Build It & They Will Come – Oregon's Bulb Tee 90 Gaining Popularity

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2007 Western Bridge Engineers' Seminar

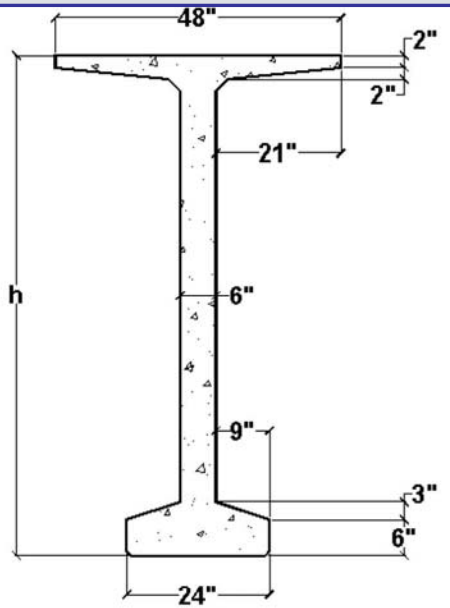
Overview

- History of the BT90 & Knife River's MOAB Casting Bed
- Case Study
  - Chemult
  - South Medford Interchange
  - Fall Creek
  - I-205 Light Rail Transit Expansion
- Future Jobs

History of the BT90

Bulb Tee Spanning Capabilities Prior To The BT90

Bulb T



Section Properties (gross)

Type	h	A	I strong axis	I weak axis	yt	yb	St	Sb	V/S	wt.
	(in.)	(in.^{2})	(in.^{4})	(in.^{4})	(in.)	(in.)	(in.^{3})	(in.^{3})	(in.)	(plf)
BT48	48	557	177736	32986	23.53	24.47	7553	7264	2.57	600
BT60	60	629	308722	33202	29.59	30.31	10432	10154	2.61	677
BT72	72	701	484993	33418	35.64	36.36	13606	13340	2.65	755
BT84	84	773	711733	33634	41.69	42.31	17074	16820	2.68	832

History of the BT90

- Production of a Larger Girder Limited By:
  - Available Bed Lengths
  - Adequate Shipping Equipment
  - Jacking Limitations
  - Industry Demand

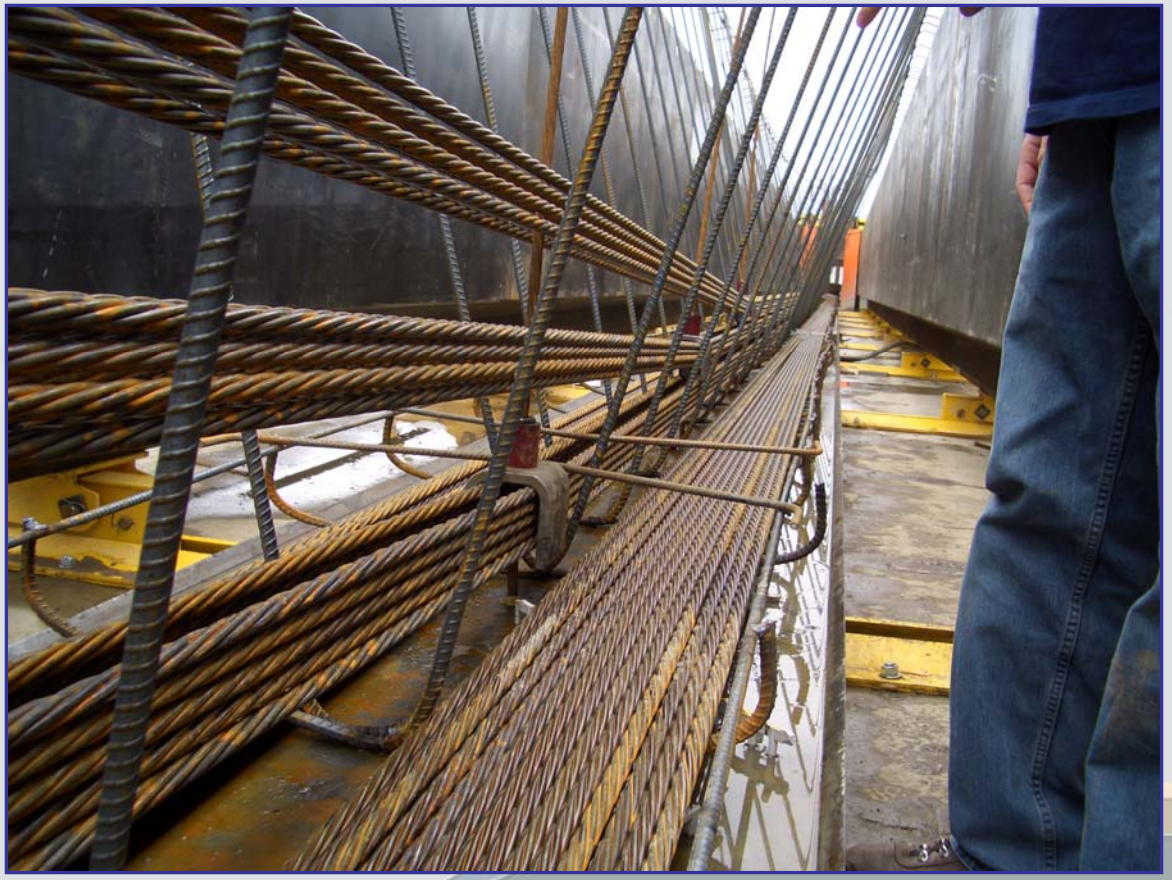
Knife River's MOAB

P_{Jack} = 3 Million lbs. @
4 feet Eccentricity

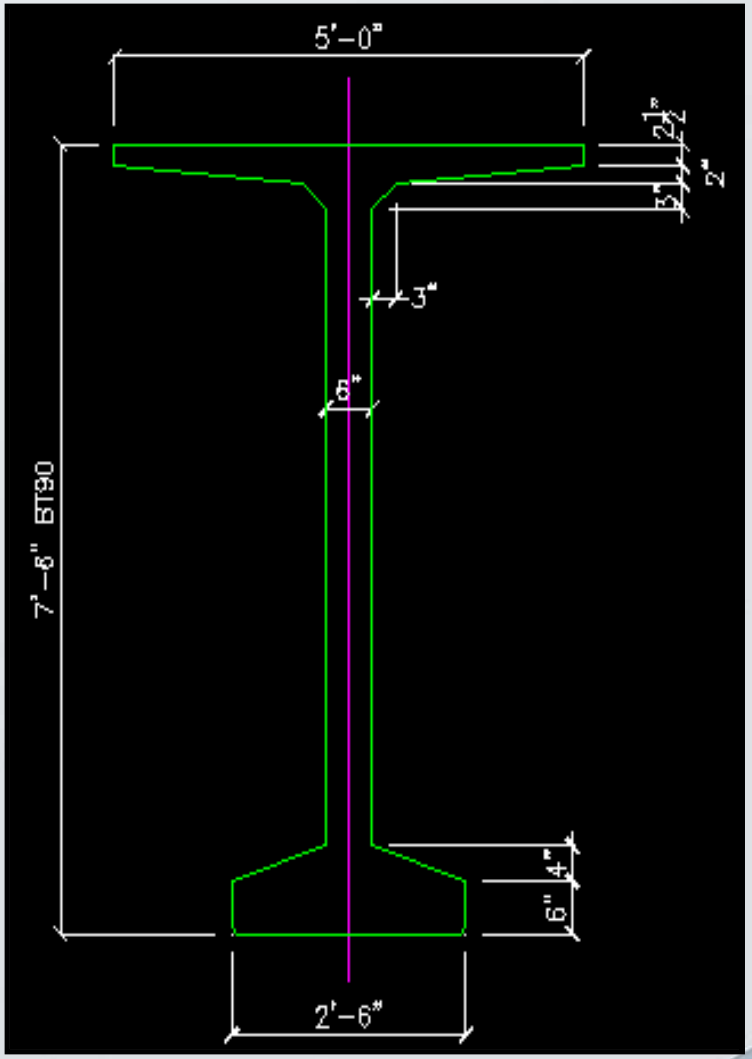
MOAB & New Form

MOAB & New Form (Cont'd)

- (60) 0.6" Diameter Strands P_{Jack} = 2640 kips

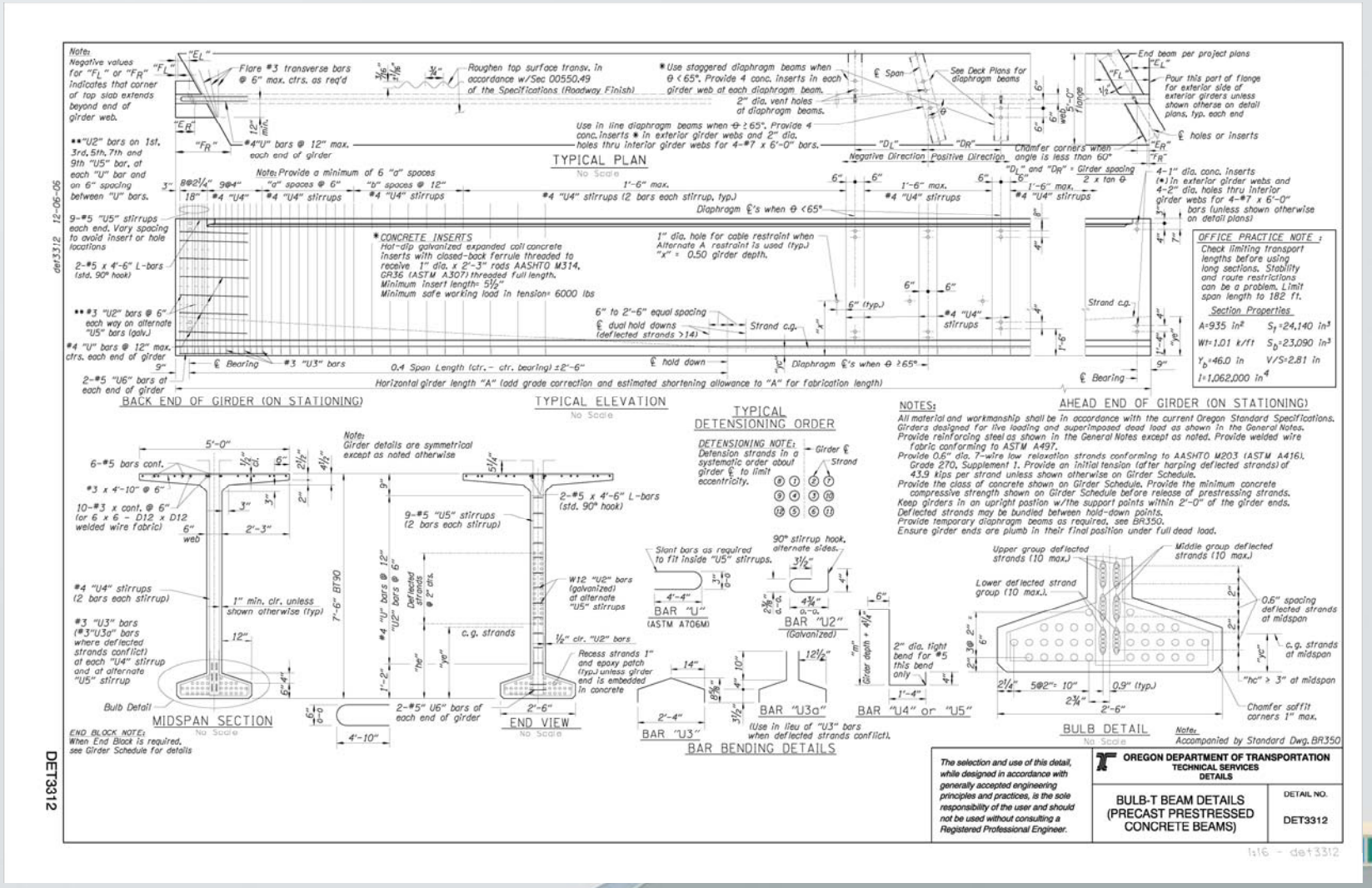


Oregon's Bulb Tee 90



- f'_{ci} = 7000 psi
- f'_{c} = 9000 psi
- (60) 0.6 Diameter, Grade 270, Strand
- L = 183'-3" o.-o.
- Weight = 185 kips

Oregon's Bulb Tee 90



Mt. Hood to Chemult Design-Build

US97 Over UPRR

Chemult

- Project Information
  - US97 (2 Lanes & Shoulders) Over UPRR
  - Existing Bridge: (3) Span Reinforced Concrete Deck Girder
  - Existing Bridge Included a Straddle Bent over Railroad, and had a Severe Skew
  - UPRR - Future Track Considerations
  - UPRR - Vertical Clearance

Chemult

- March 2005
  - Contractor Contacts Knife River
  - Request New Section Capable of Spanning 170 feet
  - Knife River's Shipping Capacity at 185 kips
  - Knife River Proposes BT96 at 177 feet
  - Contractor Directs Engineer To Consider BT96

Chemult

- April 2005
  - BT96 Proposed to Owner as Alternative
  - Owner Reviews and Requests BT90 Be Considered with Option to Construct Future BT96
  - Engineer, Contractor, & Knife River Reevaluate and Agree to Proceed with BT90 Option

Chemult

- May 2005
  - Notice to Proceed by Contractor
  - ODOT Develops Bulb Tee 90 Standard Drawing
  - Knife River Orders New Form
  - Engineer Completes Contract Drawings
  - Knife River Develops Shop Drawings

Chemult

- June 2005
  - Materials Ordered
  - Forms Installed
  - Bed Hardware is Engineered and Installed
  - Production Begins
- July 2005
  - Girders Shipped and Erected

Chemult

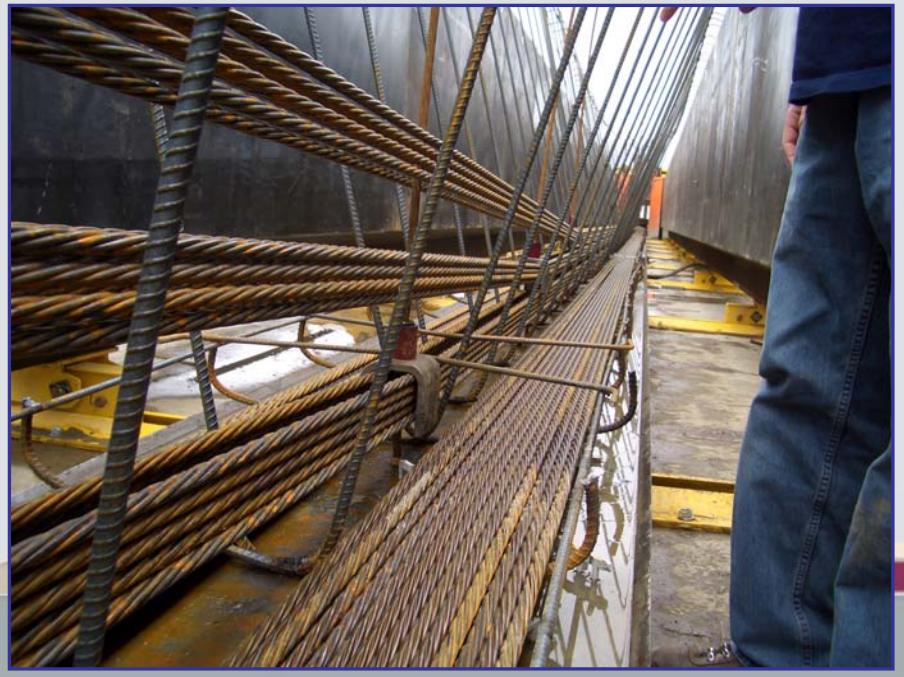
- Production

Chemult

- Production

Chemult

- Production



Chemult

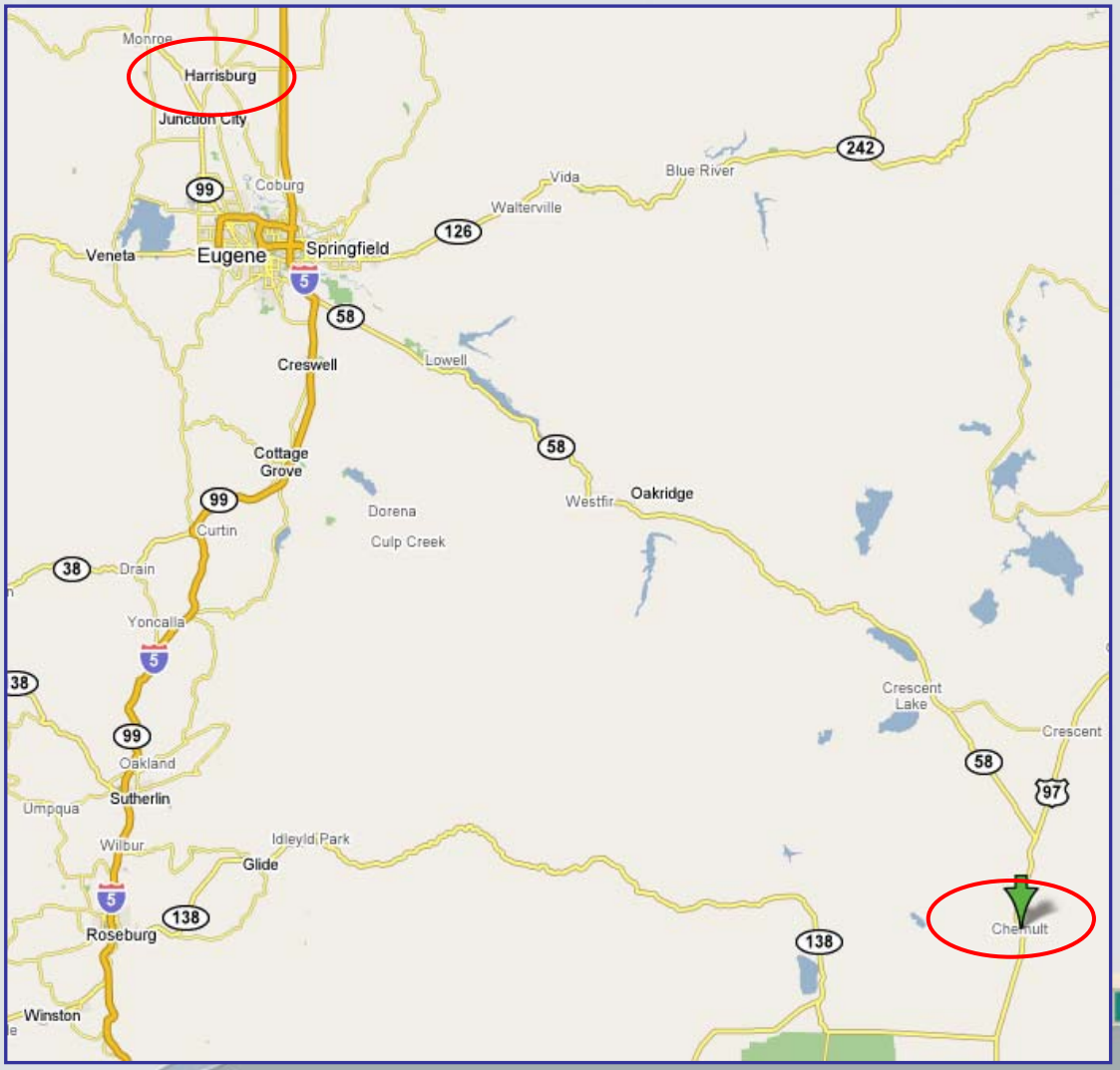
- Shipping
  - At the plant

Chemult

- Shipping
  - At the plant

Chemult

- Shipping



Chemult

- Shipping
  - Remote steerable unit

Chemult

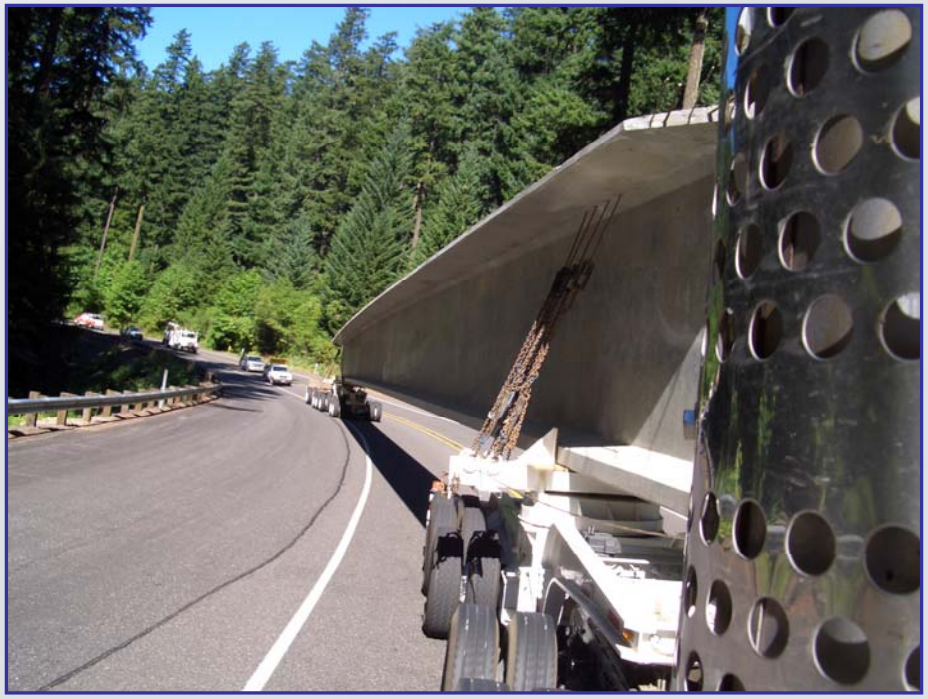
- Shipping
  - En route to Chemult (US97)

Chemult

- Shipping
  - En route to Chemult (US97)

Chemult

- Shipping
  - En route to Chemult (US97)



Chemult

- Shipping
  - Through the tunnel

Chemult

- Erection

Chemult

- Erection

Chemult

- Erection

Chemult

- Chemult Originally Supposed to be Boxes
- BT90 Met Industry Demands
- Allowed Structure Type to be Constructed
- Opened the Door for Future BT90 Projects

South Medford Interchange Project

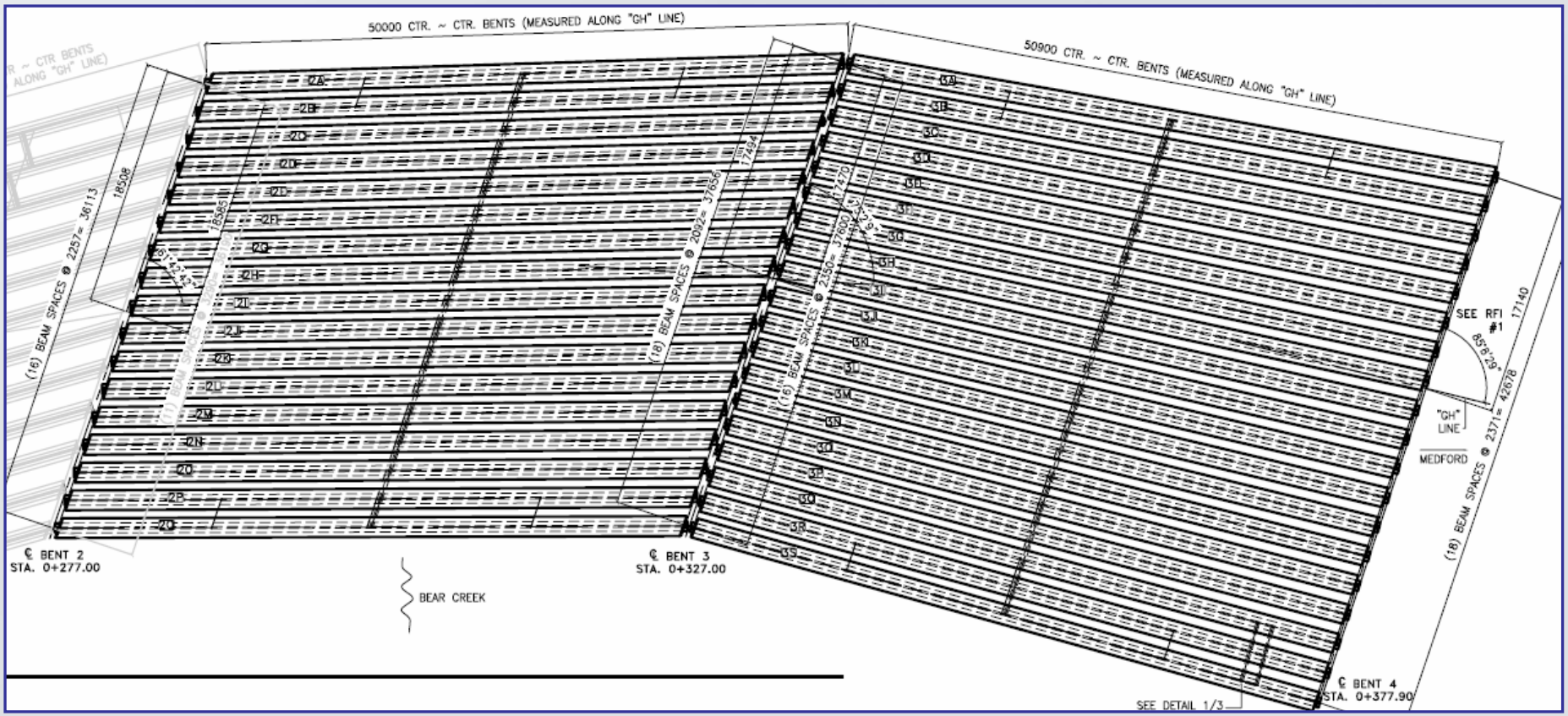
Highland Drive Over Bear Creek

South Medford Interchange

- Highland Drive Over Bear Creek
- (34) BT90's
- Originally Supposed to be BT84's
- Project Demands Pushed the Span Length

  → BT90 = Perfect Solution!

South Medford Interchange



South Medford Interchange

- Highland Drive Over Bear Creek

Span 2 = (16) BT90's

Span 3 = (18) BT90's

South Medford Interchange

- Highland Drive Over Bear Creek

South Medford Interchange

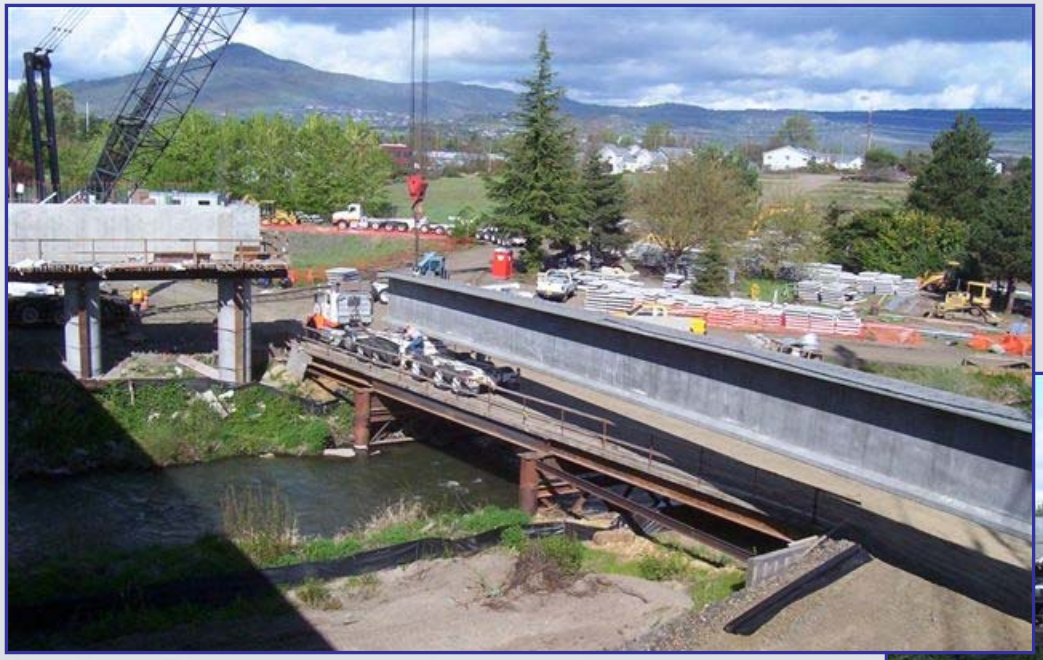
- Shipping

South Medford Interchange

- Shipping

South Medford Interchange

- Erection



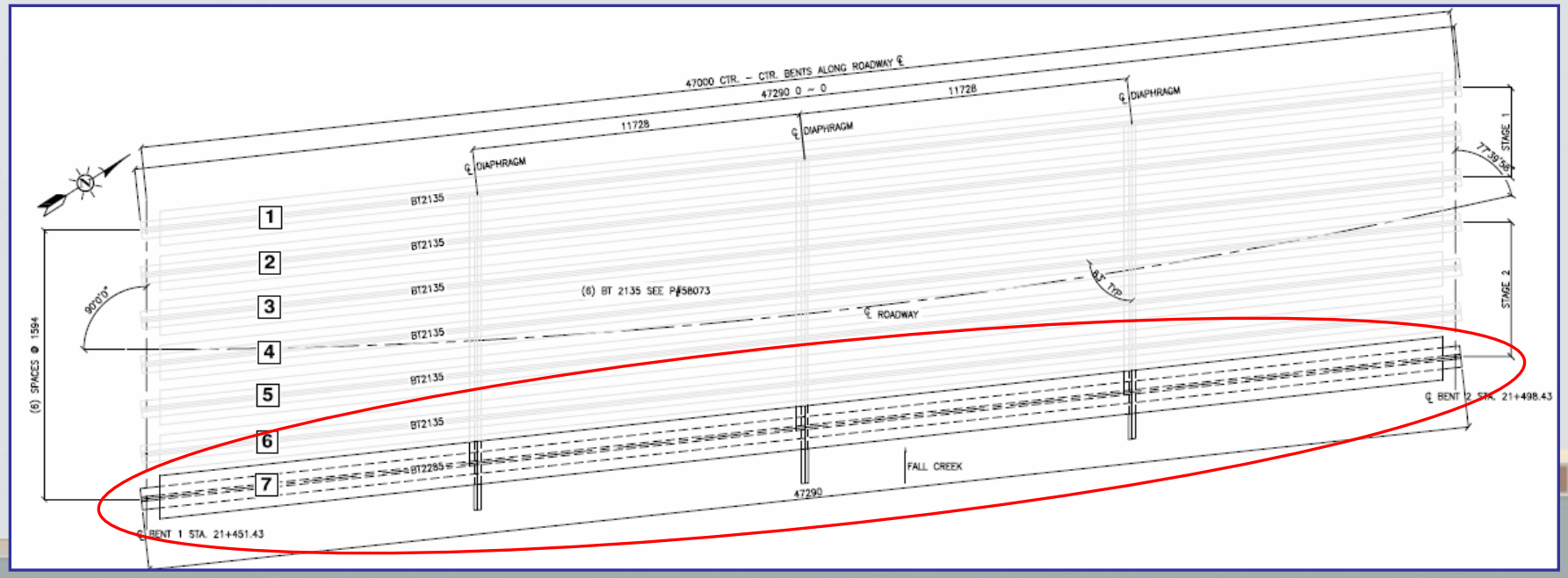
South Medford Interchange

- Erection

Fall Creek

Fall Creek

- Bridge Designed Using BT84's
- Curve Geometry Produced Large Overhang On Outside Girder
- BT90 Proposed & Used To Handle Overhang Loads



I-205 Light Rail Transit Project

I-205 Light Rail Expansion

- Project to Expand Portland's Current Light Rail Transit Line Along I-205

- (4) Bridges Utilizing BT90's
  - Johnson Creek Blvd Bridge (40 Girders)
  - Powell Blvd Bridge (4 Girders)
  - 92nd Avenue Bridge (8 Girders)
  - Foster Road Bridge (15 Girders)

I-205 Light Rail Expansion

Future BT90 Jobs

- Upcoming Jobs Include:
  - OR38: Elk Creek Crossing #1
  - OR38: Elk Creek Crossing #4
  - McKenzie River Bridge NB
  - McKenzie River Bridge SB
  - Yamhill River Bridge

Review

- History of the BT90 & Knife River's MOAB Casting Bed
- Case Study
  - Chemult
  - South Medford Interchange
  - Fall Creek
  - I-205 Light Rail Transit Expansion
- Future Jobs

The Main Idea…

- Oregon's BT90 Is An Excellent Solution!

The End

Thank You!

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