Bridge Widening Issues

Bridge Division
Alanna Bettis, P.E.
Steps to Consider when Widening

- Existing Plans and Structural Adequacy
- Substructure
- Superstructure
- Bridge Railings
- Safety
- Specific Bridge Sections
Existing Plans and Structural Adequacy
Existing Plans

- Widen with Same Superstructure
- Design Manual Examples
- Modifications to Beam Standards
- End Conditions
Structural Adequacy

- Condition Survey
- Load Rating
- Analyze the Existing Substructure
Consider Widening to One Side
Substructure Considerations

• Abutments
• Bents
• Bearing Seats
• Foundations
Abutment and Bent Design

Model of Completed Cap
Abutments Back Walls

- Match Location
- Match Width
- Match Face
Abutment Connections

- Extend Reinforcing
- Break Back Foundations
Abutment Connections

Dowel Connection
- 4 ~ No. 6 or No. 9 bars
- Extend 1’-6” into both zones
- DO NOT USE 1-¼” DIA SMOOTH DOWELS
- Slope Dowels
Separate Bents

- Separate Caps for Large Widenings
- Vehicular Protection

- Single Column
  Lacks Redundancy
- Room for Forms
Connected Bents

- Small Widenings
- Match Cap Width
Connected Bents

- Beam Depth
- Match Cap Width
Bent Connections

Dowel Connection
• 4 ~ No. 6 or No. 9 bars
• Extend 1’-6” into Both Zones
• DO NOT USE 1 ¼” DIA SMOOTH DOWELS
• Slope Dowels
Abutment and Bent Cap Connections

Other Connection Types

• Welded Splice Connection
  – 7” Projection (Single)

• Mechanical Couplers
  – 12” Projection (Desired)
Abutment and Bent Cap Details

• End Conditions
  – Fixed/Expansion
  – Diaphragms
  – Earwalls
  – Shear Keys

• Match Joint Type
Bearing Seats

- Lower Bearing Seats
- Match Existing Profile
Foundations

- Boring Logs
- Locate Existing Foundations and Utilities
- Same Foundation System
- Headroom
Superstructure Considerations

- Slab
- Beams
- Vertical Clearance
- Longitudinal Joints
Slab

- Prefer Lap Existing Bars
- Prefer 12 foot Lanes
Slab Re-Decking

To Consider on a Re-decking:

• Changes in Slab Thickness
• Make New Deck Composite to Existing Beams
Vertical Clearance

- MUST Calculate for Lower Roadways
- Beam Depth
Longitudinal Joint Locations

Widened

Existing

Possible PCP

Const Joint

Maintain Traffic Flow and Structural Integrity
Bridge Railing
“…it is Texas policy to bring all bridge railing to current standards on bridges that are being widened…”
Important Note: Update Rail on Both Sides
Safety
Safety Barriers

- Vehicular Safety
- Worker Safety
- Concrete Barrier
- Steel Rail
- Analyze Existing
Safety Barriers

- Common Shape CSB
- Replaces the CTB Shape
- Pin CSB
Safety Barriers

- T6 or T101 Rail
  - Less Edge Distance
  - Bolted Through Slab
Specific Bridge Sections

- Pan Girders
- Slab Span Bridges
- Farm System (FS) Slabs
Pan Girders: Widen with Pan Form

Methods

• Break back and Extend
• Widen and Remove
• Pie Shape
Pan Girders: Break Back and Extend

- Break back Overhang
- Extend Existing Steel
- Roughen Concrete
- Dowel at Ends
Pan Girders: Widen and Remove

- Dowel
- Cast New Pan Form
- Remove Curb

*Modify as necessary to make up required overall width. Modify standard stirrups in this area.*
Pan Girders: Pie Shape

- Old CGC Style
- Remove Curb and Top of CGC
- Cast New Pan Form
Pan Girders: Widen with Box Beams

- Vertical Clearance Issues
- Dowel and Widen
- Roughen Exist
- CIP Shear Key
Pan Girders: Widen with Double Tees
Farm System (FS) Slabs

FS Standard Detail (March 1947)

GENERAL NOTES:
Design: 2 Lanes H-10 Loading. A.A.S.H.O. (1941) Specifications, except moment distributed in accordance with the provisions of University of Illinois Experiment Station Bulletin No. 346.

CROWN DIAGRAM (Top & Bottom of Slab)

4" x 0 9" Tile drain pipe, Trowel 1/2" entrance depression.
Slab Span Bridges
Dowel and Cast New Slab
Slab Span Bridges

Cut Curb
Questions?

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