



# PreFabricated Bridges & Accelerated Bridge Construction

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Barron County Workshop & Bridge Tour  
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Short Span Steel Bridge Alliance



# Today's Presentation

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## 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)

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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

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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

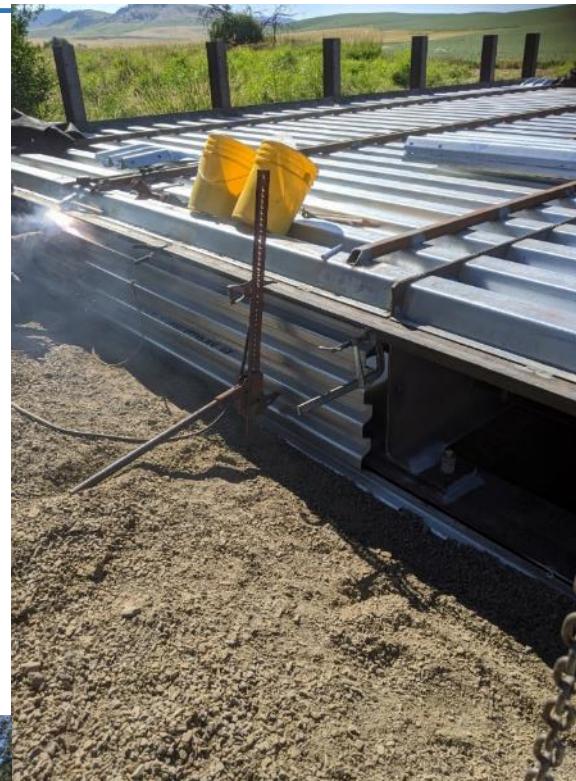
CSD and Dams

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 / ft<sup>2</sup>

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**



# Buried Steel Bridge - Corrugated Steel Plate

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# Deep Corrugated Steel Buried Bridges

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I-44 over Entrance Ramp from Route 96



I-44 over CR 1147



# Buried Steel Bridge - Corrugated Steel Plate

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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

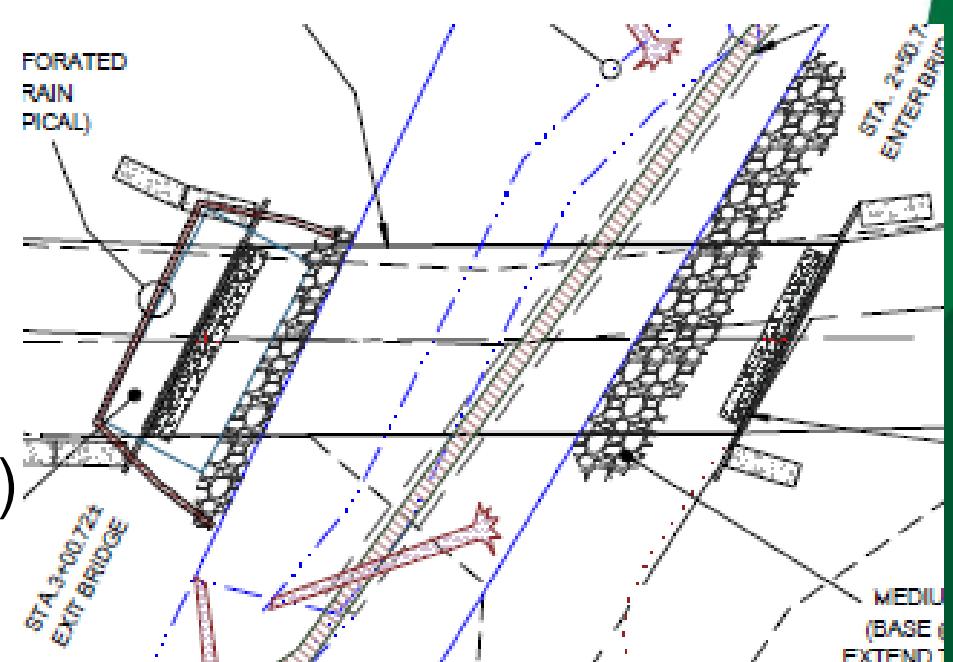
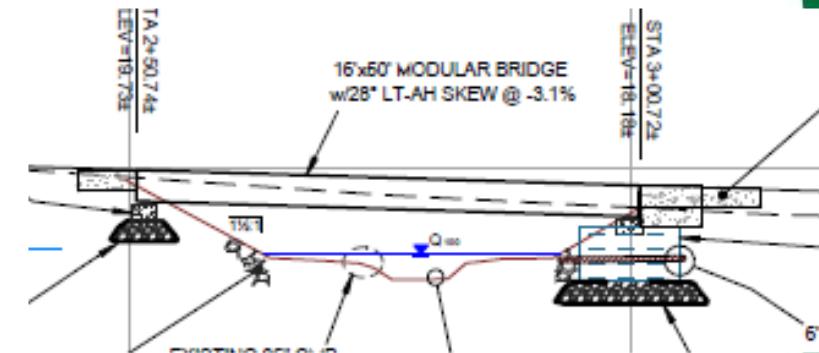
Light Superstructure

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

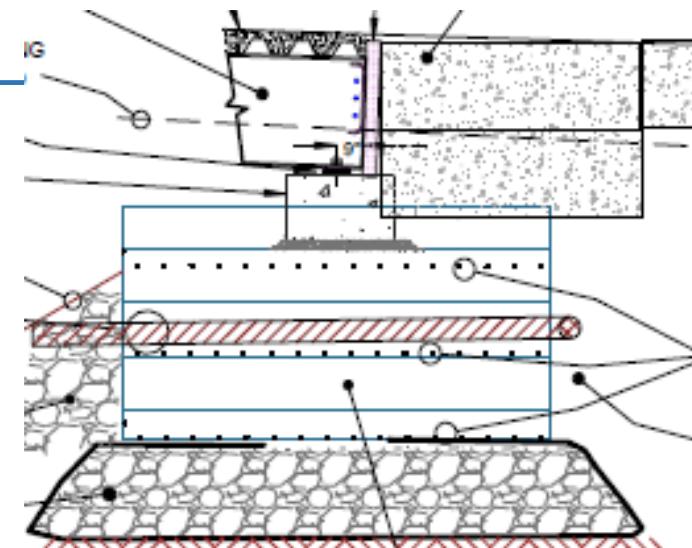
Poor Soils on Right End  
Equipment – Piles Difficult

## Steel-Bin Box Abutment

10 ft x20 ft x 6 ft Bin  
Geogrid Layers at 16"  
Precast Sill  
Rip-Rap Protection

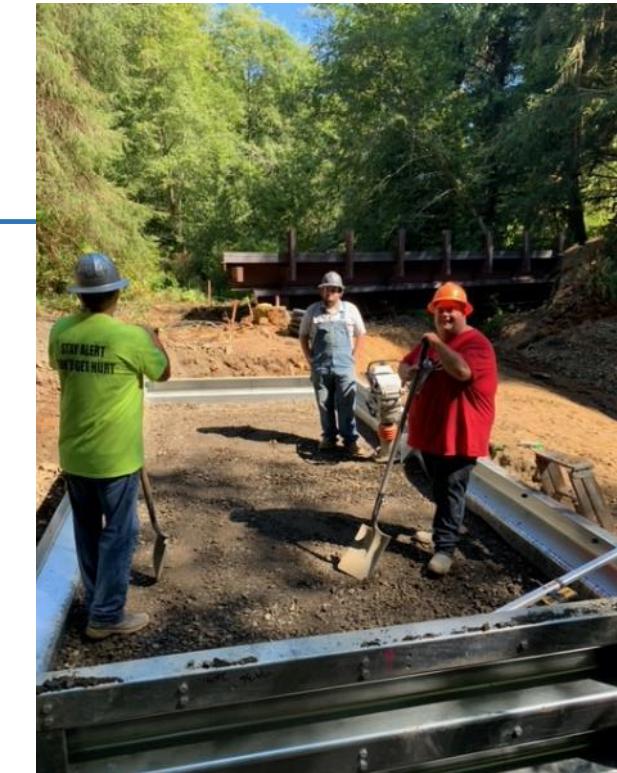
## Left Abutment Better Material

Precast Sill  
Rip-Rap Protection



# Pre-Fabricated Modular Beam

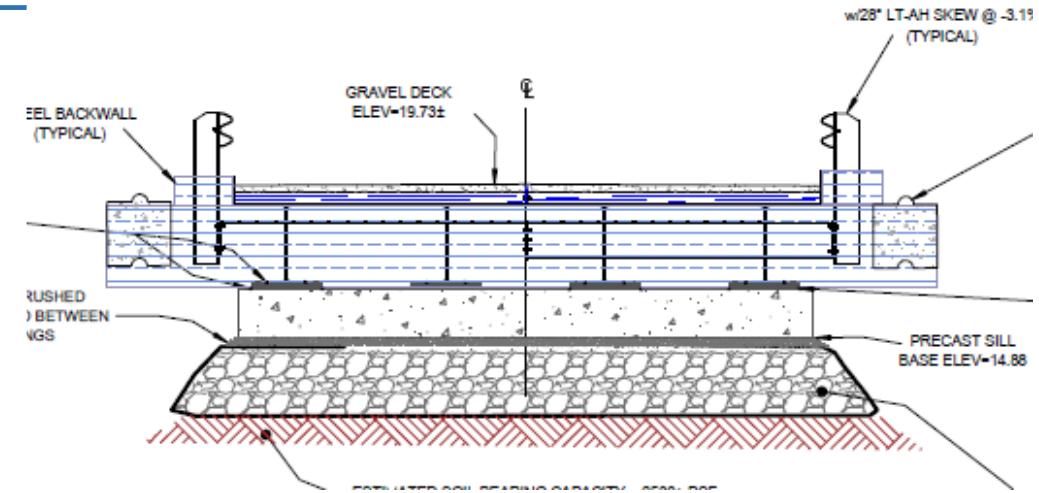
## Substructure Construction



# 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/ft<sup>2</sup>



# 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

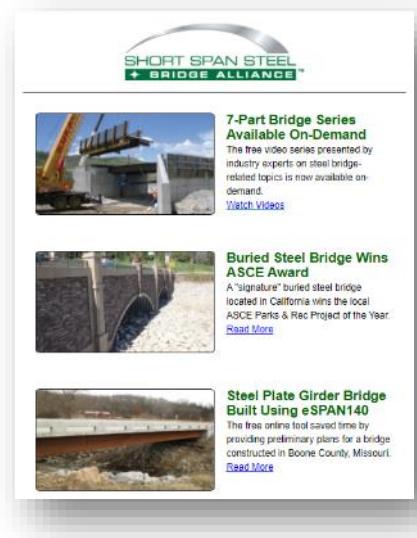
- Recyclable

- Reusable / Movable

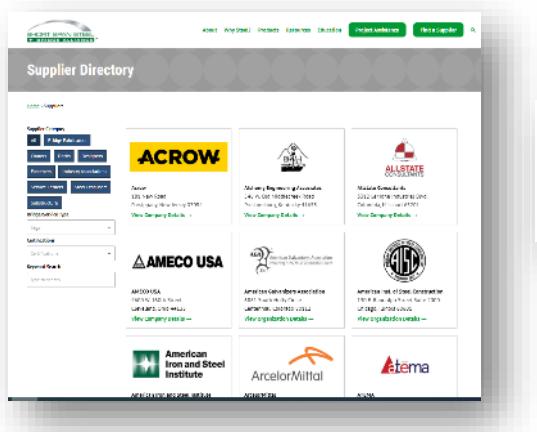


# 5 Ways to Keep Learning About Steel Bridges

## 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](http://www.ShortSpanSteelBridges.org)

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