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PURCHASING DIVISION
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Addendum #1
File # 19-08AA
Final Design Services
Lake Superior Zoo Polar Shores/Bear Country Project

This addendum serves to notify all bidders of the following submitted questions and responses:

1. What Design phase will this project start? Construction Documents? **The project is at Final Design stage.**
2. Can you provide access to the existing documentation and design prior to responding to the RFP? **The project consists of the renovation of animal habitats; including the preservation of two existing animal care buildings. No new buildings will be constructed; instead the existing buildings will be renovated and the adjacent habitats will be refurbished to meet current animal care standards and provide more natural habitats for the various animals. The structural reports for both areas are attached. The plans that were developed as a result of the RFP in 2016 have been extensively red-lined, since the project scope has changed since those designs were completed. However, we will be providing them within the next few days.**
3. Is HGA allowed to bid on this work as they were the earlier design architect involved? **Yes, HGA is allowed to propose.**
4. Does the zoo prefer a local A/E firm to lead the work? **No.**
5. At what design stage is the selected architect currently at? Conceptual, Design, Construction? This has impact for the schedule to meet the stated completion date. **See #1.**
6. Will the preliminary designs developed after an initial master planning effort by HGA and pja architects + landscape architects be made available to those seeking a submission? To be able to determine the amount of design work effort still needed and cost associated this would be important. **See #2.**
7. Do you have a construction and overall project budget established for the work? We are aware of the bonding dollars allocated but would like to understand the full budget you are trying to achieve and value engineer from the design that has been done thus far. **The total estimated construction cost is \$3,150,000.**

8. What is the overall project schedule? **The goal is to have the project completed before the end of 2019.**
9. Is there a reason for the short turn around on the proposal submission relative to the overall schedule? Will consideration be made to extend this for teams to be able to put comprehensive proposals together for such a project? We see a lot of RFP's and this timeframe is rare for the amount of work that goes into them. **The short turnaround is related to the goal of having construction completed this season.**

Please acknowledge receipt of this Addendum by including a copy with your proposal.

Posted: May 9, 2019



August 31, 2012

Joe Miller
Facilities Operations Supervisor
City of Duluth
1532 W. Michigan Street
Duluth, MN 55806

Subject: Structural Assessment of the Polar Shores Exhibit for Flood Damage
KO Job No: 121146

Mr. Miller,

On behalf of Krech Ojard & Associates, I am pleased to provide you with the completed structural assessment report of possible damage to the Polar Shores Exhibit of the Lake Superior Zoo in Duluth attributable to the June 2012 flood. The report includes summary of visual observations.

Thank you for the opportunity to present you with this assessment and report. Should you have any questions or require further clarifications of these observations, the documentation or our recommendations, please do not hesitate to contact us at your convenience.

Best Regards,

Sara D. Ojard, P.E.
Project Engineer
Krech Ojard & Associates

Enclosure: Structural Assessment Report

I HERBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SARA D. OJARD

SIGNATURE

45176
REG NO

8/31/12
DATE

Polar Shores Exhibit at Lake Superior Zoo Structural Assessment of Flood Damage

Duluth, MN

City of Duluth Contact

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BACKGROUND

Krech Ojard and Associates (KO) was contracted to provide a structural assessment of the Polar Shores Exhibit of the Lake Superior Zoo located in Duluth, Minnesota. This assessment focuses on structurally assessing the exhibit for damage caused by the flooding in June of 2012.

The Polar Shores Exhibit consists of a large 1930's stone building and animal viewing spaces which were constructed in the 1980's. During the recent flood, the waters filled the building and exhibit areas approximately 14 feet deep with water.

Krech Ojard made several site visits. KO initially observed the site on July 24th, 2012. General observations were made and we listened to witnessed events of the flood. On August 1st, 2012 KO performed another site visit with Peter Pruett from the Zoo and Dean Johnson from Johnson Wilson. We directed Johnson Wilson to excavate certain areas of the sidewalk and behind retaining walls for further investigation and to see the limits of soil failure. Two additional site visits were made on August 14th and 16th to observe the excavations.

We have noted five different locations that were chosen for excavation to help determine the extents of soil erosion or retaining wall cracking. These were damaged areas that were possibly attributable to flood. There were other areas of the exhibit and building that have cracked and deteriorating concrete and corroded steel, but these issues pre-existed the flood and so are not addressed in the report.

The following sections of this report will summarize the observation, areas that were specified for excavation, and observations of the excavations.

LIMITATIONS OF THE ASSESSMENT

The review of the exhibit was limited to visual assessment of the readily accessible areas plus excavations of a limited number of areas around the exhibit. The following report and recommendations are based on these visual observations. In addition, only structural elements were reported. Damage to items such as windows and doors is not a part of this report.

OBSERVATIONS & RECOMMENDATIONS

Figure 1 is an isometric aerial photo of the Polar Shore Exhibit at the Lake Superior Zoo. It is included for an overall reference to show the locations of witnessed sidewalk failures and sinkholes and to note locations of excavation. Please note that the photo is slightly outdated, since the cold-formed steel addition on the south west corner of the building is not shown, however it is a clear view of the exhibit for general reference and discussion.



Figure 1 – Isometric Photo of the Polar Shore Exhibit at the Lake Superior Zoo

Location #1

At Location #1 in Figure 1, a sink hole of the asphalt sidewalk was visible after the flood waters receded. Figure 2 shows the sidewalk after the flood. The visible rock work walls in the photo consist of shotcrete applied to a surface created by a welded-wire type mesh. The rock work was designed to considerably overhang the structural foundation by varying distances. It was not designed to be ground-supported.



Figure 2: Sidewalk Failure

The area was excavated for KO to observe the exhibit foundation wall adjacent to the sinkhole and the extent of the soil erosion under the sidewalk. Figure 3 shows the same area after excavation. The following items were observed:

- The ground water table was at the top of the footing, but during excavation it was witnessed that the native soil was still under the footings.
- The foundation wall did not have any visible cracks.
- The excavated material appeared to be a sandy, engineered fill.
- The rockwork that overhangs the foundation wall does not have soil compacted underneath it - creating a void between the outside face of the rockwork and the structural foundation wall. It appears the soil under the sidewalk at the viewing



Figure 4 – Vertical cracks in retaining wall



Figure 5 – Backside of retaining wall after excavation

Location #3

Zoo personnel had shared witnessing water coming out the stream bank into the stream. We excavated a small section behind the stream bank to see if there was a broken water pipe in this area. No pipe was observed and the soil was well compacted. See Figure 6.



Figure 6 – Excavation near stream

Locations #4 and #5

The asphalt sidewalk settled in these areas. Excavations were done to see the extent of the soil erosion. Location #4 was chosen since it was near a manhole. Location #5 was chosen because it was near the edge of the structural concrete supporting the upper exhibit viewing area. Figures 7 and 8 show these areas. In neither of the areas did the extent of soil erosion continue to adjacent structures causing structural concern.



Figure 7 – Location #4 excavation near manhole



Figure 8 – Location #5 excavation upper viewing area

After all the areas were observed, the fill was replaced and compacted to create a level walking surface. Any broken asphalt sidewalk pieces were removed. However, the sidewalk was not replaced.

SUMMARY

After completing our structural assessment of the Polar Shores Exhibit, we noted no structural damage to the exhibit foundation or retaining walls that appears to have been caused by the flood. There were local areas where soil was washed away causing failures of the sidewalks. However, the extent of soil erosion does not appear to have caused structural failure of the buildings or walls. The cracks in the retaining walls leading down into the underwater viewing areas appear to have not been caused by the flood waters since the soil behind the walls was dry.

There were other areas of cracked and deteriorating concrete walls and slab and corroded steel within the exhibit and building. These items pre-existed the flood and do not appear to be directly attributable to it. They also do not appear to be an imminent life-safety concern. However, we recommend a separate investigation to examine them and possibly recommend repairs to them before they do deteriorate to a serious condition.

Please contact us at your convenience with any questions or discussion. We would be happy to provide additional investigation of the exhibit to address the non-flood related concerns.

February 14, 2019

Ms. Tiersa Wodash
DSGW Architects

Sent by Email to: Twodash@dsgw.com

Re: Bear Exhibit Condition Review
NCE Job No.: 19-020

Dear Tiersa,

This is a visual structural condition review of the bear exhibit at the Duluth Zoo. I reviewed the exhibit on February 5, 2019.

The concrete structure has an arch-shaped footprint and consists of two levels. It was built during the 1930's and remodeled in later years. In this report the long direction of the tunnel is oriented north and south with the exhibit area on the east side.

The first level consists of two parallel passageways, or rings. The outer is intended for human traffic; the inner intended for holding animals and allowing human access to cages. There are entry points between rings at the south and north ends and at the center. The inner ring is separated into small spaces created by cage doors at the entry points and at intermittent points within the ring. The outer ring is continuous from one end to the other. There are access windows and doors through the wall separating the inner from the outer ring.

The first level is constructed of cast-in-place concrete walls presumably on concrete footings. The floors are concrete slab on grades. The ceiling is a concrete slab bearing on the inner wall of the perimeter walls of the rings and the central wall between the rings. The outermost wall of the outer ring is backfilled with soil.

The second level is a continuous area situated primarily above the inner ring. The concrete ceiling of the first level serves as the floor for the second. This floor carries the concrete and steel structure that forms the structural framework of the shotcrete "rock" found in the exhibit.

Emanating from the inner ring are three "fingers" of shotcrete exhibit rocks. These rocks are also supported by concrete and steel support structures that extend up from foundations at grade. These fingers were not accessed during my review but viewed from the second level at available locations.

The following was noted during my visit:

1. The overall condition of the structure is fair. With the exception of the areas noted below the concrete walls and ceiling are solid. I sounded them with a hammer in randomly selected areas with and without visual distress and the concrete was hard and did not fracture from the hammer blows. The backfilled wall of the outer ring is not leaning inwards from lateral earth pressure. Lateral pressure transmitted through the concrete ceiling or through concrete struts and door headers is not causing displacement in the center and inner wall.

2. Conditions seem reasonably dry in the first level. There are ground water stains emanating from cracks on the outer wall and at the ceiling wall interface. The leakage appears old and not serious. The floor was not layered with ice from rising groundwater. It is my understanding that a previous remodeling project included the installation of drain tile along the backfilled back wall. This tile may account for the lack of water currently noted in the space.
3. The structure has been unheated throughout its life and the lack of heat has caused settlement or seasonal frost displacement in selected areas throughout the building. The northwest corner (Item 7 on the attached floor plan) is rotated and settled. A nearby corner in the center wall and adjacent door header is fractured and settled (Item 8). At the center entry point between the outer and inner rings two interior corners (Items 3 and 5) are settled. The settlement of the interior corner at Item 5 has translated into a long settlement crack in the wall between the outer and inner ring (Item 6). This crack extends nearly half the distance to the northern end of level 1.
4. The floor of the outer ring and to a lesser degree, the inner ring floor shows the effects of displacement from seasonal frost and settlement. It appears that portions of the outer ring floor may have been previously replaced or topped since original construction to deal with this problem. The uneven surface presents a tripping safety hazard.
5. The door headers are in poor condition. These headers are Items 1, 2, 4 and 8. The condition appears in part due to the steel cage door structure that is partially embedded into the headers. Fracture points form along the embedded surfaces. Also it appears that these headers have been influenced by seasonal frost movement. The movement of the steel doors (which are attached to the displacing walls) fractures the concrete. Over time it appears that parts of the fractured concrete have been removed creating holes and jagged edges in the headers. I could see reinforcement in some of the cracks but where all the concrete is tied together with steel is unknown.
6. The framing supporting the shotcrete rock is in fair to good condition. The exposed steel is surface corroded but has quite a bit of section remaining. The concrete in some areas is cracked with efflorescence emitting from the cracks. The efflorescence is most likely due to water penetration through the shotcrete "rock". Spalling of the members was not observed.
7. I did not evaluate the shotcrete as it was not in the scope of this review. I did note cracks and a few holes in the material from second level. Such openings allow water to enter the interior and penetrate the concrete framing, causing efflorescence. It also appears to pond on the floor and enters Level 1 below.

Opinions – In my professional opinion the ring structure comprising the first level is fairly massive. It can and has suffered a fair amount of abuse since its original construction. The settlement cracks, while severe in appearance, in my opinion do not represent conditions that would make the structure unsafe. The safety issues in my opinion are found in the fractured door headers and uneven floor surface.

Before any repairs are attempted to this structure the internal temperature must be maintained at a minimum of 40 degrees (F) to negate the season frost displacement that takes place. Without reducing this movement any repairs to concrete surfaces (using concrete products) will eventually lead to future cracks and spalls.

Once heat is established in the concrete structure I would monitor the walls for continued movement. Barring such movement one could embark on concrete repairs as follows:

Item 1: Door headers found in four locations. Remove existing header concrete while attempting to salvage reinforcement. Replace in kind utilizing existing reinforcement or doweling in additional reinforcement into concrete walls. Beams could be poured through the ceiling or shotcreted. Modify existing doors to frame into headers without intrusion into concrete. An alternate repair would be to use a steel header and expansion anchor ends to the concrete walls.

Items 2 and 4: Door headers in two locations. Remove existing header concrete and reinforcement. Replace in kind by doweling new concrete into existing concrete walls. Beams could be poured through the ceiling or shotcreted. Modify existing doors to frame into headers without intrusion into concrete. An alternate repair would be to use a steel header and expansion anchor ends to the concrete walls.

Items 3 and 5: Wall corners in two locations. Remove existing concrete to sound material. Hand patch void with cementitious or polymer modified mortar suitable for vertical surfaces.

Item 6: Horizontal crack in center wall: Remove loose material along length of crack. Epoxy or polyurethane inject crack.

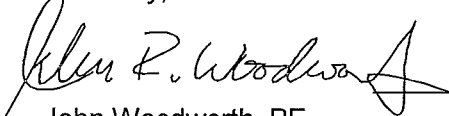
Item 7: Settled and rotated corner. Remove loose material along crack. Inject cracks with polyurethane resin.

Item 8: Cracked corner. Remove loose material in crack. Dry pack crack with cementitious or polymer modified mortars suitable for horizontal overhead repair.

Outer Ring Floor: Remove existing floor in sections so as not to destabilize outer backfilled wall. Install drain tile along outer wall in pea gravel bed. Prepare subgrade for new slab. Pour new slab on grade for floor.

Level 2: There are obvious cracks and holes allowing water infiltration. These holes and cracks should be patched with correct materials. The deterioration of the "rock" support structure is not a life-safety concern at this point. However there will be a future date that this structure will need to be restored to prolong the life of the exhibit.

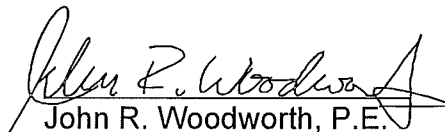
Sincerely,



John Woodworth, PE
Principal

Professional Certification:

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.



John R. Woodworth, P.E.
MN Reg. No. 15643

2/14/2019
Date