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

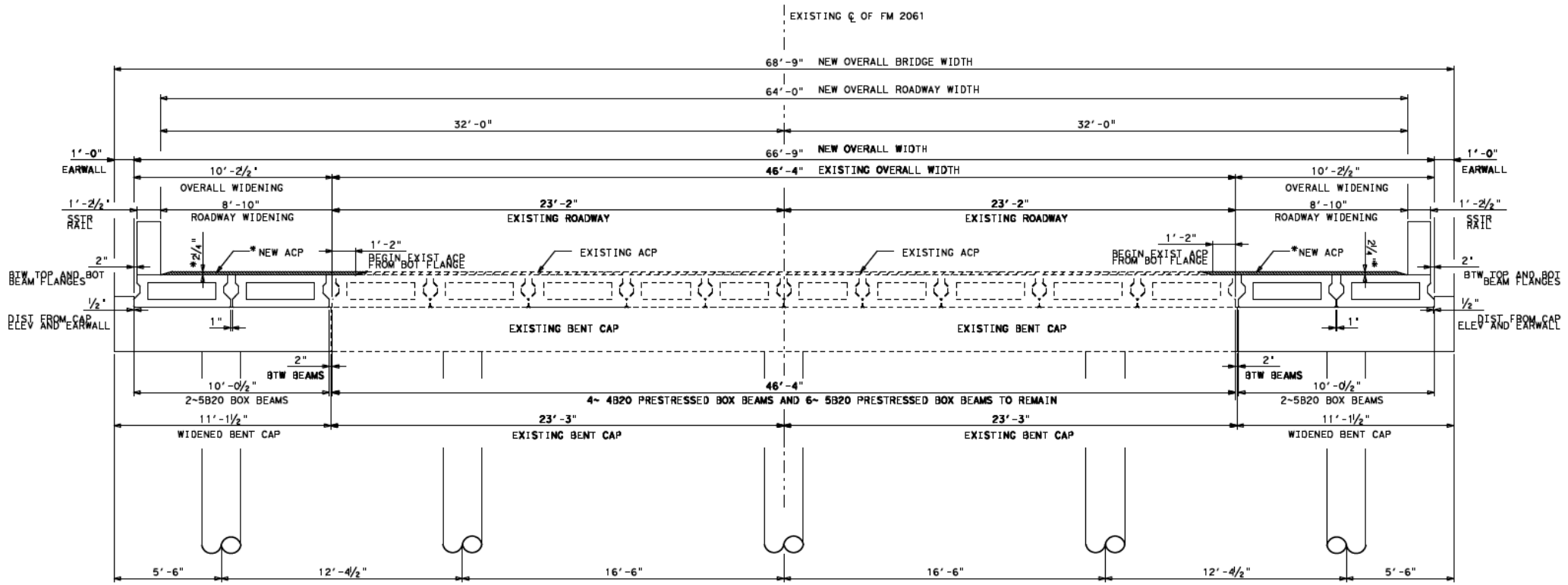
- Condition Survey
- Load Rating
- Analyze the Existing Substructure

Consider Widening to One Side

Substructure Considerations

- Abutments
- Bents
- Bearing Seats
- Foundations

Abutment and Bent Design



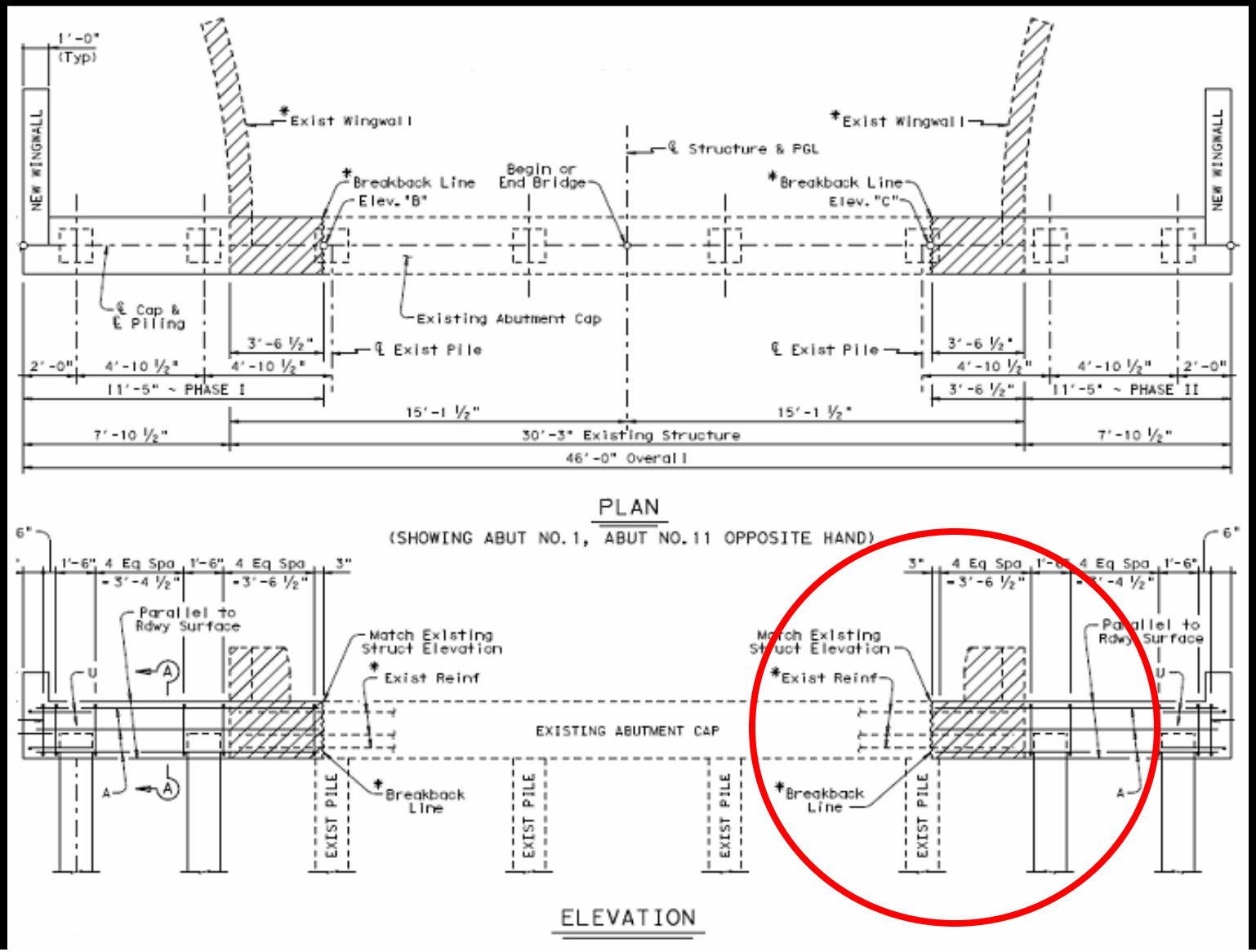
FINAL TYPICAL BRIDGE SECTION

Model of Completed Cap

Abutments Back Walls

- Match Location
- Match Width
- Match Face

Abutment Connections

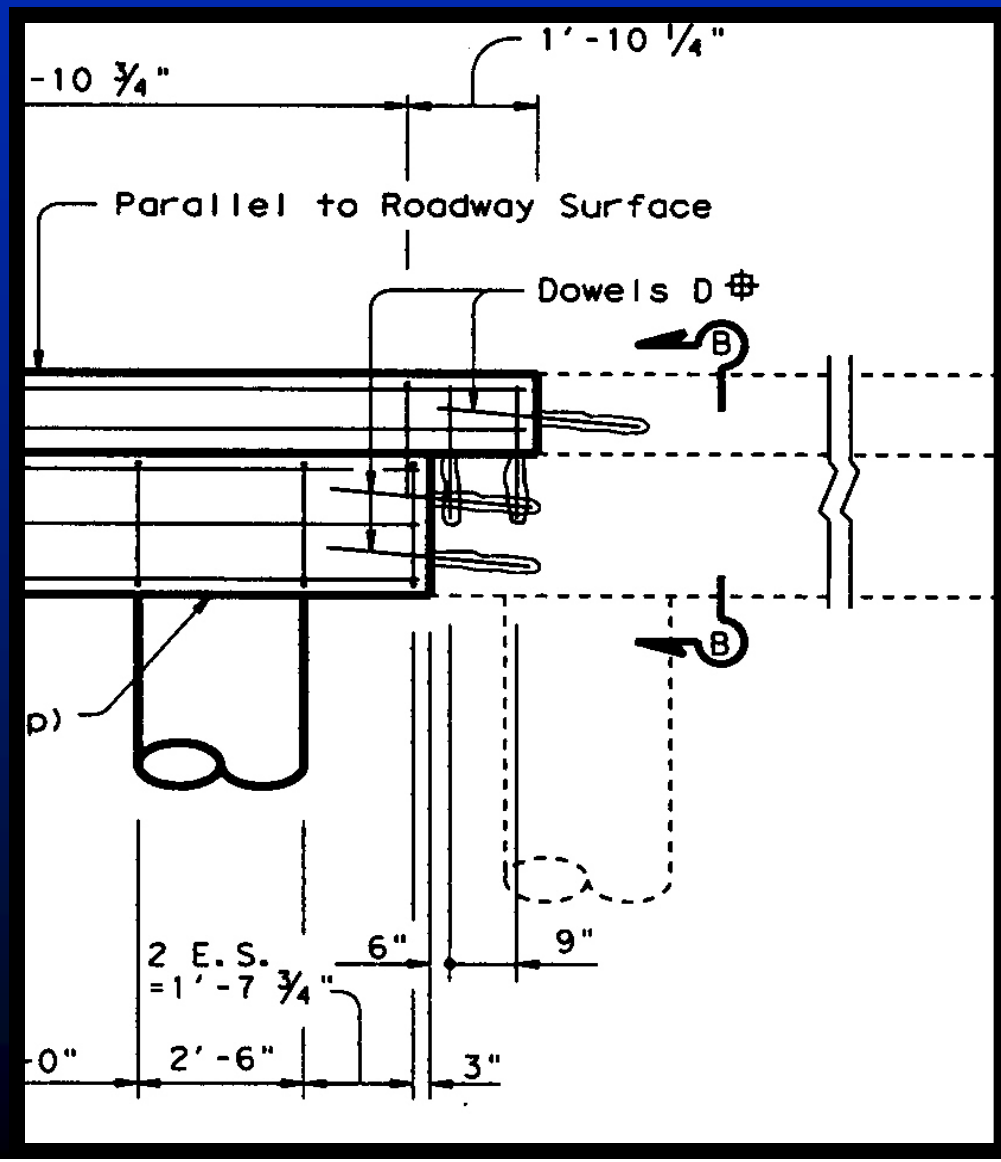


- Extend Reinforcing
- Break Back Foundations

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

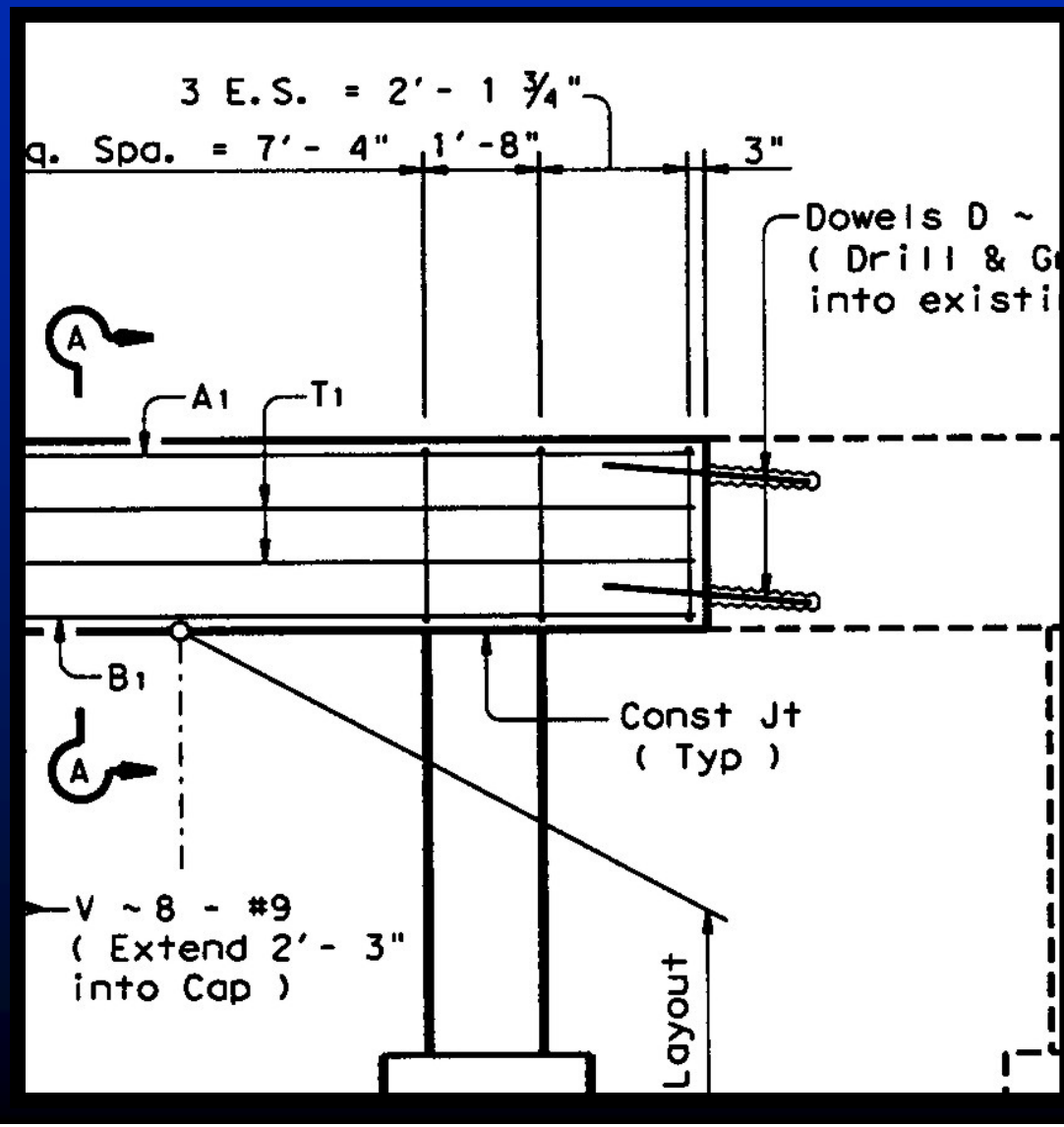
Connected Bents

- Beam Depth
- Match Cap Width

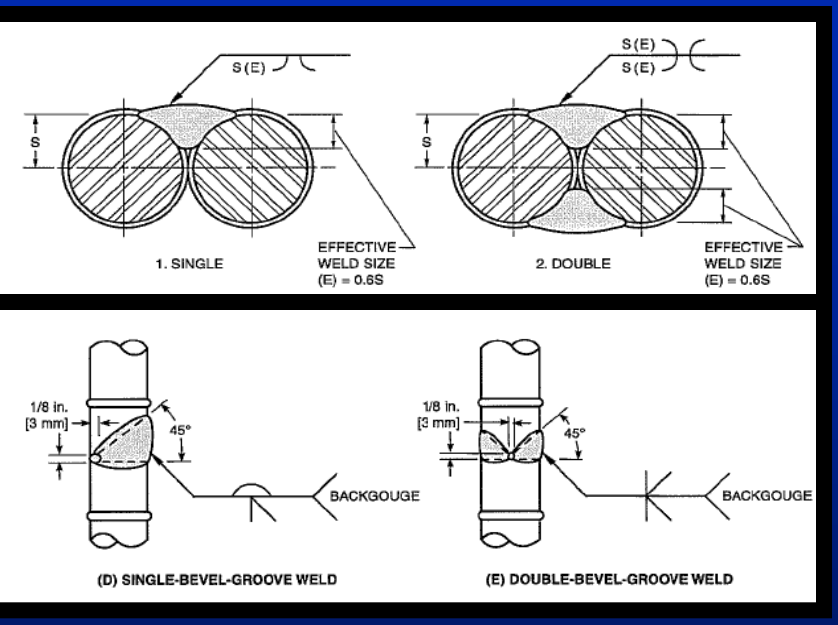
Bent Connections

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

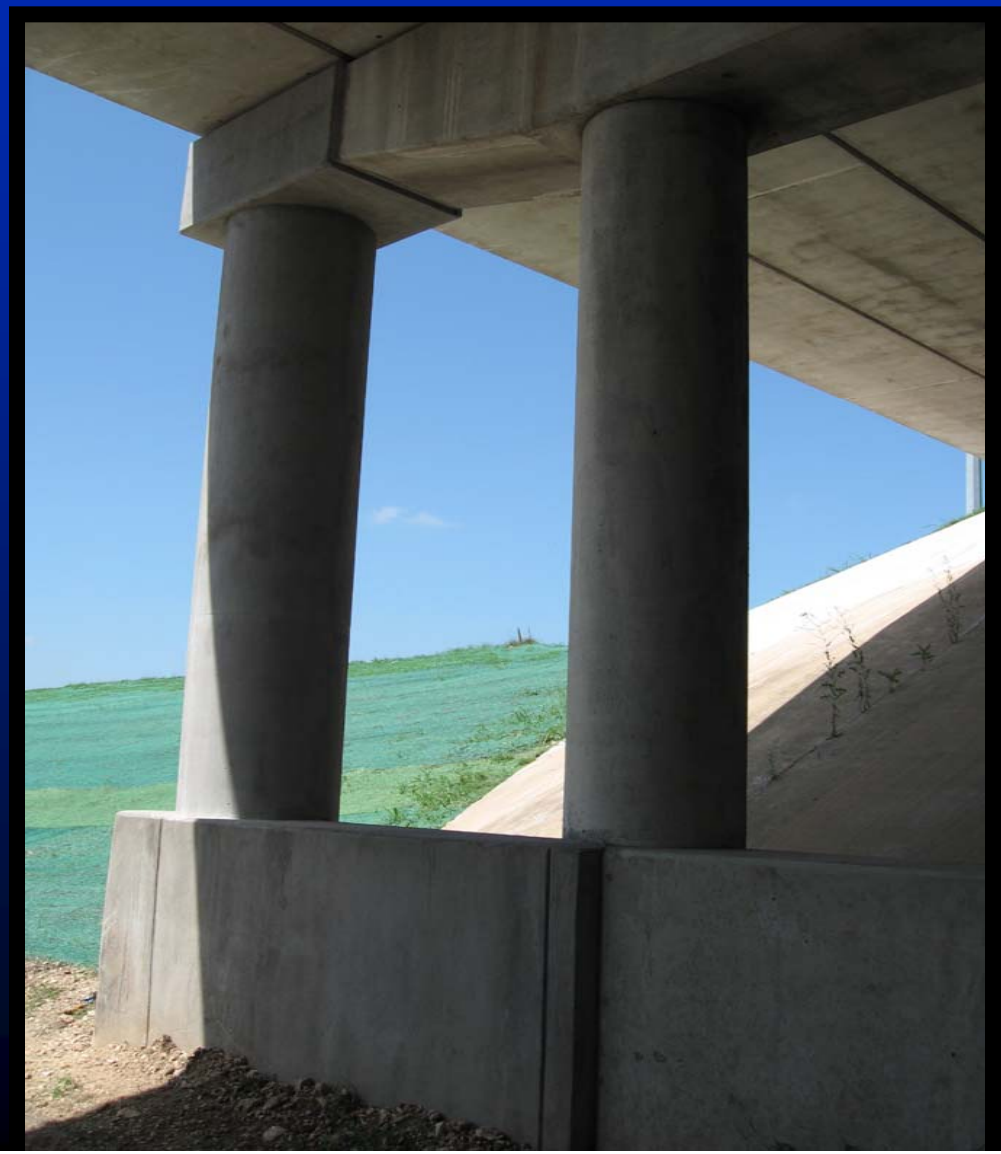
- End Conditions
  - Fixed/Expansion
  - Diaphragms
  - Earwalls
  - Shear Keys
- Match Joint Type

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

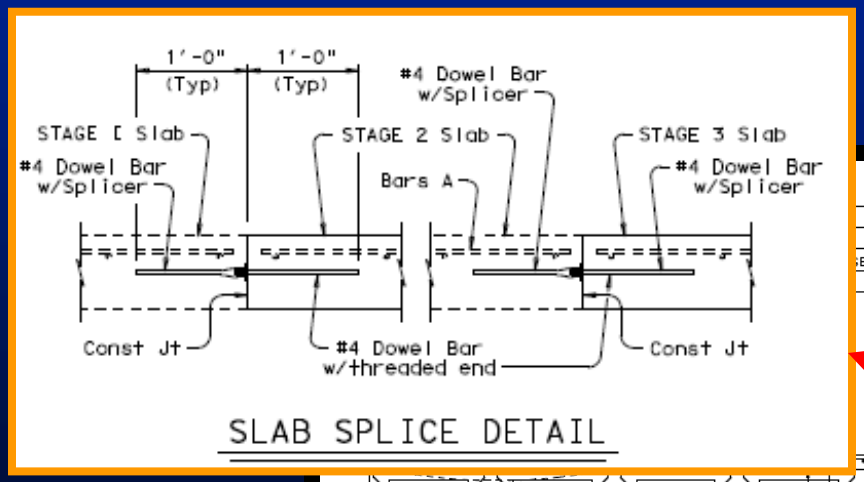
- Prefer Lap Existing Bars

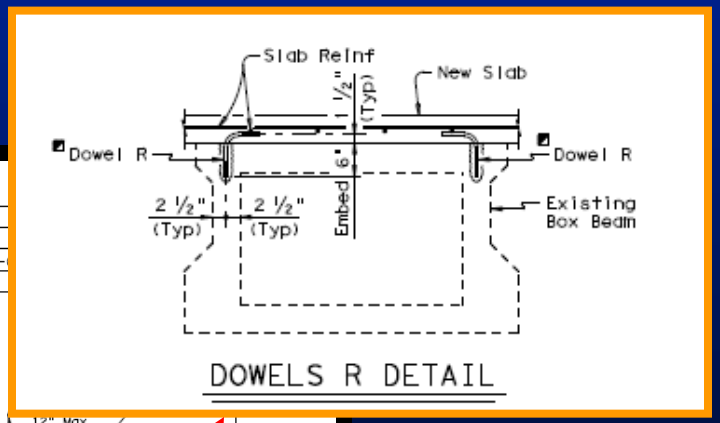
- Prefer 12 foot Lanes

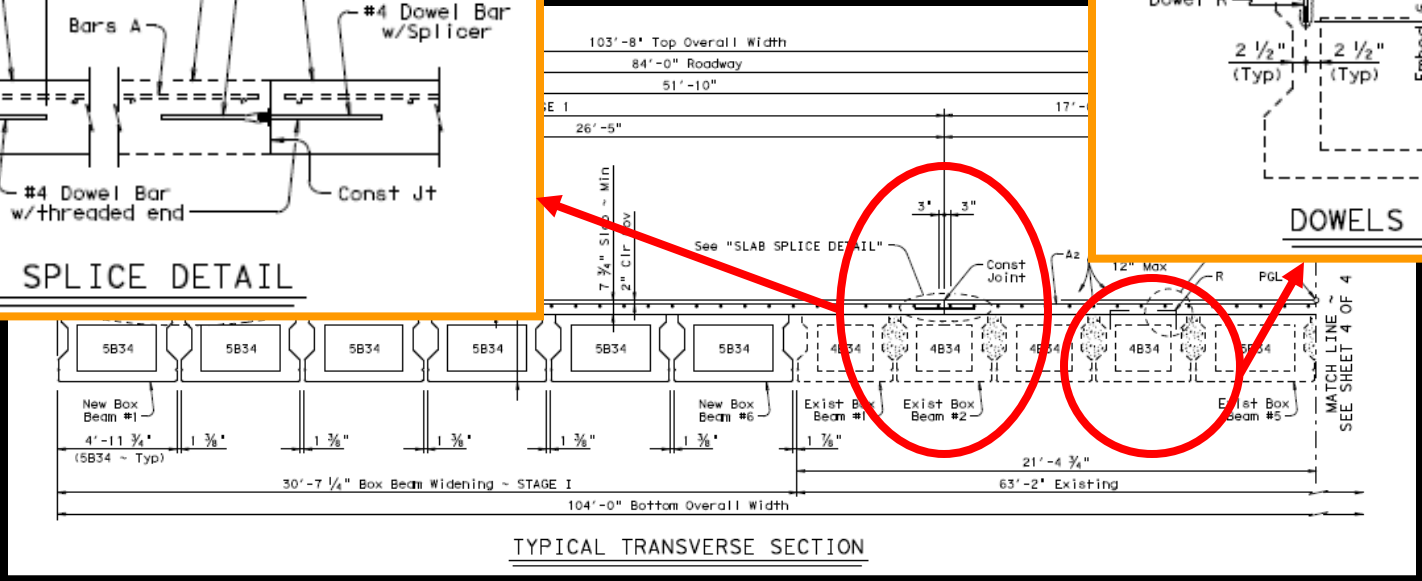
Slab Re-Decking

To Consider on a Re-decking:

- Changes in Slab Thickness
- Make New Deck Composite to Existing Beams



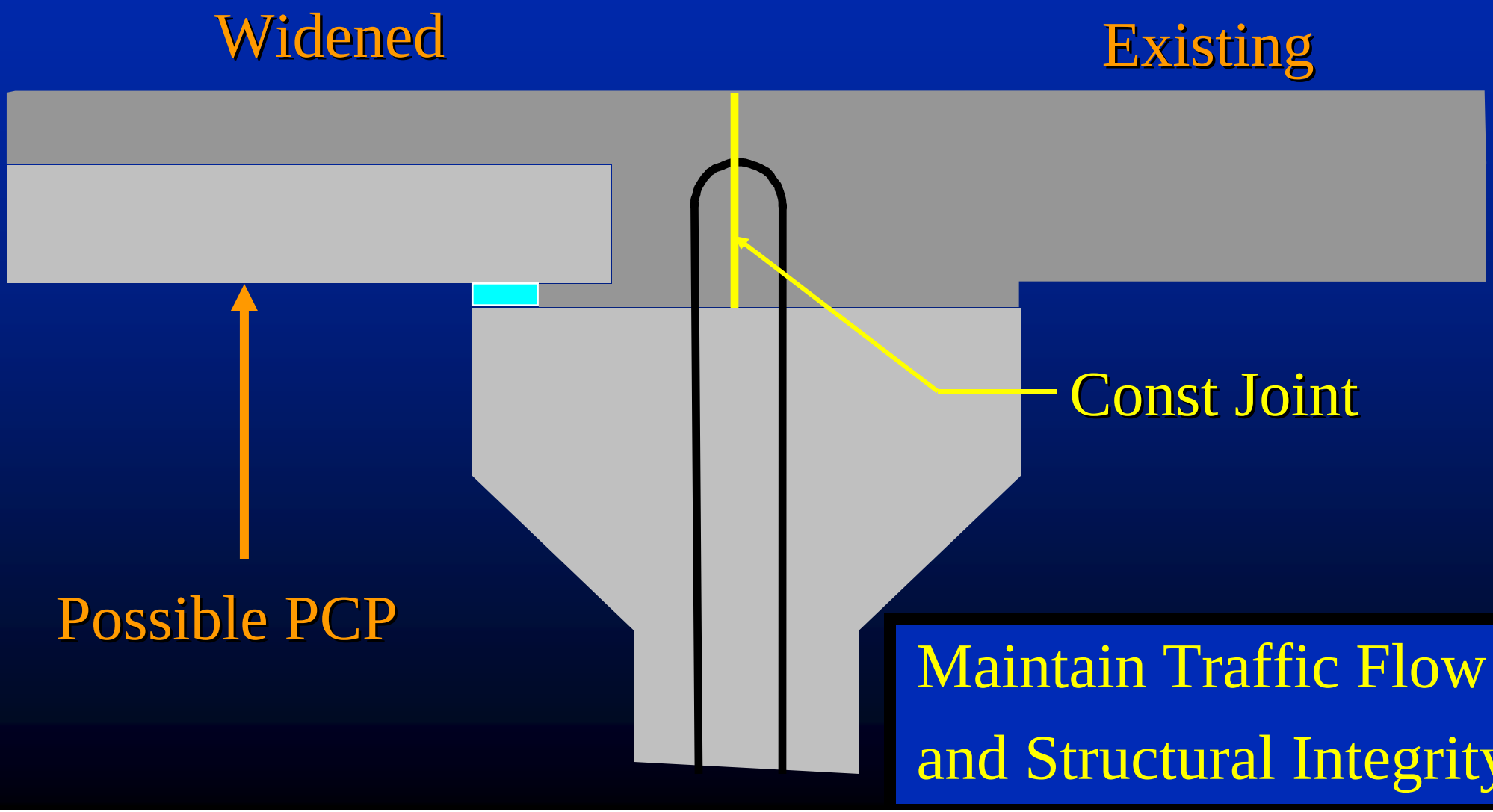




Vertical Clearance

- MUST Calculate for Lower Roadways
- Beam Depth

Longitudinal Joint Locations



Maintain Traffic Flow and Structural Integrity

Bridge Railing

Bridge Railing Manual

Summary from Page 3-3

"…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

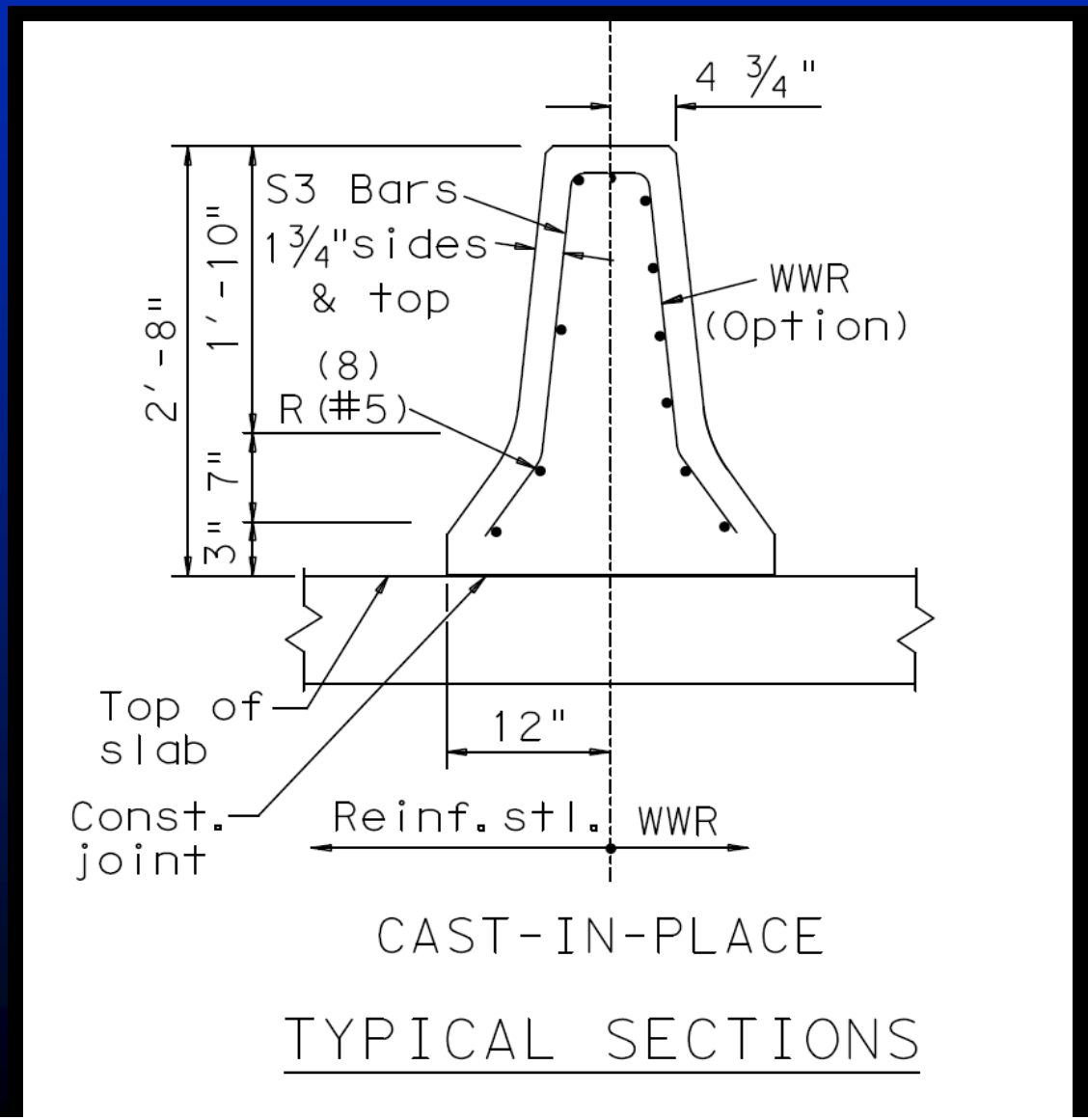
Safety

Safety Barriers

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

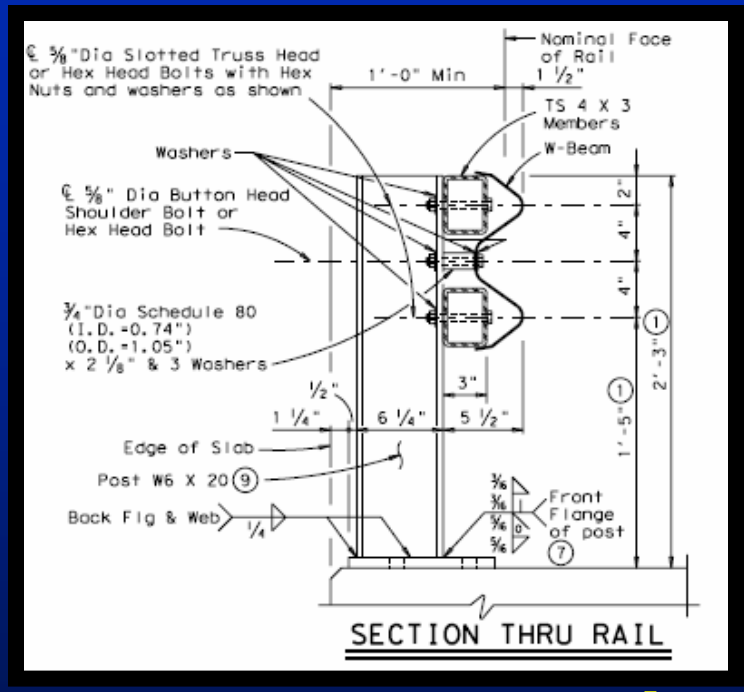
Safety Barriers

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

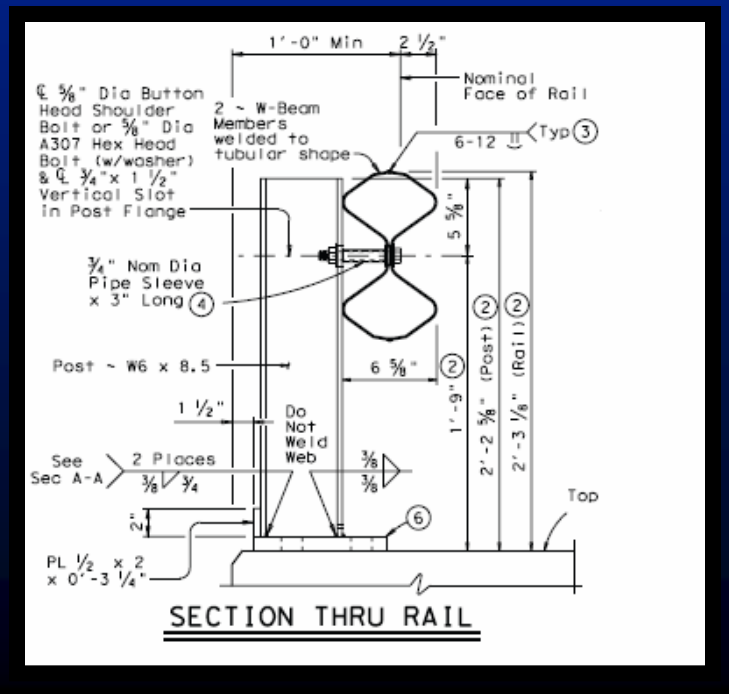


Safety Barriers

- T6 or T101 Rail
  - Less Edge Distance
  - Bolted Through Slab



T101 Rail



T6 Rail

Specific Bridge Sections

- Pan Girders
- Slab Span Bridges
- Farm System (FS) Slabs

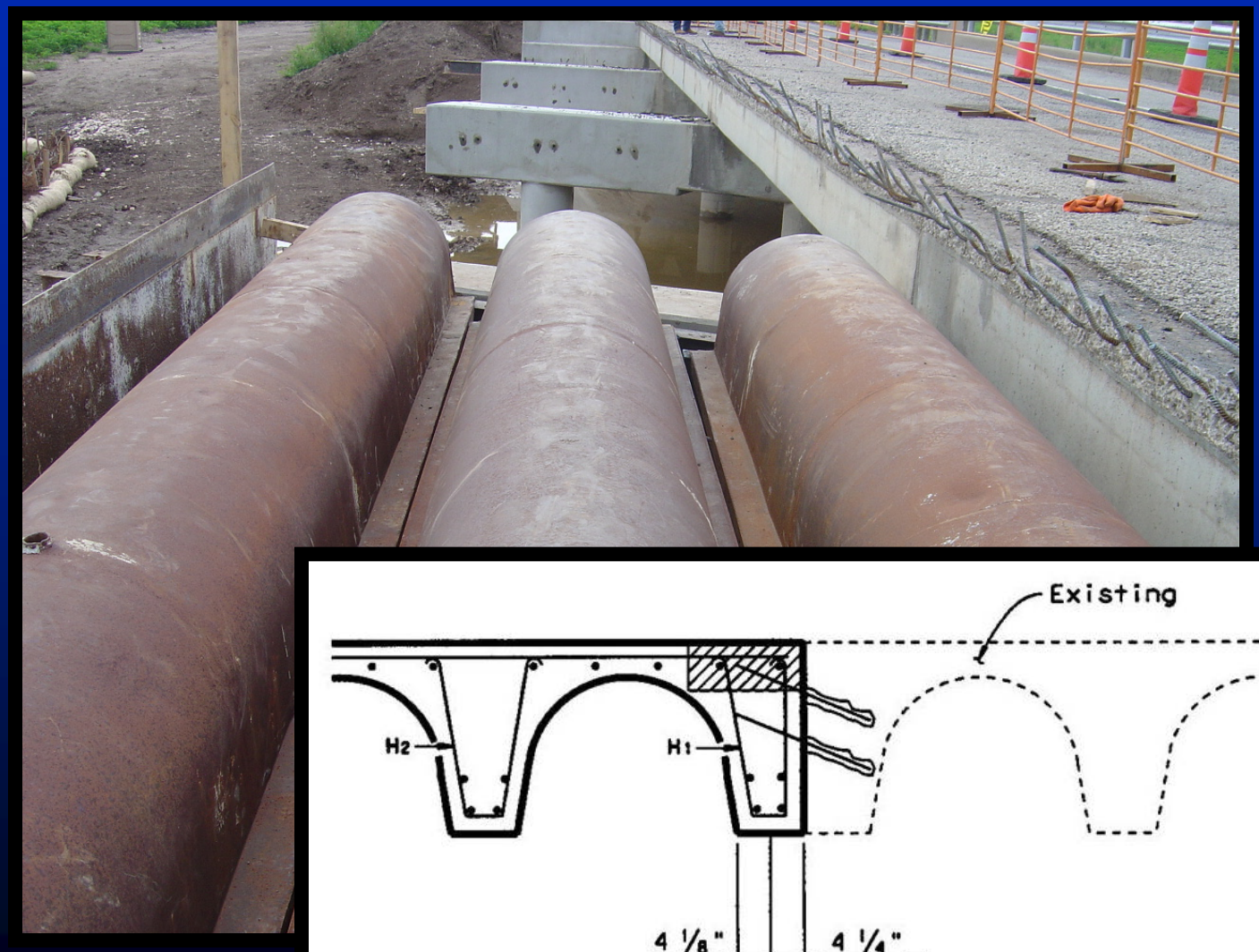
Pan Girders: Widen with Pan Form

Methods

- Break back and Extend
- Widen and Remove
- Pie Shape

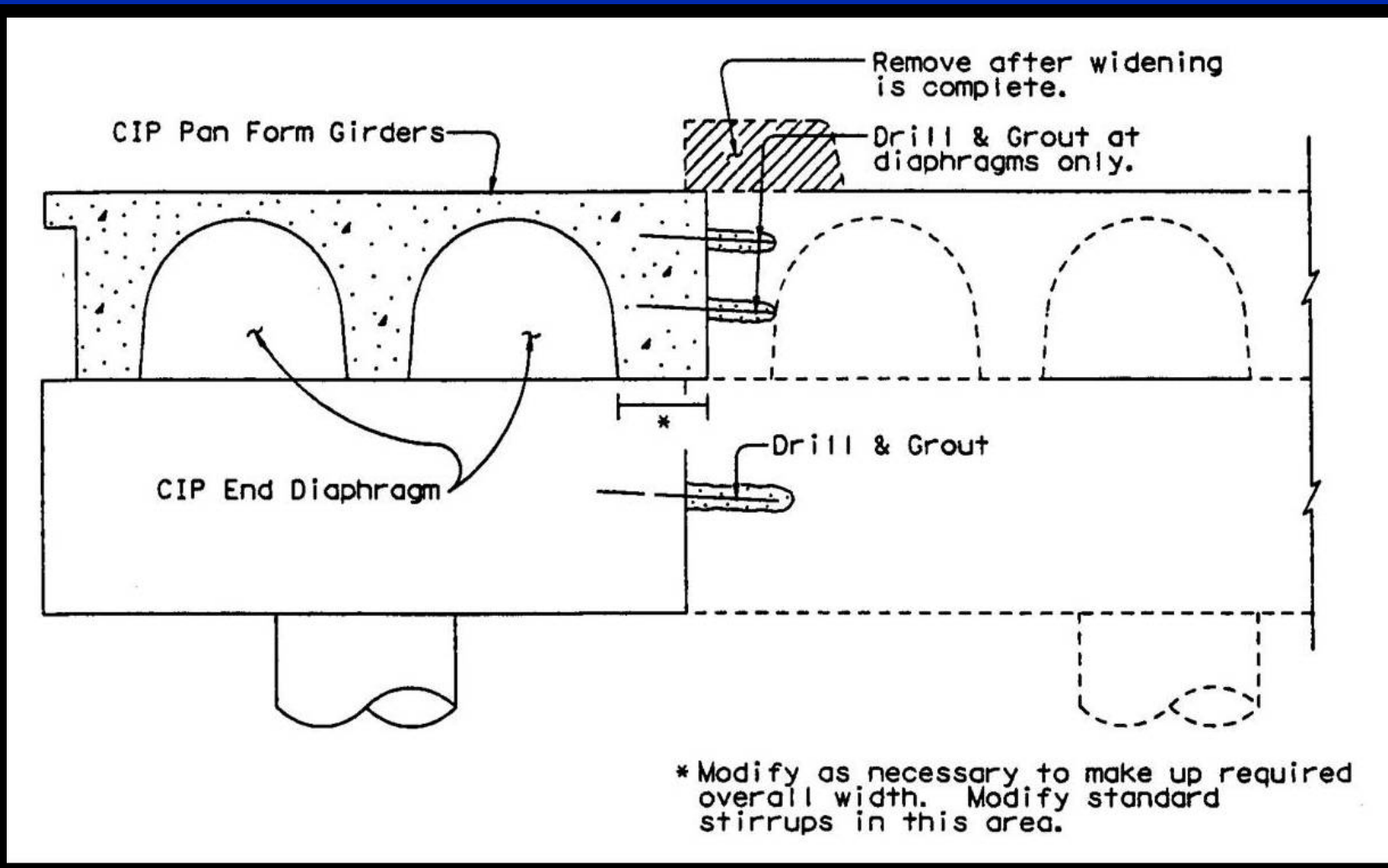
Pan Girders: Break Back and Extend

- Break back Overhang
- Extend Existing Steel
- Roughen Concrete
- Dowel at Ends

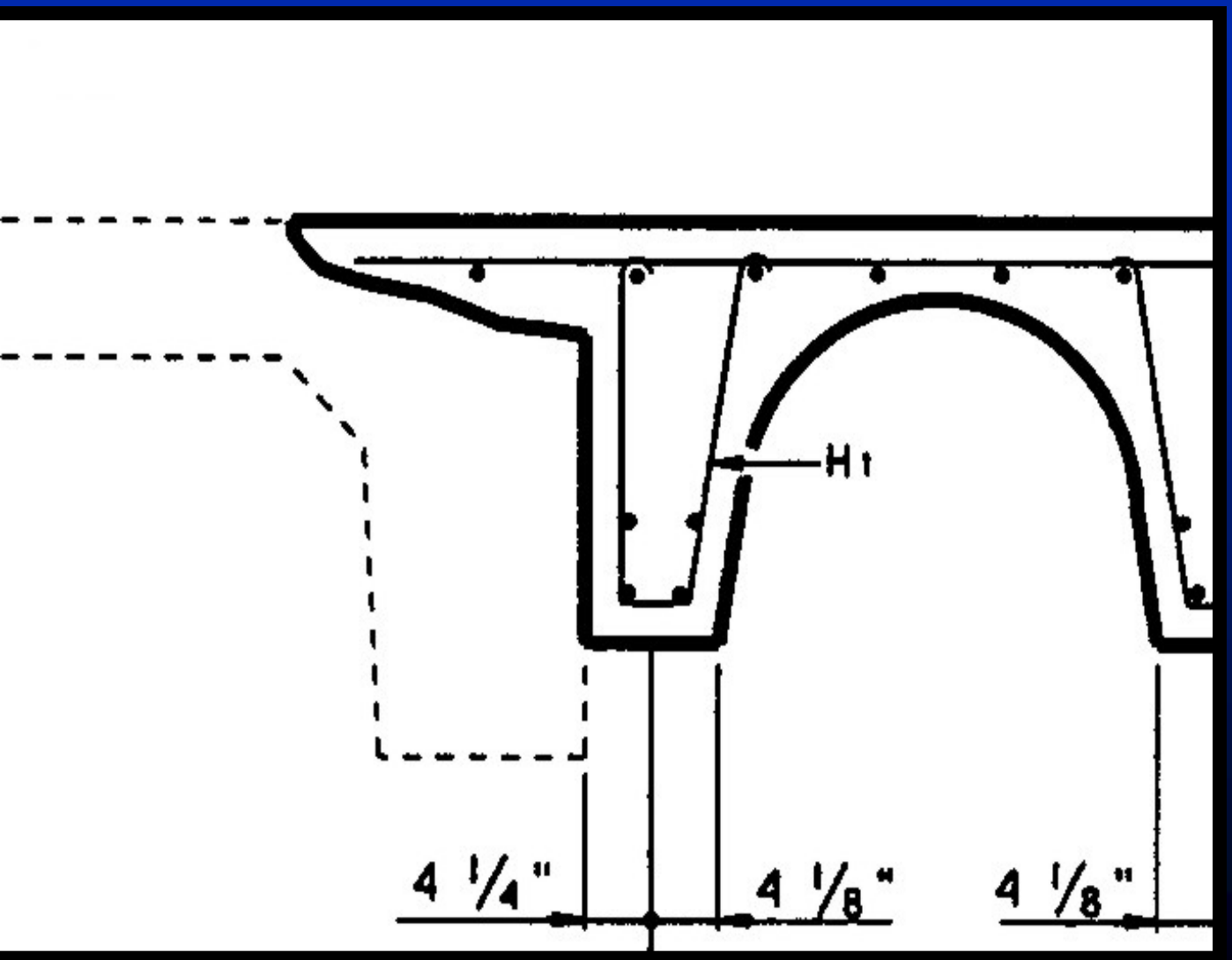


Pan Girders: Widen and Remove

- Dowel
- Cast New Pan Form
- Remove Curb

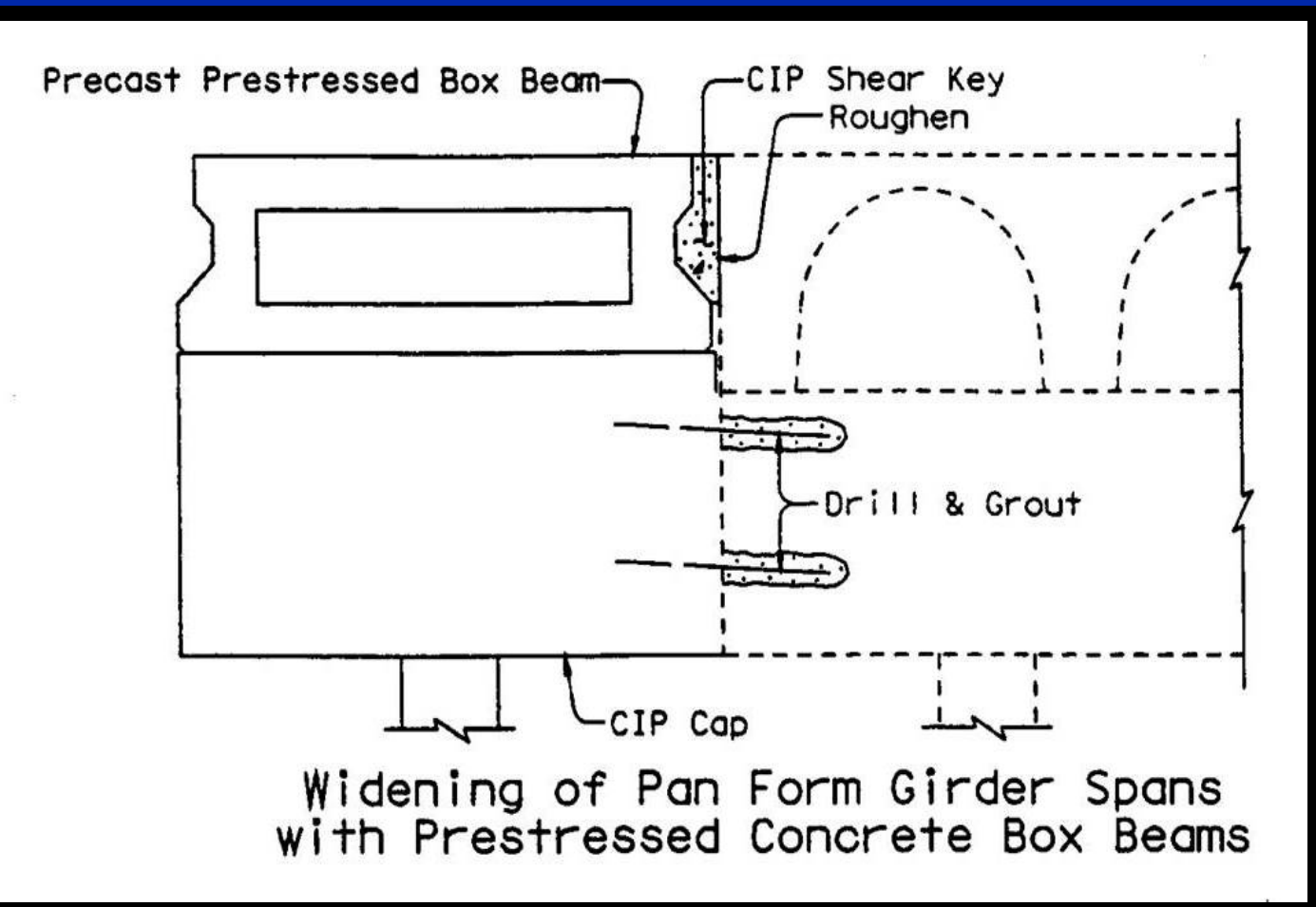


Pan Girders: Pie Shape



- Old CGC Style
- Remove Curb and Top of CGC
- Cast New Pan Form

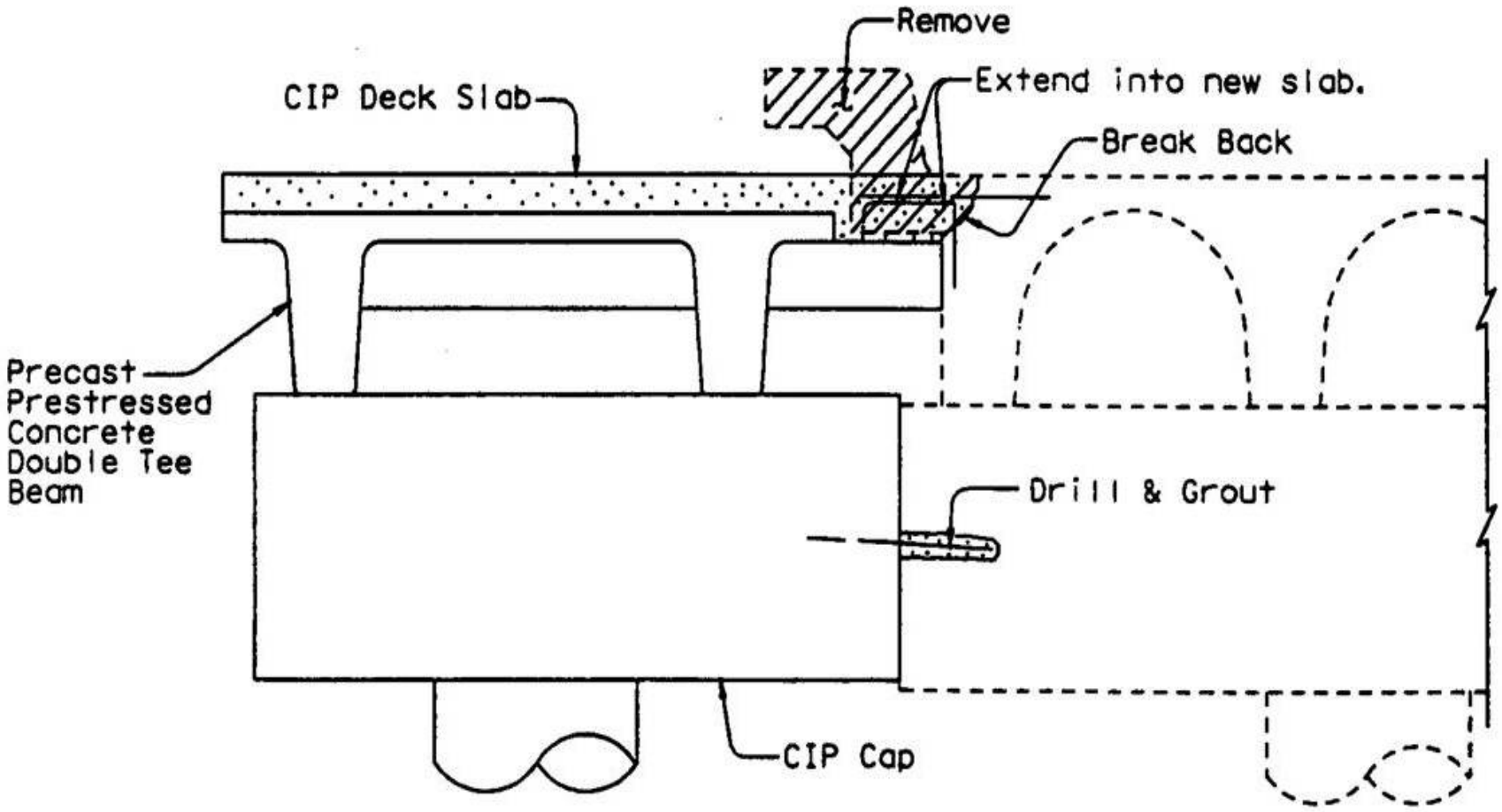
Pan Girders: Widen with Box Beams



Widening of Pan Form Girder Spans with Prestressed Concrete Box Beams

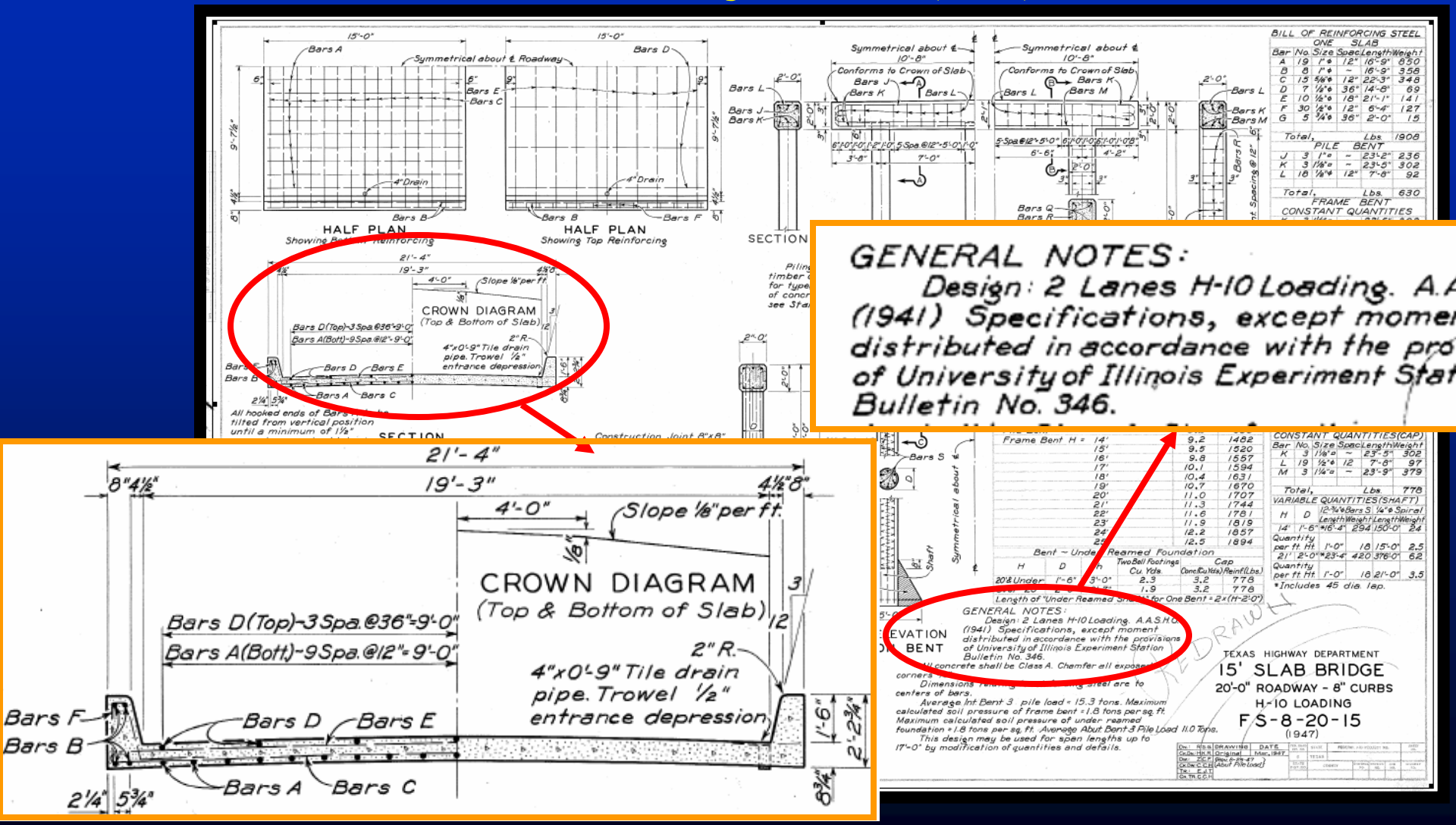
- Vertical Clearance Issues
- Dowel and Widen
- Roughen Exist
- CIP Shear Key

Pan Girders: Widen with Double Tees



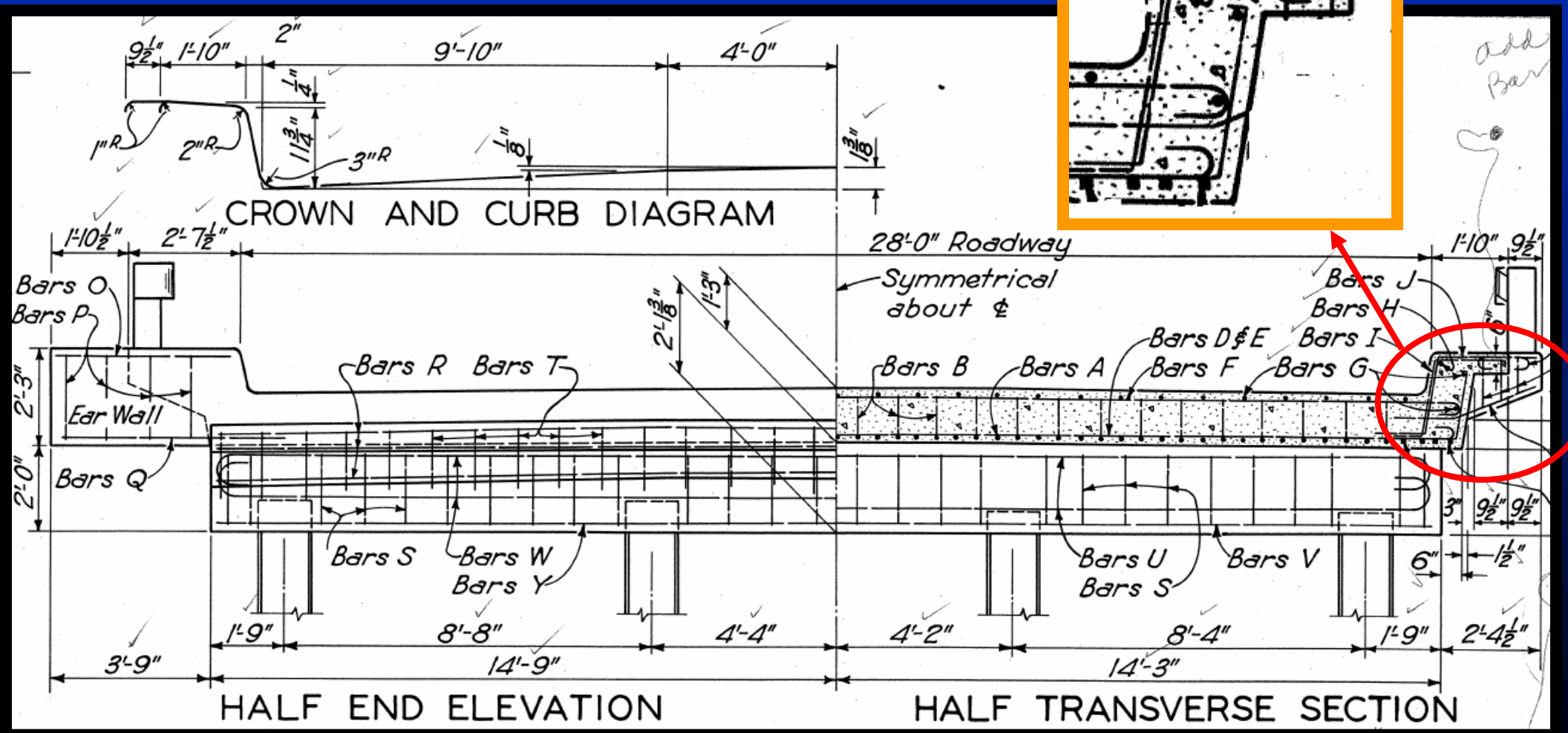
Widening of Pan From Girder Spans with Double Tee Beams

Farm System (FS) Slabs

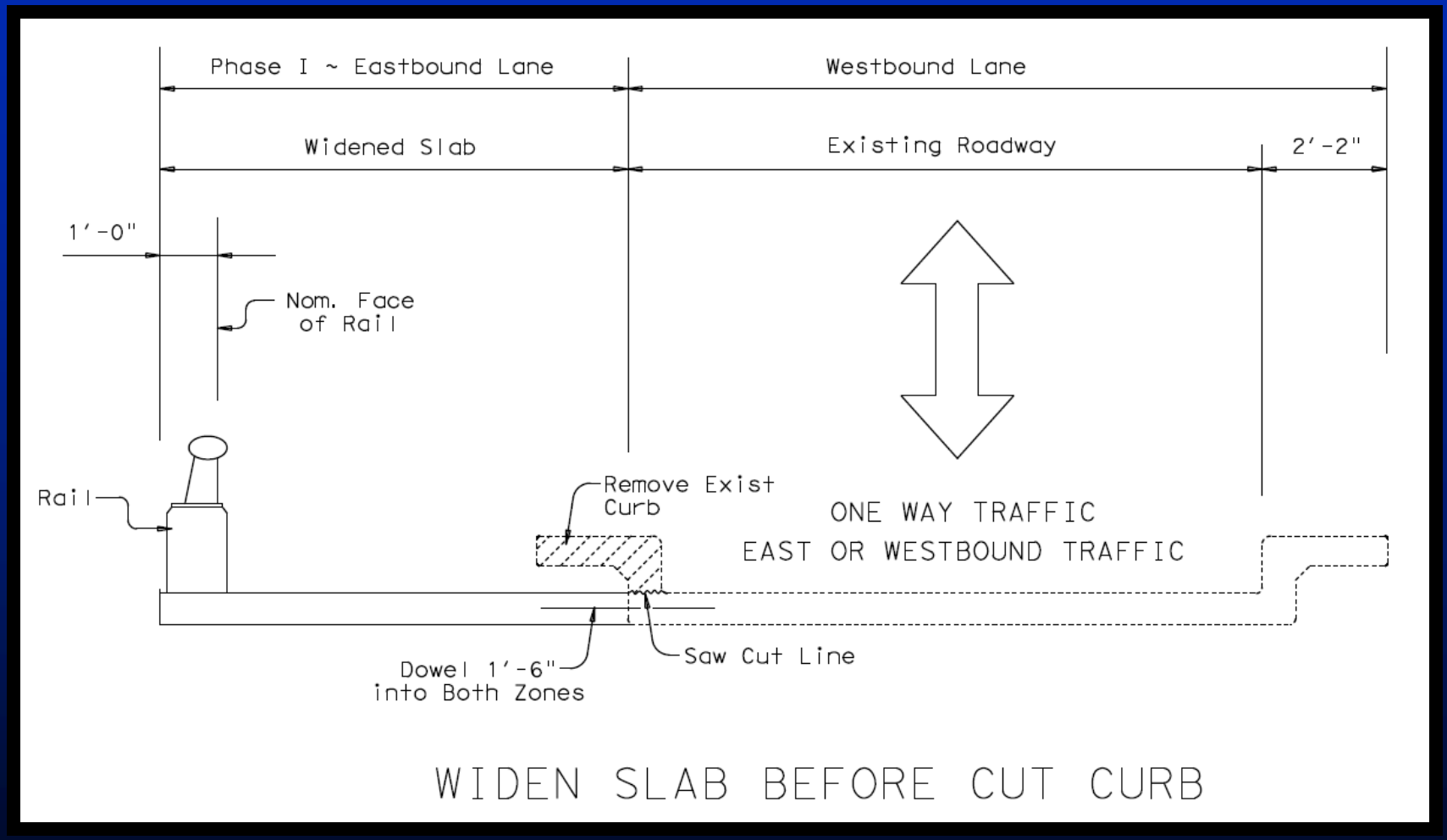


FS Standard Detail (March 1947)

Slab Span Bridges



Slab Span Bridges



Dowel and Cast New Slab

Slab Span Bridges

Cut Curb


Questions?
Alanna Bettis, P.E.
(512) 416-2316