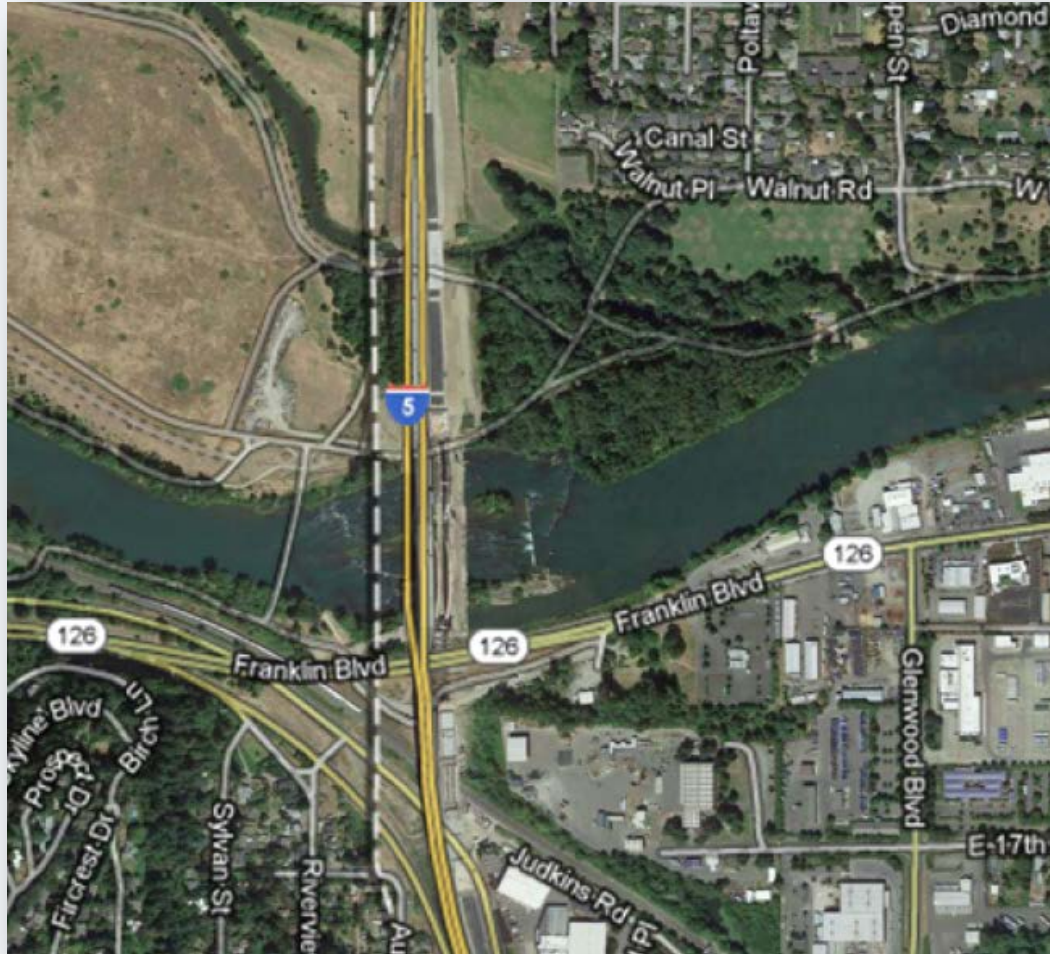




Glenwood Connector Pedestrian Bicycle Bridge: Minimizing Environmental Impacts Through Sustainable Materials and Minimal Project Footprint

By Scott Nettleton PE and Evan Sinn PE

Bundle 220 I-5: Willamette River Bridge



Bundle 220 I-5: Willamette River Bridge



SB Ramp Soundwall



Canoe Canal Liner



Sign Bridge



Patterson Slough



Channel Liner

Why a Bridge Viaduct?

- ▶ Pedestrian Path Dead End at the Springfield - Eugene City Limits
 - ▶ No controlled crossing in the area required pedestrians and bicycles to cross 4 lanes of traffic
 - ▶ No space for sidewalk along McKenzie Hwy



Pirates Cove

- ▶ Similar Project North of Depoe Bay



Before



After

Similar Solution - Extend the River Front Bike Path West along the River

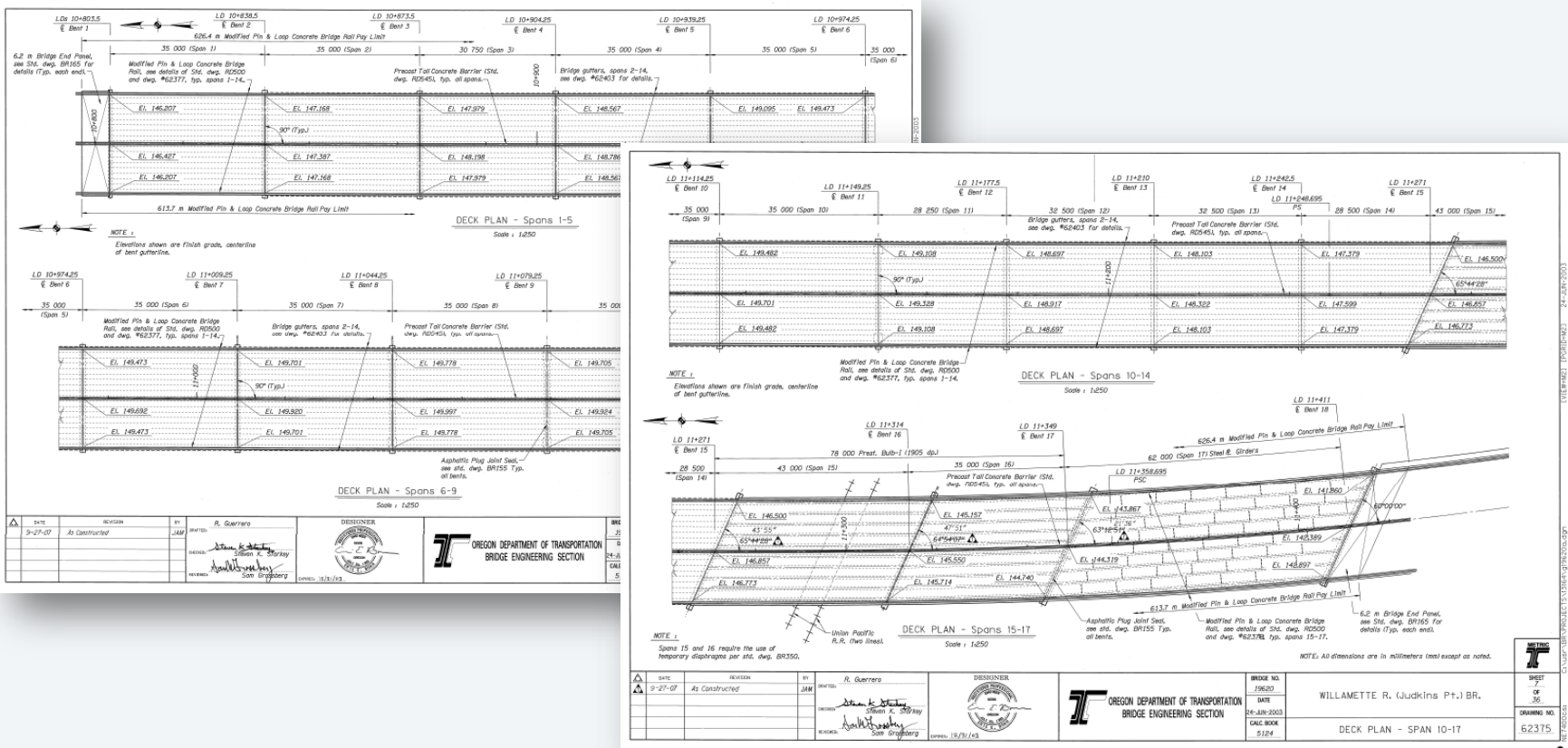
Existing Detour Structure

- ▶ Demolition and Removal Required



Opportunity

- Existing precast box girders were available from the detour structure



Advantage - Sustainability

- ▶ Reusing the box girders provided a sustainable and green solution to providing a viaduct structure
- ▶ Cost savings for reusing salvaged beams already on site
- ▶ Avoid storage of Beams, ODOT retained ownership

Site Challenges

- ▶ Access Limitations for Construction



Site Challenges

- ▶ Preserve the historic Mill Race Ruins
- ▶ Provide a viewing platform out of the typical jogging/bike path
- ▶ Coordinate with Willamette River Bridge Construction
 - ▶ Some elements of the viaduct needed to be constructed before the WRB was completed to allow for construction equipment to operate.



Opportunity

- ▶ Discontinuous Site Access for Construction of Foundations
- ▶ Avoid Falsework along the River Bank



Photo Courtesy Michael Kelley - OBDP

Advantage – ABC Design Techniques

- ▶ Use drilled shaft foundations with Hammer head configuration
- ▶ Use steel shells on columns as stay-in-place forms
- ▶ Precast Hammer heads, ABC design techniques, “Emulative” design



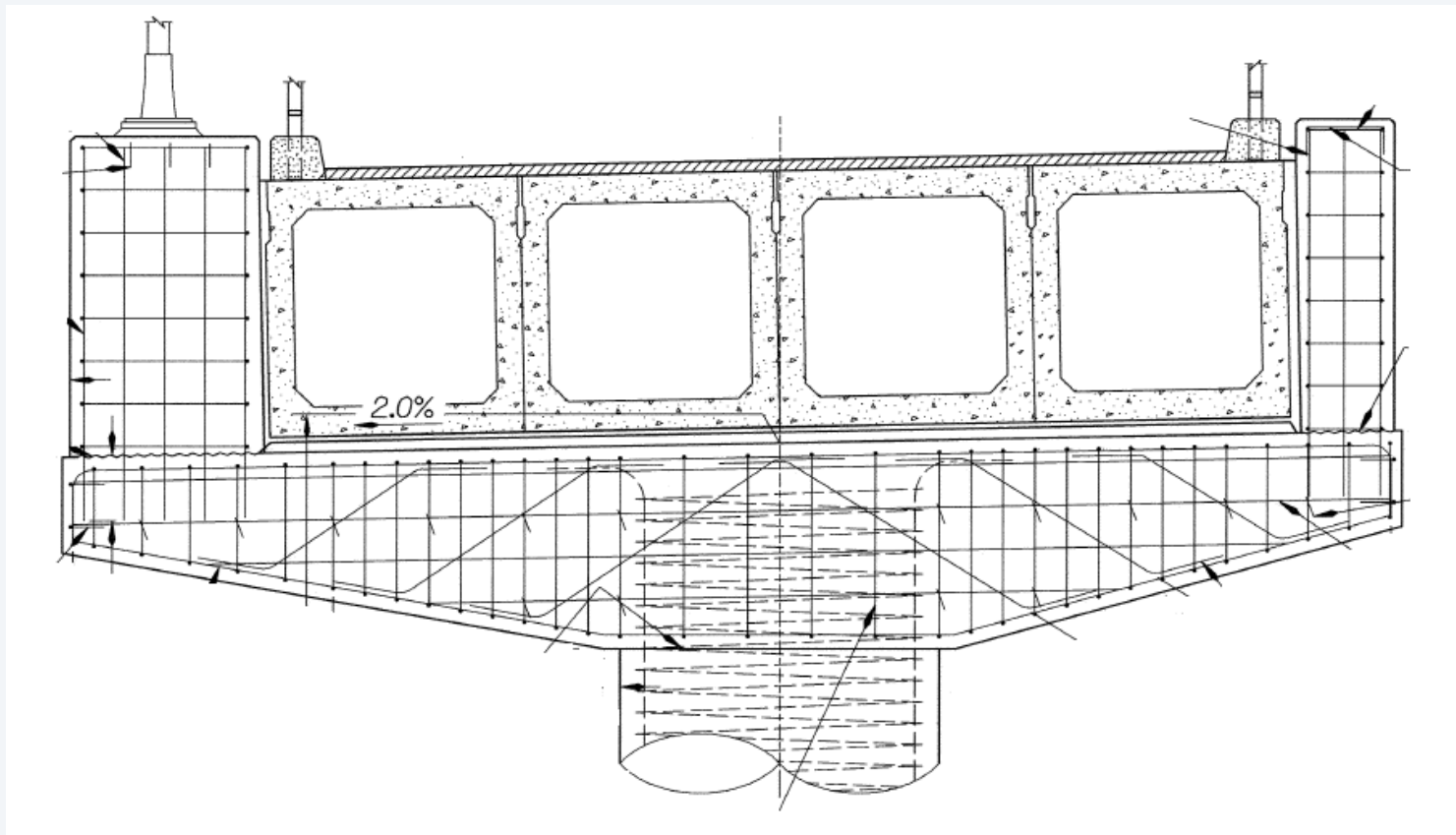
Advantage – ABC Design Techniques



Solution and Implementation

- ▶ Using the CMGC Process the Design and Construction Teams Developed a **Solution** Tailored to These Parameters:
 - ▶ Drilled Shaft Foundations
 - ▶ Discrete and Well Contained Construction Along River Bank
 - ▶ Precast Hammer Head caps
 - ▶ Avoid Falsework Support for Cast-in-Place
 - ▶ Stay-in-Place Steel Shell Used as a Column Form
 - ▶ Avoid Column Form Stripping Near Waterway

Basic Design Concept



Technical Design Challenges

- ▶ Cap to column connection



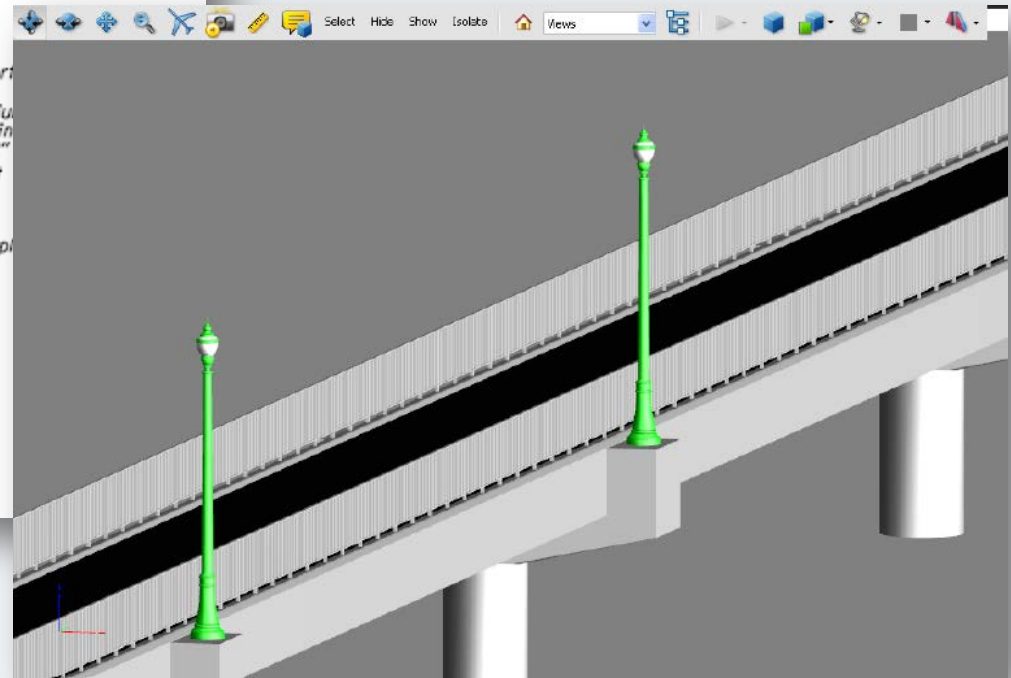
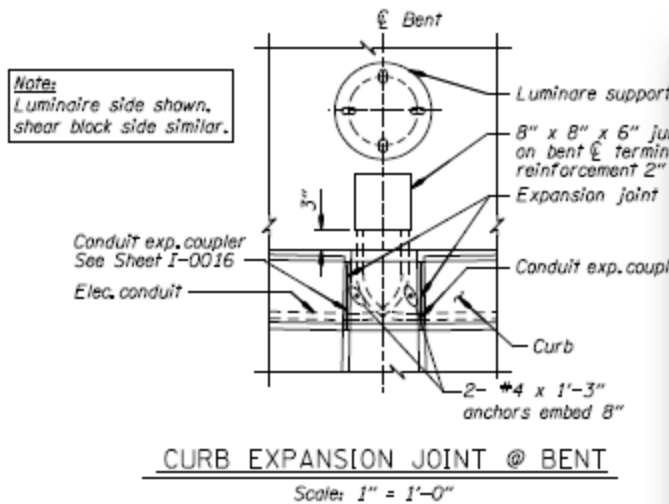
Technical Design Challenges

- ▶ Connection from column to shaft with pipe casing
- ▶ Using box girders on a curved alignment created added joint detailing



Technical Design Challenges

- ▶ Conduit for lighting required creative placement of conduit in retrofit curb



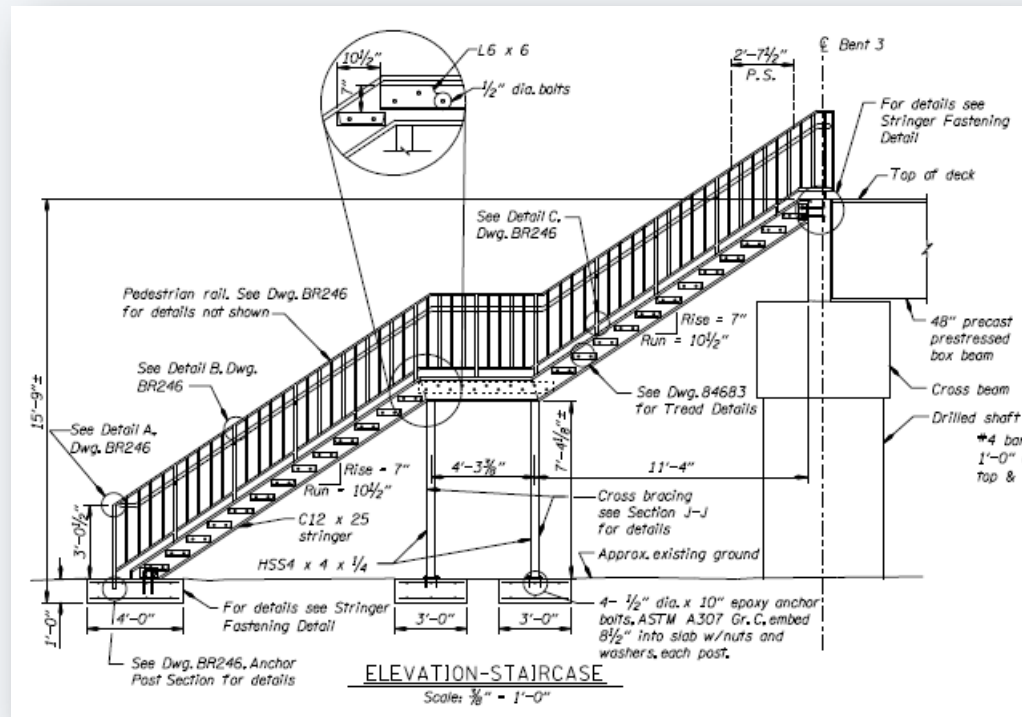
Technical Design Challenges

- ▶ Adapting/Repurposing Existing Box Girders
 - ▶ Refinishing of Existing Girders



Something to Consider when repurposing, to obtain a clean finish requires hand work at relatively high expense

Interesting Design - Staircase



Access to the Ground to View the Mill Race Ruins
Required special dispensation for a non-ADA access

Construction Process



Construction Process



Construction Process



Construction Process

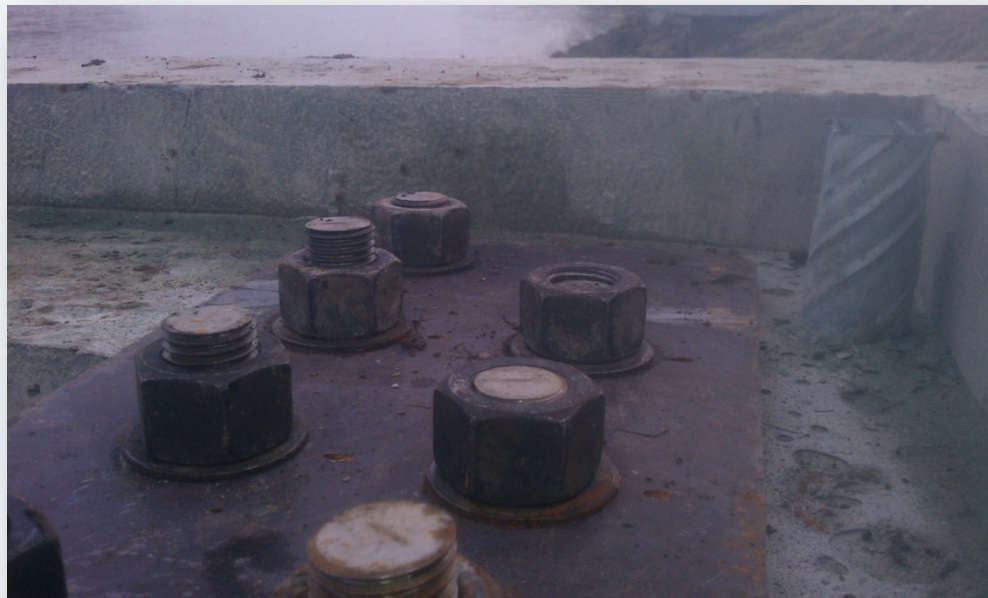


Construction Process



Construction

- ▶ Ensure proper placement of threaded rods before concrete is cast



Careful Placement Specifications required, should always check and double check. The bottom could have been raised slightly to avoid the short bar as shown.

Construction

- ▶ All bolting hardware can be black, and was. Should avoid hot dip galvanizing of high strength rods



- ▶ The portion of bolts in the column required sleeves to ensure proper determination of tensioning force
 - ▶ Use of corrugated sleeve has excellent performance

Construction

- ▶ Specify a class II finish on the exterior of reused beams to help with aesthetics
 - ▶ Can be costly, lots of hand work to accomplish



Construction

- ▶ Difficulty with casing connection into drilled shaft
- ▶ Some grout tubes were plugged or crimped
 - ▶ Required retrofit for placement, perhaps specify steel?



QUESTIONS?



Owner – City of Springfield

Contract Admin – ODOT Region 2,
Springfield Office

Bridge Engineer – TY Lin International

Contractor – Hamilton Construction in
Joint Venture w/ Slayden Construction

Alignment/Civil- OBEC

Construction Inspection – Oregon Bridge
Delivery Partners