Detroit River - High Water Level 2019

In the time between the commissioning of this study and its execution, the Detroit River has experienced a historic high-water level. Lake St. Clair, which feeds the Detroit River, experienced water levels 32 inches above the average according to U.S. Army Corps of Engineers data published in the Detroit Free Press. Given that many climate models are forecasting a trend of higher water levels over the next 50 years, it would be prudent to take this into consideration in planning the future of this structure. At its high point in the late spring, water had covered almost the entire island surrounding the Boat House and was inside the building. The review for this study was conducted months after the water had receded from its high point, but at that time it was still visually evident that the river water level was above the lower floor level of the Boat House.

It cannot be overstated, the importance of the diligent efforts of the current care takers of the building who set up pumps in the existing pools and were able to draw down the water level in the building to below the lower floor line. If a pump system exists, it is no known and we did not observe one. Finishes that were in the water were removed from the building and fans were used to dry it out. This flooding caused extensive damage. Moving forward it is recommended a permanent pumping solution be implemented to help maintain the integrity of this structure.

Condition of Components

As the different components of the existing building are discussed the terms **"GOOD, FAIR** and **POOR"** will be used as a general descriptor of condition,

In this study **"GOOD"** will be used to describe a component that is functioning with better than half of its anticipated service life remaining. Minimal maintenance may be required either immediately or in the near future to maintain proper function.

The term **"FAIR"** is used to describe components that function and are either past half of their service life or requiring immediate and substantial maintenance to maintain proper function.

Lastly, the term **"POOR"** describes components that may or may not function, are past the end of their anticipated service life and require replacement either in the immediate or near future.

SmithGroup (SG) observed the general condition of the following components:

3.0.1 Component

Facade

System Description

The exterior walls are painted stucco on infilled and/or load bearing brick mass masonry on which interior finishes were applied. Interior finishes (e.g. wood millwork, painted gypsum plaster) were assumed to have been applied over a scratch coat of cement stucco applied to the brick mass masonry wall. The exterior stucco uses the irregularity of the common brick back-up wall to key into instead of lath. Given the deterioration of the exposed masonry we could not determine if the original masonry joints had been raked to aid with keying.

The facade is in (POOR) condition overall.

Table 1: Overall Exterior Building Face Areas

Overall Conditions:	Square Footage:	Percentage of Entire Building	Reference
Exposed & Deteriorated Mass Masonry	443 sqft	3%	[Photo 5]
Spalled Stucco	1322 sqft	6%	[Photo 6]
Debonded Stucco (Exterior Façade)	6741 sqft	32%	[Photo 7]
Debonded Stucco (Back-side of Covered Terraces)	1507 sqft	7%	[Photo 8]
Damaged Stucco – Surface Scaled Finish	6263 sqft	30%	[Photo 9]
Previously Repaired Stucco	360 sqft	2%	[Photo 10]
Other Finishes (CMU, Wood, Brick, etc.)	2983 sqft	14%	[Photo #]
Stucco in Good Condition	1364 sqft	6%	[Photo #]
TOTAL	20983 sqft	100%	

Findings

- **Stucco Finish:** Approximately 16,276 sqft, or 78% percent of the exterior stucco finish is affected by one of the following conditions:
 - a. Exposed & Deteriorated Mass Masonry Walls may comprise only a small portion of the total exterior wall area, but the severity of damage represents a structural concern and fall hazard **[Photo 5**].
 - b. Missing Stucco (i.e. stucco that has spalled or was removed) represents approximately 6 percent of the façade. With the stucco removed, the underlying brick mass masonry is subject to deterioration from exposure to the elements, **[Photo 6]**.
 - c. Damaged and/or Debonded Stucco affects almost 70 percent of the façade area. Conditions include cracks, scaled stucco and pealed paint. These conditions may not be as unsightly as stucco that has spalled off the building, they allow water to infiltrate the exterior walls effecting the mass masonry, window lintels and eventually interior finishes [Photos 7-8] The National Parks Service Department of the Interior Preservation Brief #22 supports the replacement of the stucco citing 40-50% disbondment as an appropriate threshold.
 - d. Repaired Stucco exists in one area along the west elevation [Photo 9].
- **Brick Mass Masonry Walls**: The exterior walls are comprised of multi-wythe load or non-load bearing brick.
 - a. Approximately 1,765 sqft or 9% percent of the brick comprising the mass masonry walls are exposed due to missing/spalled stucco finish **[Photos 5-6]**.
 - a. Deterioration of the mass masonry due to exposure has resulted in scaling, spalled and displacement of the brick comprising the effected exterior wall [Photos 10]. These conditions may only affect a small percentage of the exterior walls, but they represent a potential structural concern.
 - b. Window Lintels: From observations of the window openings, it appears that a steel angle was anchored to the concrete frame as a lintel to carry the load of the brick above the window. Most of the lintels are corroded to the point that pack rust has displaced the brick and spalled the stucco finish. In severe instances, the lintel has bowed which and now represents a structural concern [Photo 11].

3.0.2 Component

Exterior Terraces

System Description

The terraces are mostly arcaded and feature tile floors. A couple terraces have no enclosure and utilize an elastomeric coating to waterproof the floor. The tile on the other floors appears to be a quarry tile. In most cases the tile floors are covered with an adhered EPDM black roof membrane. One section has some form of cover board between the EPDM and the tile to eliminate a low spot in the floor that had collected water. The terraces have a variety of guardrails and parapet walls. Most of these conditions do not meet the code required 42" height. The addition of the EPDM membrane suggests that the tile floors were not waterproof. They likely never were. The current repair is temporary and not appropriate (lack of durability) for general foot traffic.

The terraces are in **POOR** condition overall.

Findings

- Deteriorated stucco takes the form of cracked, debonded and spalled stucco [Photos 12].
- Tile wear surface where exposed is in fair condition [Photo 13].
- Tile wear surface was covered by an adhered EPDM membrane on most terraces [Photo 14].
- The concrete ceiling contains areas of scaled and spalled concrete and exposed reinforcing steel [Photo 15-16].
- Guard rails have been upgraded on the second level terraces to meet proper Code height, the terraces on the third level have not been upgraded. The third level terraces should be restricted to prevent occupancy.

3.0.3 Component

Exterior Stairs

System Description

There are three exterior stairs:

- The main or south entrance stair [Photo 17-18]
- The north entrance stair [Photo 19]
- The northeast secondary egress stair [Photo 20]

Findings

Main Entrance Stair is original to the building, constructed of mass masonry and concrete and in **POOR** condition. Observed conditions include:

- Mass masonry walls that form the side enclosures of the stairs are deteriorated [Photo 21].
- Concrete stair steps are deteriorated [Photo 22].
- Stair and balcony guard rail concrete copings are cracked and spalled [Photo 23].

North Entrance Stair is relatively new to the building, and at a location that previously had only a balcony is in **POOR** condition overall. Observed conditions include:

- Terrazzo threads are mostly intact but are affected by deterioration in the form of cracks, a scaled surface and minor spalled terrazzo. [Photo 24].
- Terrazzo landings are severely cracked and spalled [Photo 25].
- Steel frame and guard rails are in fair condition with only minor surface corrosion **[Photo 26]**.

Northwest stair which is assumed to have been constructed with the west addition is in **POOR** condition. Observed conditions include:

- Concrete infilled threads with tile wear surface are severely deteriorated [Photo 27].
- Steel frame and risers are severely corroded [Photo 28].

The stair from the second-floor terrace to the third-floor terrace is in **POOR** condition. Its handrail is not properly attached and is unsafe. Access to the stair should be restricted to prevent use.

3.0.4 Component

Chimneys

System Description

Four chimneys exist on the building; Two are clad in stucco, one in brick and one plywood.

The chimneys are in **POOR** condition overall.

Findings

The tallest of the chimneys (west of the tower) is in fair condition with debonded stucco confined to the upper region **[Photo 29].**

The second stucco chimney (south of the tower is in poor condition with scaled stucco throughout its exterior **[Photo 30].**

The brick chimney is in fair condition with deteriorated mortar confined to the upper regions **[Photo 31]**.

The plywood clad chimney was either constructed of wood or was repaired using wood. Either way, this chimney is in poor condition **[Photo 32]**.

3.0.5 Component

Windows

System Description

The windows are a variety of different shapes, sizes, styles and functions. Windows are both original and replacement with some openings boarded up and some infilled with bricked and CMU masonry.

- Original windows are painted and stained wood, Sash are single glazed type, double hung, fixed, casement and pivot sash varieties. Windows with muntins are true divided lite type. Aluminum storm windows are installed at some locations, especially the combination single and double hung units that infill the arched openings of the formal dining room space. [Photo 33-34]
- Replacement windows are painted wood, aluminum, and vinyl, both single glazed, and insulated, glazed types. Sash are double hung, single hung, fixed, casement and sliding varieties. Windows with muntins are simulated divided lites. [Photo 35-36]
- Infill windows are painted wood, composite, single glazed and glass block type. [Photo 37-38]

Original windows are in **(FAIR to POOR)** condition overall. Replacement Windows are in **(GOOD to POOR)** condition overall. Infill Windows are in **(FAIR)** condition overall.

Findings

Original Windows General

- Windows are heavily painted, with "alligatored" finish surfaces and are experiencing significant peeling and paint loss. [Photo39]
- Glazing putty is cracked, loose, and missing.
- Exposed wood on sash and frames is significantly weathered and checking, Lower portions of sash and sills decaying. [Photo 39 40]
- Hardware is broken, missing or non-functional, and in some cases, has been supplemented to provide additional security.

- Sash for the most part is inoperable, due to advanced weathering, and extensive paint coatings. [Photo 41]
- Windows lack weather-stripping or are deficiently weather-stripped [Photo 39-41]
- Advanced deterioration of surrounding stucco and brick masonry is contributing to moisture penetration and advancing window deterioration at many locations. [Photo 42]

.Replacement Windows General

- Most if not all replacement windows are installed within original wood window frames which are weathered and lack long term integrity. Original frames concealed behind aluminum trim, while of unknown integrity, are likely similarly worn and deteriorating from previous years of exposure. [Photo 43]
- Older replacement windows are single glazed and thermally inefficient. [Photo 44]
- Older replacement windows with insulated glass units have exceeded life expectancies.
- Exposed wood sash and frames are significantly weathered and deteriorating. Deterioration in general is most advanced at sills and lower portions of sash and frames
- Hardware is broken, missing or non-functional. and many, once operable
- Aluminum sliding replacement windows lack thermally broken frames and are inferior in thermal quality
- Newer vinyl replacement windows while conditionally best in appearance, are installed within existing wood frames of unknown condition and in masonry opening which are likely improperly flashed. [Photo 35]

Infill Windows General

- Aluminum cladding is corroding due to contact with decay retardant treated wood substrate.
- Single glazed infill window units lack thermal thermally efficiency.
- Units are poorly secured in part due to condition of surrounding material not properly flashed to resist water infiltration.
- CMU and Glass bock infill construction, while functional from a security and durability perspective, are aesthetically insensitive to the original structure.

3.0.6 Component

Roof

System Description

The Boat House has two main types of roofs, steep slope and low slope/flat. The roofs are wood framed with wood decks. The steep slope roofs feature Spanish tile shingles and are either hip or mansard configurations. The mansard roofs have a low slope/flat roof just above the headwall of the Spanish tile. The low slope/flat roofs have several different types of built-up and/or modified bitumen roofing. A small shed roof on the east side of the building has asphalt shingles. One window bay, where the arcade was removed on the west end of the building, has an EPDM membrane roof. None of the roofs appear to be insulated.

The roof surfaces are in **FAIR to GOOD** condition while the entire roof assembly is in **POOR** condition overall.

Findings

Steep slope – Spanish Tile

• Spanish tiles appear to be mostly intact. The tile is assumed to be original, but this is not documented. Localized repair efforts have damaged tile with roofing cement or other mastics. Localized edge deterioration was also observed. [Photo 45-46]

- The flashing appears to be original copper. It has had numerous repairs with mastic overcoats. The rake wall flashings tend to be most problematic. In about half the existing condition the rake wall flashing is over coated with an unknown roofing material. The overall condition of the flashing is in **POOR** condition. [Photo 47-48]
- The roof underlayment was not exposed to view, so its condition is not known. If the roof is original, the underlayment would be past its service life.

Steep slope – Asphalt Shingle

• The age of the asphalt shingle is not known. Their condition appears to be FAIR. [Photo 49]

Low Slope/Flat - Built up/Modified Bitumen

- At the highest level there are three low slope/flat roofs. Above the central rectangular form of the Boat House is a roof surrounded by a parapet and stone balustrade it is flanked to the east and west with roofs forming the mansard roof to either side. [Photo 50]
 - The center roof has numerous patches. It shows evidence of alligatoring, cracking and scouring. It is topped with a rough slag aggregate. In some areas the bitumen has worn off to expose the fiberglass reinforcing fabric. [Photos 51-54]
 - The roof to the east is similar to the center roof, with similar deficiencies. **[Photo 55-56]**
 - The roof to the west does not have an aggregate topping, it has a thin aluminumized topcoat. It is experiencing similar condition issues. [Photo57-58]
 - All of these flat roofs are not properly flashed in the adjacent walls. There are two common conditions: one the roofing is carried up and over the parapet and is feathered out to terminate or there is an exposed termination bar on the side of the parapet wall. Neither is an appropriate long-term solution. In one location of the roof running up and over the parapet, a hollow exists behind the roofing at the base of the wall and a section of the roofing has been torn off. [Photo 58-61]

Low Slope/Flat - EPDM

- At the third floor terrace the floor and parapets have been covered over with EPDM rubber roofing. The condition is generally FAIR, although the installation is **POOR** with improper detailing and terminations for the installation to be able to achieve its full-service life. The third-floor terrace has a non-Code compliant parapet, that is unsafe as a guardrail. Occupancy should be restricted. [Photo 62-64]
- The guard surrounding the stair from the third-floor terrace roof is unsafe and access to the stair should be restricted. **[Photo 65]**
- The second-floor terrace at the demolished arcade, along the west side of the Ballroom, functions as a roof. The roof membrane is EPDM. The condition is generally FAIR, although the installation is **POOR** with improper detailing and terminations for the installation to be able to achieve its full-service life. A hole was observed in the membrane and a large area exhibited ponding water. [Photo 66-68]
- End section at the terrace adjacent to the demolished arcade is braced off the supplemental steel structure with cables. This is not safe, and occupancy should be restricted from this area. [Photo 69-70]

Underside of exposed wood roof deck and roof edge.

- The underside of exposed wood roof deck is generally in **FAIR** to **POOR** condition. The paint finish has largely failed and splitting, and rot is common. This suggests that there may be issues with the water tightness of the roofing above. Several repairs were observed. **[Photo 71-72]**
- The roof brackets are in **POOR** condition. [Photo 72-73]

• The gutters are in **POOR** condition. [Photo 72-73]

3.0.7 Component

Entrance Canopies

System Description

There are three canopies, two at the entry and one at the northeast terrace. They have a tube metal frame with a vinyl coated canvas cover.

The entry canopies are in **FAIR** condition overall. The northeast terrace Canopy id in **POOR** condition.

Findings

Canopy Types

- The entry canopies have issues that require maintenance.
- The northeast terrace canopy is mostly gone, with some framing members remaining.

3.0.8 Component

Exterior Doors

System Description

Exterior Doors are a variety of types and functions. Doors are both original, replacement and overhead types, some added to protect previously exposed portions of the building or added to secure portions of the building exposed due to vandalism or advanced deterioration of earlier materials. Some openings are simply boarded up to achieve similar results or secure and protect doors beyond.

- Original Exterior Doors are stile and rail wood doors with integral and borrowed glass lites. Doors and associated borrowed lite frames and sash are painted and single glazed with true divided lites .
- Replacement doors are solid core wood doors with or without glass lites installed in original or replacement wood frames, aluminum and glass anodized storefront type single glazed in aluminum frame with borrowed lites, Primed or galvanized steel doors in steel frames, and simulated 6 panel residential grade steel and wood doors in wood frame.
- Overhead doors are coiling steel and insulate steel panel (garage) doors.

The doors are in (POOR to FAIR) condition overall.

Findings

Original Doors General

- Doors are heavily painted, exhibit "alligatored" surfaces and are exhibiting peeling and paint loss. [Photo 74-76]
- Door leaves exhibit significant signs of wear from use and abuse including dents, abrasions, and holes and damage from past and present hardware attachments, [Photo 77]
- Glazing is mostly intact but not thermally efficient, [Photo 74-77]
- Doors lack weather-stripping and threshold seals. [Photo 74-77]

Replacement Doors General

• Steel Doors and frames are mostly unpainted except for factory prime and galvanized finishes. And are fit in to both existing masonry and infill plywood and wood framed walls.

3.0.9 Component

Pool Deck

System Description

The pool deck was initially not going to be included in the architectural portion of the report. During our observations it was determined that this section needed to be included. The pool deck is a cast in place concrete deck supported from below by concrete beams that are supported by wood piles driven into the riverbed. This is similar construction to the first-floor construction of the Boathouse. This system lacks water proofing or a serviceable wear layer.

The pool deck is in **POOR** condition overall. It is unsafe and should be restricted to prevent occupancy.

Findings

Pool Deck

- A hole in the deck observed in 2016 has dramatically enlarged by 2019. [Photo 78-79]
- Deterioration of the underside of the deck was observed at the access hatches. [Photo 80]
- Spalling concrete was lifted up to reveal another hole in the pool deck. [Photo 81-82]

3.0.10 Conclusion

Façade

The overall condition of the stucco façade is **POOR**. Large areas of stucco have either fallen or are debonded and water infiltration/weather exposure has damaged the masonry back-up wall. The stucco should be stripped off, masonry back-up wall repaired and a new drainable stucco system with proper flashings be installed.

The cast stone balustrade, copings and sills are in **POOR** condition. They have been overcoated with stucco and roofing materials and are severely deteriorated. These elements should be replicated and replaced with limestone.

Exterior Terraces

The overall condition of the exterior terraces is **POOR**. Most of the terraces have been over coated with EPDM rubber roofing which is not an appropriate lasting solution for their function. The northeast terrace is in a state of collapse and access to this area has been restricted to prevent occupancy. The terrace by the Ballroom has a section which has been determined to be unsafe and should be restricted from occupancy.

The terraces should have all flooring removed and a new waterproofing layer installed below new exterior grade Quarry tile to match the existing. The floor deck of all terraces needs to be repaired where reinforcing steel has been exposed, support steel is corroded and at cracks. New Code compliant guardrails are to be installed.

Exterior Stairs

The exterior stairs are generally in **POOR** condition. The main front stair needs to be repaired similar to the exterior terraces. The remaining stairs should be removed and replaced with code compliant stairs that replicate the aesthetics of the original historic stairs.

Chimneys

The chimneys are generally in **POOR** condition. The repair of the chimneys will be similar to the repair of the façade. Inactive chimneys are to be capped.

Windows

The condition of the windows ranges from **GOOD** to **POOR** with the older historic windows generally in **POOR** condition. A number of replacement windows have been installed that are not necessarily sensitive to the building's historic character. Many lintels need repair and the windows in general lack flashing.

The lintels should be repaired, and new flashing installed. The windows should all be replaced with historically accurate aluminum clad wood windows with insulated glass units.

Roofs

The overall condition of the roofs is **POOR**. The roof coverings might be in FAIR condition but the lack of proper flashings and failing underlayment have led to the deterioration of the roof deck in many locations.

The roofing should be removed and roof decks repaired. New Spanish tile roofing with modern underlayment and flashing should be installed on the sloped roofs. Sloped roofs should have new gutters and downspouts. At the low-slope roofs new drainage should be installed with an insulated membrane roof system (modified bitumen, EPDM or thermoplastic).

Entrance Canopies

The overall condition of the entrance canopies is **FAIR**. The main entry canopy needs maintenance. The canopy at the northeast terrace needs to be replaced.

Exterior Doors

The overall condition of the exterior doors is **POOR**. The exterior doors need to be removed and replaced with historically accurate doors. Where appropriate hollow metal doors can be used. Otherwise aluminum clad wood doors that replicate the historic character of the originals should be used. Repair lintels and provide new flashing at all doors.

Pool Deck

The pool deck is in **POOR** condition. Repair of the pool deck is not feasible. In its current state it is a safety hazard. The pool deck should be removed and filled in.

Historic Considerations - Exterior

The boat house has not been designated a historic structure, but it does exist within a historic district. Accordingly, repairs should be performed in accordance with the historic district guidelines. However, in our opinion due to the severity of deterioration of the façade, (exterior stucco finish, terraces, roofs and windows) it is reasonable to assume that repairs would take a rehabilitation approach rather than one where components are restored.



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5 Damaged/Deteriorated Brick



Photo 6 Spalled Stucco



Photo 7 Debonded Stucco (Back-side of covered terraces)



Photo 8 Damaged Stucco - Surface Scaled Finish



Photo 9 Previously Repaired Stucco



Photo 10 Deteriorated Masonry



Photo 11 Damaged Lintels



Photo 12 Debonded Stucco (Exterior Façade)



Photo 13 Exposed Terrace Tile



Photo 14 EPDM covered tile terraces



Photo 15 Damaged Stucco - Surface Scaled Finish



Photo 16 Damaged Stucco - Surface Scaled Finish



Photo 17 South Staircase



Photo 18 South Staircase



Photo 19 North Staircase



Photo 20 Northeast Secondary Staircase



Photo 21 South Staircase Deteriorated Masonry



Photo 22 South Staircase Deteriorated Concrete Steps



Photo 23 South Staircase Deteriorating Copings



Photo 24 North Staircase Deteriorated Treads



Photo 25 North Staircase Deteriorated Landing



Photo 26 North Staircase Corrosion



Photo 27 Northeast Staircase Deteriorated Treads



Photo 28 Northeast Staircase Corroded Steel



Photo 29 Debonding Stucco on Chimney



Photo 30 Scaled Stucco on Chimney

Photo 31 Brick Chimney

Photo 32 Plywood Clad Chimney

Photo 33 Historic Ballroom Windows

Photo 34 Historic Dining Room Windows

Photo 35 Modern Replacement Window

Photo 36 Modern Replacement Windows

Photo 37 Various Infill Strategies

Photo 38 Glass Block Infill

Photo 39 Deteriorated Paint and Wood

Photo 40 Splitting Wood Sill

Photo 41 Weathered Condition Impeding Operation

Photo 42 Water Damage