



The City of Milwaukee

North Point Water Tower Roof Conditions

Type of Document

Preliminary

Project Name

North Point Water Tower Roof Renovations

Project Number

CHI-00227212-A0

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Legal Notification

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Table of Contents

Client i

Legal Notification..... ii

Table of Contentsiii

1 Background..... 1

2 Weathervane Removal 1

3 Condition Assessment..... 1

4 Corrective Measures/Recommendations 3

4.1 Decorative sheet metal roof overall: 3

4.2 Weathervane 3

4.3 Weathervane shaft and anchorage: 3

Appendix 1 – Elevation and Weathervane Sketches 5

Appendix 2 – Photographs 8

List of Appendices 34



1 Background

On May 17, 2017, a contractor working on the restoration of the NPWT masonry, noticed that the weathervane was tilted and swaying in the wind. They reported their observation to Milwaukee DPW.

June 27, 2017, the City of Milwaukee contracted with F.J.A. Christiansen Roofing Co., Inc. to remove the damaged weathervane and secure the sheet metal roof that was damaged.

2 Weathervane Removal

The roofing contractor used a reciprocating saw to cut a portion of the 1-1/2" forged steel shaft that the weathervane was mounted to. The weathervane and section were lowered to the ground for measurements and taken to be stored by DPW.

Another portion of the shaft was removed from the top of the tower using the same method. The second shaft piece was also stored by DPW.

The Contractor secured the roof after the removal of the weathervane and remaining shaft construction, by constructing a prefinished sheet metal enclosure, placing it over the opening in the roofing and the remaining shaft material, and securing it with mechanical fasteners to the existing sheet metal roof construction.

The contractor also stabilized the lower sheet metal roof section that was damaged by realigning it to vertical position and securing it in place with prefinished sheet metal straps on the West side of the roof.

The finish color on the new enclosure is Aspen Green, which closely resembles the paint color of the existing roofing. This is a temporary enclosure intended to be in place for a period of 2 to 4 years while construction documents for the repair of the roofing and the weathervane can be prepared and bid out to qualified contractors.

3 Condition Assessment

After the weathervane and rod were removed EXP conducted a review of the observable conditions where the weather vane support shaft was attached to the tower construction and where it interfaced with the sheet metal roofing.

It appears that one of four internal steel support members may have corroded over time, due to water infiltration at the very top of the sheet metal roofing, and broke, or became disengaged from the building structure, during a storm event in May 2017. The broken portion of the shaft support was not visible at the time of the review. It is located somewhere between the remaining exterior sheet metal roof construction and the interior wood roof deck construction,

A visual review the interior of the tower at the very top(peak), indicates that there may be moisture present in the wood decking material.

Possible causes of moisture:

1. Moisture from standing water present in the stand pipe, on interior of tower. (hot moist air rises to peak of roof and collects).
2. The seal around the weathervane shaft was deficient and water was able to infiltrate into the roof construction over time.
3. Small openings in the sheet metal roofing (cracks or pin holes) allowed water to infiltrate the roof construction.

The combination of water infiltration and the presence of moisture, may have corroded the metal shaft support over a long period of time, that combined with strong winds from a storm event, may have caused one of the metal supports members to break or become disconnected from the structure. Which destabilized the weathervane and allowed it lean over and sway in the wind.

It was also observed that a portion of the decorative sheet metal roofing, located approximately 3 ft below the weathervane, was also damaged, and is now unstable. It moved with the weathervane when the weathervane was swaying. The sheet metal is bent out of its original shape (tilting eastward) and may be cracked at that location (east face at overhang).

EXP conducted a visual inspection of the remaining decorative sheet metal roofing. The inspection took place from a personnel basket suspended from a crane with a boom attachment. The original decorative sheet metal roof dates to 1873 and is composed of highly ornate decorative galvanized sheet metal, with a finish coat of exterior (light green) paint, over a wood and steel roof structure.

This review did not include testing for Lead based Paint (LBP), or other hazardous materials, however it is assumed that there is lead in the existing exterior paint. (Milwaukee DPW later tested and confirmed the presence of lead in the existing exterior paint)

EXP noted the following condition issues:

1. Overall the decorative sheet metal roofing is intact with large areas of peeling paint, exposed galvanized finish, and some areas of rusted sheet metal.
2. The North, West, and East, sides of the roof had primarily peeling paint with minor to moderate amounts of exposed rusted surfaces.
3. The South and Southeast sides of the roof had a much larger amount of exposed rusted sheet metal surfaces.
4. There were no holes in the sheet metal roof observed.
5. From the interior, the only observable signs of moisture were at the very uppermost peak of the roof. The wood surfaces appear much darker than the adjacent wood which appears to indicate the presence of moisture. This is consistent with water infiltrating from the top of the roof where the shaft for the weathervane penetrates the sheet metal assembly.

4 Corrective Measures/Recommendations

4.1 Decorative sheet metal roof overall:

1. Remove loose paint and rust scale from all exposed sheet metal surfaces. (take necessary measures to address the presence of LBP and its removal and disposal. Follow all ordinances and code requirements)
2. Inspect all sheet metal surface for holes, cracks, and damaged material.
3. Take detailed measurements of the areas of the sheet metal roofing that require repairs or replacement.
4. Review extend with the city of Milwaukee.
5. (upon DPW concurrence) Prepare shop drawings for all replacement pieces of the sheet metal.
6. Upon receipt of approved shop drawings, fabricate replacement pieces for galvanized sheet metal matching the existing galvanized sheet metal gauge or thickness.
7. Properly install the replacement galvanized sheet metal roofing pieces.
8. Prep all sheet metal surfaces for new paint. (galvanize repair paint any existing exposed sheet metal surfaces where the galvanized finish is missing.) Prime all surfaces with an appropriate industrial epoxy primer.
9. Paint exterior finish over newly primed surfaces with the appropriate industrial coating that is compatible with the epoxy primer. (match color of the existing roof paint color)

4.2 Weathervane

1. Remove paint from the existing weathervane.
2. Inspect weathervane for damage.
3. Repair/Restore weathervane.
4. Prime all surfaces with an appropriate industrial epoxy primer.
5. Paint weathervane with the appropriate industrial coating that is compatible with the epoxy primer. (match color of the existing weathervane paint color)

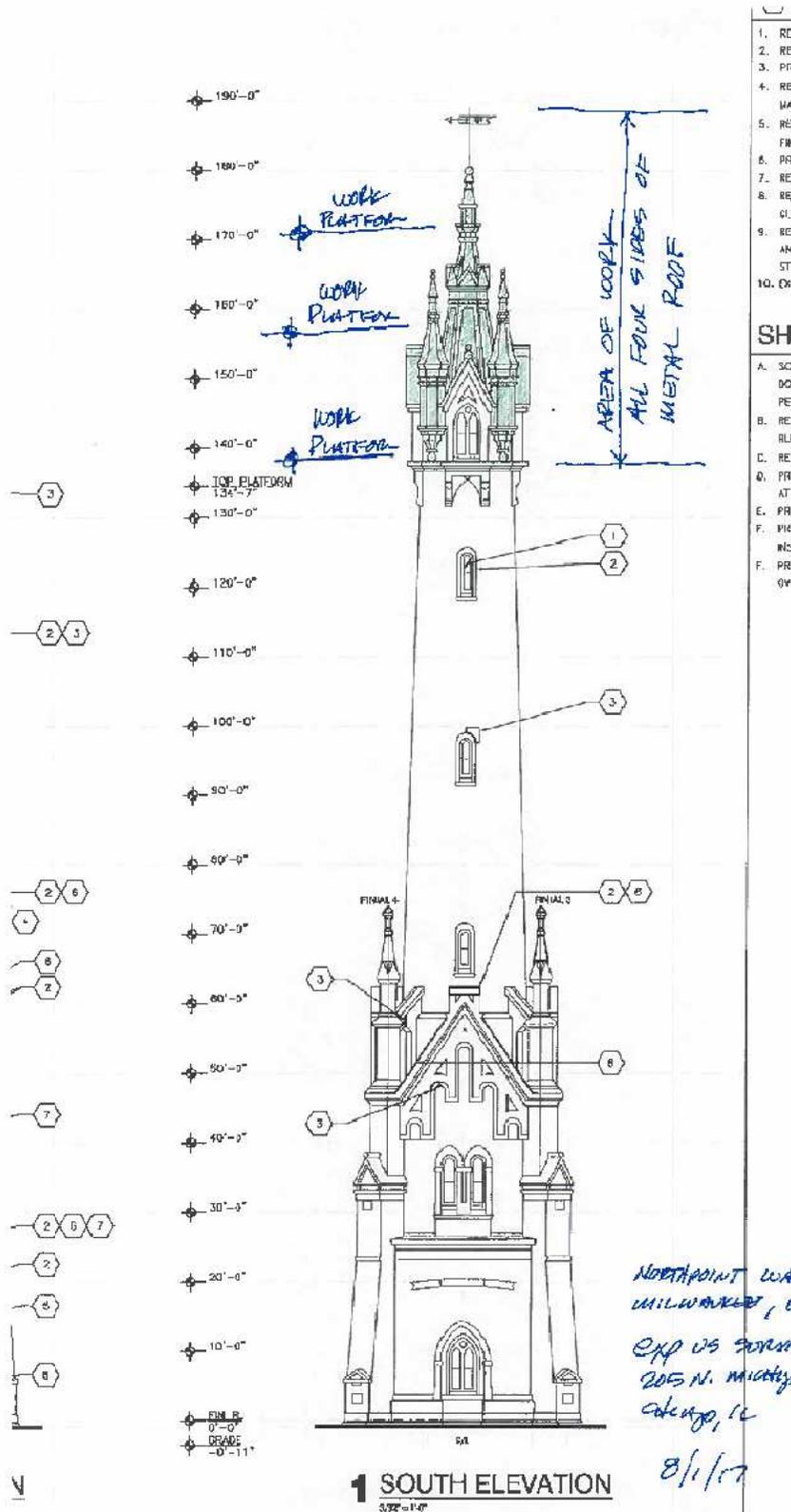
4.3 Weathervane shaft and anchorage:

The intent is to remove existing sheet metal roofing as needed to expose the damaged shaft support steel and moisture damaged wood decking. It may be necessary to remove more of the sheet metal roofing to allow sufficient room for the final repairs of the support steel and wood decking.

1. Prior to any other work in this area, take detailed measurements and prepare shop drawings for the replacement of approximately the top 10 feet of the sheet metal roofing from the current opening down to the cone over the interior wood and steel roof structure. (Please note that this extend may change depending on where the damage shaft support steel is located.)
2. After measurements have been taken and verified, carefully remove the sheet metal roofing in pieces. Being careful to keep any special shapes intact as much as possible. Catalog and store all removed pieces of the roof sheet metal. Remove sheet metal until the damaged, or disconnected, metal support for the shaft is uncovered.
3. Documents the connections, member sizes, and configuration, of the shaft support steel with photographs and measured drawings.
4. Carefully remove the existing base of the shaft that was left in place. (noting orientation, bolt configuration, etc.)

5. Prepare a shop drawing for a replacement shaft using the combined pieces of the shaft that were originally removed in June 2017. The replacement shaft should match the existing shaft in size, configuration, and construction.
6. Fabricate the replacement shaft.
7. Prepare shop drawings for the repairs to or replacement of the shaft support members.
8. Fabricate the repair and replacement parts for shaft support.
9. Install repairs and replacement parts for shaft support. (includes removal of damaged parts) Paint replacement parts with epoxy primer and epoxy paint.
10. Remove water damaged or moisture damages wood decking. Install replacement treated wood deck pieces.
11. Install weathervane shaft
12. Install new sheet metal roof components that match the original sheet metal roofing and configuration.
13. Install weather seal/shaft seal block at top of roofing assembly.
14. Prep and paint Roofing. (see decorative sheet metal roof scope for detailed description)
15. Install weathervane.

Appendix 1 – Elevation and Weathervane Sketches



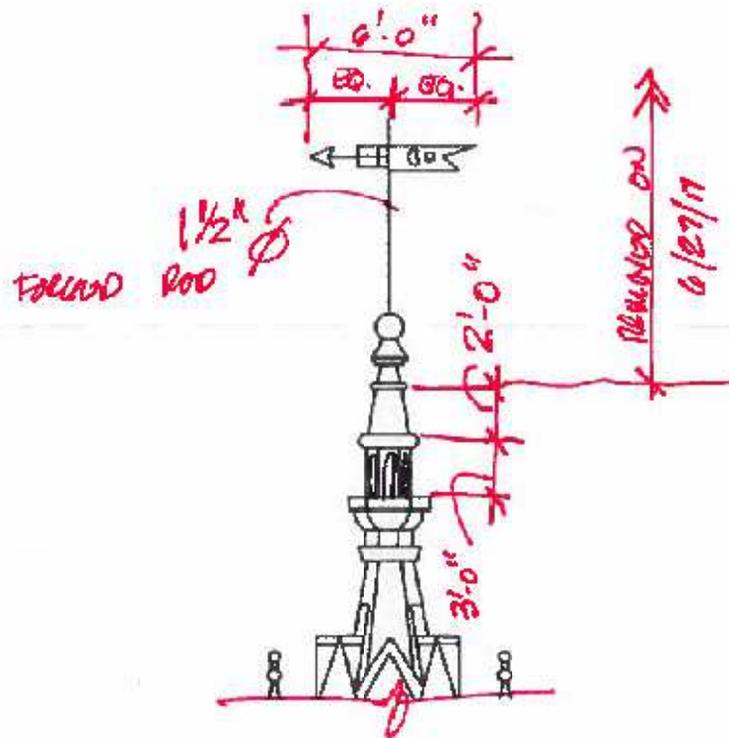
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	PEF
B.	RE
	RLT
C.	RE
D.	PRC
	AT
E.	PRC
F.	PRC
	WCS
F.	PRC
	QVE

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NORTH POINT WATER TOWER ROOF
FIELD MEASUREMENTS 6/27/17

Project No. CHI-00227212-A0 8/7/17

Appendix 2 – Photographs



Photograph No. 1 Photo taken 5/17/2017 showing the weather vane and a portion of the sheet metal Roof noticeably tilting or leaning



Photograph No. 2 F.J.A. Christiansen Roofing Co., Inc. Preparing to remove the damaged weathervane.



Photograph No. 3 Interior roof construction under the peak possible moisture present in wood deck.



Photograph No. 4 Weathervane and shaft after removal from tower.



Photograph No. 5 Second piece of weathervane shaft, collar with pitch pocket and the sheet metal cap.



Photograph No. 6 Forged base of shaft at attachment to interior tower structural supports.



Photograph No. 7 View, from the north, of tilted sheet metal enclosure with remaining shaft section. From North.



Photograph No. 8 View of damaged section from North.



Photograph No. 9 NE Final.



Photograph No. 11 NW final.



Photograph No. 12 View from North



Photograph No. 13 View from North



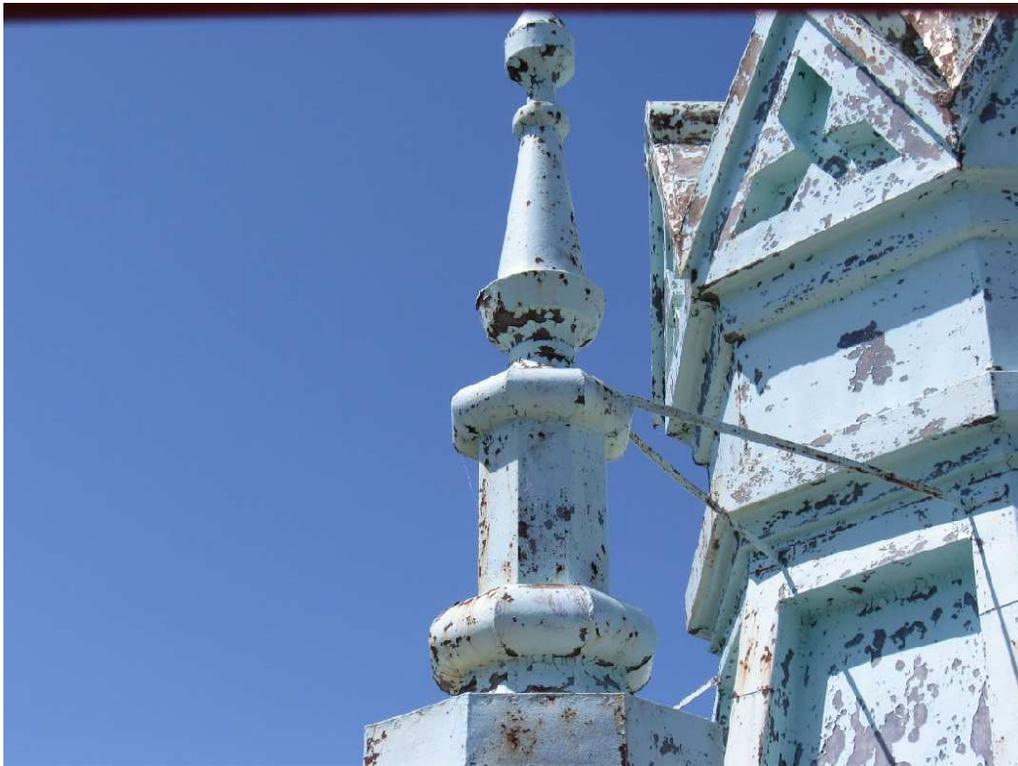
Photograph No. 14 View from North



Photograph No. 15 View from NE.



Photograph No. 15 View of damaged Sheet metal.



Photograph No. 16 NE Finial.



Photograph No. 17 NE Finial.



Photograph No. 18 NE Finial Base.



Photograph No. 19 View from North.



Photograph No. 21 View from East.



Photograph No. 22 View from NE.



Photograph No. 23 View form NE.



Photograph No. 24 View for east.



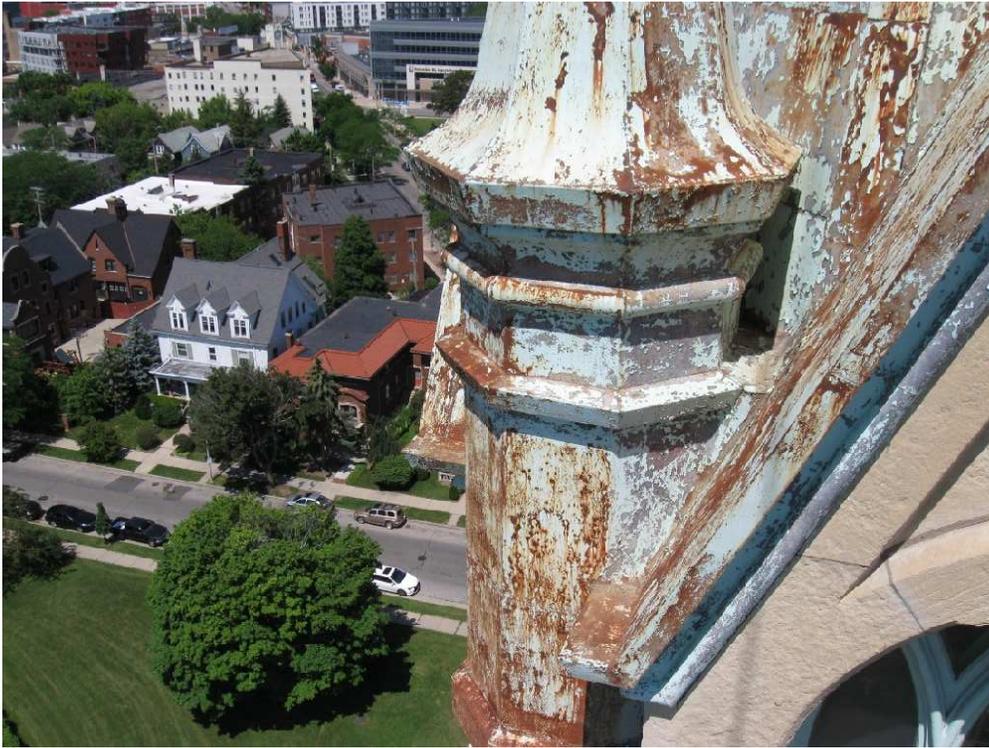
Photograph No. 25 View of northeast finial.



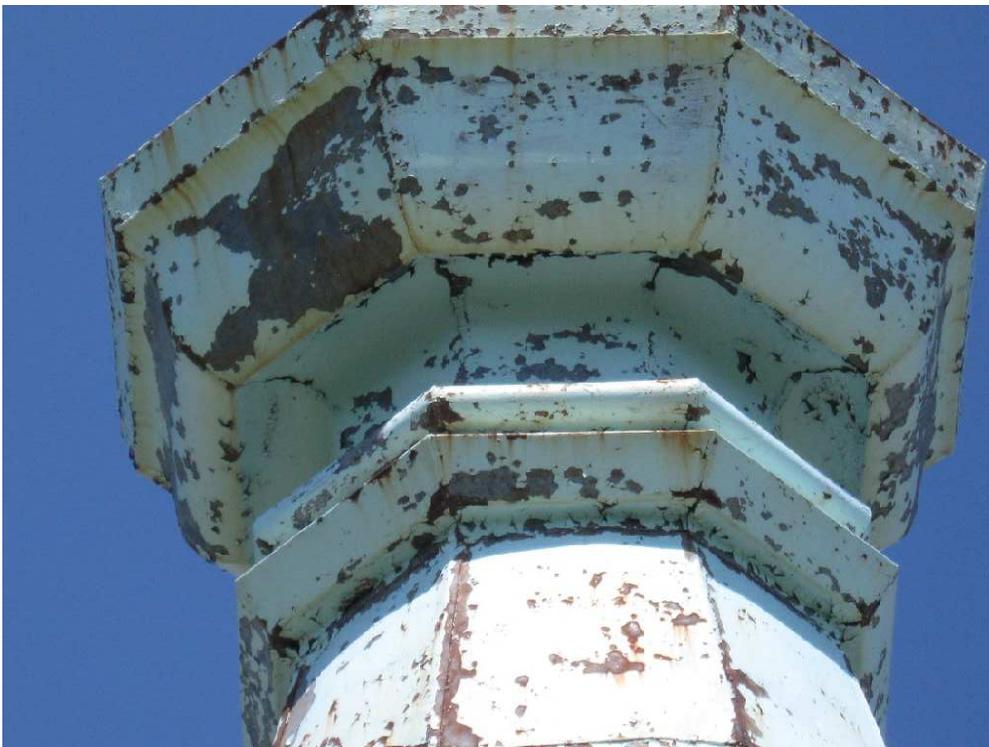
Photograph No. 26 View from East.



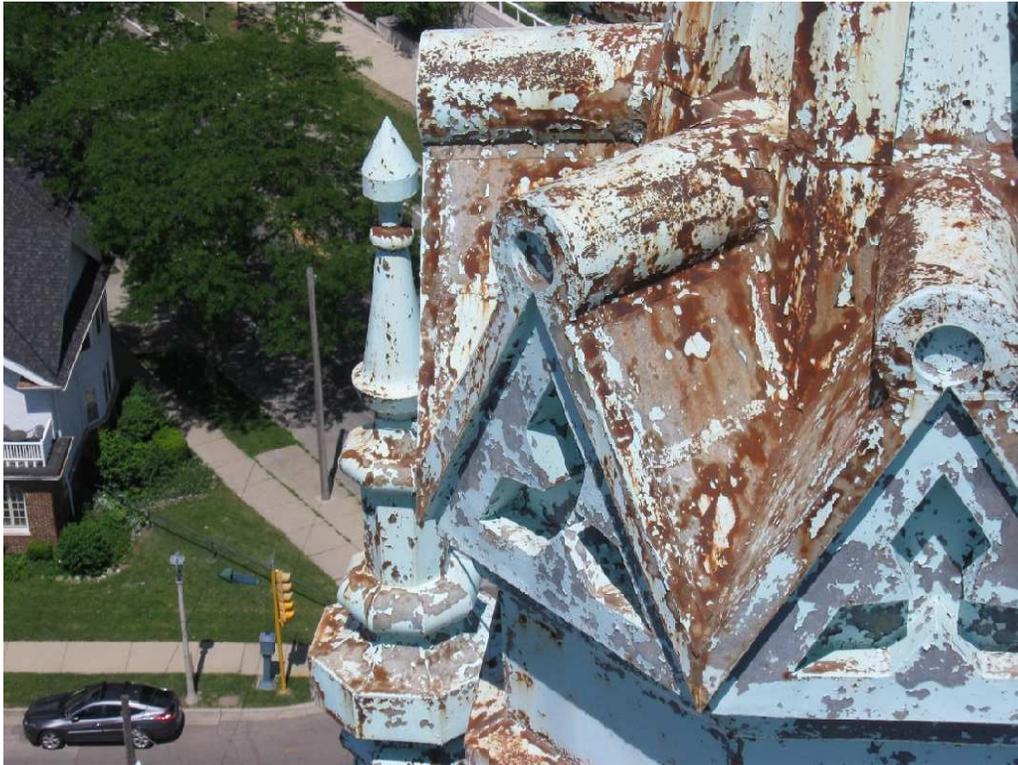
Photograph No. 27 View from East



Photograph No. 28 South east finial



Photograph No. 29 View of damaged portion of sheet metal roof, from east.



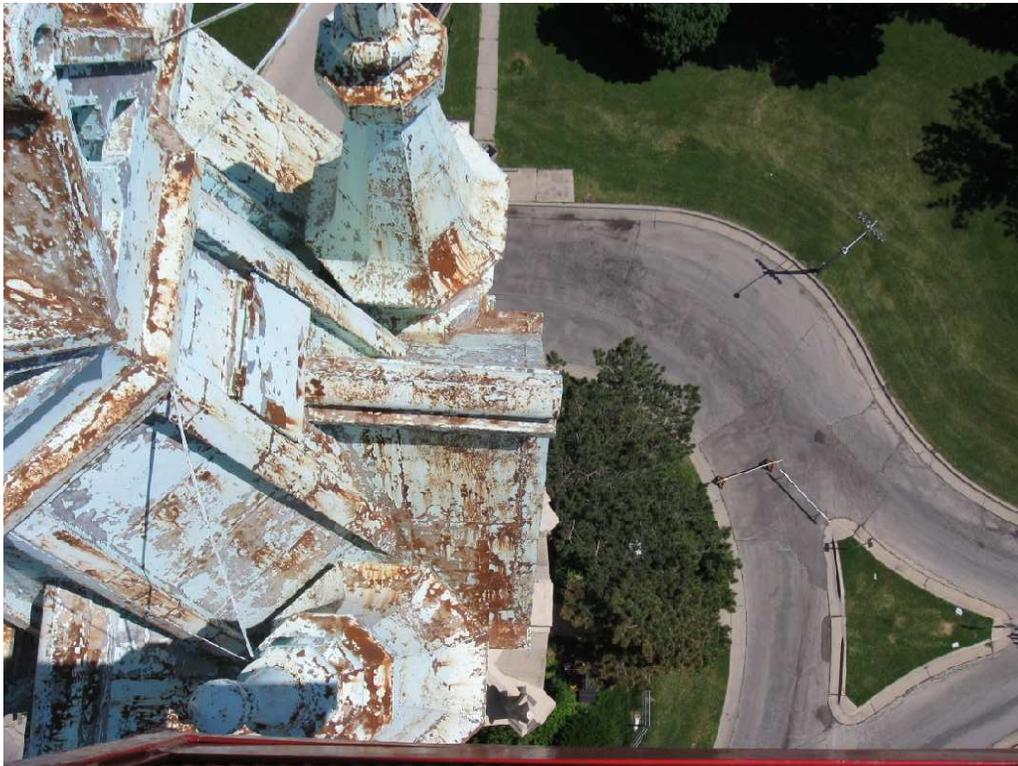
Photograph No. 30 View from northeast.



Photograph No. 31 View from East.



Photograph No. 32 View from East.

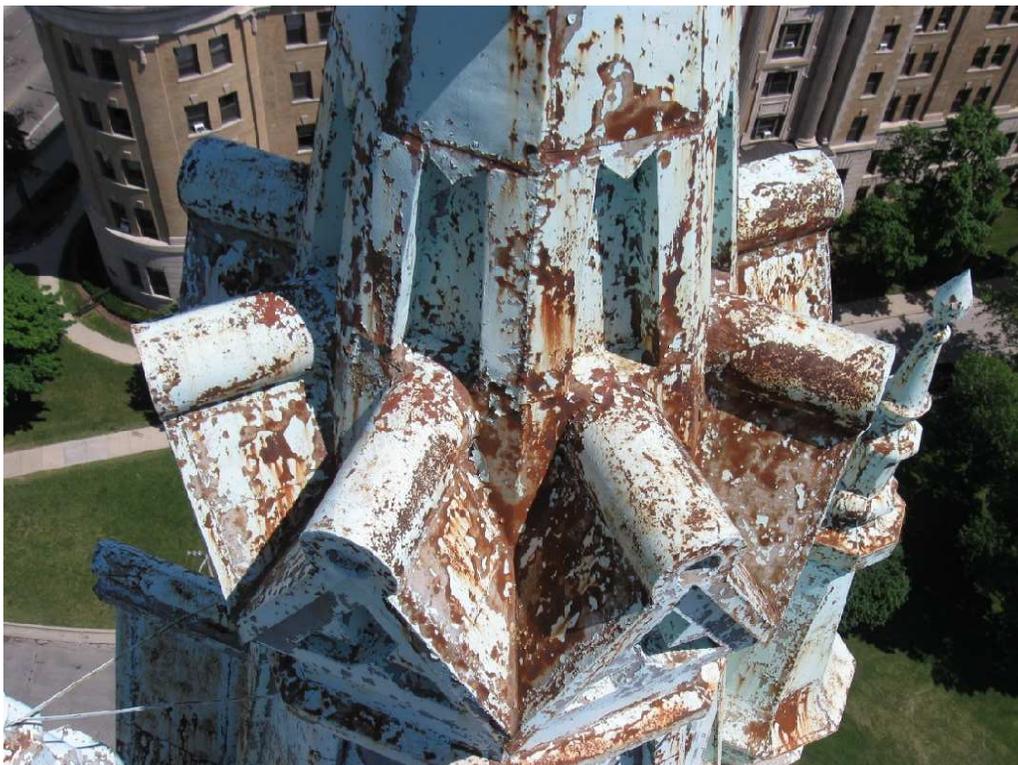


Photograph No. 33 View from SE corner showing access hatch on the east face of roof.

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Photograph No. 35 View of SE finial.



Photograph No. 36 View from the south east.



Photograph No. 37 View of damaged sheet metal roof section from the south.



Photograph No. 38 View from the south



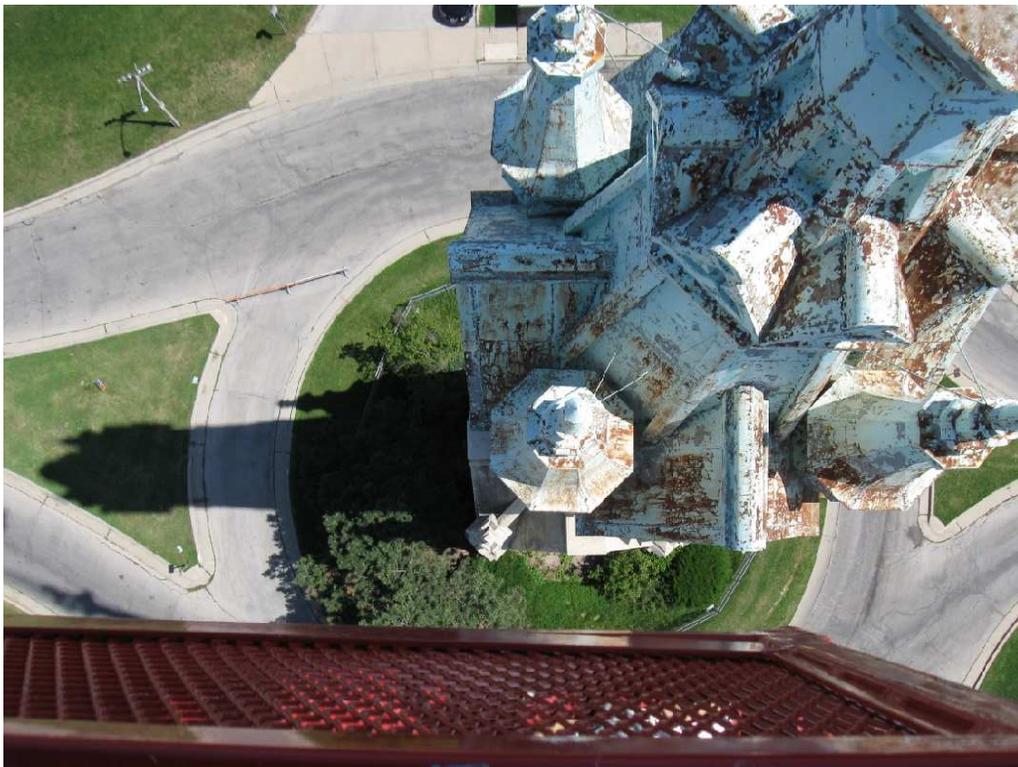
Photograph No. 38 View from south



Photograph No. 39 View of top from the south side.



Photograph No. 40 View of NW finial.



Photograph No. 41 View from the south at west finial.



Photograph No. 43 View from the southwest looking down on SW finial.



Photograph No. 44 View of the top from the west.



Photograph No. 45 View from the west.



Photograph No. 46 View from west showing south face of lower finial body observed to be the most visible rust.



Photograph No. 47 Prefinished sheet metal cover fabricated to cover the remaining section of the shaft and enclose the open sheet metal roof.



Photograph No. 48 Removing the weathervane and shaft.



Photograph No. 49 Removing the second section of the shaft.



Photograph No. 50 Installing the new temporary prefinished sheet metal enclosure over shaft and opening in the sheet metal.



Photograph No. 51 Temporary sheet metal enclosure installation is complete.

List of Appendices

Appendix 1 – Elevation Sketch for Scaffolding Quotes

Appendix 2 – Weather-vane Sketch