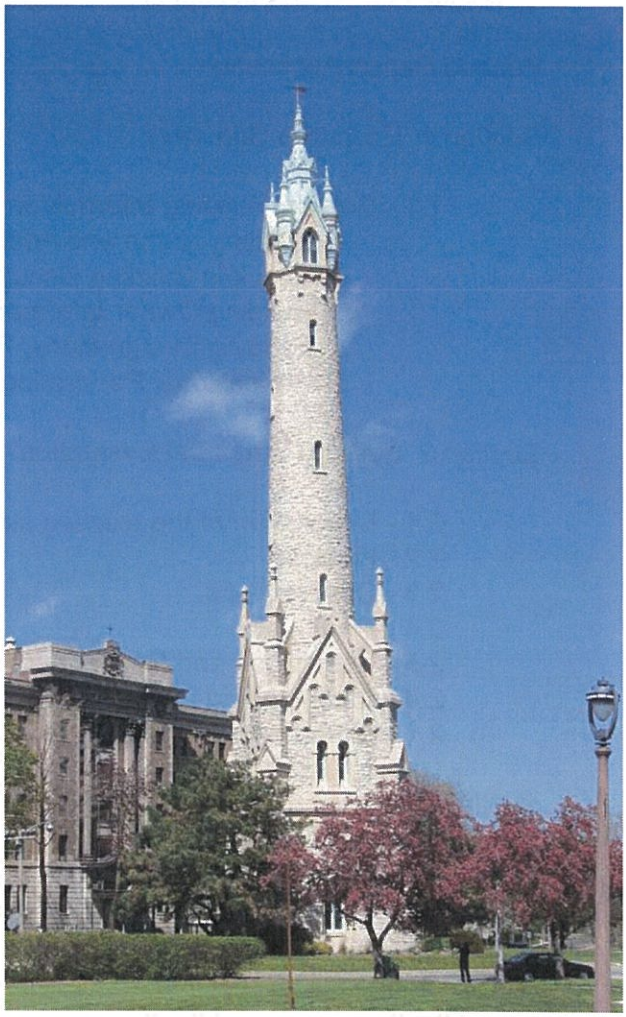
Façade Critical Examination Ordinance Report
2015 Follow-up

City of Milwaukee
North Point Water Tower

2288 North Lake Drive
Milwaukee, WI 53202

August 5, 2015



City of Milwaukee

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(Date Received by DNS_____)

City of Milwaukee

Department of Neighborhood Services
Façade Report Application

Address of Building: E. North Ave btwn N. Lake Dr & Terrace Ave **TaxKey** _____

Name of Owner/Agent: City of Milwaukee, Department of Public Works, Milwaukee Water Works

Address/City/Zip: 841 North Broadway, Room 409, Milwaukee, WI 53202

Contact Person: Carrie M. Lewis **Phone:** 414.286.2801

Signature of Owner or Owner's Agent _____

(See sec. 275-32-13 of Milw. Code of Ordin.Vol. II for definitions and reporting requirements)

BUILDING CONDITION

_____ **SAFE**

_____ **SAFE WITH AN ORDINARY REPAIR AND MAINTENANCE PROGRAM**

__✓__ **UNSAFE**

_____ **UNSAFE AND IMMINENTLY HAZARDOUS.** Notify DNS by phone at (414) 286-3754, (414) 286-3862, or (414) 286-2548 within 24 hours. Indicate where this condition exists on the façade and what safety precautions have been provided.
Name of DNS employee contacted:_____ Date of Contact:_____

ISSUED 2013
NO CHANGE

BUILDING DESCRIPTION

Date of the Report: 11/25/2013 **Occupancy of Building:** Unoccupied

No. of stories: approx 15 **Year Built:** 1873

Description of Exterior Walls (check all that apply)

Brick ____ **Terra Cotta** ____ **Stone** ✓ **Concrete** ____ **Stucco** ____ **Concrete Block** ____

Glass ____ **Windows** ____ **Metal** ____ **Soffit** ____ **Cornice** ____ **EFIS** ____

Category I:____ **Category II** ____ **Category III** ✓ **Category IV** ____

(See section 275-32-13-c for definition of category types)

LICENSED PROFESSIONAL

Name: John Stryker **Firm Name:** exp US Services Inc.

Address: 205 N. Michigan Avenue Suite 3600 **City:** Chicago

State: Illinois **Zip** 60601 **Professional Seal and Signature:**

Phone: 312.616.7919

Fax: 312.616.6069

E mail: John.Stryker@exp.com

The following is additional information required to be part of the report per sec. 275-32-13-h:

- A site plan of the building showing adjacent streets and alleys, and relationship of the building to property lines and adjacent buildings.
- A description of the building, including the number of stories, height, plan dimensions, age and type of exterior wall construction, describing (as applicable) cornices, soffits or similar overhangs or features.
- Overall photographs or drawings of the 4 elevations of the building.
- A detailed description of the critical examination in narrative form, including start and completion dates.
- A designation of the building's status by the professional as stated above.
- Drawings or photographs describing the locations and extent of all significant distress or deteriorated conditions observed in the facades.
- A description of recommended repair work and precautionary measures that will be taken to safeguard the public, if any, and the recommended completion date of such work.
- Where appropriate, a comparison of conditions of facades on the building with conditions observed during previous examinations.
- A recommendation for future examination, if earlier than 5 years from date of the report.

Section 1 Executive Summary

This Facade Critical Examination Ordinance Report was prepared in response to the City of Milwaukee's request to review several existing conditions of the North Point Water Tower. The following conditions were reviewed; Exterior stone masonry facade / building envelope, interior metal spiral stair, metal standpipe and floor / landings. The examination and this report were conducted and prepared in accordance with the latest ordinance requirements published by the City of Milwaukee.

The subject building is located at 2288 North Lake Drive, Milwaukee, WI 53202.

The tower was designed by Charles A. Gombert, and constructed in 1873 for the purpose of relieving the City's water distribution mains of the water surges and water pulsations that resulted from the early steam driven pumps used for the water supply. Located inside the masonry tower is a standpipe with a diameter of four (4) feet and a height of one hundred twenty (120) feet. The Tower rises to a height of 175 ft. Within the structure is a spiral stairway encircling the standpipe that leads to an interior observation platform, near the top of the tower. The water tower was designated a Milwaukee landmark in 1968 and was selected as one of 5 landmarks in the United States by the American Water Works Association (AWWA).

This report is not to be issued or used for construction, and should not be the basis of implementation of a repair program.

All deficiencies noted are to be considered part of the "repair and maintenance program" required to maintain a safe façade condition. The owner is advised to address these deficiencies promptly to prevent the development of unsafe conditions.

A metric has been applied to most items reported on, and designated as follows - Hazardous, Severe, Moderate or Minor. Below is an explanation and overview of each designation.

Hazardous: These items pose an imminent threat of falling and require attention as soon as reasonably possible.

Severe – These stone pieces and assemblies are severely damaged, beyond which should be repaired during a routine maintenance schedule. These items should be considered immediate action items. Items need to be repaired within 3 to 6 months.

- Removal of large stone finial #3 – completed by City of Milwaukee (10/2013).
- For both Hazardous and Severe items, removal or temporary restraint of large cracked ornate stone caps is required, including cornice pieces and finial assemblies. A wire mesh fall arrest net can be mechanically fastened to adjacent secure structure to prevent falling hazard.

Moderate – These items represent work that would not require immediate action but are necessary to arrest further deterioration of the structure. Items need to be repaired within 12 to 24 months.

- The repair and/or rebuilding of the decorative wood windows will prevent further water infiltration and mitigate further interior masonry degradation.
- The replacement of the interior stair elements is necessary to ensure a safe passage to the upper portion of the water tower. The current lower platform assembly actively promotes rust decay of the steel support structure below and should be remedied to establish a more permanent and secure main platform.
- Installation of a sump pump will help mitigate dangerous standing water below the main lower platform level.

Minor – Items designated as minor should be considered less time sensitive and, while not necessary ensure a stable, safe structure, should be considered important in the overall holistic effort to renovate and preserve the water tower. Items need to be repaired within 24 to 48 months.

- General masonry repair, including replacement stones, tuck-pointing and vegetative growth elimination.
- Rehabilitation of existing steel elements, including rust removal and repainting.

1.1 - General Building Information

A. Building Name and Address

Building Name: North Point Water Tower
Building Address: 2288 North Lake Drive, Milwaukee, WI 53202

B. Principle Building Occupancy

Unoccupied

C. Building Owner Information

Owner's Name: City of Milwaukee, Dept. of Public Works, Milwaukee Water Works
Owner's Address: 841 North Boardway, Room 409, Milwaukee, WI 53202
Primary Contact: Carrie M. Lewis
Phone Number: 414.286.2801
Fax Number: 414.286.2672
Email Address: carrie.m.lewis@milwaukee.gov

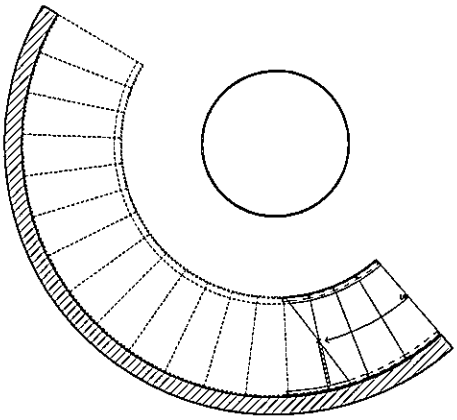
D. Building Designations, Records & Listings

Named Milwaukee Landmark: 1968
Recorded for the Historic American Buildings Survey: 1969
Selected as a National landmark of the American Water Works Association: 1969
Listed National Register of Historic Places: 1973

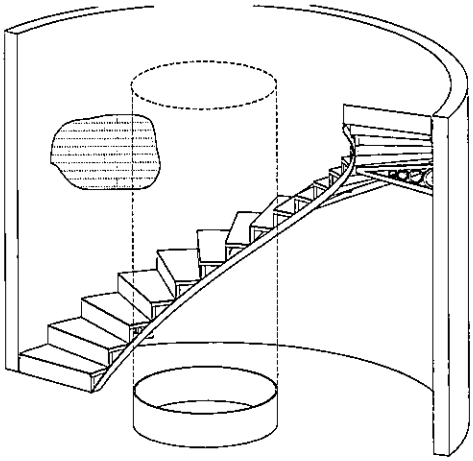
E. Professional Performing the Critical Examination Report Information

Business Name: exp US Services Inc.
Business Address: 205 N. Michigan Avenue Suite 3600, Chicago, IL 60601
Professional Name: John Stryker
Phone Number: 312.616.7919
Fax Number: 312.616.6069

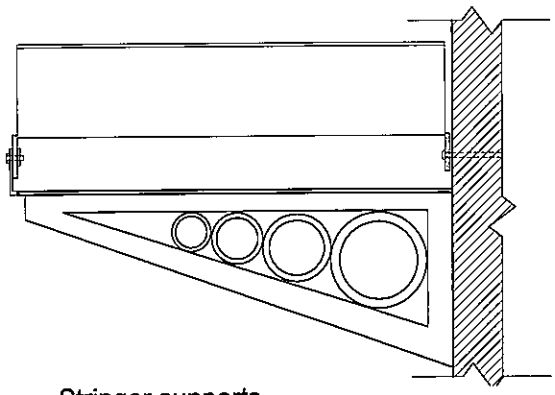
Section 2 - Structural Evaluation



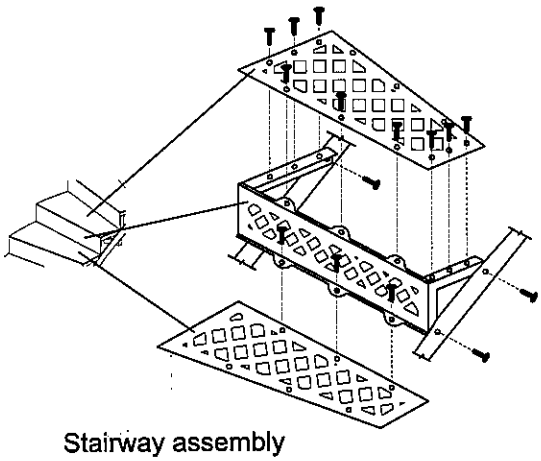
Circular stair plan



Typical stair segment within tower



Stringer supports



Stairway assembly

2.1 - Description of the existing structure

The 175 foot tall North Point water tower structure built in 1873-74, is a Victorian Gothic design with limestone veneer and load bearing Milwaukee brick back up. The tower – conical frustum shape, with an approximate base diameter of 14 foot – relies on its 24 feet x 24 feet x 65 foot tall buttressed base for stability.

The tower structure houses a 4 foot diameter x 120 foot tall above grade iron stand pipe inside it and was built primarily to prevent the formation of ice within the standpipe. The tower has four platforms – an observation deck at an approx. elevation of 135 feet above grade, second platform at an approx. elevation of 117 feet above grade (just below the top of standpipe), third at an approx. elevation of 64 feet above grade and a fourth platform at grade.

Each of these platforms is served by a spiral iron stair that wraps around the 120 foot tall standpipe and is supported off the interior face of the load bearing brick wall.

2.2 - Purpose

As part of the City of Milwaukee facade critical examination program, on October 14th, 2013 exp US services Inc. visited the structure to visually inspect and assess the condition of the existing interior structural elements by conducting a visual review of:

- portions of spiral iron stair and its connection to load bearing brick wall.
- the four platforms.
- the standpipe.

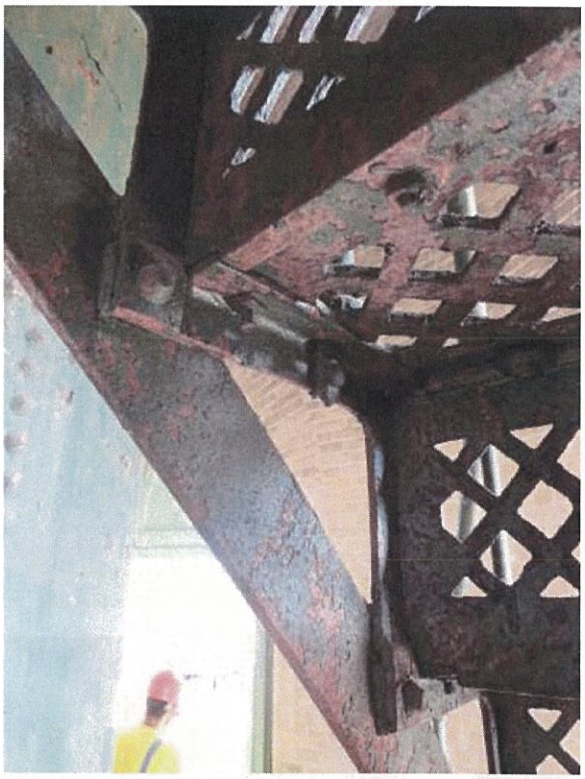
Field measurements of the stair structure were also taken during this visit to in order to construct a drawing for the stair and also to perform an analysis of the sample section of stair. No material testing or probing was conducted.

2.3 - Observations

Stair Structure

The spiral iron stair within the tower was observed to be field assembled at the site with each component of the stair - the tread, riser, tread/riser support angles and stringers were found to either bolted or riveted together.

See page 4 for drawings that illustrate a typical run of the spiral iron stair.

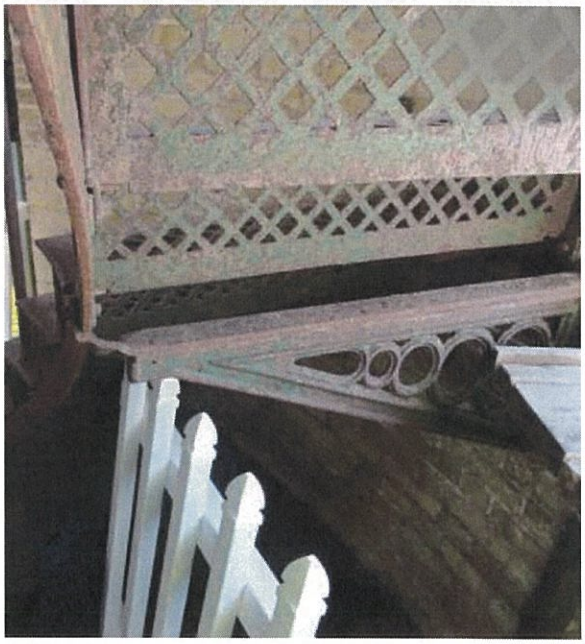


S18

The steps of the stairs were numbered by the inspection team from bottom to top, and one has to climb 213 steps to reach the observation deck at the top of the tower. The stair risers are supported by the stair treads which in turn sit on 'L' shaped 1¼"x1¼" angles (Photo S18 and S19).

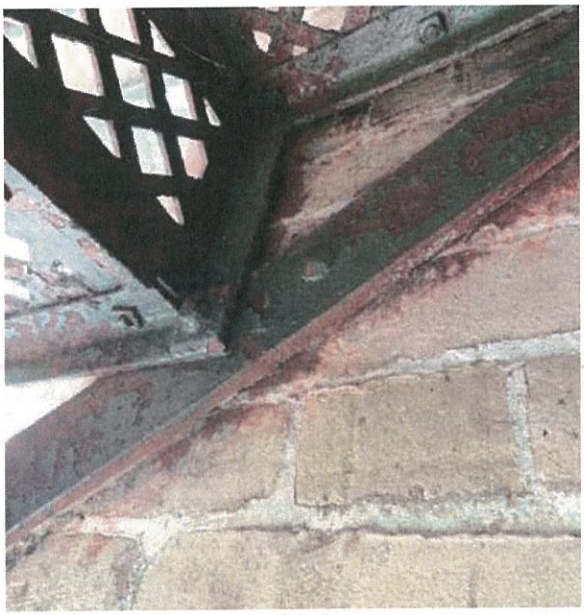
S19

The 'L' shaped 1¼"x1¼" angles are riveted to the 3/8"x 2 ½" plate stringers. The inside plate stringer is supported by a bracket that extends from the masonry brick wall typically every 11 to 12 steps (Photo S22).



S22

S20



The outside plate stringer is bolted to the masonry brick wall every 6 to 7 steps with the bolt typically located in the brick mortar joint (Photo S20 and S23).

S23

S21

The stringers are typically spliced together with a 7"x2.5" plate using 6 rivets every 11 to 12 steps (Photo S21).

The overall stair structure looked to be in fair condition for a structure of its age, except for 'segments' of stairs adjacent to existing windows above step # 110.

The stair components (treads, risers, support angles as well as stringers) adjacent to an existing window above step #110 had some degree of corrosive damage that varied from minor (a buckled tread or flaky riser with support angles and stringers showing minimal damage) to severe (tread/riser falling apart and/or plate stringer nonexistent owing to corrosion). This damage was due to moisture infiltration from the exterior masonry brick wall adjacent to the window sill or header.

Please refer to photographs – S02, S05, S06 through S09, and S13 through S15 for the observed condition.

S02

S05

S06

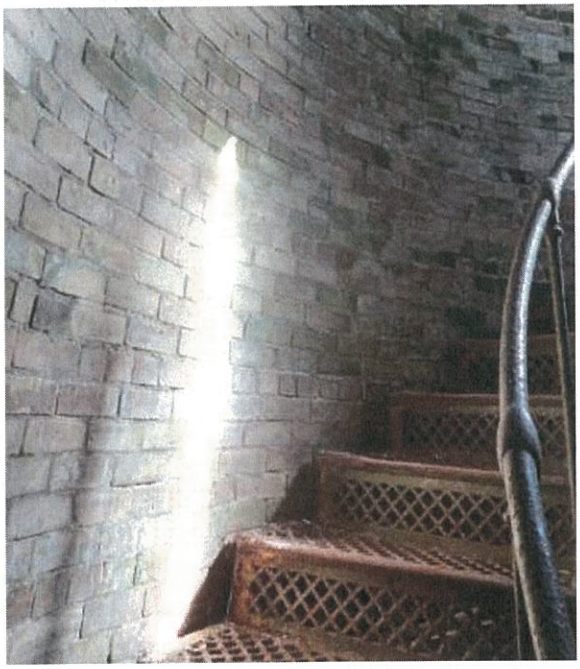
S07

See page 8 for additional referenced photos.

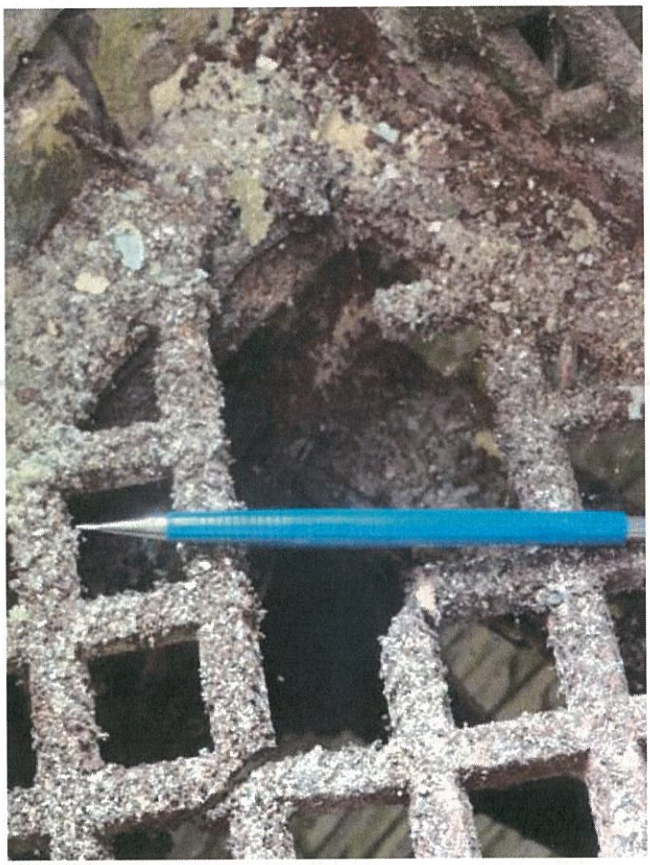
S08

S09

S15



S13



S14

Platforms

The following observations were made at the four platforms within the tower:

'Observation Deck' platform at an approx. elevation of 135 feet: The top as well as the underside of this deck was covered with wood decking and ceiling (Photo S25). The deck structure appeared to be made up of wood / timber framing.

S25

Platform at an approx. elevation of 117 feet: This platform is couple of feet below the top of the standpipe (Photo S27) and is framed with steel beams that are arranged in a radial pattern around the standpipe (Photo S28).

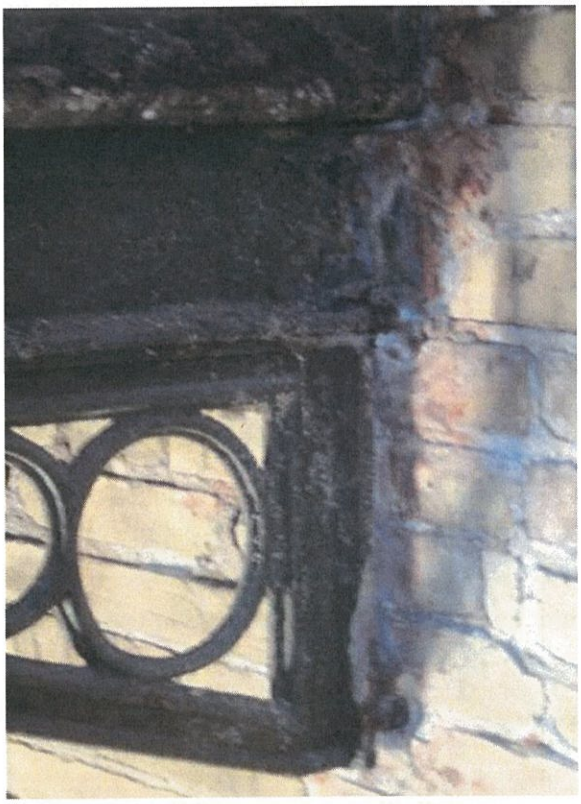
S27

S28

S29

The radial steel beams are supported by steel brackets that extend off of the masonry brick wall (Photos S29 and S30).

S30



S31

A stiffened checkered plate acts as the deck over the radial beams (Photo S31).

Platform at an approx. elevation of 64 feet: A metal grating supported on eight steel angles constitute the framing for this platform (Photo S33 and S34).

S33

S34

All eight angles were observed to be welded to the standpipe on the inside end (Photo S35).

S35

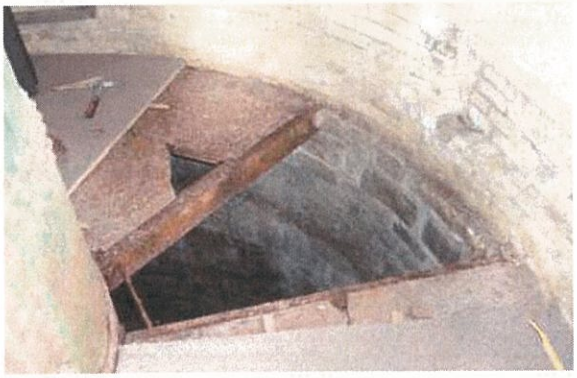
Four of these eight angles were observed to cantilever from the standpipe. In addition, two steel angles were observed to be supported by steel clips at the masonry brick wall (Photo S36)

S36

S38

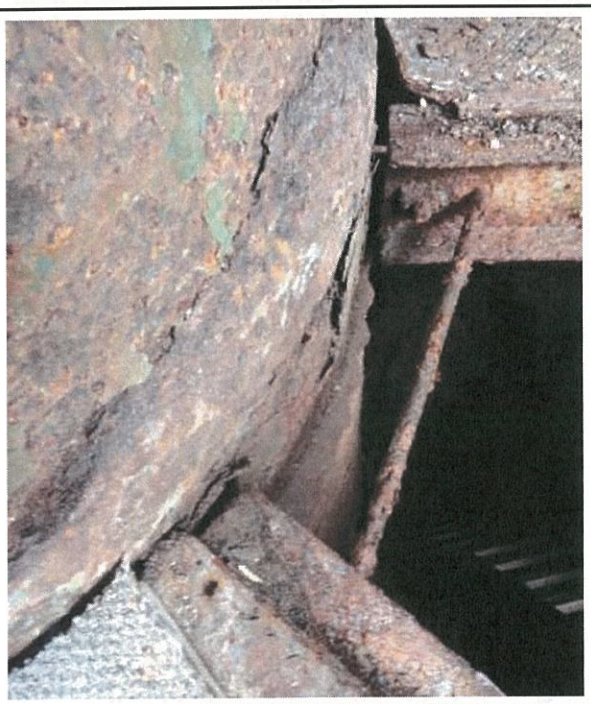
To support this platform, the other two remaining angles are supported by kickers off of the standpipe (Photo S38).

S39



Platform at grade: The platform at grade was framed similar to the platform at elevation 117 feet. Steel beams appear to cantilever from the existing foundation wall and are arranged in a radial pattern around the standpipe (Photo S39).

S40



A stiffened checkered plate formed the deck over the radial beams. The checkered plate along with the steel framing was observed to be corroded (Photos S40 and S41).

S41

Standpipe

The protective cover at the top of the standpipe (120 feet from grade) was removed to observe the condition on the inside of the standpipe. The pipe was found to be approximately ¼" thick at this elevation and the inside of the pipe looked typical of a pipe structure of this age with minor to moderate corrosion. The author was surprised to see that the level of water was visible from the top of the pipe in spite of the standpipe being no longer in service since 1963.

Foundation

The checkered plate at the platform on grade was removed to investigate the base of the standpipe and to observe the foundation wall of the tower. The standpipe extended below the platform and stood on a 'junction chamber' of three water pipes. The corrosion of standpipe, while not as severe above the platform, did extend below the platform. A 13'-6" (approx.) high stepped limestone wall made up the foundation wall of the tower. At the base of the 'junction chamber' there was a pool of water that was approx. 1'-6" deep. The source of the water was unknown. The water did not appear to be stale and the walls of the limestone were observed to be dry at the time of inspection but did display efflorescence. Thus, in all likelihood the pool of water at the base of the foundation was either ground water or it was run off water that accumulated in the chamber from the three foundation wall openings for the pipes that start/end in the chamber.

2.4 - Findings

Owing to the absence of structural drawings for the existing structure, the analytical evaluation of the stair structure was based on the following assumptions:

Gravity Loads: Dead Load

12 psf. (¼" thick riser with 50% perforations + ¼" thick tread with 50% perforations + misc. steel)

3 plf. (stringer weight)

Steel Stringer: Assumed to be a Wrought iron stringer with an allowable bending stress of 12 ksi.

Deflection Criteria: 3/8" max. deflection

With the above design assumptions, the stair live load was varied to arrive at the load carrying capacity of the stair stringers. The stair was found to be capable of resisting a live load of 15 psf (versus a current International Building Code recommended value of a uniform live load of 40 psf for a stair structure). The stair was also analyzed for a 200 lb concentrated live load (not considered concurrently with the 15 psf uniform live load) that was strategically placed along the length of the stringers to analyze the stringer behavior. It was observed that the stringer while being overstressed by about 20%, still was within the assumed deflection limits when subjected to the concentrated live load.

2.5 - Conclusions and Recommendations

Stair Structure

Based on our limited visual review and analysis of the stair structure, we find that the stair cannot sustain the typical code prescribed uniform live load of 40 psf and is adequate only for a load of 15 psf. In spite of the observed overstress under a concentrated 200 lb live load, we feel the occasional loading of the stair stringer with the concentrated load will not affect its long term performance.

We thus conclude that the stair structure can remain in service provided,

Proposed Interim Repair:

- Install 1/8" galvanized steel plate on top of existing treads and bolted/screwed to the existing tread that are in turn supported off of angle brackets. Verify the related support brackets are in fair condition. If not, the angle brackets must be replaced in kind first prior to putting the plate on the treads.

- Install the 3/8" plate over the corroded stringer sections. The new stringer repair plate must overlap with sound stringer plate at least 12 inches and must have two 5/8" diameter post-installed mechanical anchors (compatible to be installed in solid masonry) spaced at 8" O.C.

Proposed Ultimate Repair:

- the corroded stair stringers/treads/risers and associated hardware is removed and replaced in kind.

- it is not open to public and used only for the periodic maintenance (with the live loads being less than the 15 psf and 200 lb uniform and concentrated load respectively) of the tower interior.

Platforms

- Observation Deck' platform at an approx. elevation of 135 feet: A condition assessment of this platform was not possible at this time as the structure was not exposed to view.

- Platform at an approx. elevation of 117 feet: Apart from the checkered plate corrosion observed along the circumference of this platform, the platform framing appeared to be in good condition. We recommend replacing the checkered plate with a galvanized steel checkered plate. The existing structural steel framing should be cleaned and painted per the repair procedure described below.

- Platform at an approx. elevation of 64 feet: It is a known fact that welding to wrought iron or cast iron is problematic due to the presence of slag. The use of welding in addition to the haphazard framing layout of this platform were indications that this platform was neither engineered nor built at the time of tower/stair construction. In lieu of further evaluation and allocating a budget for periodic maintenance of this platform' we recommend the platform be removed in its entirety owing to the reasons cited.

- Platform at grade: We recommend that the checkered plate be replaced with a galvanized steel checkered plate. The existing structural steel framing should be cleaned and painted per the repair procedure described below.

Standpipe

The standpipe from the outside was observed to be in good condition over its entire height with the only telltale of the age of the pipe being the riveted joints and failing paint coating. However, at the grade level platform the standpipe was observed to be corroded extensively. In order to fully evaluate the condition of the standpipe, we recommend retaining a testing agency to perform additional destructive/non-destructive tests and exploratory investigations. The testing program should evaluate/investigate:

- the standpipe wall thickness at the bottom of the pipe (after scrapping away the exterior surface of the pipe of all rust) and variation of the wall thickness (if any) over the height of the standpipe.

- the height of water within the standpipe.

- the yield/ultimate strengths of the standpipe steel. This can be achieved by retrieving coupons from the top of the standpipe where there exists some slotted openings in the standpipe. Coupons can be retrieved by enlarging these slotted openings. The same coupon can be used to determine the chemical composition of the standpipe to determine if it is weldable.

We also recommend taking advantage of the presence of a testing agency at the site during the above evaluation to retrieve a coupon from the steel stair in order to determine its yield/ultimate strength and weldability. Such information will be helpful to not only confirm the design assumptions used to analyze the existing stair but also use it to determine if there exist any alternate retrofit schemes for the stair stringer.

Foundation

It is our understanding that along with the standpipe, the three water pipes that terminate in the 'junction chamber' below the platform at grade, are no longer in use. In order, to keep the 'junction chamber' dry we recommend one of the following two options:

- Installing a sump pump that pumps the water from the 'junction chamber' into a nearby at grade drain.

- Pumping low density pervious lightweight cellular concrete (www.geofill.com) into the 'junction chamber' and sealing it permanently. While such an option will imply that the bottom of the chamber will not be accessible anymore it does give the advantage of not having to worry about maintaining the steel platform at grade.

2.6 - Cleaning and Painting Retrofit Procedure

All existing steel that has undergone minor to moderate corrosion damage must be retrofitted per the following procedure:

- Existing coating must be removed with a chemical stripper specifically designed to remove coating from metal surfaces and recommended for the intended application or it can be blast-cleaned according to SSPC-SP6/NACE No. 3 standard.

- Coat steel with a zinc rich primer followed by a polyamide epoxy intermediate coating followed by a polyurethane paint coating.

2.7 - Statement of Limitations

We gathered information for this report through an on-site inspection, which was limited to features readily accessible to touch and discernible to the naked eye. We conducted no material testing or probing. Material testing, inspection of hidden or inaccessible areas, necessitating use of invasive procedures, and inspection of structural components other than the stair, standpipe and platform framing is beyond our Scope of Services.

This report shall not be construed to warrant or guarantee the building and any of its components under any circumstances. exp US Services Inc. shall not be responsible for latent or hidden defects that may exist, nor shall be inferred that all defects will have been either observed or recorded. The review is intended solely to visually inspect and assess the condition of the existing interior structural elements and determine the necessity of retrofits for any imminently hazardous conditions.

Section 3 - Interior Evaluation

Interior photo of standpipe and stair

Interior photo of roof structure

3.1 - Observations

The interior evaluation of the structure was conducted by traversing the height of the tower several times, noting any significant deficiencies in the masonry. The notations made during the evaluation are keyed to the adjacent stair tread at that location, as the stair structure was considered a constant benchmark throughout the tower.

Starting at the ground level, each stair tread was designated with a number, 1 - 213. The deficiencies notes can be located around the area of said tread number.

Tread #30 = T30.

Comment:
Water infiltration from window has caused wearing at mortar joints

Action:
Remedy moisture infiltration from windows, repoint mortar joints

Grade: Minor

T30

Comment:
Deterioration at window sill due to moisture infiltration (East of North windows)

Action:
Remedy moisture infiltration from windows, clean and remove loose / flakey stone material from sill

Grade: Moderate

T34

Comment:
Deterioration at window sill due to moisture infiltration (North of East windows)

Action:
Remedy moisture infiltration from windows, clean and remove loose / flakey stone material from sill

Grade: Moderate

T40

Comment:
Several common bricks at window arch have deteriorated faces

Action:
Replace damaged bricks, repoint mortar joints

Grade: Moderate

T40 A

T45

Comment:
Orphaned metal pin in masonry

Action:
Remove pin and repoint mortar joints

Grade: Minor

T70

Comment:
Supplementary mortar added over possibly compromised mortar beds

Action:
Repoint mortar joints

Grade: Minor

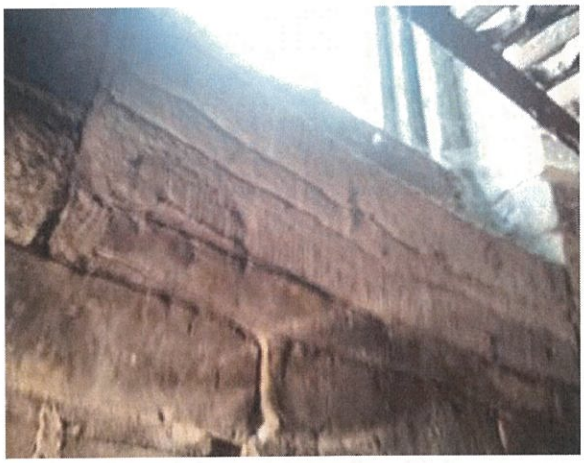
T90

Comment:
Large amounts of efflorescent and organic matter present on brick face.

Action:
Clean portion of masonry

Grade: Minor

T90 A



Comment:
Face of sill cracked from past water infiltration

Action:
Remedy moisture infiltration from window, repoint mortar joints

Grade: Minor

Comment:
Crack occurs above South window 71' A.G.P. (above ground platform) up to 92' A.G.P. (approx.. 1/8") horizontal crack

Action:
Replace fractured bricks, repoint mortar joints

Grade: Moderate

T95

Comment:
Crack in common brick, through mortar joints and brick. Crack is above South window, movement appears to be horizontal (minimal movement)

Action:
Replace fractured bricks, repoint mortar joints

Grade: Moderate

T95 A

Comment:
Crack continues approximately 3' above window

Action:
Replace fractured bricks, repoint mortar joints

Grade: Minor

T95 B

T105

Comment:
Crack occurs below West window 66' A.G.P. up to 89' A.G.P., movement appears to be horizontal (1/8") but not vertical

Action:
Replace fractured bricks, repoint mortar joints

Grade: Minor

T135 A

Comment:
Face of sill cracked from past water infiltration
Crack in brick occurs below South window extends from 92' A.G.P. down to 71' A.G.P. (Comment T95)

Action:
Remedy moisture infiltration from window, repoint mortar joints

Grade: Minor

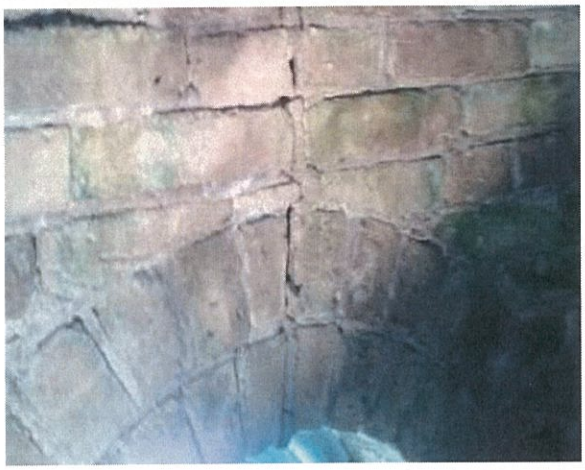
T153

Comment:
Crack occurs below North window at 89' A.G.P. to 119' A.G.P.

Action:
Replace fractured bricks, repoint mortar joints

Grade: Minor

T179



Comment:
Crack occurs above West window at 116' A.G.P., Horiz. movement (1/16")

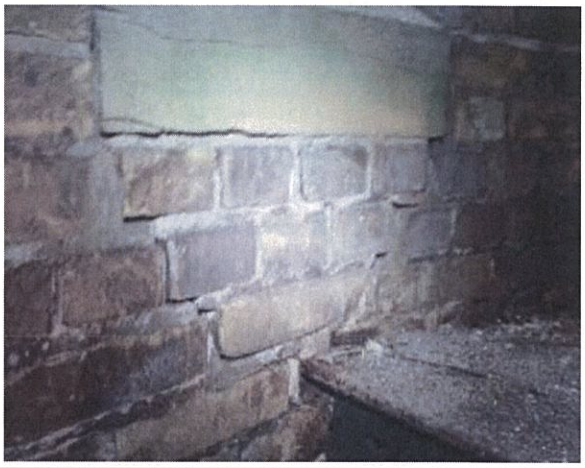
Action:
Replace fractured bricks, repoint mortar joints

Grade: Moderate

Comment:
Lower portion of south window sill and lower window have shifted

Action: Repoint mortar joints

Grade: Moderate



T187

Comment:
Crack occurs above North window, extends from 124' A.G.P. to 128' A.G.P, west side of window arch moved out (1/8")

Action:
Replace fractured bricks, repoint mortar joints

Grade: Moderate

T187 A

Comment:
Shifting in sill and sub-masonry raised up a 1/4"

Action:
Replace fractured bricks, repoint mortar joints

Grade: Moderate

T187 B

Comment:
Crack occurs above South window, eastern block of arch dropped 3/16", crack extends from 124' A.G.P. to 129' A.G.P.

Action:
Replace fractured bricks, repoint mortar joints

Grade: Moderate

T188

T200

Comment:
Crack occurs above North window, extends from 124' A.G.P. to 128' A.G.P.

Action:
Replace fractured bricks, repoint mortar joints

Grade: Minor

T202

Comment:
Missing underside of upper wooden platform

Action:
Refasten wood decking to underside of platform

Grade: Minor

T212

Comment:
Cracked arch, East (right) side of North window

Action:
Replace fractured bricks, repoint mortar joints

Grade: Minor

3.2 - Conclusions and Recommendations

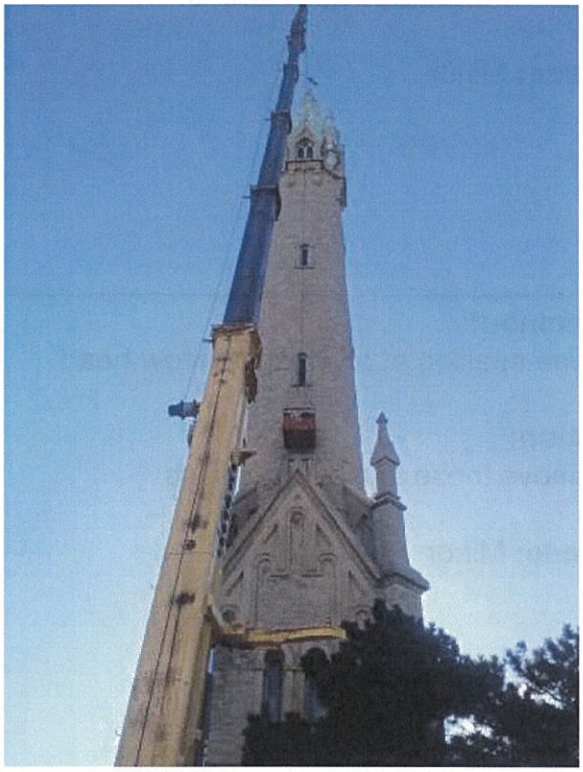
Upon completion of the visual evaluation, the interior masonry and various interior elements of the Water Tower are noted in satisfactory condition. The previously referenced flaws in the mortar and common brick work are to be expected in a structure of this age. The majority of the notes made regarding the interior stonework are aesthetic flaws and do not affect the structure of the building. Future maintainance of the building should include ensuring that the multiple windows in the tower are water tight and prevent infiltration as moisture has been the cause of much of the masonry damage in the past.

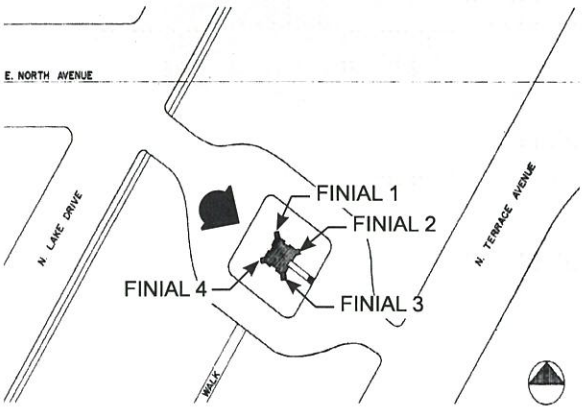
4.1 - Observations

The exterior evaluation of the structure was conducted via a series of (4) elevation drops. A representative from exp US Services Inc, accompanied by a representative from Masonry Restoration Inc, traversed in a crane supported basket from the top of the structure down to the lower portion of the structure.

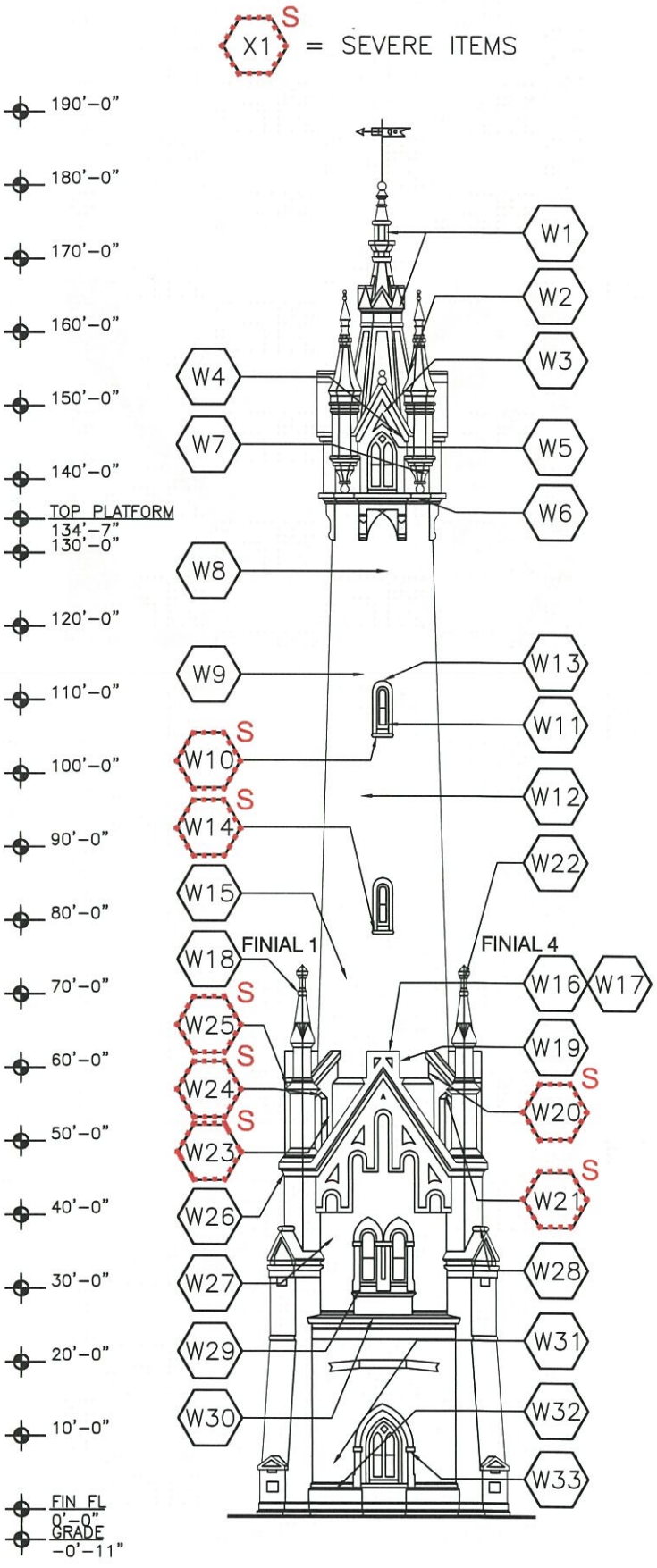
The notes made and photos taken from the (4) drops are categorized by directional elevation.

W4= 4th comment, West elevation





SITE PLAN



W1

Comment:
Metal roof / finials: Exterior metal sheeting is intact. Peeling paint and spotting rust across entire surface

Action:
Sand, reprime and paint entire surface

Grade: Moderate

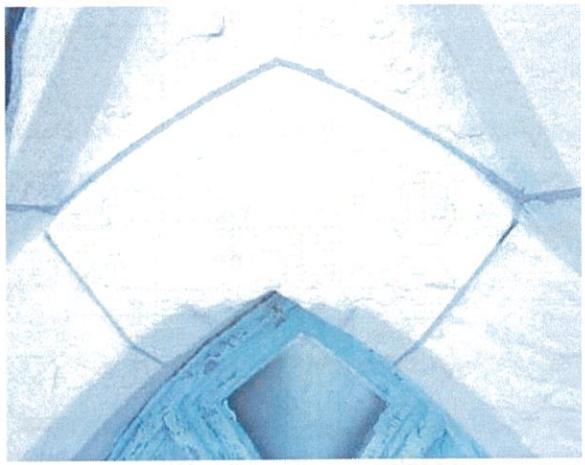
W2

Comment:
Organic debris in roof valleys

Action:
Remove and dispose of debris

Grade: Minor

W3



Comment:
Stone spalling at arch top window head

Action:
Remove loose layers and flakes

Grade: Minor

W4

Comment:
Missing joint sealant and mortar at window casing and roof / stone interface

Action:
Repoint and reseal joints

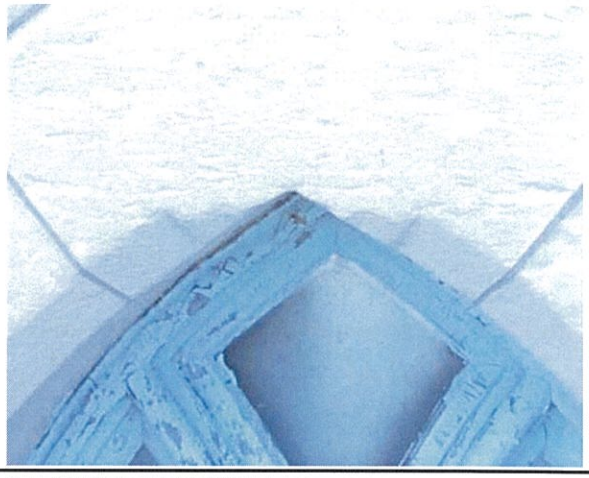
Grade: Moderate

Comment:
Mortar joint deterioration at window head

Action:
Repoint mortar joints

Grade: Minor

W5



Comment:
Organic debris / mud dauber nest at underside of horizontal shelf stone

Action:
Remove debris & clean

Grade: Moderate

W6

Comment:
Gaps between metal roof / finials and stone façade. No sealant, caulk or mortar

Action:
None

Grade: None

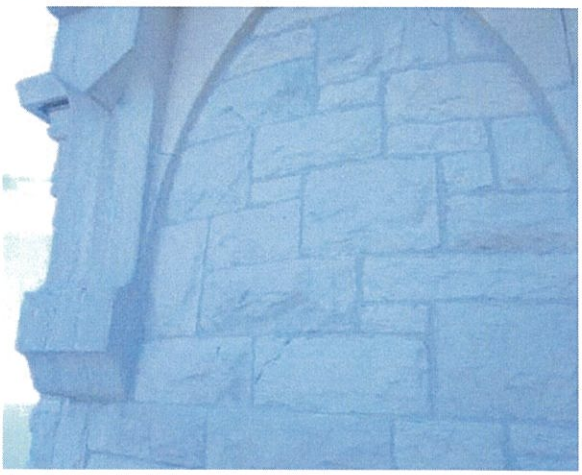
W7

Comment:
Field stone in good general

Action:
None

Grade: None

W8



W9

Comment:
Step cracking at stone and joint adjacent to Window 2. Approx. 3'x3'

Action: Repair stone and repoint mortar joints

Grade: Moderate

W10

Comment:
Window 2: Stone sill cracked at north end

Action: Route and point with mortar

Grade: Severe

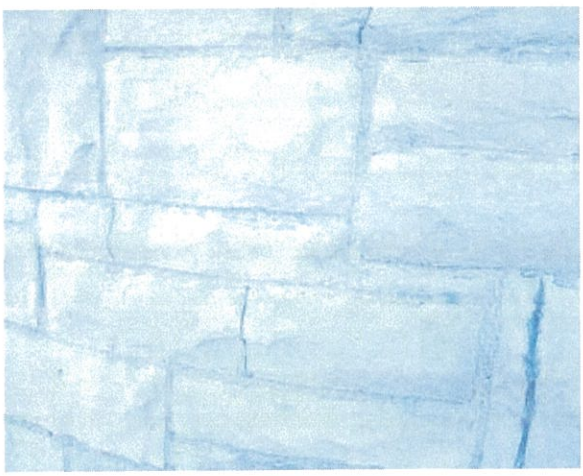
W11

Comment:
Window 2: Paint peeling across entire surface

Action:
Sand, reprime and paint entire surface

Grade: Moderate

W12



Comment:
Approx. (5) stones split and/or mechanically routed and missing mortar

Action: Route and point with mortar

Grade: Moderate

Comment:
Window 2: Oversized mortar joints with some deterioration

Action:
Repoint mortar joints

Grade: Minor

W13

Comment:
Window 3: Stone sill cracked at north end

Action:
Repair stone and repoint mortar joints

Grade: Severe

W14

Comment:
Below Window 3: Large cracks at stone and mortar

Action:
Repair stone and repoint mortar joints

Grade: Moderate

W15

Comment:
Large horizontal roof: Cracked stone and corner

Action:
Repair stone and repoint mortar joints

Grade: Moderate

W16

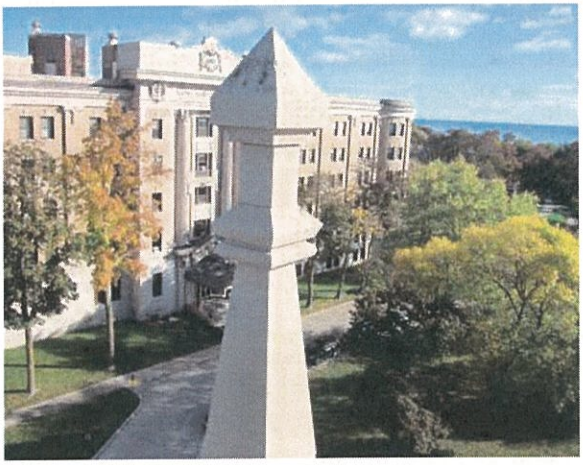
W17

Comment:
Large horizontal roof: Chipped leading edges and spalling surfaces

Action:
Remove loose stone and surfaces

Grade: Minor

W18



Comment:
Stone Finial 1: Good general condition (new upper pieces)

Action: None

Grade: None

W19

Comment:
Large Horizontal roof: Spalling surface, missing large mortar joints at SW side

Action:
Remove loose layers / flakes and repoint mortar joints

Grade: Moderate

Comment:
Flying Buttress 4: Missing / deteriorated mortar joints along assembly (5-piece buttress), missing mortar joint at cap stone - tower interface

Action:
Repair stone and repoint mortar joints

Grade: Severe

W20

Comment:
Flying Buttress 4: Cracked upper arch piece

Action:
Repair stone and repoint mortar joints

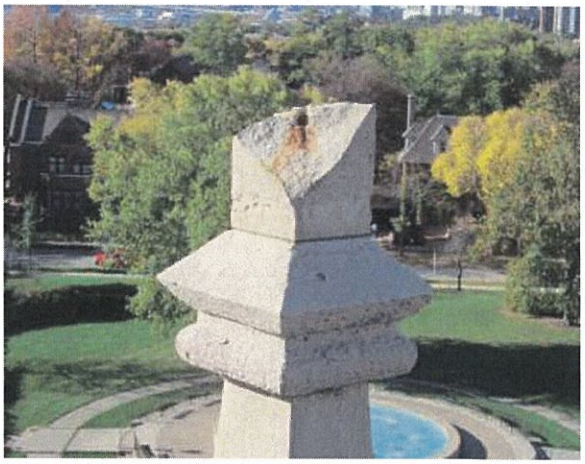
Grade: Severe

W21

Comment:
Stone Finial 4: Missing upper finial assembly

Action:
Replace stone and repoint mortar joints

Grade: Minor



W22

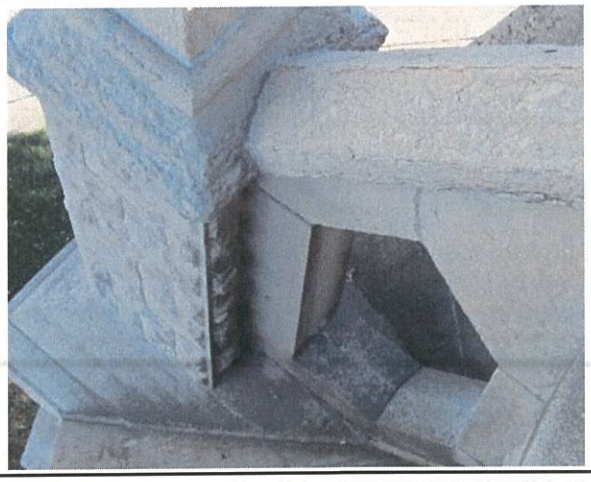
Comment:
Flying Buttress 1: Missing / deteriorated mortar joints along assembly (5-piece buttress), missing mortar joint at cap stone - tower interface

Action:
Repoint mortar joints

Grade: Severe

W23

W24



Comment:
Flying Buttress 1: Cracked upper arch piece, missing mortar

Action:
Repair stone and repoint mortar joints

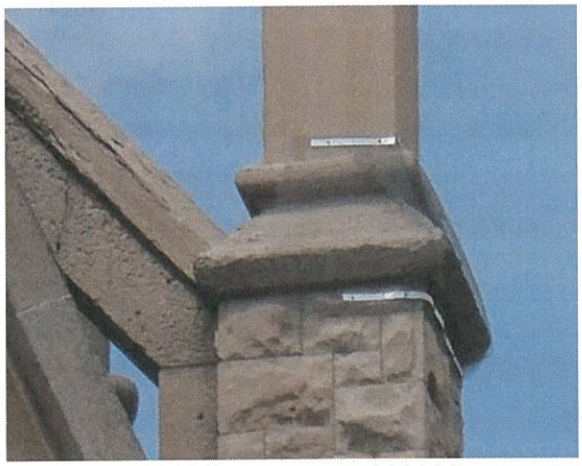
Grade: Severe

W25

Comment:
Large Stone Finial 1: Cracked mid cap piece

Action:
Replace stone and repoint mortar joints

Grade: Severe



UPDATE (6/24/15): Stone elements have been mechanically restrained by City of Milwaukee.

W26

Comment:
Loose cornice stone and mortar

Action:
Repair stone and repoint mortar joints

Grade: Moderate

Comment:
Mortar joint deterioration - approx. 6' x 6'

Action:
Repoint mortar joints

Grade: Moderate

W27

Comment:
Gable roof ridge round profile - spalling along entire ridge

Action:
Remove loose layers / flakes

Grade: Moderate

W28

Comment:
Window 4: Stone sill spalling along leading edge

Action:
Remove loose layers / flakes

Grade: Moderate

W29

Comment:
Large stone sill spalling along top face and leading edge

Action:
Remove loose layers / flakes

Grade: Moderate

W30

W31

Comment:
Compromised mortar joint

Action:
Repoint mortar joints

Grade: Minor

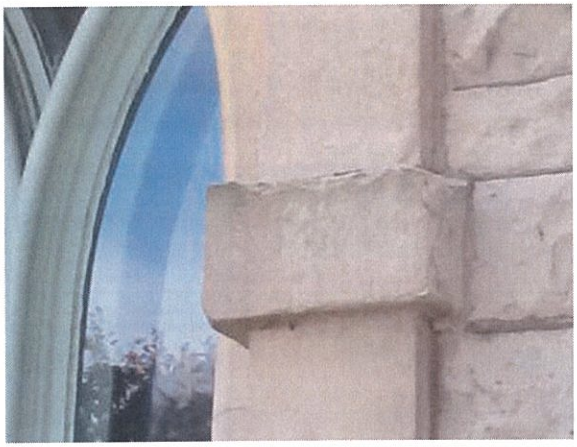
W32

Comment:
Foundation / base stone edge delamination

Action:
Repair stone. Remove loose layers / flakes

Grade: Minor

W33

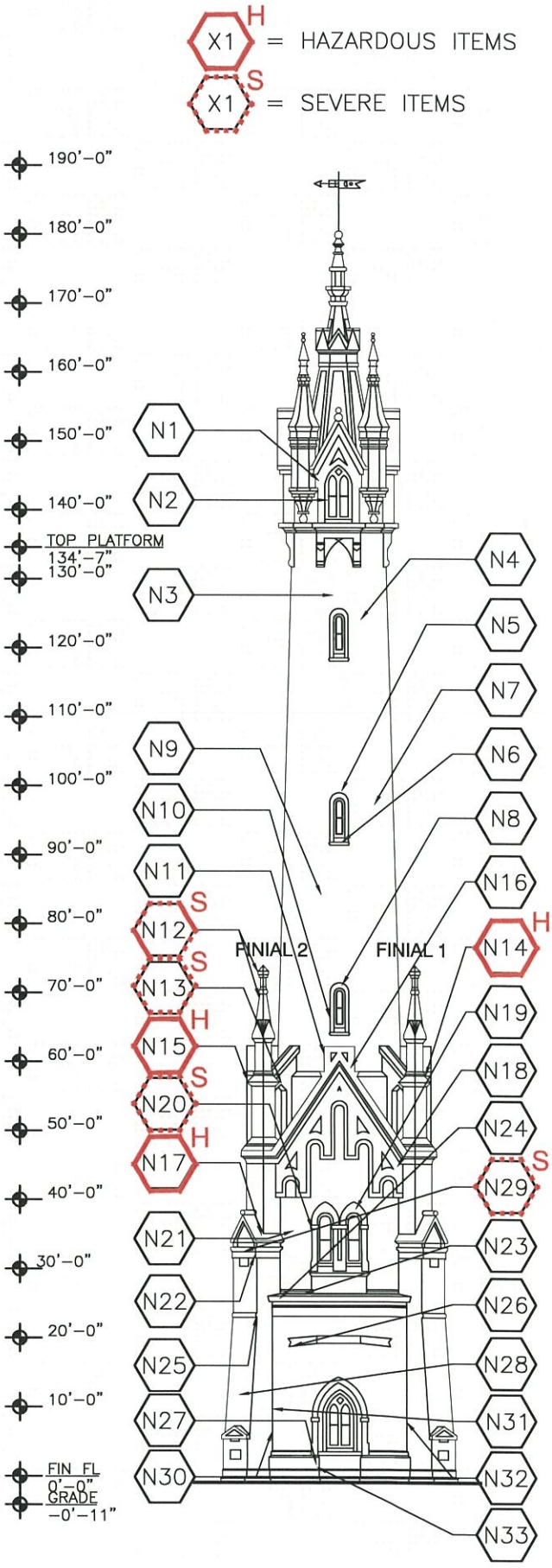


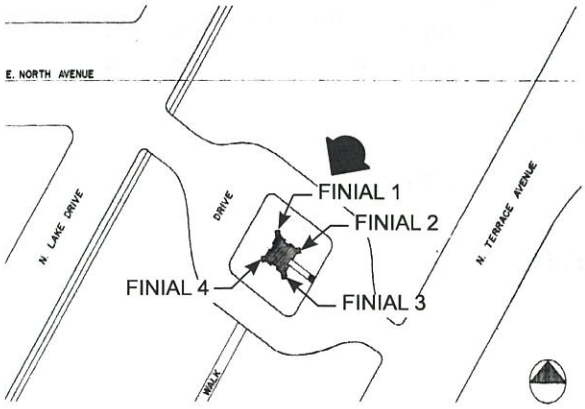
Comment:
Deteriorated corners of stone window detail

Action:
Repair stone

Grade: Minor

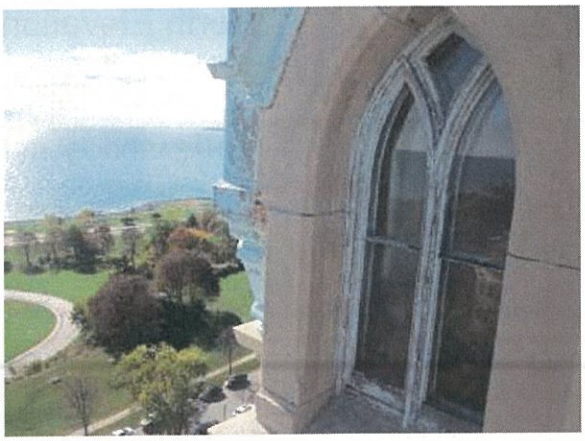
North Elevation Drop





SITE PLAN

N1

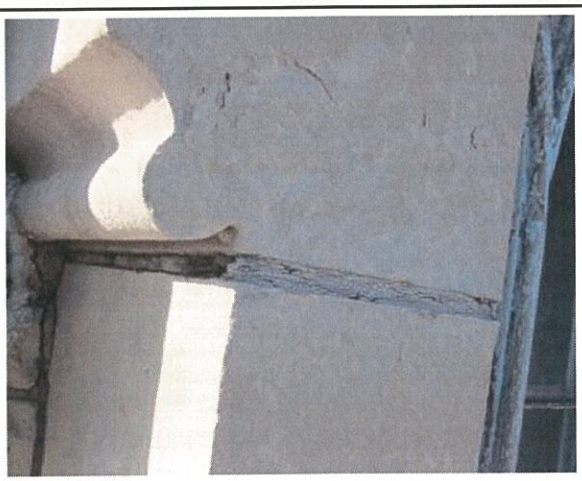


Comment:
Window 7: Wood window frame and sash is deteriorated / split / rotted. Peeling paint over entire surface

Action:
Repair frame / sash, reprime and paint

Grade: Minor

N2

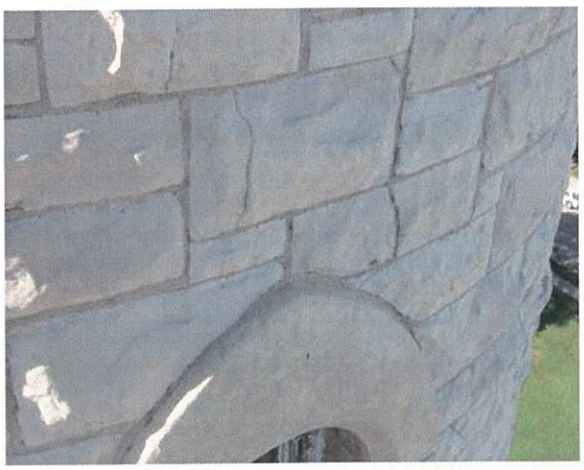


Comment:
Window 7: Stone arch / window casing: Caulk joint over mortar joint has failed

Action:
Repoint mortar joints

Grade: Moderate

N3



Comment:
Window 8: Approx. (4) stones split and/or mechanically routed and missing mortar

Action:
Route and point w/ mortar

Grade: Minor

N4

Comment:
Window 8: Approx. (11) stones split and/or mechanically routed and missing mortar

Action:
Route and point w/ mortar

Grade: Minor

Comment:
Window 9: Missing stone / mortar, split stones at arch top window casing

Action:
Replace stone and repoint mortar joints

Grade: Moderate

N5

Comment:
Window 9: Stone sill cracked (entire depth)

Action:
Route and point w/ mortar

Grade: Minor

N6

Comment:
Approx. (10) stones split and/or mechanically routed and missing mortar

Action:
Route and point with mortar

Grade: Moderate

N7 A

N7
B

Comment:
Approx. (10) stones split and/or mechanically routed and missing mortar

Action:
Replace stone, route and point w/ mortar

Grade: Moderate

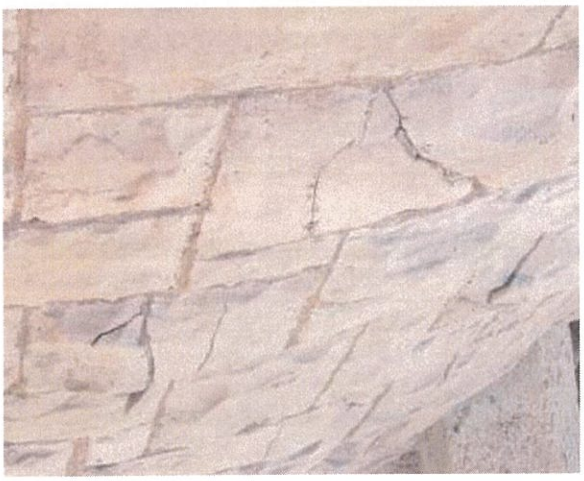
N8

Comment:
Window 10: Stone arch / window casing: cracked (entire depth)

Action:
Repair stone and repoint mortar joints

Grade: Moderate

N9



Comment:
Approx. (10) stones split and/or mechanically routed and missing mortar

Action:
Route and point w/ mortar

Grade: Moderate

Comment:
Approx. (10) stones split and/or mechanically routed and missing mortar

Action:
Route and point with mortar

Grade: Moderate

N9

Comment:
Window 10: Stone sill cracked (leading edge)

Action:
Repair stone and repoint mortar joints

Grade: Minor

N10

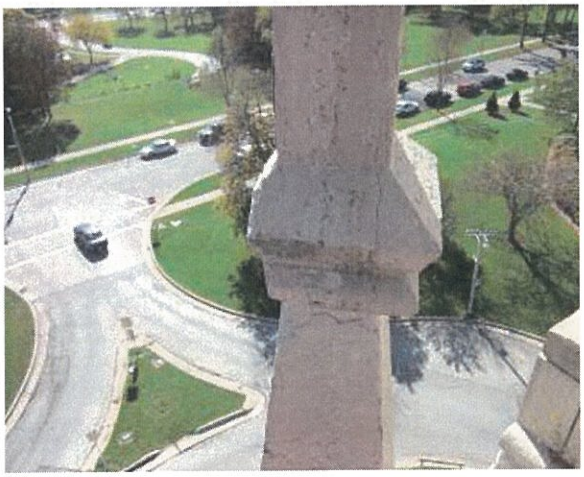
Comment:
Flat Roof: Spalling on top surface, missing mortar at horizontal and vertical joints

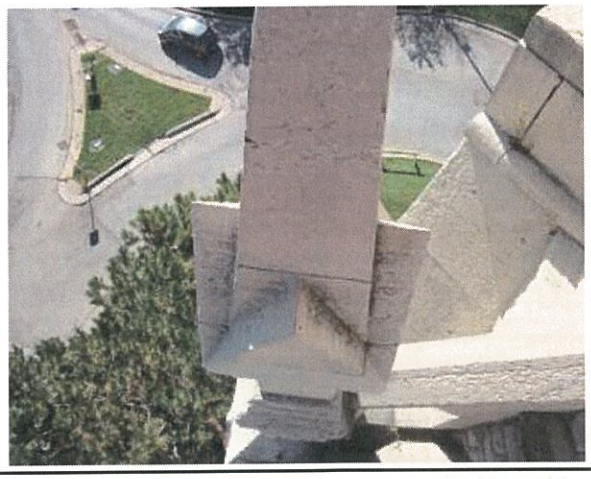
Action:
Remove loose layers and flakes and repoint mortar joints

Grade: Moderate

N11

N12





Comment:
Stone Finial 2: Stone is spalling, splitting, shearing

Action:
Replace stone and repoint mortar joints

Grade: Severe

N13

Comment:
Flying Buttress 2: Cracked upper arch piece, missing mortar

Action:
Repair stone and repoint mortar joints

Grade: Severe

Comment:
Stone Finial 1: Mid cap stone is cracked

Action:
Replace stone and repoint mortar joints

Grade: Severe (Hazardous)

Update:
Hazardous condition abated on 4/11/14. Stone elements have been mechanically restrained by city of Milwaukee on 4/11/14

N14

Comment:
Stone Finial 2: Mid cap stone is cracked, loose

Action:
Replace stone and repoint mortar joints

Grade: Severe (Hazardous)

Update:
Hazardous condition abated on 4/11/14. Stone elements have been mechanically restrained by city of Milwaukee on 4/11/14

N15

Comment:
Deteriorated mortar / sealant joints at top of gable ridge stone

Action:
Route and point with mortar / sealant

Grade: Minor

N16

N17

Comment:
Flying Buttress 2: Cracked gable roof at North side (entire length)

Action:
Repair stone and repoint mortar joints

Grade: Severe (Hazardous)

Update:
Hazardous condition abated on 4/11/14. Stone elements have been mechanically restrained by city of Milwaukee on 4/11/14

N18

Comment:
Northwest stone arch pillaster: cracked

Action:
Repair stone and repoint mortar joints

Grade: Moderate

N19

Comment:
Window 12: Stone arch / window casing: cracked (10" piece in hand)

Action:
Repair stone and repoint mortar joints

Grade: Severe

Comment:
Window 11: Stone casing: spider cracking

Action:
Repair stone and repoint mortar joints

Grade: Severe

N20

Comment:
Split stone: 18" x 18"

Action:
Repair stone and repoint mortar joints

Grade: Moderate

N21

Comment:
Split stone: 2 pieces (10" piece in hand)

Action:
Repair stone and repoint mortar joints

Grade: Moderate

N22

N23

Comment:
Main horizontal stone sill: Spalling at top and leading edge. Vegetative growth

Action:
Remove loose stone / surfaces

Grade: Minor

N24

Comment:
Flying Buttress 2: Missing mortar, loose stones at main horizontal sill

Action:
Repair stone and repoint mortar joints

Grade: Moderate

N25

Comment:
Flying Buttress 2: Bull nose profile: cracked entire vertical thickness

Action:
Repair stone and repoint mortar joints

Grade: Minor

N26

Comment:
1873 Flag Banner: cracked edges both ends

Action:
Repair stone and repoint mortar joints

Grade: Minor

Comment:
Foundation corner at Window 13: cracked

Action:
Repair stone and repoint mortar joints

Grade: Moderate

N27

Comment:
Various face cracks in stones full height of buttress

Action:
Repair stone and repoint mortar joints

Grade: Minor

N28

Comment:
Enlarged mortar joint at round detail stone profile

Action:
Repoint mortar joints

Grade: Minor

N29

Comment:
Various mortar joints have failed in corner

Action:
Repoint mortar joints

Grade: Minor

N30

N31

Comment:
Single stone has several vertical fractures

Action:
Replace stone and repoint mortar joints

Grade: Moderate

N32

Comment:
Compromised portion of mortar joint

Action:
Repoint mortar joints

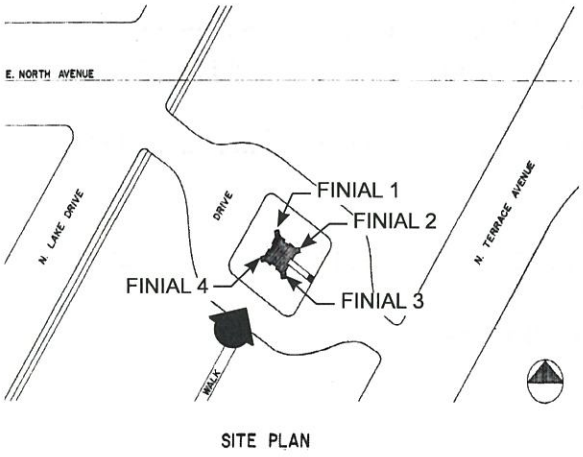
Grade: Moderate

N33

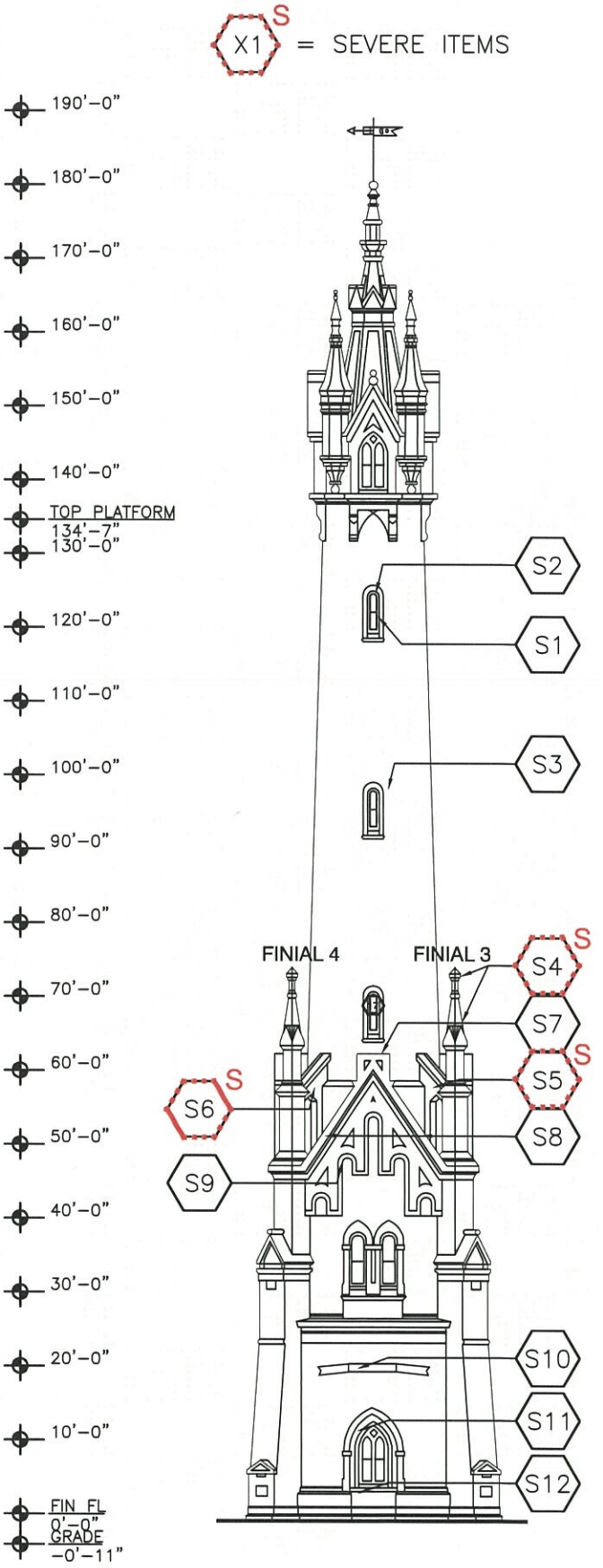
Comment:
Corner of foundation / base stone has severe crack, may be completely separated. Crack was repaired at one point

Action:
Repair stone and repoint mortar joints

Grade: Severe


E. NORTH AVENUE
N. LAKE DRIVE
DRIVE
N. TERRACE AVENUE
WALK
FINIAL 1
FINIAL 2
FINIAL 3
FINIAL 4

SITE PLAN


S
X1
= SEVERE ITEMS
190'-0"
180'-0"
170'-0"
160'-0"
150'-0"
140'-0"
TOP PLATFORM
134'-7"
130'-0"
120'-0"
110'-0"
100'-0"
90'-0"
80'-0"
70'-0"
60'-0"
50'-0"
40'-0"
30'-0"
20'-0"
10'-0"
FIN FL
0'-0"
GRADE
-0'-11"
FINIAL 4
FINIAL 3
S2
S1
S3
S4
S7
S5
S6
S8
S9
S10
S11
S12

S1

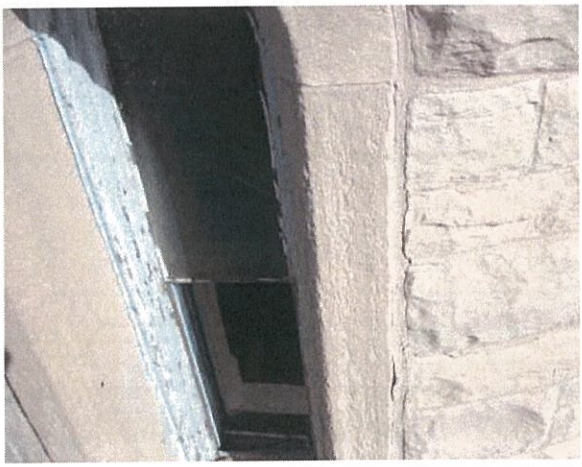
Comment:
Window 15: Wood window frame and sash is deteriorated / split / rotted. Peeling paint over entire surface

Action:
Repair frame / sash, reprime and paint

Grade: Minor

Updated Comment: Lower outer glass lite missing (6/24/15). Replace lower lite.

S2



Comment:
Window 15: Mortar / sealant deteriorated or missing

Action:
Recaulk / repoint mortar joint

Grade: Minor

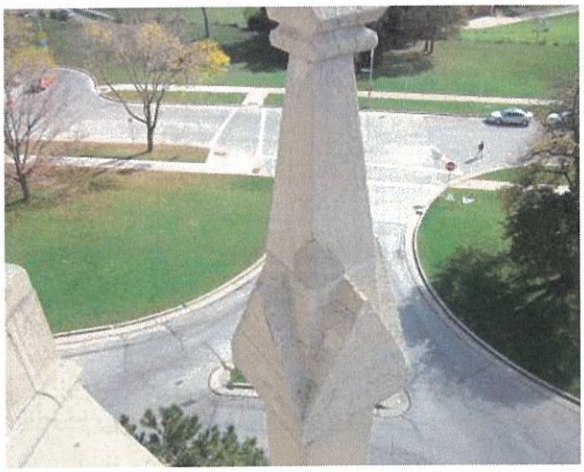
S3

Comment:
Window 16: Approx. (5) stones split and/or mechanically routed and missing mortar

Action:
Route and point w/ mortar

Grade: Moderate

S4



Comment:
Stone Finial 3: Upper sections / assembly: vertical and horizontal cracks throughout, large (10"x10"x6") mortar
patches loose x2, spalling / flaking surface

Action:
Replace stone and repoint mortar joints

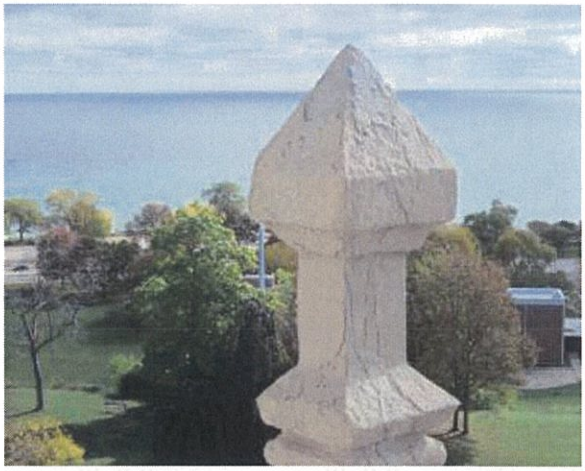
Grade: Severe

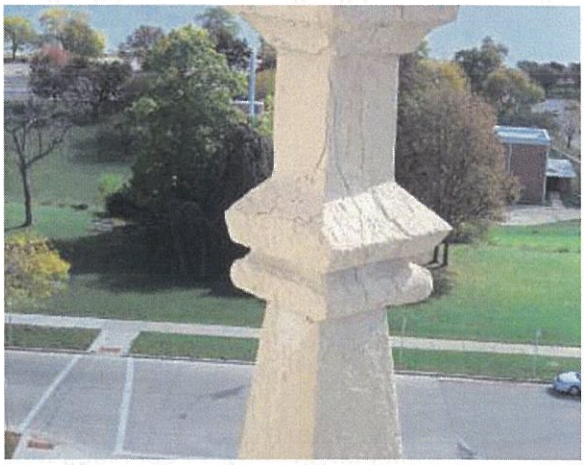
S4

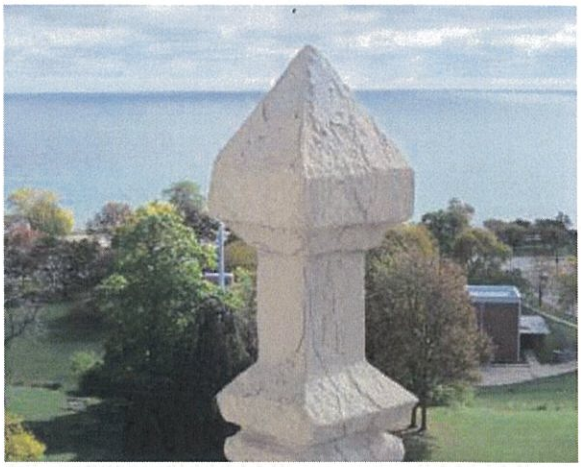
Comment:
Stone Finial 3: Upper sections / assembly:
vertical and horizontal cracks throughout, large (10"x10"x6") mortar
patches loose x2, spalling / flaking surface

Action:
Replace stone and repoint mortar joints
Portion of Finial 3 removed from structure on 10/2013

Grade: Severe

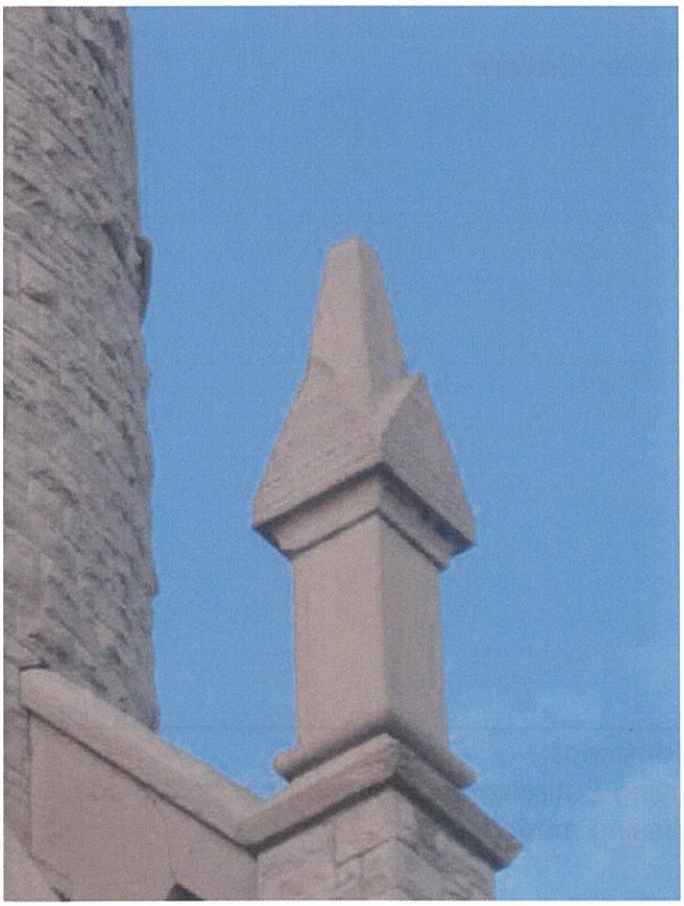




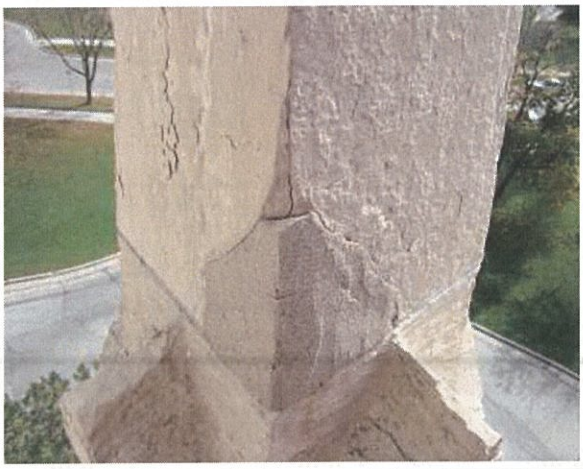


Updated Comment:
Upper portion of Finial #3 identified in note S4 was removed on 10/2013.

The below photo shows the remaining stone work.



S4

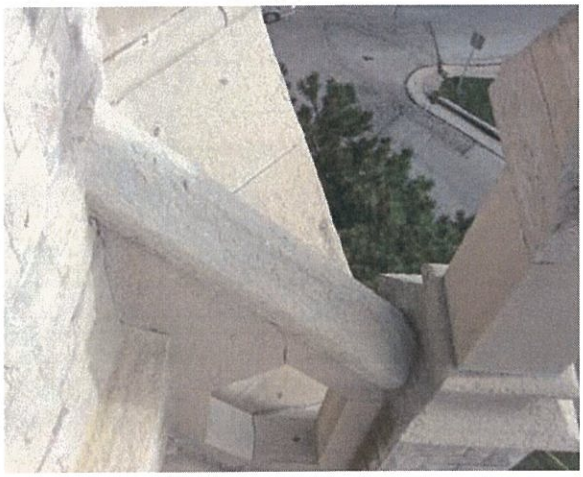


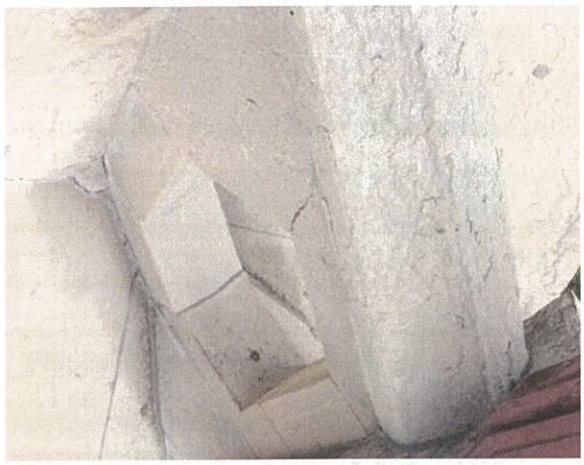
Comment:
Stone Finial 3: Upper sections / assembly: vertical and horizontal cracks throughout, large (10"x10"x6") mortar patches loose x2, spalling / flaking surface

Action:
Replace stone and repoint mortar joints

Grade: Severe

S5





Comment:
Flying Buttress 3: Cracked upper arch piece, missing mortar

Action:
Repair stone and repoint mortar joints

Grade: Severe

S6

Comment:
Flying Buttress 4: Cracked upper arch piece, missing mortar

Action:
Repair stone and repoint mortar joints

Grade: Severe

Comment:
Flat Roof: Spalling on top surface, missing mortar at horizontal and vertical joints, loose stones

Action:
Remove loose layers / flakes and repoint mortar joints

Grade: Moderate

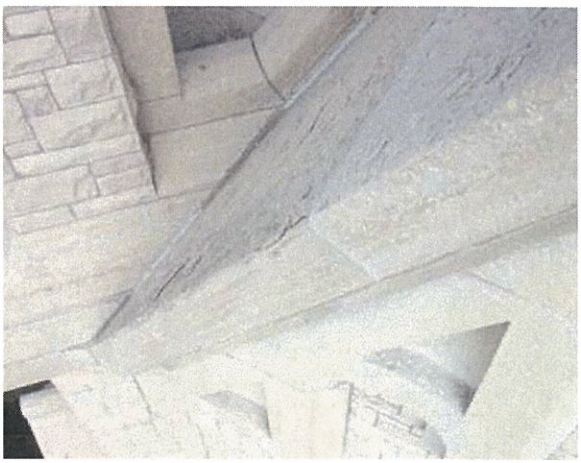
S7

Comment:
Main gable roof: Spalling on top surface, loose chips

Action:
Remove loose layers / flakes

Grade: Moderate

S8



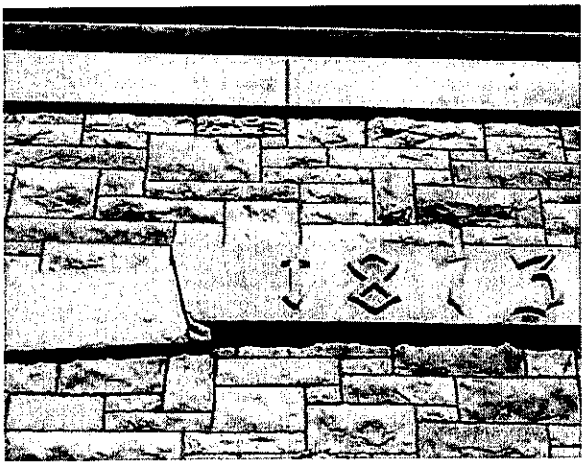
S9

Comment:
West stone arch pilaster: cracked, loose stone

Action:
Remove loose stone / surfaces

Grade: Moderate

S10



Comment:
Crack in dated stone work, once repaired

Action:
None

Grade: Minor

S11

Comment:
Various locations of corner the tuck pointing has failed

Action:
Repoint mortar joints

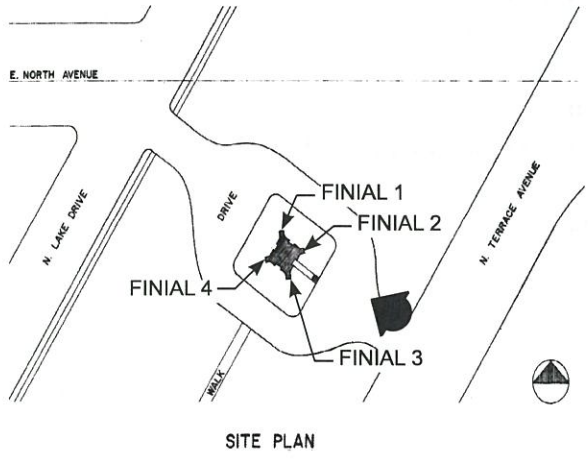
Grade: Minor

S12

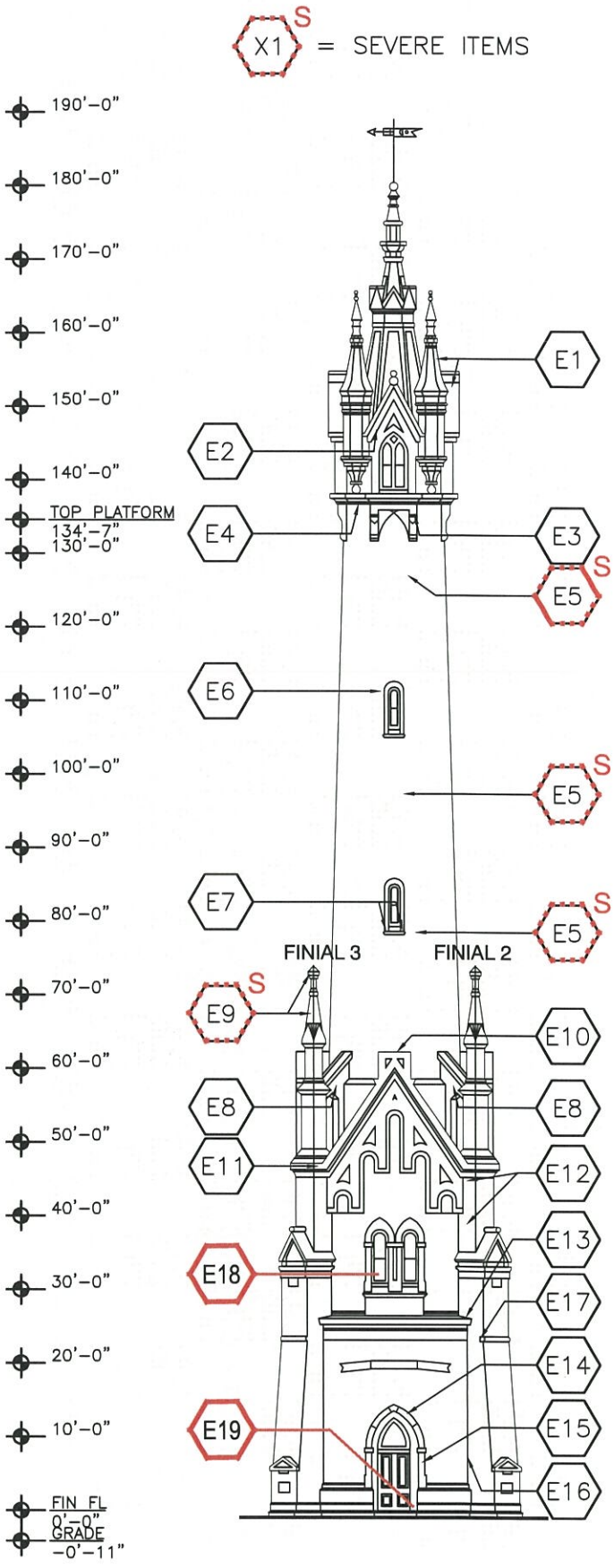
Comment:
Loss of mortar joint

Action:
Repoint mortar joints

Grade: Minor


E. NORTH AVENUE
N. LAKE DRIVE
DRIVE
WALK
N. TERRACE AVENUE
FINIAL 1
FINIAL 2
FINIAL 3
FINIAL 4

SITE PLAN


X1 S = SEVERE ITEMS
190'-0"
180'-0"
170'-0"
160'-0"
150'-0"
140'-0"
TOP PLATFORM 134'-7"
130'-0"
120'-0"
110'-0"
100'-0"
90'-0"
80'-0"
70'-0"
60'-0"
50'-0"
40'-0"
30'-0"
20'-0"
10'-0"
FIN FL 0'-0"
GRADE -0'-11"
E1
E2
E3
E4
E5
E6
E7
E8
E9
E10
E11
E12
E13
E14
E15
E16
E17
E18
E19
FINIAL 3
FINIAL 2

E1

Comment:
Metal roof / finials: Exterior metal sheeting is intact. Peeling paint and spotting rust across entire surface

Action:
Sand, reprime and paint entire surface

Grade: Moderate

E2

Comment:
Missing joint sealant and mortar at metal roof / stone interface

Action:
Repoint and reseal joints

Grade: Minor

E3

Comment:
Hairline cracking at corbel

Action:
Route and point with mortar

Grade: Minor

Comment:
Hairline cracking at corbel

Action:
Route and point with mortar

Grade: Minor

E3

Comment:
Organic debris / mud dauber nest at underside of horizontal shelf stone

Action:
Remove debris and clean

Grade: Minor

E4

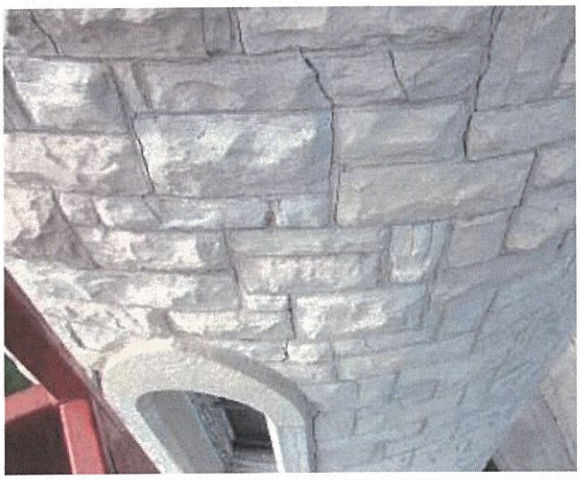
Comment:
Step cracking at stone and joint at approx. 130' level and extending down to 80' level

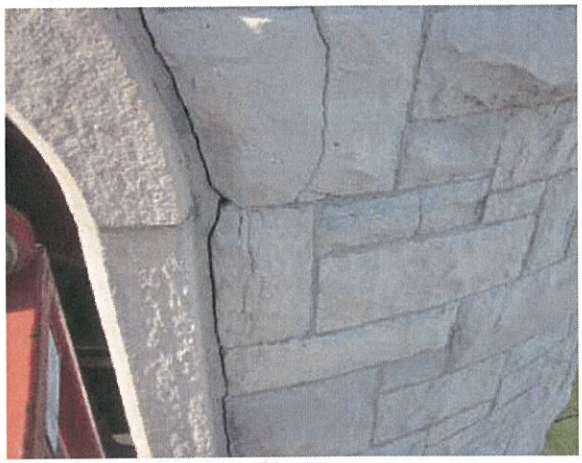
Action:
Repair stone and repoint mortar joints

Grade: **Severe**

E5

E5





Comment:
Step cracking at stone and joint at approx. 130' level and extending down to 80' level

Action:
Repair stone and repoint mortar joints

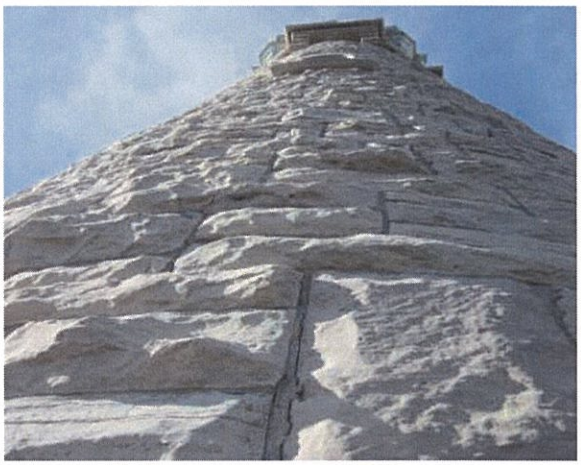
Grade: Severe

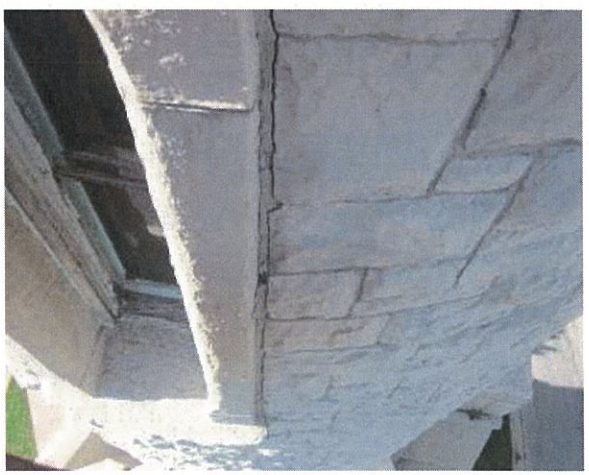
E5

Comment:
Step cracking at stone and joint at approx 130' level and extending down to 80' level

Action:
Repair stone and repoint mortar joints

Grade: Severe





E5

Comment:
Step cracking at stone and joint at approx 130' level and extending down to 80' level

Action:
Repair stone and repoint mortar joints

Grade: Severe

Comment:
Window 22: Loose stone (10x6x4) removed and in hand (stone given to client)

Action:
Replace stone

Grade: Minor

E6

Update Comment: Exterior glass lite missing (6/24/14).

Action: Replace glazing and patch window frame.

Comment:
Window 23: Stone sill cracked in multiple places

Action:
Repair stone and repoint mortar joints

Grade: Minor

E7

E7

Update Comment: Exterior glass lites missing (6/24/14).

Action: Replace glazing and patch window frame.

E8

Comment:
Flying Buttress 2 & 3: Missing / deteriorated mortar joints along assemby (5-piece buttress), missing mortar joint at cap stone - tower interface

Action:
Repair stone and repoint mortar joints

Grade: Moderate

E9

Comment: Stone Finial 3: Upper sections / assembly: vertical and horizontal cracks through out, large (10"x10"x6") mortar patches loose x2, spalling / flaking surface

Action: Replace stone and repoint mortar joints

Grade: Severe

Comment:
Flat Roof: Spalling on top surface, missing mortar at horizontal and vertical joints

Action:
Remove loose layers / flakes and repoint mortar joints

Grade: Moderate

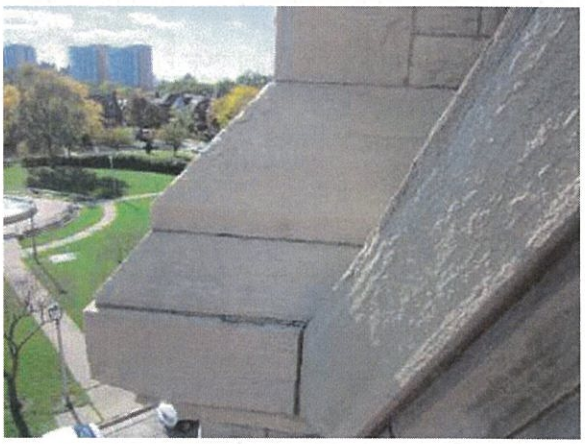
E10

Comment:
Stone Finial 3: Cracked base section

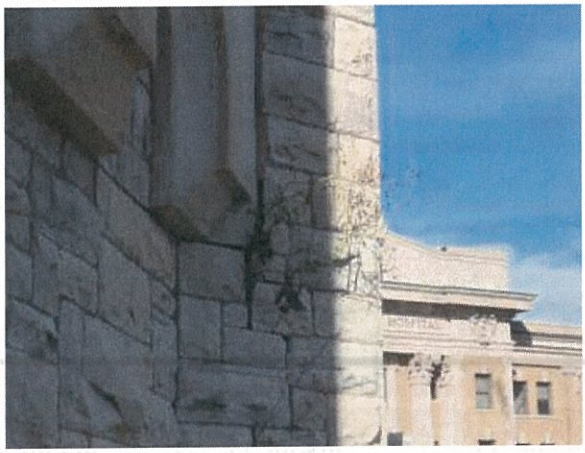
Action:
Route and point with mortar

Grade: Minor

E11



E12



Comment:
Organic debris at stone façade - vines and weeds

Action:
Remove debris and clean

Grade: Minor

E13

Comment:
Main horizontal stone sill: Spalling at top and leading edge. Vegetative growth, loose stones and missing mortar at edges

Action:
Remove loose stone / surface, repair stone and repoint with mortar

Grade: Moderate

E14

Comment:
Upper portion of arch is deteriorated. Face of stone
is delaminated 3/4" - 1" less than adjacent stones

Action:
Remove loose layers / flakes

Grade: Minor

Comment:
Upper portion of arch is deteriorated. Face of stone
is delaminated 1/4"-3/8" less than adjacent stones

Action:
Remove loose layers / flakes

Grade: Minor

E15

Comment:
Various locations of corner the tuckpointing is failing

Action:
Repoint mortar joints

Grade: Minor

E16

Comment:
Enlarged vertical mortar crack between buttress and rounded stone profile

Action:
Repoint mortar joints

Grade: Minor

E17

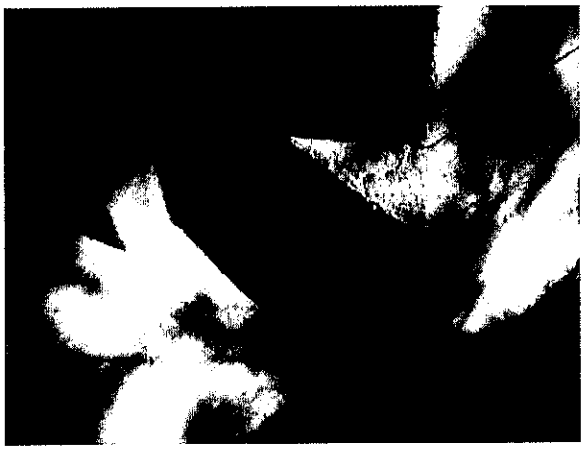
Comment (6/24/15):
Projectile damage to outer lite of glass.

Action:
Replace existing lite with new.

Grade: Minor

E18

E19



Comment (6/24/15):
Base and step portions of entrance is delaminated
.

Action:
Remove loose layers / flakes

Grade: Minor

4.2 - Conclusions and Recommendations

Upon completion of the visual evaluation, the exterior masonry of the Water Tower was noted in satisfactory condition. Flaws in the (3) original decorative finials and other detailed stonework noted in the above reference are an exception, and should be addressed accordingly in a timely fashion. In addition to the masonry items listed for repair / replacement, approximately 15-25% of the facade requires tuck pointing. Also the entire surface of upper metal roof / dormers and finials are to be scraped, primed and painted.