ABHT
STRUCTURAL ENGINEERS

PPS - Marshall High School - Grandstand Assessment

South View of Grandstand

ABHT Project #11516

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Submitted to:

Portland Public Schools
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EXECUTIVE SUMMARY

Portland Public Schools was concerned that the Marshall 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 #72 and 73) dated February1961, that ABHT was provided from Portland Public Schools (PPS).
2. Site observations were performed by representatives of ABHT Structural Engineers on 3/30/16, 5/11/16, and 5/16/16.
3. Limited calculations/analysis were performed.

BUILDING SUMMARY

The Marshall High School football field grandstands were constructed circa 1961. 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 FRAMING PLAN
DRAWING S3 - OVERALL BLEACHER PLAN AND SECTION
DRAWING S4 - ENLARGED BLEACHER PLAN
DRAWING S5 - ENLARGED BLEACHER PLAN
DRAWING S6 - PARTIAL PLAN AND DETAILS
DRAWING S7 - 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 and S5) and the Bleacher Observations/Recommendations Table shown on Drawing S7. 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 S6.

Therefore please reference note #1, below the Bleacher Observations/Recommendations Table shown on Drawing S7, which recommends all bleacher rows and spans to be tied together per the bleacher partial plan and associated details on Drawing S6. 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 S6. 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 S7**
  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: CONCRETE STEMWALL SPALLING AT NORTH CORNER

FIGURE F1B: CONCRETE STEMWALL SPALLING AT SOUTH CORNER

FIGURE F2: SMALL CONCRETE CRACK AT NORTH WALL PILASTER

FIGURE F3: SMALL CONCRETE CRACK AT SOUTH WALL PILASTER

FIGURE F4: SPALLING AT EAST SIDE

STEEL STRUCTURE FIGURES

FIGURE S1A: SPALLING AT FRONT CONCRETE STEMWALL SUPPORTING STEEL RAKER

FIGURE S1B: SPALLING/CRACKING AT CONCRETE STEMWALL SUPPORTING STEEL RAKER

FIGURE S2: CRACKING OF GROUT AT STEEL COLUMN BASE PLATE

FIGURE S3: MISSING NUT AT STEEL RAKER TO STEEL BEAM

FIGURE S4: MISSING BOLTS AT STEEL RAKER TO STEEL BEAM

FIGURE S5A: POTENTIAL STEEL BEAM RUST DUE TO WATER INTRUSION

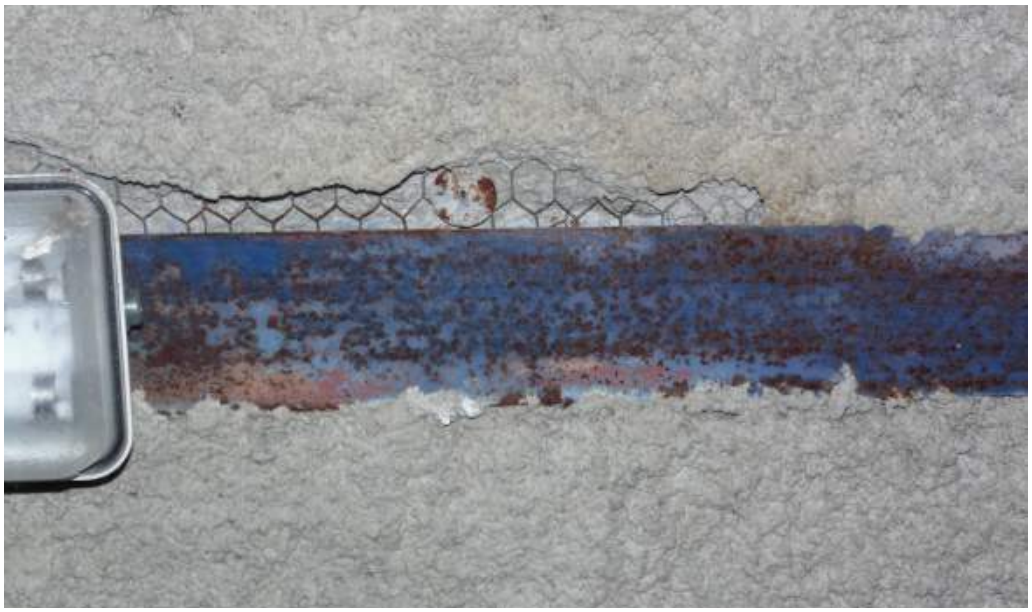

FIGURE S5B: POTENTIAL STEEL BEAM RUST DUE TO WATER INTRUSION

FIGURE S5C: POTENTIAL STEEL BEAM RUST DUE TO WATER INTRUSION

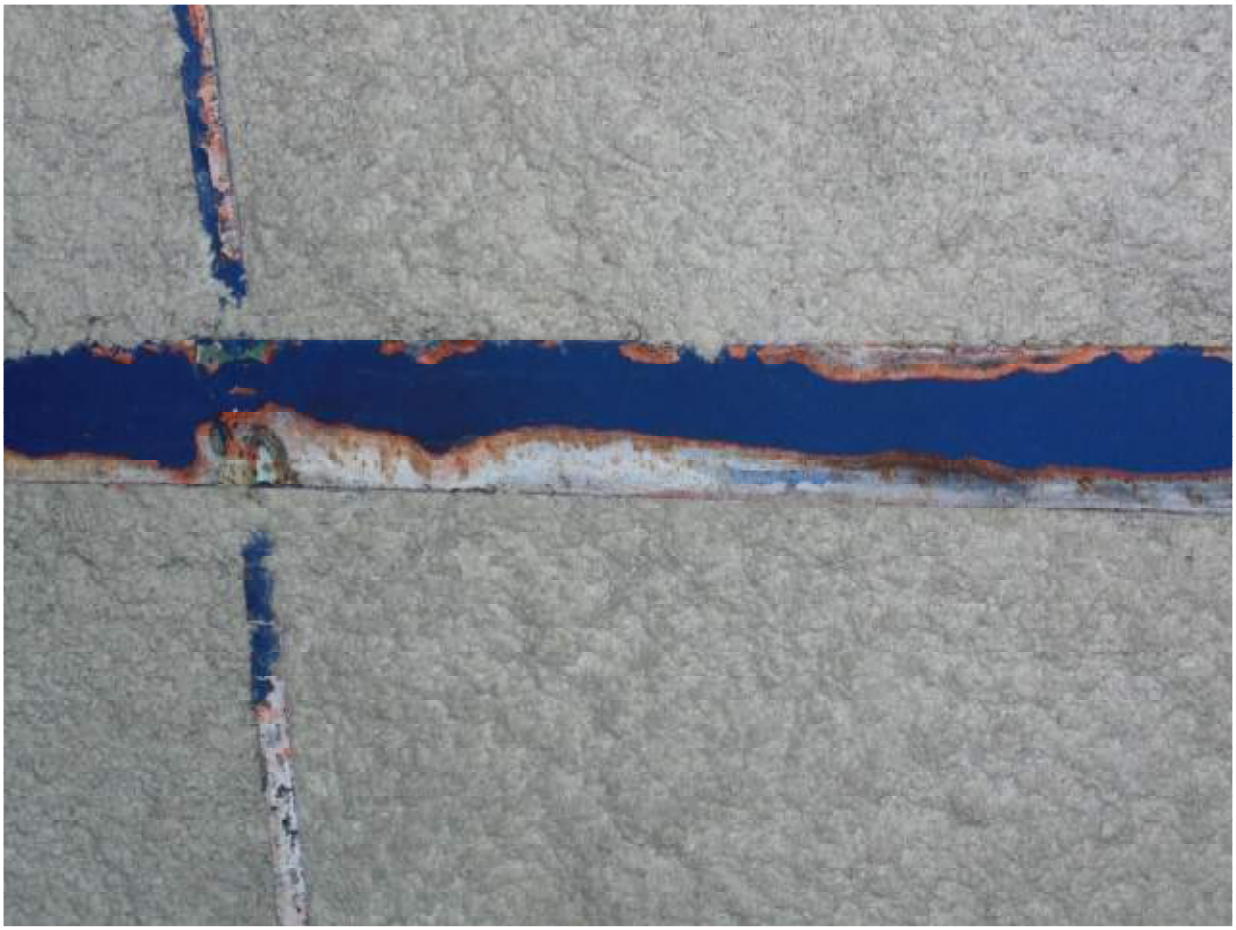

FIGURE S5D: POTENTIAL STEEL BEAM RUST DUE TO WATER INTRUSION

FIGURE S6: CONNECTION (BOLT AND PLATE) RUST AT BLEACHER BOARD CONNECTIONS

RAILING FIGURES

FIGURE R1A: DAMAGED RAILING

FIGURE R1B: DAMAGED RAILING

FIGURE R2: INSUFFICIENT RAILNG SPLICE

FIGURE R3A: INSUFFICIENT RAILNG SPLICE

FIGURE R3B: INSUFFICIENT RAILNG SPLICE

FIGURE R3C: INSUFFICIENT RAILNG SPLICE

FIGURE R4: DAMAGED RAILING

FIGURE R5A: LARGE SPACE BETWEEN RAILING AND BLEACHERS

FIGURE R5B: LARGE SPACE BETWEEN RAILING AND BLEACHERS

FIGURE R5C: 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 AT FRONT OF AISLE

FIGURE B2A: DAMAGED/WEATHERED BLEACHER BOARDS

FIGURE B2B: DAMAGED/WEATHERED BLEACHER BOARDS

FIGURE B3A: REPLACED CEDAR BLEACHER BOARD

FIGURE B3B: REPLACED CEDAR BLEACHER BOARD

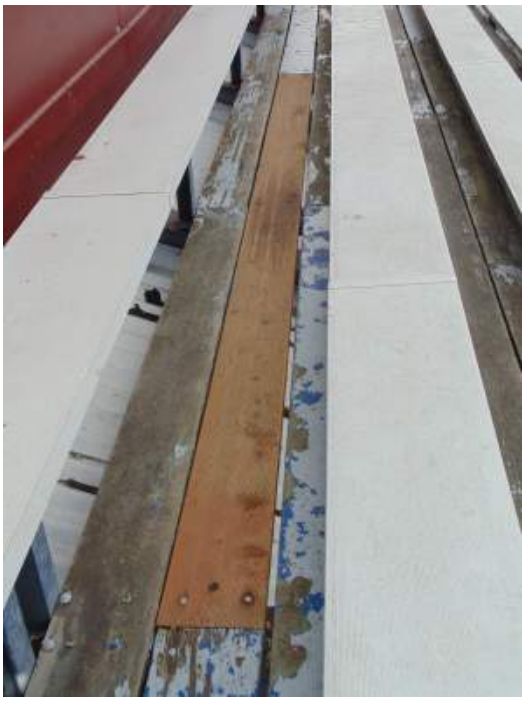

FIGURE B4A: REPLACED PRESSURE TREATED DFL BLEACHER BOARD

FIGURE B4B: REPLACED PRESSURE TREATED DFL BLEACHER BOARD

FIGURE B5A: ORIGINAL SINGLE SPAN BLEACHER BOARD

FIGURE B5B: ORIGINAL SINGLE SPAN BLEACHER BOARD

FIGURE B6A: SIGNIFICANT BLEACHER BOARD DAMAGE AT CONNECTION

FIGURE B6B: SIGNIFICANT BLEACHER BOARD DAMAGE AT CONNECTION

FIGURE B7: DETERIORATED PAINT AT UNDERSIDE OF BLEACHER BOARDS