
















Highlights of the 2024 MassDOT Hundredth Anniversary Edition Bridge Manual

1920 MassDOT Bridge Section 2020 Celebrating One Hundred Years

 <i>W.F. Williams</i> DIRECTOR ENGINEER William F. Williams Nov. 1920 – Dec. 1922	 <i>G.S. Harkness</i> BRIDGE ENGINEER George S. Harkness Nov. 1924 – Jan. 1942	 <i>R.O. Spofford</i> BRIDGE ENGINEER Ralph O. Spofford Jan. 1942 – Feb. 1951	 <i>J.C. Rundlett</i> BRIDGE ENGINEER John C. Rundlett Mar. 1951 – Dec. 1956	 <i>S. Kirshen</i> BRIDGE ENGINEER Simon Kirshen Dec. 1956 – Jan. 1958
 <i>J.H. Kane</i> BRIDGE ENGINEER James H. Kane Feb. 1958 – Feb. 1963	 <i>J.F. McGovern</i> BRIDGE ENGINEER John F. McGovern Feb. 1963 – Dec. 1965	 <i>R.J. McDonagh</i> BRIDGE ENGINEER Robert J. McDonagh Dec. 1965 – Jul. 1971	 <i>J.J. Aherne</i> P.E. John J. Aherne Jul. 1971 – Dec. 1981	 <i>R.V. Costello</i> P.E. Robert V. Costello Jan. 1982 – Jun. 1987
 <i>T.A. Eddlem</i> P.E. Thomas A. Eddlem Jun. 1987 – Nov. 1988 (Acting)	 <i>P.J. Sullivan</i> P.E. Paul J. Sullivan Nov. 1988 – Mar. 1991	 <i>J.P. Gill</i> P.E. Joseph P. Gill Mar. 1991 – Nov. 1994	 <i>A.C. Dalopoulos</i> P.E. Arthur C. Dalopoulos Nov. 1994 – Mar. 1995	 <i>A.K. Bardow</i> P.E. Alexander K. Bardow Mar. 1995 –

Massachusetts State Bridge Engineers 1920-2020

What has Stayed the Same, What has Changed

- Organization – Still Consists of Three Parts
 - Part I – Design Guidelines
 - Part II – Conventional Construction
 - Part III – Prefabricated Bridge Elements
- What's changed
 - Part I – Contains new material
 - Part II
 - Four new chapters added with new material
 - Beam chapters re-organized based on beam type
 - Part III
 - Chapter sequence re-organized
 - No longer stand alone – must be used in conjunction with Part II
 - Buried Structures and PBU chapters added

What's new in Part I

- Chapter 1 – Hydraulics
 - Information on stream survey limits for hydraulic studies
 - Elevation readings for existing structures
 - Soil sample locations for scour analysis
 - Use of pebble counts for scour soil sampling

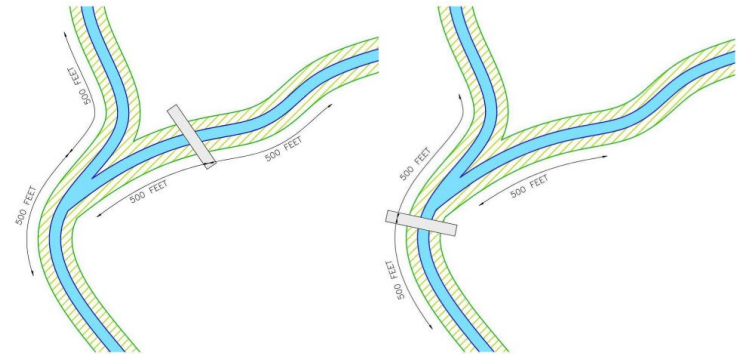


Figure 1.1.5-2: Survey Limits for Stream Confluence



Figure 1.1.5-4 (a): Multi-Span Structure (Open Bottom) Survey Locations

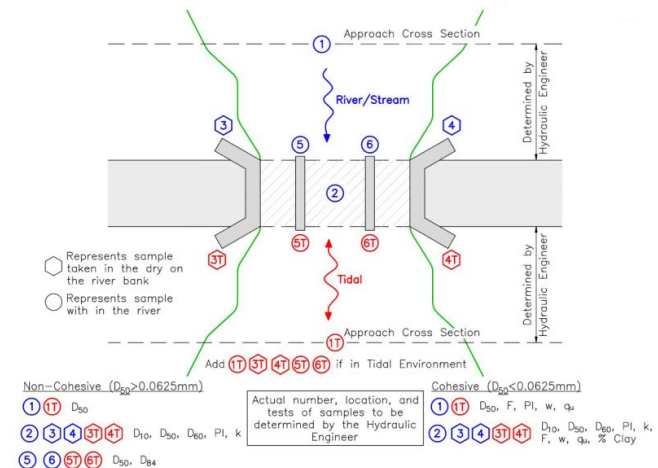


Figure 1.3.1-2: Multi Span Bridge in Riverine and Tidal Environment

What's new in Part I

- Chapter 2 – Hydraulics and Scour
 - Use Climate Change Indicator (CCI) for resilience
 - How to measure scour and how to design foundations
 - Scour countermeasures

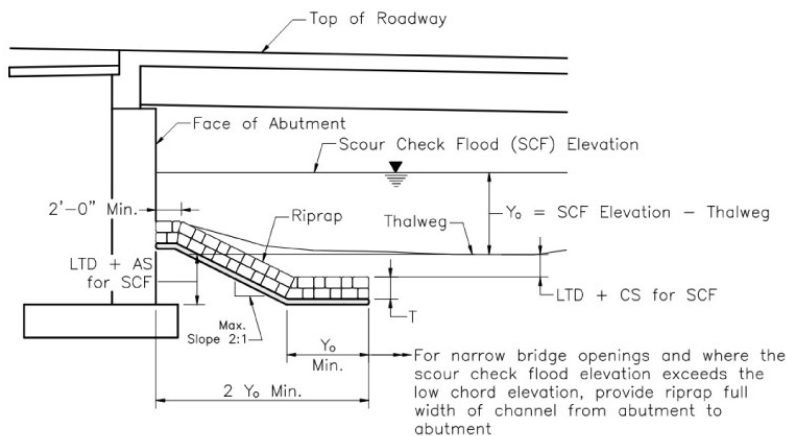


Figure 2.6.5-2: Riprap Countermeasures for Spread Footings

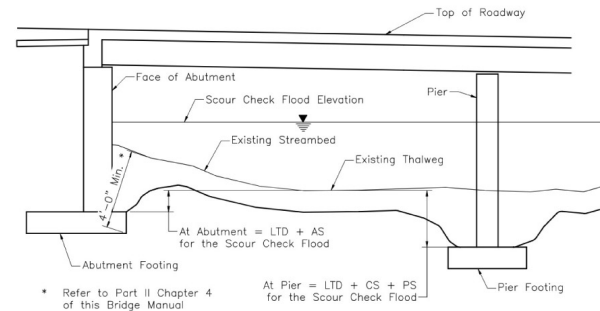


Figure 2.6.5-1: Spread Footing Placement for Scour

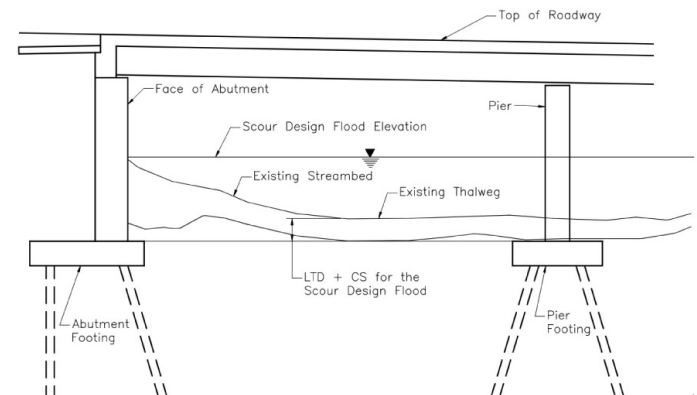


Figure 2.6.5-3: Scour Placement of Footings for Deep Foundations

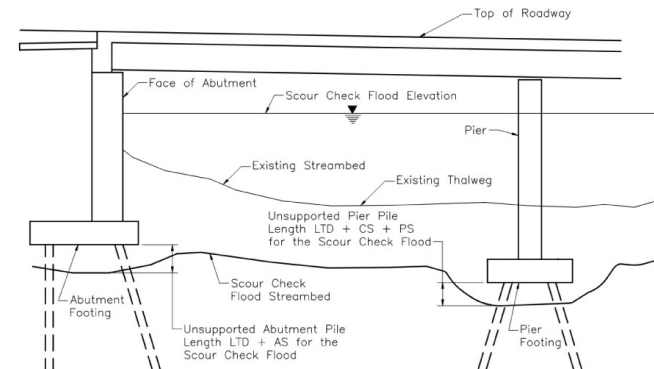


Figure 2.6.5-4: Unsupported Pile Lengths for Deep Foundations

What's new in Part I

- Chapter 3
 - Clearer direction on use of Galvanizing/Metalizing
 - Micropiles
 - Scour Design Considerations
 - Link Slab Design
 - PBU Design considerations, including making them continuous for Live Load
 - Bridge Inspection considerations, including Scour Coding
- Chapter 6
 - Reflects use of PDFs in shop drawing review and approval
 - Provides email addresses for distributing shop drawings

What's new in Part I

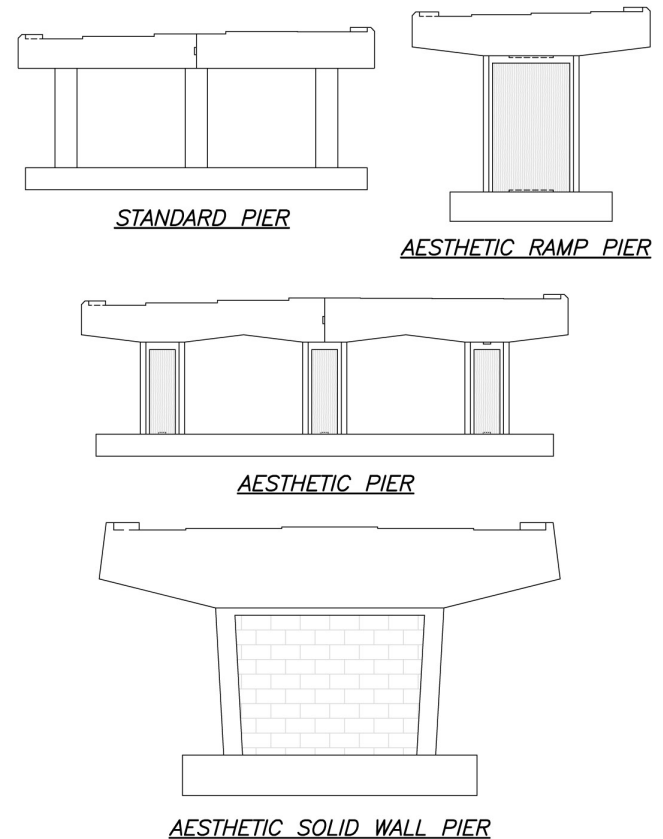
- Chapter 7
 - Major rewrite that includes:
 - Rating guidelines for Special Hauling Vehicles (SU) and Emergency Vehicles (EV)
 - Results of UMass research
 - Deteriorated Steel Beam Ends
 - Deteriorated Prestressed Concrete Beams
 - A new Bridge Load Rating Report checklist to be used by rating engineers when preparing and submitting a report
 - As a separate file to download from the webpage as well as a part of Chapter 7
 - Currently working on revision to reflect submission through SharePoint
 - Would be issued some time next year

What's new in Part II

- Four new chapters added
 - Chapter 4 – Abutments and Wingwalls
 - Chapter 5 – Piers
 - Chapter 6 – Bridge Seat Elevations
 - Chapter 11 – Prestressed Stringer Bridges with Integral Deck
- One chapter moved
 - 2013 Chapter 11, Concrete Box Culverts, moved to Part III because these structures are now exclusively prefabricated
- Chapters 1, 2, 7, 8, 9, 10, 12, 13, 14, and 15 remain content wise the same as their previous versions, just updated and re-organized

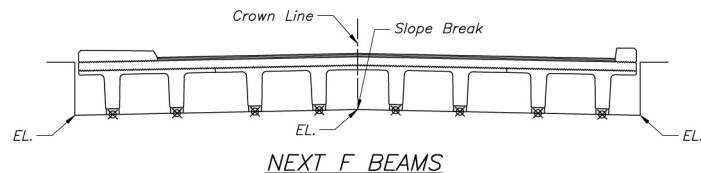
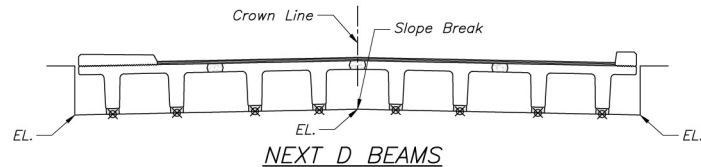
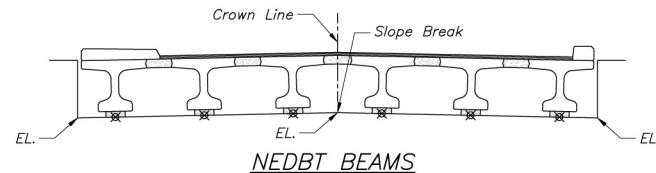
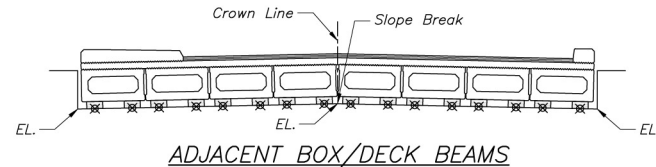
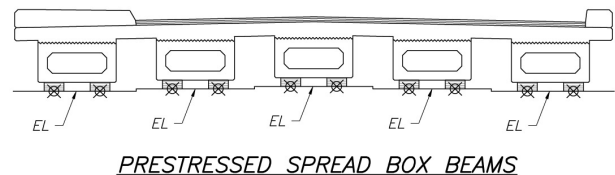
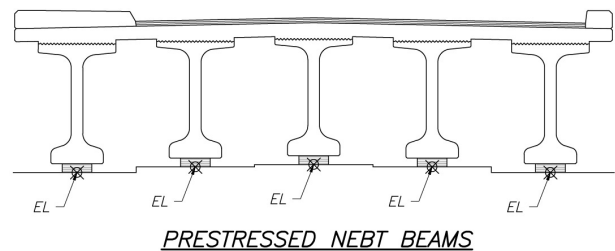
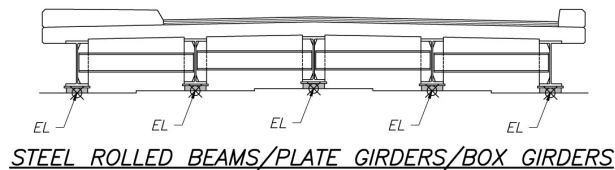
What's new in Part II

- 2013 Chapter 3, Bridge Substructures, split into three new chapters:
 - Chapter 3 – Foundations
 - includes new micropile details
 - Chapter 4 – Abutments and Wingwalls
 - Chapter 5 – Piers
- Pier chapter completely new
 - Includes several new Aesthetic Pier details
 - Provides typical reinforcing patterns for piers



What's new in Part II

- New Chapter 6 shows how to calculate bridge elevations
 - Stepped, sloped, and how to modify to prevent beam racking

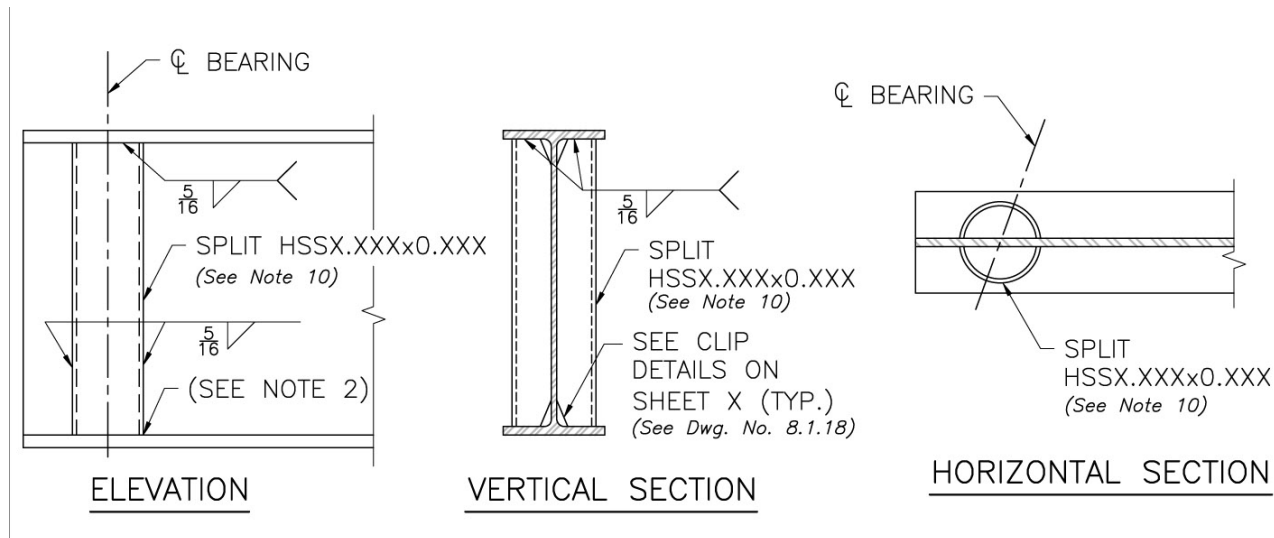


What's new in Part II

- Beam chapters organized by type of beam
 - Chapter 8 – Steel Stringer Bridges
 - Rolled Beams, Welded Plate Girders, Steel Box Girders
 - Chapter 9 – Prestressed Stringer Bridges with Conventional Deck
 - NEBT, NEXT F, Spread Box Beam
 - Chapter 10 – Adjacent Beams with Conventional Deck
 - Deck and Box Beam used as adjacent systems
 - Chapter 11 – Prestressed Stringer Bridges with Integral Deck
 - NEDBT, NEXT D

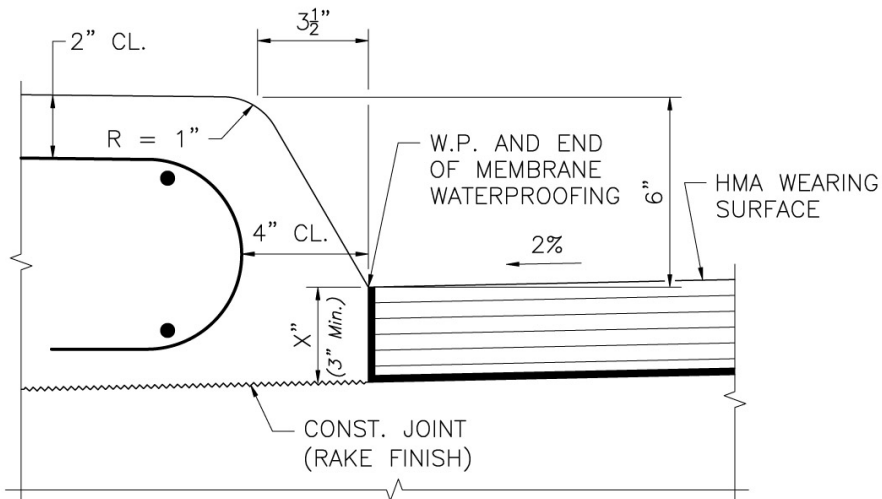
New Features in Part II

- New features for steel beams
 - Split HSS tubes for skewed end diaphragm connections
 - Interior diaphragms square to beam but follow skew line



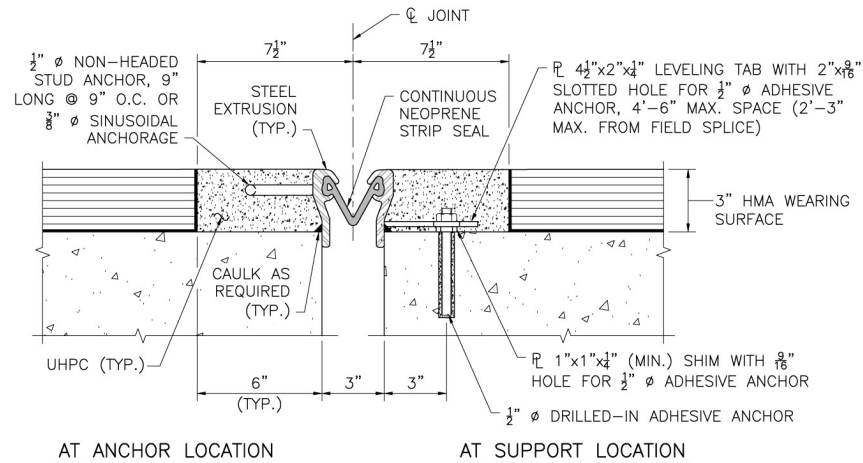
New Features in Part II

- Chapter 12 uses the new shaped curb for sidewalks
 - Developed to meet MASH crash testing requirements
 - Performance verified by actual crash tests



New Features in Part II

- Chapter 13 Roadway Joints
 - Chapter now includes the saw cut as a joint
 - Strip Seal detail uses a more robust steel extrusion and UHPC as a header pour



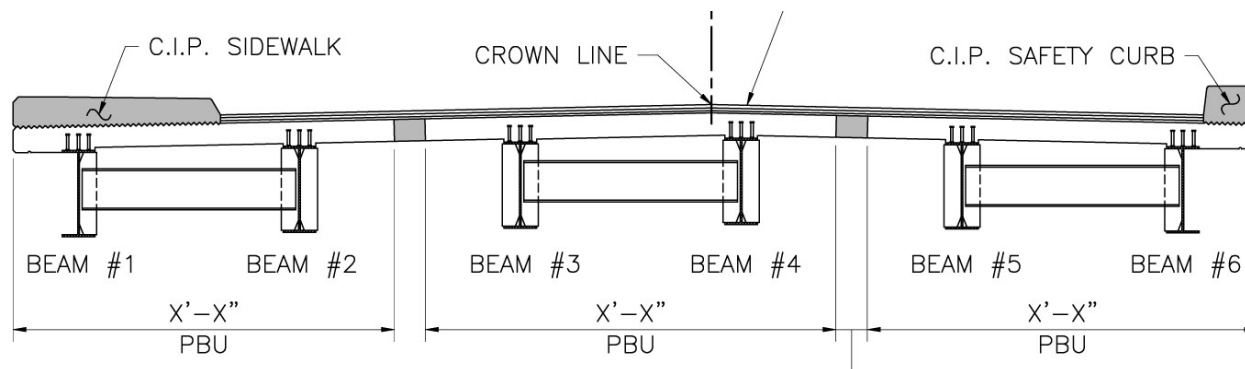
- Chapter 15 adds corner pilasters to aid in concrete consolidation for abutments with NEDBT and NEXT D

What's new in Part III

- Sequence of chapters has been revised
- Part III now needs to be used in conjunction with Part II
 - Before Part III details were similar to Part II and showed all relevant dimensions and reinforcement so details could be used on plans
 - Now, Part III provides guidance and only those details that are needed to convert a Part II detail into a prefabricated detail

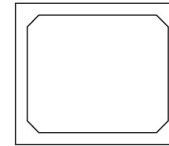
What's new in Part III

- Two new chapters added
 - Chapter 6 – Prefabricated Bridge Units (PBU)
 - Provide design and detailing guidelines
 - Provide details for link slabs and making PBUs continuous for Live Load
 - Diaphragms required between beams within a PBU unit but no longer required between PBU units
 - Shows crane lifting strategies

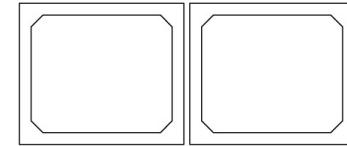


What's new in Part III

- Chapter 8 – Buried Structures
 - Includes three sided frames and arches and box culverts, including wingwalls and approach slab shelves
 - Frames and box culverts with at least 18” or more of fill and pavement over the culvert no longer require approach slabs



BOX CULVERT



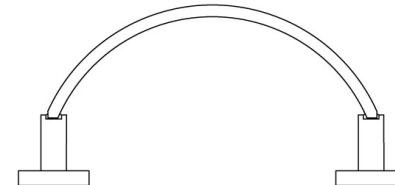
TWIN-CELL BOX CULVERT



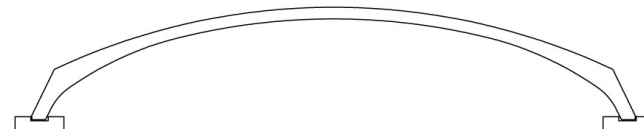
THREE-SIDED FRAME ON SPREAD FOOTING



THREE-SIDED FRAME ON PEDESTAL STEM



ARCH ON PEDESTAL STEM



LONG SPAN ARCH ON SPREAD FOOTING

What's new in Part III

- Chapter 7 – Deck Panels now include non-post tensioned deck panels details
 - To be constructed with cast in place longitudinal and transverse closure pours
 - Shows how to lay out the panels for different skews
 - Shows suggested vertical adjustment devices

