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ACEC/NCDOT Spliced Girder Workshop

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Spliced Girder Bridges

- Fabricate girders in pieces shorter than final structure
  - For fabrication, handling or transportation
  - Partial or full span segments
- Assembled at site to obtain final structure
- Cast-in-place concrete at splices
- Post-tensioning is typically used to join the pieces

Spliced Concrete Girders

Makes long-span concrete solutions viable

- Provides a new design alternate that leads to improved economy

Not a new concept

- Built in US as early as 1954

Can lead to dramatic span increases

Details are very important

Overview

- *Introduction*
- *Reasons to use spliced girders*
- *Typical applications*
- *Basic concepts and special issues*
- *Examples of spliced girder bridges*
- *NCHRP Report 517*

Reasons to Use Spliced Concrete Girders

- Design Issues
- Construction Issues
- Economical Issues

Design Issues

Provide longer spans

- Avoid placing piers in water
- Avoid other obstacles
- Eliminate piers for safety
- Reduce number of substructure units
- Minimize structure depth
- Reduce number of girder lines
- Eliminate joints
- Improve aesthetics
- Continuity for seismic or impact loads

Construction Issues

Full-span girders are too large

- Fabrication and handling
- Transportation
- Erection

Depends on

- Fabricator’s facility and equipment
- Access to the site
- Contractor’s preferences and equipment

Economical Issues

Generally requires a compelling issue

- Reduced construction costs
- Reduced fabrication time
- Increased costs for PT
- Increased costs for temporary supports

New approaches to contracts where Contractors are lead party

- Design/Build
- Value Engineering

Typical Applications

- *Simple Spans*
- *Continuous Spans*
- *Seismic Applications*

Simple Spans

- ***Very long spans***
  - ***Single Point Urban Interchanges (SPUIs)***
- ***Remote sites***
- ***Sites with limited access***
- ***Limitations of fabricator’s or contractor’s equipment***

Continuous Spans

- *Very long spans*
  - *Intracoastal Waterway*
  - *Other waterways*
  - *Viaducts*
- *Minimum depth or fewer girders*
- *Limited substructure locations*

Seismic Applications

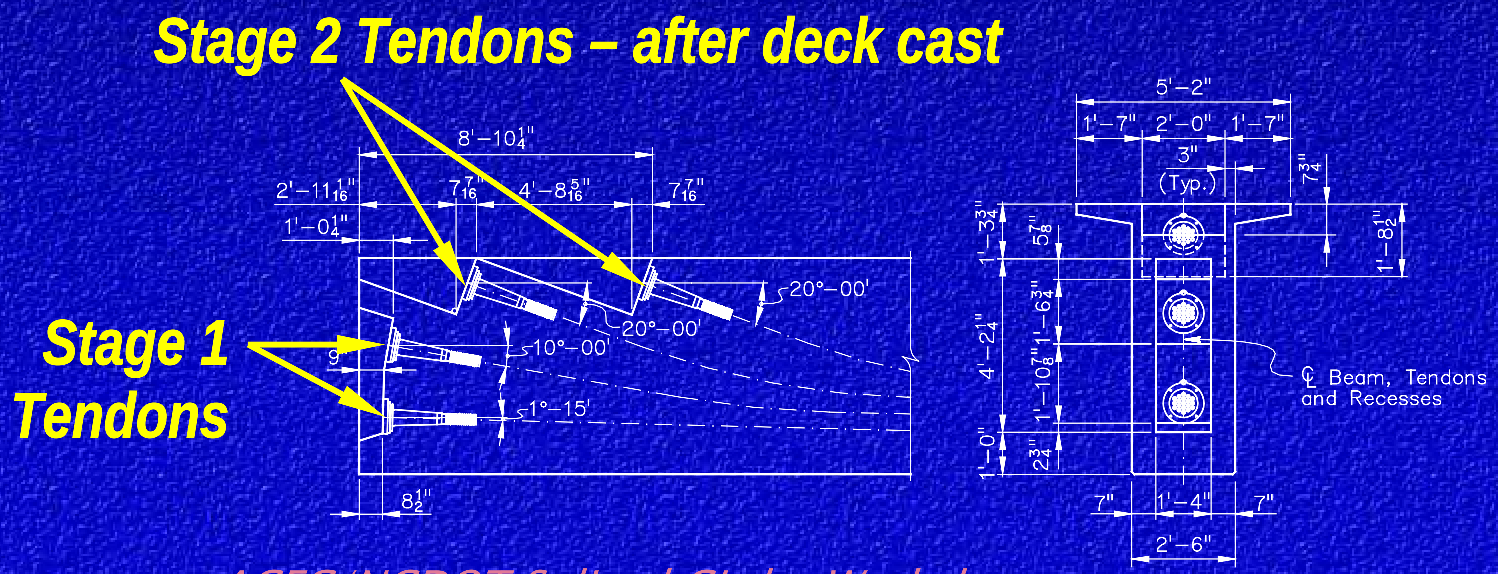
- ***Continuity***
- ***Integral connection to substructure (integral caps)***
- ***Compared to cast-in-place construction***
  - ***Eliminate or reduce falsework***
  - ***More rapid construction***

Basic Concepts & Design Issues

- Design issues
- Fabrication details
- Erection details
- Splice details
- Post-tensioning and grouting

Design Issues

- **Post-tensioning**
  - Post-tensioned in the field for splicing, often staged
  - Losses
  - Secondary moments
  - Deformations during PT



Design Issues

Restrained deformations

- Time-dependent effect may become significant
- More refined analysis

Cross-section types

- I- or Bulb Tee girders
- Open-topped boxes

Fabrication Issues

- Post-tensioning ducts
- End blocks and anchorages
- Haunched pier segments
- More intensive fabrication effort

Erection Issues

- Temporary towers
- Strong-backs
- Launching
- Splicing before placement

Splice Details

- Duct splicing
- Wet joints
- Match-cast or machined forms
- Shear keys

Post-Tensioning & Grouting

Details

Procedures

Specifications

Inspection

- *Construction*
- *Long-term*

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Examples of Spliced Girder Bridges

Examples of Spliced Girder Bridges

Simple Spans

- Remote Site
- Urban Site

Continuous Spans

- Urban Site
- Interstate Crossing
- Rivers & Coastal
- Seismic

Spliced Concrete Girder Projects

Simple Spans

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- Klickitat County, WA
- Rock Cut Bridge, WA
- I-15 Reconstruction, Salt Lake City, UT