ATTACHMENTS

The City of Sheboygan
City Hall North Parking Garage

Condition Assessment Report-DRAFT

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- BIM Consulting
- Structural Engineering
- Forensic Engineering

Prepared for:
City of Sheboygan
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Attn: Mr. Bernard Rammer
Purchasing Agent

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May 27, 2015
ZS Project No. 7402

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May 27, 2015

Mr. Bernard Rammer
Purchasing Agent
City of Sheboygan
828 Center Avenue, Suite 205
Sheboygan, WI 53081

Subject: **City Hall North Parking Garage Condition Assessment DRAFT Report**
828 Center Avenue, Sheboygan, Wisconsin

Dear Mr. Rammer:

The following is a report associated with the ZS LLC (ZS) condition assessment of the Sheboygan City Hall North Parking Garage property located at 828 Center Avenue in Sheboygan, Wisconsin. This property is located at the same address as the City Hall building. ZS teamed with IBC Engineering (IBC), a Mechanical, Electrical, and Plumbing engineer, to perform the assessment. A separate report titled City Hall Condition Assessment Report was prepared for the City Hall property.

INTRODUCTION

The ZS/IBC team was retained to perform a Condition Assessment related to the one story City Hall North Parking Garage structure located at 828 Center Avenue in Sheboygan, Wisconsin. The scope of the assessment included a 3D laser scan of the building's exterior facade, as well as surveys of the following systems: site, building envelope, structural, architectural, mechanical, plumbing, electrical, and fire suppression and detection.

The primary goal of this Condition Assessment was to evaluate the conditions of exterior and interior elements, provide projected remaining useful life, and provide a twelve (12) year projected capitol project outlook associated with maintenance and repairs to the facade. The completion of these goals will help advance the vision of the City of Sheboygan for the project by balancing project cost, building performance, and the overall architecture of the building.

BACKGROUND

The subject facility is a one story masonry structure that was constructed on the same site as the City of Sheboygan's City Hall (Figure 1). The parking garage is situated just north of the City Hall structure, and is used for storage and parking of city related vehicles. The primary exterior building envelope components consist of brick coursing, limestone architectural elements, original steel framed windows, aluminum framed entrance systems, and a modified bitumen roof system.

3D Laser Scan

Description: The 3D laser scanner was used to assess the conditions of exterior facades and parapets, as well as detection of out of plane wall movement which would otherwise not be noticeable using standard inspection techniques. Multiple scan locations were determined and then combined into a composite point cloud to prepare a 3D model (Figure 2). The point cloud was then used to perform out-of-plane movement analysis of the parapets and for investigation of any other anomalies identified during the survey.

Images: Using the laser scanning data, out-of-plane movement of the walls were identified, measured and depicted. Figures 3 - 6 show the extent of movement of the walls at different elevations. The figures show a colorized point cloud scale depicting the extent of the out-of-plane movement. Red colored areas of the scan indicates out-of-plane wall movement of two inches. For this type of wall, areas of the wall that are bulging two inches or greater are considered excessive and should be repaired.

Findings/Observations: The following specific conditional issues were noted during the laser scan of the facades: bulging brick and out of plane brick movement at several locations (Figures 3 - 6).

FIELD OBSERVATIONS

ZS and IBC performed thorough visual surveys of the existing building systems at the subject facility. Each building system type was identified, inventoried, and conditionally assessed. The following represents a description and conditional overview for each building system:

I. Exterior

Description: Assessment of the building's exterior systems including: site features, exterior masonry walls, parapets, doors, windows, and roofs.

A. Site. Assessment of hardscapes and grounds.

Description: The site surrounding the building consists of asphalt paving.

Estimated Age: Unknown

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the visual survey of the site:

a. Deteriorating asphalt (Figure 7).

Repair/Timeframe: Remove deteriorating asphalt and install new asphalt paving (1-3 years).

B. Roof. Assessment of roof areas.

Description: Smooth surface modified bitumen system with a silver roof coating applied to the surfaces of the roof (Figure 8).

Estimated Age: 1992

Estimated Remaining Life: 1-3 years

Conditional Issues: The following specific conditional issues were noted during the visual survey of the roof:

a. Failed skyward facing joints on stone copings throughout (Figure 9).

Repair/Timeframe: Install new sealant at skyward facing joints (1-3 years).

b. Significant alligator bitumen bleed out between membrane sheets (Figure 10).

Repair/Timeframe: Replace roof system (3-5 years).

c. Open joints between metal counter flashings throughout (Figure 11).

Repair/Timeframe: Replace roof system (3-5 years).

d. Open sealant joint at top of counter flashings throughout (Figure 12).

Repair/Timeframe: Replace roof system (3-5 years).

e. Membrane cracking and air pockets throughout (Figure 13 & 14).

Repair/Timeframe: Replace roof system (3-5 years).

f. Failed joints at penetrations (Figure 15).

Repair/Timeframe: Replace roof system (3-5 years).

g. Ponding at roof drains (Figure 16).

Repair/Timeframe: Provide positive slope to drain during roof replacement (3-5 years).

Roof Commentary: The existing roof systems are exhibiting numerous failures and deteriorated conditions. Complete replacement is recommended.

C. Facade. Assessment of all facades and systems.

1. Windows.

Description: The windows throughout the building are original steel frame systems, containing single pane wire reinforced glazing as well as one large glass block unit system.

Estimated Age: Original construction

Estimated Remaining Life: 3-5 Years

Conditional Issues: The following specific conditional issues were noted during the visual survey of the windows:

a. Sealant deteriorating/failing along entire perimeter of all windows (Figure 17).

Repair/Timeframe: Remove existing sealant from all window units and reseal all perimeters with new sealant (1-3 years).

b. Cracked glass in window panes (Figure 18).

Repair/Timeframe: Replace cracked panes (1-3 years).

Window Commentary: Windows are exhibiting numerous failures and are past their useful serviceable life. Replacement of the windows is recommended.

2. Doors.

Description: The entrance assemblies are aluminum frame systems with clear single pane glazing, as well as automatic overhead garage door systems. The individual entrance doors and overhead garage doors are all in overall good condition (Figures 19 - 21).

Estimated Age: Varies

Estimated Remaining Life: Sustainable.

Conditional Issues: No conditional issues were noted.

3. Brick Masonry.

Description: The brick throughout the building consists of red running bond brick masonry coursing, with decorative offset brick units along the west facade as well as the northwest and southwest corners.

Estimated Age: Original construction

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the visual survey of the building brick:

a. Significant brick and mortar deterioration (Figures 22 - 24).

Repair/Timeframe: Remove and replace deteriorated bricks, perform 100% tuckpointing of brick masonry mortar joints at brick units not replaced (1-3 years).

b. Out of plane movement (Figure 25).

Repair/Timeframe: Remove and reconstruct brick masonry at out of plane areas (0-1 years).

c. Corroded window and door steel lintels with rust jacking causing brick masonry out of plane movement (Figures 26 - 29).

Repair/Timeframe: Remove brick to expose lintels at identified locations, repair or replace lintels, install new through wall flashing and replace removed brick masonry (0-1 years).

4. Concrete Foundation.

Description: The building is constructed on a concrete foundation wall that is exposed on the exterior below the base of the brick masonry exterior walls.

Estimated Age: Original construction (1915)

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the visual survey of the buildings concrete elements:

a. Concrete cracking (Figure 30).

Repair/Timeframe: Perform concrete crack repair injection (3-5 years).

5. Stone Masonry.

Description: Limestone sills and cornices are set throughout the building's facades while a limestone water table is set along the west facade.

Estimated Age: Original construction (1915)

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the visual survey of the buildings stone elements:

a. Spalled stone units at isolated locations.

Repair/Timeframe: Perform Dutchmen repair of spalls (1-3 years).

b. 100% mortar joint deterioration on all facade stone elements (Figure 31).

Repair/Timeframe: Remove all existing stone mortar and replace (1-3 years).

II. Interior

Description: Assessment of interior architectural systems as well as structural systems including: foundation, structural frame, and exterior walls.

Estimated Age: Varies

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the interior visual survey:

a. Brick masonry step cracking throughout (Figure 32).

Repair/Timeframe: Replace cracked bricks, perform brick crack stitching (reinforcing) repair (0-1 years).

b. Brick masonry deterioration throughout (Figure 33).

Repair/Timeframe: Reconstruct deteriorated brick masonry (1-3 years).

c. Out of plane brick movement (in relation to exterior out of plane movement).

Repair/Timeframe: Rehabilitate areas (0-1 years).

d. Paint deterioration (Figure 34).

Repair/Timeframe: Clean, prime and repaint deteriorated areas (0-1 years).

e. Concrete floor cracking and deterioration (Figure 35 & 36).

Repair/Timeframe: Remove and install new concrete at cracked/deteriorated slab areas (1-3 years).

f. Failed wall to floor joints (Figure 37).

Repair/Timeframe: Remove existing and install new sealant (1-3 years).

IV. Mechanical, Electrical, and Plumbing (MEP) Systems

Description: The MEP systems are integral with the City Hall Building and commentary can be found within the City Hall Report.

12 YEAR CAPITAL REPAIRS AND MAINTENANCE OUTLOOK

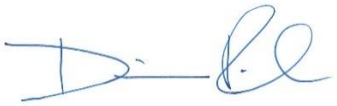
Please see the 12 Year Capital Repairs and Maintenance Outlook repair list and cost estimate in Appendix A. Repairs are listed and categorized by 0-1 year, 1-3 year, 3-5 year, 5-8 year, and 8-12 year repairs. Costs are in 2014 values and are not escalated.

CLOSING

If you have any questions or require additional information, please feel free to contact our office.

Sincerely,

ZS LLC



Darin C. Rickert, AIA, RRC, LEED AP
Senior Architect and Building Envelope Consultant

REPRESENTATIVE FIGUREGRAPHS

Figure 1: City Hall North Parking Garage Aerial View.

Figure 2: Sheboygan City Hall North Parking Garage colorized 3D laser scan image.

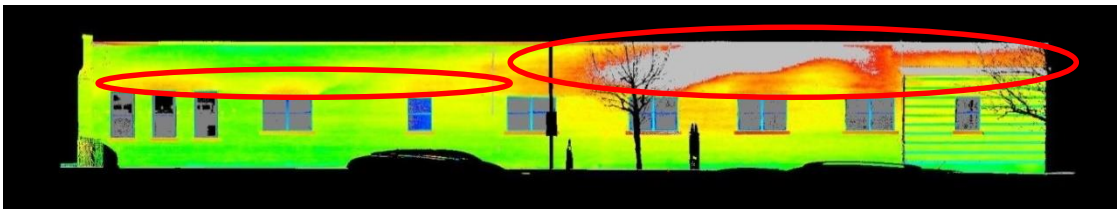


Figure 3: North elevation, plane deviation analysis (circled areas indicate excessive out-of-plane movement)

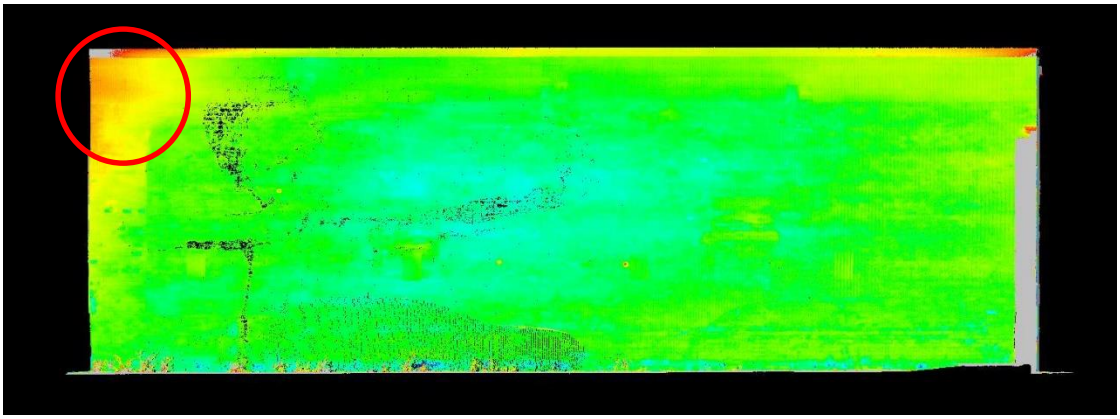


Figure 4: East elevation, plane deviation analysis (circled areas indicate excessive out-of-plane movement)

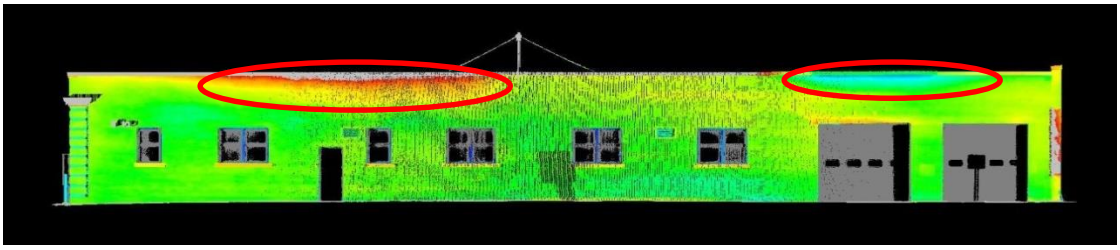


Figure 5: South elevation, plane deviation analysis (circled areas indicate excessive out-of-plane movement)

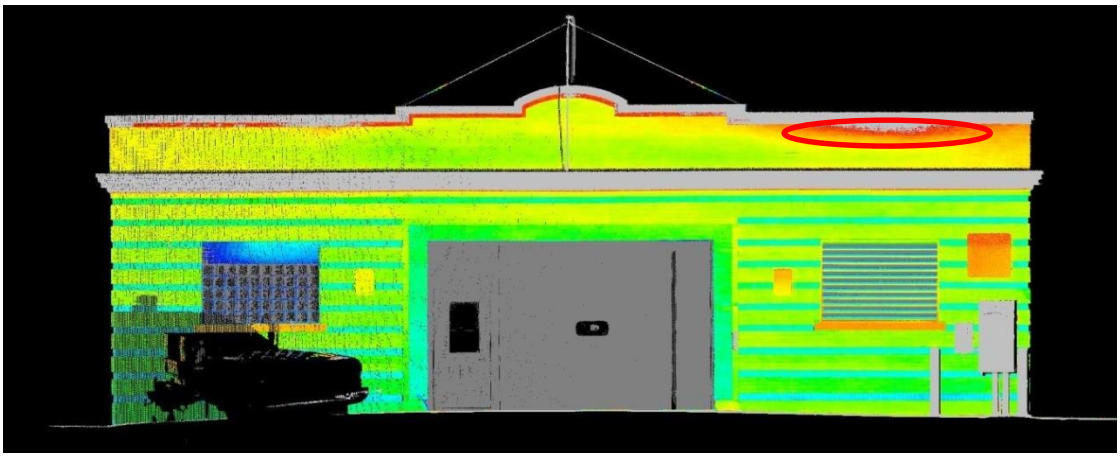


Figure 6: West elevation, plane deviation analysis (circled areas indicate excessive out-of-plane movement)

Figure 7: Deteriorating asphalt paving.

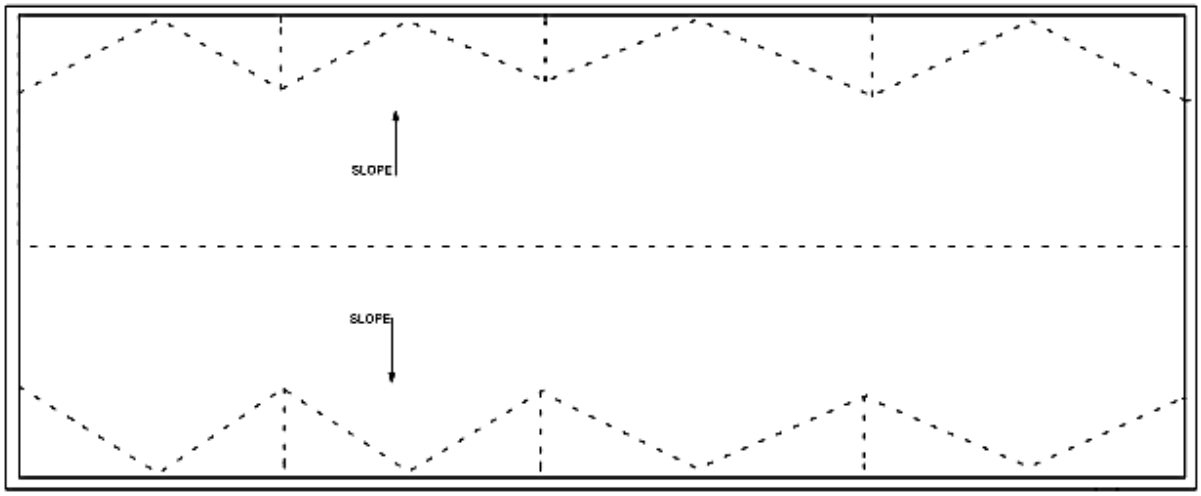


Figure 8: North parking garage roof plan.

Figure 9: Failed skyward facing stone coping joint.

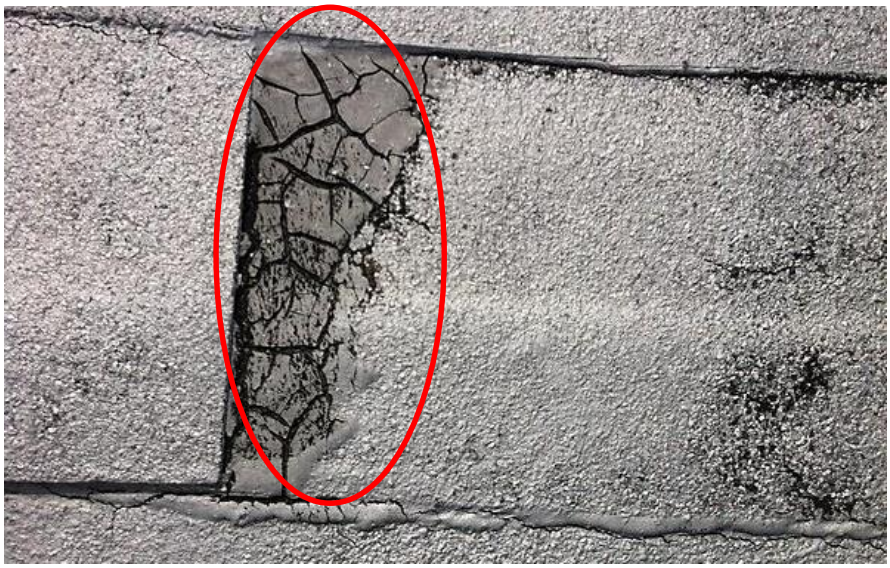


Figure 10: Alligator cracking.

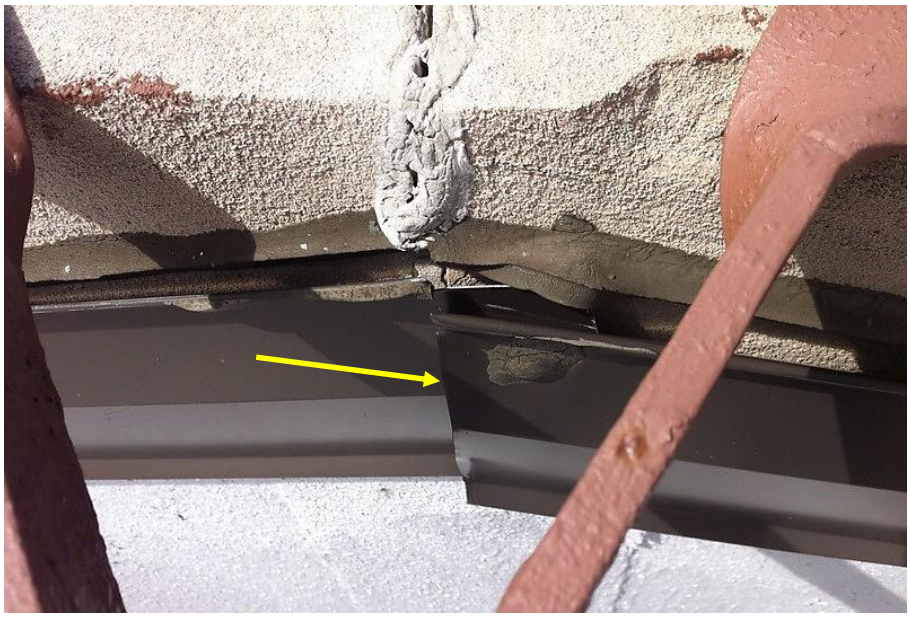


Figure 11: Open joint between metal counter flashings.

Figure 12: Open sealant joint at top of counter flashing.

Figure 13: Membrane cracking.

Figure 14: Membrane cracking and bubbling.

Figure 15: Failed joint at penetration.

Figure 16: Ponding at roof drain.

Figure 17: Window sealant deterioration.

Figure 18: Cracked glass window pane.

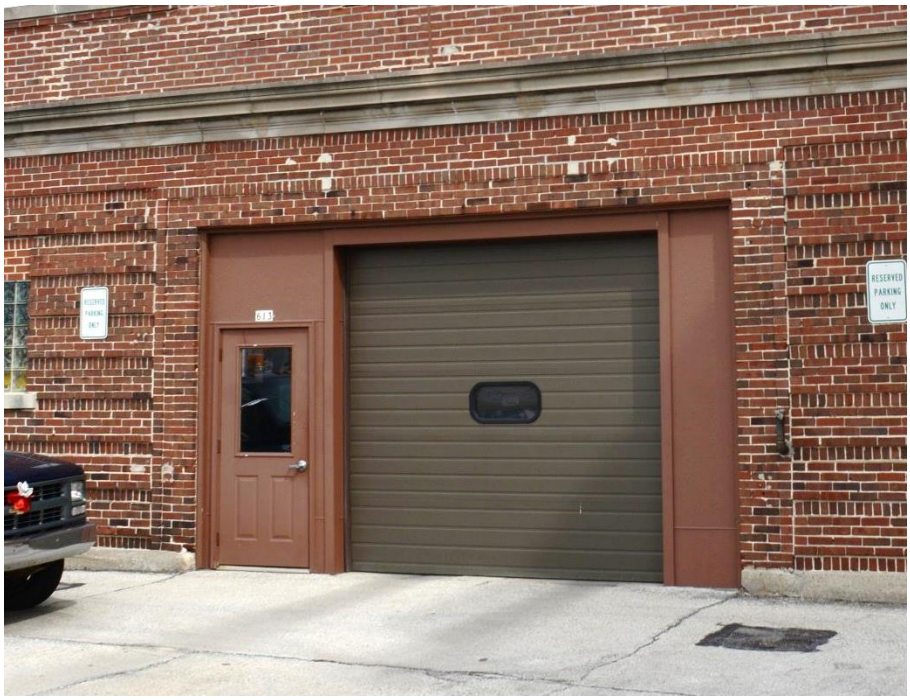


Figure 19: West facade doors.

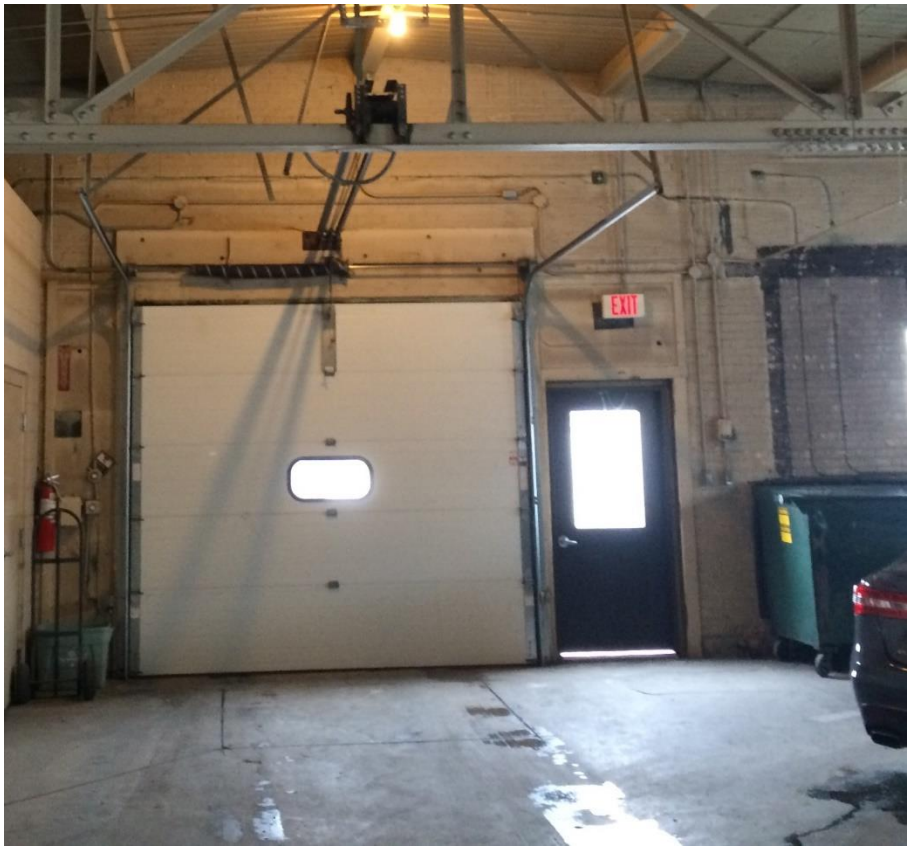


Figure 20: West facade doors interior view.

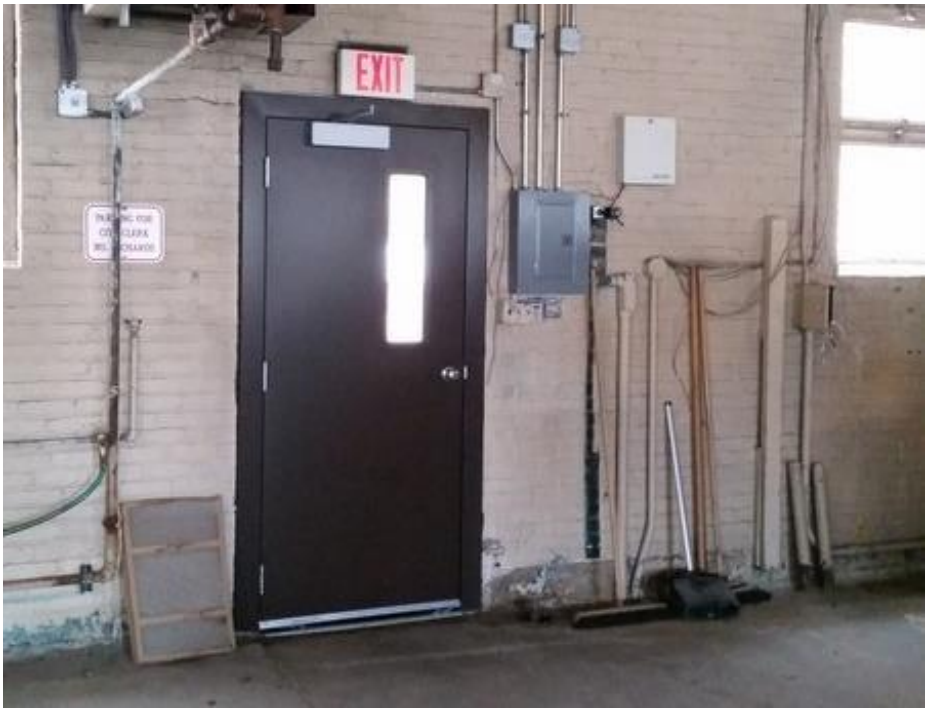


Figure 21: Interior view of south facade access door.

Figure 22: Deteriorated brick masonry.

Figure 23: Deteriorated mortar joints.

Figure 24: Deteriorated brick.

Figure 25: Out of plane brick movement.

Figure 26: Corroded steel window lintels.

Figure 27: Corroded steel window lintel.

Figure 28: Corroded steel door lintel.

Figure 29: Corroded steel door lintel.

Figure 30: Cracked concrete foundation wall.

Figure 31: Mortar joint deterioration on stone.

Figure 32: Interior brick cracking.

Figure 33: Interior brick deterioration.

Figure 34: Paint deterioration.

Figure 35: Concrete floor cracking.

Figure 36: Deteriorating concrete floor.

Figure 37: Failed floor to wall joint.

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City Hall

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City of Sheboygan
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Subject: **City Hall Property Condition Assessment DRAFT Report**
828 Center Avenue, Sheboygan, Wisconsin

Dear Mr. Rammer:

The following is a report associated with the ZS LLC (ZS) condition assessment of the Sheboygan City Hall property located at 828 Center Avenue in Sheboygan, Wisconsin. ZS teamed with IBC Engineering (IBC), a Mechanical, Electrical, and Plumbing engineer to perform the assessment. A separate report titled City Hall North Parking Garage Property Condition Assessment Report was prepared for the one story parking garage associated with the City Hall property.

INTRODUCTION

The ZS/IBC team was retained to perform a Condition Assessment related to the four story City Hall structure located at 828 Center Avenue in Sheboygan, Wisconsin (Figure 1). The scope of the assessment included a 3D laser scan of the building's exterior facade and parapets, as well as visual surveys of the following systems: site, building envelope, structural, architectural, mechanical, plumbing, electrical, and fire suppression and detection.

The primary goal of this Condition Assessment was to evaluate the conditions of exterior and interior elements, provide projected remaining useful life, and provide a twelve (12) year projected capitol project outlook associated with maintenance and repairs to the building. The completion of these goals will help advance the vision of the City of Sheboygan for the project by balancing project cost, building performance, and the overall architecture of the building. By providing this pertinent data as well as professional recommendations, it is ensured that future projects related to City Hall will be a straight-forward and predictable process that leads to successful results for the City of Sheboygan.

BACKGROUND

The subject facility is a four story masonry structure that was constructed and dedicated in 1915, and is currently in use as the City of Sheboygan's City Hall (Figure 2). The structure is a City of Sheboygan and Sheboygan County Historic Landmark. The primary exterior building envelope components consist of brick coursing, limestone architectural elements, aluminum framed windows and storefront entrance systems, and a modified bitumen roof system.

3D Laser Scan

Description: A 3D laser scanner was used to document and assess the conditions of exterior facades and parapets, as well as detection of out-of-plane wall movement which would otherwise not be noticeable using standard inspection techniques. Multiple scan locations were determined and then combined into a composite point cloud to prepare a 3D model (Figure 3). The point cloud was then used to perform out of plane movement analysis of the parapets and for investigation and quantification of any other anomalies identified during the survey.

Images: Using the laser scanning data, out-of-plane movement of the walls were identified and accurately measured and depicted. Figures 4 - 8 show the extent of movement of the walls at different elevations. The figures show a colorized point cloud scale depicting the extent of the out-of-plane movement. Red colored areas of the scan indicates out-of-plane wall movement of two inches. For this type of wall, areas of the wall that are bulging two inches or greater are considered excessive and should be repaired.

Findings/Observations: The following specific conditional issues were noted during the laser scan of the facades: bulging brick adjacent to window sills on the north facade (Figure 4), and leaning parapet walls at several locations (Figures 5 - 8).

FIELD OBSERVATIONS

ZS and IBC performed a thorough visual survey of the existing building systems at the subject facility. Each building system type was identified, inventoried, and conditionally assessed. The following represents a description and conditional overview for each building system:

I. Exterior

Description: Assessment of the building's exterior systems including: site features, exterior masonry walls, parapets, doors, windows, roofs, and below-grade foundation waterproofing.

A. Site: Assessment of hardscapes and exterior metals.

1. Hardscapes.

Description: The site surrounding the building consists of concrete entrance steps on the south, east and west facades (Figure 9), an ADA accessible wheelchair ramp on the south facade (Figure 10), and an asphalt alley driveway behind the building (i.e. at the north elevation) (Figure 11).

Estimated Age: Varies

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the visual survey of the site hardscapes:

a. Spalled stone elements at entrance steps (Figure 12).

Repair/Timeframe: Perform dutchmen stone repair (1-3 years).

b. Deteriorating asphalt alley driveway (Figure 13).

Repair/Timeframe: Repave asphalt areas (1-3 years).For more details on asphalt issues directly relating to below-grade waterproofing and the interior damage see Section II, Category A, Sub-categories h & i.

2. Exterior Metals.

Description: The site surrounding the building has multiple metal components that were visually evaluated. These components include downspouts, handrails, light poles, etc.

Estimated Age: Original construction (1915)

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the visual survey of the site exterior metals:

a. Disconnected downspouts (Figure 14).

Repair/Timeframe: Replace/reattach all disconnected downspouts (0-1 years).

b. Corroding and paint failure on light poles at entrances (Figure 15).

Repair/Timeframe: Remove all existing failed paint, remove/clean corrosion, repair metal as necessary and repaint (1-3 years).

c. Corroded and damaged fire escape (Figure 16).

Repair/Timeframe: Remove all existing failed paint, remove/clean corrosion, repair metal as necessary and repaint. The fire escape is a life safety component and should be addressed immediately. Perform repairs to fire escape components (0-1 years).

d. Corroded and damaged window well grates at basement windows (Figure 17).

Repair/Timeframe: Repair and repaint window well grates (1-3 years).

B. Roof: Assessment of all roof areas.

1. All Roof Areas.

Description: The city hall roofs (Figure 18) consist of smooth surface modified bitumen system, on all roof areas. There are three main roof areas, identified as areas 1, 2, and 3 (Figures 19 - 21) as well as three smaller roof areas on each of the three larger areas, identified as areas A, B, and C (Figures 22 - 24).

Estimated Age: 1990

Estimated Remaining Life: 1-3 years

Conditional Issues: The following specific conditional issues were noted during the visual survey of the roof:

a. Significant membrane alligator cracking (Figure 25).

Repair/Timeframe: Replace roof system (1-3 years).

b. Membrane blisters & air pockets (Figure 26).

Repair/Timeframe: Replace roof system (1-3 years).

c. Deteriorated pitch pockets (Figure 27).

Repair/Timeframe: Replace roof system (1-3 years).

d. Failed aluminum coating above counter flashing (Figure 28).

Repair/Timeframe: Replace roof system (1-3 years).

Roof Commentary: The existing roof systems are exhibiting numerous failures and deteriorated conditions. Complete replacement is recommended.

C. Facade: Assessment of all facade systems.

1. Windows.

Description: The windows throughout the building are mill finish aluminum frame systems, consisting of synthetic material panels at the upper sashes and clear insulated glass at the lower sashes (Figure 29).

Estimated Age: 1970

Estimated Remaining Life: 3-5 years

Conditional Issues: The following specific conditional issues were noted during the visual survey of the windows:

a. Window perimeter sealant deteriorating/failing along entire perimeter of all windows (Figure 30).

Repair/Timeframe: Remove existing sealant from all window unit perimeters and install new backer rod and sealant (1-3 years).

b. Seal failure at Insulated Glass Units (IGU) causing fogging and condensation in between window panes (Figure 31).

Repair/Timeframe: Replace failed/fogged IGU's (1-3 years).

c. Detached opaque window panel on the west facade (Figure 32).

Repair/Timeframe: Replace/reattach panel (0-1 years).

Window Commentary: Windows are exhibiting numerous failures and are past their useful serviceable life. Replacement of the windows is recommended. Window replacements should be performed in a historically sensitive nature due to the historical designation of the City Hall Building.

2. Doors.

Description: The exterior storefront entrance assemblies are mill finish aluminum frame systems with clear single pane glazing. The main entrance door on the south facade has a decorative cast iron transom and jambs (Figure 32), as well as a mill finish aluminum frame entrance vestibule with clear single pane glazing (Figure 33). The roof access door is a wood panel door (Figure 34).

Estimated Age: Varies.

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the visual survey of the doors:

a. Roof access door in severe damaged condition (Figure 34).

Repair/Timeframe: Replace door within 0-1 years.

b. Corrosion and paint deterioration at main entrance doors cast iron elements (Figure 35).

Repair/Timeframe: Remove all corrosion and paint where necessary, prime and repaint to match existing within 1-3 years.

c. Deteriorated perimeter sealant at main entrance on south facade

Repair/Timeframe: Remove existing sealant from entrance system perimeters and install new sealant.

3. Brick Masonry.

Description: The primary exterior wall cladding consists of red running bond brick masonry coursing with decorative offset brick units along first floor windows, beneath third floor windows, and along the uppermost parapet on the south elevation (Figure 36).

Estimated Age: Original construction (1915)

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the visual survey of the buildings brick:

a. Corroded steel lintels at most locations with rust jacking causing brick masonry out of plane movement (Figure 37).

Repair/Timeframe: Remove brick to expose lintels at identified locations, repair or replace lintels, install new through wall flashing and replace removed brick masonry (1-3 years).

b. Corroding embedded steel at window jambs along east elevation (Figure 38).

Repair/Timeframe: Remove brick around embedded steel, cut back/remove steel and replace brick (1-3 years).

c. Out of plane movement and deteriorated brick masonry at upper portion of chimney (Figure 39).

Repair/Timeframe: Remove and reconstruct brick masonry at upper portion of chimney (1-3 years.)

d. Brick cracking at random locations (Figure 40).

Repair/Timeframe: Remove crack brick masonry units and replace with new brick provide horizontal stitching reinforcement as necessary (1-3 years).

e. Mortar deterioration throughout (Figure 41).

Repair/Timeframe: Cut out existing mortar to a depth of a minimum of ¾" and install new pointing mortar (1-3 years).

4. Stone Masonry.

Description: Limestone watertables, sills, bands and cornices are set at multiple locations along all elevations of the building (Figure 42).

Estimated Age: Original construction (1915)

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the visual survey of the buildings stone elements:

a. Erosion of outer surface of stone units at select locations (Figure 43).

Repair/Timeframe: Remove loose stone material and tool/reprofile stone units (1-3 years).

b. Cracked stone units at several locations.

Repair/Timeframe: Perform stone crack repair (1-3 years).

c. Spalled stone units at several locations (Figure 44-45).

Repair/Timeframe: Perform Dutchmen repair of spalls (1-3 years).

d. 100% mortar joint failure at all stone bands (Figure 46).

Repair/Timeframe: Removed existing mortar joints to a depth of a minimum of ¾" and install new mortar. Install sealant at all skyward facing joints (1-3 years).

c. Deteriorating asphalt coating on skyward stone cornice face (Figure 47).

Repair/Timeframe: Install sheet metal coping or liquid membrane coating over top of stone cornice (1-3 years).

5. Parapet Walls.

Description: All parapets consist of red running bond coursing capped with limestone copings. The uppermost parapet on the south elevation contains decorative offset brick elements. The parapet walls of roof areas 2 and 3 are approximately 10 feet high above the roof level.

Estimated Age: Original construction (1915)

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the visual survey of the parapets:

a. Deteriorated brick at the inside face of all parapets (Figure 48).

Repair/Timeframe: Replace deteriorated brick units (1-3 years).

b. Out of plane movement at parapet corners (Figure 49).

Repair/Timeframe: Reconstruct parapet corners (1-3 years).

c. Deteriorated mortar joints on exterior face of parapet walls.

Repair/Timeframe: Remove existing mortar joints to a depth of a minimum of ¾" and install new mortar (1-3 years).

II. Interior

Description: Architectural Systems assessment including: stairways, hallways, and office layout. Structural systems assessment including: foundation, structural frame, and walls.

1. Interior-All Floors

A. Basement.

Description: The basement level consists of multiple finishes, and is primarily used for storage with the exception of a conference room.

Estimated Age: Original construction (1915), with the exception of limited spaces that have been remodeled within the last twenty years (conference room).

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the interior visual survey of the basement:

a. Leaks present along foundation wall causing efflorescence at multiple locations (Figures 50 & 51).

Repair/Timeframe: Replace deteriorated brick units, grind out and repoint deteriorated mortar joints (3-5 years).

b. Men's and women's restrooms are not ADA accessible.

Repair/Timeframe: Reconfigure men's and women's bathrooms to meet ADA standards (3-5 years).

c. Floor tiles in poor condition in restrooms and common areas (Figures 52 & 53).

Repair/Timeframe: Replace flooring (3-5 years).

d. Carpet in poor condition throughout (Figure 54).

Repair/Timeframe: Replace carpet (1-3 years).

e. Concrete floor finish in poor condition at boiler room (Figure 55).

Repair/Timeframe: Patch concrete and seal flooring (3-5 years).

f. Paint chipping and failure on walls throughout (Figure 56).

Repair/Timeframe: Repaint walls (1-3 years).

g. Multiple holes in clay tile ceiling structure (Figure 57).

Repair/Timeframe: Patch holes (3-5 years).

h. Spalling concrete, corrosion of embedded reinforcing steel, and signs of water infiltration were observed within the vaulted space beneath the north side alley (Figure 58).

Repair/Timeframe: During replacement of alley asphalt (See I.A.1.b) repair deteriorated concrete structural elements and install new waterproofing membrane over vaulted space (1-3 years).

i. Corrosion of steel elements and signs of water infiltration below the west stairs/entrance area in the basement record room (Figure 59).

Repair/Timeframe: Repair Expose corroded steel elements and repair/reinforce corroded steel. Monitor condition for active leakage. If area is actively leaking, remove concrete entrance steps and install waterproofing system at foundation wall and entrance area (1-3 years).

j. Basement exit stairwell leading to back alley on the north elevation in deteriorated condition with the following observations: opened joint between stair and building walls, spalled concrete steps and foundation wall cracking (Figures 60 - 62).

Repair/Timeframe: Perform concrete spall and crack repairs and install sealant joints between stair and building walls (1-3 years).

B. First, Second, and Third Floors.

Description: The first, second, and third floor levels consist of multiple finishes, and are the most used floors throughout the building. These levels consist of multiple offices, departments, a common council chamber, and other miscellaneous rooms.

Estimated Age: Renovated in the 1990's

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the visual surveys of the first, second and third floors:

a. Carpeting throughout in poor condition (Figure 63).

Repair/Timeframe: Replace carpet (1-3 years).

b. Approximately 75% of ceiling tiles throughout in poor condition (Figure 64).

Repair/Timeframe: Replace ceiling tiles (3-5 years).

c. Paint chipping and cracking on walls throughout (Figure 65).

Repair/Timeframe: Repaint walls (3-5 years).

d. Bathroom fixtures serviceable but are aged. (Figure 66).

Repair/Timeframe: Remodel bathrooms (3-5 years).

e. Door frames and panels separating at joints at multiple locations (Figure 67).

Repair/Timeframe: Repair doors (1-3 years), Replace doors (5-10 years).

f. First and second floor men's and women's bathrooms not ADA accessible (Figure 68).

Repair/Timeframe: Remodel bathrooms to meet ADA standards (3-5 years).

g. Missing and deteriorated sealant at multiple marble to marble joints in bathrooms and common areas (Figure 69).

Repair/Timeframe: Install new sealant at all joints (3-5 years).

C. Fourth Floor.

Description: The fourth floor is unfinished and in poor condition. The fourth floor is currently not in use for any purposes other than storage and roof access.

Estimated Age: Renovated in the 1990's

Estimated Remaining Life: Sustainable with repair and maintenance.

Conditional Issues: The following specific conditional issues were noted during the visual survey of the fourth floor:

a. Significant wall cracking and floor separation along north exterior wall and east/west walls that return to the north wall (Figures 70 - 72).

Repair/Timeframe: Reconstruct upper level of north exterior wall (1-3 years).

b. Cracked marble floor in stairwell (Figure 73).

Repair/Timeframe: Repair cracked marble with stone crack repair material (3-5 years).

c. Floor finishes throughout in poor condition (Figure 74).

Repair/Timeframe: Replace flooring (3-5 years).

d. Wall paint throughout in poor condition (Figures 75 & 76).

Repair/Timeframe: Repaint walls (3-5 years).

III. Mechanical, Electrical, and Plumbing

Description: Assessment of heating, ventilation, air conditioning, water heaters, and environmental controls.

A. HVAC.

Description: The building is currently heated with a steam heating system which is generally in good condition. Cooling and ventilation is provided in the basement and on the first floor by several air handling units with refrigerant coils and air-cooled condensers. Cooling for upper floors is provided by window air conditioning units, computer room air conditioning units, or not at all. Ventilation for upper floors is only provided through operable windows.

Estimated Age: Varies

Estimated Remaining Life: While the existing systems have been well-maintained and are in relatively good working condition for their age, most of the systems are within 3-5 years of their typical life expectancy.

Conditional Issues: The following specific conditional issues were noted and should be addressed for the building to be considered a long-term home to the city:

a. Since there is only a single boiler, there is no redundancy in the heating system. When the boiler fails, the building will be without heat until the system is repaired.

b. Steam systems are generally difficult to control well and have relatively high maintenance requirements.

c. The current cooling systems are high in maintenance since there are so many pieces of equipment, and they also interfere with the historic appearance of the exterior.

d. Many areas of the building do not have sufficient ventilation to meet current code requirements or industry standards.

e. The existing systems are inefficient compared to current standard options.

Repair/Timeframe: The following options are presented in order to solve the existing conditional issues:

Repair Option A: Four-pipe fan coil system with hot water boilers and an air-cooled chiller to generate chilled water. Hot water and chilled water distributed to fan coil units that are installed above ceiling or on walls in place of existing radiators. The boilers would likely be installed in the existing boiler room or in space that is available on the fourth floor mezzanine, while the chiller could be installed on the roof or on grade.

Repair Option B: Variable refrigerant flow (VRF) system. Like the four-pipe system, fan coil units would be installed above ceilings or along walls in place of existing steam radiators. Instead of relatively large hot- and chilled-water piping, these fan coils are connected to heat pumps with smaller refrigerant piping to provide heating and cooling to spaces. The heat pumps, while commonly referred to as outdoor units in this system, are actually installed indoors, with louvers providing controlled outside air to the heat pumps for heat rejection. This allows the VRF system to operate effectively in this climate.
The VRF system is approximately the same cost as the four-pipe system and is more energy efficient. The primary limitation for this option is finding locations in the building for the heat pumps since the length of refrigerant piping between the fan coils and heat pumps impacts the capacity of the system (longer runs require oversized equipment to achieve the same capacity as smaller equipment with shorter runs).

Ventilation: For both repair options A and B, ventilation would be provided by a new dedicated outside air system (DOAS), air handling units that do require ductwork distribution, however since space conditioning is done by the fan coil units, this system only requires enough air to meet ventilation requirements and therefore provides better control of ventilation while simultaneously using smaller ducts than a traditional forced-air heating and cooling system.

Controls: For both repair options A and B, a new direct digital control (DDC) system would be installed to replace the existing pneumatic control system. The DDC system will offer more flexible control and increased ability to optimize operations for energy conservation, as well as improve monitoring of systems to more efficiently plan maintenance operations.

HVAC Commentary: Installing new systems in historic buildings can present many challenges, particularly with respect to finding space within the existing structure to run new ductwork. For this reason, new systems that rely on forced air for heating and cooling often do not fit in historic buildings without significant concessions made to interior spaces. The two recommended options for systems to replace the existing systems address these issues while minimizing impact on the historic structure.

Existing systems are described on the following pages in more detail. Where a repair/upgrade option is impacted by the two options described above, both options are

identified as Option A or Option B and correspond to the options described above. Repair items listed as Option C should be considered as items that should be done to the existing systems if an upgrade to Option A or B will not be implemented.

B. Heating Plant.

Description: The primary source of heating for both City Hall and the parking garage is a 2887 Mbh natural gas-fired steam boiler located in the basement of City Hall.

Estimated Age: 1998

Estimated Remaining Life: Approximately 13 years

Conditional Issues: The boiler appears to be well maintained and in relatively good condition, however City of Sheboygan staff reported that the boiler has been subject to excessive priming. This can increase maintenance requirements.

Repair/Timeframe: The following options are presented in order to solve the existing conditional issues:

Repair Option A: Replace steam system with hot water boilers as part of conversion to a four-pipe fan coil system.

Repair Option B: Remove steam system. No boilers are required in Option B.

Repair Option C: Replace steam boiler with two new smaller steam boilers, each sized for 65% - 75% of the building load. This will improve reliability of the system if a boiler fails.

C. Heating Distribution.

Description: Steam and condensate return piping extend from the boiler to steam radiators throughout the building. A single steam main extends from City Hall to the parking garage and supplies unit heaters in the garage.

Estimated Age: Mostly original to the building, some piping has been replaced.

Estimated Remaining Life: Average life expectancy for steam and condensate piping can vary widely based on steam velocity, quality, etc. Destructive exploration to examine interior of pipes was not included in this analysis. City staff reported that there have been relatively few leaks in existing piping, and leaks that do occur are treated quickly. It should be expected that incidents of pipe and joint failures will increase with time.

Conditional Issues: In addition to the issues described above, it was observed that in several areas the piping insulation was compromised or missing completely.

Repair/Timeframe: The following options are presented in order to solve the existing conditional issues:

Repair Options A and B: All existing piping is replaced.

Repair Option C: Repair/restore piping insulation in critical areas within 1 year. Plan for ongoing pipe repair and replacement as system ages.

D. Combined Cooling and Ventilation Systems.

Description: Three forced air systems provide cooling and ventilation to the basement and first floor Air handlers are located in the basement and in the ceiling above the main toilet rooms on the first floor, air-cooled condensing units are mounted on the back.

Estimated Age: Air handlers and condensing units: Approximately 30 years (mid 1980's). It was reported that one or more compressors with the condensing units have been replaced already.

Estimated Remaining Life: Approximately 5 years for air handlers. Condensing units are at the end of the average life expectancy for this type of equipment.

Conditional Issues: The equipment appears to have been well-maintained and in good working order.

Repair/Timeframe: The following options are presented in order to solve the existing conditional issues:

Repair Options A and B: All equipment would be replaced with new systems as described above.

Repair Option C: Replace existing older condensing units within the next five years. Replace or recondition existing air handlers within the next 10 years.

E. Cooling Only Systems (Computer Room).

Description: Two water-cooled CRAC units provide cooling for the computer room and adjacent offices. The unit serving the computer room is a split DX system with an air-cooled condenser at the back of the building. The unit serving the adjacent offices is water cooled with domestic water and can be controlled to serve the computer room if the unit serving the computer room fails.

Estimated Age: The unit serving the computer room has been recently replaced. The unit serving the adjacent offices is approximately 25 – 30 years old.

Estimated Remaining Life: The new unit should last 15 years. The older unit is past the end of the average life expectancy for this type of equipment.

Conditional Issues: The equipment appears to have been well-maintained and in good working order. Use of domestic water for heat rejection is costly and no longer compliant with code.

Repair/Timeframe: The following options are presented in order to solve the existing conditional issues:

Repair Options A and B: The unit serving the offices would be replaced with new systems as described above.

Repair Option C: Replace the unit serving the office with a new split system similar to the computer room system within the next 5 years.

F. Cooling Only Systems (Window Air Conditioners).

Description: Many of the spaces on the 2nd floor and the entire 3rd floor are supplied with approximately 22 window air conditioners to provide cooling for occupied spaces.

Estimated Age: On average, the window air conditioners are 5 – 10 years old.

Estimated Remaining Life: 5 years

Conditional Issues: The equipment appears to have been well-maintained and in good working order.

Repair/Timeframe: The following options are presented in order to solve the existing conditional issues:

Repair Options A and B: All units would be replaced with the new systems.

Repair Option C: Replace all units within the next 5 years.

G. HVAC Controls.

Description: Existing systems are controlled with a pneumatic control system.

Estimated Age: The compressor has been replaced in the last 10-15 years.

Estimated Remaining Life: 5 years

Conditional Issues: The equipment appears to have been well-maintained and in good working order. Staff reported that pneumatic control lines within the building are largely intact.

Repair/Timeframe: The following options are presented in order to solve the existing conditional issues:

Repair Options A and B: System would be replaced with the new DDC system.

Repair Option C: Replace compressor within 10 years.

IV. Electrical

Description: Assessment of primary service, emergency generator, lightning protection, and lighting.

A. Utility Service and Normal Power Distribution.

Description: Sheboygan City Hall has an existing underground electrical service provided by a 300 kVA, 120/240 Volt exterior pad mounted utility transformer and building mounted utility meter/CT cabinet.

The electrical service enters at the northwest portion of the basement to an 800 Amp, 120/240 Volt, three phase, four wire, Square-D I-Line main distribution panelboard (MDP). Connected to the main distribution panel is a LEA International surge protection device.

Staff indicated that the main electrical service entrance was replaced five or six years ago.

The main distribution panelboard serves a number of Square-D, QO Load Centers throughout the building and one I-T-E, FEQ panelboard in the 2nd floor UPS room. Some of these load centers are protected by Square-D disconnect switches located in the basement main electrical room. The majority of the load centers feed smaller adjacent sub-panels. In most locations, the load centers feed two to three sub-panels. The main load centers are located behind door compartments that are stacked per floor in the northwest portion of the building.

The vehicle garage is served from a 100 Amp, 120/240 Volt, 3 phase, 4 wire Square-D QO load center.

Estimated Age: 2009 for newer equipment; unknown for older equipment.

Estimated Remaining Life: Approximately 19-24 years for newer equipment, the life expectancy of this electrical equipment is 25-30 years; unknown for older equipment.

Conditional Issues: All of this equipment is in fair to good condition and not in need of immediate replacement.

Repair/Timeframe: The following options are presented in order to solve the existing conditional issues:

Repair Option A: Install appropriate sealing for incoming electrical service feeder conduits.

Repair Option B: New Electrical Equipment Associated with Options A and B in Mechanical Report. These options recommend adding 75kW of cooling for the building. To accommodate this cooling load the following would be recommended: New 225 Amp feeder circuit breaker in MDP, 225 Amp, 120/240 Volt, 3 Phase branch panel (Square-D, NQOD type). As well as associated conduit, conductors and wiring devices for mechanical equipment.

Repair Option C: Combine existing branch circuits from existing panels in the Old Men's Cell Room. Capture (29) existing branch circuits from two existing Square-D Load Centers. Remove the two existing panels and re-feed the existing branch circuits from a new 100 Amp, 120/240 Volt, 3 Phase, (42) circuit branch panel (Square-D, NQOD type).

Combine existing branch circuits from existing panels in the Old Civil Defense Room. Capture (33) existing branch circuits from three existing Square-D Load Centers (Panels labeled P.1A, P.1B & P.1C). Remove the three existing panels Re-feed the existing branch circuits from a new 100 Amp, 120/240 Volt, 3 Phase, (30) circuit branch panel (Square-D, NQOD type). Re-use existing panel DA and add remaining circuits.

B. Emergency Power Distribution.

Description: The existing emergency power system is served from an interior pad mounted, 120/240 Volt, 180kW, diesel, stand-by, Kohler-180ROZJ generator. The generator has a sub-base fuel tank and is located in the generator room of the vehicle garage.

The emergency power distribution is protected by a main disconnect switch that is an 800 Amp, 240 Volt, Square-D enclosed circuit breaker.

From there, the emergency power distribution moves onto a Kohler transfer switch and (30) circuit, 100 Amp, 120/240 Volt, 3 phase, 4 wire Square-D NQOD panelboard. Emergency power in the city hall building is served from a 100 Amp, 120/240 Volt, Square-D QO Load Center in the basement main electrical room. Emergency panels are also located outside of the door compartments that are stacked on the 2nd and 3rd floors. Both are 120/240 Volt, Square-D QO Load Centers.

All of this equipment is in good condition and not in need of replacement.

A new telecommunications room on the 2nd floor is served by a 70 Amp, 120/240 Volt, Square-D QO Load Center. The load center is in good condition and not in need of replacement.

Estimated Age: 1999

Estimated Remaining Life: Approximately 9-14 years, the life expectancy of this electrical equipment is 25-30 years.

Conditional Issues: Staff indicated that the generator is tested monthly. There are no current issues with it.

Repair/Timeframe: Repair upon failure or if desired, replace upon equipment operating past its life expectancy.

C. Lighting System.

Description: The existing lighting system is protected by a series of 240 Volt, Arrow Hart fused disconnects (one for each floor) that are located in the basement main electrical room. Existing light fixtures consist largely of surface and recessed mounted lighting fixtures using linear T8, 25 Watt lamps. Mechanical and utility spaces have industrial type light fixtures. Red exit signs and emergency battery pack units are installed throughout the building indicating exit and egress paths. Lighting control consists of standard toggle wall switches and minimal occupancy switches. Exterior lighting consists of four post top light fixtures. Two are located at the south main entrance and two are located at the west entrance. Exterior lighting is assumed to be controlled by an existing Photocell. No existing lighting control panel or time clock was observed.

Estimated Age: Unknown

Estimated Remaining Life: Unknown; the life expectancy of T8 lamps is 30,000 hours of operation and the life expectancy of electronic ballasts is 50,000 hours of operation.

Conditional Issues: Staff indicated that on the main floors the original interior lighting above the existing acoustical ceiling is still present.

Repair/Timeframe: The following options are presented in order to solve the existing conditional issues:

Repair Option A: Remove original building lighting above ceilings.

Repair Option B: Remove original building lighting disconnects. Provide relay control system.

Repair Option C: Repair other components upon failure or if desired, replace upon components operating past its life expectancy.

D. Telecommunications System.

Description: The existing telecommunications system enters the building in the basement main electrical room and is routed to the new 2nd floor telecommunications room and old telephone room located in the equipment room on the mezzanine level. It is distributed throughout the building from these locations to wall phones and voice/data jacks. A few small data racks on the main floors have been added. The building does have fiber optic cabling. Existing UPS unit is located in the new 2nd floor telecommunications room. Manufacturer is Emerson – 20kVA.

Estimated Age: Unknown

Estimated Remaining Life: Unknown; the life expectancy of a phone system is 7-10 years.

Conditional Issues: A large amount of abandoned telecommunications cabling is present in the basement main electrical room and mezzanine level equipment room.

Repair/Timeframe: The following options are presented in order to solve the existing conditional issues:

Repair Option A: Remove abandoned telecommunications cabling.

Repair Option B: Repair other devices upon failure or if desired, replace upon equipment operating past its life expectancy.

E. Fire Alarm System.

Description: The existing fire alarm system is a Fire-Lite by Honeywell MS9200 series addressable system that consists of an annunciator, manual pull stations, notification devices and supporting elevator devices throughout the building. It's in good condition and not in need of replacement. Staff indicated that the fire alarm system was replaced five or six years ago. However, the only smoke detectors in the building are those associated with the elevator.

Estimated Age: 2009

Estimated Remaining Life: Approximately 14 years; the life expectancy of this equipment is 20 years.

Conditional Issues: A number of abandoned original fire alarm system cabinets are present in the basement main electrical room.

Repair/Timeframe: The following options are presented in order to solve the existing conditional issues:

Repair Option A: Remove abandoned original fire alarm system cabinets.

Repair Option B: Repair other devices upon failure or if desired, replace upon equipment operating past its life expectancy.

F. Security and Access Control Systems

Description: The existing security system is Altronix and access control system is Brivo. Portions of the systems are located in the basement level water meter room and the new 2nd floor telecommunications room. A Centurion wireless security system is located in the 2nd floor stacked door compartment. Systems consist of the mentioned head end locations, interior and exterior camera, door card readers, door electric strikes and motion detectors.

Estimated Age: Unknown

Estimated Remaining Life: Unknown; the life expectancy of this equipment is 20 years.

Conditional Issues: None observed, all of this equipment is in fair to good condition and not in need of immediate replacement.

Repair/Timeframe: Repair upon failure or if desired, replace upon equipment operating past its life expectancy.

G. Lightning Protection System.

Description: Staff indicated that the building has an existing lightning protection system that they have no issues with.

Estimated Age: Unknown

Estimated Remaining Life: Unknown; the life expectancy of this equipment is 20 years.

Conditional Issues: None observed.

Repair/Timeframe: Repair upon failure or if desired, replace upon equipment operating past its life expectancy.

12 YEAR CAPITAL REPAIRS AND MAINTENANCE OUTLOOK

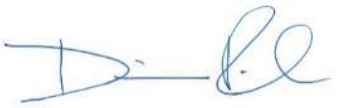
Please see the 12 Year Capital Repairs and Maintenance Outlook repair list and cost estimate in Appendix A. Repairs are listed and categorized by 0-1 year, 1-3 year, 3-5 year, 5-8 year, and 8-12 year repairs. Costs are in 2015 values and are not escalated.

CLOSING

If you have any questions or require additional information, please feel free to contact our office.

Sincerely,

ZS LLC



Darin C. Rickert, AIA, RRC, LEED AP
Senior Architect and Building Envelope Consultant

REPRESENTATIVE FIGUREGRAPHS

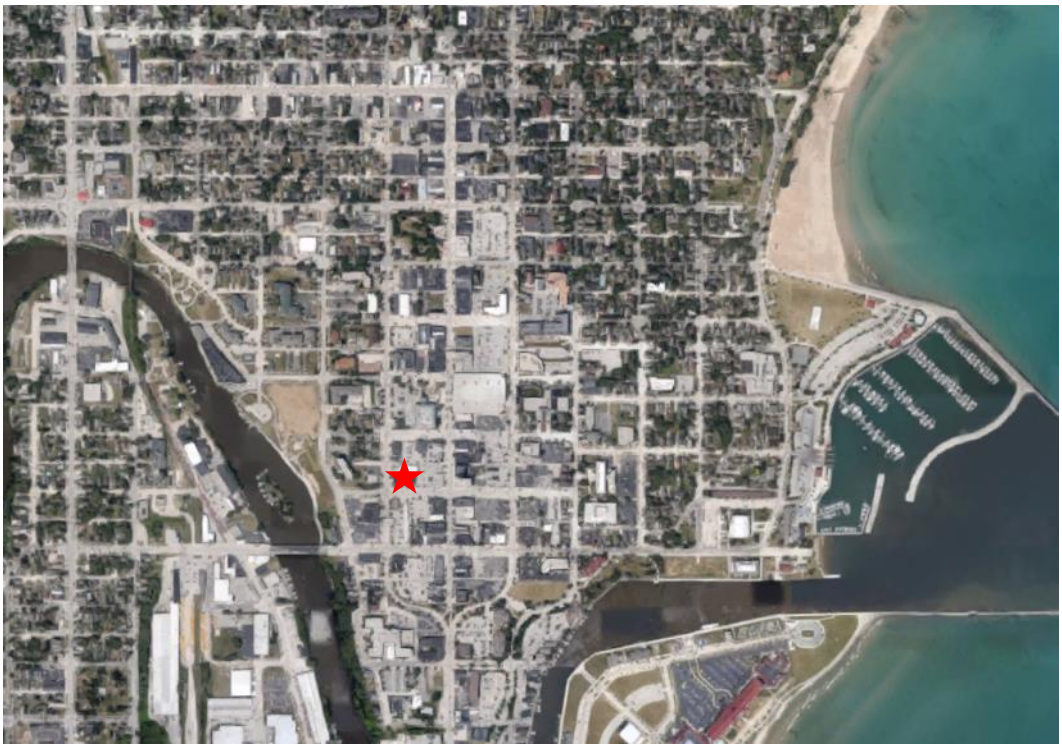


Figure 1: Sheboygan, WI, City Hall location

Figure 2: Sheboygan City Hall Aerial View.

Figure 3: Sheboygan City Hall colorized 3D laser scan image.

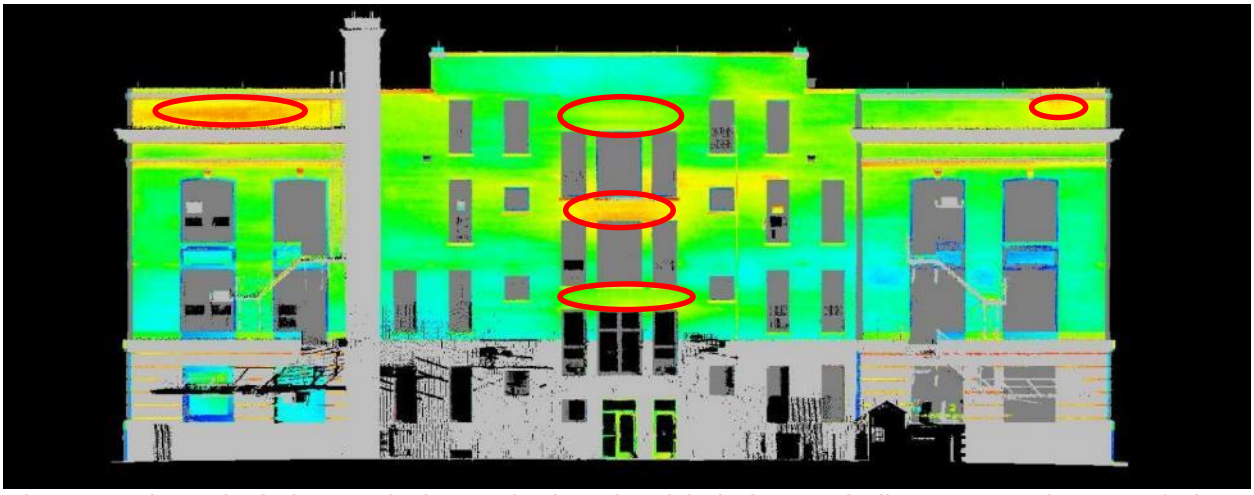


Figure 4: Plane deviation analysis, north elevation (circled areas indicate excessive out-of-plane movement)

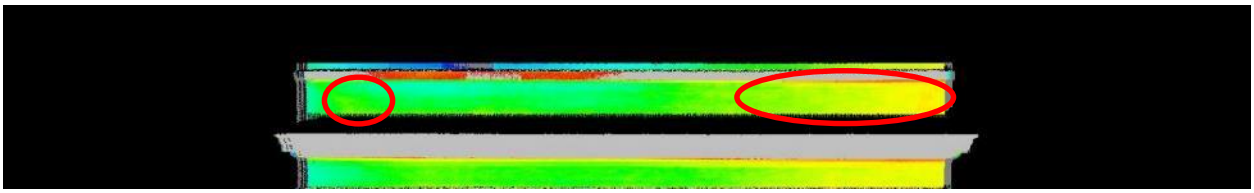


Figure 5: Plane deviation analysis, east parapet (circled areas indicate excessive out-of-plane movement)

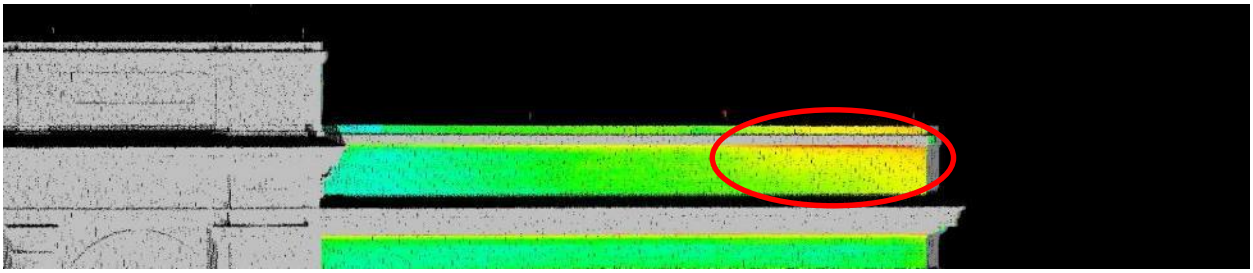


Figure 6: Plane deviation analysis, south parapet-east wing (circled areas indicate excessive out-of-plane movement)

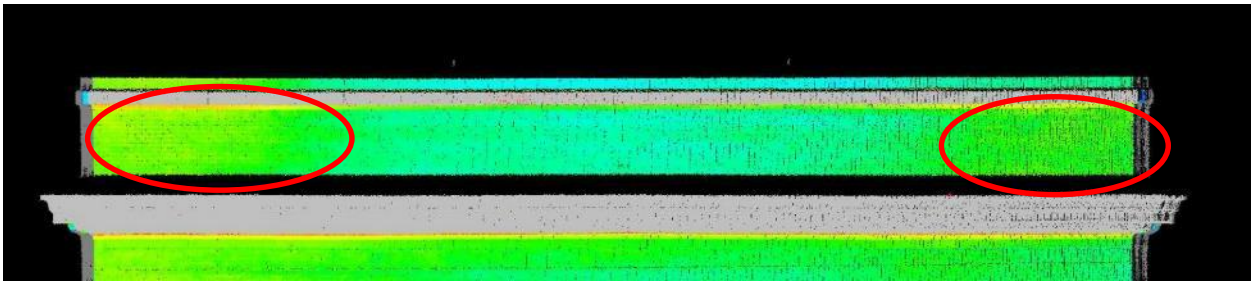


Figure 7: Plane deviation analysis, west parapet (circled areas indicate excessive out-of-plane movement)

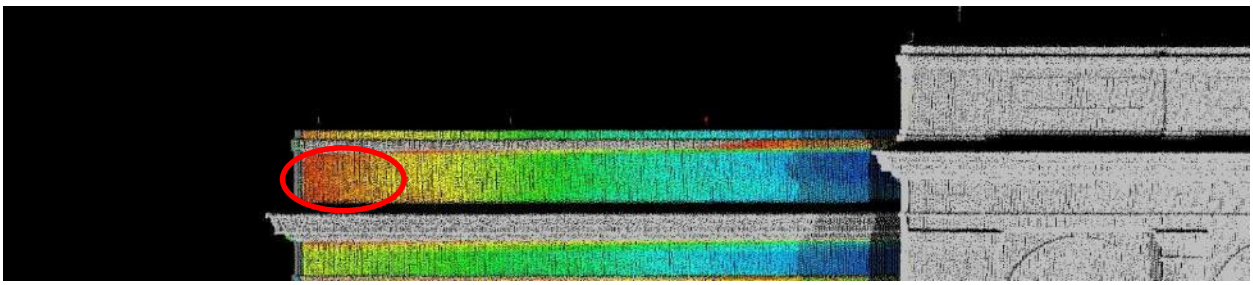


Figure 8: Plane deviation analysis, south parapet-west wing (circled areas indicate excessive out-of-plane movement)

Figure 9: Typical entrance system, west facade

Figure 10: Wheelchair ramp entrance, south facade

Figure 11: Alley, north elevation

Figure 12: Spalled stone at main entrance, south facade

Figure 13: Deteriorating asphalt pavement at alley, north elevation

Figure 14: Disconnected downspout, south facade

Figure 15: Corrosion/peeling paint on light poles at main entrance on south elevation

Figure 16: Corroded/damaged fire escape

Figure 17: Corroded/damaged window well grate

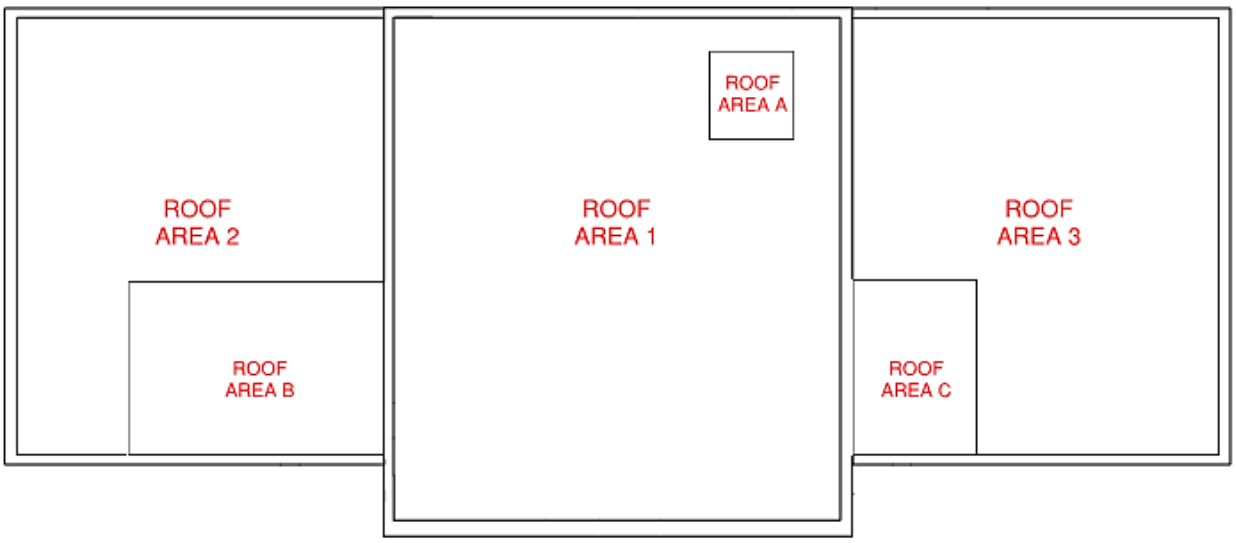


Figure 18: City Hall roof plan

Figure 19: Roof area 1

Figure 20: Roof area 2

Figure 21: Roof area 3

Figure 22: Roof area A

Figure 23: Roof area B

Figure 24: Roof area C

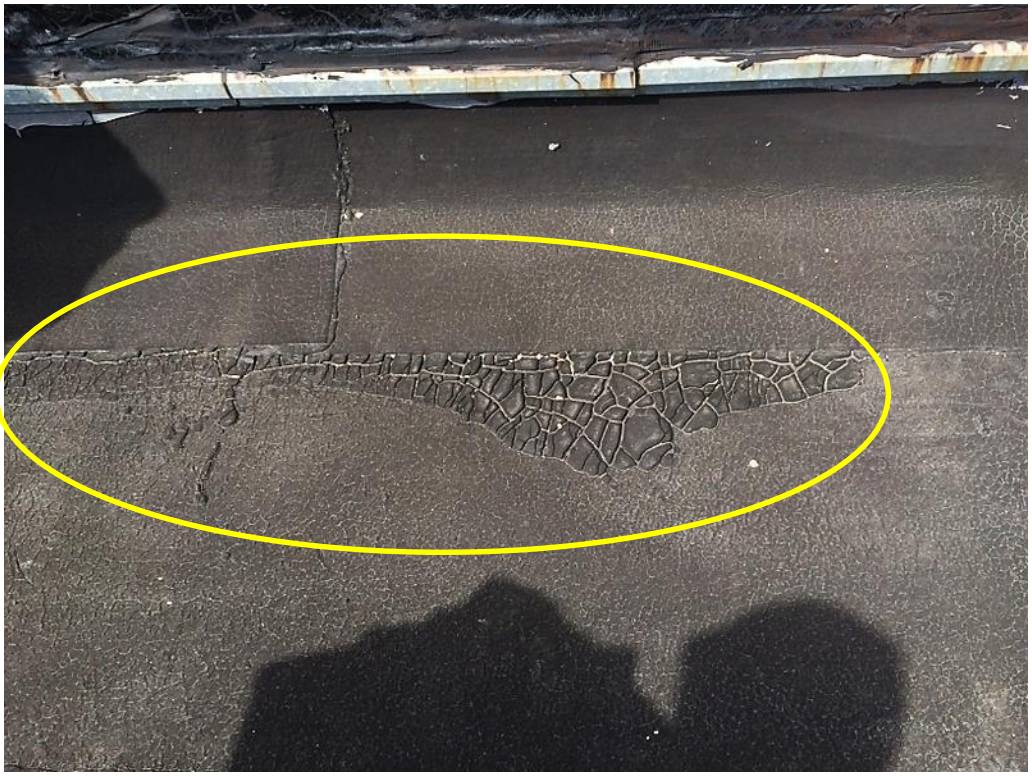


Figure 25: Deteriorated/asphalt cracking at modified bitumen membrane surface.

Figure 26: Blister within roof system.

Figure 27: Deteriorated pitch pocket

Figure 28: Failed aluminum coating above counter flashing

Figure 29: Typical window system

Figure 30: Deteriorated sealant at window perimeter

Figure 31: Condensation in between window panes of IGU.

Figure 32: Detached window panel on west facade.

Figure 32: Main entrance door, south facade

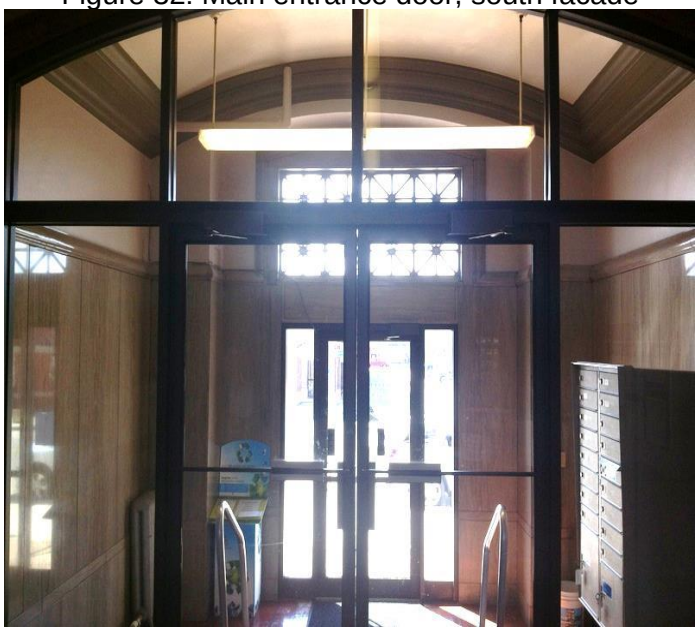


Figure 33: Main entrance vestibule, south facade

Figure 34: Damaged roof access door

Figure 35: Corroded and deteriorated door frame

Figure 36: Typical brick coursing

Figure 37: Corroded lintel causing brick movement.

Figure 38: Corroding embedded steel at window jamb

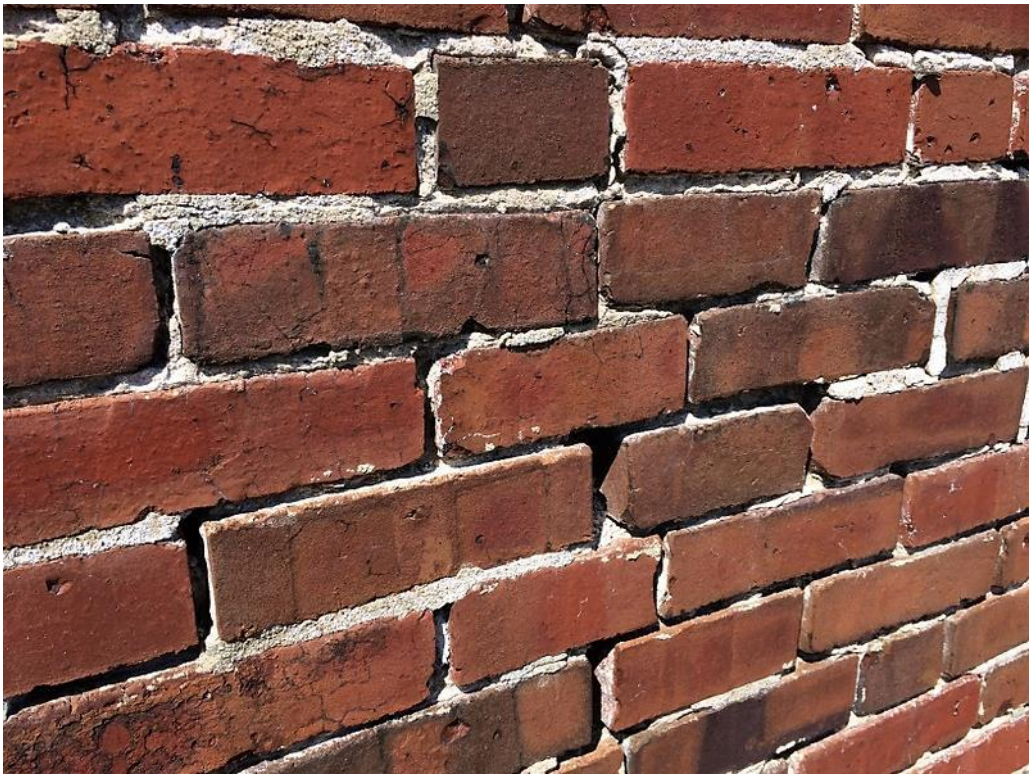


Figure 39: Chimney brick/mortar deterioration

Figure 40: Cracked brick

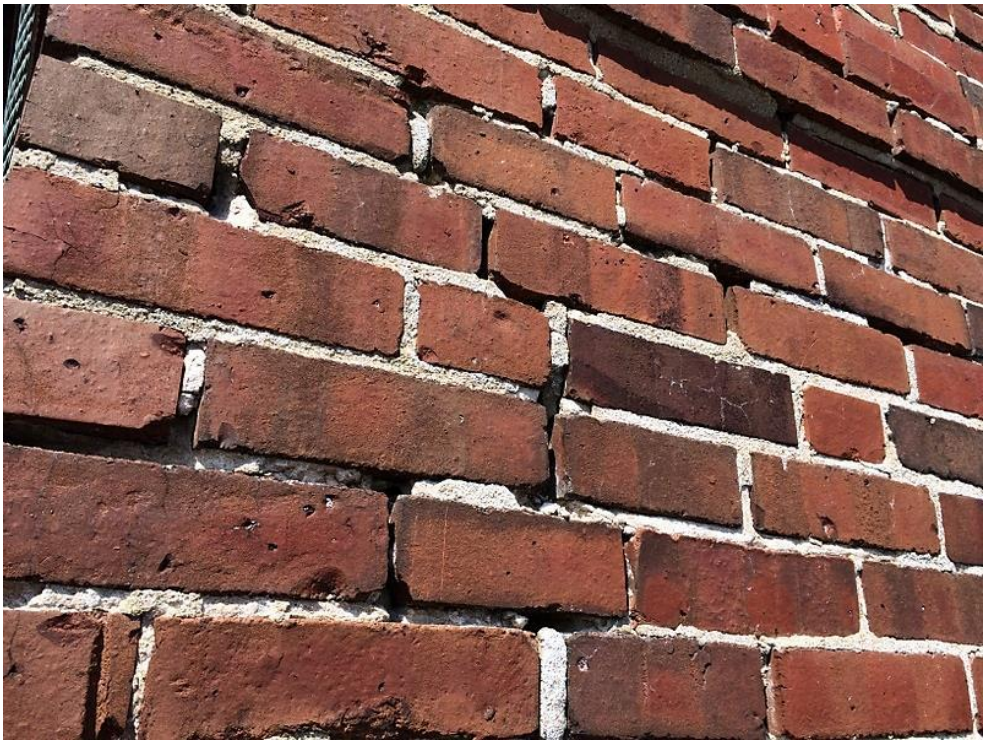


Figure 41: Brick/mortar deterioration on building facade

Figure 42: Limestone architectural elements wrap all building facades

Figure 43: Stone erosion.

Figure 44: Spalled Stone

Figure 45: Spalled stone

Figure 46: Deteriorated stone mortar joints with deteriorated sealant over mortar.

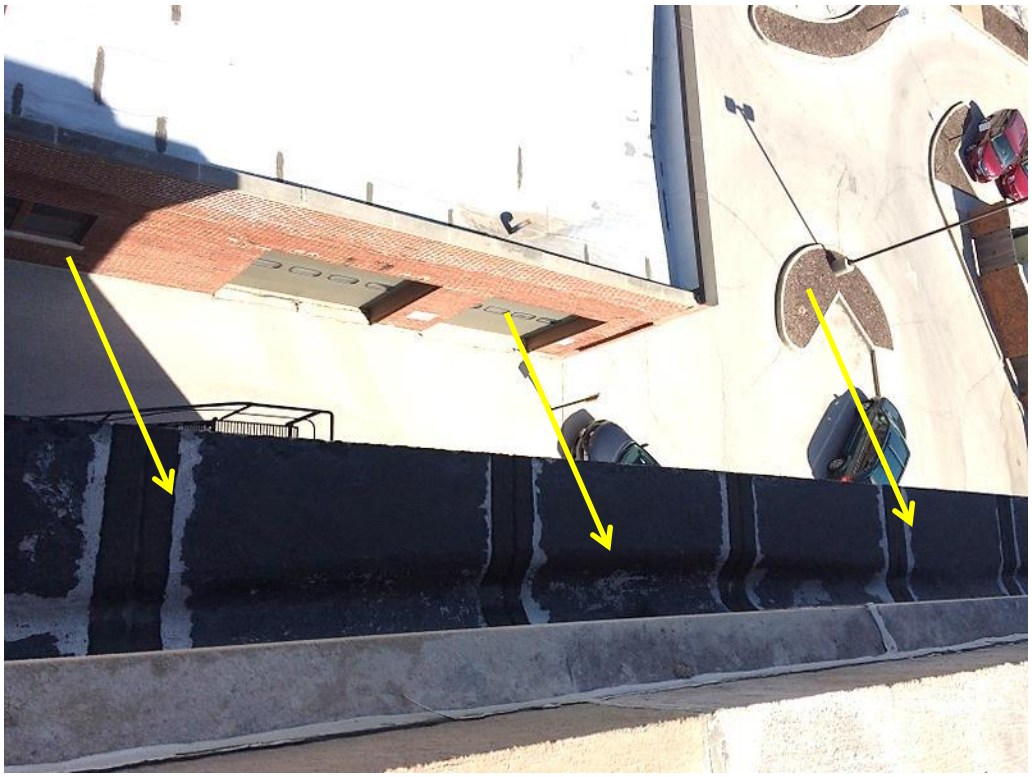


Figure 47: Deteriorated asphalt coating on skyward facing cornice/gutter.

Figure 48: Deteriorated brick at inside face of parapet

Figure 49: Out of plane brick movement

Figure 50: Leaks present along foundation wall

Figure 51: Effloresence/water staining along basement floor

Figure 52: Basement common area tile

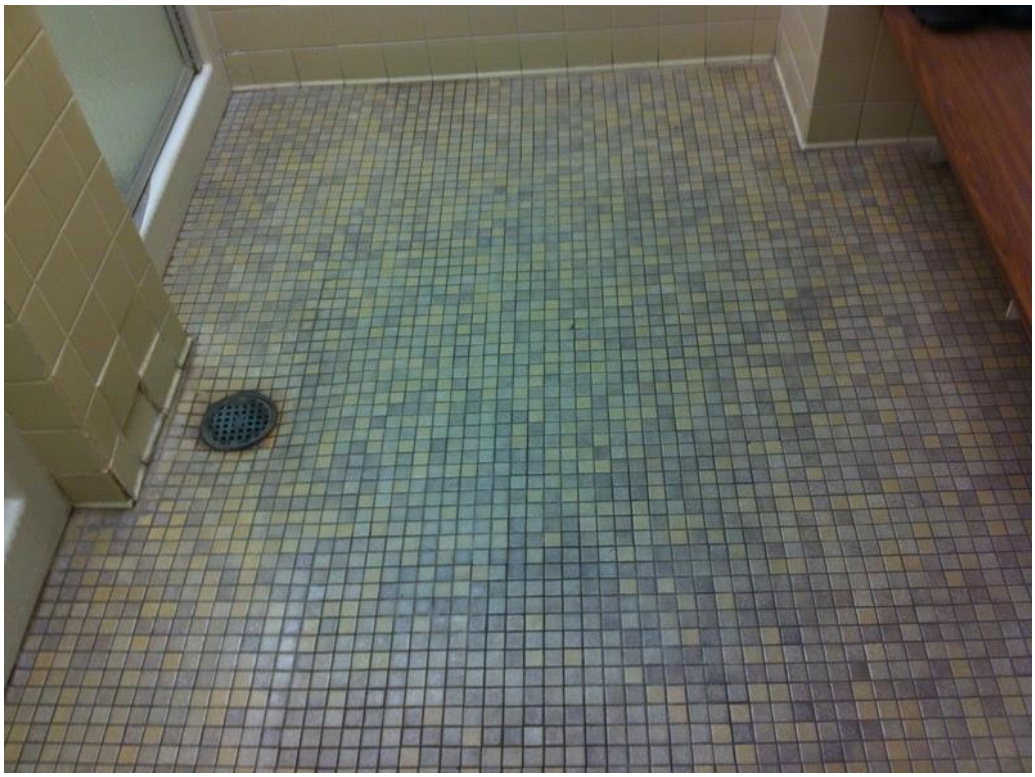


Figure 53: Basement men's bathroom tile

Figure 54: Basement carpet

Figure 55: Basement concrete floor in boiler room

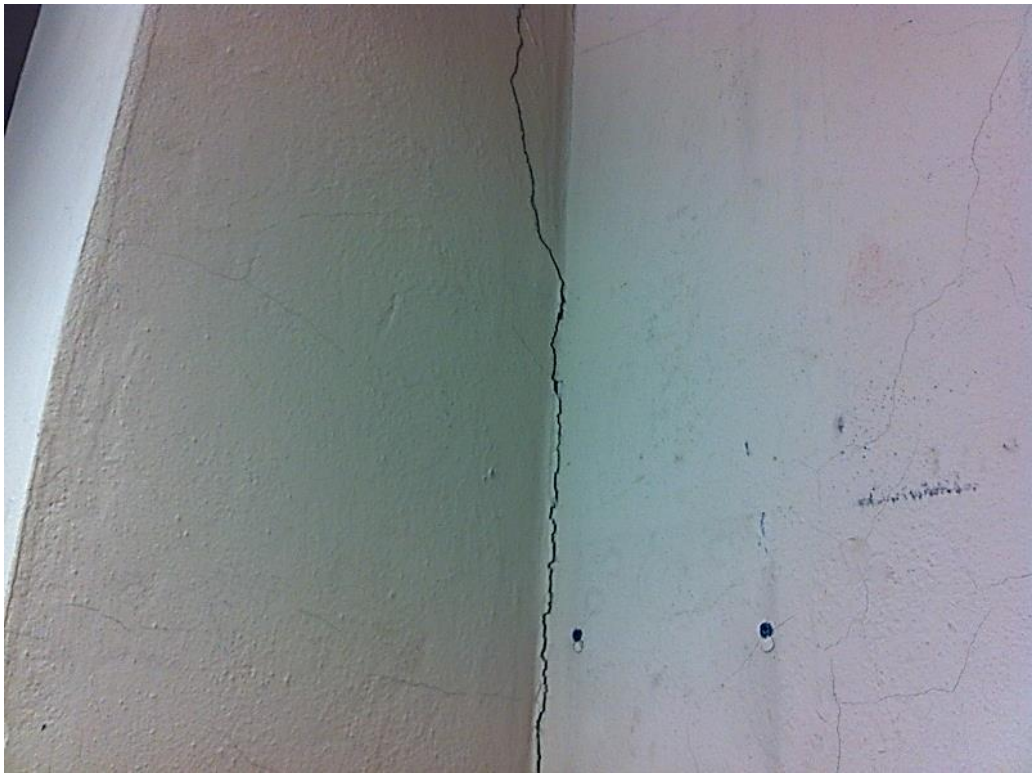


Figure 56: Basement paint cracking; large crack in wall

Figure 57: Hole in clay tile ceiling

Figure 58: Exposed rebar/structure deterioration in vault below alley.

Figure 59: Deterioration, water leakage beneath west entrance stair

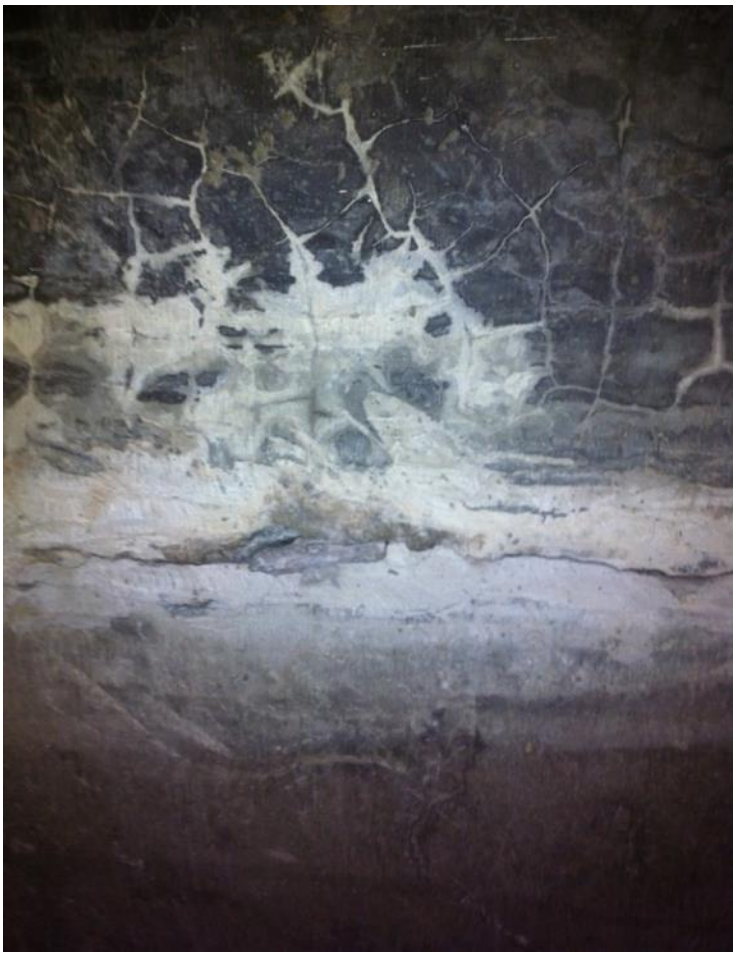


Figure 60: Deteriorating building foundation in stairwell

Figure 61: Opened wall joint and spalled steps in north basement exit stairwell

Figure 62: Foundation cracking in north basement exit stairwell

Figure 63: Office carpet in poor condition

Figure 64: Damaged ceiling tiles showing signs of leaks

Figure 65: Paint cracking

Figure 66: Aged bathroom fixtures

Figure 67: Door separating at joint

Figure 68: Second floor women's restroom, not ADA accessible

Figure 69: Marble joints missing and deteriorated sealant

Figure 70: Significant wall cracking in stairwell at fourth floor on north facade

Figure 71: Significant wall cracking at fourth floor on east wall that returns to exterior north wall.

Figure 72: Floor separation from wall in stairwell at fourth floor, north

Figure 73: Cracked marble floor in stairwell at fourth floor

Figure 74: Fourth floor wood flooring

Figure 75: Fourth floor paint cracking

Figure 76: Fourth floor wall paint cracking