorescence.

Photo 241. South façade: Open mortar joints. Efflorescence.

Photo 239. South façade: Stone delamination. Cracked stone. Open mortar joints. Efflorescence.

Photo 242. South façade: Stone delamination. Cracked stone. Open mortar joints.

Photo 243. South façade: Open and weathered mortar joints.

Photo 244. South façade: Open and weathered mortar joints.

Photo 245. South façade: Spalled stone.

Photo 246. Roof: Failed previous roof patches.

Photo 247. Roof: Missing ridge elements. Missing shingles.

Photo 248. Roof: Failed previous roof patches. Deteriorated shingles.

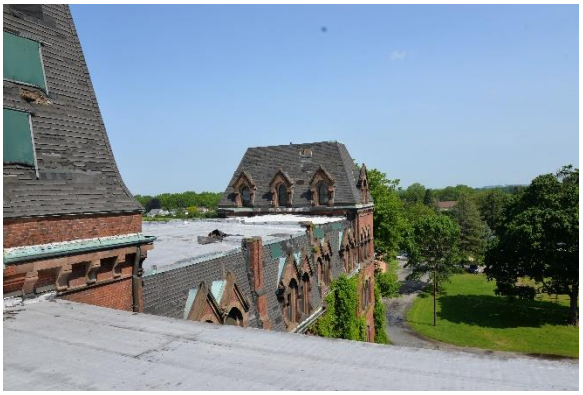


Photo 249. Roof: Deteriorated flat roof membrane. Failed previous patches on mansard roof. Deteriorated shingles.

Photo 252. Roof: Failed previous roof patches. Deteriorated shingles. Damaged egress stairs. Deteriorated window frame.

Photo 250. Roof: Failed previous roof patches. Deteriorated shingles. Damaged and open roofing.

Photo 253. Roof: Open and weathered mortar joints at the roof. Soiled masonry. Failed previous patches.

Photo 251. Roof: Damaged and open roofing.

Photo 254. Roof: Displaced steps at the egress stairs. Corroded egress stairs.

Photo 255. Roof: Temporary tarp installed at roofing.

Photo 256. Roof: Missing slate shingles at the clock tower roof.

Photo 257. Roof: Damaged roofing. Failed previous roof patches.

Photo 258. Roof: Damaged roofing. Failed previous roof patches.

Photo 259. Roof: Damaged roofing. Failed previous roof patches.

Photo 260. Roof: Damaged roofing. Failed previous roof patches.

Photo 261. Roof: Damaged roofing. Missing ridge elements.

Photo 262. Roof: Loose shingles.

Photo 263. Roof: Loose shingles.

Photo 264. Roof: Damaged roofing. Failed previous roof patches.

Photo 265. Roof: Loose shingles.

Photo 266. Roof: Loose shingles.

Photo 267. Roof: Damaged roofing. Failed previous roof patches.

Photo 268. Roof: Missing shingles.

Photo 269. Roof: Missing / loose shingles.

Photo 270. Roof: Missing finial.

Photo 271. Roof: Damaged roofing. Failed previous roof patches.

Photo 272. Roof: Missing / loose shingles. Failed previous roof patches.

Photo 273. Roof: Damaged roofing. Failed previous roof patches.

Photo 274. Roof: Damaged roofing. Failed previous roof patches.

Photo 275. Roof: Loose shingles..

Photo 276. Roof: Missing shingles.

Photo 277. Roof: Ponding water. Open seams. Membrane beyond service life.

Photo 278. Roof: Ponding water. Open seams. Membrane beyond service life.

Appendix B

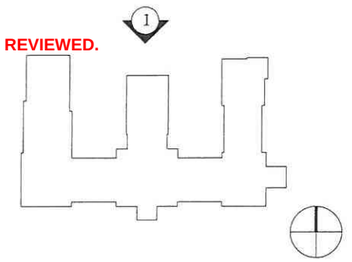
Appendix B - Immediate Needs Sketch

7/19/2019

Thornton Tomasetti

LEGEND:

- CRACKED OR MISSING GLASS
- DEFLECTING OR SEPARATED WINDOW FRAME
- UNSAFE CONDITION
- APPROXIMATE LOCATIONS OF EXISTING IVY. **AREAS NOT REVIEWED.**
- MISSING SHINGLES
- DAMAGED AND OPEN ROOF AREA
- PREVIOUS PATCH
- DETERIORATED ROOFING
- MISSING RIDGE OR VALLEY ELEMENTS



Key Map

NORTH ELEVATION

Existing Conditions - Building Exterior

Appendix B - Immediate Needs Sketch

7/19/2019

Thornton Tomasetti

DAMAGED AND OPEN SECTION OF THE ROOF (PHOTO ABOVE)

LOOSE BRICKS

DAMAGED AND OPEN SECTION OF THE ROOF (PHOTO ABOVE)

LOOSE

NOT REVIEWED

NOT REVIEWED

SPALLING / DELAMINATING STONE

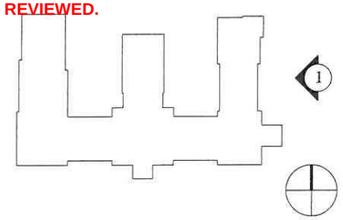
CRACKED BROWNSTONE LINTEL

LOOSE BRICK MASONRY

1.

LEGEND:

- CRACKED OR MISSING GLASS
- DEFLECTING OR SEPARATED WINDOW FRAME
- UNSAFE CONDITION
- APPROXIMATE LOCATIONS OF EXISTING IVY. **AREAS NOT REVIEWED.**
- MISSING SHINGLES
- DAMAGED AND OPEN ROOF AREA
- PREVIOUS PATCH
- DETERIORATED ROOFING
- MISSING RIDGE OR VALLEY ELEMENTS



Key Map

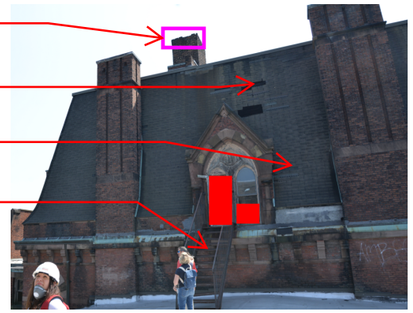
EAST ELEVATION

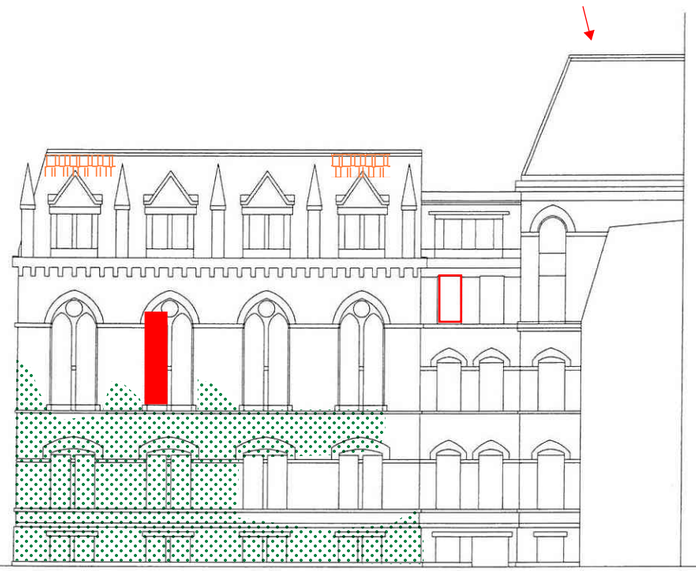
Existing Conditions - Building Exterior

Appendix B - Immediate Needs Sketch

7/19/2019

Thornton Tomasetti





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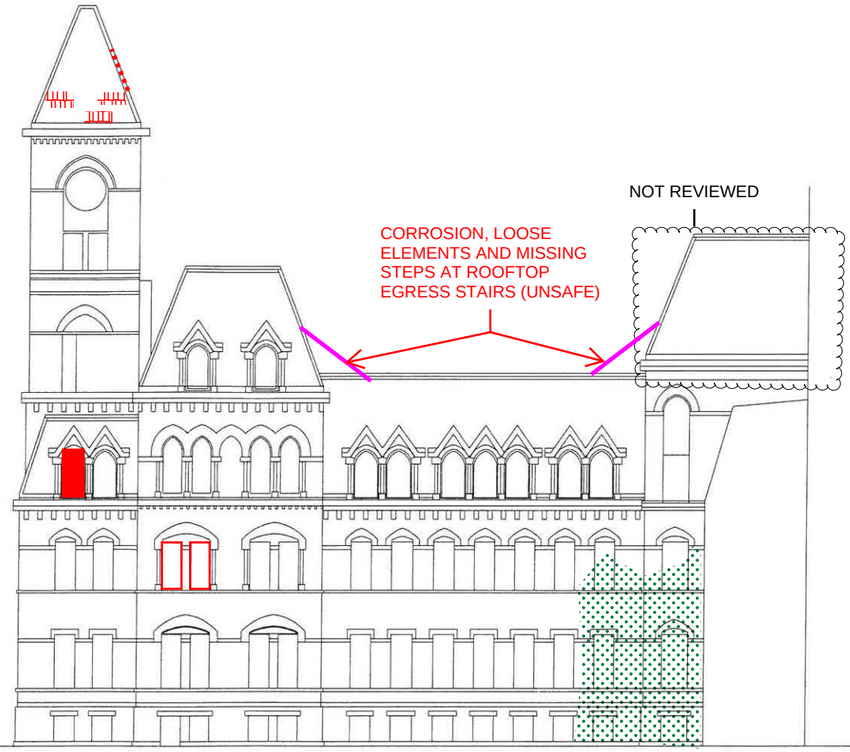
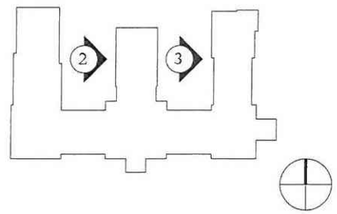


3.

LEGEND:

- CRACKED OR MISSING GLASS
- DEFLECTING OR SEPARATED WINDOW FRAME
- UNSAFE CONDITION
- APPROXIMATE LOCATIONS OF EXISTING IVY. **AREAS NOT REVIEWED.**
- MISSING SHINGLES
- DAMAGED AND OPEN ROOF AREA
- PREVIOUS PATCH
- DETERIORATED ROOFING
- MISSING RIDGE OR VALLEY ELEMENTS



Key Map

WEST ELEVATIONS

Existing Conditions - Building Exterior

Appendix B - Immediate Needs Sketch

7/19/2019

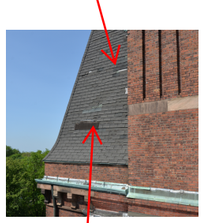
Thornton Tomasetti

DAMAGED AND OPEN ROOFING SECTION

DETERIORATED AND MISSING SHINGLES

DEFLECTED AND OPEN WINDOW FRAME

NORTH FACE



DETERIORATED AND MISSING SHINGLES

PREVIOUS PATCHES

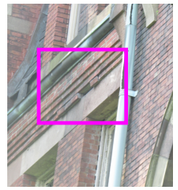
DAMAGED AND OPEN ROOFING SECTION

DETERIORATED AND MISSING SHINGLES

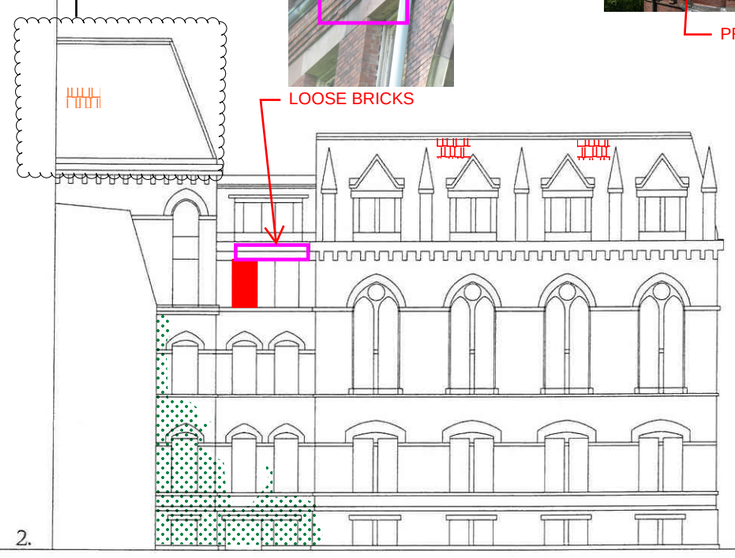
PREVIOUS PATCHES

DETERIORATED AND MISSING SHINGLES

NOT REVIEWED



LOOSE BRICKS



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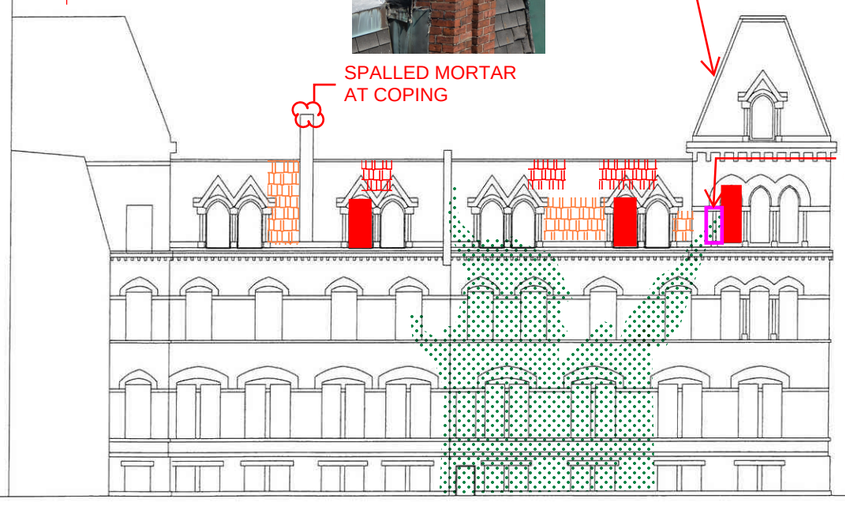


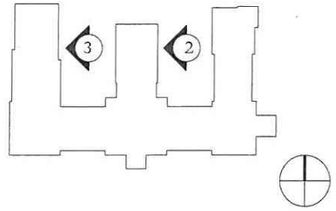
3.

SPALLED MORTAR AT COPING

SPALLED BROWNSTONE COLUMN

LEGEND:

- CRACKED OR MISSING GLASS
- DEFLECTING OR SEPARATED WINDOW FRAME
- UNSAFE CONDITION
- APPROXIMATE LOCATIONS OF EXISTING IVY. **AREAS NOT REVIEWED.**
- MISSING SHINGLES
- DAMAGED AND OPEN ROOF AREA
- PREVIOUS PATCH
- DETERIORATED ROOFING
- MISSING RIDGE OR VALLEY ELEMENTS



Key Map

EAST ELEVATION

Existing Conditions - Building Exterior

Appendix B - Immediate Needs Sketch

7/19/2019

Thornton Tomasetti

LOOSE BRICKS AT THE CORNER

BROKEN RAILING

SPALLED TURRET (UNSAFE)

DETERIORATED BROWNSTONE SILLS

CORROSION, LOOSE ELEMENTS AND MISSING STEPS AT ROOFTOP EGRESS STAIRS (UNSAFE)

NOT REVIEWED

NOT REVIEWED

CORROSION, LOOSE ELEMENTS AND MISSING STEPS AT ROOFTOP EGRESS STAIRS (UNSAFE)

LOOSE CRACKED BRICKS

SPALLED DECORATIVE PLATE

SPALLED DELAMINATING BROWNSTONE COLUMN

DETERIORATED BROWNSTONE SILLS

LOOSE BRICKS

MISSING FLASHING

DETERIORATED BROWNSTONE SILLS

LEGEND:

CRACKED OR MISSING GLASS

DEFLECTING OR SEPARATED WINDOW FRAME

UNSAFE CONDITION

APPROXIMATE LOCATIONS OF EXISTING IVY. **AREAS NOT REVIEWED.**

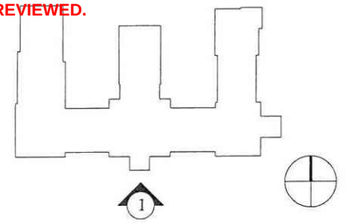
MISSING SHINGLES

DAMAGED AND OPEN ROOF AREA

PREVIOUS PATCH

DETERIORATED ROOFING

MISSING RIDGE OR VALLEY ELEMENTS

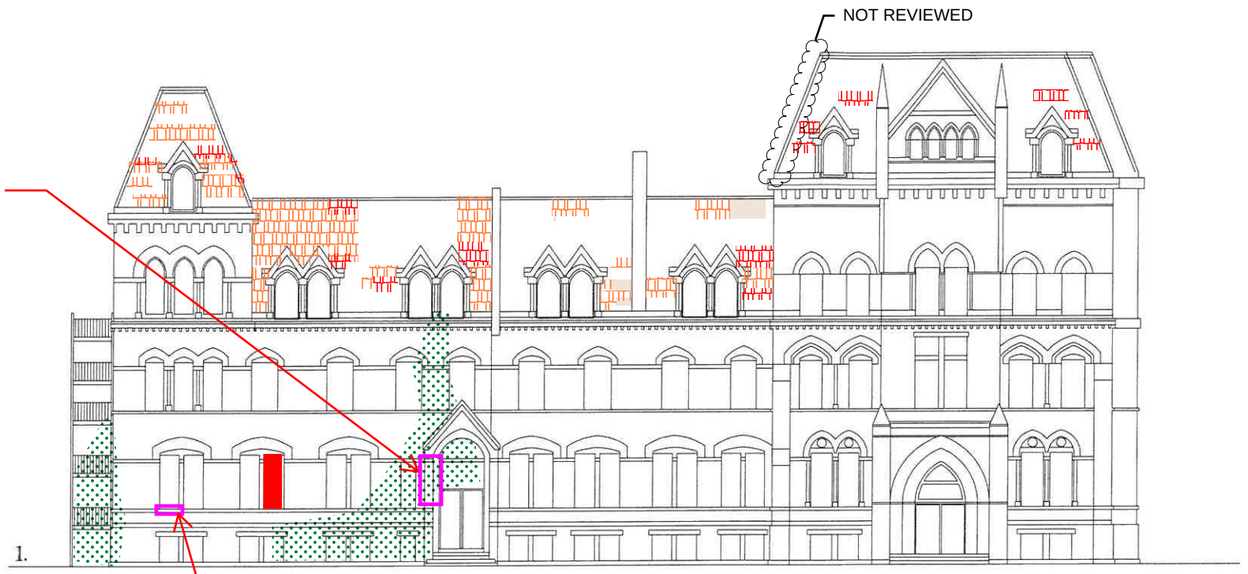


Key Map

SOUTH ELEVATION

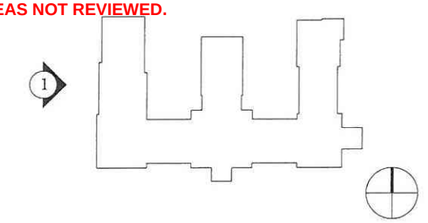
Existing Conditions - Building Exterior

LOOSE WINDOW FRAME ELEMENT



LEGEND:

- CRACKED OR MISSING GLASS
- DEFLECTING OR SEPARATED WINDOW FRAME
- UNSAFE CONDITION
- APPROXIMATE LOCATIONS OF EXISTING IVY. **AREAS NOT REVIEWED.**
- MISSING SHINGLES
- DAMAGED AND OPEN ROOF AREA
- PREVIOUS PATCH
- DETERIORATED ROOFING
- MISSING RIDGE OR VALLEY ELEMENTS



Key Map

WEST ELEVATION

Existing Conditions - Building Exterior

Appendix C

Appendix C - General Facade Conditions

7/19/2019

Thornton Tomasetti

LEGEND:

APPROXIMATE LOCATIONS OF EXISTING IVY. **AREAS NOT REVIEWED.**

BRICK MASONRY

- OPEN MORTAR JOINTS
- LOOSE BRICKS
- CRACKED BRICK MASONRY
- SPALLED OR MISSING BRICK

STONE MASONRY

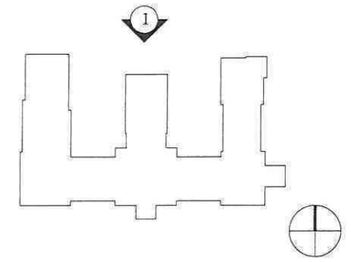
- OPEN MORTAR JOINTS
- CRACKED STONE MASONRY
- SPALLED STONE MASONRY
- STONE DELAMINATION

OTHER

- EFFLORESCENCE
- DETERIORATED WOOD DOOR/WINDOW FRAME
- CRACKED OR MISSING DOWNSPOUT

NORTH ELEVATION

Existing Conditions - Building Exterior



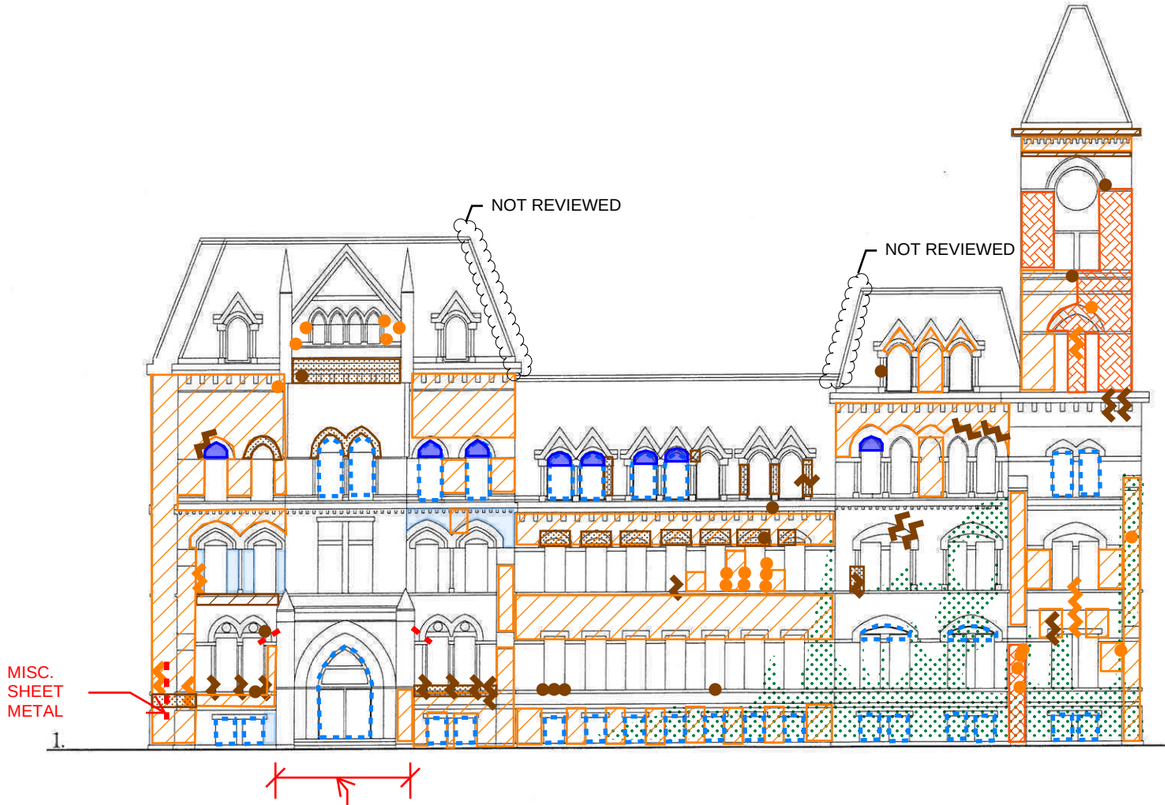
Key Map

NOTES:
1. CLEAN 100% OF BROWNSTONE
2. 100% OPEN MORTAR JOINTS
3. BIO GROWTH THROUGHOUT

Appendix C - General Facade Conditions

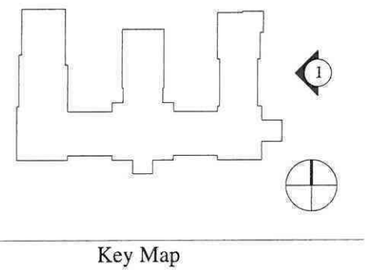
7/19/2019

Thornton Tomasetti



EAST ELEVATION

Existing Conditions - Building Exterior



Key Map

LEGEND:

APPROXIMATE LOCATIONS OF EXISTING IVY. **AREAS NOT REVIEWED.**

BRICK MASONRY

- OPEN MORTAR JOINTS
- LOOSE BRICKS
- CRACKED BRICK MASONRY
- SPALLED OR MISSING BRICK

STONE MASONRY

- OPEN MORTAR JOINTS
- CRACKED STONE MASONRY
- SPALLED STONE MASONRY
- STONE DELAMINATION

OTHER

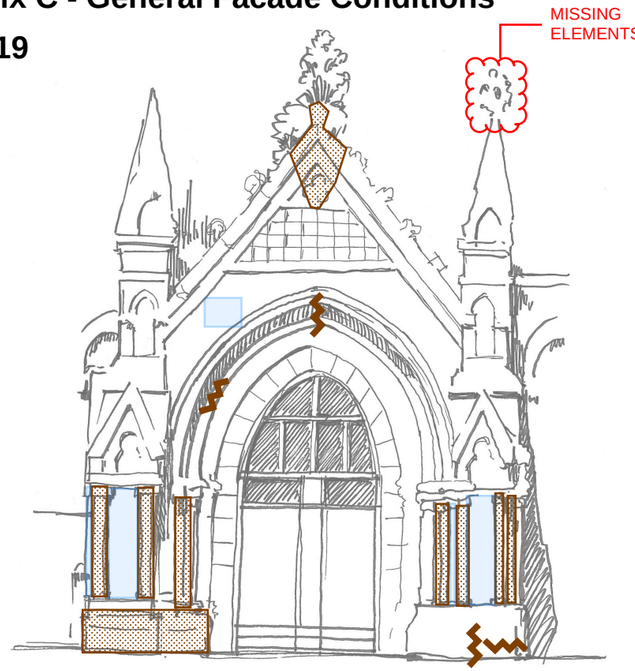
- EFFLORESCENCE
- DETERIORATED WOOD DOOR/WINDOW FRAME
- CRACKED OR MISSING DOWNSPOUT

NOTES:
1. CLEAN 100% OF BROWNSTONE
2. 100% OPEN MORTAR JOINTS
3. BIO GROWTH THROUGHOUT

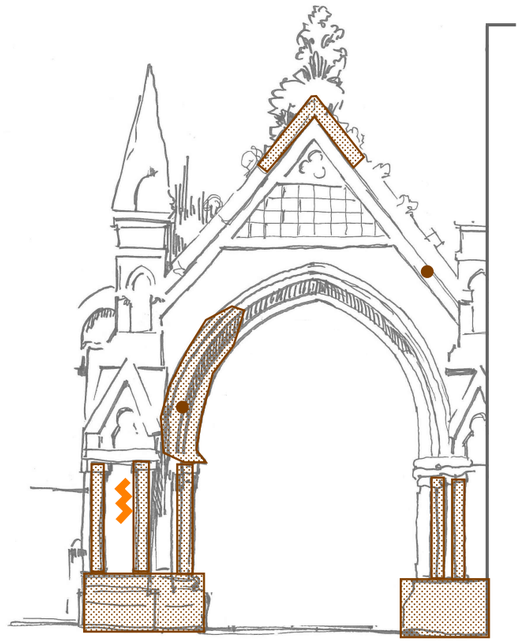
Thornton Tomasetti

Appendix C - General Facade Conditions

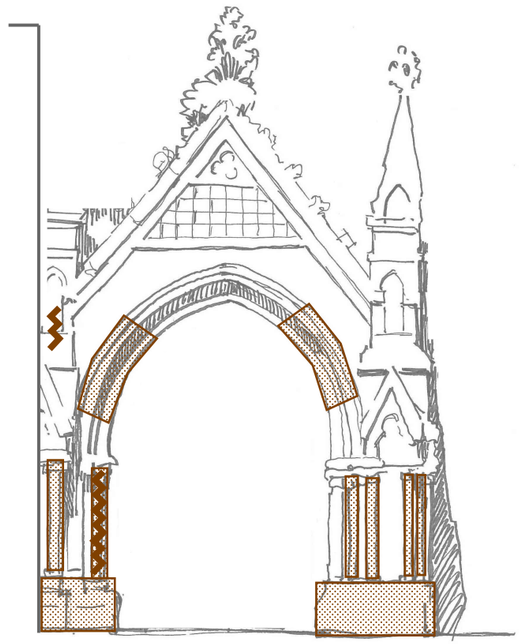
7/19/2019



EAST ELEVATION



NORTH ELEVATION



SOUTH ELEVATION

LEGEND:

APPROXIMATE LOCATIONS OF EXISTING IVY. **AREAS NOT REVIEWED.**

BRICK MASONRY

- OPEN MORTAR JOINTS
- LOOSE BRICKS
- CRACKED BRICK MASONRY
- SPALLED OR MISSING BRICK

STONE MASONRY

- OPEN MORTAR JOINTS
- CRACKED STONE MASONRY
- SPALLED STONE MASONRY
- STONE DELAMINATION

OTHER

- EFFLORESCENCE
- DETERIORATED WOOD DOOR/WINDOW FRAME
- CRACKED OR MISSING DOWNSPOUT

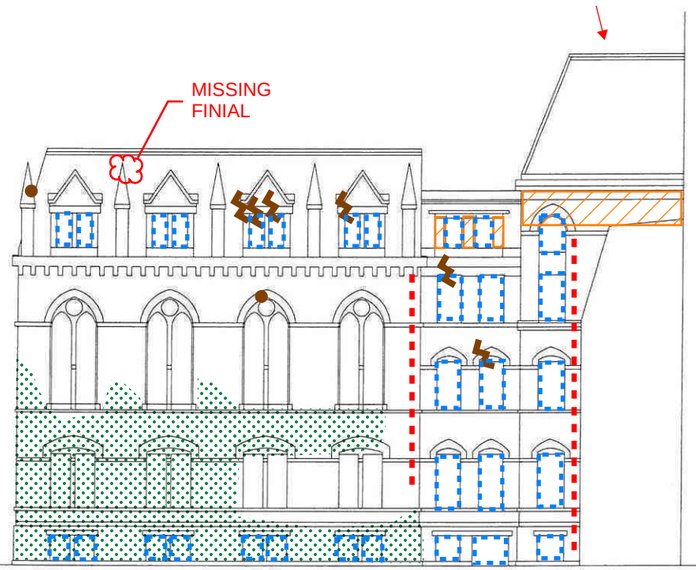
NOTES:
1. CLEAN 100% OF BROWNSTONE
2. 100% OPEN MORTAR JOINTS
3. BIO GROWTH THROUGHOUT

+ MULTIPLE BRICK AND STONE CRACKS ON THE INTERIOR FACE
+ STONE DELAMINATION AT ARCH UNDERSIDES
+ OPEN MORTAR JOINTS, TYPICAL.

Appendix C - General Facade Conditions

7/19/2019

Thornton Tomasetti



LEGEND:

APPROXIMATE LOCATIONS OF EXISTING IVY. **AREAS NOT REVIEWED.**

BRICK MASONRY

- OPEN MORTAR JOINTS
- LOOSE BRICKS
- CRACKED BRICK MASONRY
- SPALLED OR MISSING BRICK

STONE MASONRY

- OPEN MORTAR JOINTS
- CRACKED STONE MASONRY
- SPALLED STONE MASONRY
- STONE DELAMINATION

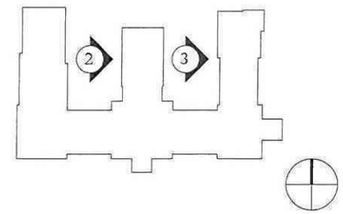
OTHER

- EFFLORESCENCE
- DETERIORATED WOOD DOOR/WINDOW FRAME
- CRACKED OR MISSING DOWNSPOUT

NOTES:
1. CLEAN 100% OF BROWNSTONE
2. 100% OPEN MORTAR JOINTS
3. BIO GROWTH THROUGHOUT

WEST ELEVATIONS

Existing Conditions - Building Exterior



Key Map

Appendix C - General Facade Conditions

7/19/2019

Thornton Tomasetti

DAMAGED FLASHINGS

NORTH FACE

STONE CRACKS AND DELAMINATION, TYP.

NOT REVIEWED

LEGEND:

APPROXIMATE LOCATIONS OF EXISTING IVY. **AREAS NOT REVIEWED.**

BRICK MASONRY

- OPEN MORTAR JOINTS
- LOOSE BRICKS
- CRACKED BRICK MASONRY
- SPALLED OR MISSING BRICK

STONE MASONRY

- OPEN MORTAR JOINTS
- CRACKED STONE MASONRY
- SPALLED STONE MASONRY
- STONE DELAMINATION

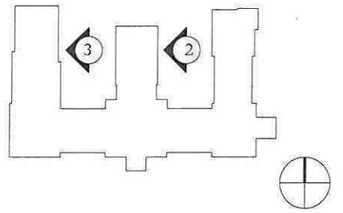
OTHER

- EFFLORESCENCE
- DETERIORATED WOOD DOOR/WINDOW FRAME
- CRACKED OR MISSING DOWNSPOUT

NOTES:
1. CLEAN 100% OF BROWNSTONE
2. 100% OPEN MORTAR JOINTS
3. BIO GROWTH THROUGHOUT

EAST ELEVATION

Existing Conditions - Building Exterior



Key Map

Appendix C - General Facade Conditions

7/19/2019

Thornton Tomasetti

LEGEND:

APPROXIMATE LOCATIONS OF EXISTING IVY. **AREAS NOT REVIEWED.**

BRICK MASONRY

- OPEN MORTAR JOINTS
- LOOSE BRICKS
- CRACKED BRICK MASONRY
- SPALLED OR MISSING BRICK

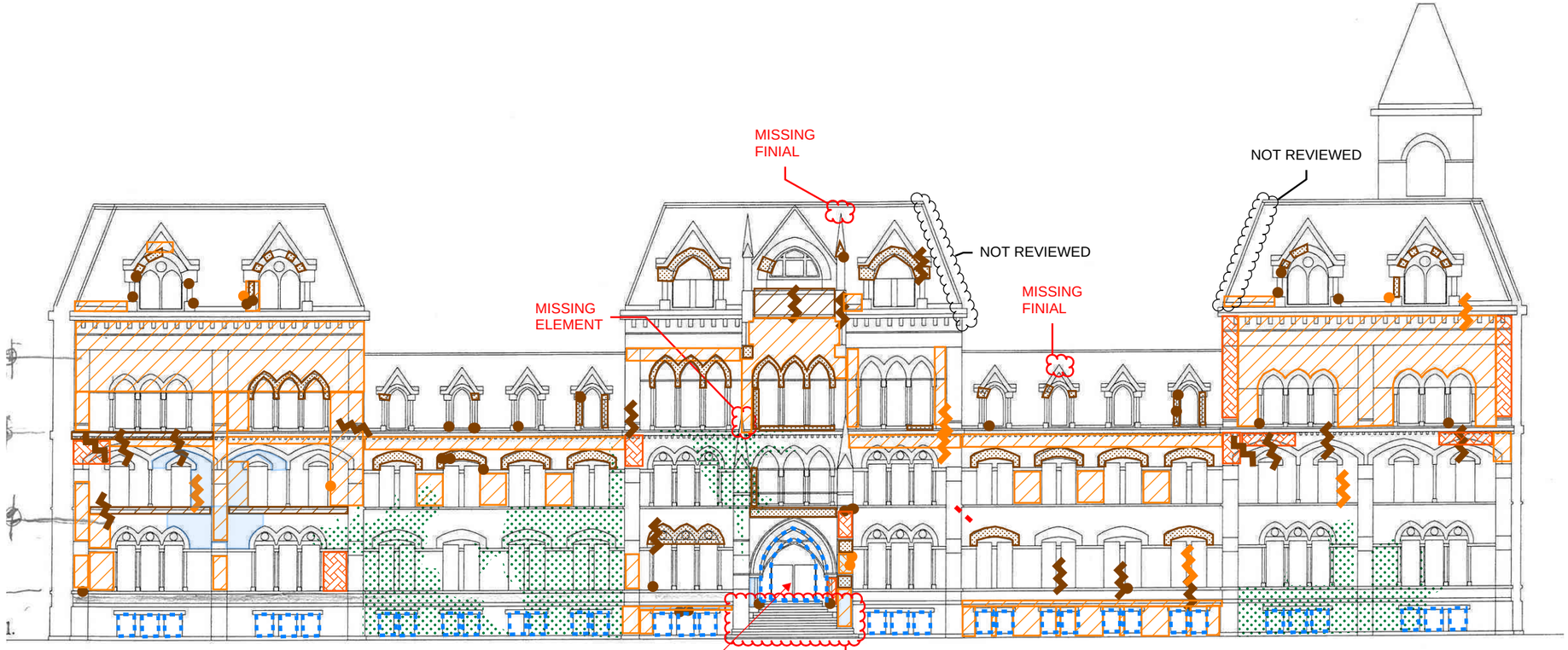
STONE MASONRY

- OPEN MORTAR JOINTS
- CRACKED STONE MASONRY
- SPALLED STONE MASONRY
- STONE DELAMINATION

OTHER

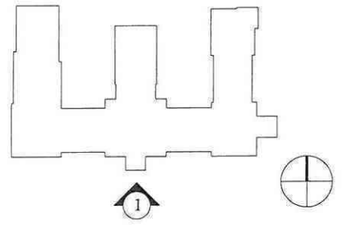
- EFFLORESCENCE
- DETERIORATED WOOD DOOR/WINDOW FRAME
- CRACKED OR MISSING DOWNSPOUT

NOTES:
1. CLEAN 100% OF BROWNSTONE
2. 100% OPEN MORTAR JOINTS
3. BIO GROWTH THROUGHOUT



SOUTH ELEVATION
Existing Conditions - Building Exterior

INSIDE THE PORTICO:
HEAVY EFFLORESCENCE,
STONE DELAMINATION,
DETERIORATED WOOD ELEMENTS,
LOOSE BRICKS,
OPEN JOINTS,
TYPICAL.



Key Map

Appendix C - General Facade Conditions
7/19/2019

Thornton Tomasetti

LEGEND:

APPROXIMATE LOCATIONS OF EXISTING IVY. **AREAS NOT REVIEWED.**

BRICK MASONRY

- OPEN MORTAR JOINTS
- LOOSE BRICKS
- CRACKED BRICK MASONRY
- SPALLED OR MISSING BRICK

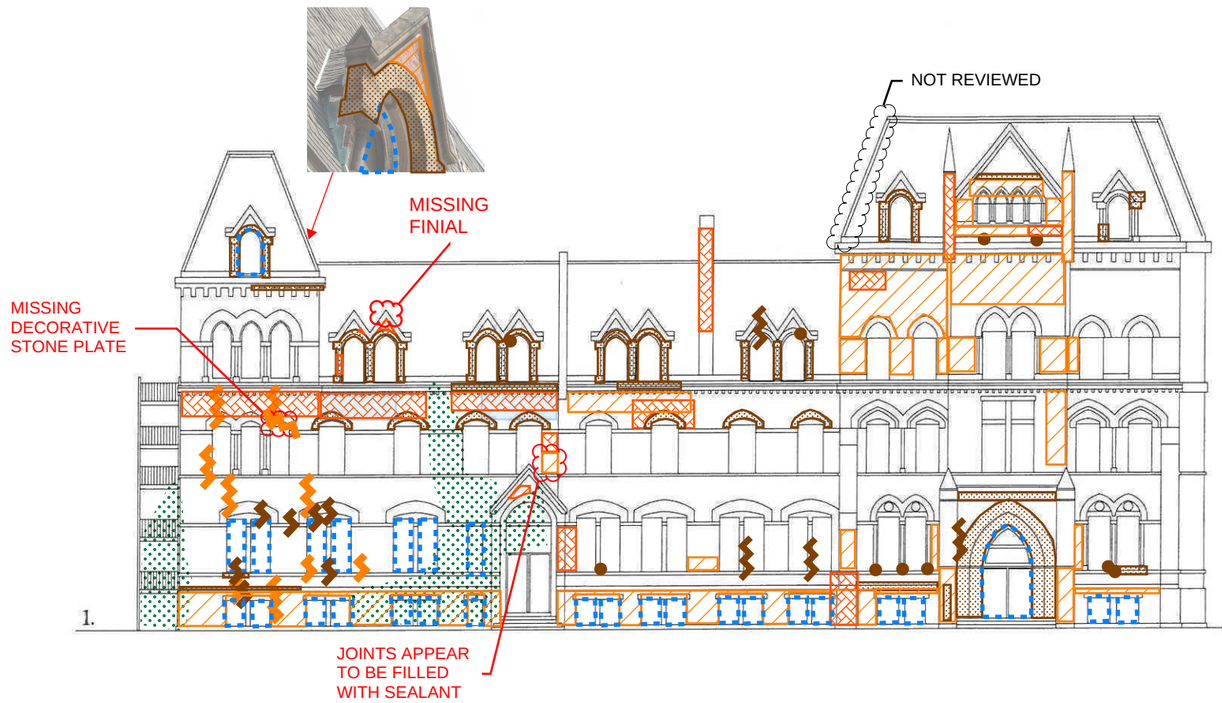
STONE MASONRY

- OPEN MORTAR JOINTS
- CRACKED STONE MASONRY
- SPALLED STONE MASONRY
- STONE DELAMINATION

OTHER

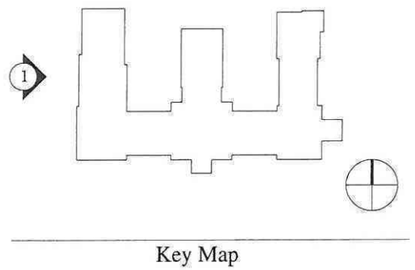
- EFFLORESCENCE
- DETERIORATED WOOD DOOR/WINDOW FRAME
- CRACKED OR MISSING DOWNSPOUT
- MISSING OR LOOSE METAL PLATE AT WINDOW

NOTES:
1. CLEAN 100% OF BROWNSTONE
2. 100% OPEN MORTAR JOINTS
3. BIO GROWTH THROUGHOUT



WEST ELEVATION

Existing Conditions - Building Exterior



Key Map

Appendix D

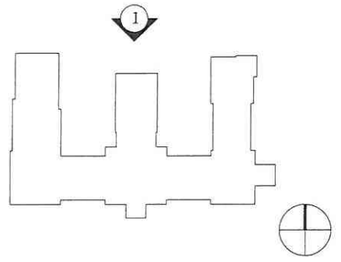
INTERIOR CONDITION

PENETRATION IN MAIN HALL ROOF
CORRELATING TO DAMAGE AT
STRUCTURE ABOVE MAIN STAIR
(BEHIND CHAPEL ROOF)

MAIN HALL ROOF

CHAPEL ROOF

1.

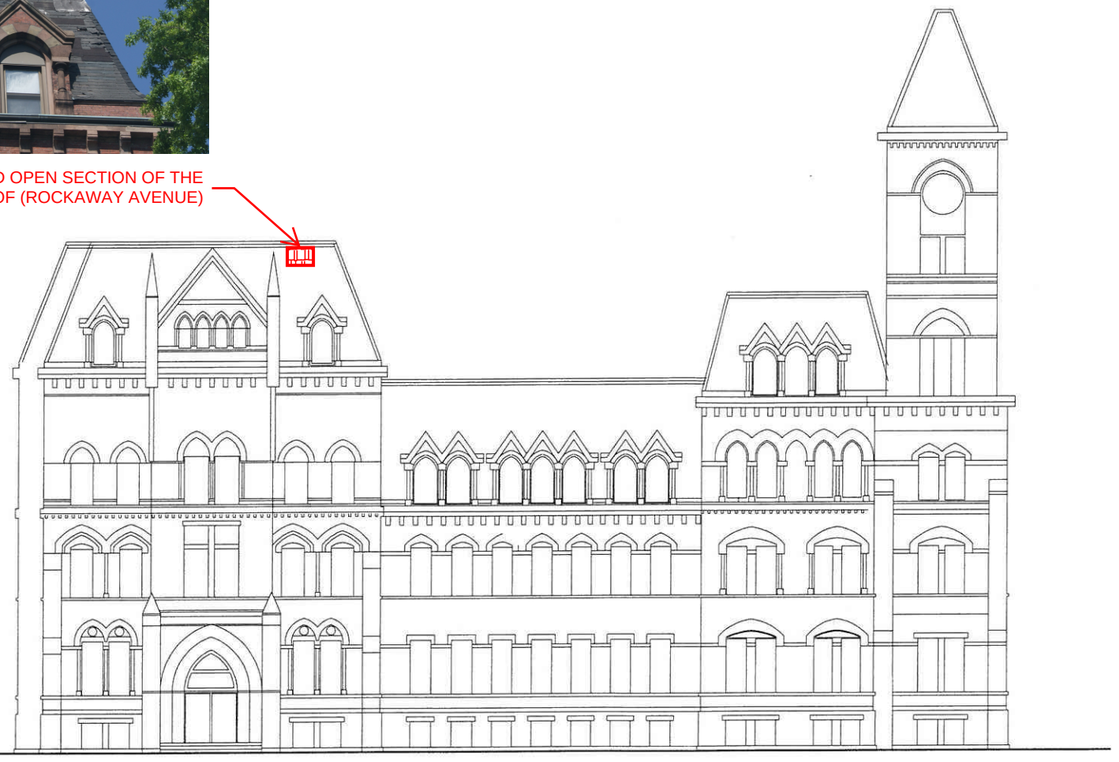


NORTH ELEVATION

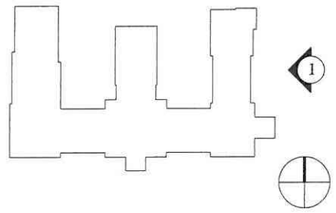
Existing Conditions - Building Exterior

Key Map

DAMAGED AND OPEN SECTION OF THE ROOF (ROCKAWAY AVENUE)



1.



EAST ELEVATION

Existing Conditions - Building Exterior

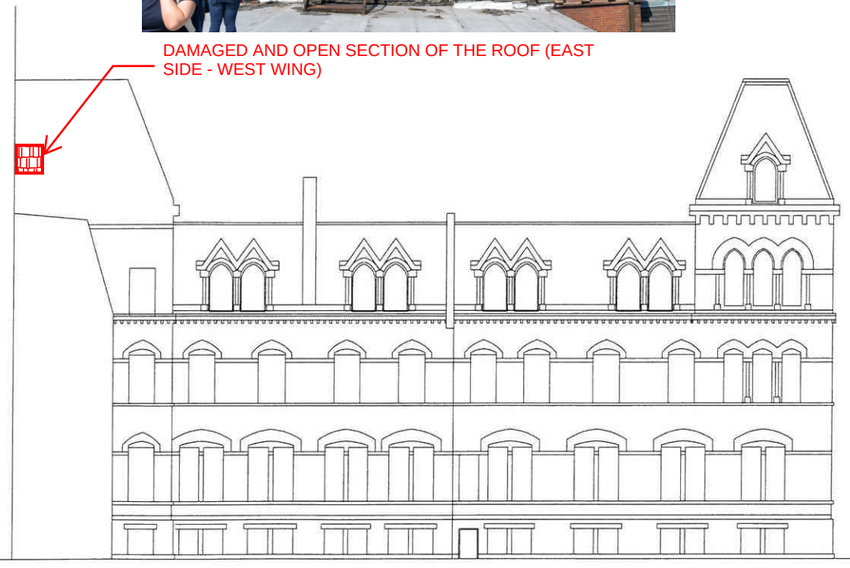
Key Map

INTERIOR CONDITION

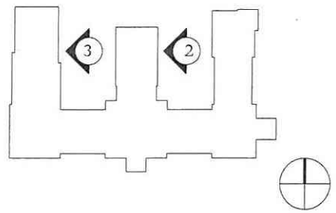
DAMAGED AND OPEN SECTION OF THE ROOF (EAST SIDE - WEST WING)

2.

ELEVATION 2 - INTENSIONALLY LEFT BLANK



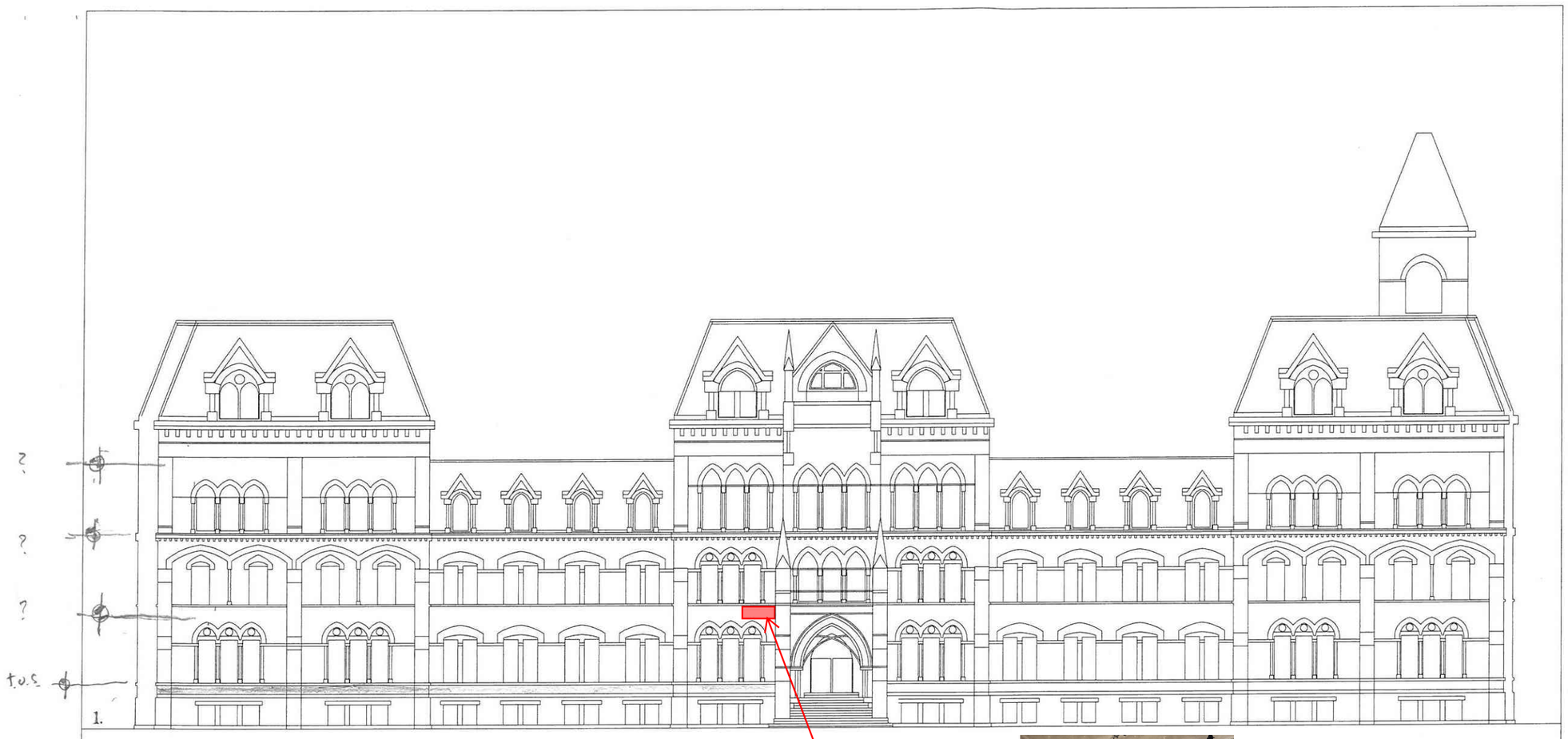
3.



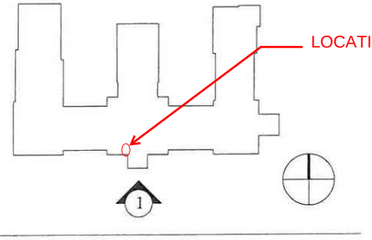
EAST ELEVATION

Existing Conditions - Building Exterior

Key Map



COMPROMISED CONNECTION BETWEEN FLOOR JOISTS AT 2ND FLOOR FRAMING AND FACADE BEARING WALL



Key Map

SOUTH ELEVATION
Existing Conditions - Building Exterior

Appendix E

Thornton Tomasetti

December 5, 2017

Mayor Brian Daughney
THE VILLAGE OF GARDEN CITY
351 Stewart Avenue
Garden City, NY 11530

RE: ST PAUL'S SCHOOL – OBSERVATION REPORT
TT Project No. N17384.00

Dear Mayor Daughney:

Thornton Tomasetti (TT) visited the site at St Paul's School in Garden City on August 4th, October 25th, and November 8th 2017. During this time, TT observed deterioration of the wood framing at the mansard roof below the skylight at the center hall staircase (Photo 1).

It is TT's recommendation that this condition be remediated as the framing has the potential to shift or collapse onto the stair below (Photos 2 and 3). The interior finishes previously covering the wood structure at this location have already collapsed, exposing the wall framing (Photo 4). We recommend temporary shoring be provided to protect the egress path and mitigate the potential for further failure in this area.

Furthermore, TT observed conditions where the temporary exterior building envelope repairs have left portions of the mansard roof framing exposed to the weather (Photo 5). Long-term exposure to moisture can result in deterioration of the exposed wood framing. We recommend that temporary building envelope repairs, to maintain the water-tightness of the building envelope and protect the wood mansard framing from additional moisture exposure, be implemented until permanent repairs can be performed.

This report is limited to observations TT was able to make on site given limited visibility and access to the existing roof framing. A full-scale survey, exposing all mansard roof framing for investigation would need to be conducted to provide a complete condition assessment.

Very truly yours,
THORNTON TOMASETTI, INC.

Stephen Szycher, P.E.
Principal

Photo 1: Area of deteriorated wood framing above stair landing

Photo 2: Deteriorated wood wall framing

Photo 3: Close-up of deteriorated wood framing

Photo 4: Debris below deteriorated wall framing

Photo 5: Exposed structural framing at roof patch repair at the west wing