

PPS - Madison High School - Grandstand Assessment



West View of Grandstand

ABHT Project #11516

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Submitted to:

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EXECUTIVE SUMMARY

Portland Public Schools was concerned that the Madison High School football field grandstands at the Bleacher Rows/Terrace Levels was being compromised structurally due to water damage. The goal of ABHT's work was to review existing drawings and perform site observations in order to assess areas of the grandstand which had potentially been damaged due to water. Our assessment was based on the following:

1. Review of existing as-built drawings (drawing #70 and 71) dated November 1957, that ABHT was provided from Portland Public Schools (PPS).
2. Multiple site observations were performed by representatives of ABHT Structural Engineers between the months of April and June 2016.
3. Limited calculations/analysis were performed.

BUILDING SUMMARY

The Madison High School football field grandstands were constructed circa 1957. While PPS had contracted us to mainly review the Bleacher Rows/Terrace levels, we did also perform a cursory review of other areas of the Grandstand as well. Attached drawings have been provided within this assessment to provide a better understanding of the existing structure, observations, and recommendations. The grandstand existing structure has been shown on the attached drawings. The attached drawings to this assessment are as follows:

DRAWING S1 - OVERALL FOUNDATION PLAN
DRAWING S2 - OVERALL AND PARTIAL FRAMING PLANS
DRAWING S3 - OVERALL BLEACHER PLAN AND SECTION
DRAWING S4 - ENLARGED BLEACHER PLAN
DRAWING S5 - ENLARGED BLEACHER PLAN
DRAWING S6 - ENLARGED BLEACHER PLAN
DRAWING S7 - PARTIAL PLAN AND DETAILS
DRAWING S8 - OBSERVATIONS/RECOMMENDATIONS TABLES

Please note that the all recommendations and details noted within this report and within the attached drawings are preliminary and are not meant to be used for construction.

BLEACHER ROWS/TERRACE LEVELS SUMMARY

During our review of the bleacher rows, we noticed many different conditions and levels of rot/weathering/damage. We grouped our areas of concern into different categories as indicated on the Enlarged Bleacher Plans (Drawings S4, S5, and S6) and the Bleacher Observations/Recommendations Table shown on Drawing S8. All observations and recommendations have been indicated within the attached drawings.

Each bleacher row is composed of (3) individual flat 2x8 bleacher boards (assumed DFL no. 2 grade) spanning 6'-0" to its supports. It does not appear the original boards are pressure treated. The boards are not tied together in any manner to share loads between the supports. Therefore, we reviewed each individual board to span to its supports with either a 100 PLF (pounds per linear foot) load or a 300# point load in the center of the span. It is important to note that none of the existing members are adequate per current building code allowable stresses. The original board material (assumed again to be DFL no. 2 grade), while not pressure treated and therefore prone to water damage, is not far from adhering to the current building code allowable stresses if the boards are tied together at mid-span as shown on the bleacher partial plan and associated details on Drawing S7.

Therefore please reference note #1, below the Bleacher Observations/Recommendations Table shown on Drawing S8, which recommends all bleacher rows and spans to be tied together per the bleacher partial plan and associated details on Drawing S7. However, it is also noted that we understand that this may not be economically feasible.

All new replacement boards are indicated to be pressure treated flat 2x8 select structural grade with the added ties per the bleacher partial plan and associated details on Drawing S7. This assembly will meet current building code allowable stresses.

STRUCTURAL OBSERVATIONS/RECOMMENDATIONS

All of our structural observations and recommendations have been noted within the attached drawings.

REPORT INFORMATION PROVIDED

This assessment contains the following information:

- **Figures/Photos**

- **Foundation Figures**

- Observation photos at the foundation level of the structure.

- **Steel Structure Figures**

- Observation photos of the steel structure.

- **Railing Figures**

- Observation photos of the railing structure.

- **Bleacher Figures**

- Observation photos of the wood bleacher structure.

- **Drawings S1 through S8**

- Indicated within the building summary section.

DISCLAIMER

No liability of the existing structure is assumed based on the issuance of this assessment. Due to the limitations of this assessment and the fact that not every area of the grandstand was reviewed, it is possible that other issues exist. Limitations of this needs assessment include: observations only readily available to view and limited calculations/analysis performed. Guarantees cannot be made that construction or engineering problems, concealed or otherwise, could exist.

FOUNDATION FIGURES



**FIGURE F1A:
DETERIORATION OF CMU**



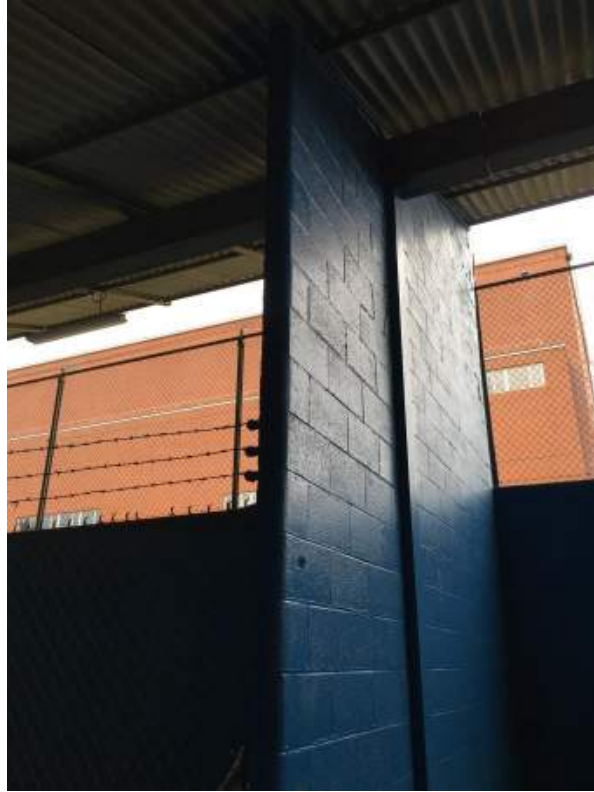
**FIGURE F1B:
DETERIORATION OF CMU**



**FIGURE F1C:
DETERIORATION OF CMU**



**FIGURE F1D:
DETERIORATION OF CMU**



**FIGURE F2A:
4" CMU NON-BEARING PARTITION**



**FIGURE F3A:
MINOR CRACKING IN FRONT BEARING CONCRETE STEMWALL
TYPICAL OF ENTIRE STEMWALL**



**FIGURE F3B:
MINOR CRACKING IN FRONT BEARING CONCRETE STEMWALL
TYPICAL OF ENTIRE STEMWALL**



**FIGURE F3C:
MINOR CRACKING AND SPALLING IN CONCRETE WALL**



**FIGURE F4A:
CRACKING AND SPALLING IN FRONT BEARING CONCRETE STEMWALL**



**FIGURE F4B:
SPALLING IN STEMWALL WITH REBAR EXPOSED**



**FIGURE F5A:
PORTION ON NON-SHRINK GROUT BENEATH BASE PLATE IS DETERIORATING**



**FIGURE F5B:
PORTION ON NON-SHRINK GROUT BENEATH BASE PLATE IS DETERIORATING**



**FIGURE F5C:
PORTION OF NON-SHRINK GROUT BENEATH BASE PLATE IS DETERIORATING**



**FIGURE F5D:
PORTION OF NON-SHRINK GROUT BENEATH BASE PLATE IS DETERIORATING**



**FIGURE F6A:
VERTICAL CRACKS IN BACK RETAINING WALL (TYPICAL OF WALL)**



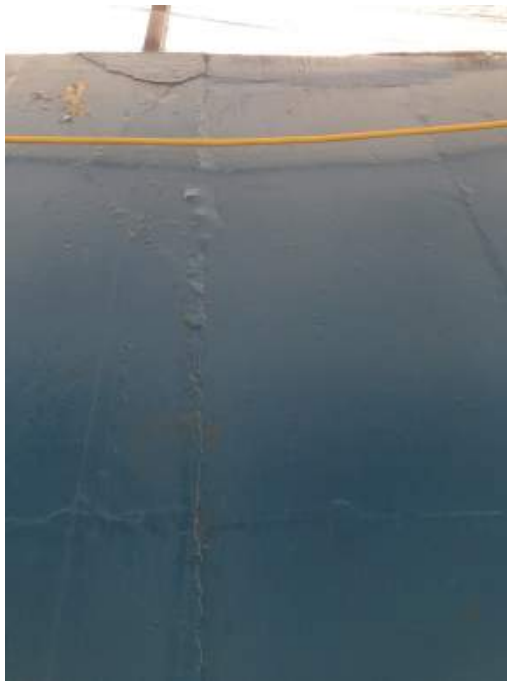
**FIGURE F6B:
VERTICAL CRACKS IN BACK RETAINING WALL (TYPICAL OF WALL)**



**FIGURE F6C:
VERTICAL CRACKS IN BACK RETAINING WALL (TYPICAL OF WALL)**



**FIGURE F7A:
SPALLING ALONG WITH CRACK**



**FIGURE F7B:
SPALLING AND CRACKING AT TOP OF WALL PERHAPS DUE TO CORROSION
OF FENCE POST**



**FIGURE F7C:
SPALLING AND CRACKING**



**FIGURE F7D:
SPALLING AND CRACKING**

STEEL STRUCTURE FIGURES



**FIGURE S1A:
GENERAL RUSTING OF THE STEEL STRUCTURE ABOVE
AND BEYOND SURFACE RUSTING**



**FIGURE S1B:
GENERAL RUSTING OF STEEL STRUCTURE ABOVE
AND BEYOND SURFACE RUSTING**



**FIGURE S1C:
GENERAL RUSTING OF STEEL STRUCTURE ABOVE
AND BEYOND SURFACE RUSTING**



**FIGURE S2A:
SIGNIFICANT STEEL CORROSION AT STEEL COLUMN WITHIN CMU WALL**



**FIGURE S3A:
SIGNIFICANT STEEL CORROSION AT CENTER GRANDSTAND BEAM**



**FIGURE S3B:
SIGNIFICANT STEEL CORROSION AT CENTER GRANDSTAND BEAM**



**FIGURE S4A:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4B:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4C:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4D:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4E:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4F:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4G:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4H:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4I:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4J:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4K:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4L:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4M:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4N:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4O:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4P:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4Q:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4R:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4S:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4T:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4U:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S4V:
SIGNIFICANT STEEL CORROSION AROUND AND IN MECHANICAL ROOM**



**FIGURE S5A:
BLEACHER BOARD STEEL SUPPORT RUSTING FROM TOP**



**FIGURE S5B:
BLEACHER BOARD STEEL SUPPORT RUSTING FROM TOP**



**FIGURE S5C:
BLEACHER BOARD STEEL SUPPORT RUSTING FROM TOP**



**FIGURE S5D:
BLEACHER BOARD STEEL SUPPORT RUSTING FROM TOP**



**FIGURE S5E:
BLEACHER BOARD STEEL SUPPORT RUSTING FROM TOP**



**FIGURE S5F:
BLEACHER BOARD STEEL SUPPORT RUSTING FROM TOP**



**FIGURE S6A:
HEAVY MOSS GROWTH ON CORRUGATED SOFFIT DECK**

RAILING FIGURES



**FIGURE R1A:
LARGE SPACE BETWEEN RAILING AND BLEACHERS**



**FIGURE R1B:
LARGE SPACE BETWEEN RAILING AND BLEACHERS**



**FIGURE R1C:
LARGE SPACE BETWEEN RAILING AND BLEACHERS**



**FIGURE R1C:
LARGE SPACE BETWEEN RAILING AND BLEACHERS**

BLEACHER FIGURES



**FIGURE B1A:
SIGNIFICANTLY DAMAGED BLEACHER BOARDS**



**FIGURE B1B:
SIGNIFICANTLY DAMAGED BLEACHER BOARDS**



**FIGURE B1C:
SIGNIFICANTLY DAMAGED BLEACHER BOARDS**



**FIGURE B1D:
SIGNIFICANTLY DAMAGED BLEACHER BOARDS**



**FIGURE B1E:
SIGNIFICANTLY DAMAGED BLEACHER BOARDS**



**FIGURE B1F:
SIGNIFICANTLY DAMAGED BLEACHER BOARDS**



**FIGURE B1G:
SIGNIFICANTLY DAMAGED BLEACHER BOARDS**



**FIGURE B1H:
SIGNIFICANTLY DAMAGED BLEACHER BOARDS**



**FIGURE B1:
SIGNIFICANTLY DAMAGED BLEACHER BOARDS**



**FIGURE B2A:
DAMAGED / WEATHERED BLEACHER BOARDS**



**FIGURE B2B:
DAMAGED / WEATHERED BLEACHER BOARDS**



**FIGURE B2C:
DAMAGED / WEATHERED BLEACHER BOARDS**



**FIGURE B2D:
DAMAGED / WEATHERED BLEACHER BOARDS**



**FIGURE B2E:
DAMAGED / WEATHERED BLEACHER BOARDS**



**FIGURE B3A:
REPLACEMENT CEDAR BLEACHER BOARDS**



**FIGURE B3B:
REPLACEMENT CEDAR BLEACHER BOARD**



**FIGURE B4A:
REPLACEMENT PRESSURE TREATED BLEACHER BOARD**



**FIGURE B4B:
REPLACEMENT PRESSURE TREATED BLEACHER BOARD**



**FIGURE B5A:
ORIGINAL SINGLE SPAN BLEACHER BOARD**



**FIGURE B5B:
ORIGINAL SINGLE SPAN BLEACHER BOARD**



**FIGURE B6A:
SIGNIFICANT DAMAGE AT BLEACHER BOARD CONNECTION**