

PROVIDENCE PARK STADIUM EXPANSION



OSBEELS 2018

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PRINCIPAL, KPFF CONSULTING ENGINEERS

PROVIDENCE PARK STADIUM EXPANSION

OSBEELS - SEPTEMBER 14, 2018

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- SUBSTRUCTURE AND FOUNDATIONS
- SUPERSTRUCTURE:
 - ROOF
 - SEATING TRAYS
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PROVIDENCE PARK STADIUM EXPANSION: OVERVIEW

- What is it?

Vertical addition of approximately 4000 seats to the east side of the existing Providence Park Stadium in Portland. New seats are located on 3 new levels (Seating Trays) above the existing concourse.

- How much is it going to cost?

+/- \$60M

- Who's involved?

Owner: The City of Portland (Leased by and paid for by the Timbers Organization)

Contractor: Turner

Architect: Allied Works

Structural and Civil Engineer: KPFF

- Who plays there?

Portland Timbers, Portland Thorns and the PSU Vikings Football Team









Entry M
C1-C5
98/99
PROVENANCE
PARK

C4
C5
98/99

Entry L
C1-C5
98/99

Entry R
C1-C5
98/99

Alaska

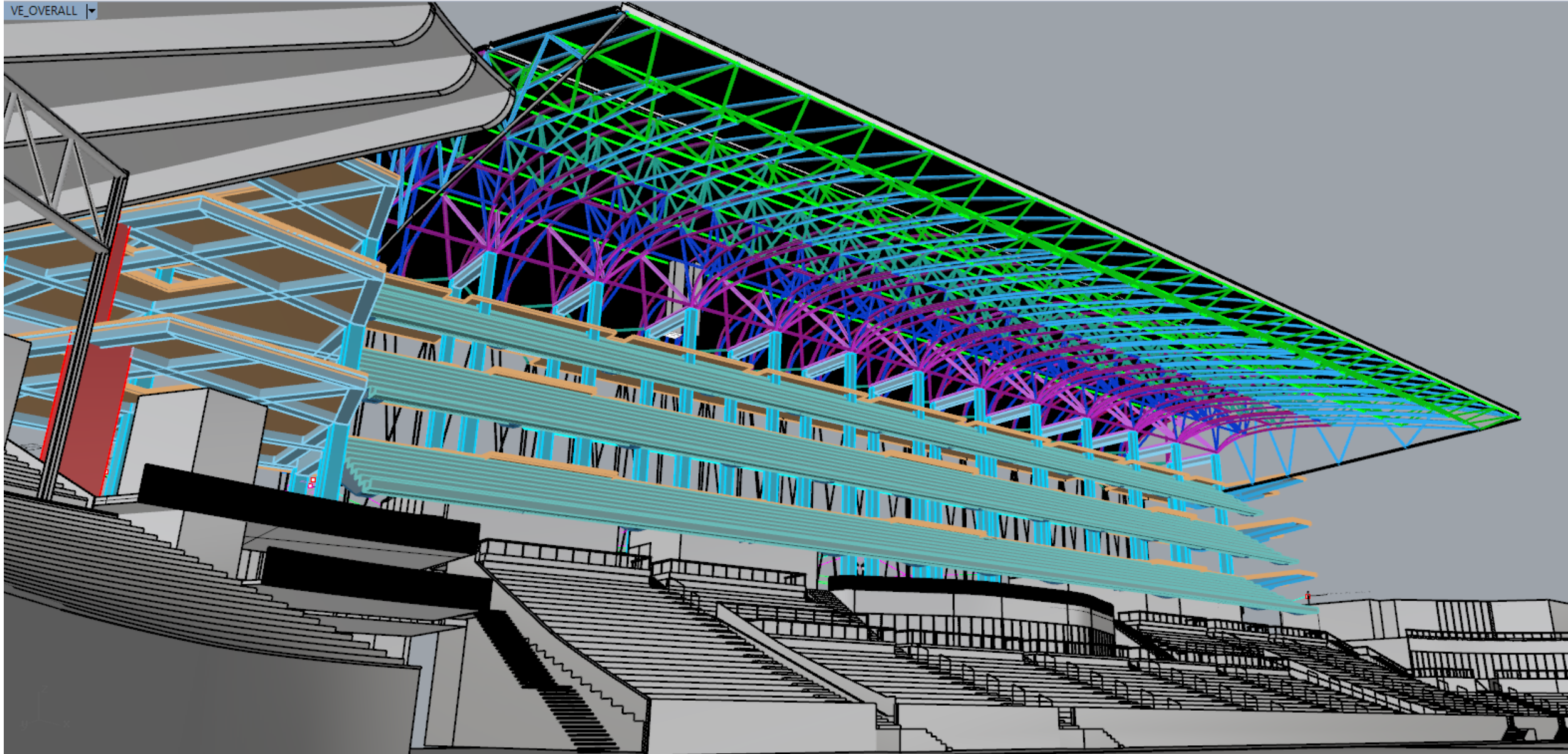
KeyBank

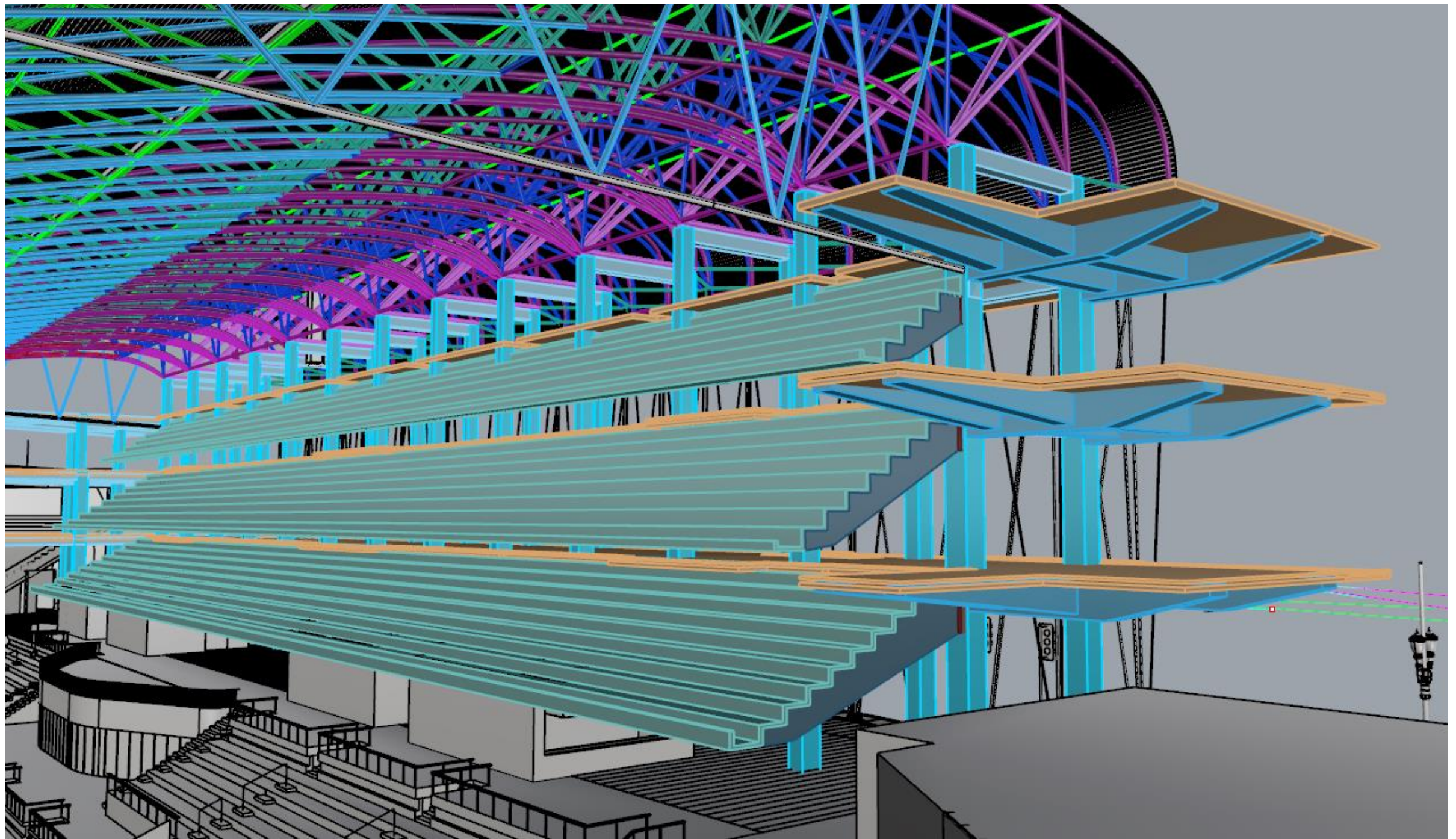
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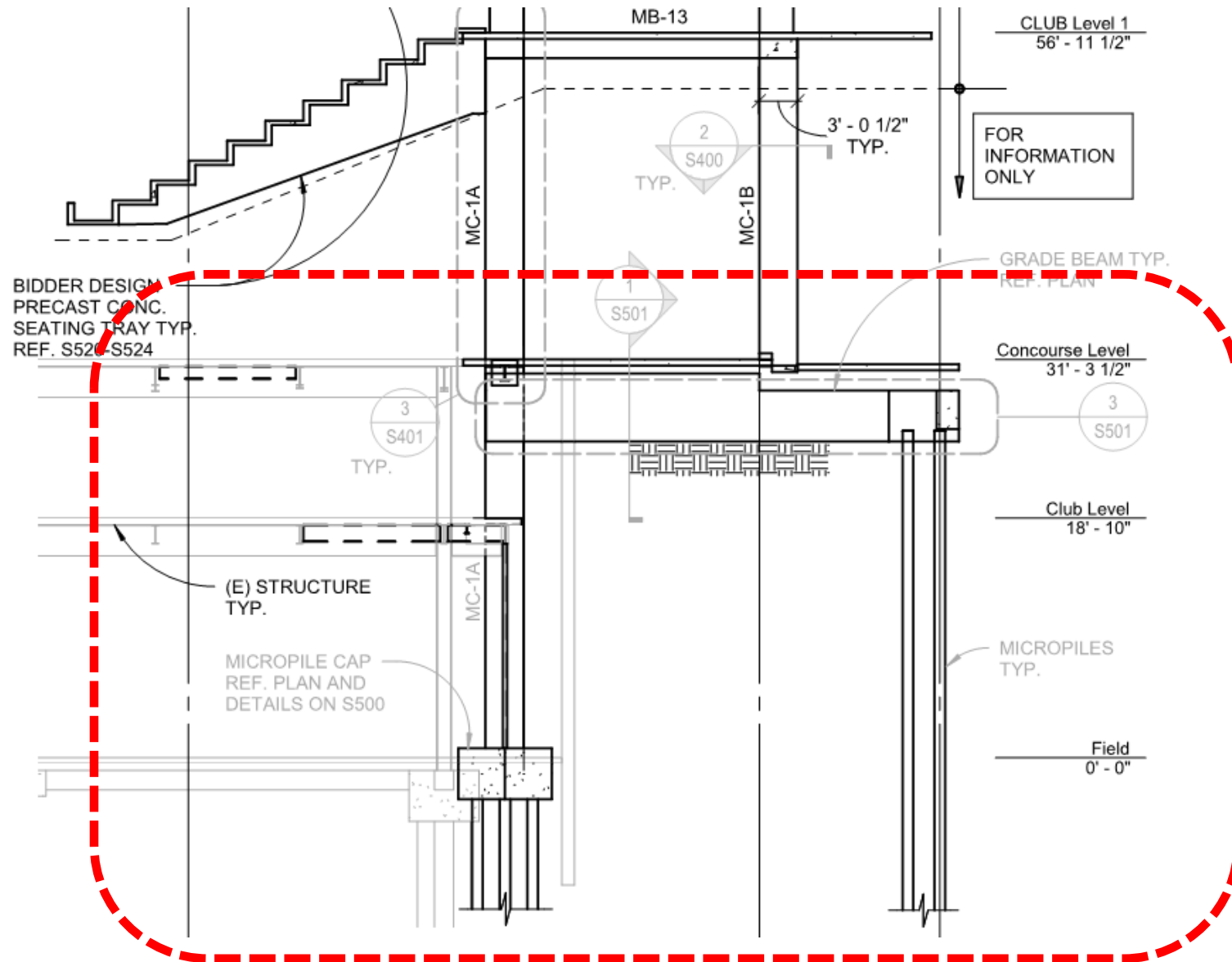
O'HARA
21

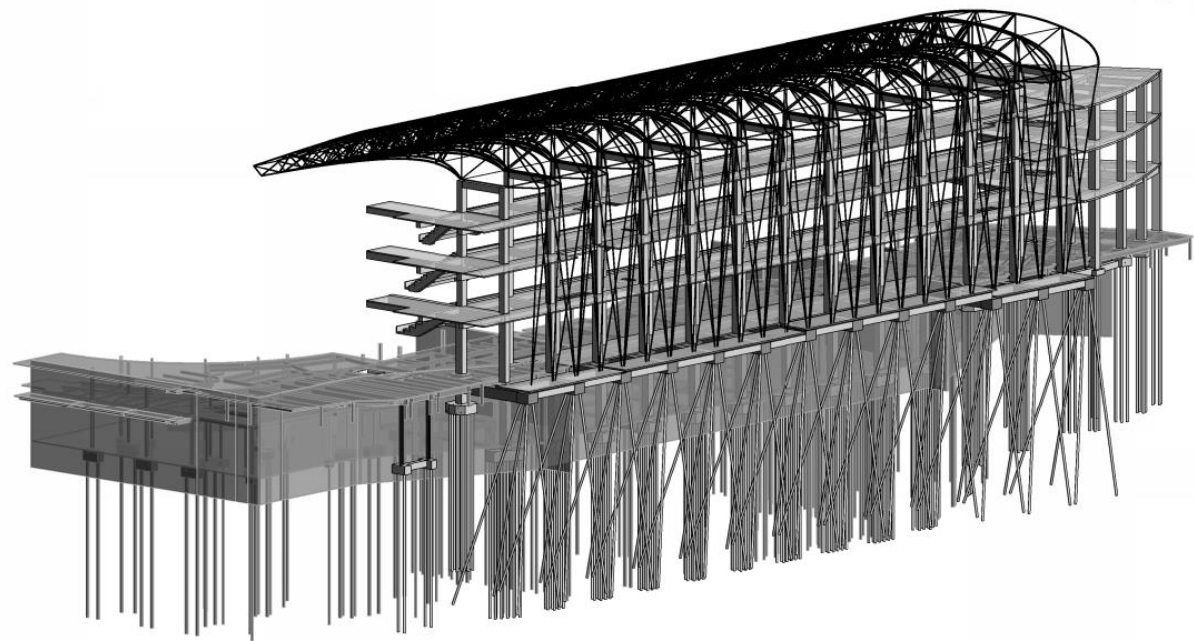
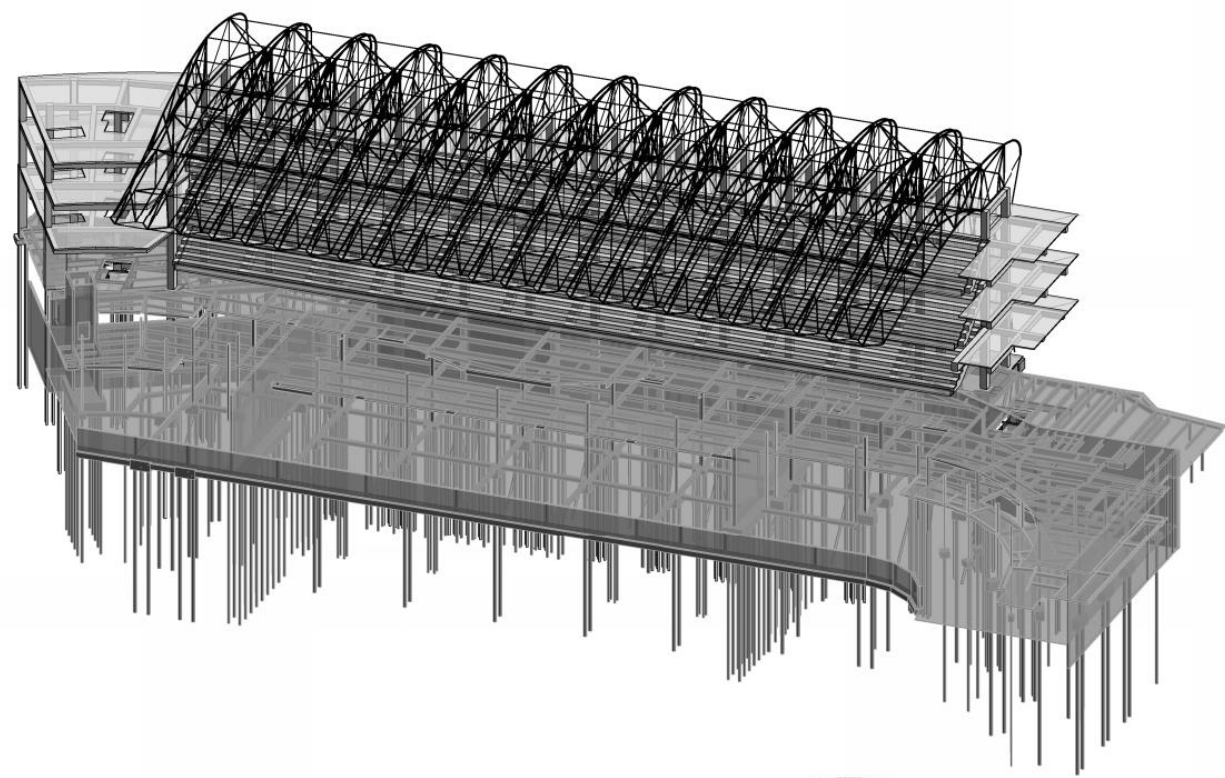
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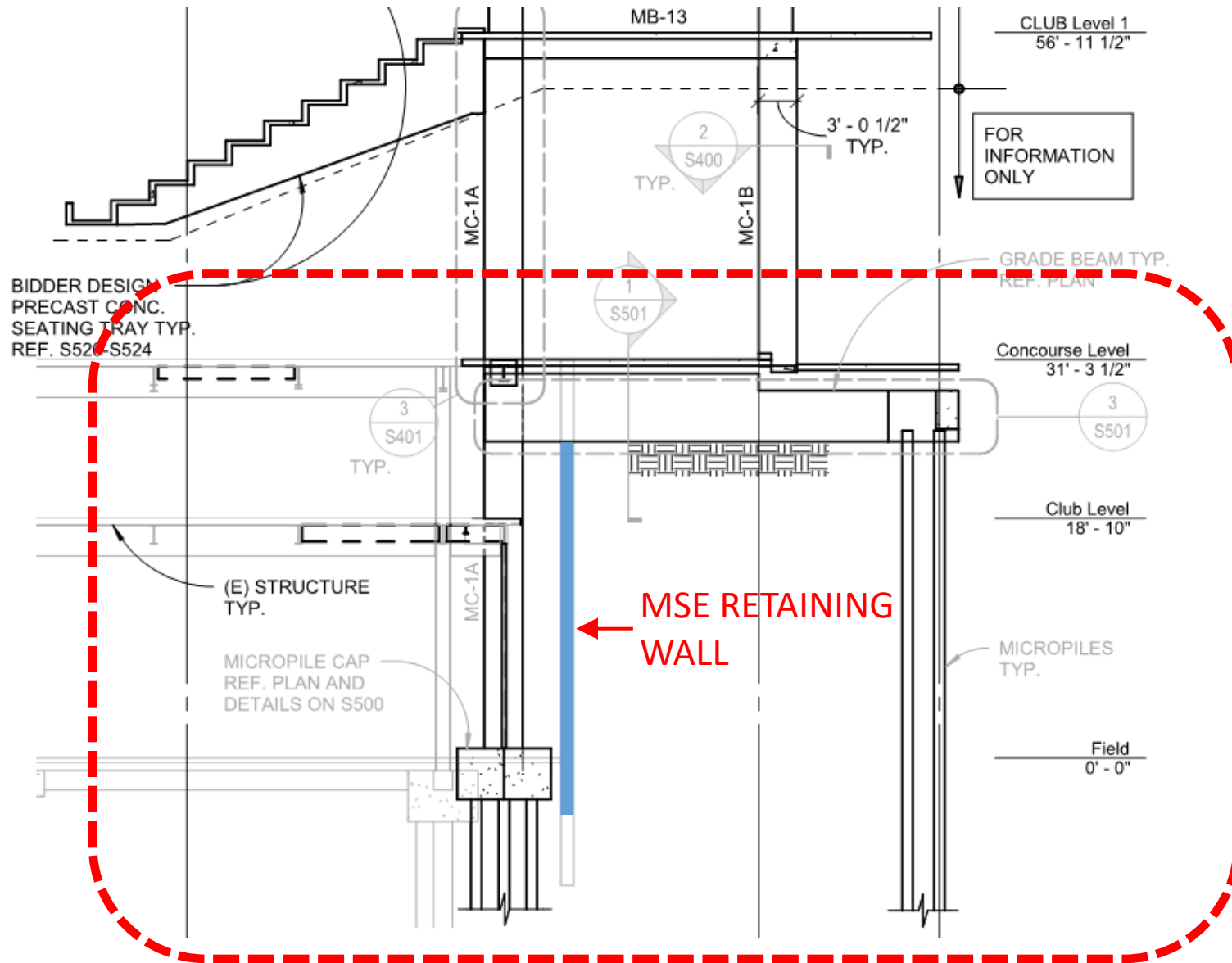
SUBSTRUCTURE AND FOUNDATIONS

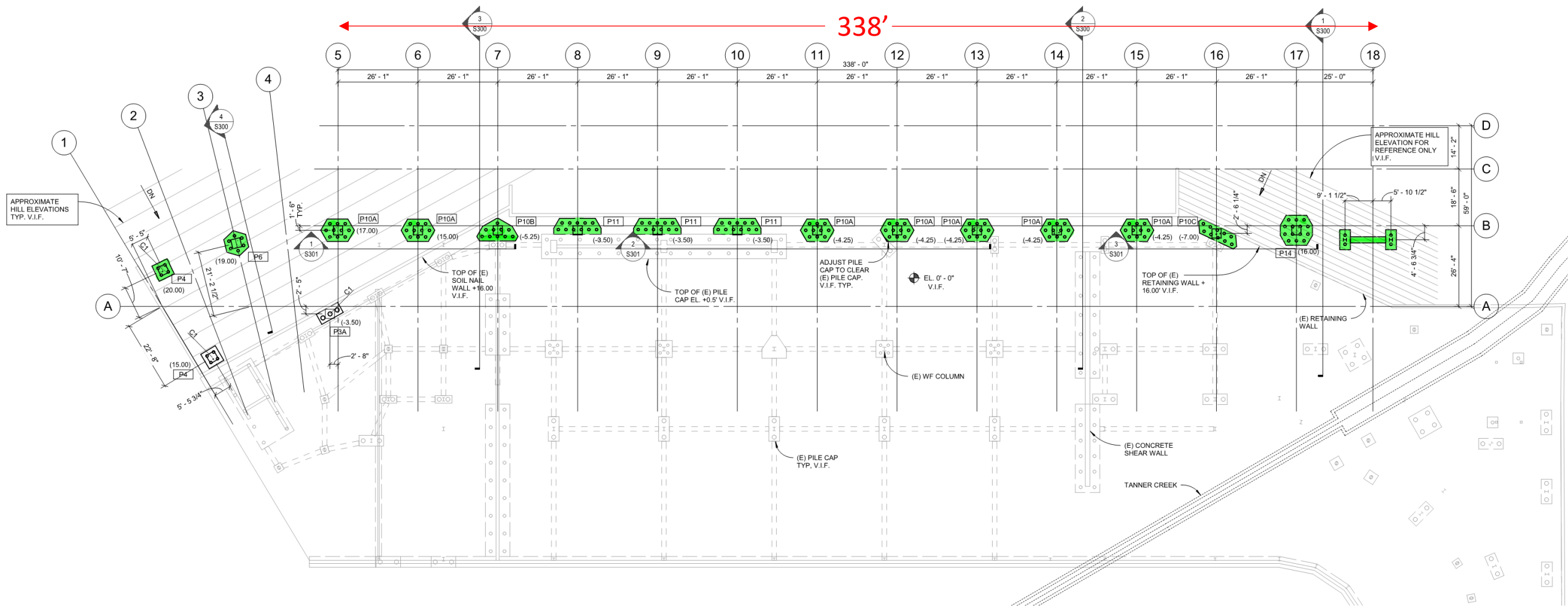




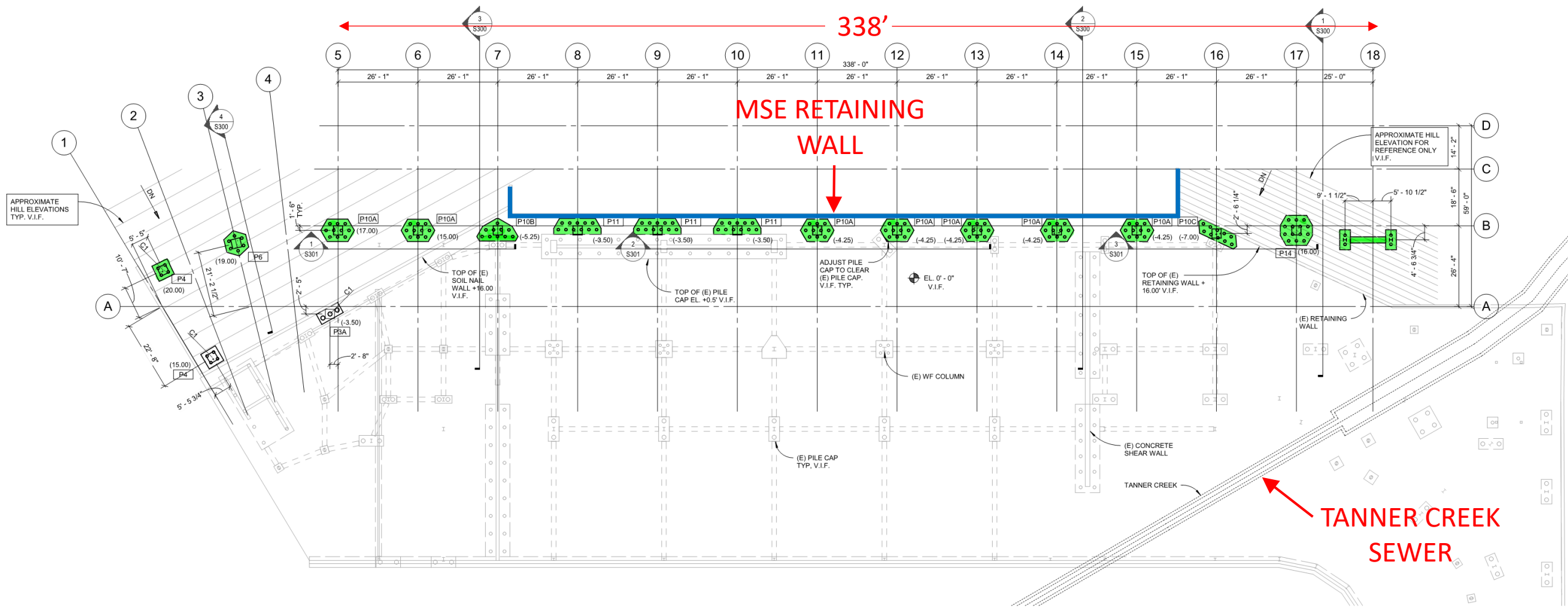




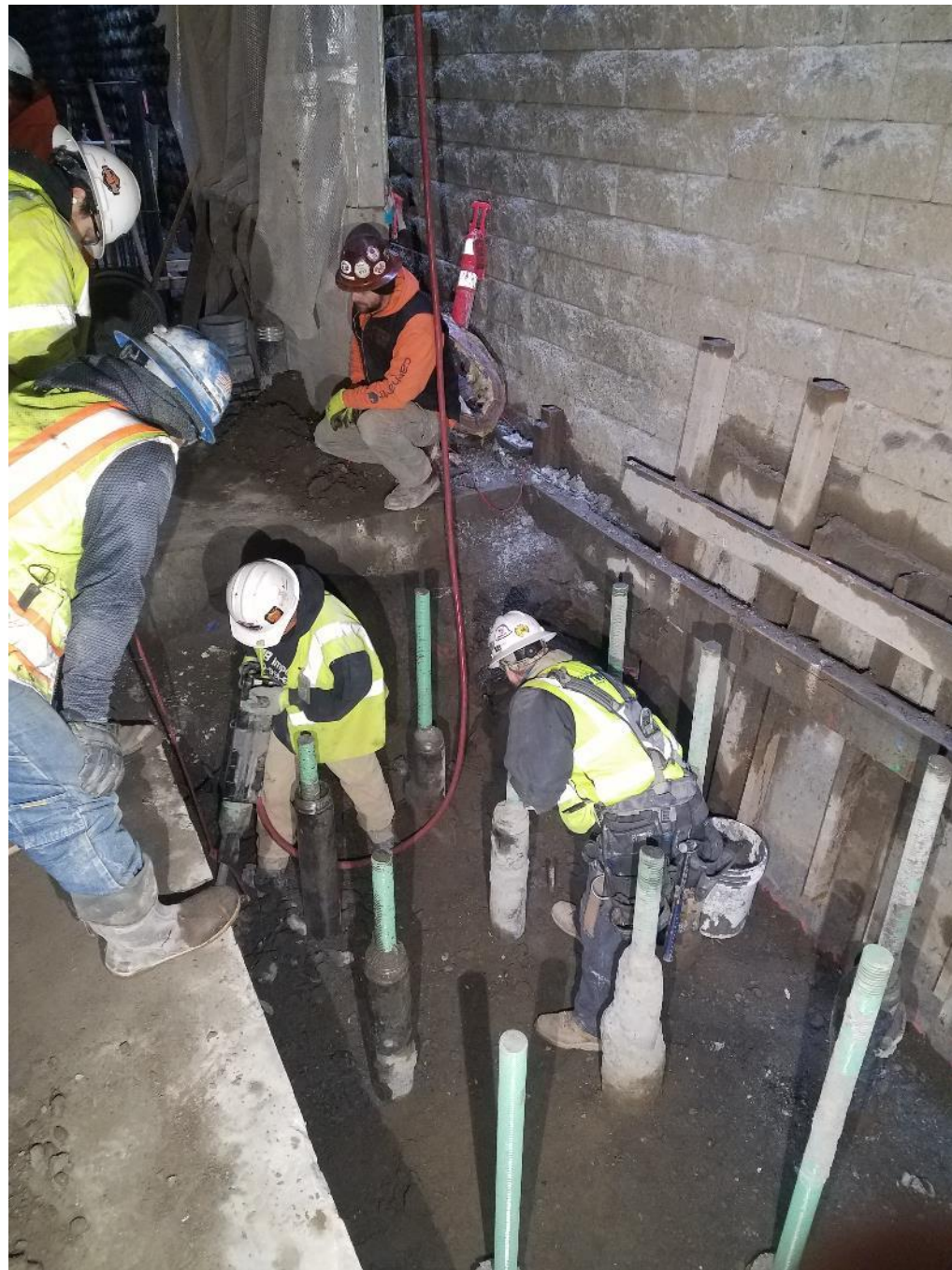


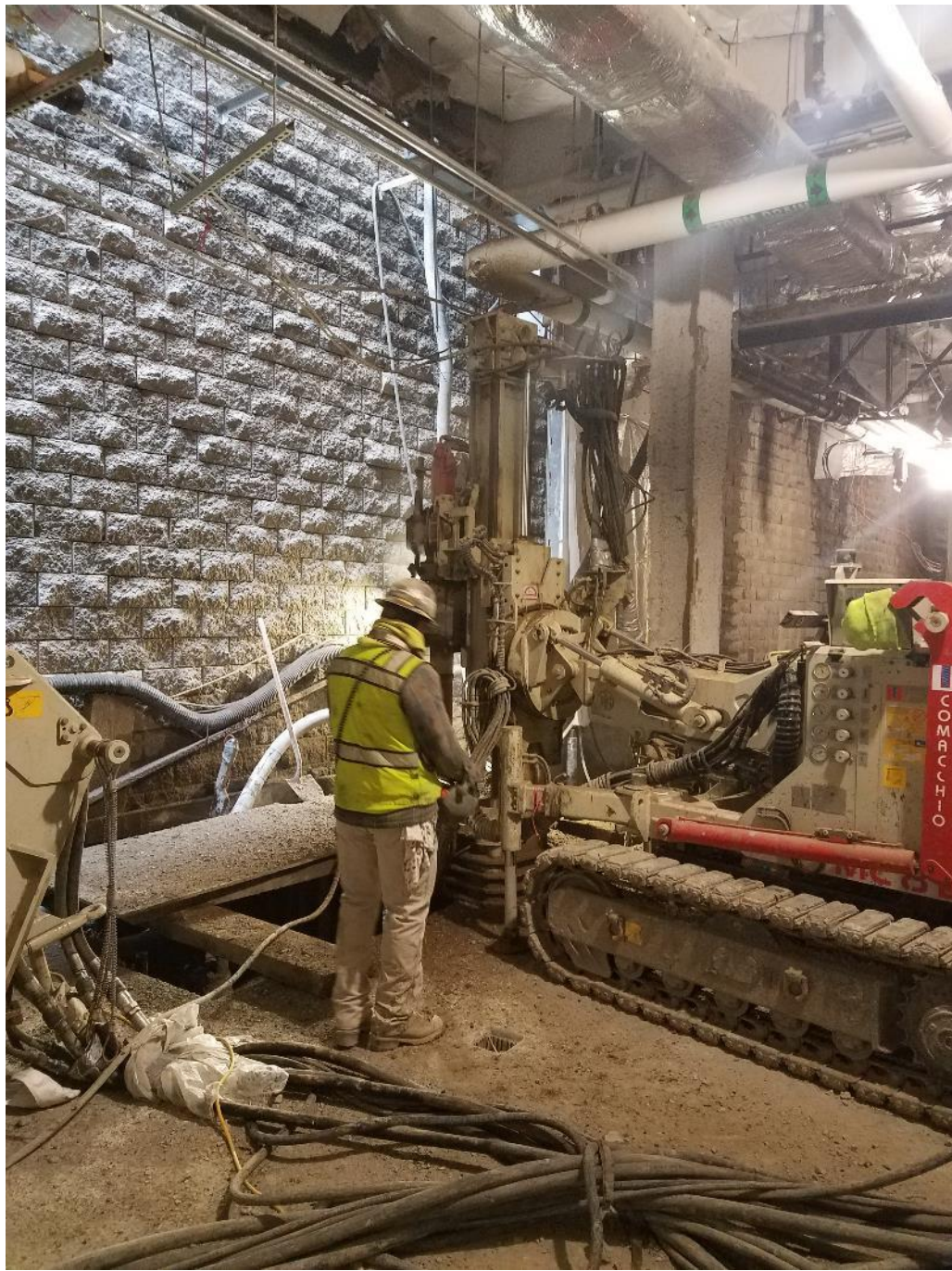


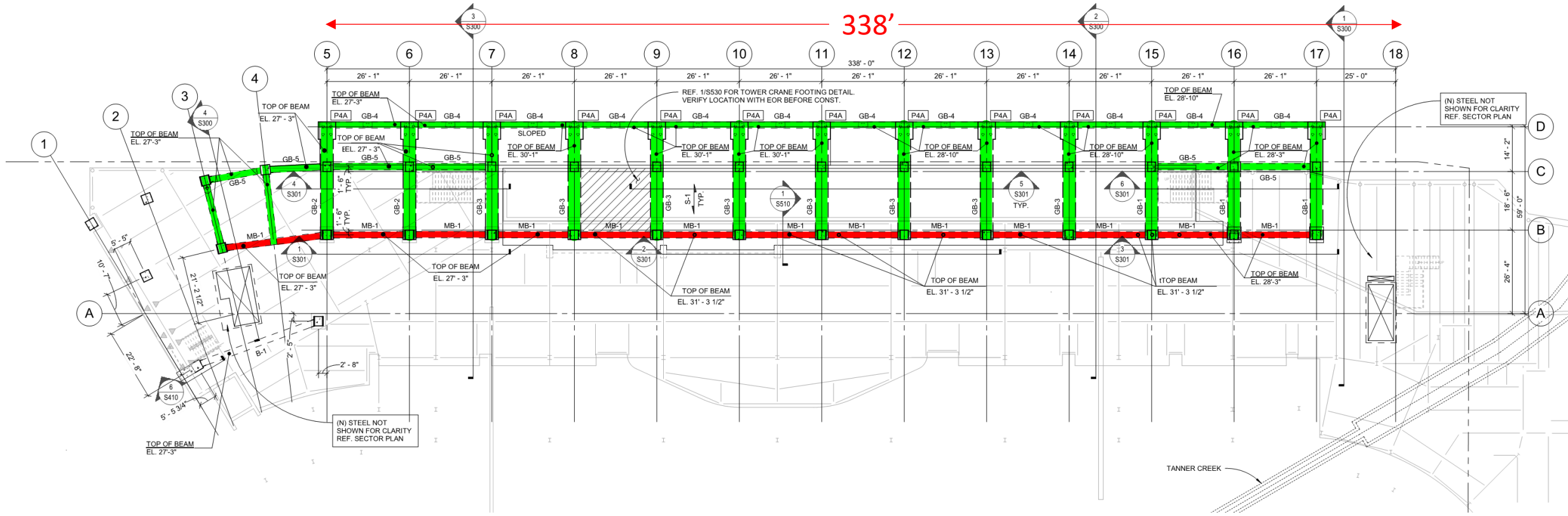
1 LOWER LEVEL PLAN
 1/16" = 1'-0"



1 LOWER LEVEL PLAN
 1/16" = 1'-0"







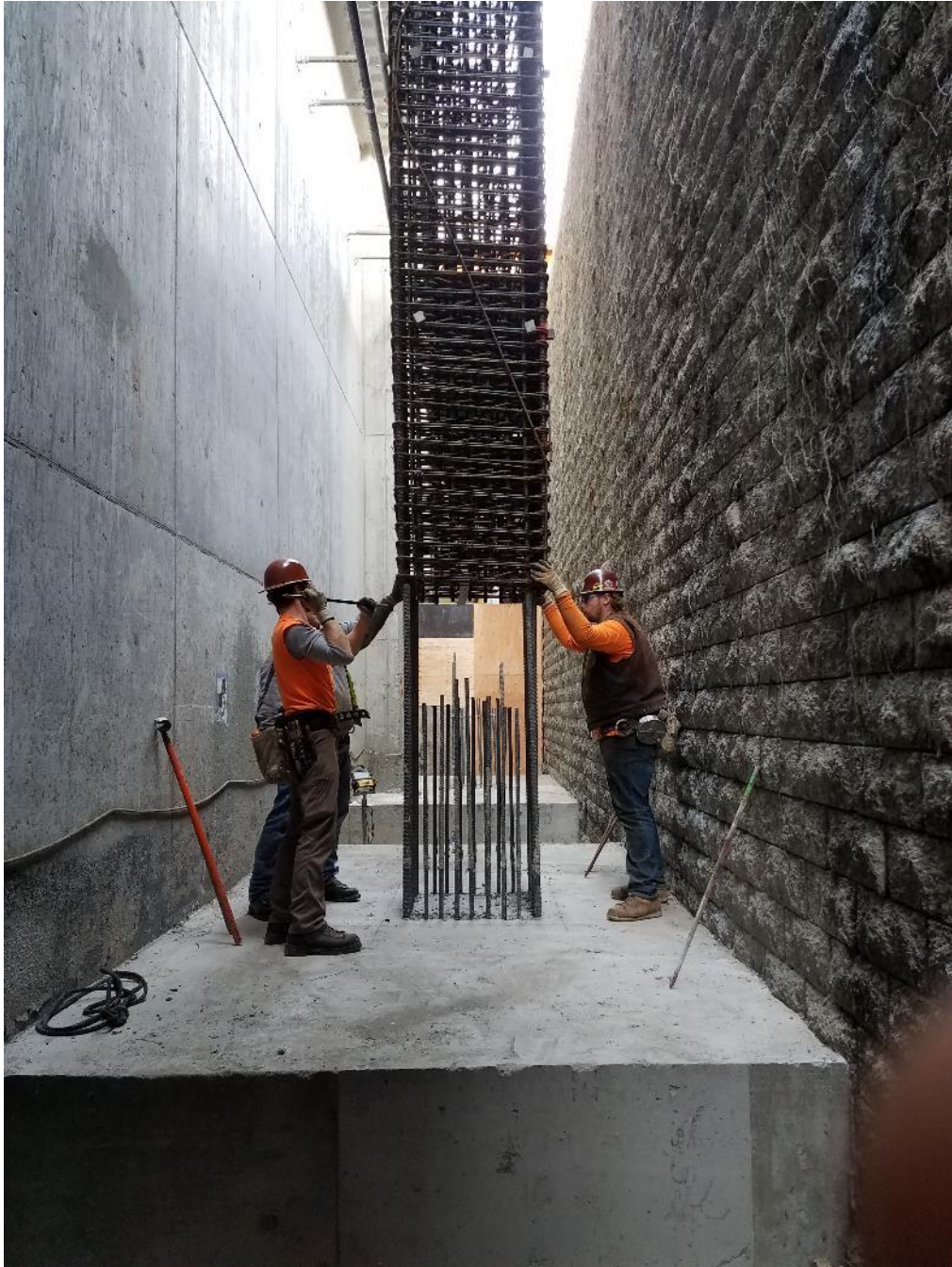
1 CONCOURSE LEVEL PLAN
1/16" = 1'-0"



DANGER
AUTHORIZED
PERSONNEL
ONLY
Turner







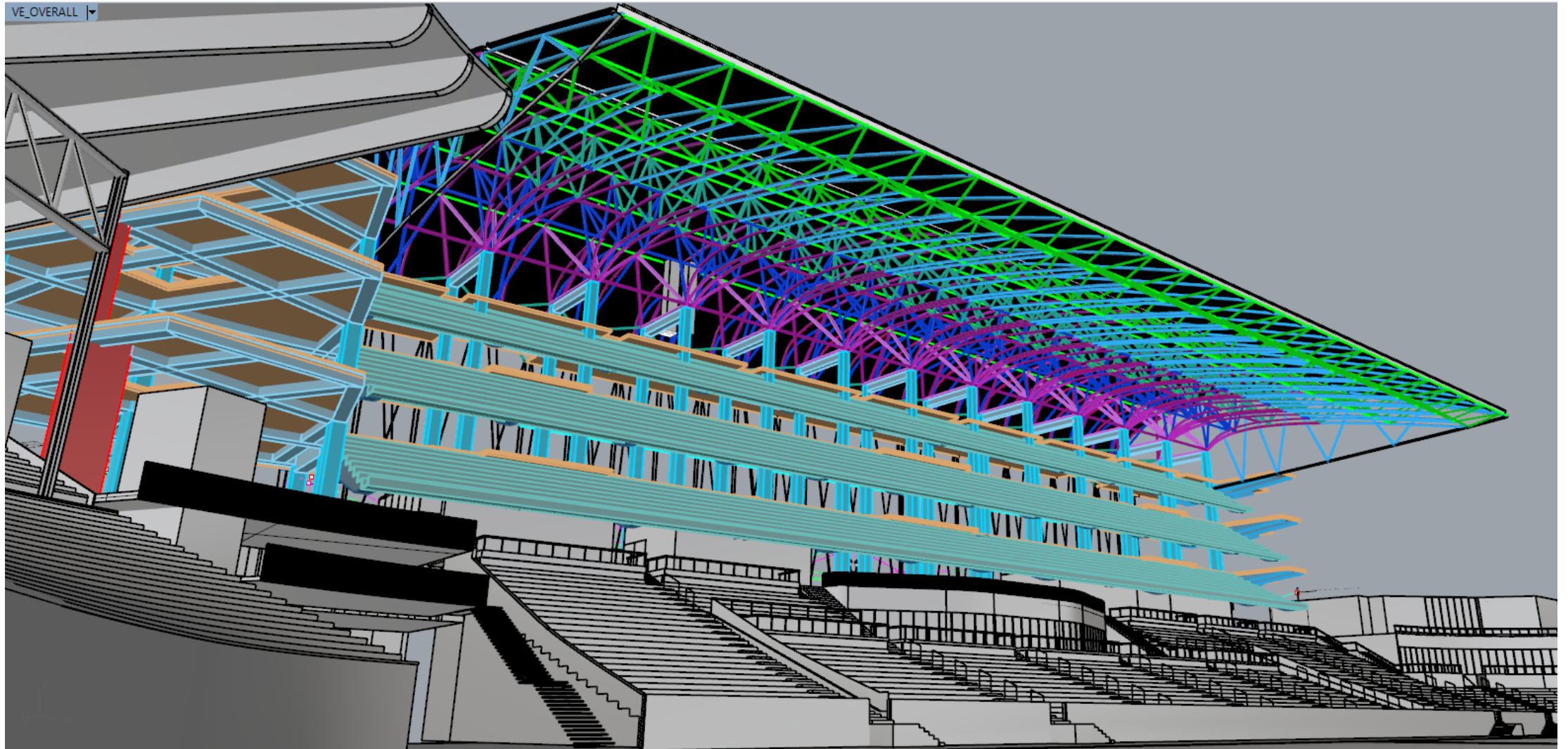


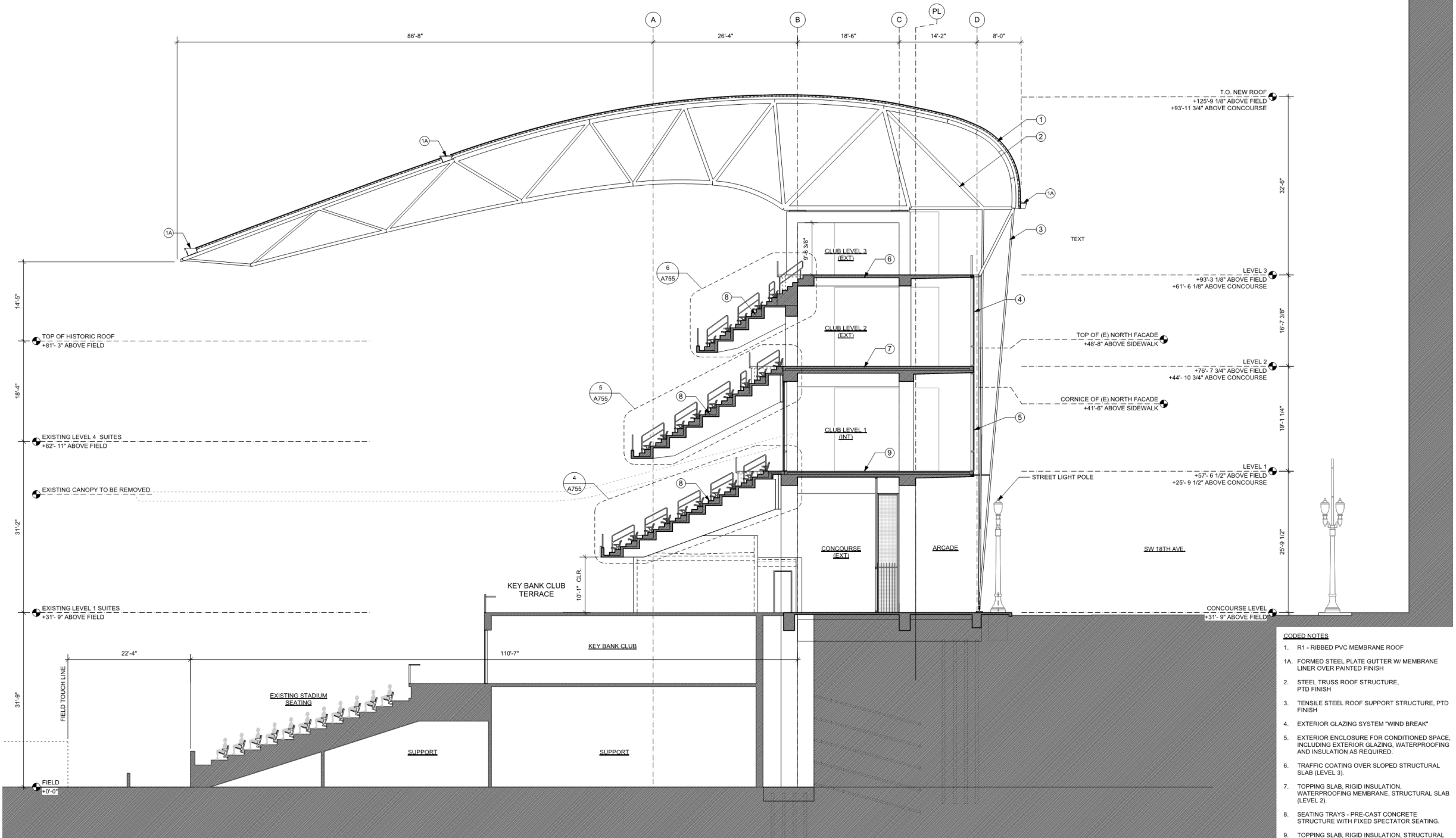




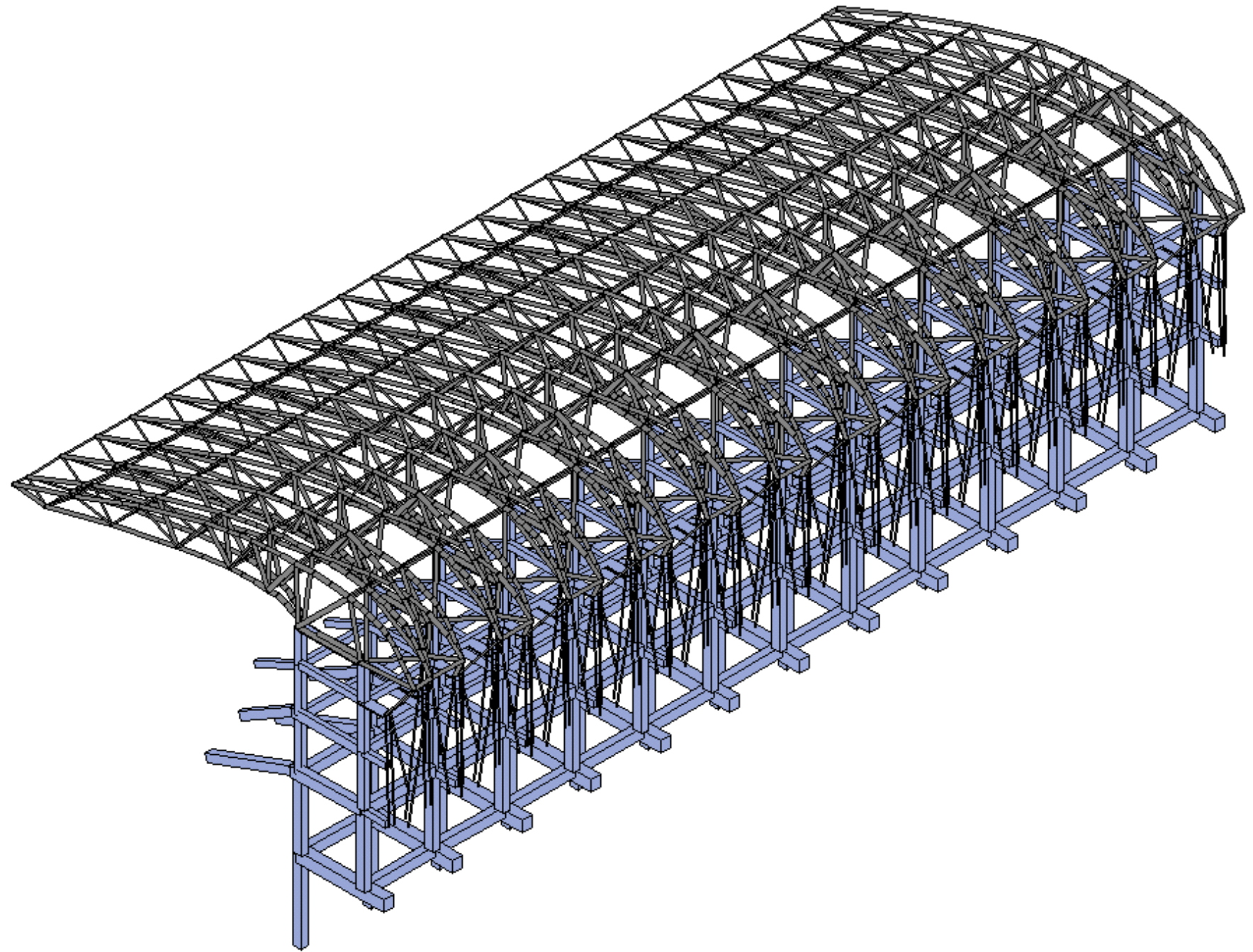


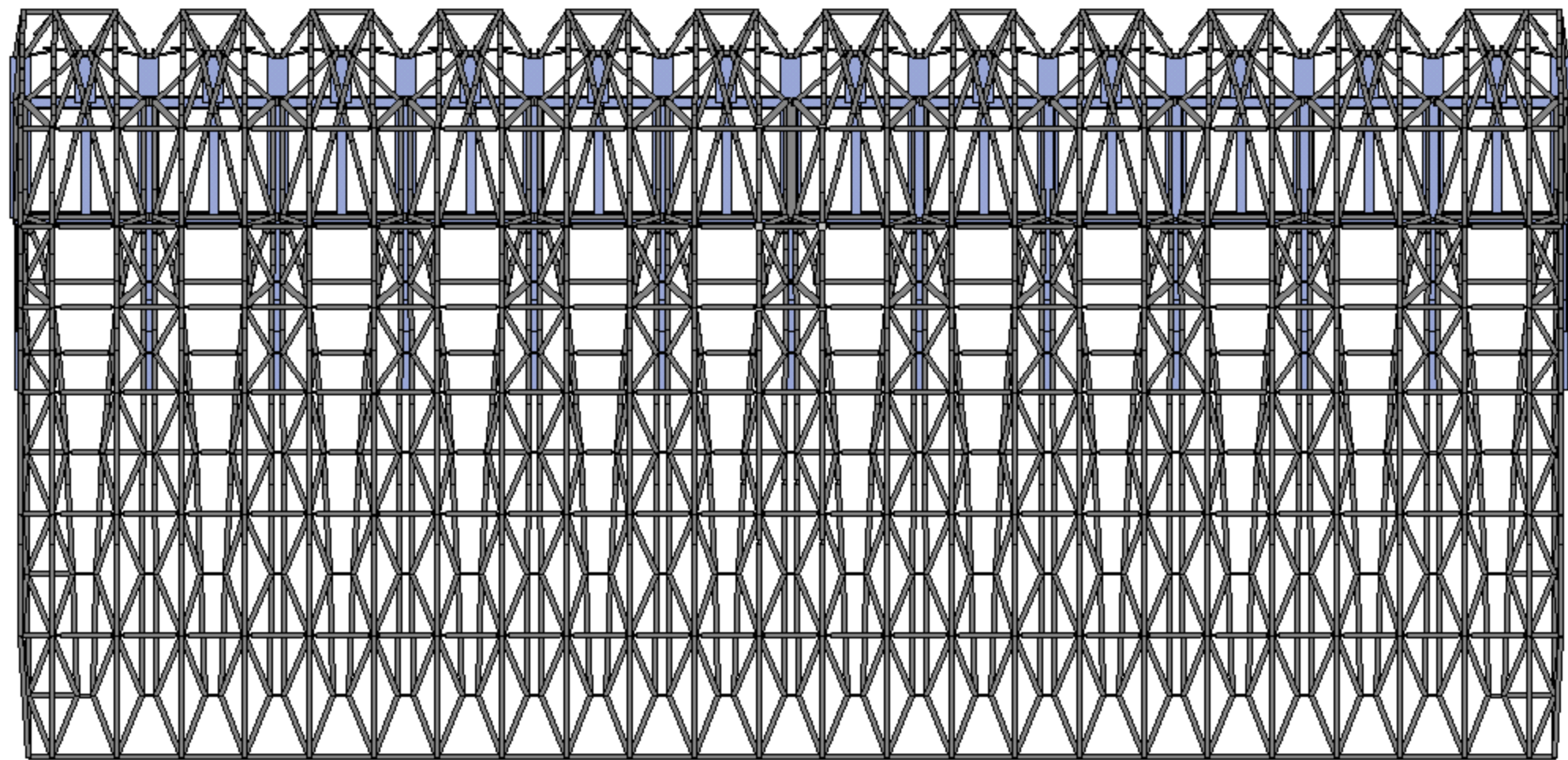
SUPERSTRUCTURE: ROOF

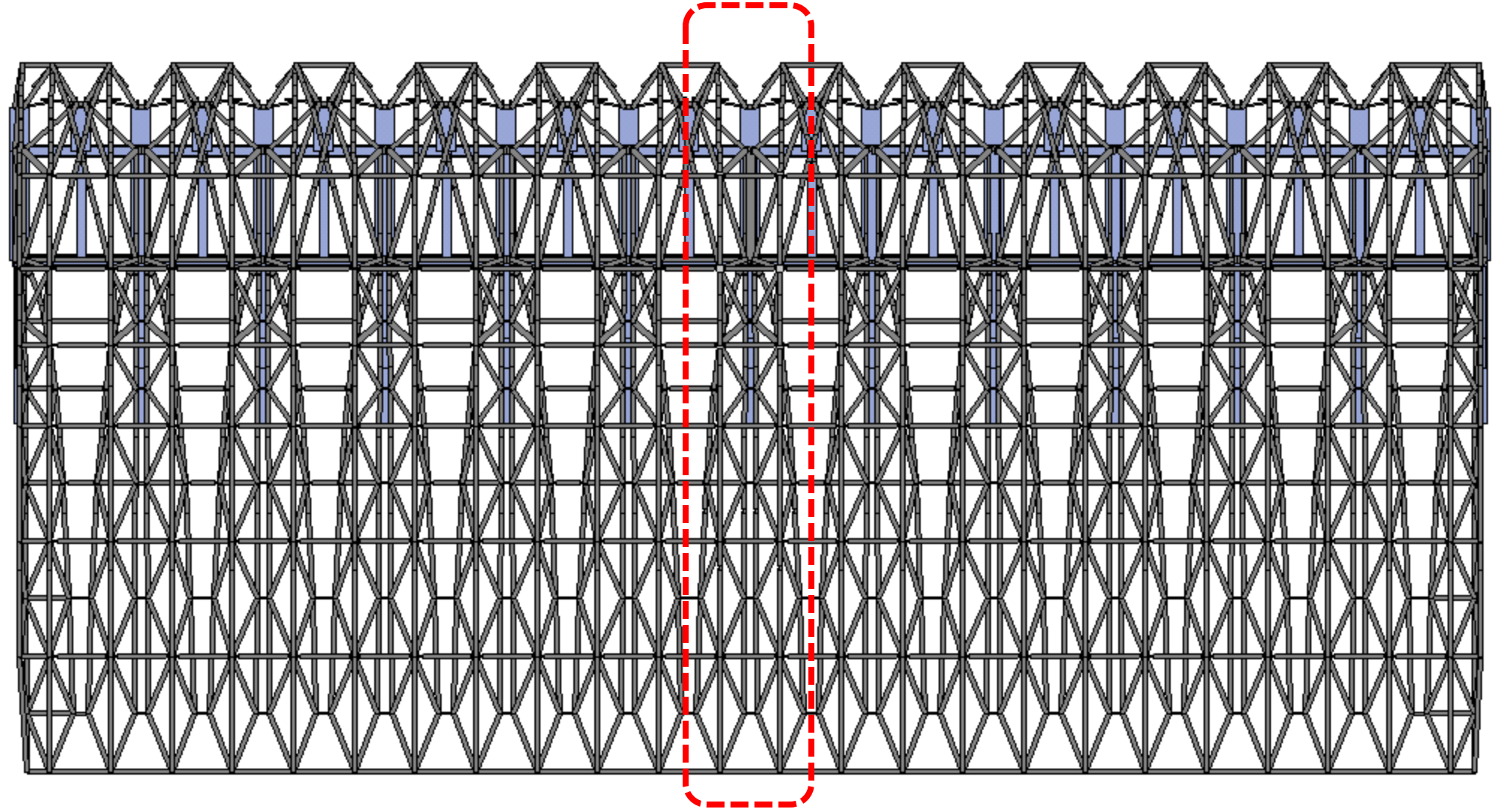


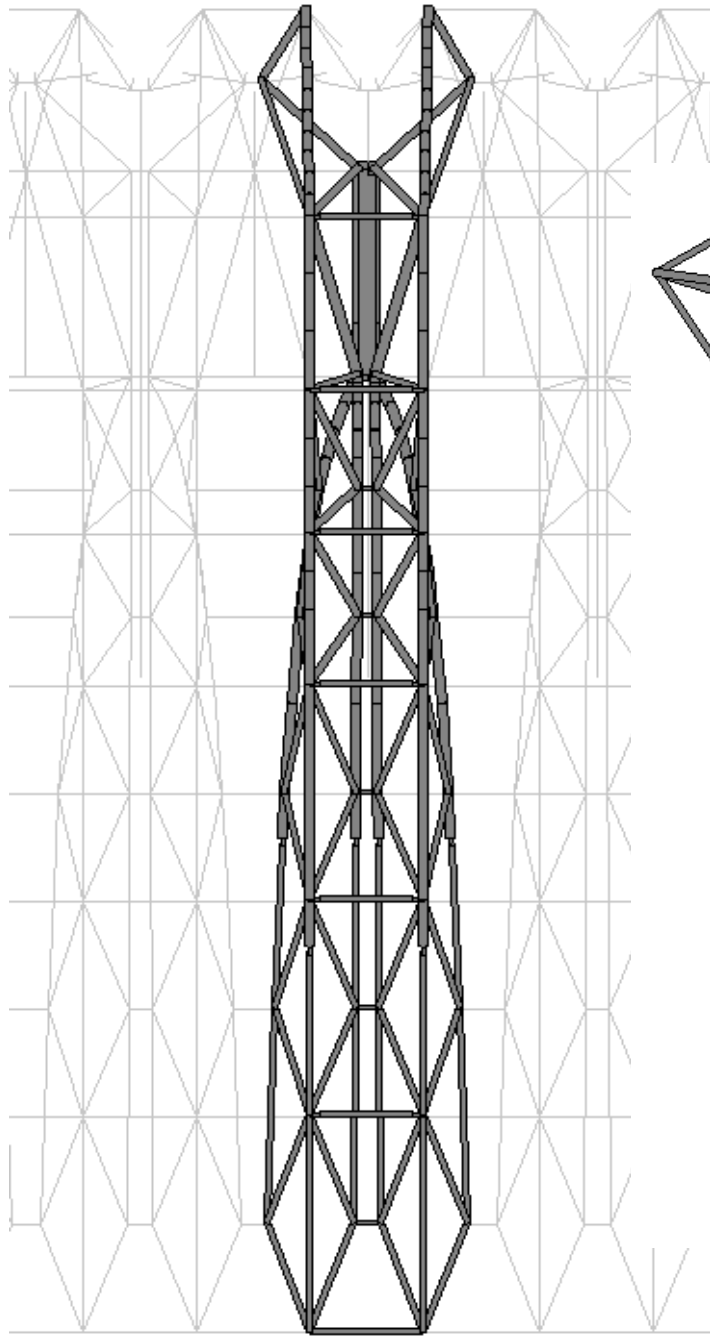


- CODED NOTES**
- R1 - RIBBED PVC MEMBRANE ROOF
 - 1A - FORMED STEEL PLATE GUTTER W/ MEMBRANE LINER OVER PAINTED FINISH
 - 2 - STEEL TRUSS ROOF STRUCTURE, PTD FINISH
 - 3 - TENSILE STEEL ROOF SUPPORT STRUCTURE, PTD FINISH
 - 4 - EXTERIOR GLAZING SYSTEM "WIND BREAK"
 - 5 - EXTERIOR ENCLOSURE FOR CONDITIONED SPACE, INCLUDING EXTERIOR GLAZING, WATERPROOFING AND INSULATION AS REQUIRED.
 - 6 - TRAFFIC COATING OVER SLOPED STRUCTURAL SLAB (LEVEL 3).
 - 7 - TOPPING SLAB, RIGID INSULATION, WATERPROOFING MEMBRANE, STRUCTURAL SLAB (LEVEL 2).
 - 8 - SEATING TRAYS - PRE-CAST CONCRETE STRUCTURE WITH FIXED SPECTATOR SEATING.
 - 9 - TOPPING SLAB, RIGID INSULATION, STRUCTURAL SLAB (LEVEL 1).





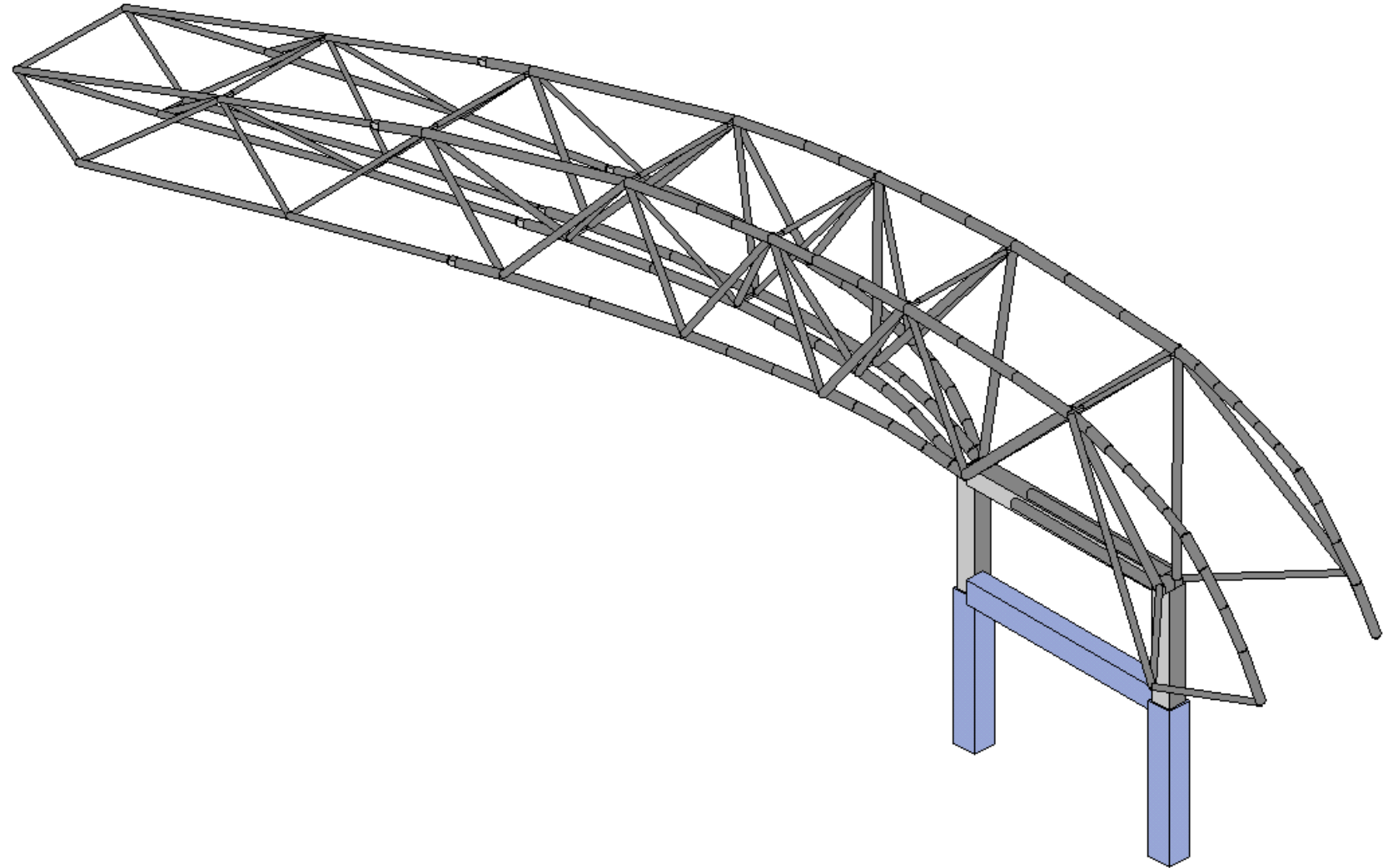




Roof Truss Member Sizes:

Top & Bott Chords vary from 6-5/8" HSS to 9-5/8" HSS

Web Members vary from 4-1/2" HSS to 8-5/8" HSS



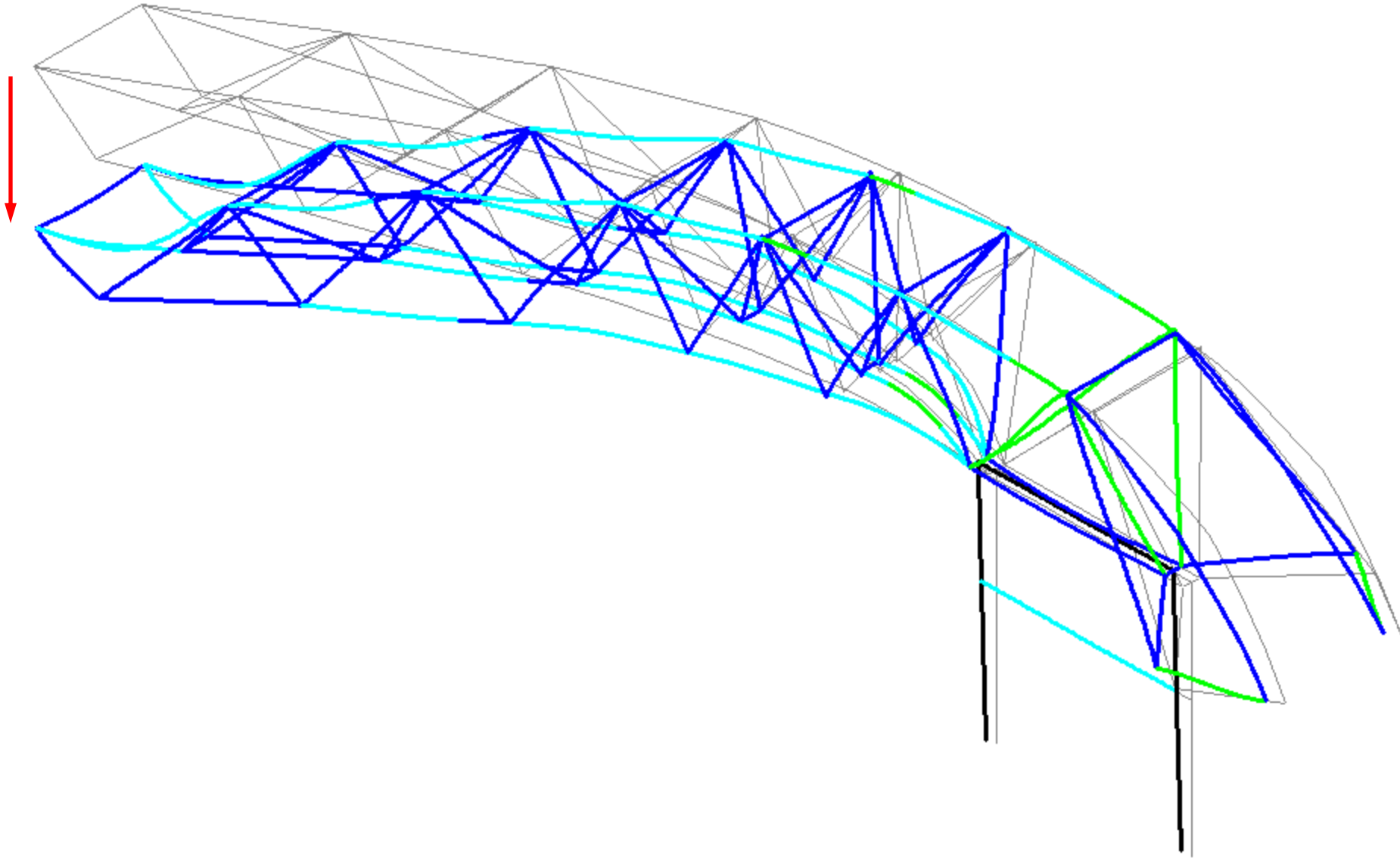
Tip Deflections:

SW = 1.9"

DL = 3.1"

DL+SL = 10.2"

.6DL+WL = -2.7"





CERMAK
PETERKA
PETERSEN

WIND ENGINEERING AND AIR QUALITY CONSULTANTS



Final Structural Canopy Report

Wind Tunnel Tests for
PROVIDENCE PARK MLS STADIUM
Portland, Oregon
CPP Project 11470
12 February 2018

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WIND ENGINEERING AND AIR QUALITY CONSULTANTS



Final Pedestrian-Level Winds Report

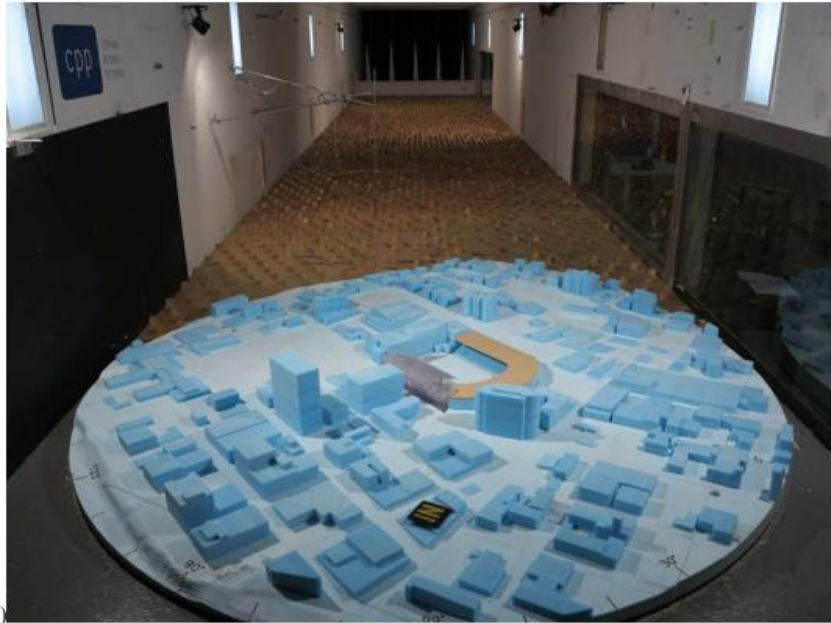
Wind Tunnel Tests for
PROVIDENCE PARK MLS STADIUM
Portland, OR
CPP Project 11470
8 February 2018

Prepared for:
KPFF Consulting Engineers
111 SW Fifth Avenue, Suite 2500
Portland, Oregon 97204

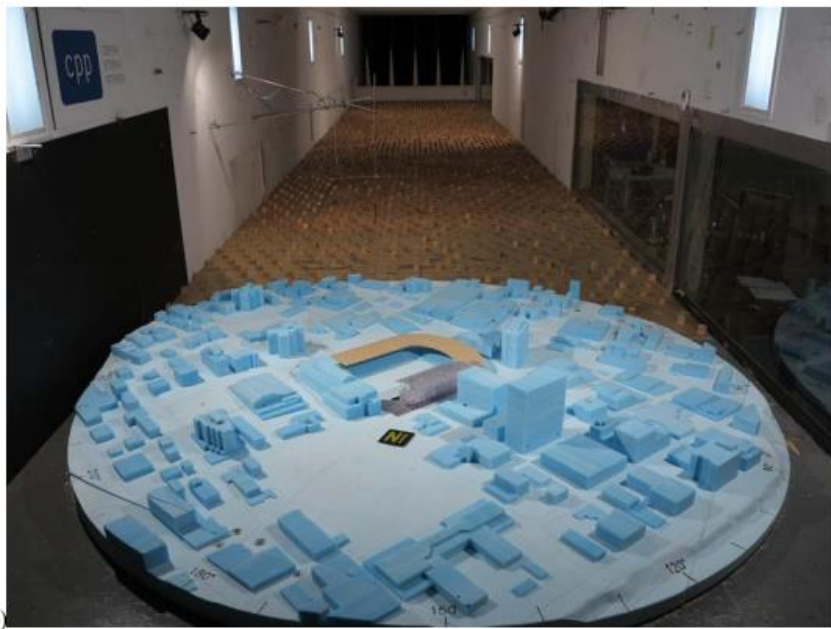
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a)



b)

Figure 1. Photographs of the completed model in the wind tunnel: (a) View from northeast, simulating southwesterly wind; (b) View from southeast, simulating northwesterly wind. Note spires and trip at entrance to test section, and roughness elements on approach fetch to develop a turbulent boundary-layer flow.

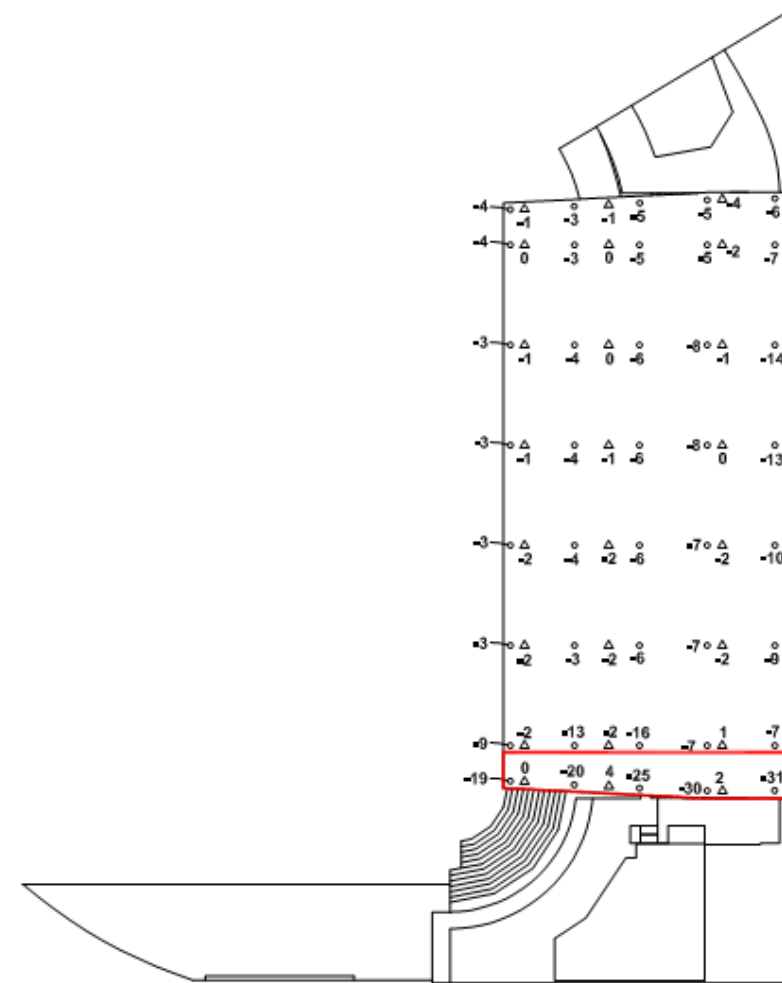
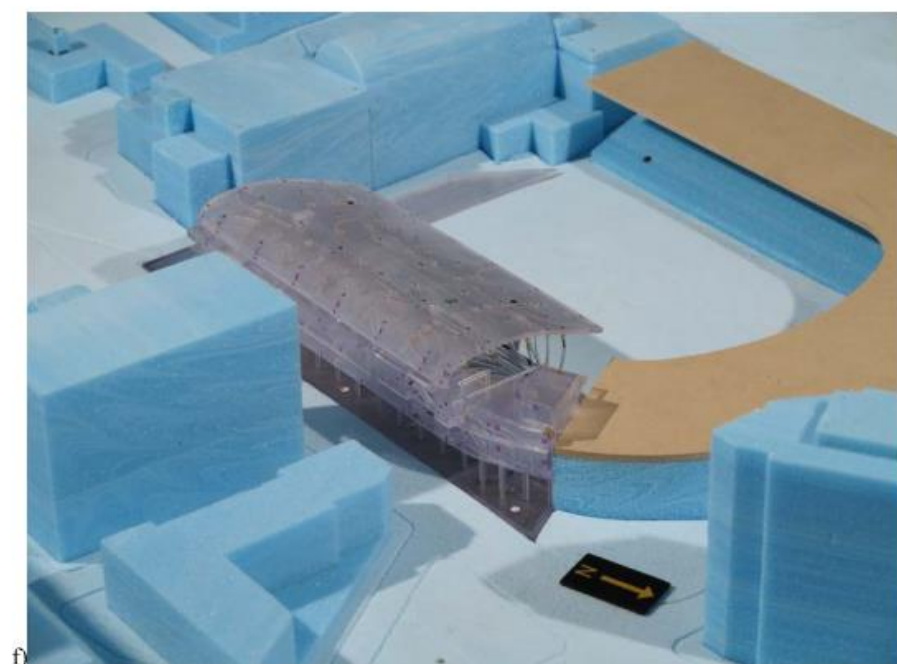
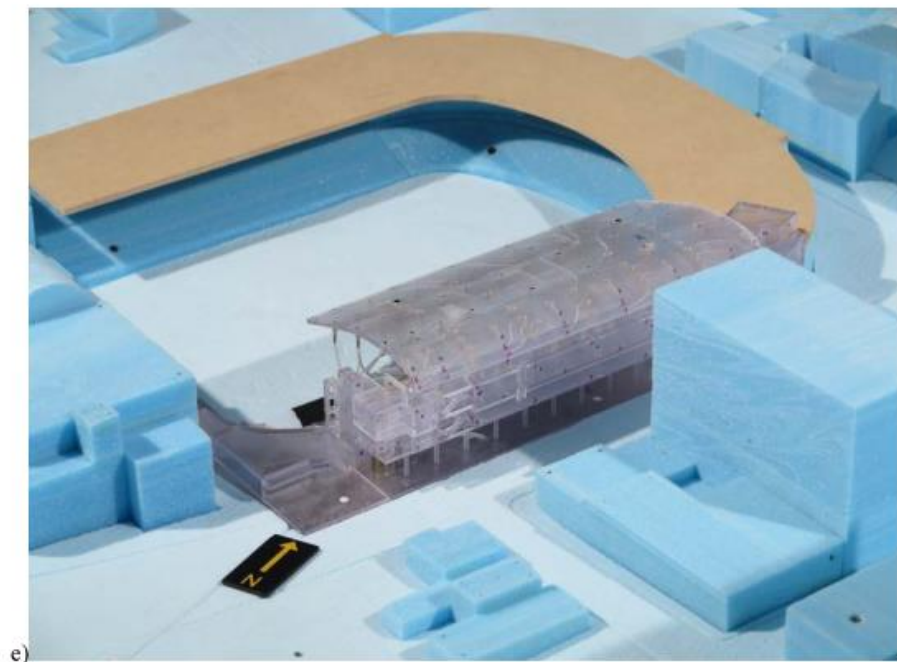


c)



d)

Figure 1. Photographs of the completed model in the wind tunnel: (c); (d) Overhead views of the model.

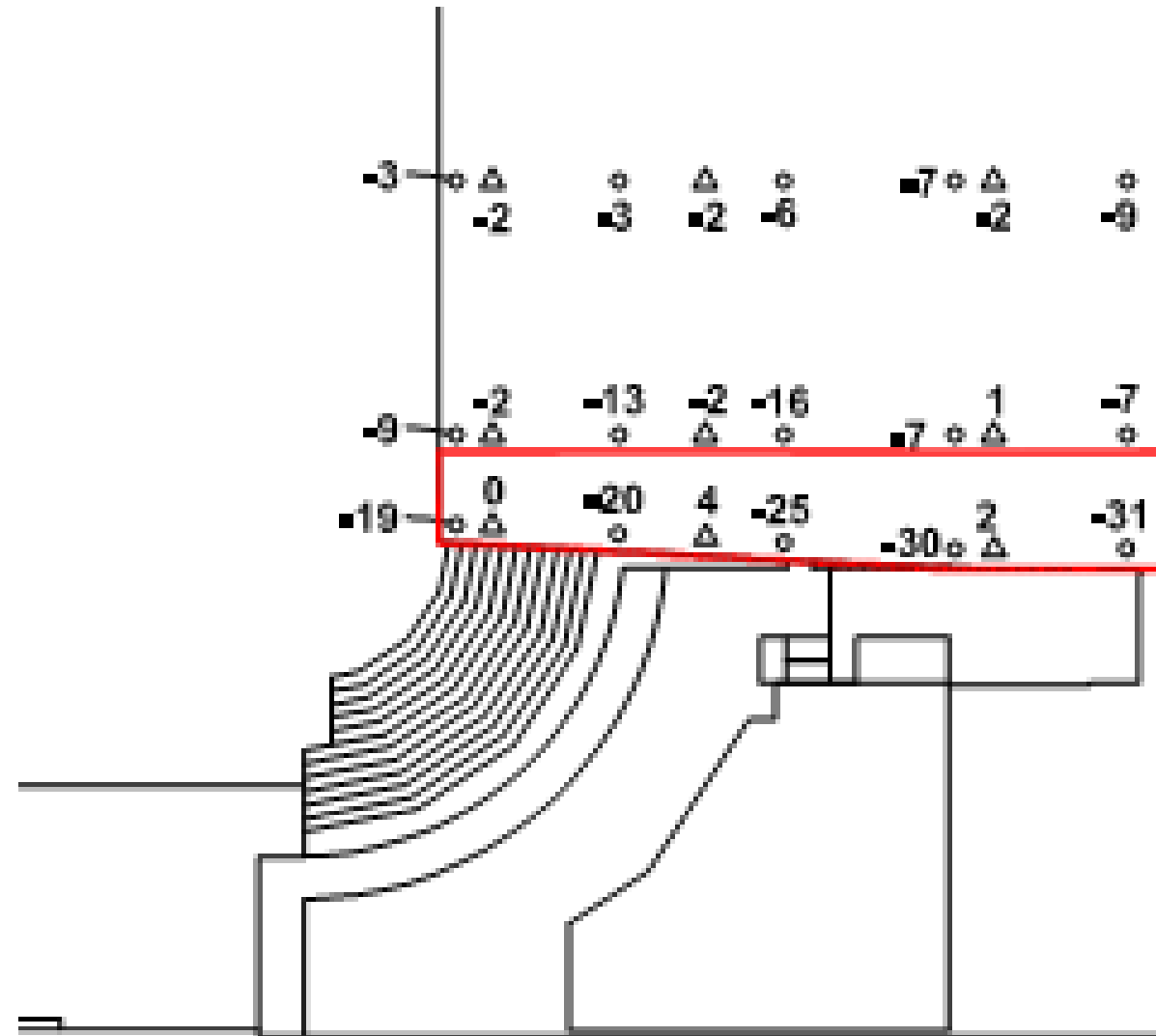


ROOF
-01 MIN



Simultaneous pressures for Member 01 (negative acts outward from building surface, triangles are underside surface).

Figure 1. Photographs of the completed model in the wind tunnel: (e); (f) Close-up views of the model.



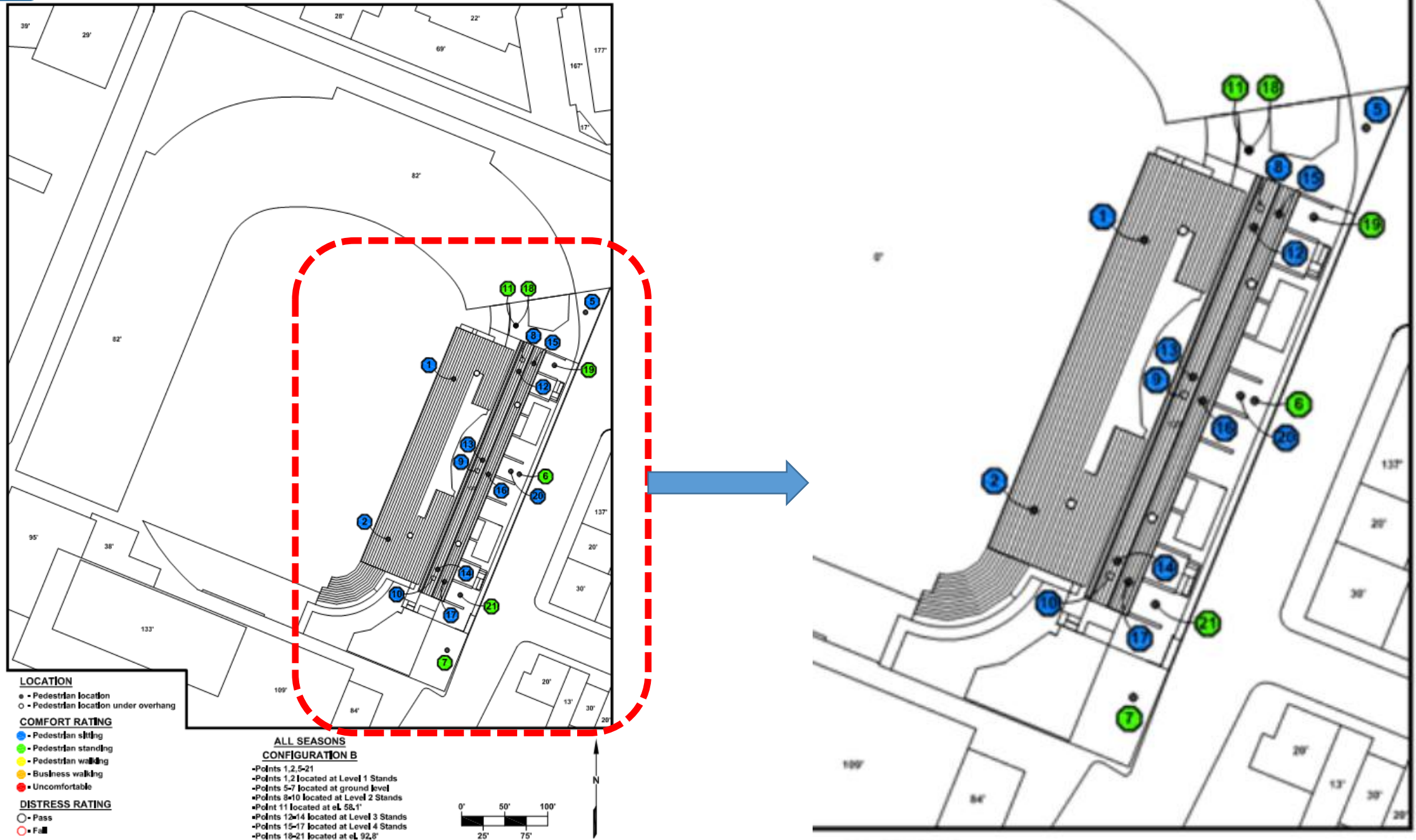
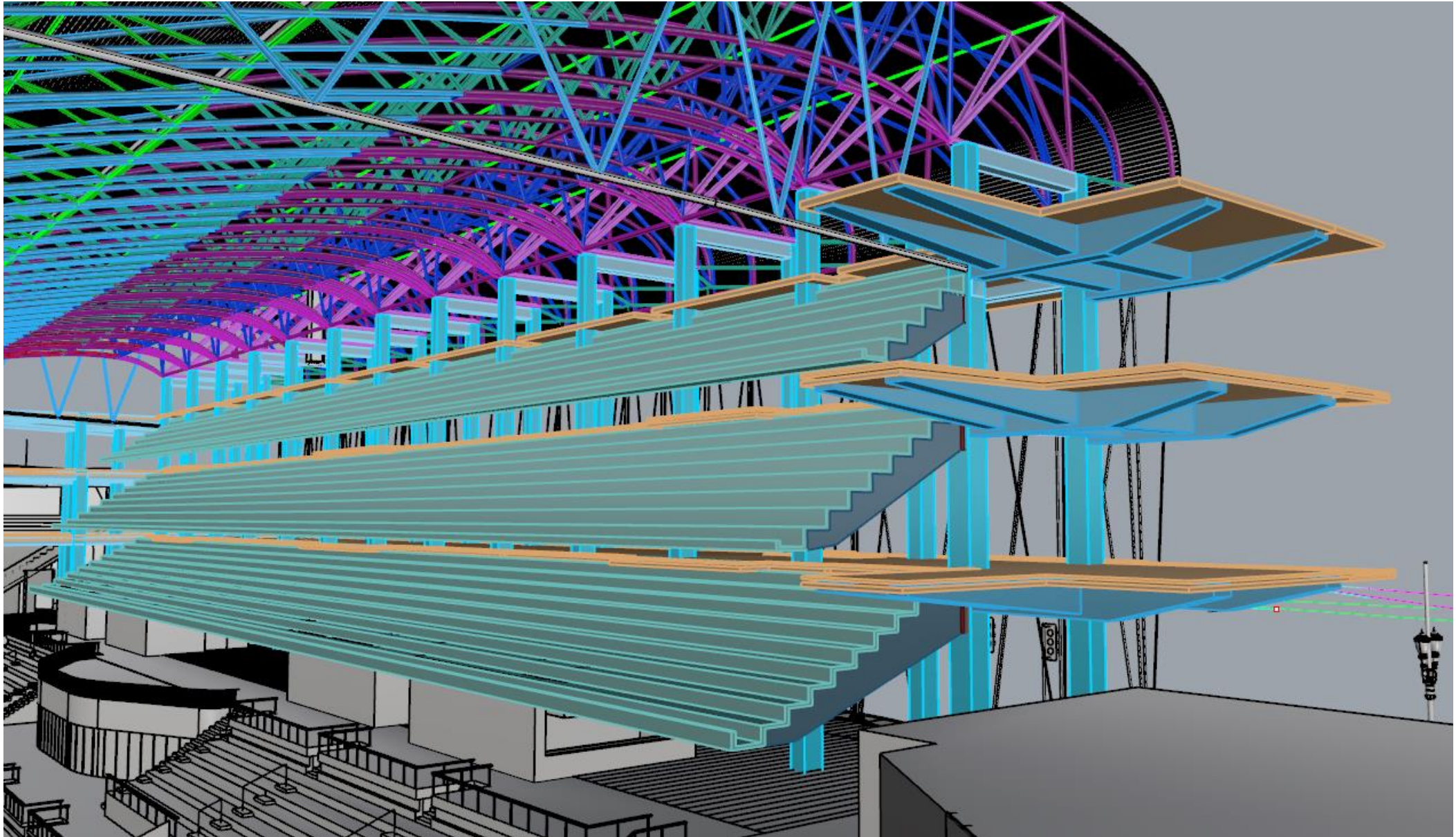
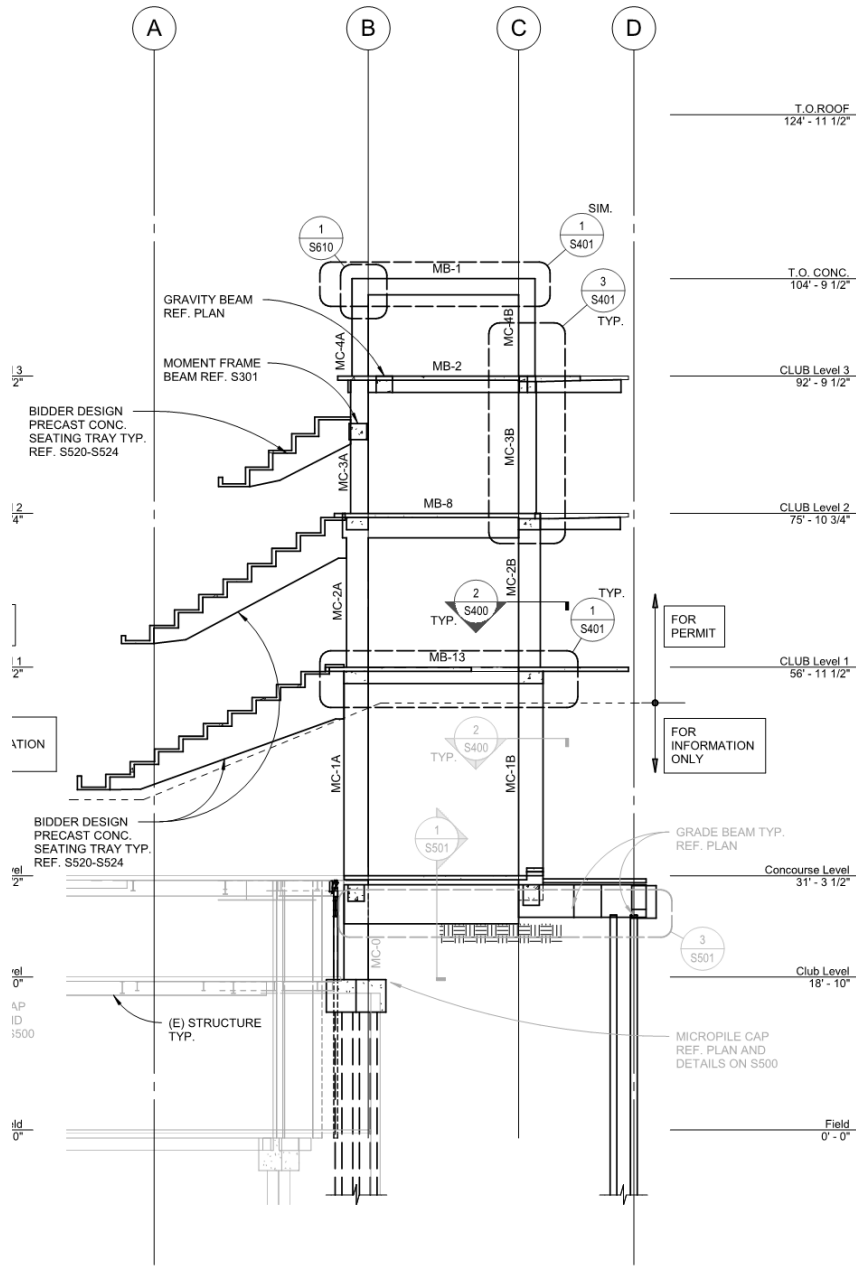


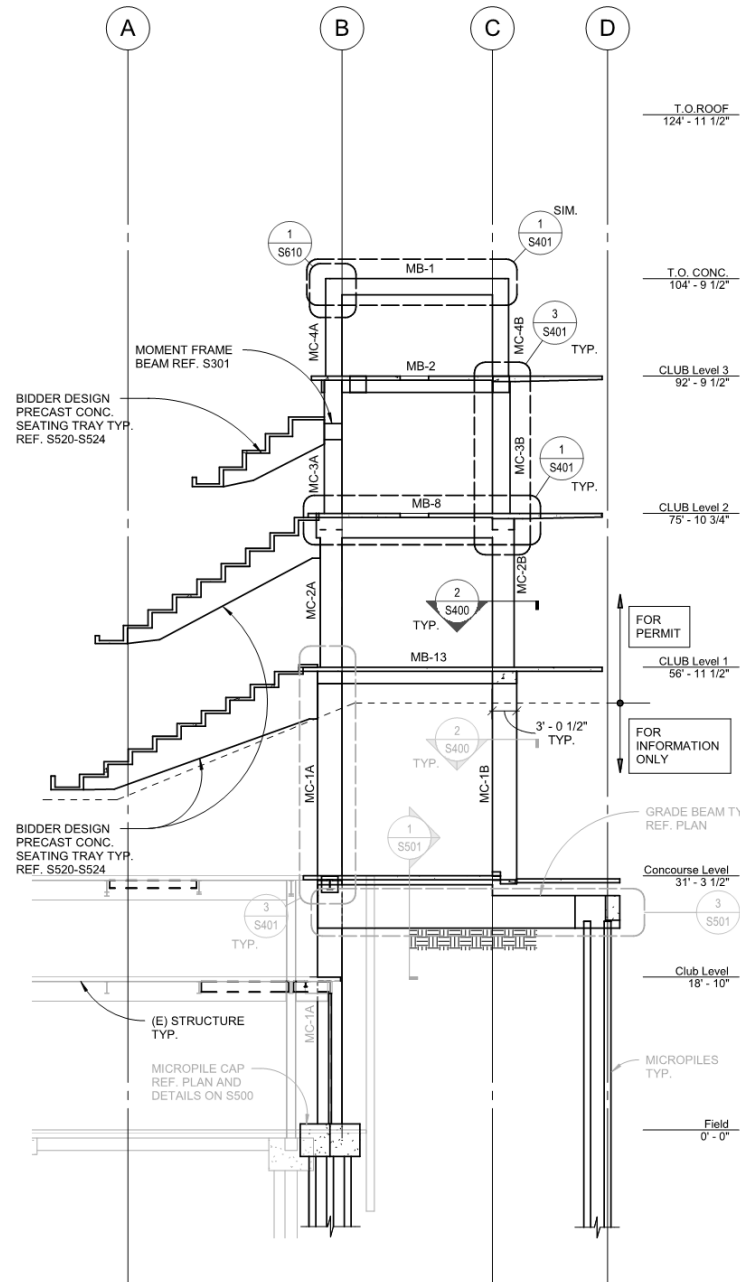
Figure 2b. Pedestrian wind speed measurement points with comfort/distress ratings – Annual.

SUPERSTRUCTURE: SEATING TRAYS

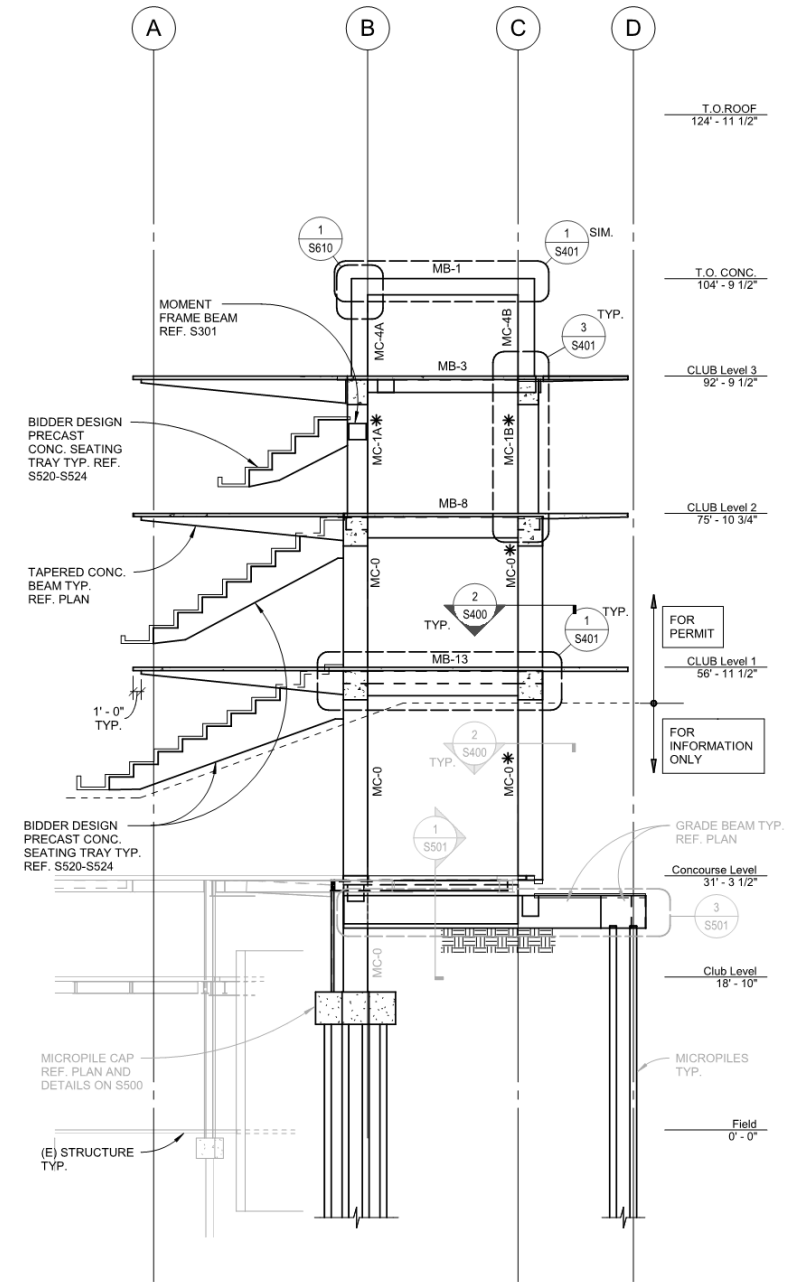




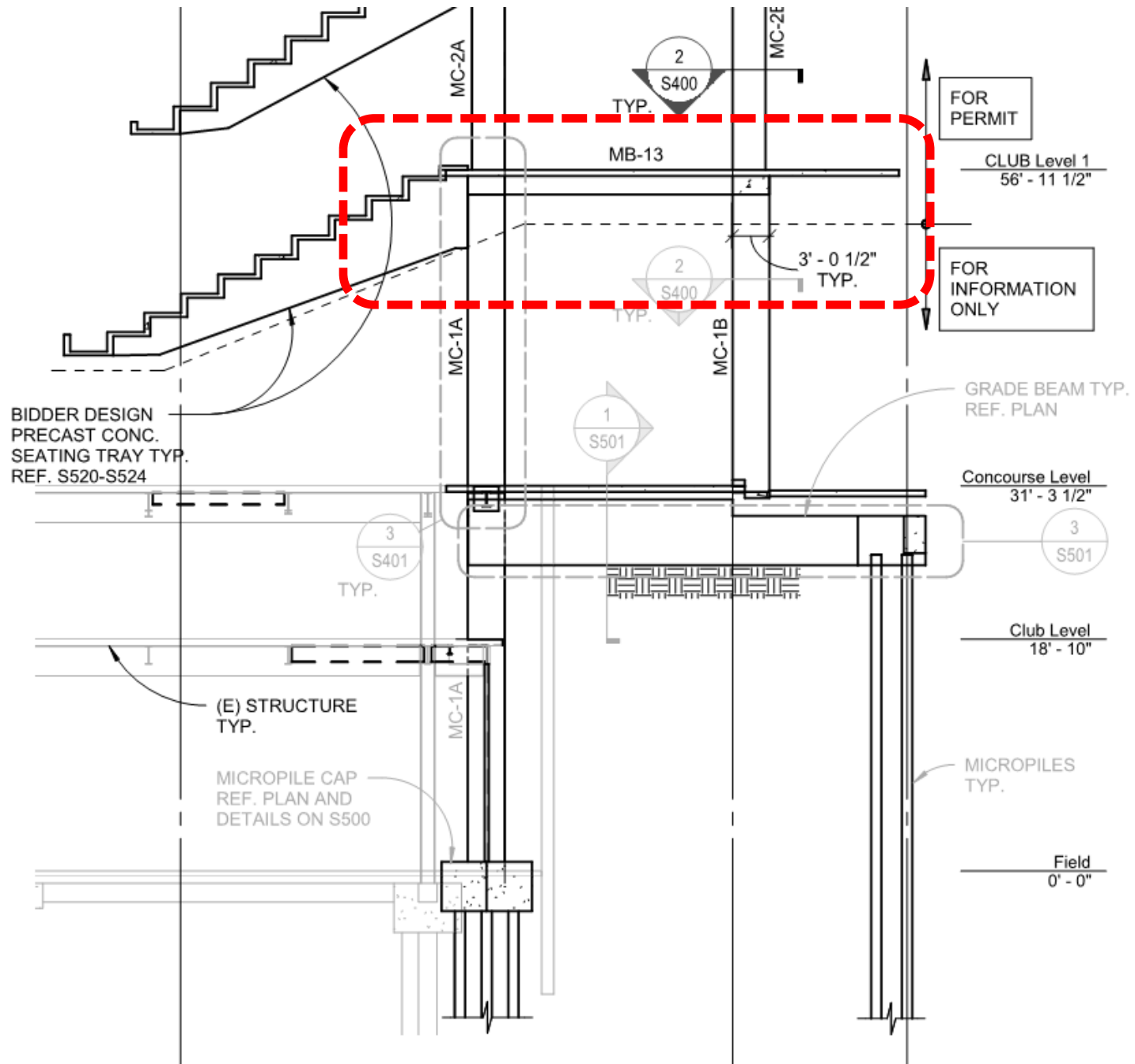
GRID 3 **3** **MOMENT FRAME ELEVATION AT GRIDS 5-6**
 3/32" = 1'-0"

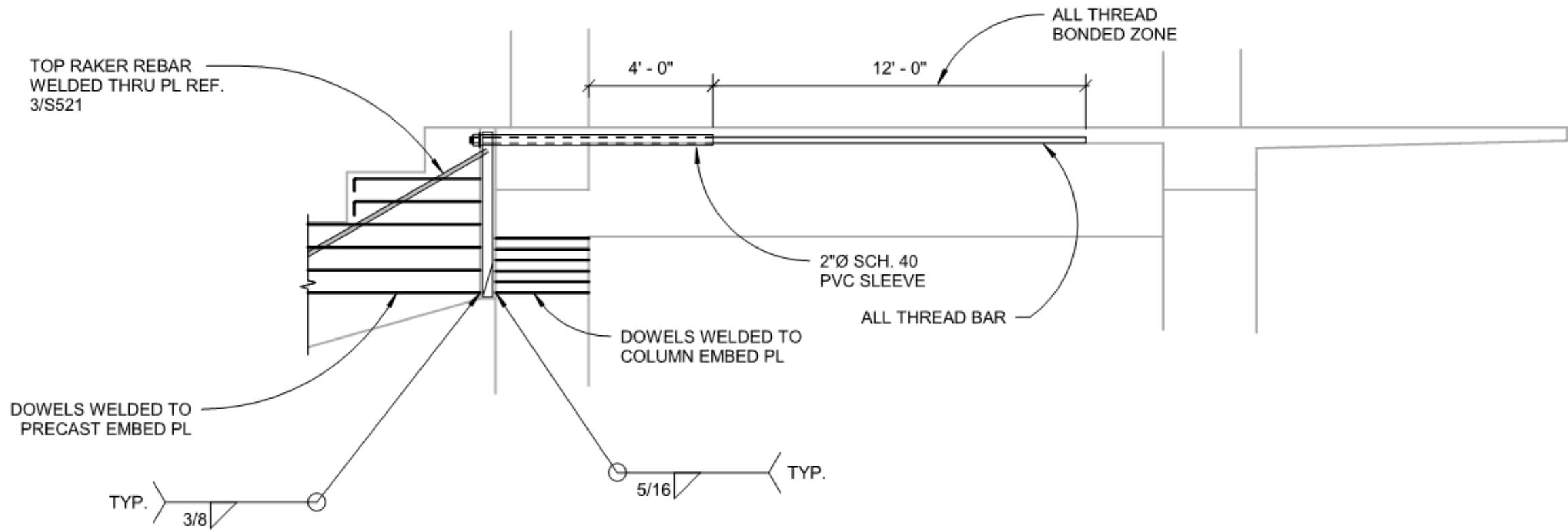


2 **MOMENT FRAME ELEVATION AT GRIDS 7-16**
 3/32" = 1'-0"



1 **MOMENT FRAME ELEVATION AT GRID 17**
 3/32" = 1'-0"

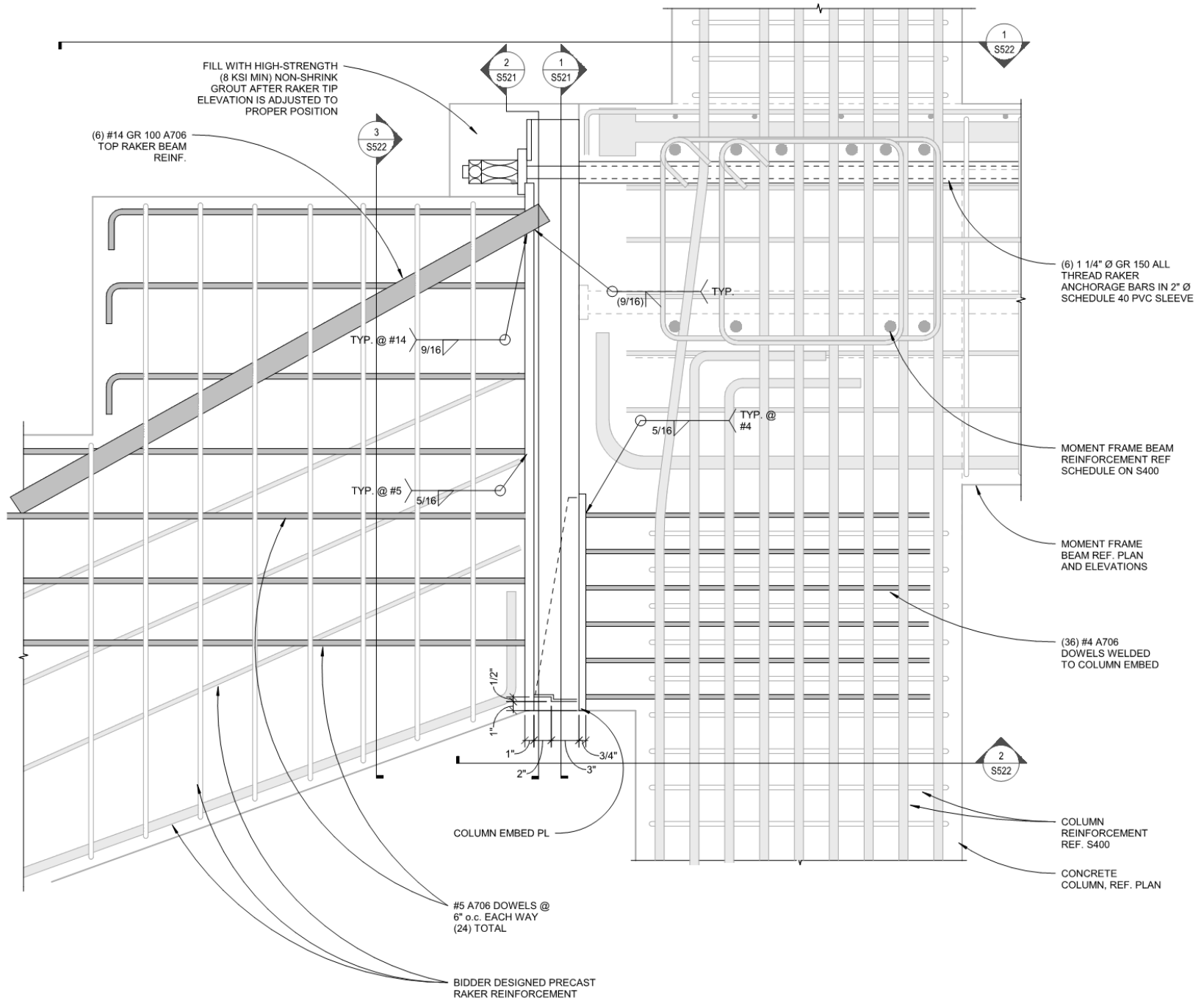




4

OVERALL SECTION

1/4" = 1'-0"



FILL WITH HIGH-STRENGTH
(8 KSI MIN) NON-SHRINK
GROUT AFTER RAKER TIP
ELEVATION IS ADJUSTED TO
PROPER POSITION

(6) #14 GR 100 A706
TOP RAKER BEAM
REINF.

3
S522

2
S521

1
S521

1
S522

(6) 1 1/4" Ø GR 150 ALL
THREAD RAKER
ANCHORAGE BARS IN 2" Ø
SCHEDULE 40 PVC SLEEVE

TYP. @ #14
9/16"

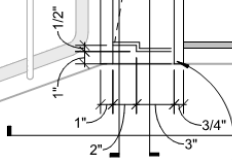
TYP. @ #5
5/16"

TYP. @
#4

MOMENT FRAME BEAM
REINFORCEMENT REF
SCHEDULE ON S400

MOMENT FRAME
BEAM REF. PLAN
AND ELEVATIONS

(36) #4 A706
DOWELS WELDED
TO COLUMN EMBED



COLUMN EMBED PL

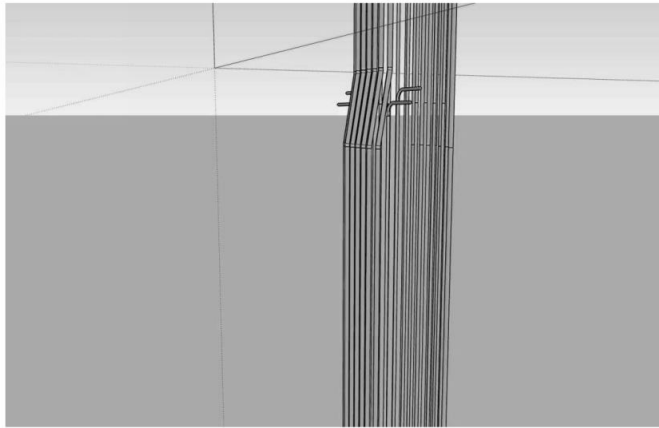
2
S522

COLUMN
REINFORCEMENT
REF. S400

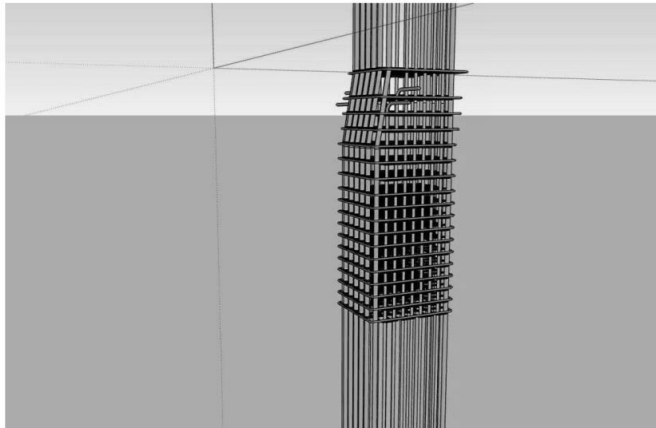
CONCRETE
COLUMN, REF. PLAN

#5 A706 DOWELS @
6" o.c. EACH WAY
(24) TOTAL

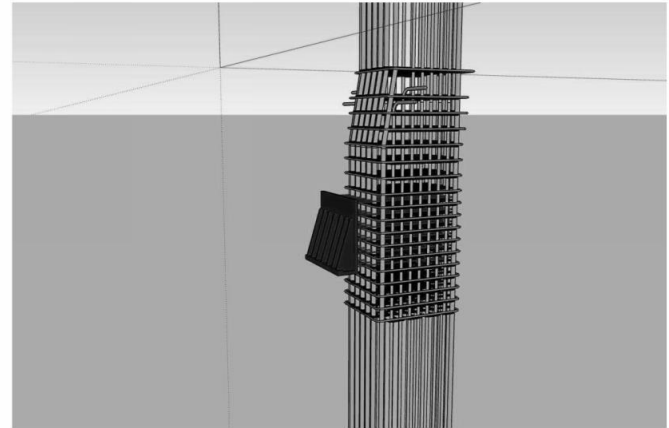
BIDDER DESIGNED PRECAST
RAKER REINFORCEMENT



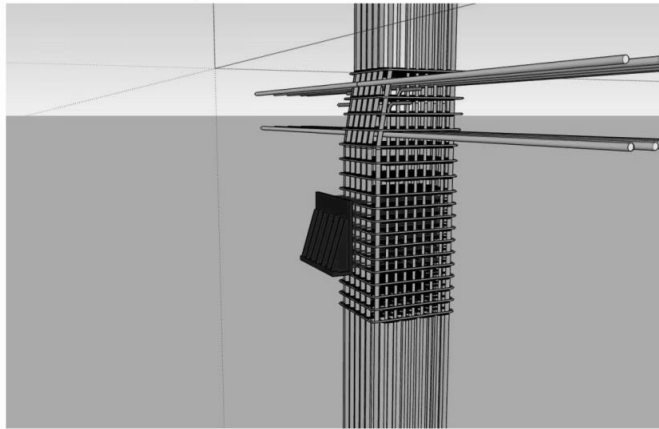
1.) COLUMN VERTICAL BARS



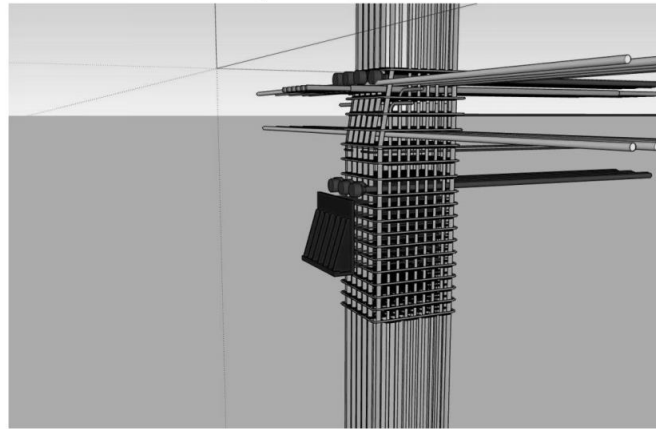
2.) COLUMN TIES



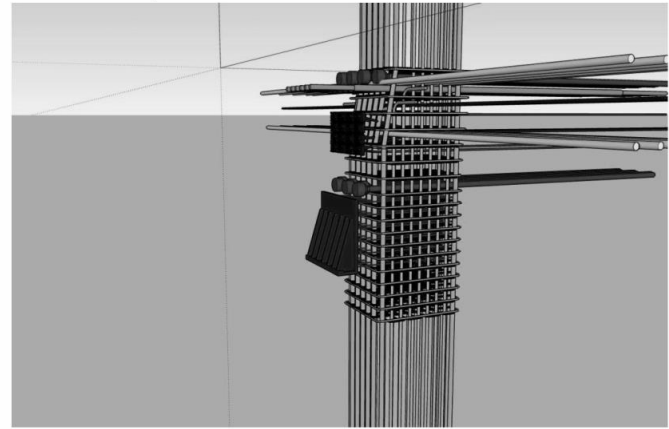
3.) EMBEDDED STEEL PRECAST SEAT



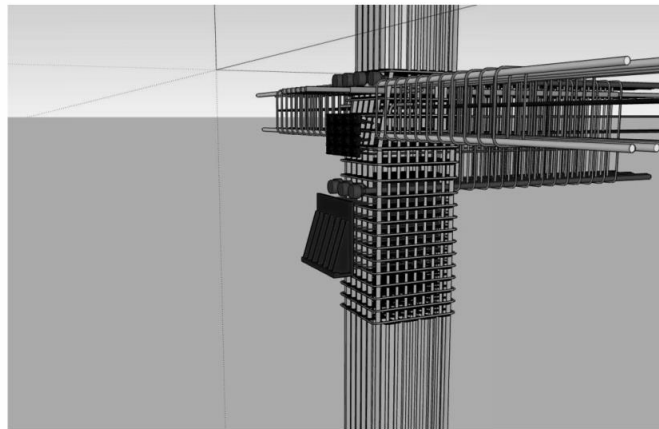
4.) NORTH-SOUTH BEAM REINFORCING



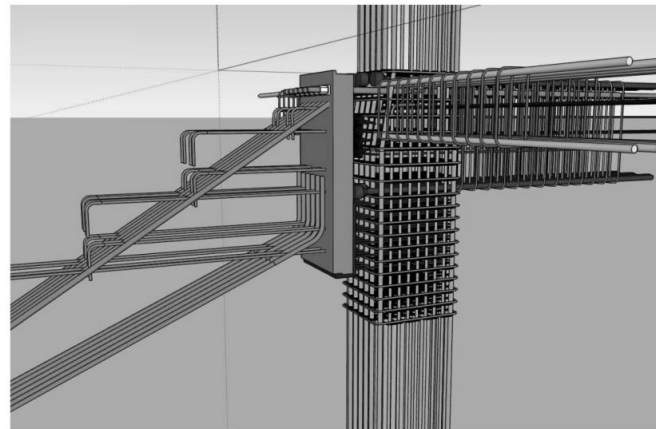
5.) EAST-WEST BEAM REINFORCING



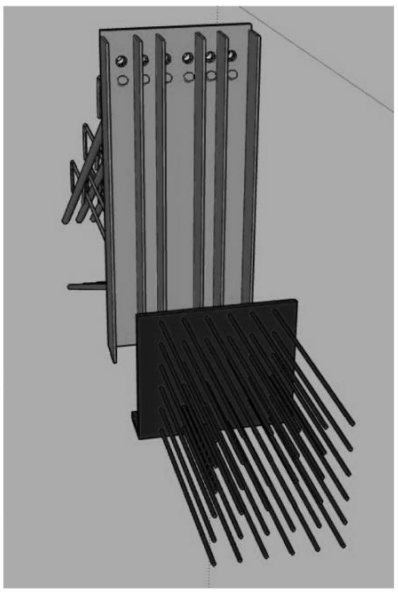
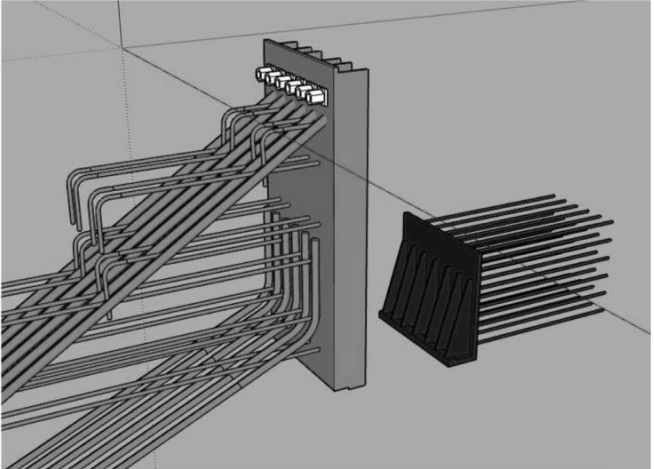
6.) POST-TENSIONING CABLES



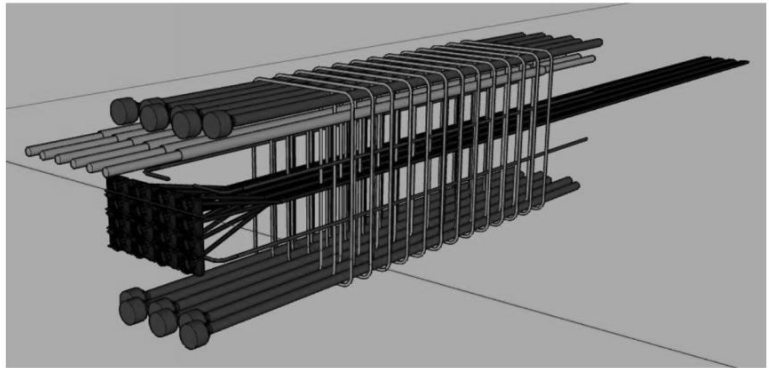
7.) BEAM STIRRUPS



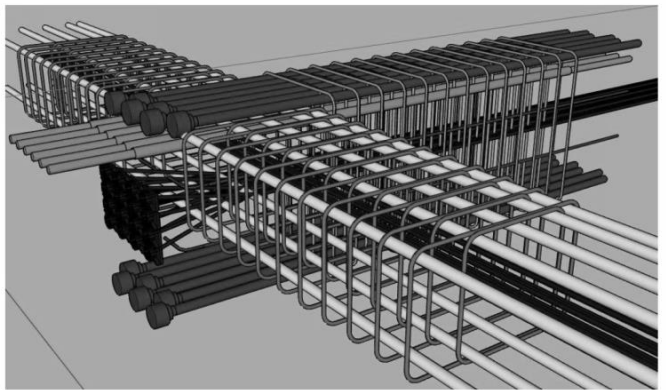
8.) INSTALL PRECAST



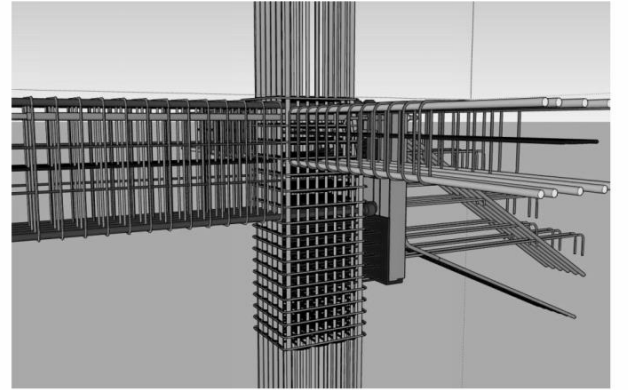
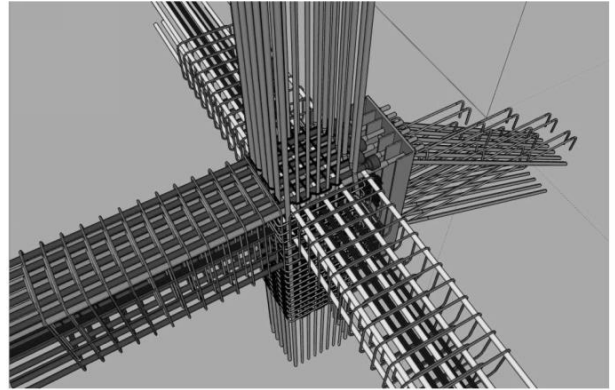
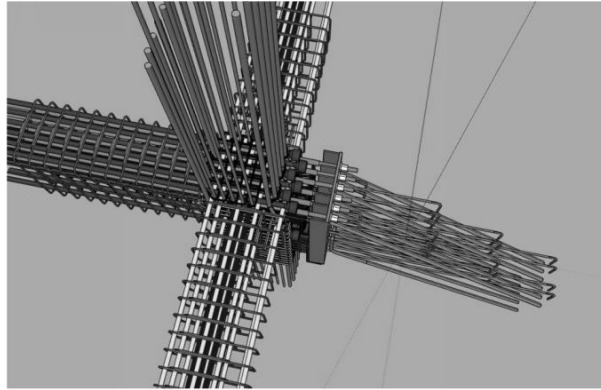
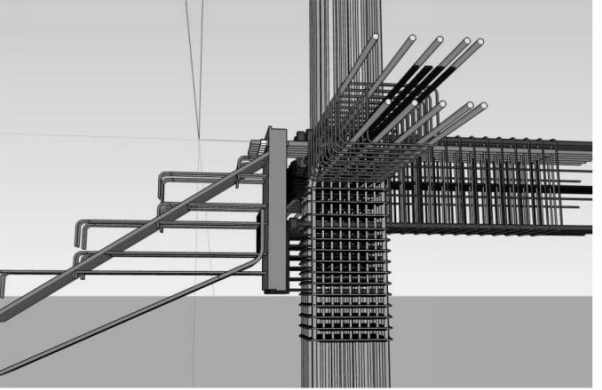
PRECAST SEAT CONNECTION ISOLATED VIEW



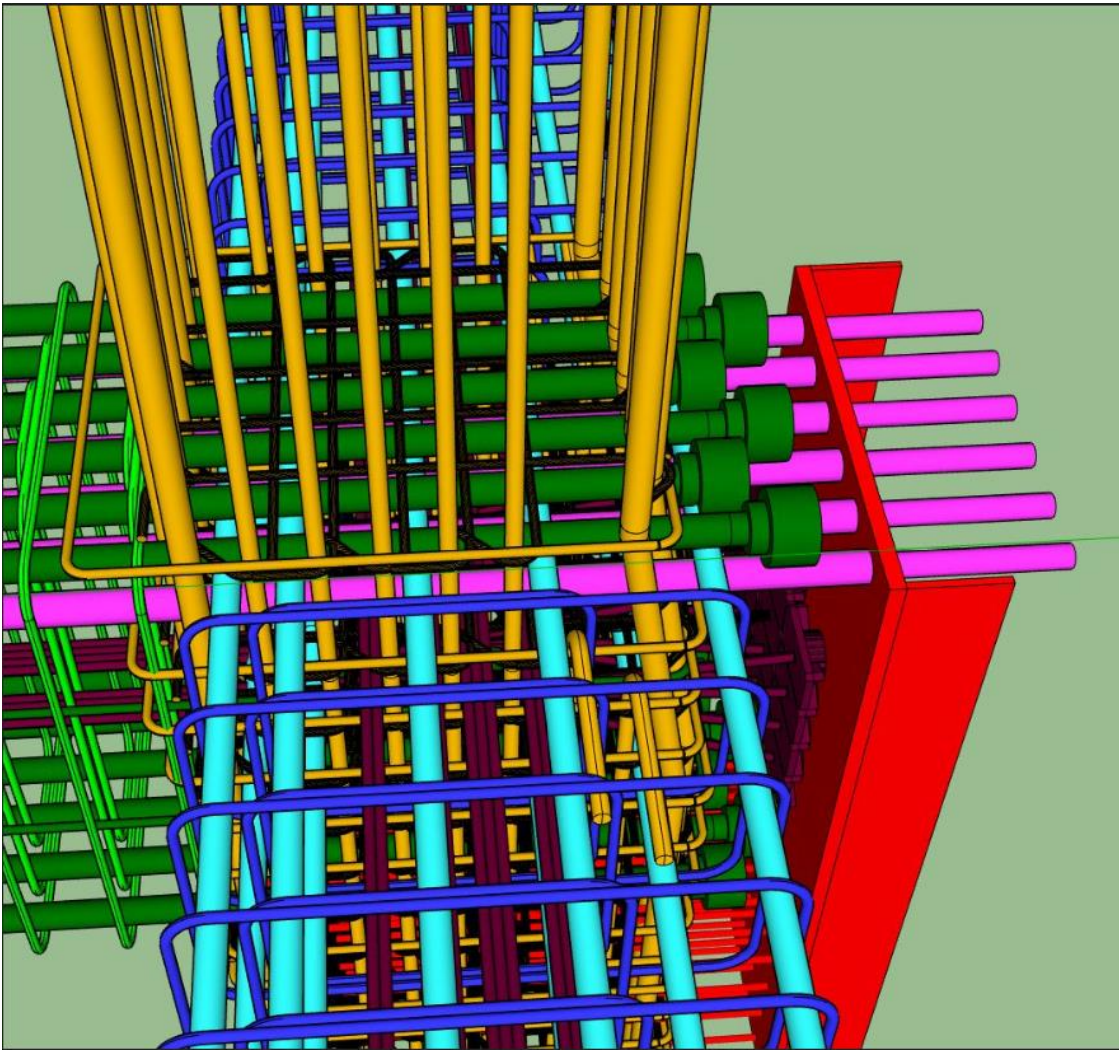
EAST-WEST BEAM ISOLATED VIEW

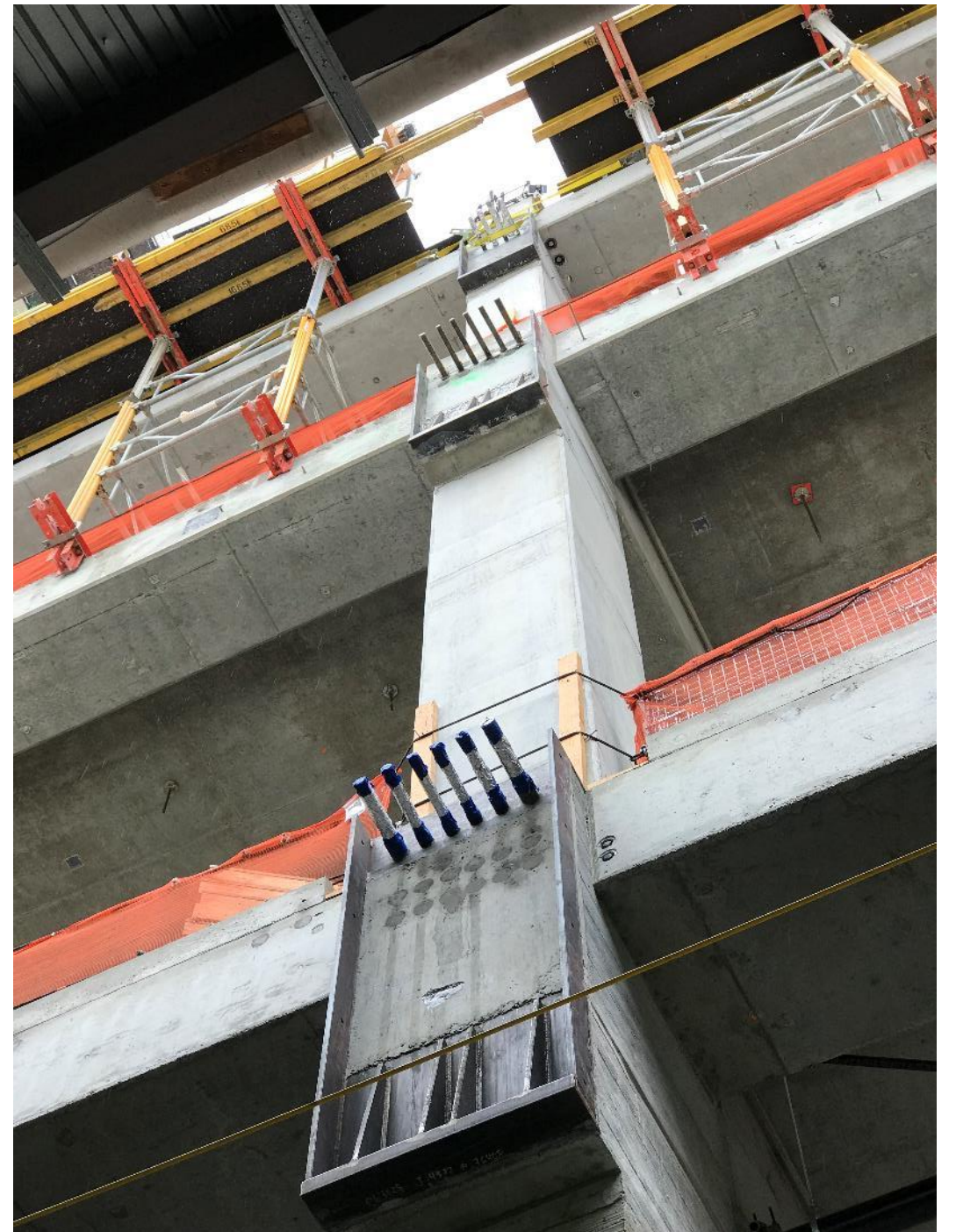


BEAM REINFORCING ISOLATED VIEW



PRECAST RAKER CONNECTION - ISOMETRIC VIEWS







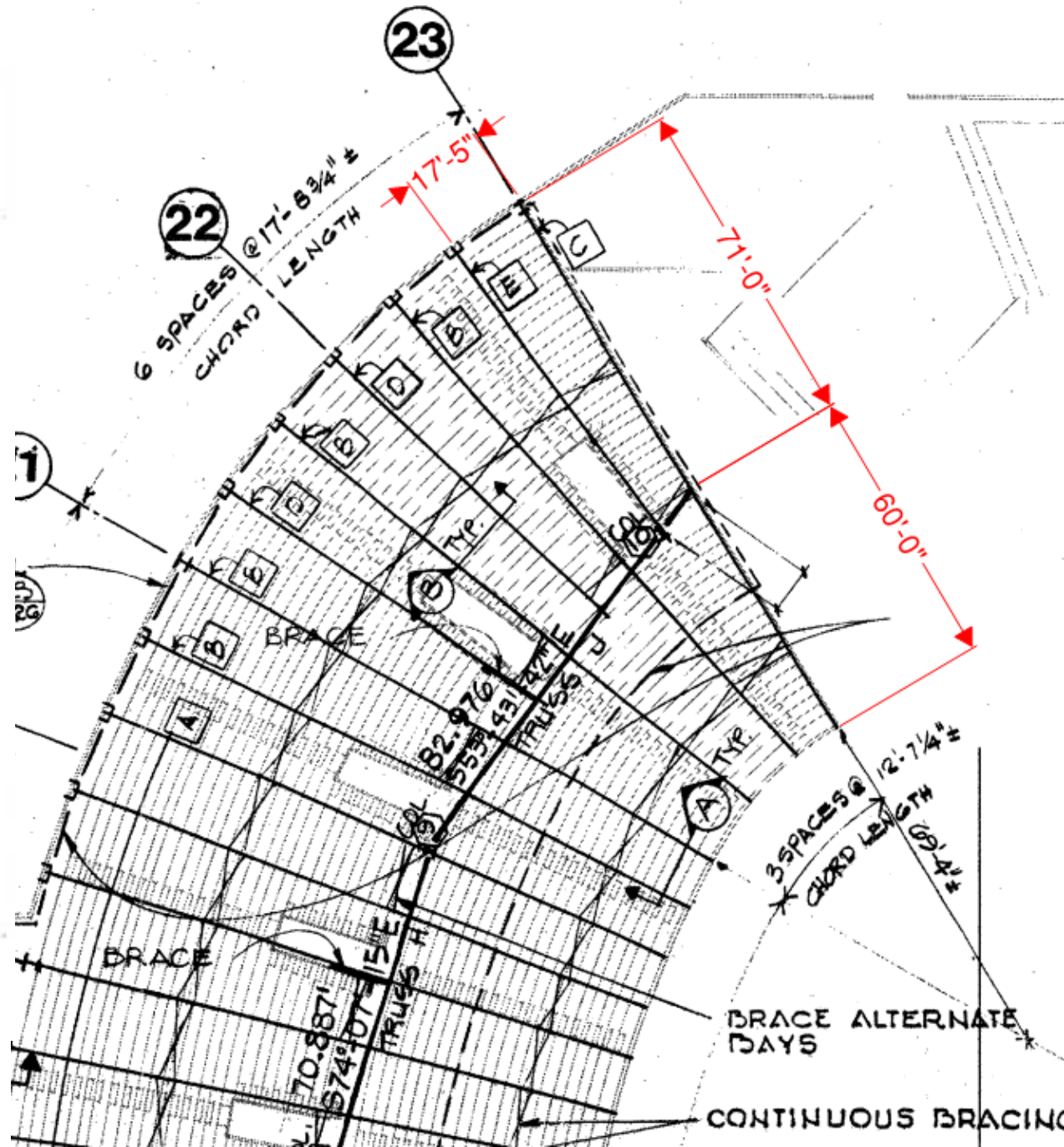
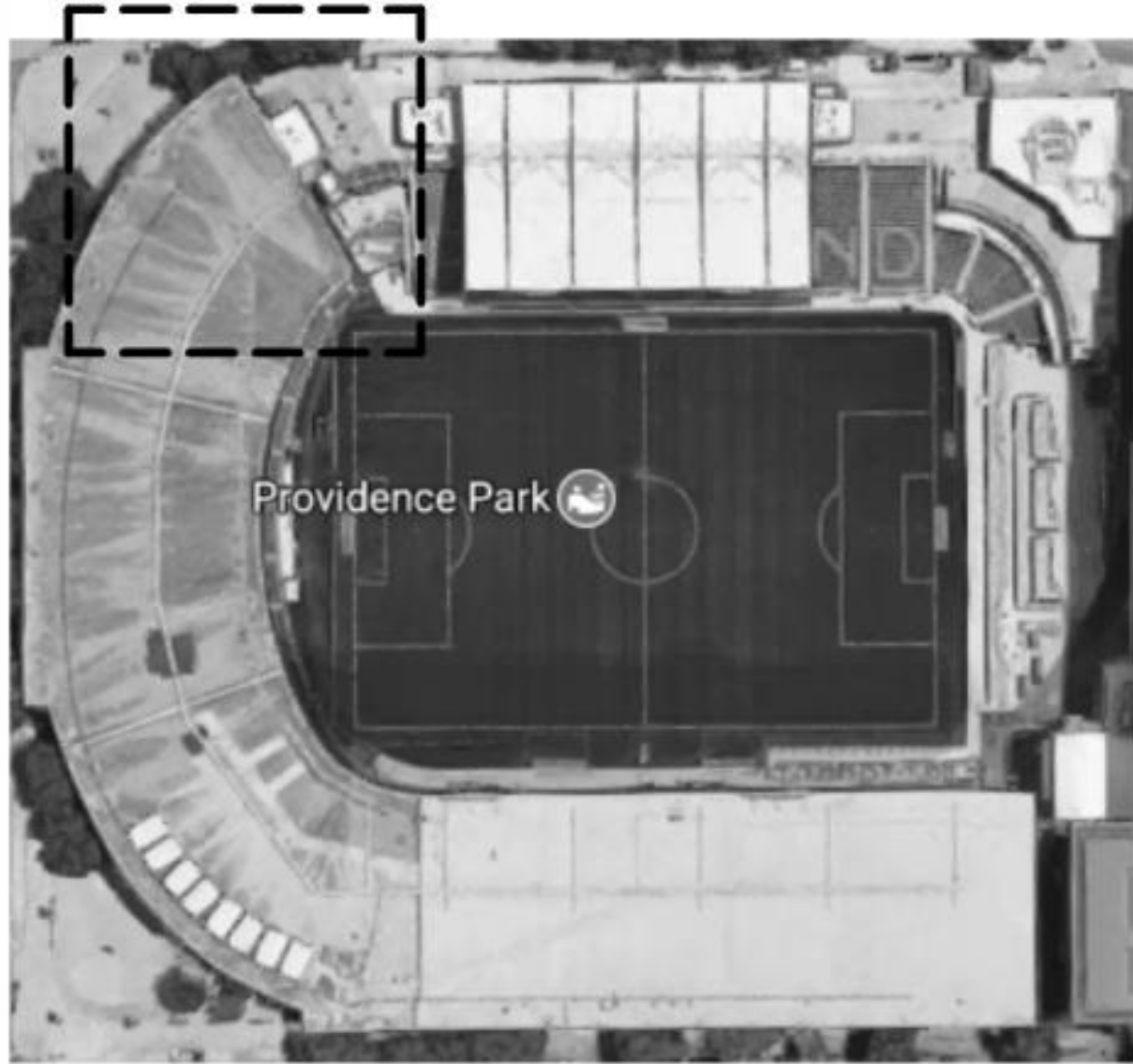
RCID
THE AXE STAND





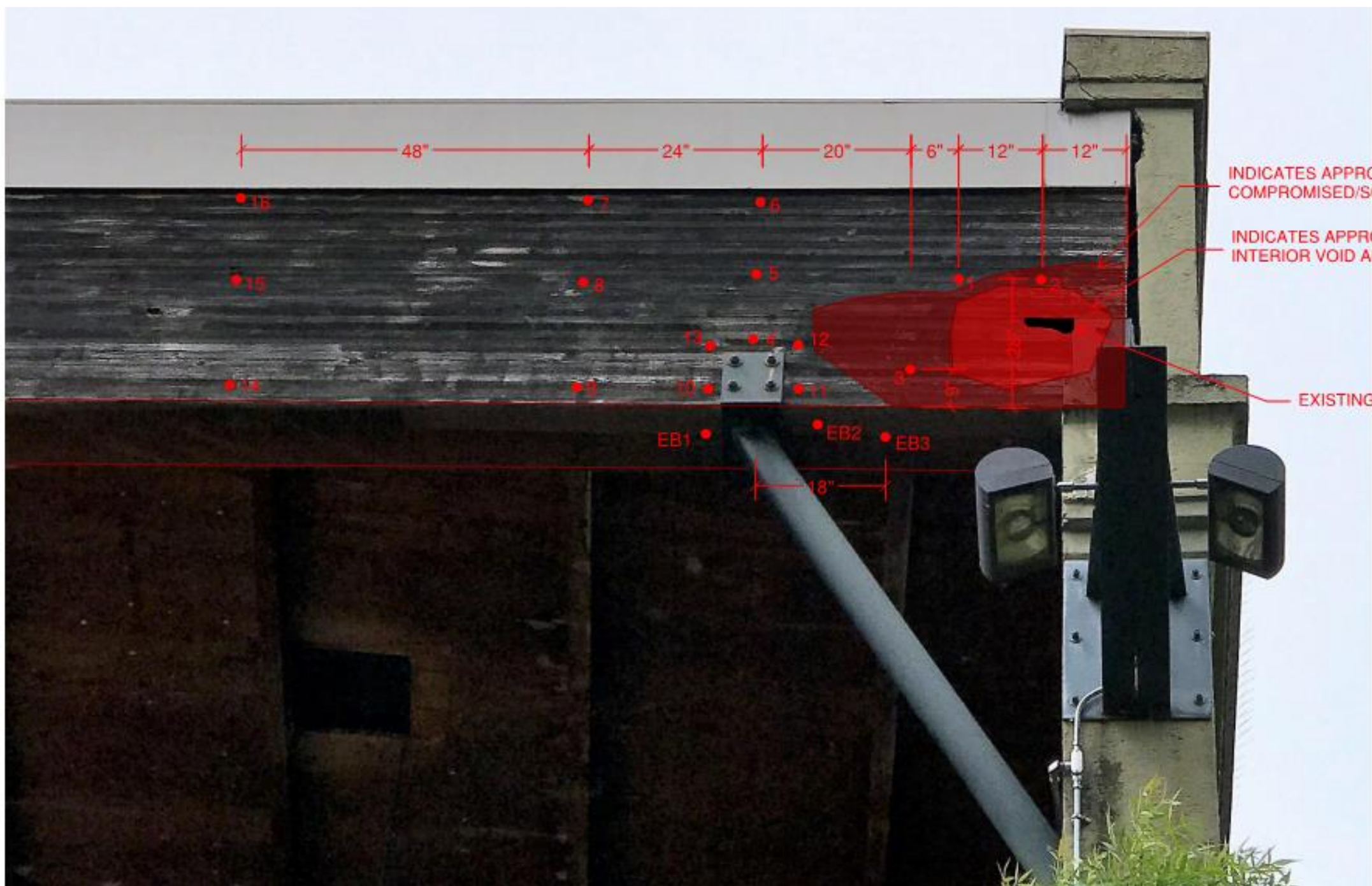
WOODPECKERS...











48" 24" 20" 6" 12" 12"

16
15
14

7
8
9
10
11
12
13

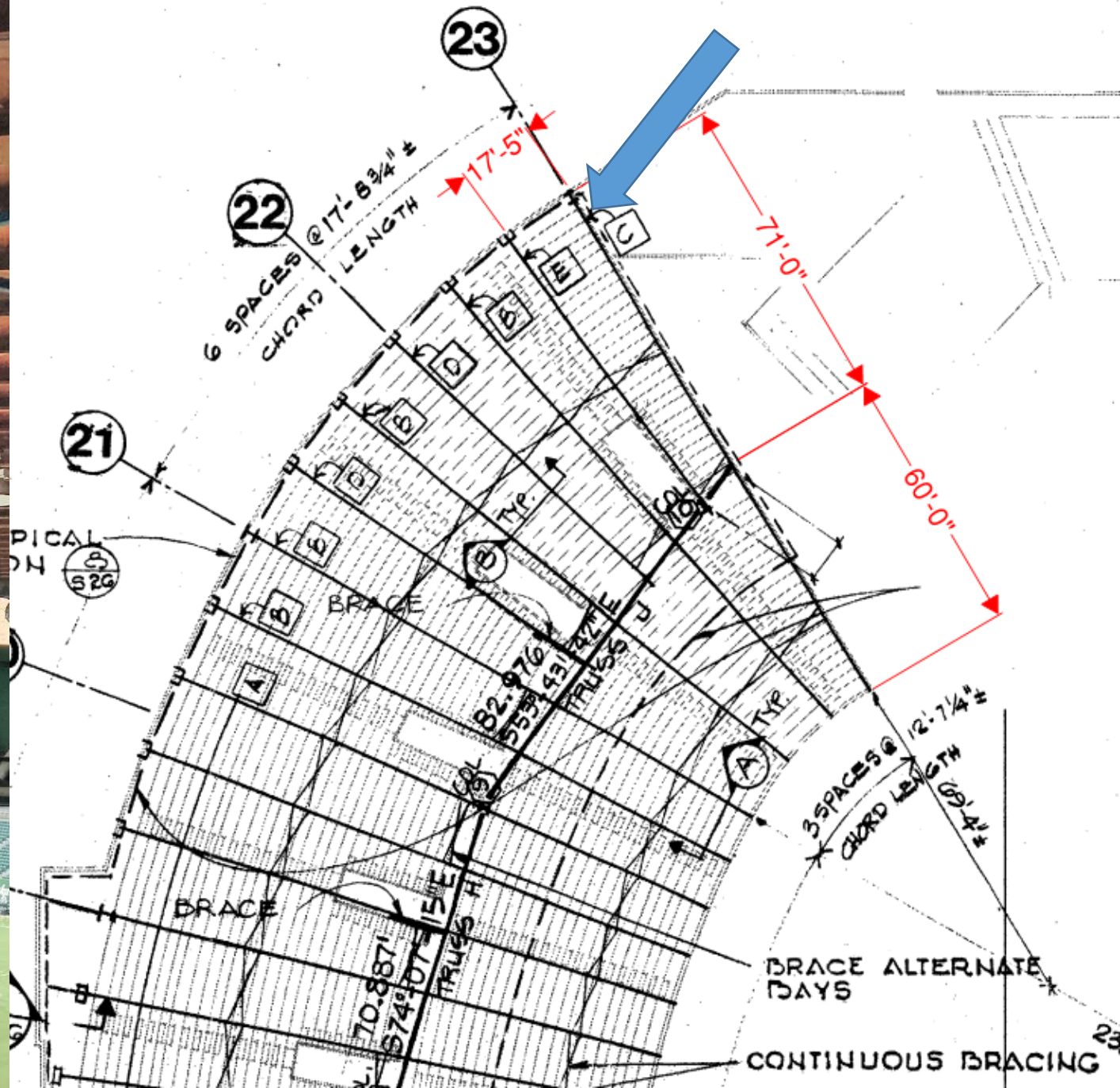
EB1 EB2 EB3

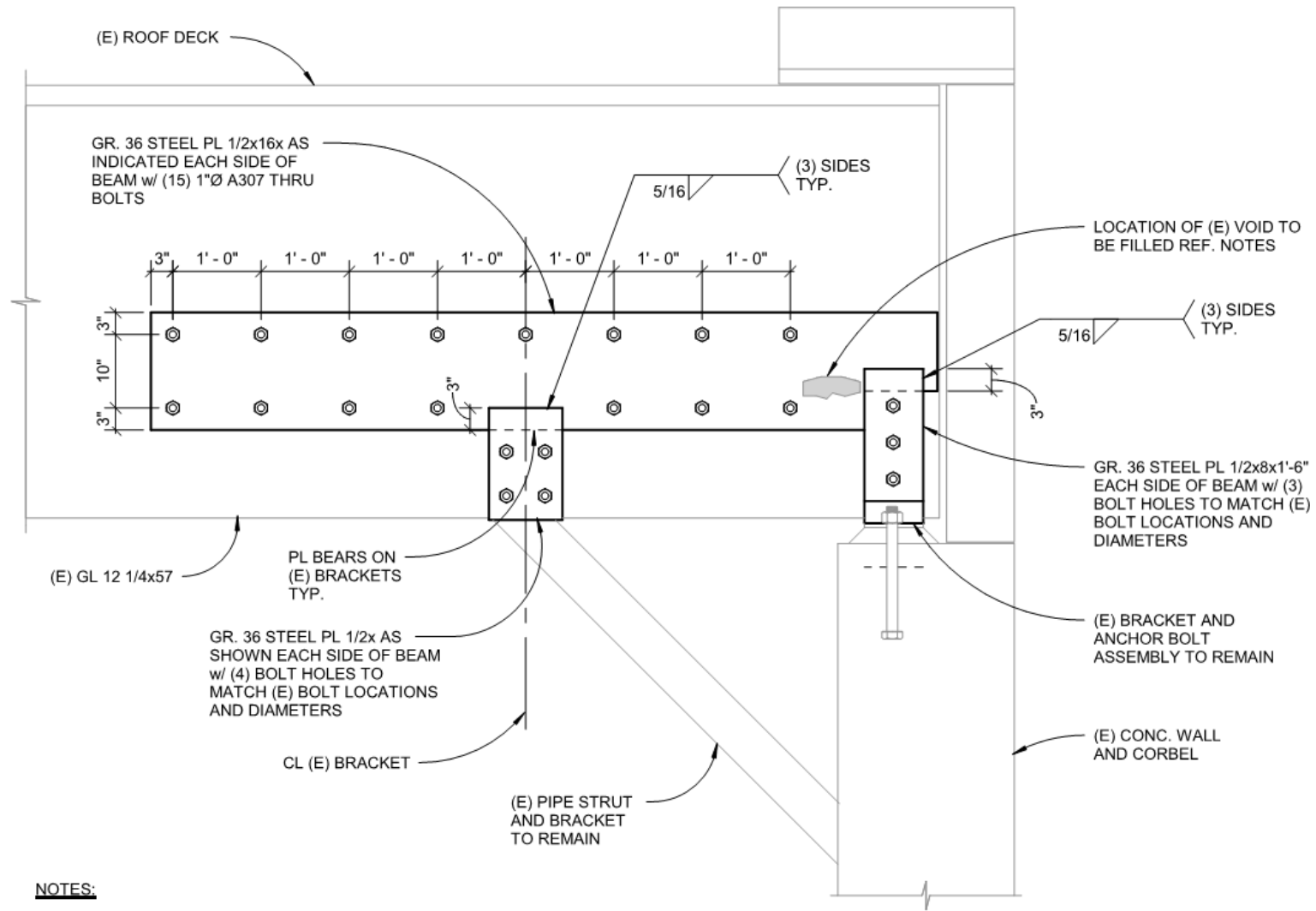
18"

INDICATES APPROXIMATE COMPROMISED/SOFT AREA

INDICATES APPROXIMATE INTERIOR VOID AREA

EXISTING HOLE





NOTES:

1. FILL EXISTING VOID WITH WOOD PULP AND EPOXY REPAIR MIX PRIOR TO ANY STEEL REINFORCING WORK. USE CPES BY THE ROT DOCTOR OR EQUIVALENT PRODUCT AFTER REMOVING ANY LOOSE WOOD AND BEFORE FILING VOID.
2. REMOVE AND REPLACE EXISTING THROUGH BOLTS TO ACCOMMODATE NEW PLATE ASSEMBLY. REPLACE ANY CORRODED HARDWARE WITH NEW GALVANIZED HARDWARE.
3. ALL NEW STEEL AND HARDWARE TO BE HOT-DIPPED GALVANIZED.
4. NOTIFY ENGINEER OF ANY DISCREPANCIES FROM THE EXISTING CONDITIONS NOTED.
5. NOTIFY ENGINEER OF ANY ADDITIONAL VOIDS OR SOFT/ROTTEN WOOD OBSERVED DURING REINFORCING WORK.



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