



Great Falls Civic Center

Façade Assessment

April 1, 2016

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1.0 Intent

The intent of this report is to review and assess the existing condition of the exterior veneer panel of the City of Great Falls Civic Center; specifically to review imminent safety and/or degradation concerns and potential remediation solutions related to the veneer panels on the east façade at and above the entry.



Figure 1- East Façade

2.0 Background / Prior Investigation

It is our understanding that the façade for the Civic Center has shown signs of degradation over the past 10 or more years, and that the condition of the façade panels over the past few years has begun to reflect further breakdown of the panel structure due to various forces acting on the panels. The City has determined that they need a specific review of the existing panel and exterior wall around the entry aimed at reviewing the safety and long-term viability of the exterior veneer system.

Hessler Architects performed a full review and assessment of the Civic Center exterior in 2011 including petrographic and chemical analysis of materials utilized in the exterior of the building. Many of the recommendations indicated by Hessler continue to be valid at the time of this report. We will reference their report herein, but were not tasked to re-create the contents of that report.

3.0 Existing Documentation

Existing Construction Documents are available for review, both in hard copy and in digital format. Some of the superstructure information is available, as are some details. Exterior wall construction details and exterior stone veneer panel connection details are not available. Nor are there any details concerning air vents, head venting strategies, flashings, and weep vents. As a result, our observations and estimated methods of replacement are dependent on the observable exterior condition of the building.

4.0 Existing Conditions

Review of the existing condition of the panels was done by using a lift and by observation from the roof section over the entry stair. Loose pieces of mortar were observed on the stair landing and had fallen from the panel joints above. These mortar pieces are small and impose no imminent danger to the public, but do suggest degradation of the veneer system and need for addressing potentially more destructive forces present in the wall system itself.

The panels themselves exhibit substantial cracking and heaving/buckling. Primarily in the larger panels at the sign above the entry, the veneer panels exhibit a mixture of surface cracking and large shear cracks in their faces. Also observable are panels that have heaved toward the exterior. This heaving is a likely cause of the bulk of the stress cracks and fractures, and is also a partial cause of mortar failures. As the panels swell independent of each other, the differential movement inherently exerts high stresses on the mortar joints, causing cracking and mortar failure.



Figure 2- Surface Cracking



Figure 3 - Some Panels Exhibit Potential for Shearing due to Internal Forces



Figure 4 - Noticeable Buckling is Observed on Some Panels

As indicated in the Hessler report, some of the mortar joints have been replaced with sealant to help with flexibility of the joint and water intrusion. This is a temporary solution and will help with some of the mortar loss, but does not address the larger issue that is impacting the panels.

Some of the stone panels appear to still be in relatively good shape. Most of the decorative frieze above the entry is in good condition, as are the fluted stone columns at the entry. The stone panels at the entry itself are in relatively good condition as well, and are sheltered from direct exposure to rainfall and weather. Denticel detail bands at the top of the walls are both in rough condition, with exposed reinforcement and spalling/peeling panels. Visible cracks are in locations where water is provided easy entry and freeze-thaw cycles can further damage the façade.



Figure 5 - Some features, such as this frieze, are still in good condition.



Figure 6 - Major Cracking at Top Edge of Veneer

5.0 Exterior Wall System

The stone panels appear to be a concrete product approximately 4 inches in thickness (nominally) with an air space of approximately 1" behind the panels. It is unknown whether the panels are pinned to the structure behind or whether they are more reliant on gravitational support to maintain their position.

Concrete and/or limestone is a porous material that will absorb moisture, both in liquid and in vapor form. In order for the material to maintain longevity and integrity, the veneer should be able to dry out naturally within a relatively short period of time. The air space behind the panels allows for a drainage plane for any liquid water to travel and drain out through weep vents in the structure, and also serves as a natural thermal stack to help ventilate and move air up behind the veneer. This action requires the presence of a head vent in the masonry system, and requires the presence of weep vents and flashing at the bottom.

Both of these vents are either absent or covered up at the existing installation. No weep vents could be observed during our site inspections, and no head vents were exposed. There is evidence that the masonry has been re-pointed at some point in the past. Perhaps there were vents at one time, but have since been filled or covered.

At the small roof over the entry, a relatively new EPDM membrane was installed. It is terminated on the top of the stone with a standard manufacturer's termination bar, and is terminated on the face the brick similarly and sealed. It appears that this membrane covers up a flashing band and possible weep vents for the brick wall. It may also be preventing the veneer face from ventilating properly on the front as well, resulting in increased moisture in the cavity of the wall. Visual observation underneath the membrane was not available without compromising the weather-tightness of the membrane.

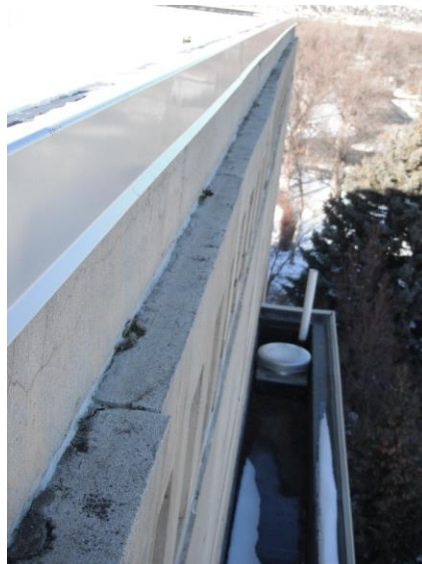


Figure 7 - Both Upper and Lower Roofs have covered any potential Air Space

At the upper level, there was observed a surface treatment covering portions of the upper stone panels. It is assumed that this was an attempt to either limit cracking or further seal the surface from water penetration. This surface treatment, however, will limit the amount of transmission through the stone from the inside as well and can contribute to further stress on the panels.

6.0 Recommendations

The panels as observed are in a state where replacement is essential. Some measures may be implemented to try to prevent further water infiltration into the wall system, but due to the porosity of the material and the substantial amount of cracking and points of penetration into the wall system, these measures are no longer suitable to prevent further degradation of the exterior veneer.

Further, as indicated in the Hessler report, the interior reinforcement steel within the panels is corroding and will continue to corrode due not only to presence of water, but to the chlorides and chemical composition that now exists within the stone panels and the wall system. Further corrosion of the steel will continue to compromise the structural integrity of the panels.



Figure 8 - Exposed Reinforcement

It is recommended that all of the stone panels eventually be removed and replaced with panels that match the existing in order to maintain the historical integrity of the facade. These can be completed and contracted in phases, focusing on sections of the building at a time.

7.0 Potential Construction and Costs

Focusing primarily on the East Façade of the Civic Center, construction would require removal of one of the panels at a location that can be supported and easily weather-protected. This panel can then be analyzed for thickness, color, and shape, and coordinated with a manufacturing facility to match as nearly as possible the original material and structure. It is recommended that this investigation be undertaken prior to preparation of construction documents and/or obtaining a bid for full façade replacement.

Following a match and a better understanding of the substructure and connection details, a complete exterior wall system should be designed as a replacement for the existing panels, including ventilation, weather barriers, and water control measures.

It is anticipated that removal and replacement of the panels will require careful scaffolding and crane use around the public entry, which will be closed during the construction process. The panels likely will need to be removed completely from the top down and then replaced according to their new attachment system requirements. The entire front may need to be fully tented and weather-protected, as the back-up construction will be exposed for a substantial length of time.

Generally, it should be anticipated that construction for removing the panels and replacing them at the east façade could take 3-4 months to fully complete. We have discussed the particulars of the project with a local stone installer and have discussed the individual custom pieces that would be required with a plant in Indiana.

General order of magnitude for a project like this is difficult to quantify at present, due to multiple unknowns in the system and structure, which are presently unobservable, but a brief breakdown of anticipated costs, based on the scope of replacement in the attached drawings are as follows :

General Conditions of the Contract/Miscellaneous Work	\$ 75,000
Stone Removal and Replacement	\$ 515,000
Rework of existing systems (roofing, electrical)	\$ 35,000

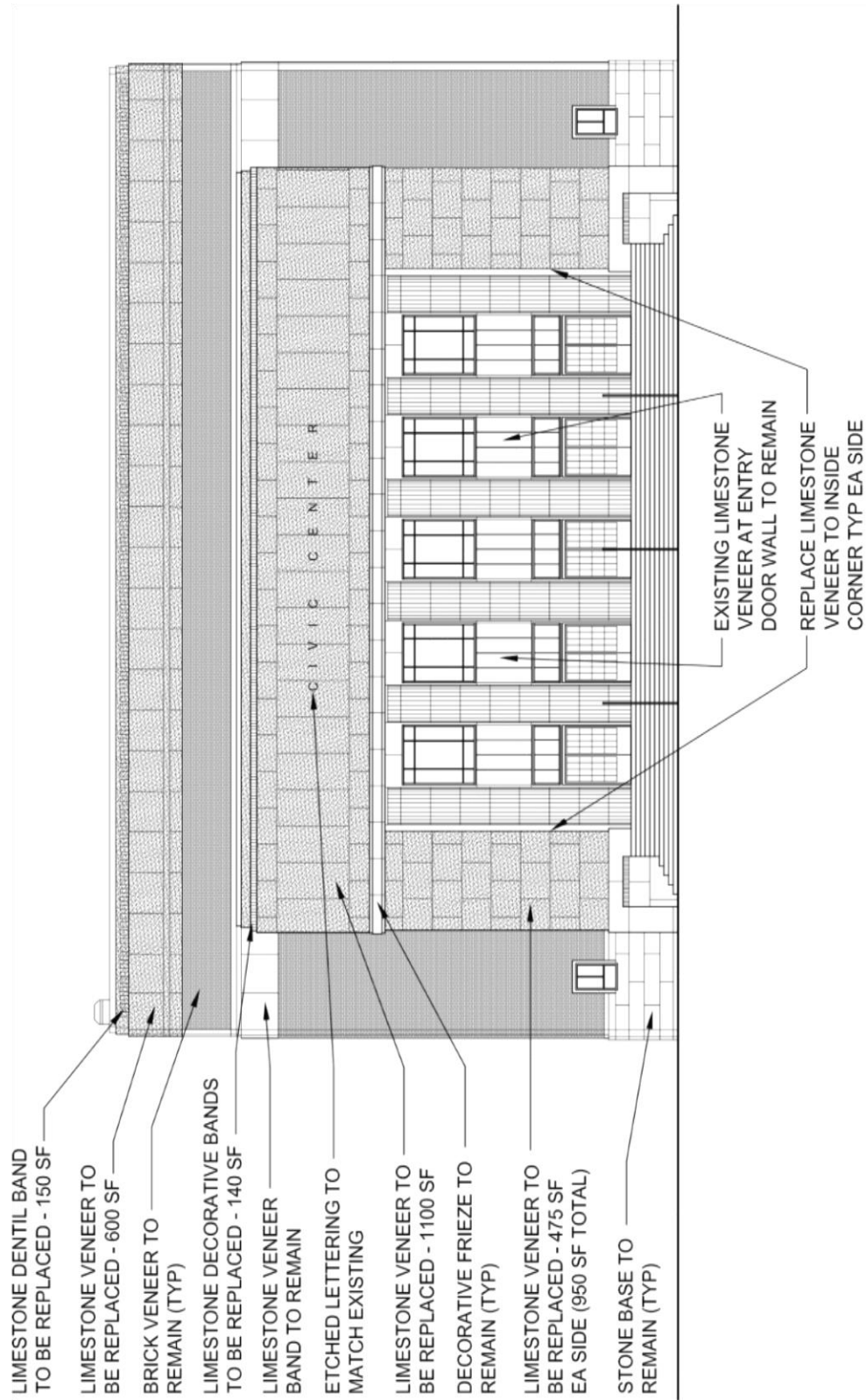
A contingency and allowance for design fees and oversight during construction should also be included as part of the general budget for the project.

8.0 Conclusion

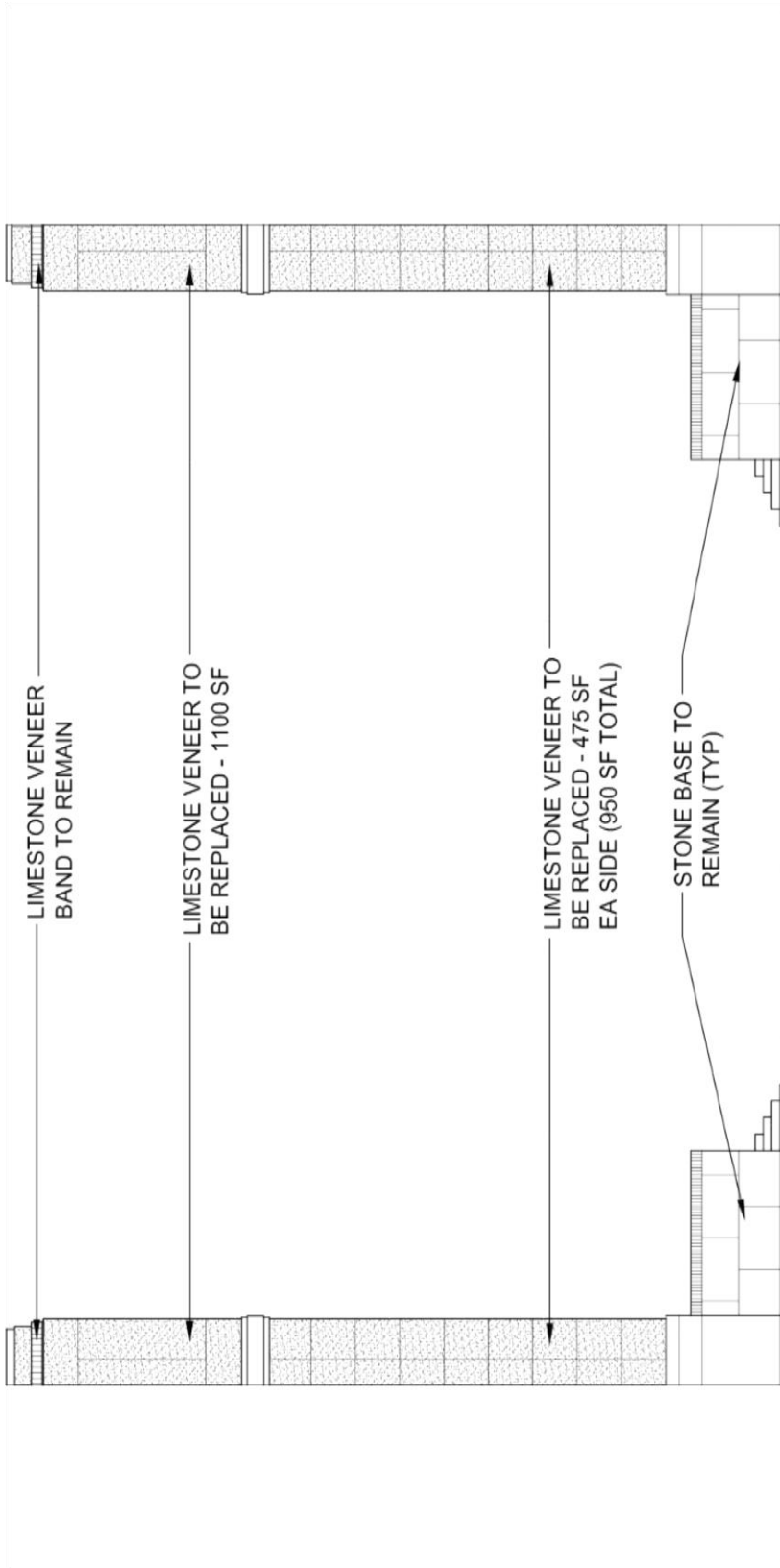
The Great Falls Civic Center stands as an exemplary artifact of the history of this city and should be preserved accordingly. The failures of the exterior veneer system appear to be caused by the natural forces of nature over time. Corrections at this point are invasive and involve replacement of large portions of the exterior, but should result in a facility that can continue to serve the public for many more years.

A handwritten signature in black ink, appearing to read 'A. Houtz', with a vertical line extending downwards from the 'H'.

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Great Falls Civic Center East Elevation



Great Falls Civic Center North Elevation

Great Falls Civic Center South Elevation

