



10/26/2026

Construction Phasing and Work Access for Bridge Projects

Bridge Briefing

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Phased Construction Recommendations



- Chapter 4 - General Requirements
 - Section 6 – Phased Construction
 - 4.6.1 - General
 - 4.6.2 – Superstructure
 - 4.6.3 - Substructure

Phased Construction Recommendations Cont.

- Do not use standard detail sheets for phased structures.

Superstructure

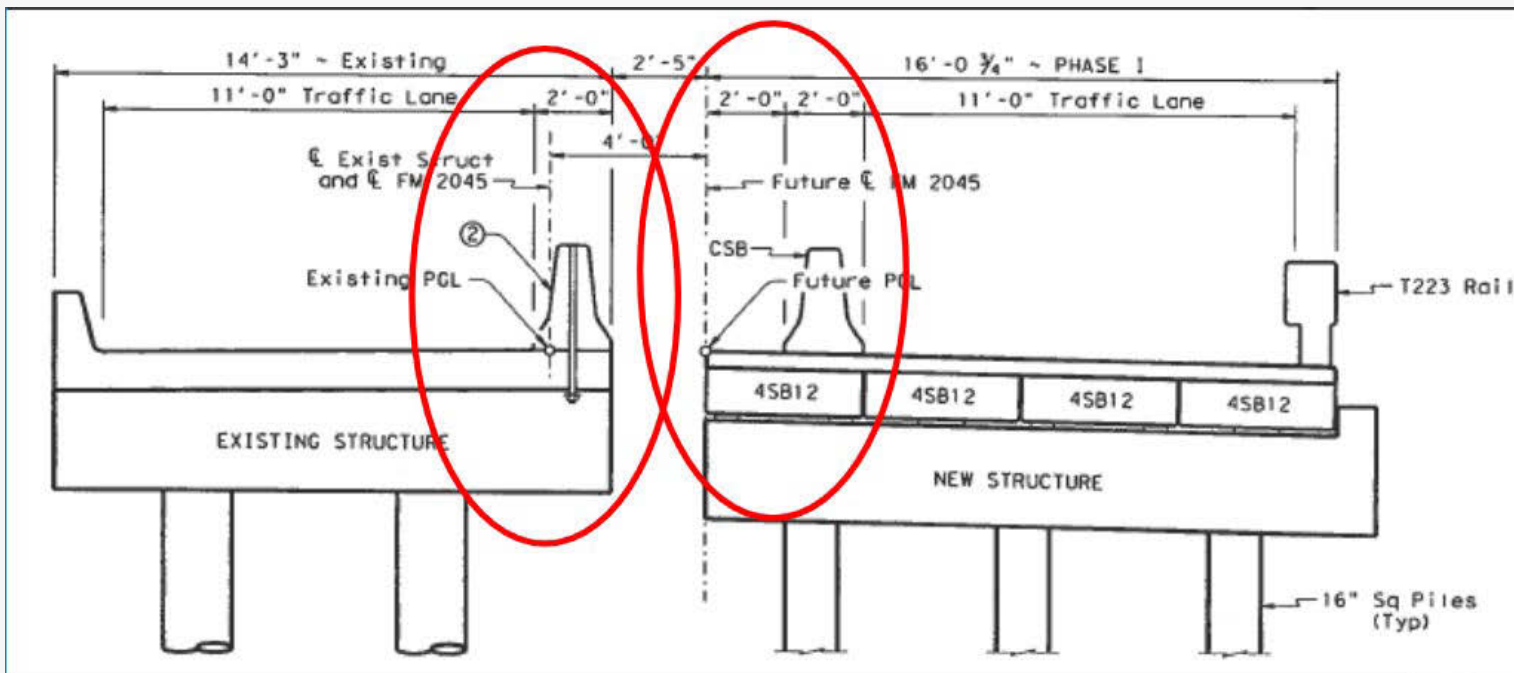
- Geometric Considerations
- Structural Analysis
- Software

Superstructure - Geometric Considerations

Consider the traffic needs of any temporary barriers

- If the clear distance between the back of barrier and edge of slab is < 2 -ft, anchor the barrier to the deck.

Temporary Barrier Considerations

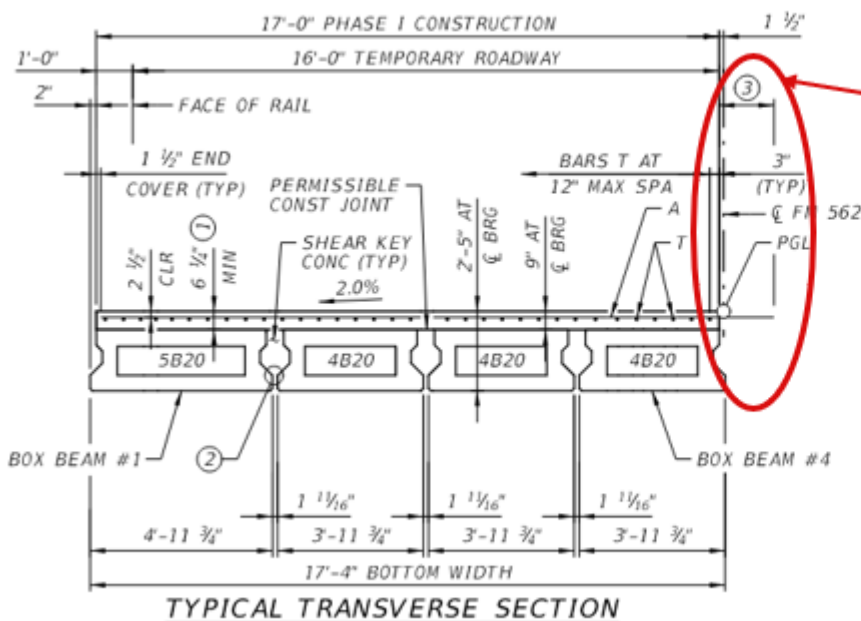


Superstructure - Geometric Considerations Cont. 1

When building next to an existing structure (e.g. for phased replacements), provide enough space between the existing and new construction to accommodate:

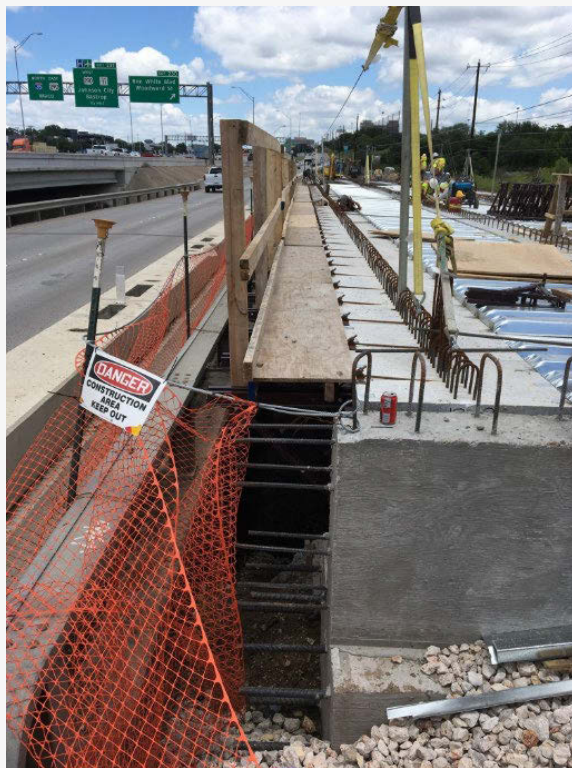
- Splicing of the deck reinforcement
- Portion of the beam that extends beyond the edge of slab
- Formwork

Superstructure - Geometric Considerations Cont. 2



- ① SLAB THICKNESS AT MIDSPAN OF BEAMS MAY NOT EXCEED 7 INCHES.
- ② FORM BOTTOM OF SHEAR KEYS WITH FOAM BACKER ROD OR OTHER MATERIAL ACCEPTABLE TO THE ENGINEER.
- ③ EXTEND TRANSVERSE BARS 1'-7" MIN. INTO PHASE II.
- ④ PROVIDE 1 1/2" END COVER TO BARS H. AFTER ALL BEAMS HAVE BEEN PLACED, WELD ONE BAR H TO TWO BARS D AT EACH END OF ALL BEAMS.
- ⑤ REINFORCING STEEL WEIGHT IS BASED ON AN APPROXIMATE FACTOR OF 2.0 LBS PER SQUARE FOOT OF SLAB.

Superstructure - Geometric Considerations Cont. 3



Superstructure - Geometric Considerations Cont. 4



Phase Lines for TxGirders

- Place at a minimum of 4-in past the center line of the girder
- Phase line can be placed between two beams. PCP's are not allowed in this bay

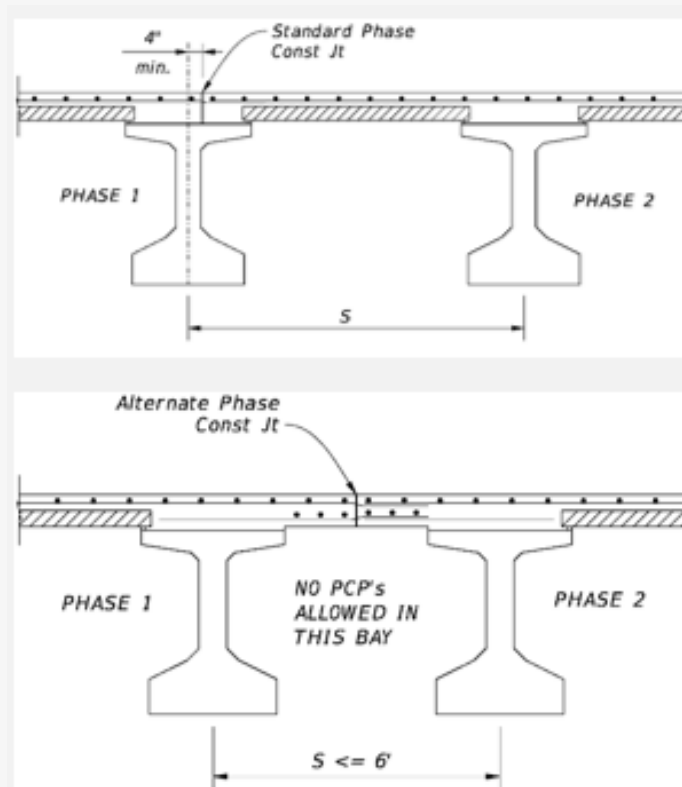


Figure 4.6.2-1: Phasing for TxGirders

Phase Line for TxGirders

- Do not place in the middle or at the edge of the precast panel
- Do not place closer than 10-in from the beam edge, to allow for the use of PCPs in the future phase

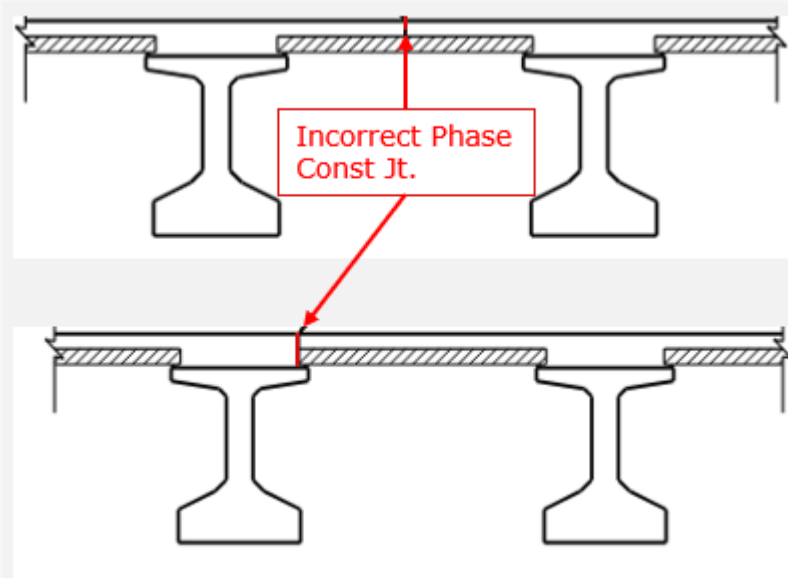


Figure 4.6.2-2: Incorrect Phasing for TxGirders

Phase Lines for Slab or Adjacent Box Beams

- Do not place phase line in the top flange

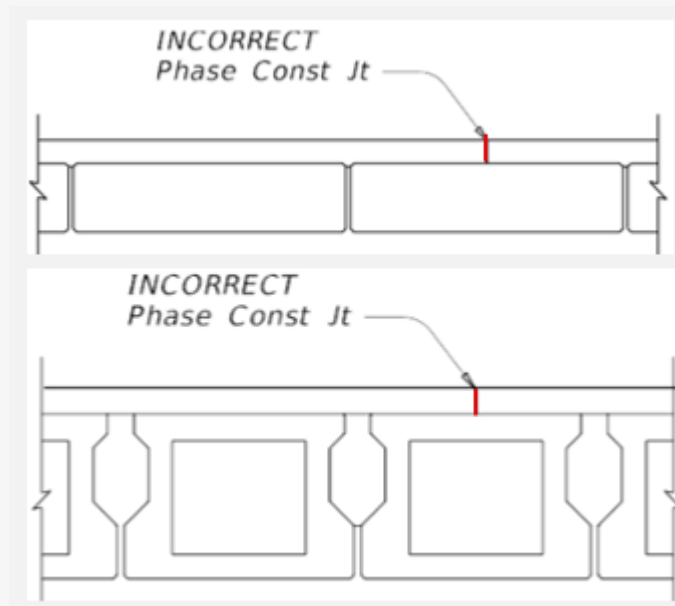


Figure 4.6.2-5: Incorrect Phasing for Slab and Box Beam

Phasing for Slab or Adjacent Box Beams

- Place at the edge of the beam

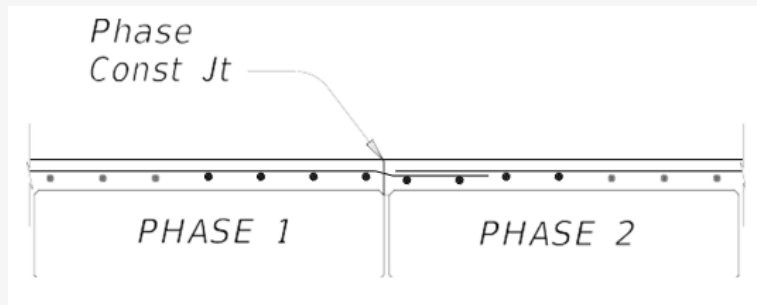


Figure 4.6.2-3: Phasing for Slab Beams

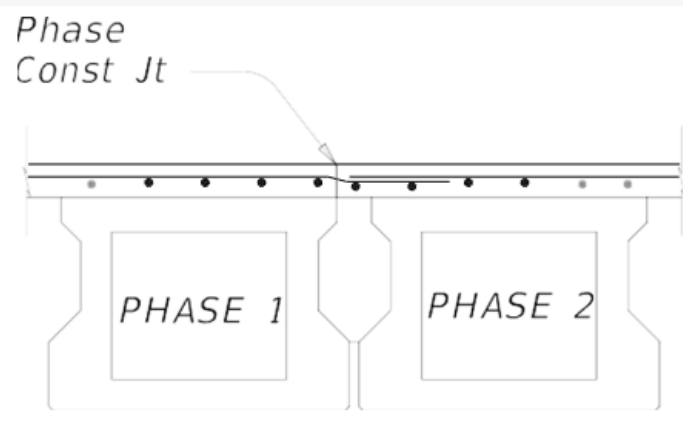


Figure 4.6.2-4: Phasing for Adjacent Box Beams

Phasing for X-Beams

- Place along top flange of the beam
- Do not place closer than 10-in from beam edge.
- Phase line can be placed between two beams. No PCPs in this bay

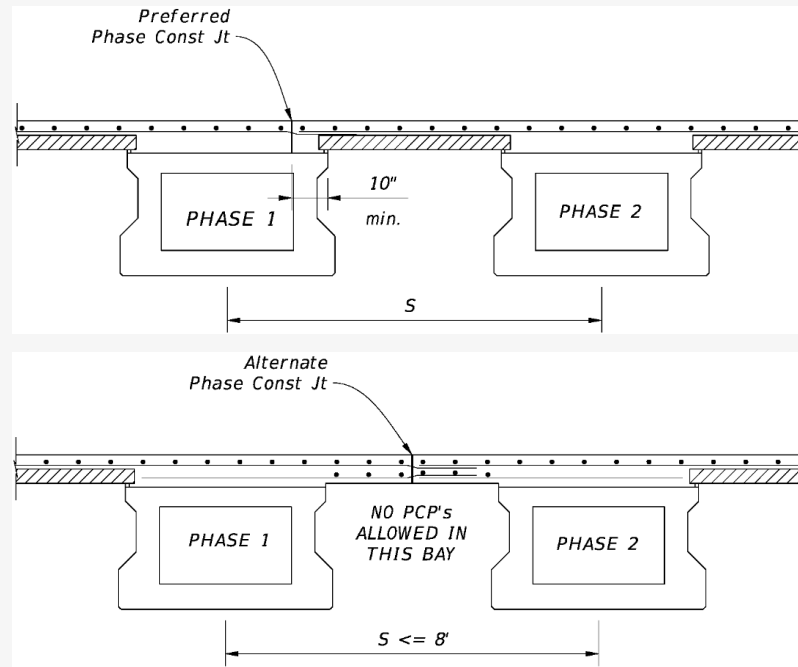
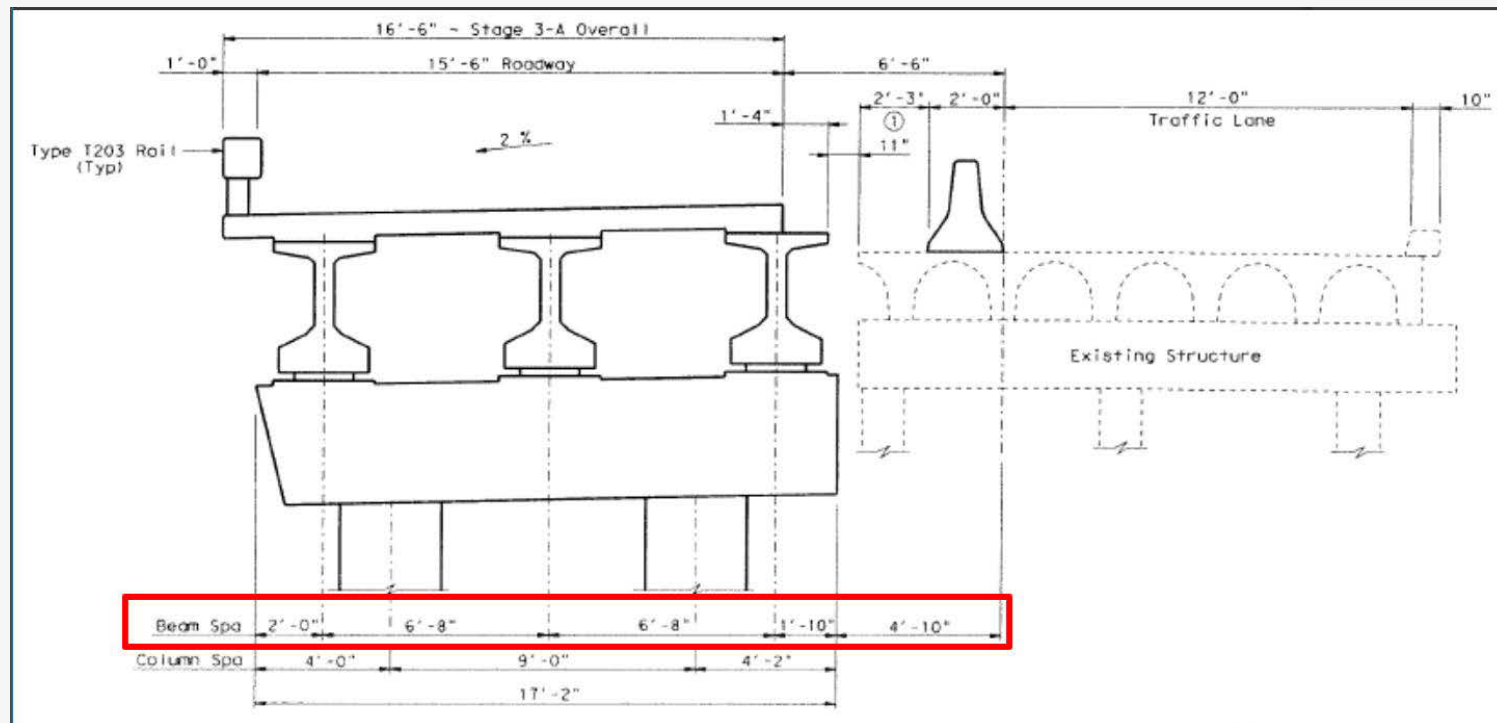


Figure 4.6.2-6: Phasing for X-Beams

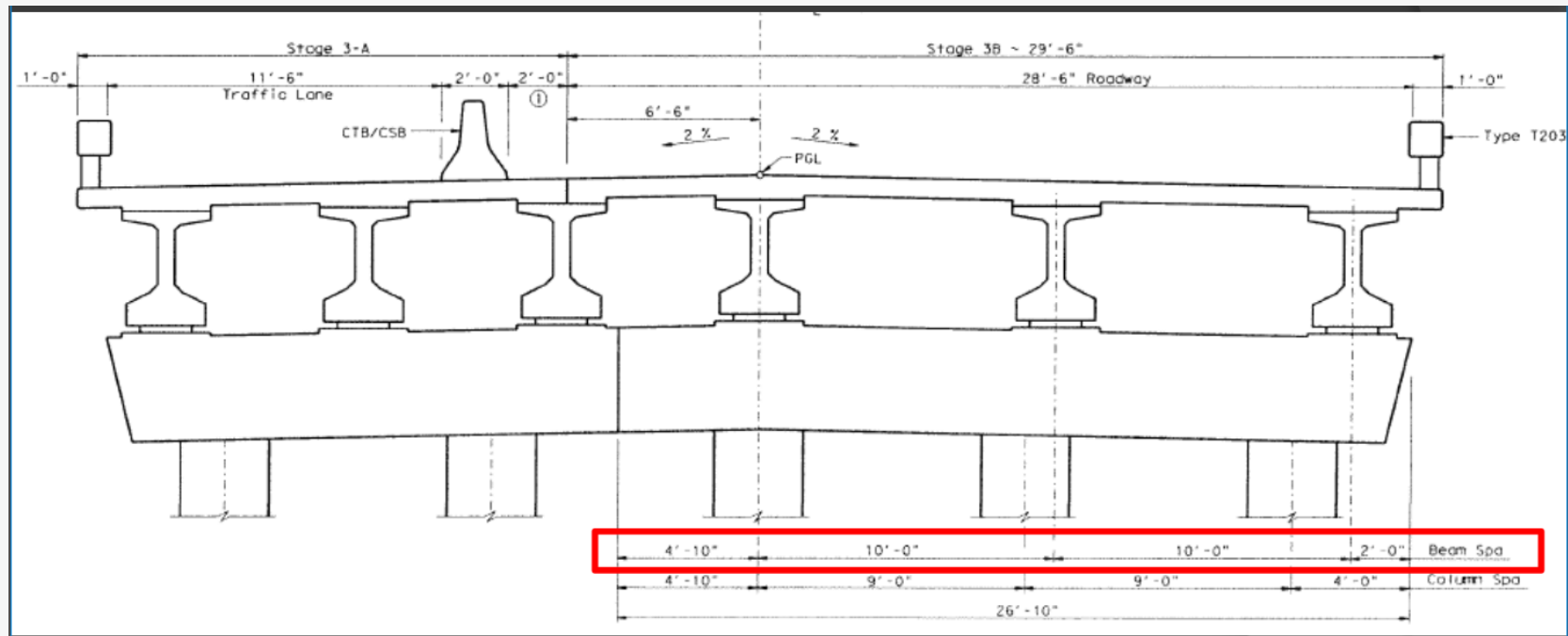
Superstructure - Geometric Considerations Cont. 5

- Phased superstructures may require a different beam spacing for each phase and for the beams near the phase line.

Superstructure - Geometric Considerations Cont. 6



Superstructure - Geometric Considerations Cont. 7

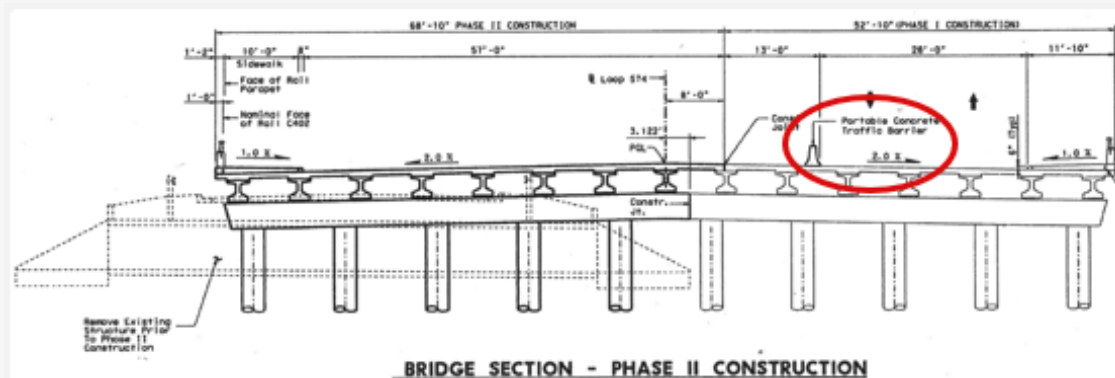


Superstructure – Structural Analysis

When designing the beams, account for all temporary loading such as temporary rails as permanent loads for that phase.

BRIDGE SECTION - PHASE I CONSTRUCTION

BRIDGE SECTION - PHASE I CONSTRUCTION



BRIDGE SECTION - PHASE II CONSTRUCTION

52'-10" (PHASE I CONSTRUCTION)

41'-0"

6" Sidewalk

Face of Rail Parapet

Face of Rail C402

6" (Typ)

1'-2"

1'-0"

8'-0"

3.122'

Const. Jt.

2.0 %

1.0 %

4.878'

66'-0"

Loop 574

42.73' (Approx.)

20'-0"

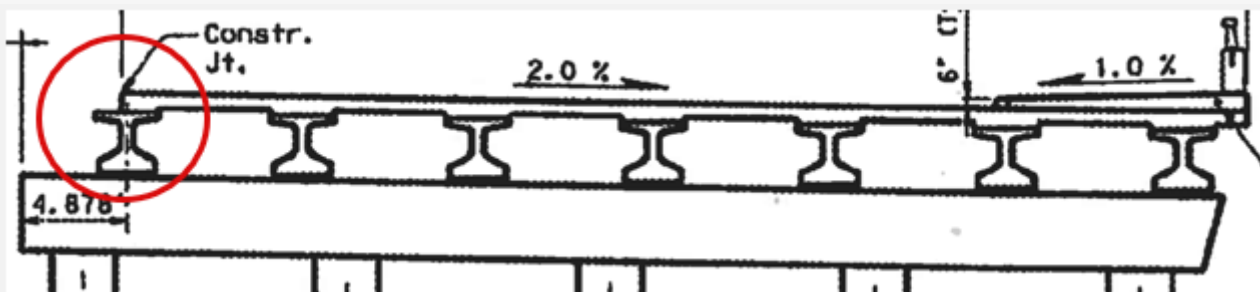
20'-0"

MBGF

EXISTING STRUCTURE
5 - 10' X 6' MRC

EXIST. RDWY.

BRIDGE SECTION - PHASE I CONSTRUCTION



Superstructure – Structural Analysis Cont. 3

- The beam under the phase line will have less dead load deflection than the other beams constructed at the same time.
- This beam will not deflect additionally when the remainder of the slab is cast, due to the added stiffness of the cured slab.
- When calculating haunch for the beam along the phase line, use the dead load deflection from the initial slab weight. Do not use the full dead load deflection due to the full slab weight (initial and final).

Superstructure – Structural Analysis Cont. 4

- Bearing seat elevations may be lowered in later phases to account for the potential for higher than predicted cambers
 - There is no way to adjust the roadway grade in subsequent phases to accommodate high camber girders.

Superstructure – Structural Analysis Cont. 5

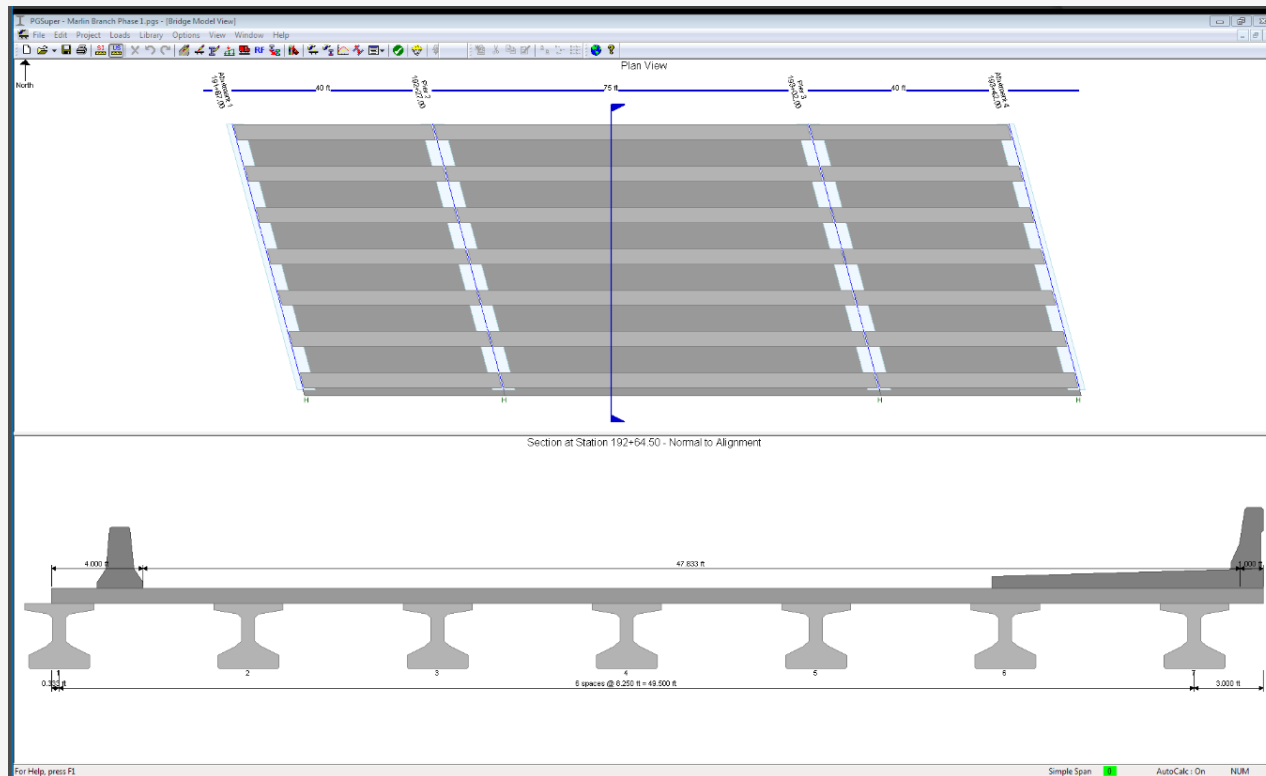
- Load rating of the existing structure is required if the phasing plan removes portions of the existing structure
- Acceptable load rating limits for phased construction of existing structures should be discussed with the District

Superstructure – Software

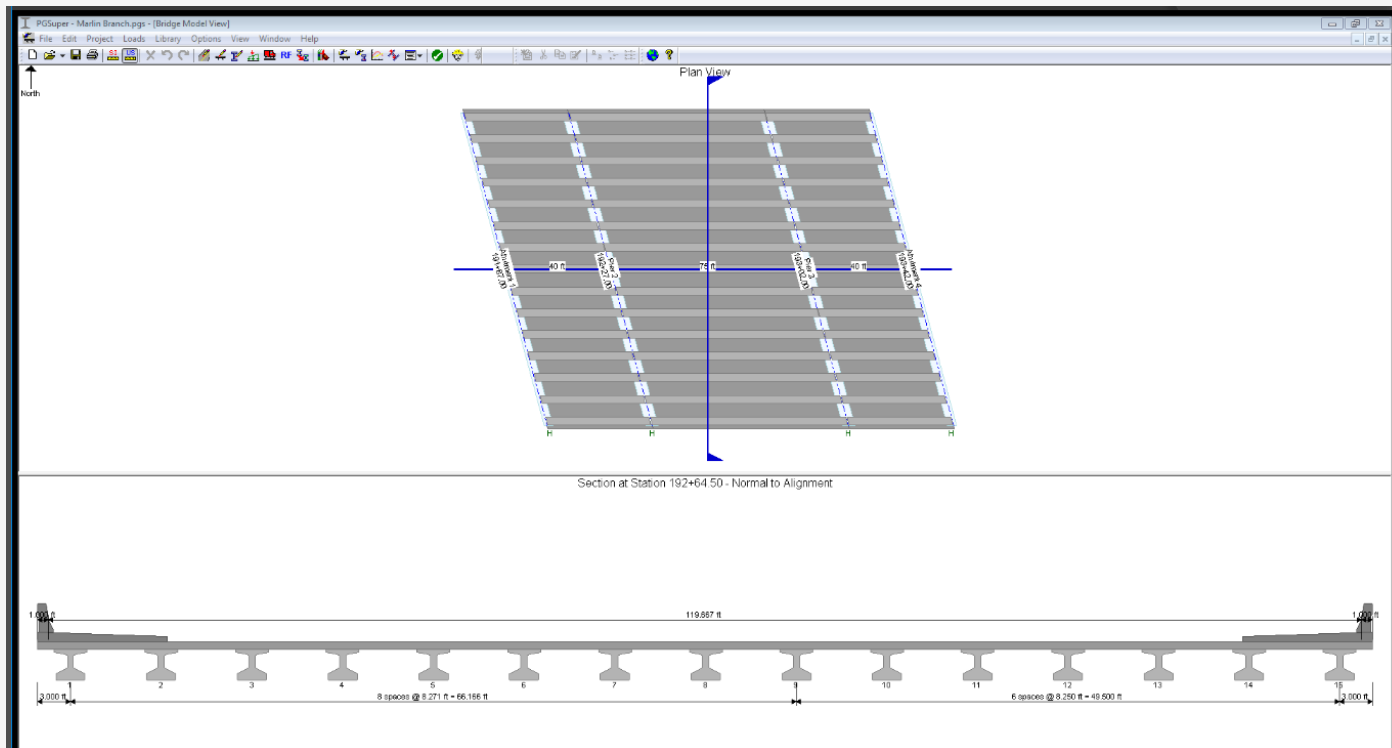
- Model phasing in PGSuper by using separate files for each phase and the completed structure.



Superstructure – Software Cont. 1



Superstructure – Software Cont. 2



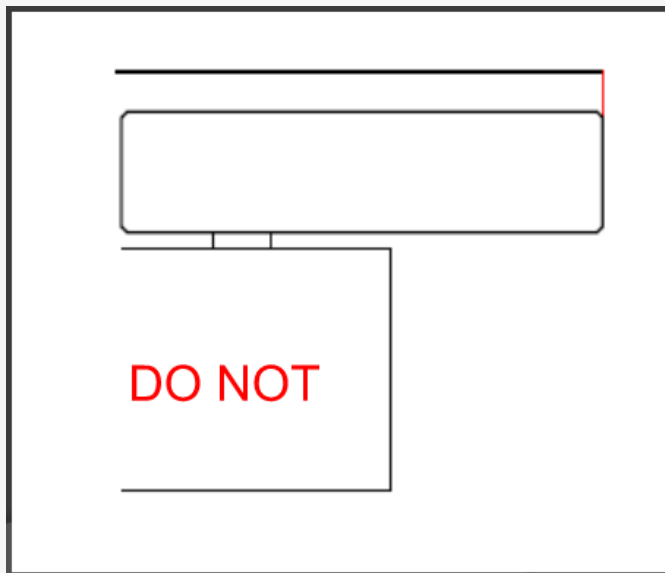
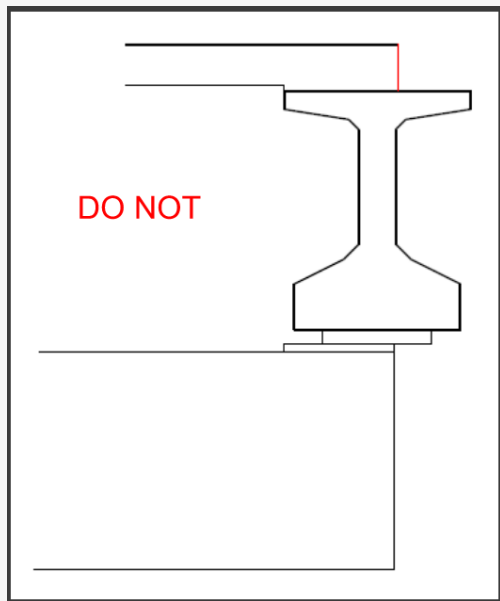
Substructure

- Geometric Considerations
- Structural Analysis
- Detailing

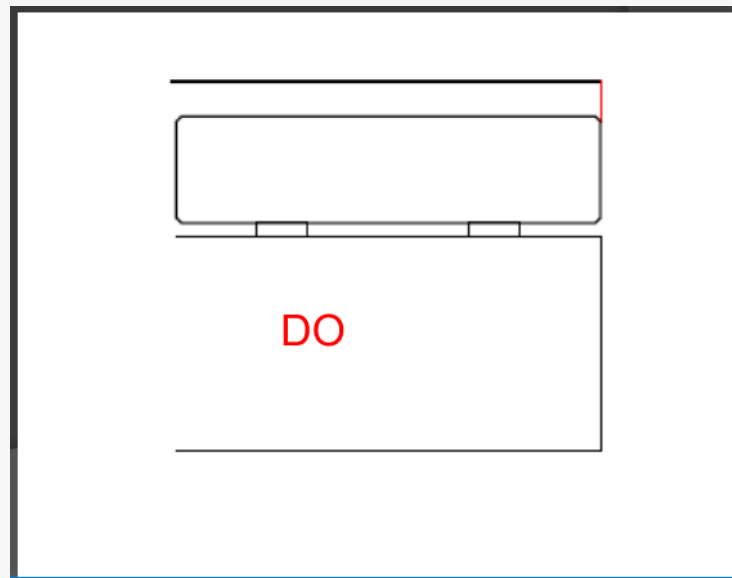
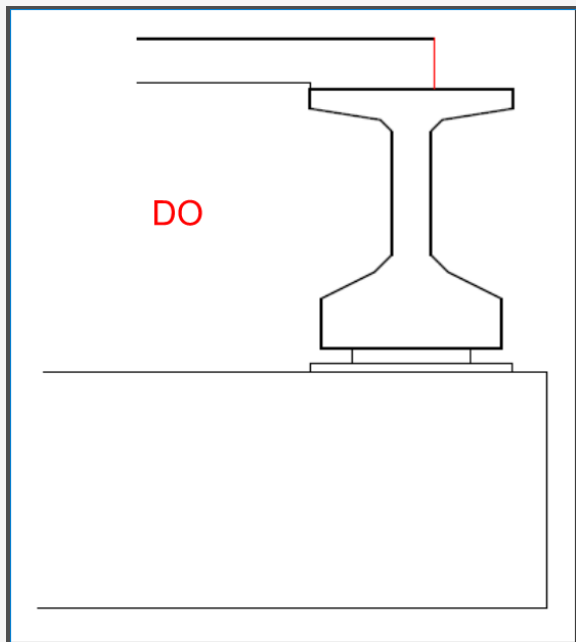
Substructure – Geometric Considerations

- The phase line in an abutment or interior bent will be offset from the phase line for the slab
- The phase line should not be under a beam or within a bearing seat
- Extend the abutment or interior bent past the slab phase line to provide support for the beam or girder.
 - Minimum of 3-inches from the bearing seat or edge of beam, whichever is further

Substructure – Geometric Considerations Cont. 1



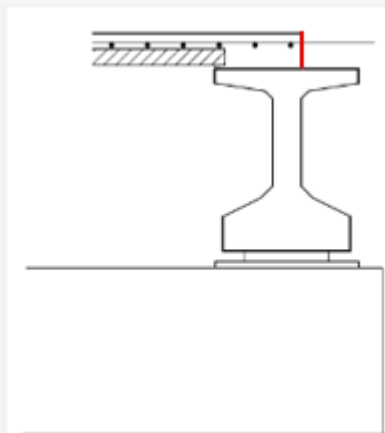
Substructure – Geometric Considerations Cont. 2



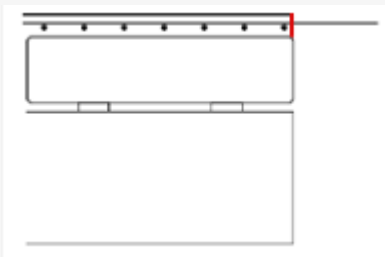
Substructure – Geometric Considerations Cont. 3

- Provide enough space between the existing and new construction to accommodate splicing of the reinforcement and formwork
- Consider how the next phase of construction will be impacted by the placement of the phase lines and reinforcement that extends beyond the phase line

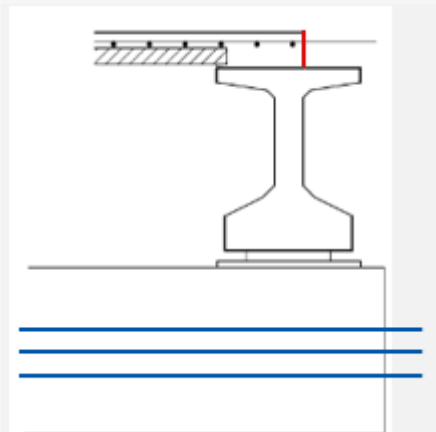
Substructure – Geometric Considerations Cont. 4



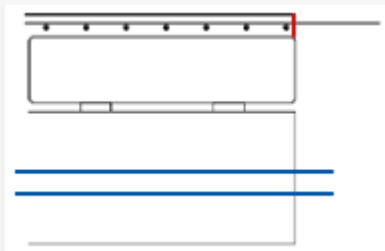
Edge of cap



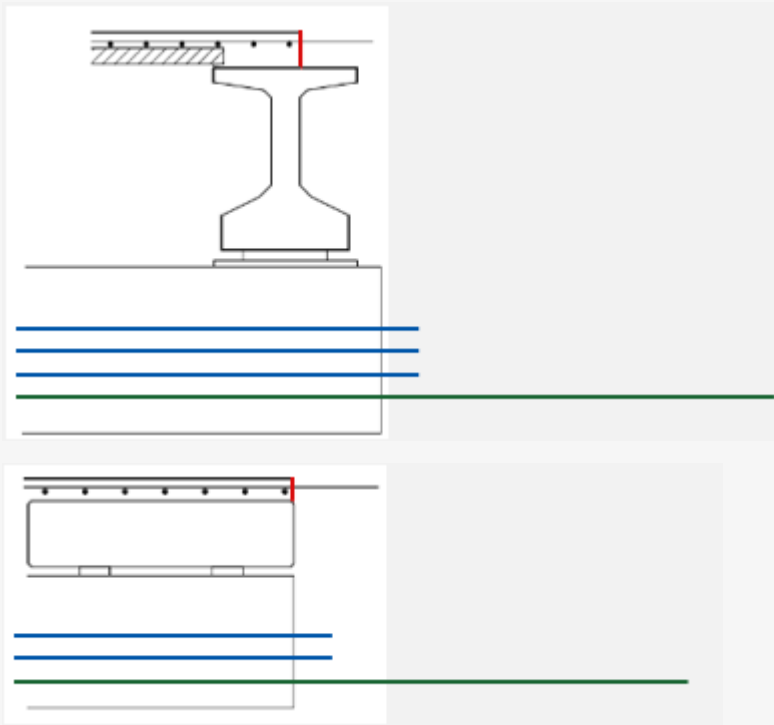
Substructure – Geometric Considerations Cont. 5



Side reinforcement

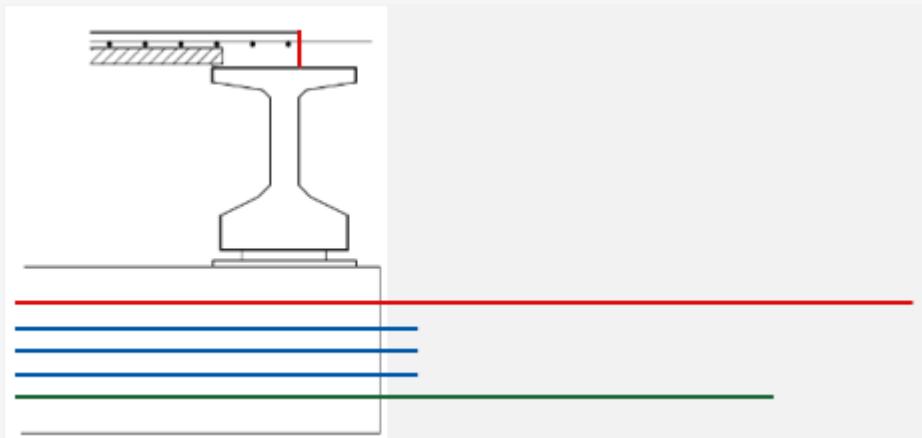


Substructure – Geometric Considerations Cont. 6



Bottom reinforcement

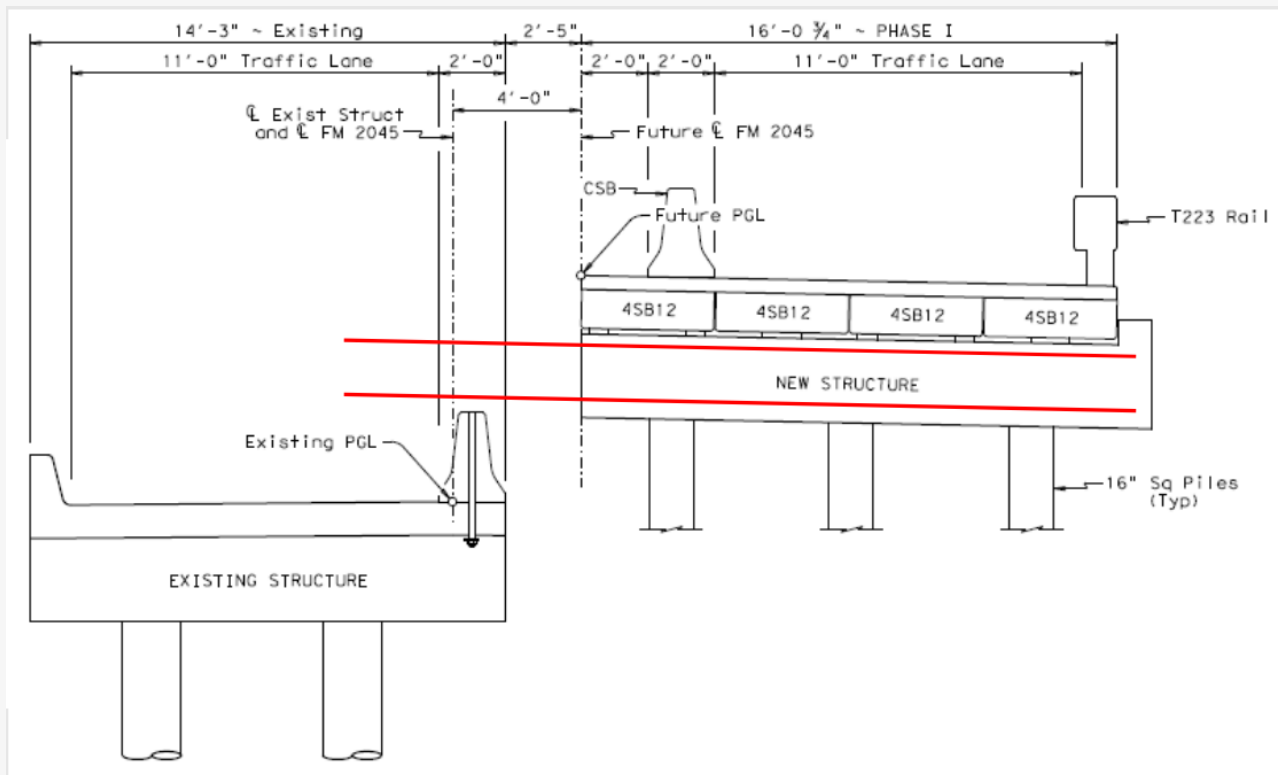
Substructure – Geometric Considerations Cont. 7



Top Reinforcement



Substructure – Geometric Considerations Cont. 8



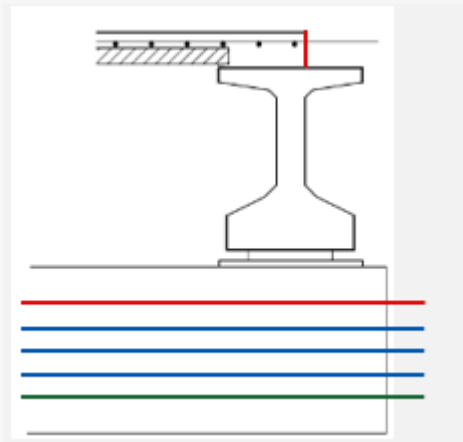
Substructure – Geometric Considerations Cont. 9

- Drilled shaft or piles for the next phase may lie within the length necessary for splicing.
- Avoid having splices that overlap drilled shaft or pile locations to facilitate construction

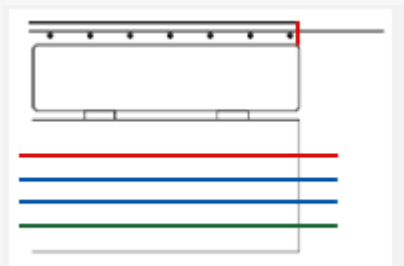
Substructure – Geometric Considerations Cont. 10

- If unable to provide enough room to splice the reinforcement through traditional lapping, use welded splices or mechanical couplers.
 - Extend reinforcement that will be spliced by at least 1-foot.

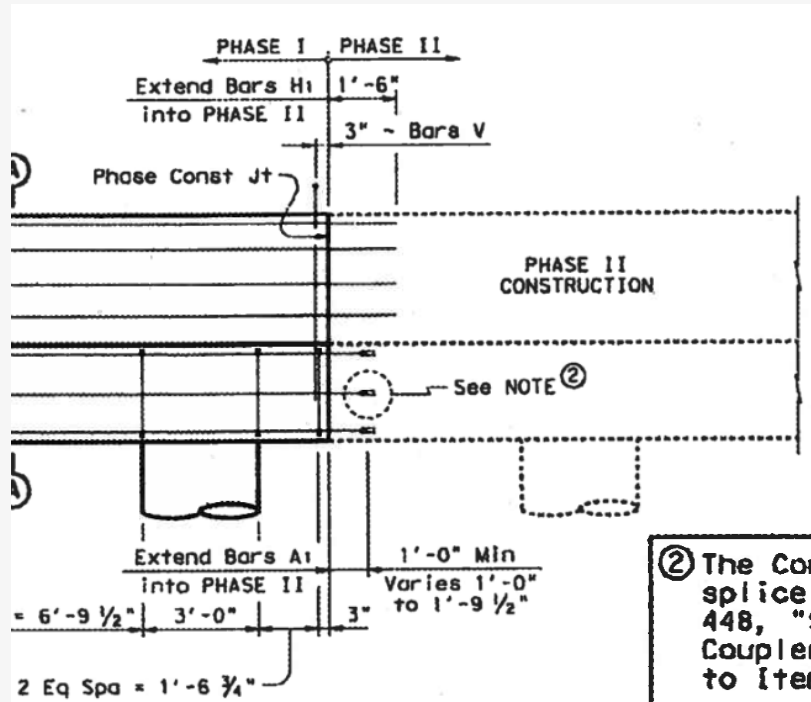
Substructure – Geometric Considerations Cont. 11



Mechanical couplers need ~1-foot past the end of the cap and ~3-feet past the phase line



Substructure – Geometric Considerations Cont. 12



- ② The Contractor, with the approval of the Engineer, will splice Bars A by welding in accordance with the Item 448, "Structural Field Welding" or by using Mechanical Couplers in accordance with the current Special Provision to Item 440, "Reinforcing Steel".

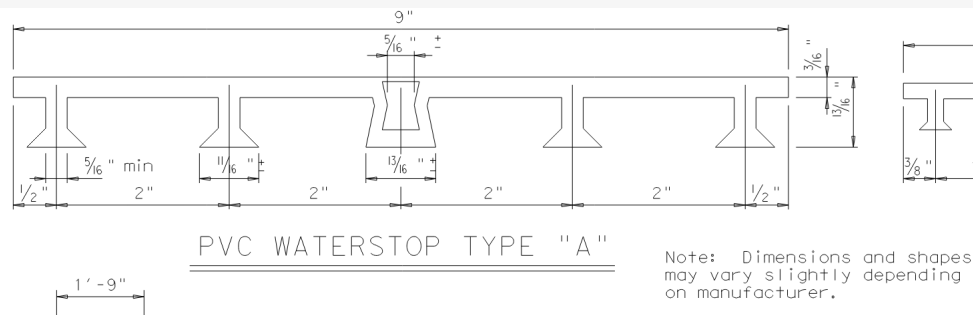
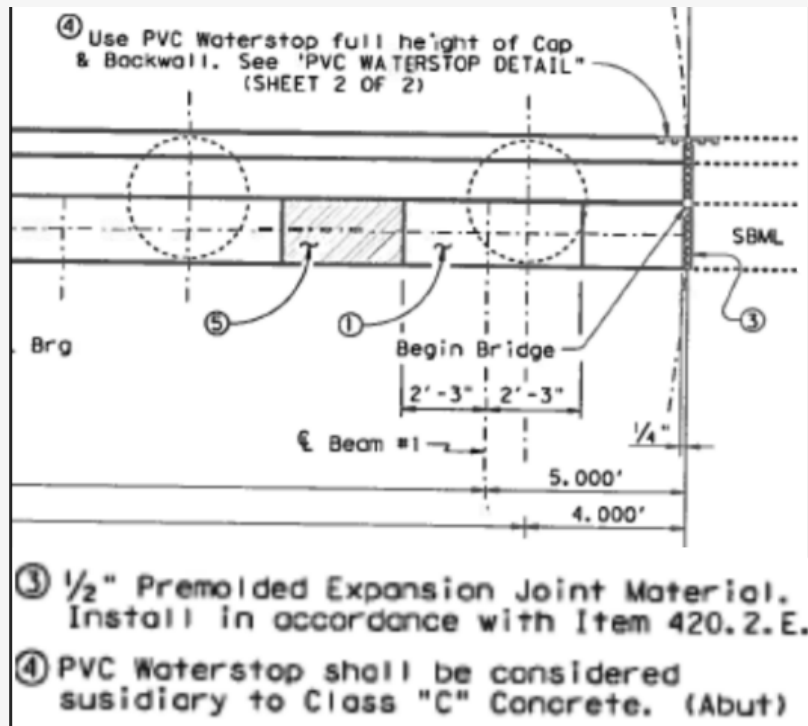
Substructure – Geometric Considerations Cont. 13

- As an alternative to splicing or welding reinforcement, a full depth joint maybe used at the phase line.

Substructure – Geometric Considerations Cont. 14

- For abutments, limit the space between abutments to 1-inch.
 - Use bituminous fiber to fill the gap between the phases
 - Use PVC waterstop across the space along the full height of the cap and backwall

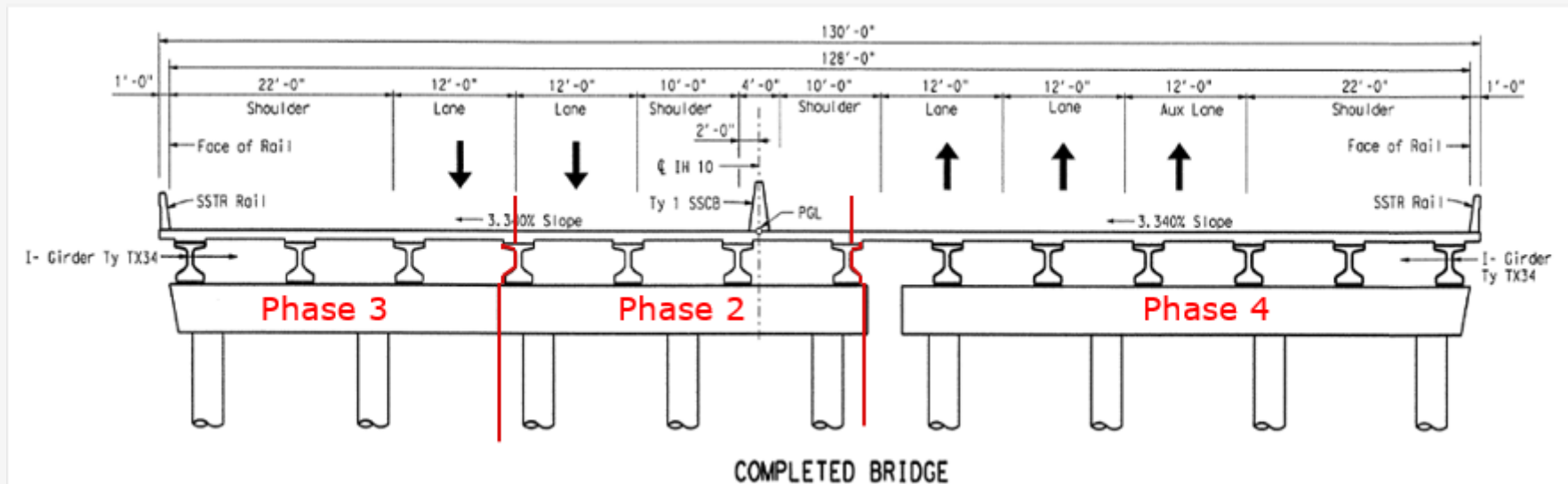
Substructure – Geometric Considerations Cont. 15



Substructure – Geometric Considerations Cont. 16

- For bent caps, the full depth open joint at the phase line should be at least 1-foot wide to allow for forming of the adjacent phases.
- Design bents and abutments that have full depth joints at the phase line as individual components

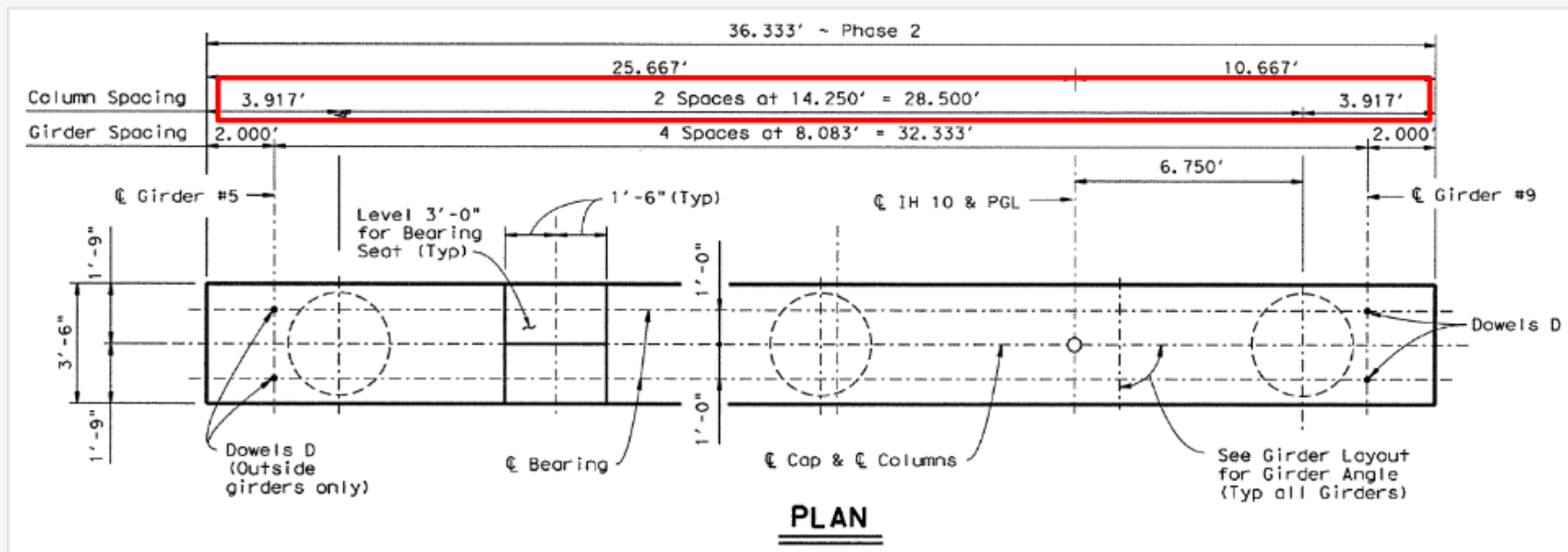
Substructure – Geometric Considerations Cont. 17



Substructure – Geometric Considerations Cont. 18

- When selecting column or drilled shaft/pile spacing, set the distance from face of column or drilled shaft/pile to the phase line between 0.5 and 4-feet.
 - Overhangs >4 feet can result in high negative moments and permanent deflection of the overhang under loading.
 - The construction of additional phases will not remove this deflection.
- Columns or drilled shafts may be spaced at irregular intervals

Substructure – Geometric Considerations Cont. 19



Column Spacing: 3.750', 16.250', 12.333'

Girder Spacing: 2.000', 3 Spaces at 8.083' = 24.250', 6.083'

32.333' ~ Phase 3

38.000'

€ Girder #1

Level 3'-0" for Bearing Seat (Typ)

1'-6" (Typ)

€ Girder #4

Phase 2

€ Bearing

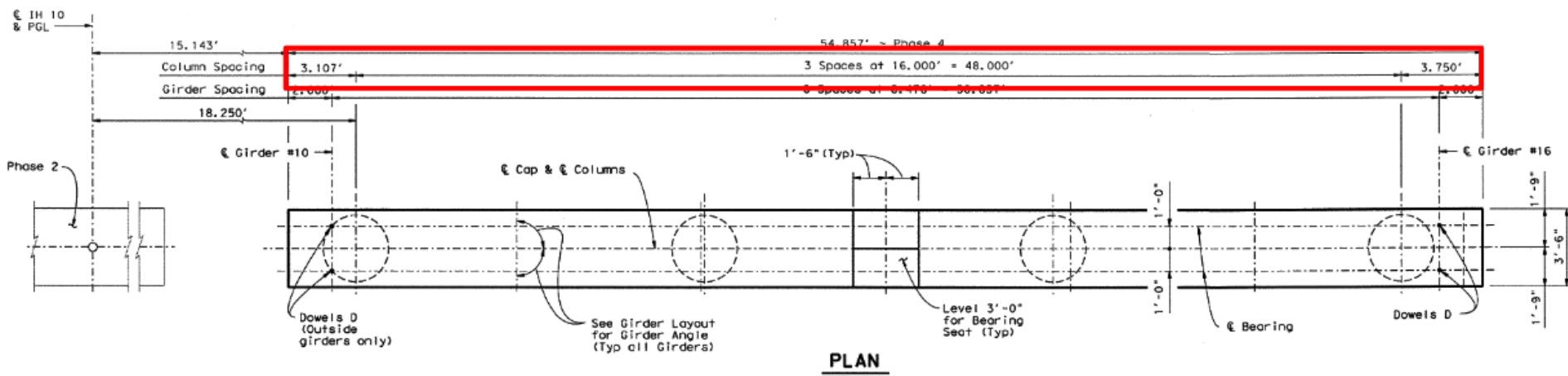
€ Cap & € Columns

See Girder Layout for Girder Angle (Typ all Girders)

Dowels D (Outside girders only)

PLAN

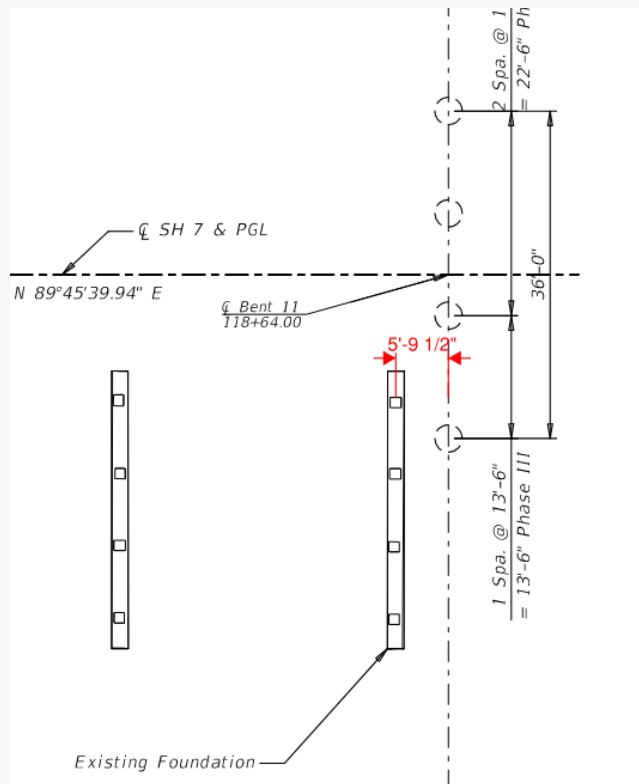
Substructure – Geometric Considerations Cont. 21



Substructure – Geometric Considerations Cont. 22

- Offset old bent lines and new bents by at least 5-feet to keep from fouling foundations on the existing structure
- Existing structures may have battered piling and may be widened with battered piling.
 - Account for potential battered pile conflicts with wingwalls

Substructure – Geometric Considerations Cont. 23



Substructure – Structural Analysis

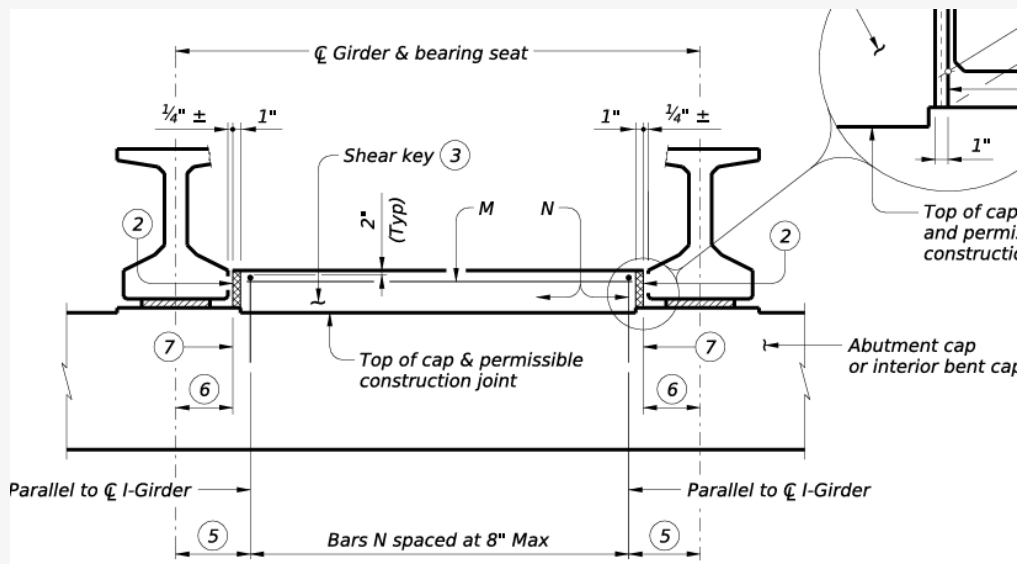
- When designing bents and abutments to be continuous after phasing, consider all stages of construction (including temporary loads) and the final configuration.
- Design for locked in dead load effects between phases.
- Select flexural and shear reinforcement so that loading in all phases can be supported

Substructure – Detailing

- Phased construction may require additional beam dowels, and wide structures may require beam dowels to be moved to inside girders
 - See guidelines for maximum recommended space between dowels.
- If a full depth joint is used between the phases, each component may require a dowel.

Substructure – Detailing Cont.

- Additional lateral restraint (LR shear keys) may be needed for phased structures



Phased Construction Recommendations

- Additional information can be found in the TxDOT Bridge and Structures Design Manual
- <https://www.txdot.gov/content/dam/txdotoms/brg/bsd/bsd.pdf>