Construction Observation

MAGNUSSON KLEMENCIC ASSOCIATES

Structural + Civil Engineers

1301 Fifth Avenue, Suite 3200 Seattle Washington 98101-2699 T: 206 292 1200 F: 206 292 1201 W: www.mka.com

			DISTRIBUTI LLJ
PROJECT	Lincoln Park Zoo Pavilion	REPORT #	2
LOCATIO	Chicago, Illinois	TRIP DATE	September 24, 2020
PROJECT	_	ENGINEER/OB	Dave Eckmann
CLIENT	Studio Gang Architects	TODAY'S DATE	11/5/2020
CONTRA	Pepper Construction	PAGE	1 OF 11

GENERAL

Purpose: Site visit with Harry Soenksen of Studio Gang to observe the condition of the pavilion and provide recommendations on improving current conditions and future maintenance.

Summary: Overall, it is Magnusson Klemencic Associates' (MKA) opinion that the condition of the pavilion is above average compared to what would be expected given the exterior exposure of the timber and steel connections over the past 10 years. There are visible signs of rust at the steel base connections. Several areas on the timber members, especially along the south side, that are showing signs of splitting, delamination, and wood "spalling". Specific recommendations on improving these areas and suggestions for future maintenance are listed below. The observed deteriorations currently do not cause concern for structural performance of the pavilion. However, MKA highly recommends that the repairs and maintenance items are completed as soon as feasible to avoid additional deterioration.

For orientation and reference, **Figure 1** shows the overall pavilion with grids to clarify where the following photos were taken and where the following recommendations apply.

However, the photos provided do not necessarily capture all conditions. MKA recommends that the Owner and/or Contractor review the entire pavilion for signs of similar deterioration to apply recommended fixes or evidence of new conditions.

If new conditions are observed that do not match the descriptions in this report, these areas should be brought to the attention of Studio Gang and MKA so that they can be addressed.

MAGNUSSON
KLEMENCIC
ASSOCIATES

Structural + Civil Engineers

1301 Fifth Avenue, Suite 3200 Seattle Washington 98101-2699 T: 206 292 1200 F: 206 292 1201 W: www.mka.com

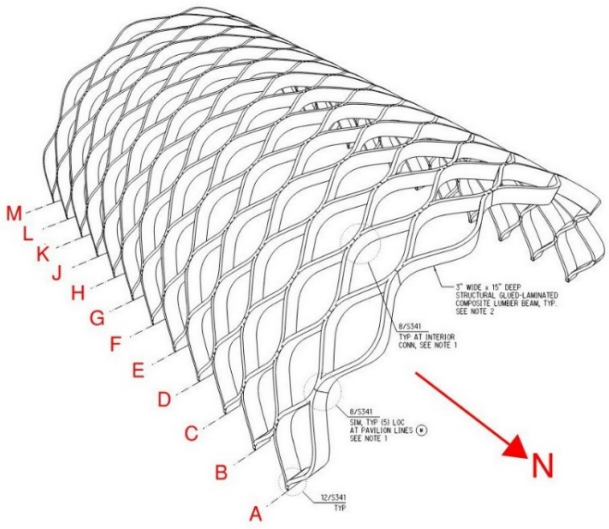

Figure 1. Overall Pavilion Diagram for Orientation

OBSERVATIONS

1. New oil has been applied to the full structure as seen in **Figure 2**. MKA's understanding is that the oil application followed the Wood Preservation Plan for Lincoln Park Shelter dated 11/8/19 by Autumn Peterson, CEO of Heritage Natural Finishes.

Figure 2. New Oil on Pavilion (Photo of South Side)

MAGNUSSON
KLEMENCIC
ASSOCIATES

Structural + Civil Engineers

1301 Fifth Avenue, Suite 3200 Seattle Washington 98101-2699 T: 206 292 1200 F: 206 292 1201 W: www.mka.com

Recommendation: Additional coats of oil should be applied, especially on south-facing surfaces, to ensure that timber absorbs as much oil as possible and surfaces are uniformly coated/protected. MKA suggests that SGA provides a follow-up inspection after all oiling is considered complete. Heritage may also recommend a wax and UV coating on the south faces.

2. Visible rust on steel base connections was observed in most locations as shown in **Figure 3**.

Recommendation: Clean any metal surface to be painted using a wire brush to remove loose rust and paint. Where bare metal is exposed, use rust preventative epoxy primer. Once all bare metal locations are primed, apply an automotive finish paint over the entire metal surface. https://www.martinsenour-autopaint.com/rustproof/specialty/rustproof-md-gloss-dark-gray

Thru-bolts at all base connections should be tightened prior to painting.

Figure 3. Visible Rust at Steel Base Connection

MAGNUSSON
KLEMENCIC
ASSOCIATES

Structural + Civil Engineers

1301 Fifth Avenue, Suite 3200 Seattle Washington 98101-2699 T: 206 292 1200 F: 206 292 1201 W: www.mka.com

3. In a few locations, but especially at Grid C (east), the outer lamination of the timber has "spalled" - likely due to moisture intrusion in the end-grain near the connections, and pins on the hidden connection plate are exposed (see **Figure 4**).

Figure 4. Wood Spalling at Grid C – East

Recommendation: Sand areas to remove dirt and debris. At exposed pins, fill any gaps with wood filler (see product recommendation below) to help protect the pins from corrosion. Two options for repair are listed below. Option 1 is recommended for aesthetics and to achieve more uniform weathering over time with adjacent timber material. After repair, re-apply Heritage oil as recommended by Heritage Natural Finishes.

Option 1: Patch spalled area with new glulam material (glued and screwed thin veneers). Recommend contacting Rick Collins of Trillium Dell Timberworks – rick@trilliumdell.com - or a similar contractor. Added screws can be hidden with wood filler.

Option 2: Patch area with wood filler – recommend using Abatron WoodEpox or equivalent.

Option 3: Replacement - A long term solution would be replacement of the member. It is possible to remove and replace the member without compromising the structure. If this route is selected please contact SGA, MKA and Trillium Dell for further coordination.

MAGNUSSON
KLEMENCIC
ASSOCIATES

Structural + Civil Engineers

1301 Fifth Avenue, Suite 3200 Seattle Washington 98101-2699 T: 206 292 1200 F: 206 292 1201 W: www.mka.com

4. A similar timber-spalling condition can be found away from the connections, shown in **Figure 5**, which occurs near the base at Grid C-west.

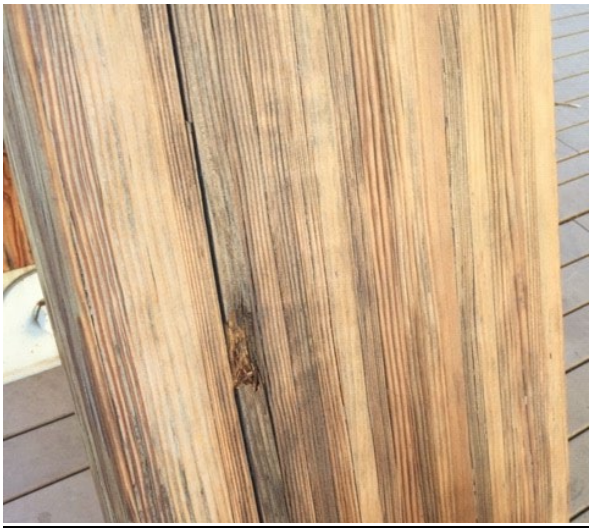

Figure 5. Wood Spalling at Grid C – West

Recommendation: Sand areas to remove dirt and debris. Follow Option 1 or 2 listed above for repairing. Re-apply Heritage oil as recommended by Heritage Natural Finishes.

5. The worst wood spalling occurring away from the connections was observed along the south side of the pavilion (see **Figure 6**). This is likely due to the additional exposure to weather typically seen for south-facing conditions.

Figure 6. Wood Spalling at Southside (Southeast)

MAGNUSSON
KLEMENCIC
ASSOCIATES

Structural + Civil Engineers

1301 Fifth Avenue, Suite 3200 Seattle Washington 98101-2699 T: 206 292 1200 F: 206 292 1201 W: www.mka.com

Recommendation: Sand areas to remove dirt and debris. Remove all wood showing signs of rot or decay. Do not remove more than ¾" of thickness from the original surface Wood filler or epoxy is not recommended for this area given the extent of spalling. Instead, patch spalled area with new glulam material (glued and screwed thin veneers). Recommend contacting Rick Collins of Trillium Dell Timberworks – rick@trilliumdell.com - or a similar contractor. Added screws can be hidden with wood filler. Re-apply Heritage oil as recommended by Heritage Natural Finishes.

Option 2: Replacement - A long term solution would be replacement of the member. It is possible to remove and replace the member without compromising the structure. If this route is selected please contact SGA, MKA and Trillium Dell for further coordination.

6. There are several areas, particularly along the west side, where some delamination has occurred along the narrow face of the timber member (see **Figure 7**).

Figure 7. Delamination Along West Side

Recommendation: Sand areas to remove dirt and debris. Two options for repair are listed below. Option 1 is recommended for aesthetics and performance over time. After repair, re-apply Heritage oil as recommended by Heritage Natural Finishes.

MAGNUSSON
KLEMENCIC
ASSOCIATES

Structural + Civil Engineers

1301 Fifth Avenue, Suite 3200 Seattle Washington 98101-2699 T: 206 292 1200 F: 206 292 1201 W: www.mka.com

Option 1: Clamp laminations together with screws. Recommend contacting Rick Collins of Trillium Dell Timberworks – rick@trilliumdell.com - or a similar contractor. Added screws can be hidden with wood filler.

Option 2: Patch area with wood filler – recommend using Abatron WoodEpox or equivalent.

Option 3: Replacement - A long term solution would be replacement of the member. It is possible to remove and replace the member without compromising the structure. If this route is selected please contact SGA, MKA and Trillium Dell for further coordination.

7. In a few locations, graffiti and carvings were observed (see **Figure 8** which is located at Grid E-East).

Figure 8. Graffiti and Carving Near Base Connection

Recommendation: Sand areas to remove dirt and debris. Continue sanding to remove graffiti and carvings and re-apply Heritage oil as recommended by Heritage Natural Finishes.

MAGNUSSON
KLEMENCIC
ASSOCIATES

Structural + Civil Engineers

1301 Fifth Avenue, Suite 3200 Seattle Washington 98101-2699 T: 206 292 1200 F: 206 292 1201 W: www.mka.com

8. Some dark staining was observed in several areas, likely caused by soiled water from rain or snow (see **Figure 9** which is located at Grid J - West). Where tested by hand on site, the wood appears solid and not spongy, suggesting no signs of rot or decay.

Figure 9. Dark staining at Grid J-West

Recommendation: If aesthetically desired, sand areas to remove dark staining and re-apply Heritage oil as recommended by Heritage Natural Finishes.

MAGNUSSON
KLEMENCIC
ASSOCIATES

Structural + Civil Engineers

1301 Fifth Avenue, Suite 3200 Seattle Washington 98101-2699 T: 206 292 1200 F: 206 292 1201 W: www.mka.com

9. In most joints near the base, installed chinking does not extend to the edge of the timber members (see **Figure 10**). There also appears to be some deterioration of the member end-grains given the susceptibility of collecting moisture on these surfaces.

Figure 10. Chinking in Connection Joints

Recommendation: Remove existing chinking. Clean and sand joint. Apply wax-based end-grain sealer (suggest using Heritage Liquid Wax End Sealer or similar) and install new chinking to cover the full surface area of the member end-grain.

10. In some locations, thru-bolts appeared to be loose or missing washers (see **Figure 11**)

Figure 11. Thru-bolts at Typical Connections

MAGNUSSON
KLEMENCIC
ASSOCIATES

Structural + Civil Engineers
1301 Fifth Avenue, Suite 3200 Seattle Washington 98101-2699 T: 206 292 1200 F: 206 292 1201 W: www.mka.com

Recommendation: All thru-bolts should be inspected and re-tightened after oiling and repairs are complete. Any damaged thru-bolts or thru-bolts missing washers should be replaced with stainless steel ¼" diameter thru-bolts.

11. In a few locations, timber splitting was observed at the connections (see **Figure 12** taken at Grid D - East).

Figure 12. Splitting at Connections

Recommendation: Cracks such as these, in the wide faces of members, can be left as shown but should be monitored to make sure they do not enlarge. Other options to mitigate are listed below. Option 1 is recommended for better long-term performance.

Option 1: Apply screws to clamp cracks together, similar to the recommendations listed above for cracks found in the narrow face of members.

Option 2: Patch area with wood filler – recommend using Abatron WoodEpox or equivalent.

12. In all base conditions, it appears as if chinking was not installed or needs to be replaced in the joint between glulam members at the base connections (see **Figure 13**).

MAGNUSSON
KLEMENCIC
ASSOCIATES

Structural + Civil Engineers

1301 Fifth Avenue, Suite 3200 Seattle Washington 98101-2699 T: 206 292 1200 F: 206 292 1201 W: www.mka.com

Figure 13. Missing Chinking at Base Connections

Recommendation: Sand and clean area and install or replace chinking.

END OF OBSERVATION REPORT