Roof

Introduction

The existing flat roofs on the Hall of Waters were inspected by Susan Richards Johnson & Associates, Inc. (SRJA) and Structural Engineering Associates, Inc. (SEA) in order to determine if the roofs and related assemblies were performing according to their intended installation, to identify signs of weakness or deterioration and to recommend maintenance and repairs. In general, the roofs were visually inspected and the following conditions were reviewed: the continuity of the roof covering; deterioration of the roof covering; dispersement of rock ballast; visible ponding of water; existing roof drains; existing roof penetrations; installation of metal parapet caps; metal flashings (through-wall and regleted) and sealant installations. Interior spaces were also reviewed in relation to adjacent ceilings and walls for signs of water infiltration and/or distress. Photographs were taken at each roof during the inspection. The roofs were inspected in June 2012, in the midst of a drought, and therefore, no leaks were noticeable at the time of survey.

There are many levels of roofs (Figure 102). All roofs were accessible for inspection except the Tower Roof (R7). The roofs, in general, appear to be in overall good condition.

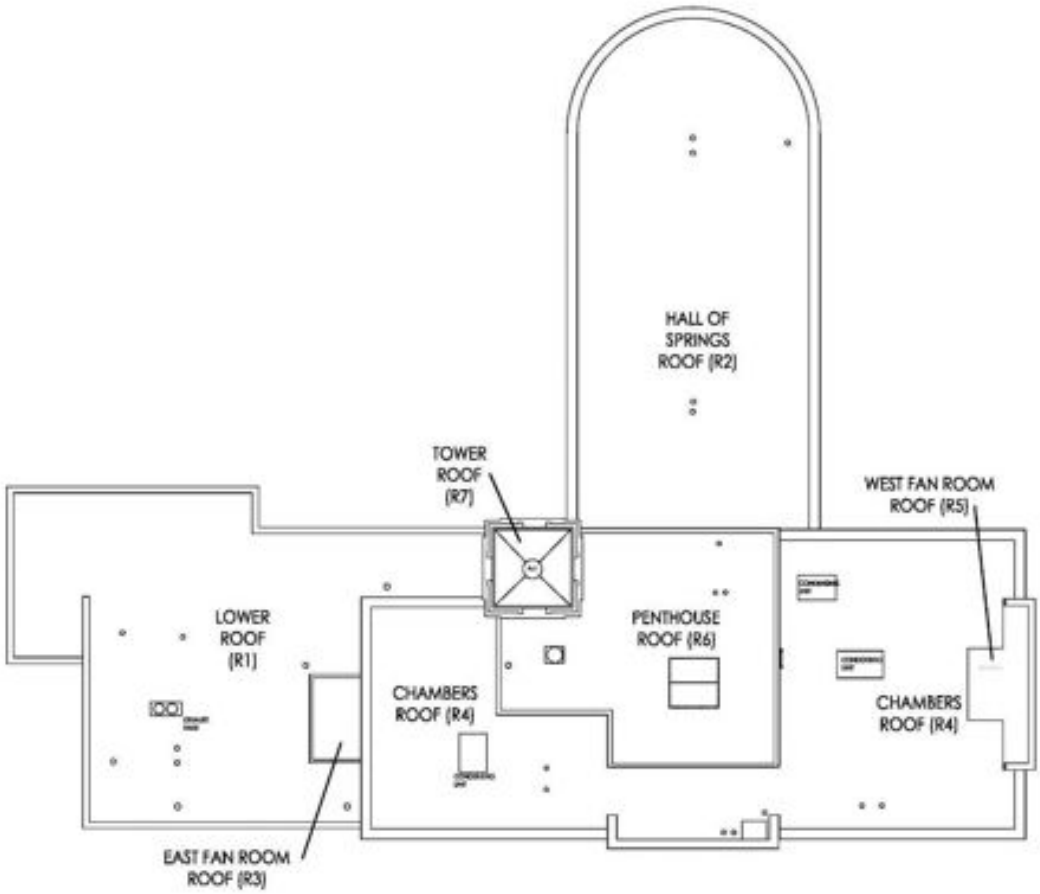

Fig. 102 Roof Plan. (SRJA 2013)

For the purposes of this report, the roofs are named as follows:

- Lower Roof (R1) – Located above the second floor spa and office spaces on the eastern portion of the building
- Hall of Springs Roof (R2) – Located above the Hall of Springs
- East Fan Room Roof (R3) – Located adjacent to the City Hall Chambers
- Chambers Roof (R4) – Located above the City Hall and Court Chambers
- West Fan Room Roof (R5) – Located at the west end of the Chambers Roof
- Penthouse Roof (R6) – Located above the elevator penthouse and attic spaces
- Tower Roof (R7) – Located atop the tower

General Flat Roof Observations

A majority of the roofs are flat and are covered with built-up roofing that is anchored with rock ballast. Exposed portions of the roof materials are painted a silver aluminum color, preventing any UV light from damaging the roofing material. Any existing underlying substrates are unknown at this time, but may include insulation board and subsequent roofing systems. Due to the installation of the rock ballast, it is difficult to determine the condition of the underlying roofing material. All roofing materials appear to have been professionally installed and were in overall good condition at the time of the survey, with no noticeable leaks at the time of their inspection.

Several items of concern are noted throughout this section of the report. These include:

- Areas of standing water
- Long travel distances to drains
- Several small plants have taken root in the lower lying roof areas, where there is ponding water
- Short or missing condensate drain hoses
- Deteriorated sealants
- Possible deterioration of exposed portions of roofing membrane.
- Quantity of roof drains for total amount of roof square footage.

According to the historic drawings, the internal roof drains were set in pairs. One was labeled the roof drain, while the adjacent secondary drain was labeled for ‘emergency’ roof drainage. This redundancy was established in case the primary drain became clogged. Both the primary and secondary (overflow) roof drains should be inspected periodically to ensure they are not clogged and are working effectively.

All parapet cap flashings should be designed and attached to the top of the parapet walls in order to adequately drip water away from the face of the building. In some cases, the cast stone capstones appear to be narrower than the concrete parapet wall below. When the cap flashing was installed, it was installed snug against the side of the capstones; and therefore, the drip edges do not always extend past the face of the concrete in order to properly shed water. These cap flashings should be removed and solid rot-resistant blocking shall be installed so that when the new cap flashing is installed, the drip edge will effectively drip away from the concrete wall below. A complete survey of these varied conditions should be done before the work is designed or specified, in order to design a solution specific to each occurrence.

Lower Roof (R1)
The lower roof (R1) is accessible through a door at the east end of the City Council Chambers. The roof appears to be in overall good condition. This lower roof is approximately 2,500 square feet. The upper East Fan Room Roof (R3), which is approximately 120 square feet, also drains onto this roof through a scupper and downspout.

Several plumbing vent stacks are visible throughout the lower roof, as are two large centralized exhaust vents. These appear to be in good condition. There is only one primary roof drain for this lower section of the roof. This drain is located near the middle of the roof and is required to drain over 2,620 square feet of roof. Calculations should be taken to ensure that the design for this roof drain is sufficient to effectively drain this large of a roof area during a severe rain event. It is especially important to note that moisture from the northeastern portion of the roof must travel well over forty feet in order to reach this centralized drain. This roof should be watched during a large rain event to determine if there is any ponding on the roof during or after a storm.

This eastern portion of the Hall of Waters building is constructed with exposed formed concrete exterior walls which project vertically above the roof plane to become the roof parapet walls. Therefore, the back side of the parapet walls is exposed concrete. The exposed portions of the back side of these parapet walls are painted and appear to be in good condition. The parapet walls are topped with cast stone capstones. The roofing material is rolled up the backside of the exterior parapet walls approximately 18 inches and is terminated with a pre-finished metal flashing. The flashing is fastened with screws into the concrete parapet wall. At the building intersections, the roofing is turned up and terminated with the same flashing and varies in height from approximately 5”-9” to the top of the flashing. It is unknown if the base flashing (which is not visible) is regleted into the building, as would be the preferred detail. The top side of the termination flashing is filled with sealant, all around. The sealant appears to be in good condition, though yearly inspection and maintenance is recommended. The exposed portions of the rolled roofing material on the back sides of the parapet walls appears to be in good overall condition, though previous patches are visible in some areas.

The parapet wall capstones are clad with prefinished aluminum cap flashing with a drip edge on both the exterior and interior faces. It is unknown how the cap flashing is installed to the capstones below, though they may just be face-screwed, as shown in Figure 103. The cap flashing appears to be adequately overlapped at the seams. The seams are sealed with caulking. The caulking is beginning to show signs of deterioration and is in need of removal and replacement.

Along the eastern-most portion of the roof, the unfinished concrete parapet wall is visible, as is the bottom side of the capstones (Figure 104). The exposed concrete in this portion of the parapet wall shows some signs of deterioration and some of the bed mortar for the capstone is washed out. At the portion of the concrete parapet wall that intersections the middle of the roof, the metal parapet cap appears to have become loose and is no longer attached properly against the cap (Figure 107). This condition should be inspected to determine if reattachment is necessary and if the underlying capstone may be loose. Prior to repair, it should be determined if this cap flashing will effectively drip water away from the face of the concrete. If not, the cap flashing should be remanufactured and installed per the previous recommendations mentioned in the General Flat Roof Observations and Recommendations Section.

Fig. 105 Lower Roof (R1) Looking West (SRJA 2012)

Fig. 108 Lower Roof (R1) Looking Northeast (SRJA 2012)

Fig. 104 Lower Roof (R1) Looking East (SRJA 2012)

Fig. 107 Lower Roof (R1) Detail, Looking North at Loosened Metal Cap Flashing (SRJA 2012)

Fig. 103 Lower Roof (R1) Detail, SE Corner (SRJA 2012)

Fig. 106 East Wall Fan Room, Multiple Cracks and Previous Repairs in Wall Areas (SRJA 2012)

Hall of Springs Roof (R2)

The Hall of Springs roof is approximately 2,800 square feet and covers the southern portion of the Hall of Waters building directly over the Hall of Springs and the lower pool area. There is only one plumbing vent pipe projecting through the roof at the SW corner. There are a total of 4 roof drains (2 at the south end and 2 at the north end).

The parapet walls are constructed with masonry backup and are faced on the exterior with cut stone. The parapets are topped with cut stone capstones and are clad with metal cap flashing. The parapet walls are very low surrounding this roof; and therefore, the roofing materials are rolled up the back side of the parapet and are terminated under flashing which is lapped under the prefinished cap flashing. The flashing is fastened with screws into the concrete parapet wall. At the building intersections, the roofing is turned up and terminated with the same flashing. It is unknown if the base flashing (which is not visible) is regleted into the building, as would be the preferred detail. The top side of the termination flashing at the building is filled with sealant. The sealant appears to be in good condition, though yearly inspection and maintenance is recommended. The exposed portions of the rolled roofing material on the back side of the parapet walls appears to be in good overall condition, though previous patches are visible in some areas. The cap flashing over the curved southern section of the parapet is segmented in order to accommodate the radius of the wall. These joints are sealed with caulking along the top surface joints, which currently appears to be in good condition. These joints should be examined on a frequent basis and should be completely removed and reinstalled when they begin to show signs of deterioration. It is unknown what the lap joint coverage is for this cap flashing. A minimum of 4 inches is recommended.

Fig. 110 Hall of Waters Roof (R2) Looking North (SRJA 2012)

Fig. 111 Hall of Waters Roof (R2) Looking South at Segmented Cap Flashing on Curved Parapet (SRJA 2012)

Fig. 109 Left: Hall of Waters Roof (R2) Looking South (SRJA 2012)

East Fan Room Roof (R3)
This roof is approximately 120 square feet and covers only the small East Fan Room at the second floor level. The roof is accessed from the upper Chambers Roof (R4) above. There are no noticeable leaks in the Fan Room concrete roof structure. This flat roof drains by a through-wall scupper located in the east wall, which drains to the lower roof (R1) below. The construction material of the parapet walls surrounding the roof in this location is unknown. The top of the parapet wall is covered with cap flashing which appears to be in good condition. The seams on the flashing should be periodically inspected and the caulking completely removed and replaced once it shows signed of deterioration.

Chambers Roof (R4)
The Chambers Roof (R4) is approximately 2,900 square feet and covers the second floor Court and Council Chambers. The East Fan Room roof (F5) which is approximately 120 square feet also drains directly onto this roof. The flat roof appears to be in overall good condition, with only a few exceptions that are noted.

There are three primary roof drains, each with an adjacent overflow drain. The eastern-most drain is located just north of the Elevator Penthouse. The furthest point on the roof from this drain is 37 feet. Between the condensing unit and the Penthouse, there was a large area of standing water on the roof during the inspection. This consistently damp area allows for the growth of small plants. The condensate pipe on the condensing unit is left to drain directly onto the roof. This needs to have a new hose connected to exit directly into the roof drain without traveling across the roof. The plants need to be removed so that they do not clog the drain or damage the roof surface.

The middle drain (and the adjacent overflow drain) are directly behind the north building entrance parapet wall. This drain is much smaller than the other roof drains and is installed slightly crooked. This drain should be inspected to ensure it is functioning properly. There is only one vent pipe on Roof (R4), which is located near the central roof drain. This drain has lead flashing which is showing signs of wear and should be inspected to ensure it is performing properly. In this same general area, there is a large louvered vent installed through the roof, directly behind the north building entrance parapet wall. This vent is flashed into the back side of the parapet wall. The flashing is caulked along its top edge. This flashing should be inspected periodically and it should be completely removed and reinstalled when it is deteriorated. Along the north parapet wall, there is one seam (near the western-most roof drain) that requires inspection.

This portion of the Hall of Waters building is constructed with rubble limestone and cut stone exterior walls. Parapet walls are brick back-up, faced with cut stone and topped with cut stone parapet caps. Throughout a majority of Roof (R4), the parapet walls are very short and the roofing material is rolled up the backside of the parapet walls and is terminated with a pre-finished metal flashing which is lapped under the pre-finished cap flashing. The flashing is fastened with screws into the concrete parapet wall. At the building intersections, the roofing is turned up and terminated with the same flashing which varies from approximately 5”-9” in height to the top of the flashing. It is unknown if the base flashing, which is not visible, is regleted into the building, as would be the preferred detail. The top side of the termination flashing is filled with sealant all around. The sealant appears to be in good condition, though yearly inspection and maintenance is recommended. The exposed portions of the rolled roofing material on the

back sides of the parapet walls are coated with silver paint and appear to be in good overall condition, though previous patches are visible in some areas.

The parapet wall over the north building entrance differs from the other parapet walls. This wall is just over six feet in height and is has exposed brick on the back side. The brick mortar is showing signs of wear and should be repointed 100%. The condition of the stone capstone is unknown, as it is covered with the metal flashing. Prior to repointing, the condition of the capstones should be exposed and observed.

The parapet wall capstones are clad with prefinished aluminum cap flashing with a drip edge on both the exterior and interior faces. They properly slope towards the roof for drainage. It is unknown how the cap flashing is installed to the capstones below, though they may just be face-screwed. The cap flashing appears to be adequately overlapped at the seams. The seams are sealed with caulking. The caulking is beginning to show signs of deterioration and is in need of removal and replacement in some locations.

The western-most roof drain (and the adjacent overflow drain) is located toward the north end of the roof over the court room (Figures 118 and 122). Water from the southeast portion of this roof must travel over 44 feet in order to reach this drain. The drain appears to be in working order, though at the time of inspection, there was some standing water adjacent to the drain where there were some small plants growing. This drain should be inspected to determine why there is water ponding at this location that is not entering the drain. The plant growth needs to be removed so it does not clog the drain and so that it does not damage the roof material.

The western portion of Chambers Roof (R4) over the Court has two large roof-mounted condensing units set on roof curbs (Figures 120 and 127). When inspected, this roof section of roof appeared to be in overall good condition. However, the roof area between the condensing units and the penthouse had standing water and evidence of significant plant growth. Both of the condensing units need new condensate drain hoses installed, which should drain directly into the roof drain instead of traveling across the roof to the drain. The existing condensate hose appears to come from an interior unit, through the west penthouse wall (Figure 125). This hose is too short and needs to be taken directly to the western-most roof drain. There is also quite a bit of leaf, roofing debris material and dead plant material, especially in the southeast section of this roof, which needs to be cleaned up in order to allow for proper roof drainage.

In the very southeast corner of this section of roof, an uncovered GFCI electrical outlet has been drilled through the west Penthouse wall (Figure 129). It should be determined whether this outlet is required and if it is not, it should be removed and the hole through the concrete Penthouse wall should be repaired and the existing flashing patched or replaced. The top of the roof flashing sealant in this location should be completely removed and reinstalled, as it is showing signed of deterioration.

Fig. 114 Hall of Waters Chambers Roof (R4) Looking West. The left arrow points to area of standing water and plant growth. The right arrow points to the condensate pipe which is left to drain onto the roof. (SRJA 2012)

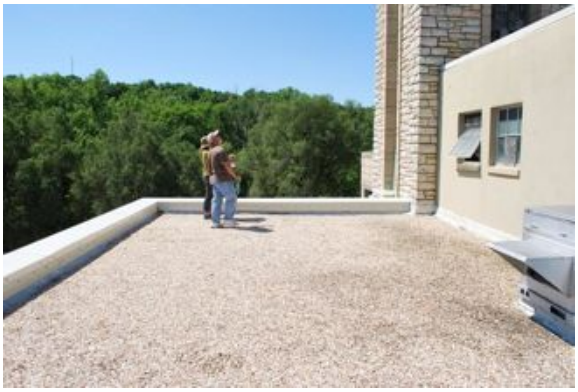

Fig. 113 Hall of Waters Chambers Roof (R4) Looking South (SRJA 2012)

Fig. 112 Hall of Waters Chambers Roof (R4) Looking South. Detail of flashing at penthouse wall. (SRJA 2012)

Fig. 117 Hall of Waters Chambers Roof (R4) Looking East (SRJA 2012)

Fig. 116 Hall of Waters Chambers Roof (R4) Looking Northeast. (SRJA 2012)

Fig. 115 Hall of Waters Chambers Roof (R4) Looking West. The east roof drains are located behind the condensing unit. The taller north building entrance parapet wall is in the background. (SRJA 2012)

Fig. 119 Hall of Waters Chambers Roof (R4) Looking North. This photograph shows the backside of the north building entrance brick parapet wall. The plumbing vent is in the foreground, with the louvered vent in the center and the central roof drain to the right of the vent. (SRJA 2012)

Fig. 118 Hall of Waters Chambers Roof (R4) Looking East at Western-most Roof Drain. (SRJA 2012)

Fig.122 Hall of Waters Chambers Roof (R4) Looking East. This photographs shows the roof drain with standing water and plant growth. The plants are difficult to see in this photo, as they were brown during the time the photographs were taken. (SRJA 2012)

Fig. 121 Hall of Waters Chambers Roof (R4) Looking North. The red arrow points to a seam that needs to be inspected. (SRJA 2012)

Fig. 120 Hall of Waters Chambers Roof (R4) Looking South. (SRJA 2012)

Fig. 125 Hall of Waters Chambers Roof (R4) Looking South. Note the shortened condensate hose with a significant amount of standing water and plant growth. This hose needs to be lengthened and taken directly to the roof drain. The plant growth needs to be removed. (SRJA 2012)

Fig. 124 Hall of Waters Chambers Roof (R4) Looking West. The red arrow points to the standing water at the end of the condensate hose. Boards have been placed on the hose to keep it weight it down and direct the water towards the drain. The western-most roof drain is in the right of the photograph. (SRJA 2012)

Fig. 123 Hall of Waters Chambers Roof (R4) Looking North. (SRJA 2012)

Fig. 128 Hall of Waters Chambers Roof (R4) Looking North. (SRJA 2012)

Fig. 127 Hall of Waters Chambers Roof (R4) Looking East. (SRJA 2012)

Fig. 126 Hall of Waters Chambers Roof (R4) Looking South at Flashing Detail. (SRJA 2012)

Fig. 129 Hall of Waters Chambers Roof (R4) Looking South. Southeast corner of the west part of the roof. This uncovered GFCI needs to be inspected and removed if unused or reinstalled, if required. (SRJA 2012)

West Fan Room Roof (R5)

The West Fan Room Roof (R5) is approximately 164 square feet and covers only the small west fan room. A very low u-shaped parapet cap runs along the north, west and south sides of the roof. The roof is relatively flat and is covered with rock ballast, which is held in place with a metal gravel stop along the eastern perimeter. There are no visible roof drains in this area. The water overflows the gravel stop and drains directly to the roof below. There are no signs of visible water infiltration within the West Fan Room. This roof should be watched during a large rain event to determine if there is any ponding on the roof during or after a storm, due to lack of established drainage. The north and south parapet wall / capstone / roof intersections are not detailed with metal flashings, but appear to depend upon roofing material and sealants, per Figure ?. Careful monitoring at these intersections is important to ensure leaks do not develop in these locations.

Fig. 130 Left: West Fan Room Roof (R5). (SRJA 2012)
Fig. 131 Right: West Fan Room Roof (R5) Detail. (SRJA 2012)

Penthouse Roof (R6)

The Penthouse Roof (R6) is approximately 1,260 square feet. This section of the roof covers the Elevator Penthouse, a Mechanical Room and the laylight structure over the two-story first floor entrance hall. There are two plumbing vent pipes on this roof which appear to be in good condition. There is one exhaust fan, directly north of the tower. There is one roof drain, which is located (along with the adjacent overflow drain) in the southwest section of the roof. These drains appear to be functioning adequately at the time of the inspection.

The overall penthouse roof appears to be in good condition, with no apparent leaks at the time of inspection. The rock ballast is very thin near the drains and in several other locations

throughout the roof, and the black roofing material is exposed in these areas. The rock ballast should be redistributed in order to adequately cover the roofing material in order to protect it from deterioration from UV light. If needed, more ballast may be brought to cover these sparse areas.

The parapet walls are extensions of the concrete wall structure below. They are very short and are covered on the back side with roofing material and flashing and are topped with metal cap flashing. The flashing appears to be in overall good condition. There are some signs of previous patches. The exposed portions of the rolled roofing material on the back side of the parapet walls are coated with silver paint and appear to be in good overall condition, though there are some areas adjacent to the tower which may require recoating that should be inspected.

The roof flashing adjacent to the stone tower is approximately 5”-7” in height. It is unknown if the base flashing, which is not visible, is regleted into the stone building, as would be the preferred detail. The top side of the termination flashing is filled with sealant, all around. The sealant appears to be in good condition, though yearly inspection and maintenance is recommended.

There is a lot of glass and plywood debris lying on the roof adjacent to the tower. Some of the plywood has exposed screws. This excess material needs to be discarded in order to prevent a roof puncture. This debris is from broken glass block and temporary wood coverings that have previously been installed on the tower to prevent bird and pest access. The tower is discussed in further detail in the exterior tower assessment in this report.

The original skylight is centered over the lobby below. This skylight provides natural and incandescent lighting into the laylight. The skylight structure and copper cladding is in overall good condition. The interior of the skylight is accessed through a small door on its east side. Natural ventilation for the skylight is provided through a louver on the west side. The skylight has wire glass, with six original glazing units and the four appearing to be of replacement glass. The original glazing has a bluish tint, while the replacement glazing is relatively clear in color. All glazing is a textured wire safety glass. The glass is not visible from the interior of the building, as it is obscured by the laylight glazing below. Several of the original blue glazing panels are cracked and need to be replaced. The skylight should be inspected throughout the interior and exterior to determine if additional work is required. At the time of this report, the skylight did not appear to be leaking. The lighting inside the skylight is addressed in the Electrical Section of this report.

Fig. 132 Hall of Waters Penthouse Roof (R6) Looking West. (SRJA 2012)

Fig. 135 Hall of Waters Penthouse Roof (R6) Looking West. (SRJA 2012)

Fig. 138 Hall of Waters Penthouse Roof (R6) Looking East. (SRJA 2012)

Fig. 134 Hall of Waters Penthouse Roof (R6) Looking North. (SRJA 2012)

Fig. 137 Hall of Waters Penthouse Roof (R6) Looking South. (SRJA 2012)

Fig. 133 Hall of Waters Penthouse Roof (R6) Looking East. (SRJA 2012)

Fig. 136 Hall of Waters Penthouse Roof (R6) Looking East. (SRJA 2012)

Fig. 140 Hall of Waters Penthouse Roof (R6) Looking East. (SRJA 2012)

Fig. 142 Hall of Waters Penthouse Roof (R6) Looking West. (SRJA 2012)

Fig. 139 Hall of Waters Penthouse Roof (R6) Looking South. (SRJA 2012)

Fig. 141 Hall of Waters Penthouse Roof (R6) Looking West into Skylight. (SRJA 2012)

Tower Roof (R7)

The Tower Roof (R7) is located atop the large stone tower. The roofing material appears to be a combination of copper flashing and standing seam copper roofing. The Design Team was unable to inspect the roof due to the height of the tower. Photographs taken from a distance away from the building show that the copper roof system and the integral boiler stack are deteriorated. It is recommended that the replacement of the roofing system and associated flashings be addressed as part of the overall tower rehabilitation.

Fig. 143 Hall of Waters Tower. (SRJA 2012)

Fig. 144 Hall of Waters Tower Flashing Deterioration Detail. (SRJA 2012)

Fig. 145 Hall of Waters Tower Flashing and Boiler Stack Deterioration Detail. (SRJA 2012)

Fig. 146 Hall of Waters Tower Flashing and Boiler Stack Deterioration Detail. (SRJA 2012)