

Flathead County Fairground Grandstand - 2024 Structural Condition Assessment



Property Address: 265 North Meridian Road
Kalispell, MT 59901

Report Date: June 21, 2024

Produced For: Beth Kappes, PE, Flathead County Montana

Written By: Daniel Griesenauer, PE

Reviewed By: Andrew Emmons, PE & Nick Ereckson, PE

Project No.: 24.0803.S.01



PROJECT OVERVIEW

We have completed our investigation of the covered grandstand in the Flathead County Fairgrounds located at 265 North Meridian Road in Kalispell, Montana. The purpose of our work was to perform a visual structural condition assessment of the grandstand and its supporting framing in accordance with the 2017 International Code Council (ICC) 300 Standard on Bleachers, Folding and Telescopic Seating, and Grandstands. Specifically, our assessment pertained only to readily accessible structural elements, and we did not assess components of 2017 ICC 300 that are architectural in nature including egress, guardrails, fire protection requirements, or open spaces at footboards or seat boards.

Overall, the observable portions of the structure are in fair conditions, with the superstructure being in good condition, and the board sheathing of the grandstand being in fair to poor condition. Although there are no areas that we would consider an immediate life safety concern, we noted areas where repairs and/or maintenance are needed to maintain the integrity and prolong the useful life of the structure. We observed areas that we classified as potential hazards and recommend they be addressed as immediate priorities.

BACKGROUND

The grandstand is approximately 16,000 square feet and approximately 30 feet tall at its highest point (See Figures 1 & 2). The walking surface of the grandstand consists of 2x sheathing supported by various 2x elements attached to 2x12 rakers spaced at 16 inches which run the full short length of the building. At the easternmost bay of the structure, the rakers are supported on 5-ply 2x12 beams with 6x8 timber braces. These beams bear on 12x12 timber columns which are supported on concrete isolated footings. At the central bay and western bay of the grandstand, the support columns were timber members that are integral with the framing of the office building below the grandstand.

The canopy of the grandstand is framed with steel trusses supported on built-up columns at the east support and rolled W-shaped steel columns at the middle and west supports (See Figure 3). The trusses are spaced at 15 feet on the end bays and 18 feet at the ten interior bays. The built-up columns are constructed of back-to-back steel channels and are riveted in the strong direction to steel channels, all measuring 8 inches deep. The east columns bear on the 5-ply 2x12 beam below the grandstand and are connected to the timber columns below with steel plates on either side of the beam. The steel trusses are comprised of plates and angles riveted together at the top chord, bottom chord, and the vertical / diagonal web members. The steel trusses are braced laterally at alternating bays with crossing angles and chevron angle bracing. The steel trusses support 2x wood purlins at 16 inches on center, which bear on a wood sill plate that is bolted to the top chord of the truss. The purlins are laterally braced with 1x wood bridging nailed between each purlin in an X shape, with three rows per bay. The purlins support tongue and groove wood decking. The roofing membrane consists of a white TPO roof that was recently replaced in 2014.

At the two southernmost bays of the grandstand, there are two vomitorium staircases which connect to the second floor of the office building below. It is our understanding that these elements were added in approximately 1980.



The grandstand also includes concrete ramps and ADA accessible seating at the bottom of the grandstand in the middle five bays. Based on our conversations with on-site staff, this addition was completed in approximately 2016.

ASSESSMENT PROCESS

According to the 2017 ICC 300 Standard on Bleachers, Folding and Telescopic Seating, and Grandstands, “All existing tiered seating shall be inspected and evaluated at least once a year by a qualified person for compliance [with ICC 300 provisions]” Structurally, the code requires that existing tiered seating is maintained as follows:

- “Components or fasteners shall not be broken, damaged, badly deteriorated, or missing.”
- “Adequate bearing shall be provided. The structure shall bear uniformly on the floor or ground in a manner so as to safely support the structure.”
- “All components and systems shall be in proper working condition.”
- Outdoor tiered seating “shall be weather resistant” with wood materials being “naturally durable or preservative-treated” and steel materials being “protected from corrosion.”
- “Seating areas affected by damage, unsafe operation, or defects that interfere with safe use shall not be used or operated until satisfactory repairs restoring safe use is completed.”

Daniel Griesenauer, PE & Robert Garneau of Martin/Martin, Inc. performed a structural condition assessment of the grandstand structure on June 13, 2024. The weather at the time of the visit was mostly sunny with an approximate temperature of 75°F. In addition to our on-site observations, we met on site with Sam Nunnally and Mark Niemeyer who manage the fairgrounds, and Whitney Aschenwald, with the county commissioner’s office, to discuss their knowledge of the facility and any specific issues they have encountered. We performed minimal invasive testing during our site visit by using an awl to measure surface deterioration of wood elements and using a drill to inspect the core of select timber columns.

We used cameras with telescoping lenses and an aerial drone equipped with both thermal imaging and zoom cameras to visually document conditions at the structure. The drone was used to observe the underside and topside of the canopy framing of the structure. The drone’s thermography camera captures infrared (IR) images that can be analyzed to investigate temperature differentials across a surface, which can show if moisture has infiltrated the assembly and deteriorated the framing. Thermal images were taken of the roof of the canopy structure (See Figure 4), and no substantial deterioration or leak locations were observed (in the form of thermal irregularities).

Additionally, a limited set of existing structural drawings were available for our review. These drawings were of the 1980 addition of the vomitorium stairs, designed by Jackola Engineering Company, and dated April, 1980.

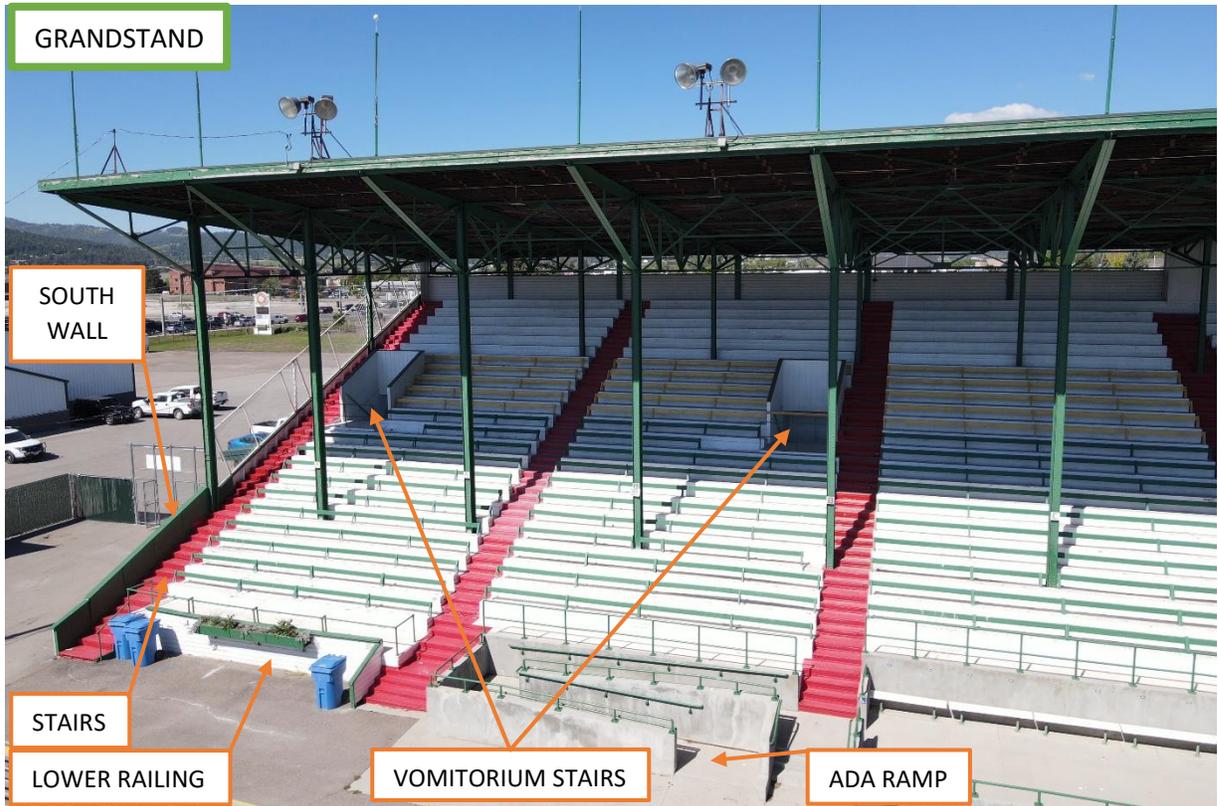


Figure 1: Diagram of grandstand structure (south end)

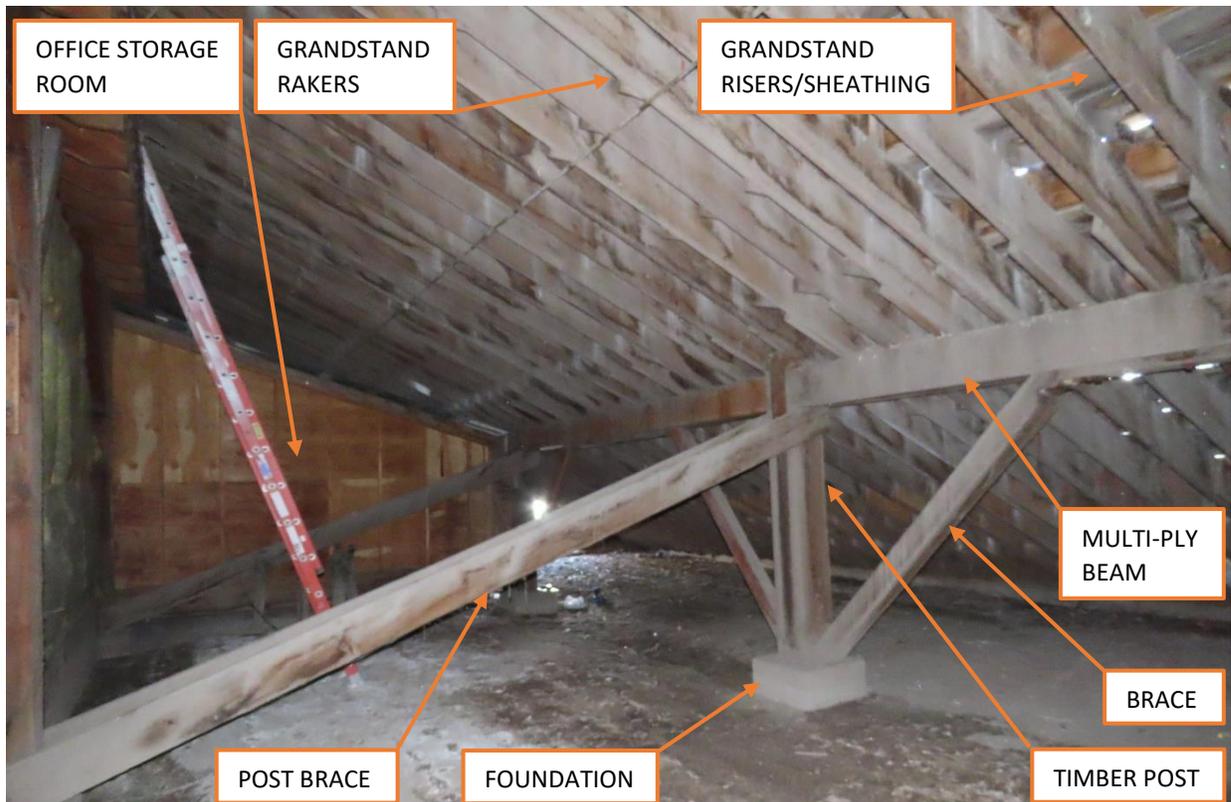


Figure 2: Diagram of easternmost framing below grandstand

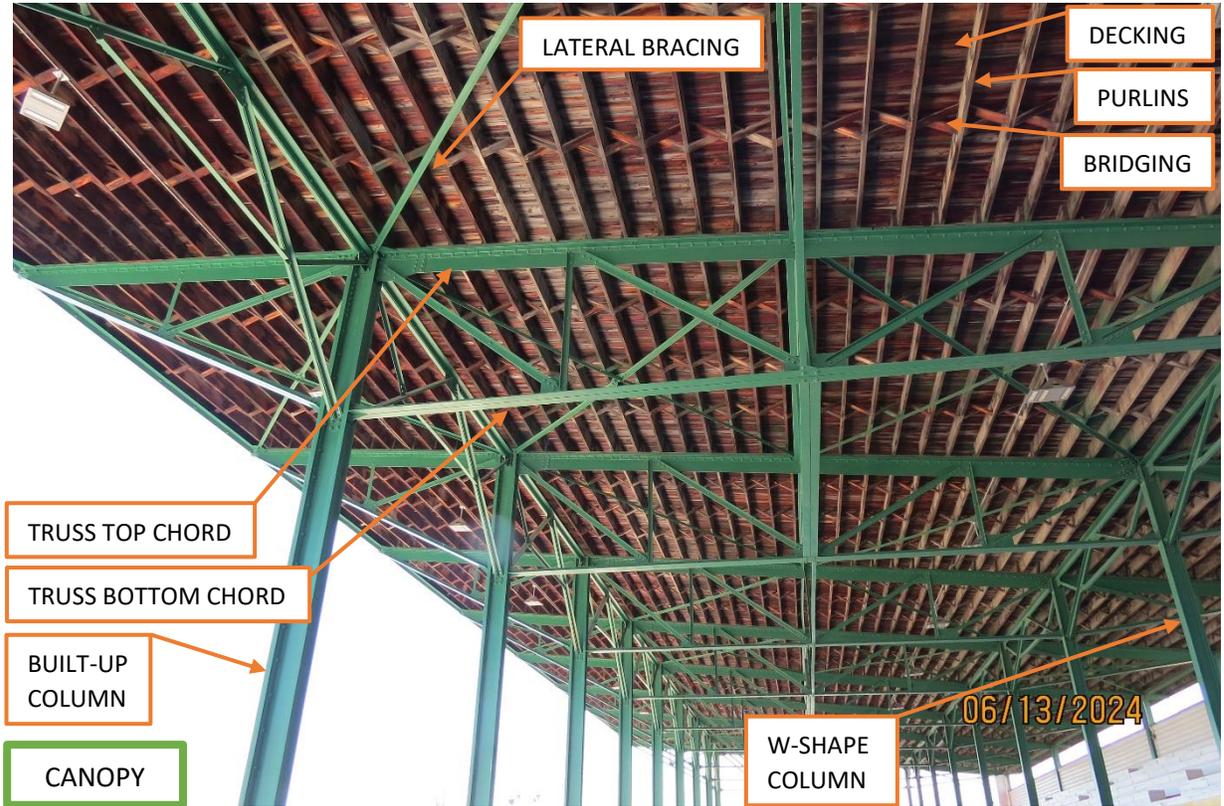


Figure 3: Diagram of canopy structure

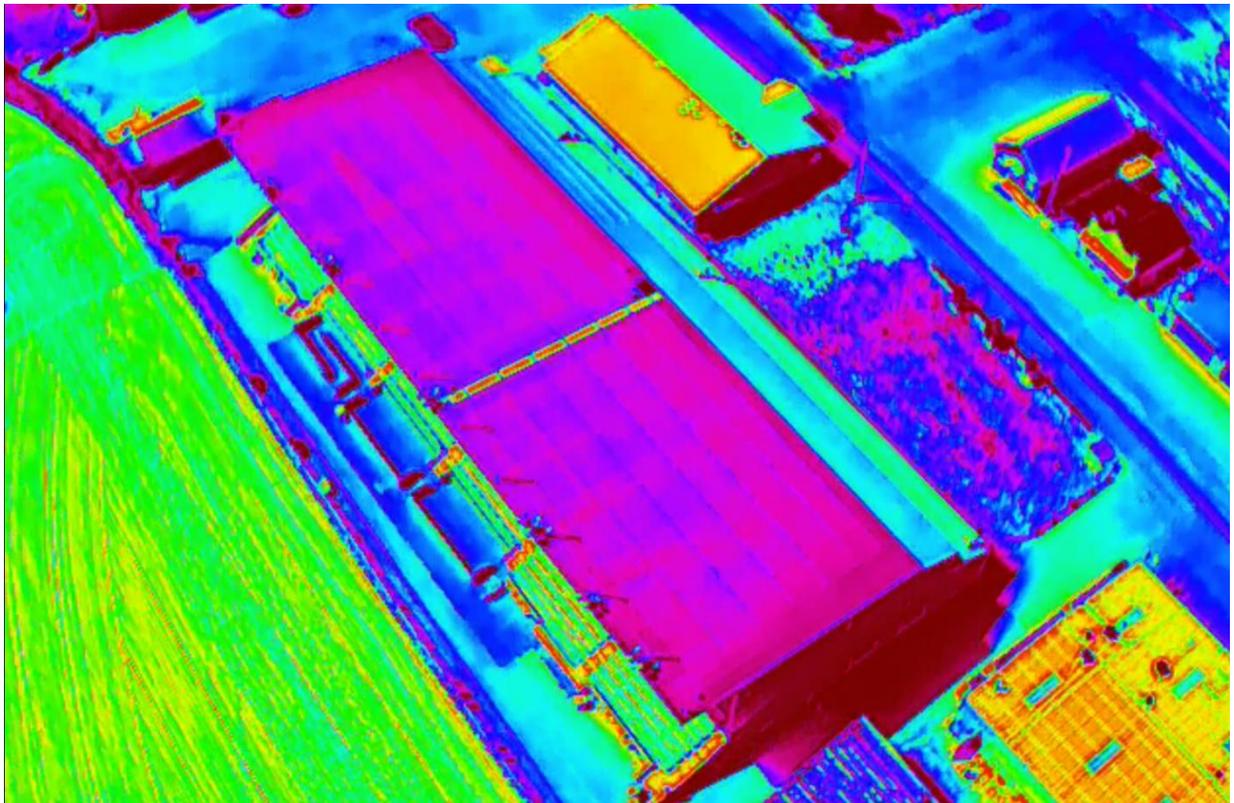


Figure 4: Aerial thermal image of grandstand structure



OBSERVATIONS

IMMEDIATE REPAIR ITEMS

We recommend immediate repairs occur prior to permitting access to the general public, to reduce the hazard of loss of life or serious harm. Contact Martin/Martin or similar professional engineering firm for construction details for repairs noted below as recommendations below are schematic in nature.

Photos and descriptions of the Immediate Repair Recommendations are listed below.

IMMEDIATE REPAIR PHOTOS

	<p><u>Damage:</u> Loose or split bridging elements in grandstand canopy. These occur throughout the facility.</p> <p><u>Recommendation:</u> Remove and replace elements to prevent falling object hazard.</p>
	



Damage: Leaning in the north end wall of the grandstand, in the northeast corner. This leaning was observed within the arrows shown in the photo to the left. At the northeast corner, the wall is leaning at approximately 7/8" per 1'-0". At the first canopy column (approximately 21 feet from the northeast corner), the wall is leaning at approximately 1/8" per 1'-0".

Recommendation: To mitigate further movement, we recommend attaching the wall to non-deteriorated members of the adjacent grandstand diaphragm, either through connecting the wall to non-deteriorated plank sheathing or connecting to the side of the first raker and bridging to adjacent rakers to distribute the load.

On a longer timeline, the client may rebuild the wall to bring it back to plumb for aesthetic reasons.



Damage: The second southernmost office storage room has failed structurally. The north girder has broken, the south girder has rotated, the joists are no longer in their seats, and the floor has dropped approximately 3 inches.

Recommendation: Do not use this storage room until it can be rebuilt and repaired. As this room is not attached to the grandstand above, this issue does not impact the operability of the grandstand.



Damage: Deterioration in board sheathing at the base of both vomitorium stairs

Recommendation: We recommend that the vomitorium stairs remain closed to public use until repairs can be made, as noted in the high priority repair items below.



HIGH PRIORITY REPAIR ITEMS (WITHIN 12 MONTHS)

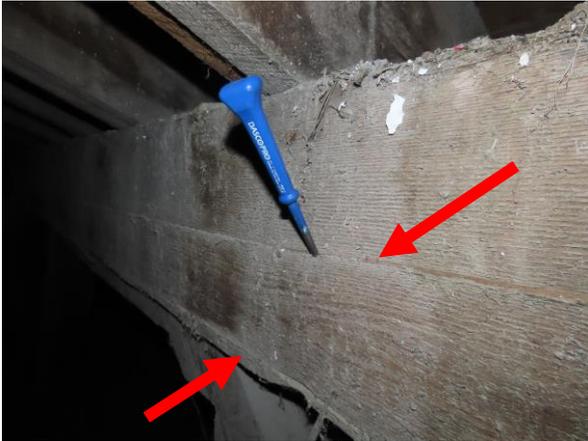
High Priority repairs are those required to address structural serviceability concerns and other crucial items that are not considered to be immediate life safety issues. We recommend high priority repairs be performed between zero and 12 months of report date.

Photos and descriptions of our observations and associated High Priority Repair Recommendations are included below.

HIGH PRIORITY REPAIR PHOTOS

	<p><u>Damage:</u> Rotted and deteriorated 2x4 elements supporting the treads and sheathing above.</p> <p><u>Recommendation:</u> Replace deteriorated boards in full. When boards are removed, inspect the rakers beyond for additional deterioration.</p> <p>At locations where deterioration is not observed, but fungus is present on the board, apply fungicides to mitigate further deterioration.</p>



	<p><u>Damage:</u> Splitting at fasteners in 2x4 elements supporting the treads and sheathing above.</p> <p><u>Recommendation:</u> Replace split boards.</p>
	<p><u>Damage:</u> Multiple raker elements not supported at timber columns.</p> <p><u>Recommendation:</u> Install a support element to the multi-ply beam below to post up and support the end of the raker.</p>
	<p><u>Damage:</u> Delamination of the outer grains of a multi-ply beam along the easternmost line of columns and framing. Delamination was only observed in one ply of one beam.</p> <p><u>Recommendation:</u> Replace the outer ply of the beam with a matching element or sister a new ply of 2x12 lumber to the north side of the beam.</p>



Damage: Deterioration in stair treads and board sheathing throughout grandstand. Deterioration was noted as being concentrated at the ends of boards, typically around the fasteners. Deterioration was concentrated around the south, east, and north ends of the structure, with select locations of additional deterioration throughout the structure.

For scale, photos show boards pierced with a 3" awl shank. The awl could be easily inserted into the boards up to ½ inch in many locations and all 3 inches in select locations.

Recommendation: Replace deteriorated boards in full. When boards are removed, inspect the rakers below for additional deterioration. If large regions of boards are removed, the owner may add flashing elements to the top of the rakers below to mitigate deterioration of those elements in the future.

At locations where deterioration is not observed, but fungus is present on the underside of the board, apply fungicides to mitigate further deterioration.



	<p><u>Damage:</u> Backrest supports missing fasteners or fastened into deteriorated elements.</p> <p><u>Recommendation:</u> Replace missing fasteners and/or replace deteriorated boards in full.</p>
	<p><u>Damage:</u> Deterioration in board sheathing at the base of both vomitorium stairs</p> <p><u>Recommendation:</u> Replace deteriorated boards in full. When boards are removed, inspect the rakers below for additional deterioration, as these members could not be observed from below and may also be deteriorated.</p> <p>After boards are replaced, install a drain system to direct water down to grade to mitigate future ponding at these locations.</p>
	<p><u>Damage:</u> Excessive cross-slope on the northern stairs of the grandstand. Maximum slope observed was approximately 7/8" per 1'-0".</p> <p><u>Recommendation:</u> Remove stair treads and reinstall meeting IBC requirements. While boards are removed, inspect tread support elements for decay or deterioration before reinstalling.</p> <p>The ends of tread boards are to align with the rakers below or single 2x elements attached to the side of the raker. At locations where this is not achievable, install an element spanning between the rakers to support the end of the board.</p>



	<p><u>Damage:</u> Leaning in the rail walls along the east edge of the grandstand. Maximum lean observed was approximately 3/4" per 1'-0".</p> <p><u>Recommendation:</u> Rebuild leaning walls.</p>
	<p><u>Damage:</u> Spongy soil throughout the south half of the grandstand. On site staff stated that this is a known groundwater issue.</p> <p><u>Recommendation:</u> Install a vapor barrier throughout the underside of the grandstand to further limit moisture within the space. Vapor barriers are to be attached to concrete foundation elements around the perimeter of the space. Do not attach the vapor barrier to wood elements.</p>
	<p><u>Damage:</u> Localized cracks, checking, and delamination in wood purlins at canopy framing.</p> <p><u>Recommendation:</u> At locations where checking occurs at the bottom of the purlin and within the middle third of the purlin span, install a full-length sister purlin of equivalent size. Install new bridging elements to match the existing configuration.</p>



	<p><u>Damage:</u> Localized notch and deterioration at purlin bearing.</p> <p><u>Recommendation:</u> Remove bridging and sister purlin with equivalent size wood member to reestablish bearing. Install new bridging elements to match the existing configuration.</p>
	<p><u>Damage:</u> Missing fastener at built-up steel column to wood column transition.</p> <p><u>Recommendation:</u> Replace all loose/missing/deteriorated fasteners. Clean and paint exposed metal to prevent further deterioration. Regularly inspect and tighten bolts/fasteners.</p>



MEDIUM PRIORITY REPAIR ITEMS (12 MONTHS TO 36 MONTHS)

Medium Priority repairs are those required to prolong the service life of the structure and/or maintain safety of the users. We recommend medium priority repairs be performed between 12 months and 36 months of the report date.

Photos and descriptions of our observations and associated Medium Priority Repair Recommendations are included below.

MEDIUM PRIORITY REPAIR PHOTOS

	<p><u>Damage:</u> Above the office and its storage rooms, there is a small separation between the roof framing/sheathing and the grandstand framing above. Due to this, there was limited visibility of rakers and the support elements for grandstand treads above the office building.</p> <p><u>Recommend:</u> Further investigation of these regions will be required as problems become apparent. These areas will need to be observed from above by removing grandstand treads.</p>
	<p><u>Damage:</u> Board elements were fastened to the tops of grandstand seats. These elements were likely installed to mask deterioration below.</p> <p><u>Recommend:</u> Remove additional boards and replace boards below in full, as needed.</p>



	<p><u>Damage:</u> Peeling, chipping, and faded paint throughout grandstand. The paint helps to mitigate UV deterioration of the wood below, which can frequently create pathways for further water infiltration and deterioration.</p> <p><u>Recommend:</u> Sand down loose paint and repaint structure as paint deterioration occurs.</p>
	<p><u>Damage:</u> Minor corrosion at the base of steel columns and their connections to the timber post below.</p> <p><u>Recommend:</u> Clean all corrosion from steel elements and coat with rust-inhibitive coating.</p>
	<p><u>Damage:</u> Localized peeling coating / corrosion staining on steel structural elements.</p> <p><u>Recommendation:</u> Clean corrosion and touch up paint with rust-inhibitive coating to protect the steel from corroding further.</p>



	<p><u>Damage:</u> Localized loose / corroded nails at purlin-to-purlin connections at bearing over truss. Blocking is missing at purlin bearing locations.</p> <p><u>Recommendation:</u> Remove any corroded / loose nails and replace. Install blocking at purlin bearing locations.</p>
	<p><u>Damage:</u> Localized missing bolts at truss top chord to sill plate connection.</p> <p><u>Recommendation:</u> Install bolts at missing connections between purlins. Install screws at missing connections below purlins.</p>
	<p><u>Damage:</u> Localized missing bolts at truss lateral cross-bracing.</p> <p><u>Recommendation:</u> Drill out hole and install bolt with nut. Paint to match.</p>



	<p><u>Damage:</u> Localized loose / damaged rim boards at canopy perimeter.</p> <p><u>Recommendation:</u> Remove and replace loose / damaged rim boards.</p>
	<p><u>Damage:</u> Global loose connections at flag pole base-to-purlin connections through roof. The fasteners are too short, and the blocking is cracked / damaged throughout.</p> <p><u>Recommendation:</u> Remove and replace all blocking and fasteners. Install new longer bolt to connect flag pole brace through purlin.</p>
	<p><u>Damage:</u> Localized loose / damaged orb atop flag poles.</p> <p><u>Recommendation:</u> Remove and replace connection of orb to top of flag pole.</p>



LOW PRIORITY REPAIR ITEMS (36 MONTHS TO 60 MONTHS)

Low Priority repairs are those required to prolong the service life of the structure and/or maintain safety of the users. We recommend low priority repairs be performed between 36 months and 60 months of the report date.

Photos and descriptions of our observations and associated Low Priority Repair Recommendations are included below.

LOW PRIORITY REPAIR PHOTOS

	<p><u>Damage:</u> Localized checking down the center of multiple timber columns. Although the checking is up to 1/2 inch wide, we do not have any structural concerns about this condition.</p> <p><u>Recommendation:</u> Monitor checking to ensure cracks do not widen substantially or split through the column.</p>
	<p><u>Damage:</u> A temporary support wall had been installed for the cut rakers during the concrete ADA seating section construction. The wall was not removed and may create unforeseen load paths within the structure.</p> <p><u>Recommend:</u> Perform additional analysis to confirm that wall is temporary and remove the stud wall if it is not required.</p>



	<p><u>Damage:</u> Hairline cracking in walls of ADA seating section and ramp.</p> <p><u>Recommend:</u> Monitor cracks and rout & seal cracks if they widen beyond 1/8 inch.</p>
	<p><u>Damage:</u> Localized openings in decking around canopy columns.</p> <p><u>Recommendation:</u> Seal openings in decking around columns to protect the connection below the grandstand from deteriorating further.</p>
	<p><u>Damage:</u> Minor wood deterioration was observed at the base of the room containing the roof access ladder. This room could not be accessed during our site visit.</p> <p><u>Recommend:</u> Investigate this room for any signs of wood deterioration and replace elements as needed. Verify that sound connections are present between the access ladder and its supporting structure.</p>



Damage: Global water staining on wood decking and purlins below roof.

Recommendation: Monitor underside of roof for active leaking and report findings to engineer. The staining is believed to be largely aesthetic and is not a structural concern. We also believe that painting or sealing the wood introduces risk of deteriorations. The paint can trap moisture and hide damages. This also involves a continuous maintenance task that will need to be redone every 3 – 5 years.



Damage: Minor corrosion at light supports.

Recommendation: Clean all corrosion from steel elements and coat with rust-inhibitive coating.



PREVENTIVE MAINTENANCE ITEMS

We recommend the maintenance items described below be performed immediately for the initial maintenance, then at regular intervals as noted in Table 1 below.

Table 1: Operations & Maintenance Items

Grandstand Operations & Maintenance Items				
Task	Weekly	Monthly	Semi-Annually	Annually
Power wash grandstand surfaces			X	
Inspect electrical panels beneath canopy			X	
Remove snow from grandstand seating & stairs (during snow events only)	As Required			
Inspect fire extinguishers		X		
Clean signage and graphics			X	
Flush drains/pipes (if installed)				X
Repaint grandstand seating and steel framing				3-5 Yrs.
Pick-up trash	X			
Clean all light fixtures, remove bird nests, etc.			X	
Graffiti removal from walls, signs, etc.		X		

RELATIVE ELEVATION SURVEY

We performed a relative elevation survey using a self-leveling laser as a stationary reference point to determine the relative elevation of nearby concrete foundation elements at the easternmost rows of columns.

Based on the age of the structure, it is unknown how precise the contractor was in installing each foundation at the same elevation. With this in mind, we are unable to comment on the variation in elevation between individual columns without gathering additional data points on a future date.

We are able to comment globally on the data we collected with the following comments:

- There does not appear to be a trend between each column indicating that the overall building is settling in any specific direction.
- No single column elevation is different enough from its adjacent columns to warrant further investigation beyond an additional elevation survey at a future date.

See Figure 5 and Table 2 below for a map of measured foundation elevations. Note that Column #1 is noted as 0.000 inches, not due to its relative elevation to the overall grandstand, but simply to set a baseline elevation for the other data provided in this map. Additionally, positive numbers denote that the column is higher than Column C1 and negative number denote that the column is lower than Column C1

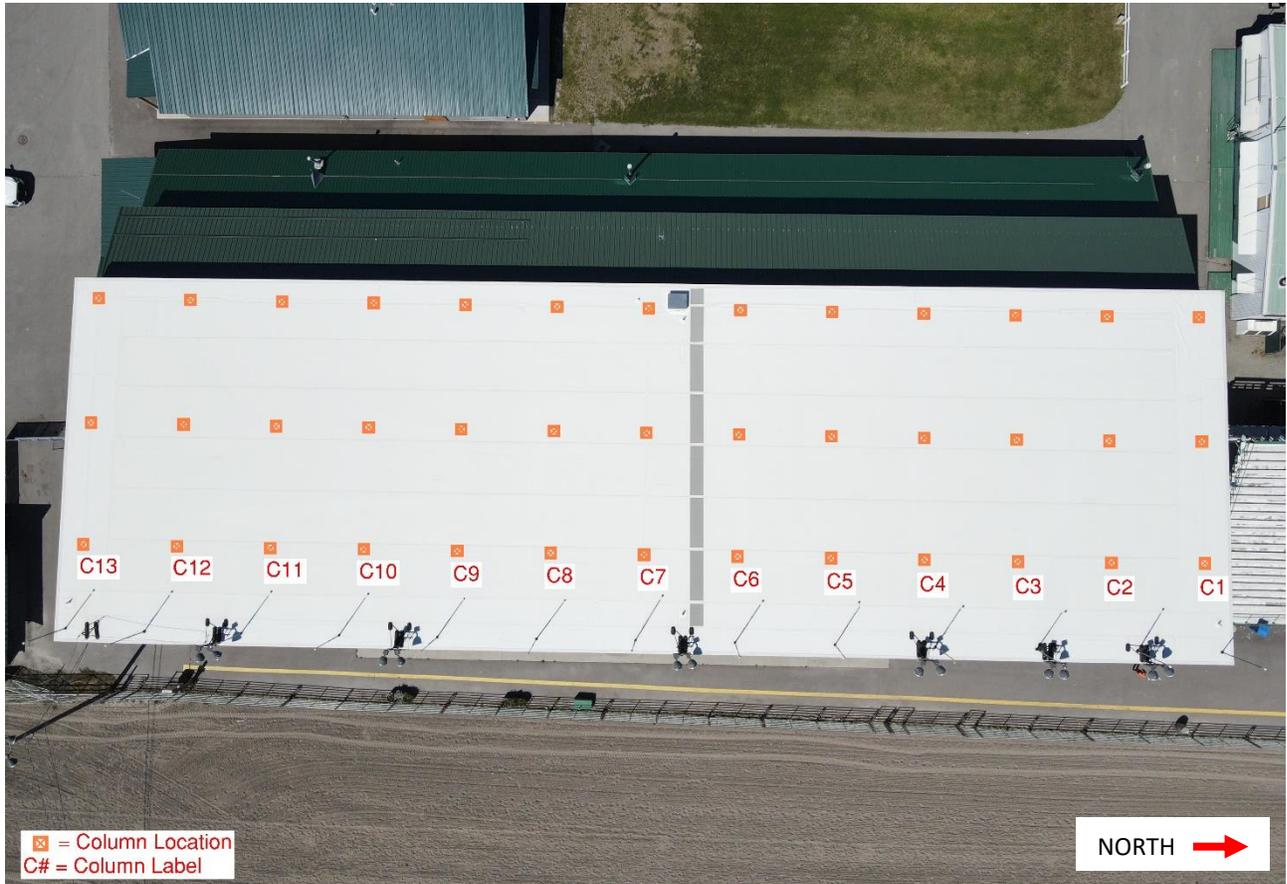


Figure 5: Grandstand column layout

Table 2: Relative elevation of easternmost column line

Column Number	1	2	3	4	5	6	7
Relative Elevation (inches) (Compared to Column C1)	0.000	0.250	0.047	0.547	0.547	0.172	-0.328

Column Number	7	8	9	10	11	12	13
Relative Elevation (inches) (Compared to Column C1)	-0.328	-0.141	-0.203	-0.328	-0.328	0.172	-0.203



CONCLUSIONS

Overall, the observable portions of the structure are in fair conditions, with the superstructure being in good condition, and the board sheathing of the grandstand being in fair to poor condition. We have a few locations of immediate repairs that we recommend be completed prior to the beginning of the upcoming season, but additional repairs noted can be performed based on the timelines provided in their respective sections.

As noted above, this report addresses all structural aspects of 2017 ICC 300, but does not comment on components of 2017 ICC 300 that are architectural in nature including egress, guardrails, fire protection requirements, or open spaces at footboards or seat boards. We recommend hiring a qualified Architect to assess for any deficiencies in these additional elements.

LIMITATIONS

Our investigation was limited solely to the structural aspects of the covered grandstand at the Flathead County Fairgrounds and is based on conditions that were readily observable at the time of our site visit. Limited existing drawings were provided for review and minimal invasive testing was performed. Repair recommendations are conceptual in nature and are not intended for construction. Neither the investigation nor this report is intended to cover mechanical, electrical, architectural, or other features beyond those described above. Martin/Martin, Inc. does not accept responsibility for deficiencies not evident during an observation of this type.

We appreciate this opportunity to be of service. Please contact us if you have any questions regarding this report or if you require further assistance.

Sincerely,

Dan Griesenauer, PE
Project Engineer



Reviewed by: Andrew Emmons, PE
Principal