Innovative Technologies in Construction

Little Humbug Creek Bridge

David Dobson, PE

ODOT Structure Services

Structural Materials Engineer

Jayson Buchholz, PE

ODOT Region 2 Area 1

Resident Engineer

ODOT/AGC Annual Conference

February 7th, 2025

Oregon Department of Transportation

US26: Little Humbug Creek Bridge Background

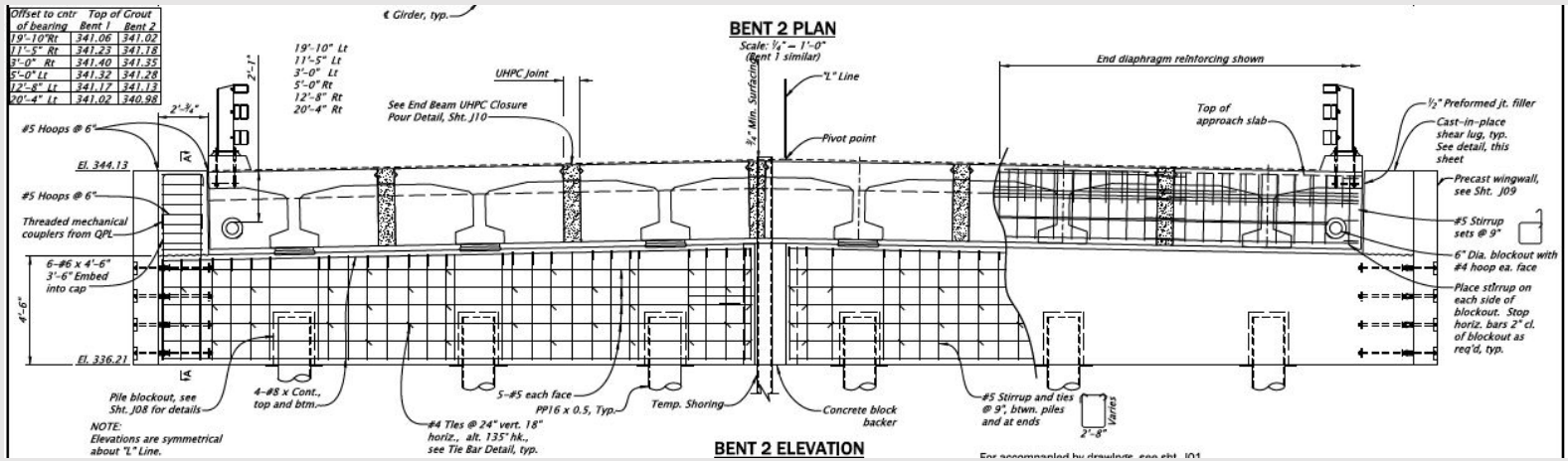
- Constructed in 1956
- 60-foot span length
- Substructure in critical condition
- Significant scour
- Bridge condition – structurally deficient
- Designed as a steel rolled beam with deck modules cast in proximity to project site.
- Contractor cost reduction proposal per 00140.70

Oregon Department of Transportation

LITTLE HUMBUG CREEK - BR# 03099 - HWY 47 - MP: 8.22 SCOUR AT BENT 3

Successful Partnership Between ODOT and Contractor

- Contractor proposed precast DBTs
- UHPC closure pours
- Epoxy Polymer Concrete deck overlay
- Maintaining contract interim completion dates
- Contractor Engineer assumes the role of RFI responses, bridge load rating and as-builts



Oregon Department of Transportation

Seaside OR 97138
United States

10 working days with 24-hour single lane closure for pile driving. Work to be complete by June 27.


Nightly single lane closures and shoulder work occurred between dates of 24-hour lane closures.
CAT
BOMAG
NM65406

IWW began on September 3 and had to be complete by September 15

11 working days with 24-hour single lane closure for first half of new structure. Work to be complete by September 13.


Seaside OR 97138
United States
13 working days with 24-hour single lane closure for second half of new structure. Work to be complete by September 26.

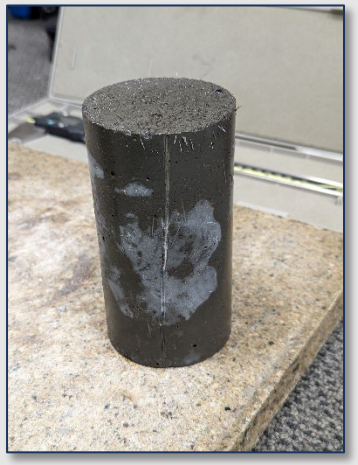
INNOVATIVE MATERIALS

Ultra High-Performance Concrete - UHPC

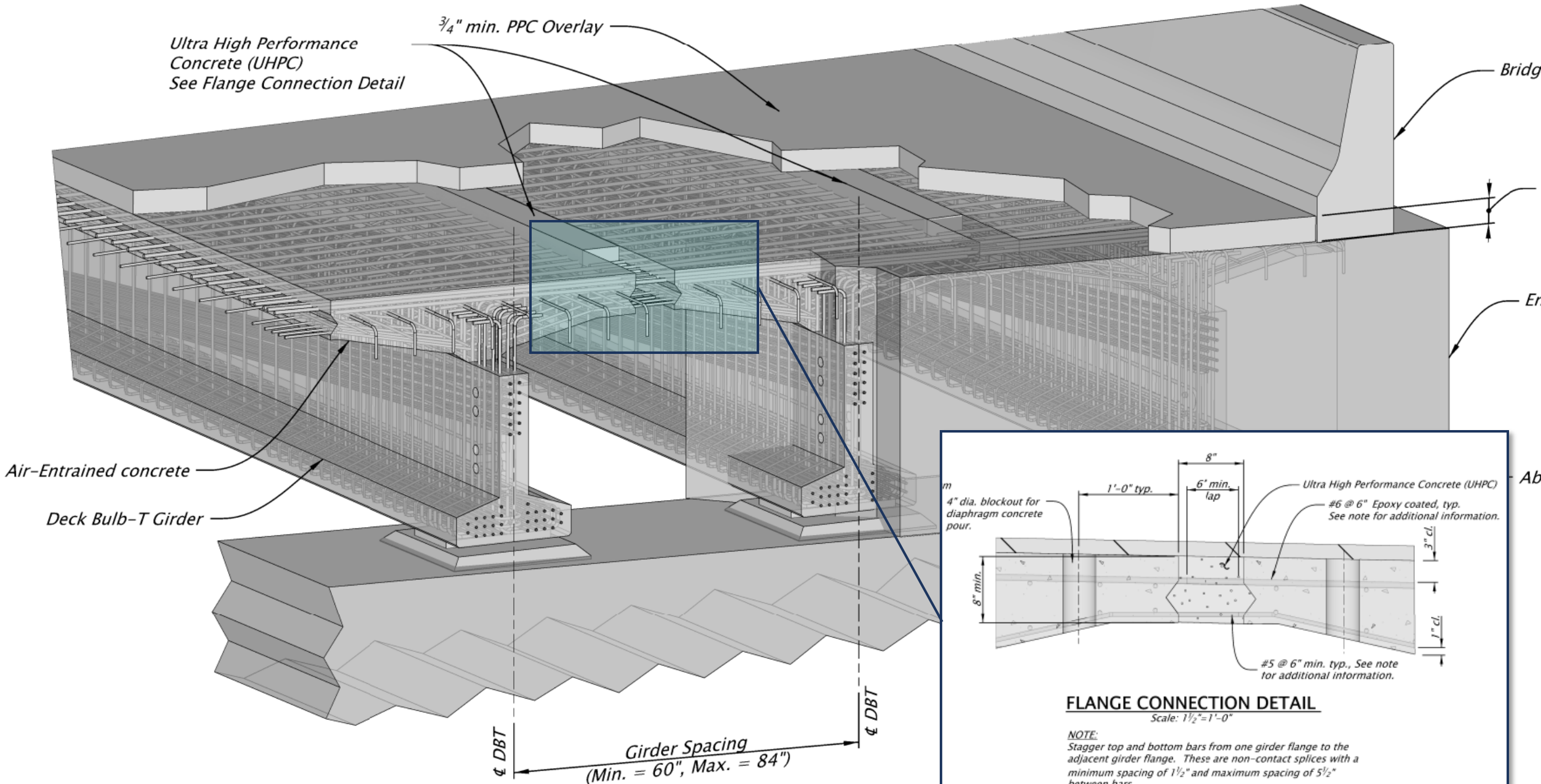
UHPC Material Properties

- No coarse aggregate
- Dense particle packing
- Steel fibers
- Nearly impermeable

Compressive Strength = 17,500 psi
Post-cracking Tensile Strength = 0.72 ksi



Oregon Department of Transportation



FLANGE CONNECTION DETAIL

Scale: 1½"=1'-0"

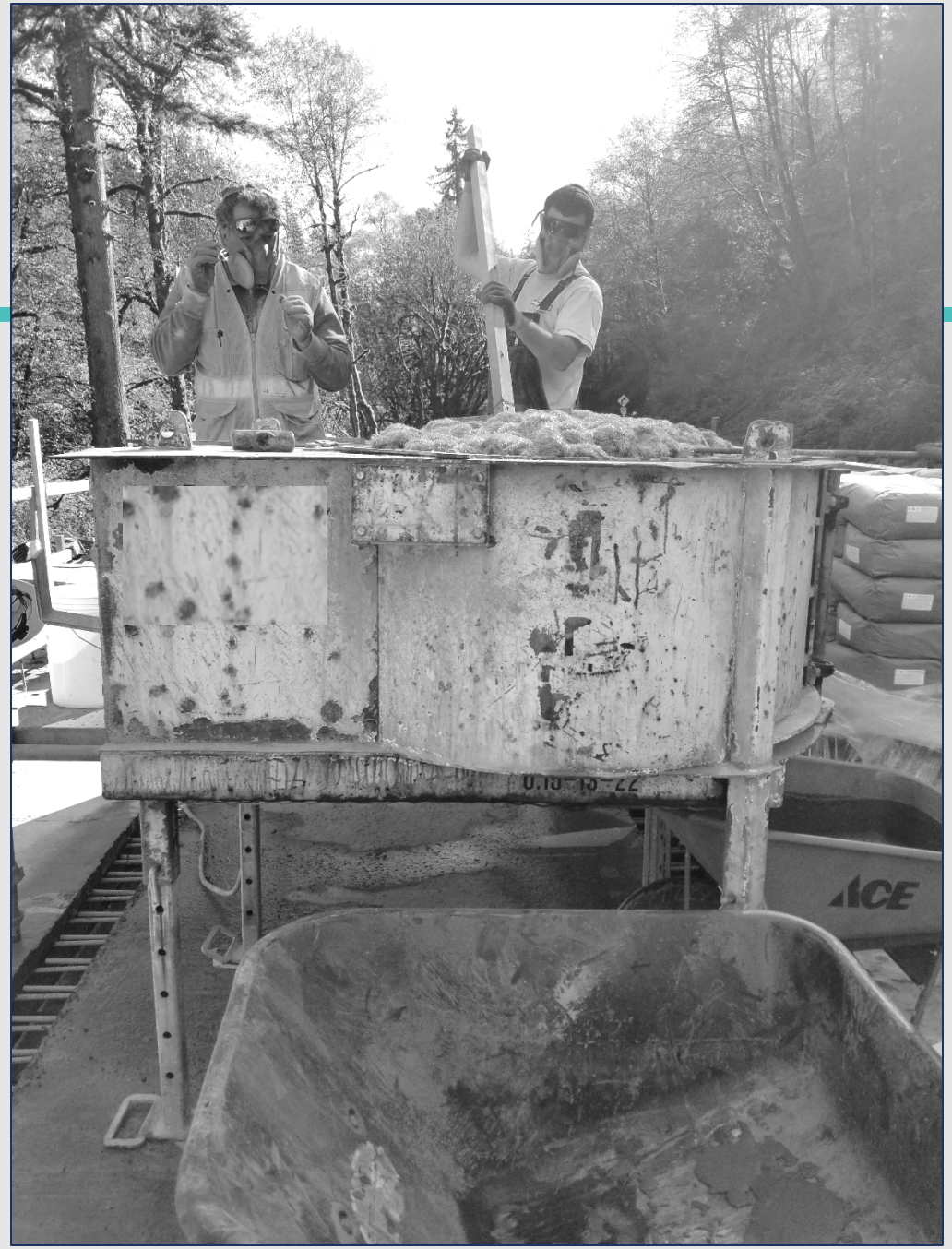
NOTE:
Stagger top and bottom bars from one girder flange to the adjacent girder flange. These are non-contact splices with a minimum spacing of 1½" and maximum spacing of 5½" between bars.

PERSPECTIVE

Scale: ⅜"=1'-0"

UHPC History

- ODOT's first use over 10+ years ago
  - —2012 Burnt River Bridge
- Single approved material supplier
- Bid prices ~$10,000/cuyd
- Mixing times >30 mins



Oregon Department of Transportation

Modern UHPC Placement

Batched in a ready-mix truck, in quantities around 4-5 cuyd per batch

Innovations in placement practices improve efficiencies

UHPC was not top formed, as a trial.

Epoxy Polymer Concrete (EPC) Overlays

- Same physical properties as PPC
- Slower set times
- More moisture tolerant
- Still in pilot phase at ODOT

Oregon Department of Transportation

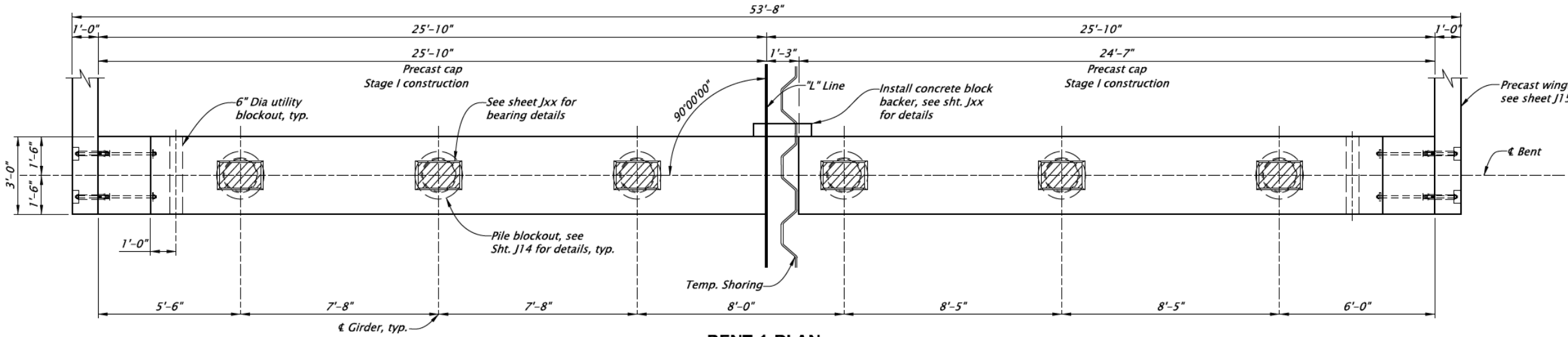
EPC Batching

EPC Placement

- Placed with a skid steer
- Finished with a truss screed
- Able to accommodate grade changes

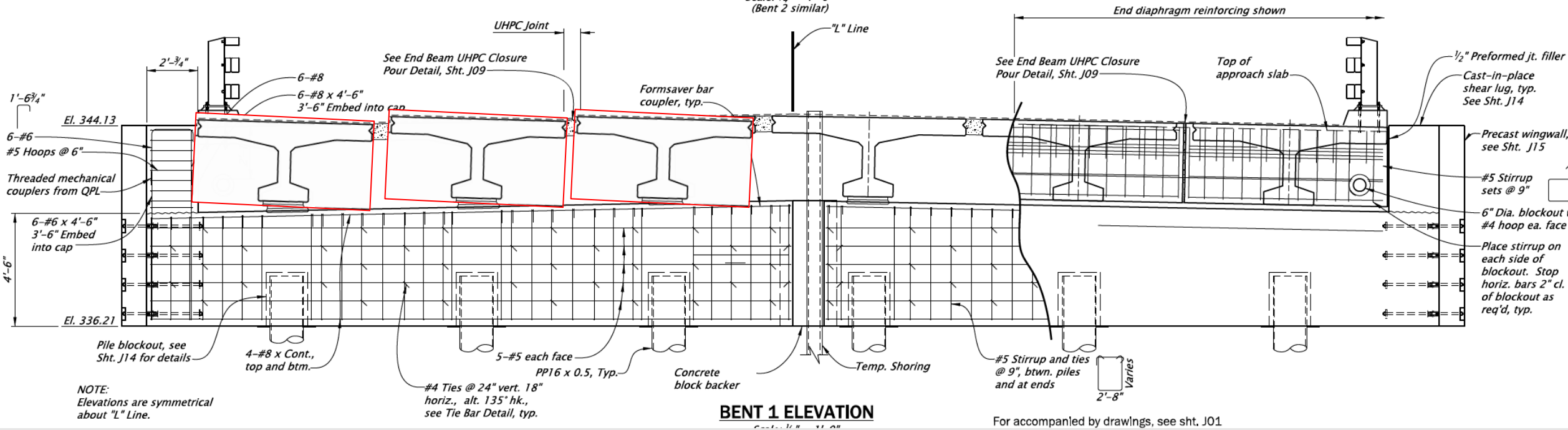
Oregon Department of Transportation

CONSTRUCTABILITY



BENT 1 PLAN

Scale: 1/4" = 1'-0"
(Bent 2 similar)



NOTE:
Elevations are symmetrical
about "L" Line.

BENT 1 ELEVATION

For accompanied by drawings, see sht. J01

UHPC connection detail could accommodate the uneven cross-slope


Uneven grade, must be corrected with the overlay

Grade adjustments were made to accommodate the slab elevations, placement proceeded on-time


Poly
Technology
EPC C
EPC CONT

Questions

David Dobson, PE
Statewide Structural Materials Engineer
ODOT Structure Services
David.dobson@odot.Oregon.gov

Jayson Buchholz, PE
Resident Engineer
ODOT Region 2 Area 1
Jayson.w.buchholz@odot.Oregon.gov

Oregon Department of Transportation