



PreFabricated Bridges & Accelerated Bridge Construction

**Barron County Workshop & Bridge Tour
September 6, 2023**

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Short Span Steel Bridge Alliance



Today's Presentation

Accelerated Bridge Construction

Prefabricated Bridges:

Shop Fabrication Quality

Shipped as Modules

Lifted into Place

Versatile Riding Surface

Cost

Convenience

**County Forces Built Bridges
Construction (ABC)**

Three Steel Bridge Case Studies for 4 C's

Cost, Convenience, County Built and Construction (ABC)

Modular Beam Bridge

Buried Steel Bridge

Modular Beam Bridge

Accelerated Bridge Construction (ABC)

FHWA (<http://www.fhwa.dot.gov/bridge/abc/>):

“ABC is bridge construction that uses innovative **planning, design, materials, and construction methods** in a safe and cost-effective manner to reduce the onsite construction time that occurs when building new bridges or replacing and rehabilitating existing bridges.”

ABC improves:

- Site Constructability
- Total project delivery time
- Work-zone safety for the traveling public

ABC reduces:

- Traffic Impacts
- Onsite construction time
- Weather-related time delays

Pre-Fabricated Bridges

Steel bridges meet owners' and the public's desire for economy, aesthetics, performance and accelerated construction.

Benefits (FHWA Resource Center: Prefabricated Bridge Elements & Systems)

Time Savings: concurrent fabrication, construction & less weather issues

Cost Savings: reduced construction time, reduced traffic delays

Safety Advantages: reduced exposure to hazards

Increased Constructability: elements constructed off-site and put in place

Now for the Showcase of Bridges

Pre-Fabricated Modular Beam – County Crew Built

Seltice-Warner Bridge, White Road, Whitman County, WA

Fabricator: BigR/Contech Engineered Solutions

Contractor: Whitman County Crew

Design Engineer: Mark Storey, County Engineer



Existing Structure – 30 ft Span, 20 ft Wide

Built/Rebuilt 1952/1986

Wood with Wood Piles & Wood Backwalls

Wood Deterioration & Susceptibility to Scour

Replacement Structure Requirements

Increase Hydraulic opening – 30 ft Channel

Raise Clearance for 100 yr Flood

Gravel Roadway

Piles with Alluvium Soils / Scouring



Pre-Fabricated Modular Beam

Foundation and Abutment

County Owned Pile Driver (44 ton/pile)

H12x53 Pile Cap



Pre-Fabricated Modular Beam

Bridge Structure

35 ft Span x 28 ft Wide

2-Girder Modules / 3 Modules

Shipped on One Truck

Fully-Assembled

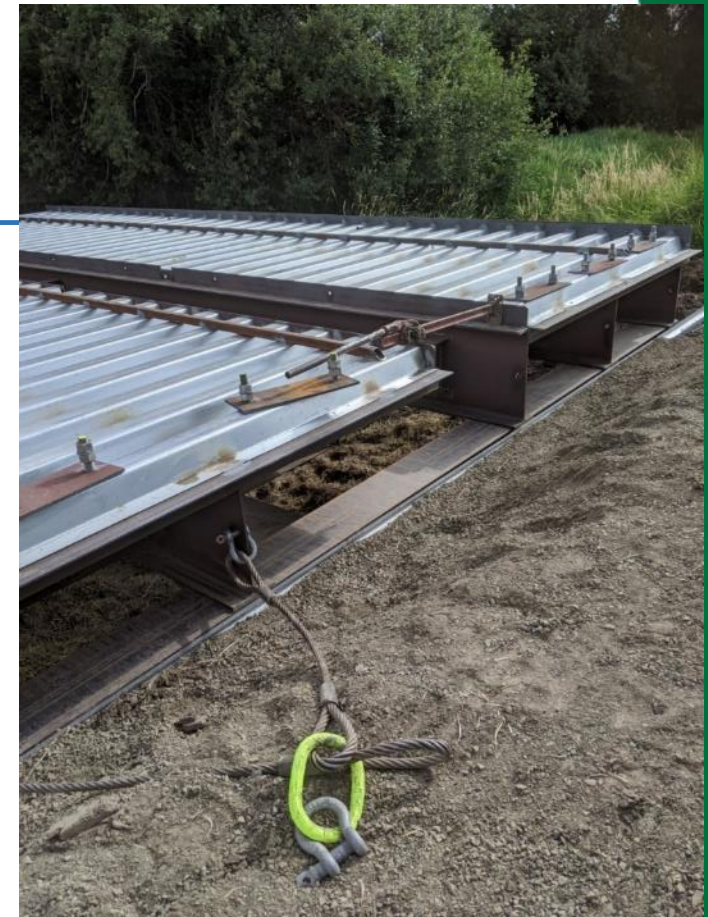
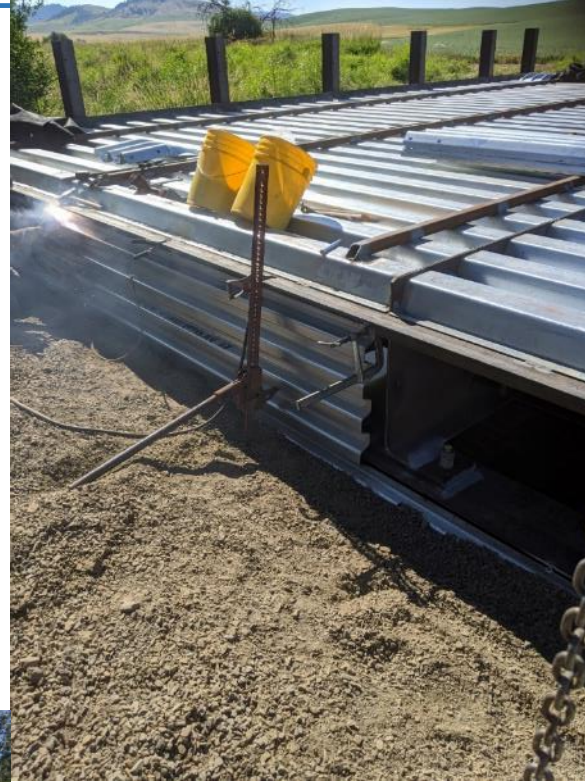
CSD and Dams

Simple Connections



Pre-Fabricated Modular Beam

SuperStructure Erection



Pre-Fabricated Modular Beam

Timing

Excavation, Stream Restoration &
Bridge Installation ~ 4 Weeks

Costs

| | |
|----------------------|-----------|
| Steel Superstructure | \$ 59,000 |
| Labor & Equipment | \$ 70,000 |
| Pile Foundations | \$ 20,000 |
| Permitting | \$ 10,000 |
| Total | \$159,000 |

\$ 162.25 / ft²

Concrete Superstructure Alternative \$ 82,000



Buried Steel Bridge - Corrugated Steel Plate – Contractor Built

VT Route 2B Bridge Replacement, St. Johnsbury, VT

Contractor: JP Sicard

Fabricator: Big R Bridge

28 day max. trail closure / 50 day road closure for all work

47'11" span x 26'9" rise Arch



Greeley, CO



Buried Steel Bridge - Corrugated Steel Plate



Deep Corrugated Steel Buried Bridges



I-44 over Entrance Ramp from Route 96



I-44 over CR 1147



Buried Steel Bridge - Corrugated Steel Plate



VT Route 2B Bridge Replacement, St. Johnsbury, VT

Pre-Fabricated Modular Beam – Contractor Built

Brookfield 100 Road, Hancock Forest Management, Cathlamet, WA

Fabricator: BigR/Contech Engineered Solutions

Contractor: Quality Excavation

Design Engineer: Pacific Forest Resources



Existing Structure – 36” Pipe

Barrier to fish movement

Restricts 6+ feet of natural stream width

Inundated by Columbia River tidal influence zone

Replacement Structure Requirements

Increase Hydraulic opening

Needed 55 – 60 ft span

Poor soil bearing capacities

Large equipment difficult in forest setting

Special logging U-80 Vehicle



Pre-Fabricated Modular Beam

Structure Considerations

- Poor Soils on Right End

- Steel-Bin Abutment

- Vertical Abutment Allowed 50 ft Span

- Light Superstructure

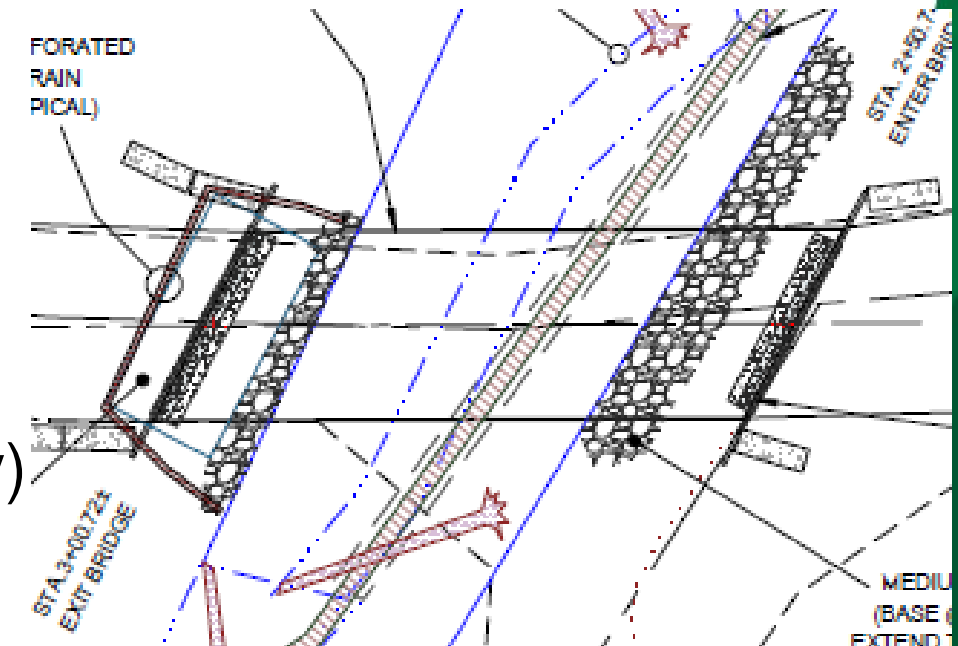
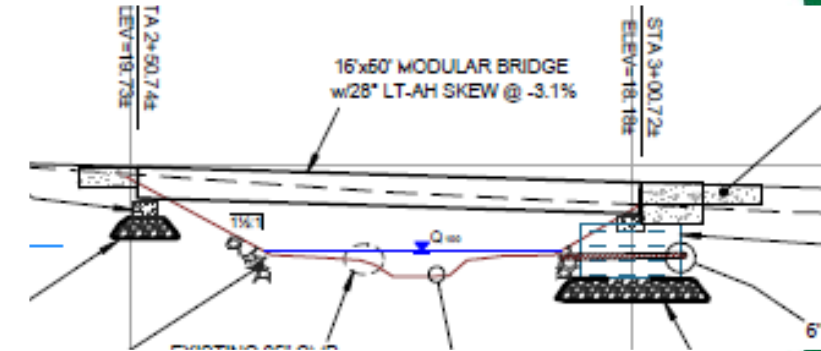
- Gravel Roadway for Forest Service

- Control of Debris into Creek

- Erection Equipment

- Two Excavators (~15 kip capacity)

- Modular Superstructure



Pre-Fabricated Modular Beam

Substructure Considerations

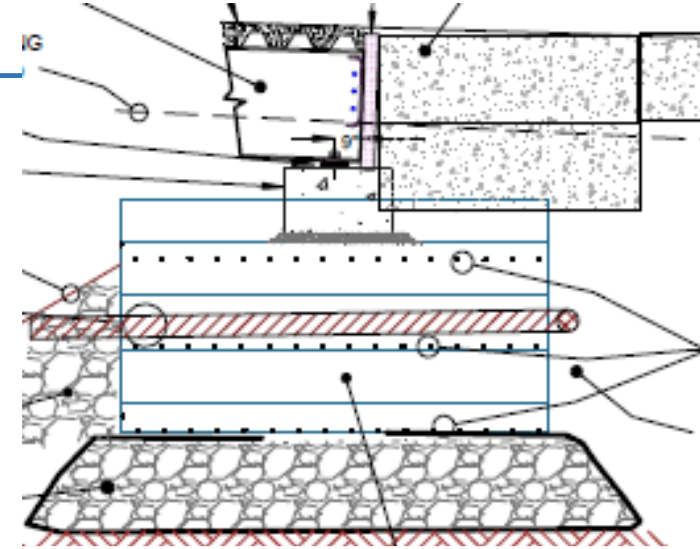
Poor Soils on Right End
Equipment – Piles Difficult

Steel-Bin Box Abutment

10 ft x 20 ft x 6 ft Bin
Geogrid Layers at 16"
Precast Sill
Rip-Rap Protection

Left Abutment Better Material

Precast Sill
Rip-Rap Protection



Pre-Fabricated Modular Beam

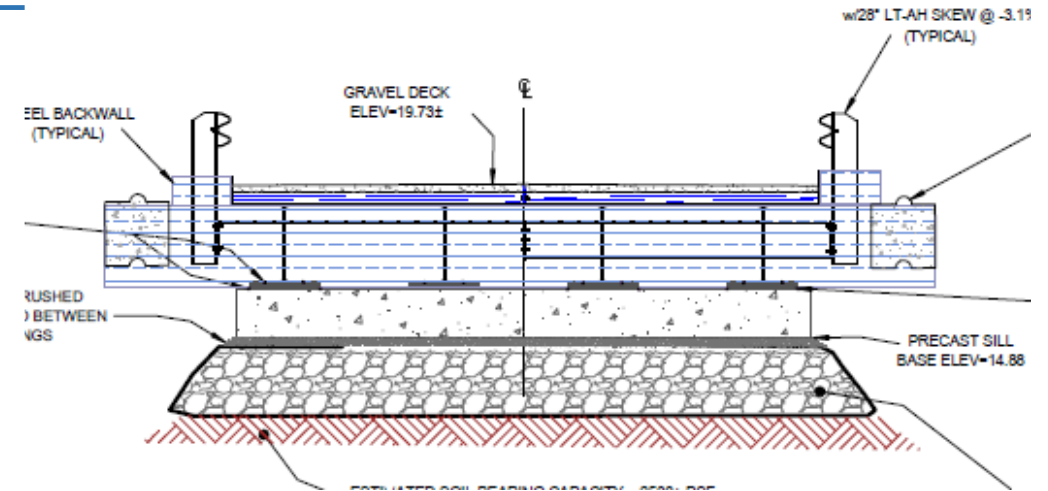
Substructure Construction



Pre-Fabricated Modular Beam

Superstructure Considerations

- Abutment Capacity
- Equipment Capacity
- Handling
- Convenience



BigR/Contech Modular Bridge

- 2-Girder Modules
- Fully-Assembled
- 19.5 kip each
- CSD and Dams
- Simple Connections



Pre-Fabricated Modular Beam

Superstructure Erection



Pre-Fabricated Modular Beam

Timing

Excavation, Stream Restoration &
Bridge Installation – 2 Weeks

Costs

| | |
|----------------------------|-----------|
| Bridge, Sills, & Steel-Bin | \$ 68,500 |
| Labor (Prevailing Wage) | \$ 77,500 |
| Engr, PM, Survey, Misc | \$ 17,000 |
| Total | \$163,000 |

\$ 203.75/ft²



SSSBA Solutions



High Quality Beautiful Bridges
Economical
ABC



PreFabricated Steel Bridges

Take-Aways – Steel Bridges

- Economical

 - Lighter Superstructure

 - Lighter Equipment

 - Lighter Abutments

- Ease of Erection

 - Modular

 - Accelerated Bridge Construction

 - Match-Fit Fabrication

- Sustainability

 - Carbon Footprint

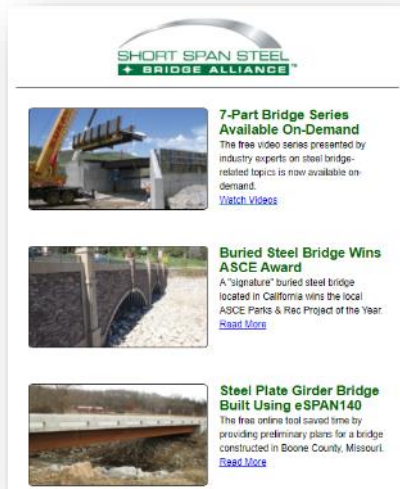
 - Recyclable

 - Reusable / Movable

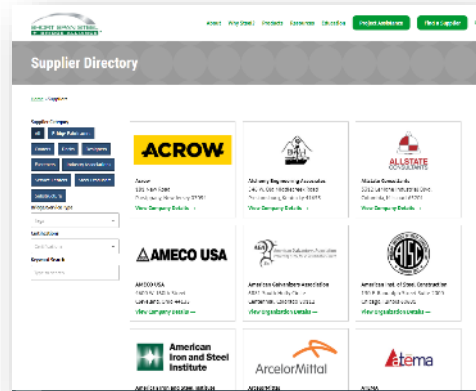


5 Ways to Keep Learning About Steel Bridges

1. Subscribe to the Weekly Newsletter



2. Find a Supplier



3. Design a Bridge in 5-Minutes



4. Receive Free Project Assistance



5. Schedule a Workshop/Webinar



www.ShortSpanSteelBridges.org

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