South Carolina
Department of Transportation

95% BRIDGE PLANS QUALITY CONTROL CHECKLIST

RD. / RTE. NO:		**RD. / RTE. NAME:**			**PROJECT ID:**		
COUNTY:	York	**PROJECT DESCR.**					
SUBMITTAL TYPE:		**SUBMITTED BY:**		**RPG/DISTRICT/ CONSULTANT:**			
QC PERFORMED BY:		**PROJECT TYPE:**			**DATE:**		

Notes to designer: 95% Bridge Plans shall be considered complete final plans by the designer and a thorough formal Assurance (QA) and Quality Control (QC) review shall be performed by the Engineer of Record (EOR) prior to submittal to the SCDOT Structural Design Support Office. Failure to provide completed plans with proper level of review by the engineer of record will be cause rejection by SCDOT and submittal will be returned for proper plans preparation. **Design review comments from previous submittals such as Preliminary Plans shall be verified and addressed on the plans by the engineer of record prior to comment responses returned to SCDOT along with 95% Bridge Plans.**

The list below is intended to be a select list of items that will be the focus of a review performed by the Engineer of Record. It is not intended to be a comprehensive QA nor QC list. Plan submittals meeting all items in the list below do not relieve the engineer of record of the responsibility to design the structure and provide bridge plans in accordance with all applicable design criteria. Plans that are noted as not being prepared per all applicable design criteria required for SCDOT projects will be cause for rejection and submittal will be returned for proper plans preparation.

Notes:

- Updated revision block with project ID, designers' initials, and date shall be used for all project sheets
- Where SCDOT Drawings are referenced, the latest revision as shown on the SCDOT website shall be used
- For bridges over railroads reference SCDOT BDM Chapter 22 and latest Railroad design and construction criteria
- For bridge widening, reference SCDOT BDM Chapter 23
- Is there a special provision as part of this project? ☐ Yes ☐ No ☐ N/A
- Is a design variance required for any part of the project that does not meet the requirements of the publications listed below? (BDM Section 11.2.3 /11.2.3.2) ☐ Yes ☐ No ☐ N/A
- Have Load Ratings for all applicable structures been submitted to SCDOT Bridge Maintenance Office for review and approval? ☐ Yes ☐ No ☐ N/A

References:

1. Bridge Design Memorandums (MEMO) https://www.scdot.org/business/design-memos.aspx
2. SCDOT Bridge Design Manual (BDM) https://www.scdot.org/business/pdf/structural-design/SCDOT_Bridge_Design_Manual.pdf
3. SCDOT Seismic Design Specification for Highway Bridges (SDS) https://www.scdot.org/business/pdf/structural-design/specs_2008.pdf
4. AASHTO LRFD Bridge Design Specifications (LRFD)
5. SCDOT Standard Specifications for Highway Construction (SS) https://www.scdot.org/business/pdf/2007_full_specbook.pdf

6. SCDOT Bridge Drawings and Details (BDWG) http://info2.scdot.org/structuraldesign/Pages/BridgeDrawings.aspx
7. SCDOT Geotechnical Design Drawings (GDWG) http://info2.scdot.org/structuraldesign/Pages/GeoTechDrawings.aspx
8. SCDOT Roadway Standard Drawing (RDWG) https://www.scdot.org/business/standard-drawings.aspx
9. SCDOT Utilities Accommodation Manual (UAM) https://www.scdot.org/business/pdf/rightofway/SCDOT_Utility_Accommodations_Manual_revised_2019.pdf
10. SCDOT Load Rating Guidance Document (LRGD)https://www.scdot.org/business/load-rating-guidance-doc.aspx
11. Other AASHTO and state design standards, specifications, policies, and practices
12. Final Geotechnical Engineering Report (Latest update) (FBGER)

95% Bridge Plans

Title Sheet	BDM 6.3.1
Summary of Estimated Quantities	BDM 6.3.2
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Girder Details	BDM 6.3.14.5
Camber and Blocking Diagram	BDM 6.3.14.6
Bearing Details	BDM 6.3.14.7
Joint Details	BDM 6.3.14.9
Top Slab Elevations	BDM 6.3.14.10
Sidewalk and Railing Details	BDM 6.3.14.11
Approach Slab	BDM 6.3.15
Slope Protection Paving Details	BDM 6.3.16
Drainage Details	BDM 6.3.17
Utilities Details	BDM 6.3.18
Existing Bridge Plans	BDM 6.3.19

Title Sheet **BDM Section 6.3.1, BDWG 700-01 or 700-02**

Reviewed during Preliminary Bridge Plans submittal. See Preliminary Bridge Plans Checklist

- ☐ Verify that all preliminary plans comments are addressed
- ☐ Project ID
- ☐ Verify sheet title and sheet number shown in Index of Sheets matches the title of each corresponding plan sheet
- ☐ Updated date of plan set, drafting Information (CADD), and plot stamp - BDM Section 6.3.1.9
- ☐ Correct Asset ID number entered in plans – MEMO DM0420 & LRGD
- ☐ Plan set date stamp and level of completion note - BDM Section 6.3.1.9
- ☐ Signature Blocks signed and sealed by the EOR - BDM Section 6.3.1.8
- ☐ Label Low Volume Bridge Title Sheet, if applicable -SCDOT PCDM-11
- ☐ Has QC review performed on all project information to ensure accuracy and completeness

South Carolina Department of Transportation

Summary of Estimated Quantities **BDM Section 6.3.2 & BDM Chapter 7**

Tabulation of Estimated Quantities

- ☐ Structure element: Tabulate the quantities for each bent, the superstructure and approach slabs
  Provide footnote on the material strength of steel piles
- ☐ Where two or more structures are provided or staged, tabulate the quantities for each structure and stage, unit, and provide a subtotal for each
- ☐ Pay items included, including values to match those from individual sheets
- ☐ Total: Provide a total for all structures and stages at the bottom of the table. For lump-sum items, indicate that the total quantity is "NECESSARY"
- ☐ Use only the pay items numbers and units provided in the SCDOT Standard Specifications, Supplemental Specifications, or Special Provisions
- ☐ Verify units are correct and match Summary of Estimated Quantities
- ☐ Verify rounding accuracy – BDM Figure 7.1-1

Summary of Estimated Quantities

- ☐ Table should contain the following elements -BDM Chapter 7
  - Pay item number
  - Bid item description
  - Unit of measurement
  - Total quantity of each bridge item used on the project
  - Where structural steel is provided, provide a footnote indicating the approximate weight, in pounds, of the structural steel
- ☐ Items not included in tabulation table but required
    - Remove & Disposal of Existing Bridge
    - Waterproofing
    - Expansion joints
    - Aggregate underdrain
    - Groove surface
    - Temporary shoring wall (verify if included in road plans instead of bridge plans)
  - Footnote stating the approximate weight of structural steel used
- ☐ Verify all pay items included in the bridge project listed
- ☐ QC review performed to verify bid items, bid item numbers, and quantities (including rounding accuracy) are correct

General Notes **BDM Section 6.3.3, BDWG 700-03 (latest update)**

- ☐ Verify that all preliminary plan comments are addressed
- ☐ Verify project design per correct version of LRFD listed at preliminary plan acceptance – BDWG 700-03
- ☐ Updated revision block with project name, initials, date
- ☐ If a new note is added, or if a note is revised, place in a double-lined box
- ☐ Reference any special provisions if applicable
- ☐ Provide seismic data for non-low-volume bridges
  - Operational Classification (OC) - SDS Table 3.1
  - Seismic Design Category (SDC) - SDS Table 3.5
  - Verify analysis method - BDWG 700-03.01 and SDS Section 6.1
  - Verify design acceleration coefficients and response spectrum data are consistent with latest FBGER
- ☐ Seismic data for low volume bridges included if applicable - BDWG 700-03.01
- ☐ If widening project, verify if bridge meets the same seismic criteria as existing – MEMO DM0115
- ☐ Verify seismic data listed on plans is consistent with Final seismic design summary report developed for the project
- ☐ Final Surface Finish selected – BDWG 700-03

☐ QC review performed on all information to ensure accuracy and completeness

General Notes & Details for Flat Slabs **BDM Section 6.3.3, BDWG 700-04, 700-04.01 (latest update)**

☐ Ensure all above General Notes Items are verified as they all are applicable here. If a new note is added or if a note is revised, place in a double-lined box.
☐ Verify project design per correct version of LRFD – BDWG 700-04, BDWG 700-04.01
☐ Final Surface Finish selected – BDWG 700-04, BDWG 700-04.01
☐ Adhesively Bonded Dowel Detail provided (if applicable) with embedment dimensions provided and notes modified as appropriate - BDWG 700-04.01, MEMO DM0408
  - o Embedment length
  - o Spacing and edge distance minimums
  - o Designed to be ductile if applicable
  - o Notes
  - o Field testing requirements

☐ Verify bar support detail does not conflict with flat slab rebar configuration with respect to cover and CHCU height
☐ Ensure concrete compressive strength matches the structural elements on the plans - BDM Fig. 15.2-1
☐ QC review performed on all information to ensure accuracy and completeness

General Details **BDM Section 6.3.3, BDWG 700-05, 700-05.01 (latest update)**

☐ Updated revision block with project name, initials, date
☐ Remove details that are not applicable
☐ Adhesively Bonded Dowel Detail provided (if applicable) with embedment dimensions provided and notes modified as appropriate - BDWG 700-04.01, MEMO DM0408
  - o Embedment length
  - o Spacing and edge distance minimums
  - o Designed to be ductile if applicable
  - o Notes
  - o Field testing requirements

☐ Anchor Bolt dimensions included- BDWG 700-05, BDM Section 21.2.1.7 and BDM Figure 21.2-2
☐ Structural steel details provided (Structural Steel Superstructure only) - BDWG 700-05
☐ Welded Stud Detail dimensions provided (Structural Steel Superstructure only)
☐ Correct drain detailed – BDWG 700-05, BDWG 700-05.01
  - o Verify if scuppers with grates are provided if the bridge has a sidewalk- BDM Section 18.2.5.1, BDWG 700-05.01
  - o 6” min. diameter scuppers for inlets on all bridges with open drainage- BDM Section 18.2.5.1
  - o 8” min. diameter, fiberglass pipe for bridges with closed drainage- BDM Section 18.3

☐ Pipe Underdrain Detail and Pipe Outlet Detail included (could be included elsewhere in plans) – BDWG 700-Misc.02
☐ Verify bar support detail does not conflict with deck rebar configuration with respect to cover and BBU height
☐ QC review performed on all information to ensure accuracy and completeness

Reinforcing Bending Details **SCDOT BDM Section 6.3.4 BDWG 703-01, 703-01.01 (latest update)**

☐ Verify latest revision of BDWG 703-01 is used
☐ Updated revision block with project name, initials, date
☐ Add any unique bar details needed for the project and called out in the plans, if applicable
☐ QC review performed on all information to ensure accuracy and completeness

Roadway Typical Section - labeled “For Information Only” **BDM Section 6.3.5**

- ☐ Verify that all preliminary plan comments are addressed
- ☐ Roadway Approach Typical Section provided that matches Final Road Plans and noted "For Information Only" – BDM Section 6.3.5
- ☐ Typical Sections provided for both facilities carried as well as routes passing below and/or above the bridge

Roadway Plan & Profile -labeled "For Information Only" **BDM Section 6.3.6**

- ☐ Verify that all preliminary plan comments are addressed
- ☐ Roadway Approach Plan & Profile provided that matches Final Road Plans and noted "For Information Only" – BDM Section 6.3.6
- ☐ Roadway profiles provided for both facilities carried and routes passing below and/or above the bridge

Stages of Construction **BDM Section 6.3.7**

- ☐ Verify that all preliminary plan comments are addressed
- ☐ Stages of Construction drawings and notes provided for each stage of construction – BDM Section 6.3.7

Bridge Plan & Profile **BDM Section 6.3.8**

Bridge Plan & Profile should be complete at Preliminary Plans submittal, with a few exceptions noted below. Notify Structural Design Support if significant additions and changes are made between Preliminary and 95% Bridge Plans submittals. See Preliminary Bridge Plans Checklist

- ☐ Verify all items listed in the *Preliminary Bridge Plans Checklist* have been resolved
- ☐ Verify that all preliminary plan comments are addressed
- ☐ Verify roadways passing under the structure minimum horizontal and vertical clearances are met - BDM Section 12.6 & BDM Figure 12.6-2, Figure 12.6-8, Figure 12.6-9
- ☐ Bents within 30 feet from edge of travel lane - Refer to MEMO DM0213
- ☐ Scour Profile provided (if applicable) – BDM Section 6.3.8.1
- ☐ Soil Borings plotted with stations and offsets from construction centerline noted – BDM Section 6.3.8.1
- ☐ Minimum two benchmarks provided, including station, offset from centerline, type, elevation – BDM 6.3.8.3
- ☐ Verify all utilities that may interfere with bridge construction are relocated or removed
- ☐ For bridge widening, comply with BDM Chapter 23

<u>Railroad Crossings:</u>

- ☐ ROW limits for railroads shown
- ☐ Railroads passing under the structure - minimum horizontal and vertical clearances are met - BDM Section 22
- ☐ Verify temporary railroad construction clearances - BDM Section 22.2.3.2
- ☐ Interior bents within 25 feet to 50 feet of CL of railroad tracks - MEMO DM0213
- ☐ To limit damage to bents supporting bridges over railways by redirection and deflection of railroad equipment, bents over railways with a clear distance of less than 25.0 ft. from the centerline of a railroad track shall be of heavy construction or shall be protected by a reinforced concrete crash wall - BDM Section 22.2.3.5:
- ☐ Verify that existing horizontal and vertical clearances are maintained for widening projects - BDM Section 22.2.3.7
- ☐ Verify construction casing is specified for drilled shafts located within 30 ft. of the centerline of an existing railroad track. For drilled shaft locations greater than 30 ft. from the centerline of a track, consideration shall be given to requiring construction casing - BDM Section 22.2.7
- ☐ Verify that latest CSX Transportation Criteria for Overhead Bridges is met
- ☐ Concrete slope protection pavement provided where practical BDM Section 22.2.3.6. Generally, concrete slope protection will not be provided where the tracks are located in a cut section having steep slopes. When concrete slope protection is not provided, consider providing a low retaining wall attached to the bents adjacent to the track to prevent the fill from sloughing into the railroad ditches. See BDM Section 22.2.3.6
- ☐ Deck drains shall not be allowed to discharge onto railroad right-of-way. See BDM Section 22.2.8

☐ QC review performed on all information to ensure accuracy and completeness. Bridge width, length, and profile information is consistent with Roadway Plans. Information is consistent with all information within the plans.

Boring Logs **BDM Section 6.3.9**

☐ Soil Boring Logs provided – BDM Section 6.3.9

☐ Include applicable boring logs from FBGER and as shown on Bridge Plan and Profile

Foundation Layout **BDM Section 6.3.10**

☐ Verify consistency with individual sheets with respect to sizing, spacing, layout, etc.

☐ Show approximate location of temporary shoring

Proposed Spread Footings

☐ Footings drawn and dimensioned from work point

☐ Show and label centerline of each bent

☐ Approximate locations for cofferdams drawn

Pile or Shaft Footings

☐ Pile or drilled shaft spacing dimensioned for each footing

☐ proposed locations for cofferdams drawn

☐ Pile locations are shown and dimensioned with respect the footing

☐ Indicate type and size of pile

☐ Indicate diameter of drilled shaft, rocket socket, and/or column

☐ Show and label centerline of each bent

Proposed Pile Bents

☐ Piles drawn and dimensioned from work point

- o Dimension spacing between each pile
- o Show pile orientation consistent with other sheets
- o Indicate type and size of pile
- o Label test and index piles, if applicable
- o Show and label centerline of each bent

Proposed Drilled Shaft Bents

☐ Drilled shafts drawn and dimensioned from work point

- o Dimension spacing between each pile
- o Indicate diameter of drilled shaft, rocket socket, and/or column
- o Show and label centerline of each bent

☐ Stationing

☐ Station where construction centerline intersects centerline of each bent

☐ Provide stationing at beginning and end of bridge

☐ Dimension overall length of structure

☐ Show location of beginning and end of bridge

☐ Show span dimensions

Existing Substructures

☐ Avoid Substructure location conflicts with proposed bents. If every effort has been made to avoid conflicts and they are unavoidable, consult with RPG Structural Design Engineer for direction forward. Provide notes to contractor as to how to handle conflict (i.e. Portions of foundations are to be removed to avoid conflict). Notify Geotechnical Engineer of Record about conflict and ensure loss of bearing is accounted for in proposed foundation-BDM Section 6.3.10

☐ Draw in existing foundation elements

☐ Either dimension approximate length between centerline of bents of existing foundations and tie the dimensions to the proposed bridge or provide approximate clear dimensions between proposed foundation elements and nearest existing foundation element

Utilities

☐ Provide approximate locations of existing buried utilities

☐ Indicate which existing buried utilities are to remain in place

☐ When existing buried utilities are to be relocated and existing utility location conflicts with proposed foundation, provide notes to give contractor guidance about how to handle abandoned utility in relation to foundation installation. Consult with Geotechnical Engineer of Record about conflict and work out plan for successful installation of proposed foundation. If abandoned utility is to be removed prior to proposed foundation installation, ensure that loss of bearing due to disturbed soil is accounted for in final foundation design.

☐ Miscellaneous information
- North arrow
- Traffic or stream flow direction
- Skew angles for centerline of bents
- Bearing and lengths of span and long chords
- Stage locations for staged construction

☐ Construction/roadway centerline

☐ Verify QC review performed to ensure the information provided is accurate and complete. Ensure all information is consistent with the other all other plans sheets.

Long Chord Layout (Bridges on Horizontal Curves)

☐ Long Chord Layout provided showing skew angles and offsets for curves at critical points – BDM Section 6.3.10
Can be included with Foundation Layout if space allows of sheet for clear detailing

Geotechnical Information

☐ Geotechnical notes, parameters, and quantities provided – BDM Section 6.3.11.6

☐ Temporary shoring soil design parameters provided

☐ QC review performed to ensure geotechnical notes and parameters match the information in the FBGER. Structural reviewer shall review all geotechnical information and ensure that they understand the intent and that information provided is consistent with structural design intent. Any conflicts shall be worked out between the Structural and Geotechnical Engineers of Record prior to submittal of 95% plans to SCDOT

End Bent: **BDM Section 6.3.11 & BDM Chapter 20**

☐ Verify that all preliminary plan comments are addressed

Plan View

☐ Centerlines shown
- Bearing(s)
  - Piles, columns, shafts, footings
  - Cap and Bent
  - Route
  - Construction, survey, and/or bridge
  - Girder/beam

☐ Dimensions - Overall Cap Width and Length and include the following:
  - Width from bent centerline to each side of bent
  - Distance from bent centerline to begin/end of bridge
  - Distance from end of bent to CL construction, bridge, or survey
  - Distance from end of bent to first and last girder
  - Distance between centerlines of girders
  - Distance from nearest girder to construction centerline
  - Staged construction distances

        - Direction of stationing
    - Minimum cap width for pile bents met - MEMO DM0312
    - Minimum cap width =diameter of column/shaft plus 3" on each side -BDM Section 20.1.3.1
    - If cap length exceeds 70 feet, verify construction joint provided BDM Section 20.1.4 and detailed per BDWG 700-05
    - Prestressed concrete pile bent caps length set to provide a minimum overhang equivalent of 2 pile widths - MEMO DM0312
    - Bent cap length - BDM Section 20.1.3.2
        - minimum 9 in from the centerline of the anchor bolt to the end of the bent cap
        - minimum 9 in from the edge or corner of the elastomeric bearing or masonry plate to the end of the bent cap
        - Exterior centerline girder not located on bent cap cantilever for pile bents
    - Cored slab units - BDM Figure 20.1-3
        - bent cap detailed with a concrete lateral guide at the outside face of the exterior slab units
        - 1½-in expansion joint material between the cored slab and lateral guide and, if approach slabs are detailed
        - 1½-in expansion joint material between the approach slab and wing wall

☐ Pavement rest is a minimum 8" wide -SCDOT BDM Section 17.4.2.5 and 20.2.3.5 - End Bent Only

☐ Verify skew angle between bridge centerline and bearing and bent centerlines
    - Skews greater than 20°, detail a 3 in. minimum chamfer at acute corners - BDM Section 20.2.3.7

☐ Beam Seats
    - Provide note to contractor to see bearing details sheet for additional information
    - Location, size, and applicable dimensions to the anchor bolts
    - Horizontal rebar size and spacing shown
    - Width and length dimensions
    - Beam seats shall be level - BDM Section 20.2.3

☐ Wing wall dimensions

☐ Joint filler material type and thickness shown

<u>Elevation View</u>

☐ Overall dimensions

    - Cap Depth
        - For single row of piles and double row of piles -BDM Figure 20.1-2
        - Square prestressed concrete pile bent, supporting slab superstructure - MEMO DM0312
        - For pile bents with piles larger than 18" square, maximum pile embedment may dictate that deeper pile caps be used for constructability and due to the effects of punching shear- MEMO DM0312
        - For pile bents supporting beams, regardless of pile size, the effects of punching shear shall be investigated - MEMO DM0312
    - Distance from end of cap to exterior pile/shaft/column shown
    - Distance from construction centerline to nearest piles/shafts/columns shown

☐ Centerlines shown

    - Cap
    - Route
    - Piles, shafts, columns
    - Construction, survey, and/or bridge

☐ Longitudinal cap reinforcement -BDM Section 20.1.6.1

- Minimum reinforcement - BDM Figure 20.1-4
- Verify bars are not bundled
- Verify there are no more than two layers of main reinforcing bars
- Splice lengths per MEMO DM0320 for appropriate Class splice and/or top bar placement
- Verify the development length at cap overhangs and footings- MEMO0320

☐ Transverse cap reinforcement - BDM Section 20.1.6.2

- Maximum bar spacing = 12 in.
- Stirrups between supports are S-bar bend details with 135-degree seismic hook. Hook extensions not less than larger of 10 bar diameters or 6 in.
- A 180° hook detailed with vertical reinforcing projecting from the cap or use protective devices to cover the ends- MEMO DM0206

☐ Verify if strut-and-tie design model of LRFD Article 5.8.2 was considered where the distance between the centers of applied load and/or the supporting reactions is less than approximately twice the cap depth. Otherwise, the sectional models for moment and shear are appropriate. See BDM Section 20.1.8.

☐ Cap must be sloped for superelevated roadways if build-up exceeds 12” on a level cap - BDM Section 20.1.7

☐ Top of caps slope between buildups transversely a minimum of 5% at expansion joints - AASHTO 2.5.2.1.2 and BDM Section 20.2.3

- If beam seat elevation difference between any two adjacent beam seats is:
  - less than 3/16 in, detail the build-up level and use the lower elevation for both beam seats;
  - 3/16 in. to 1 in, use the lower elevation for both beam seats, detail a booster plate with the bearing plate, and allow the contractor the option to combine the booster plate with the bearing plate; or
  - 1 in or greater, detail a split-level build-up

☐ For level caps, note the elevation at the top of cap

☐ For sloped caps, note the elevation at the top corners of the cap and at the construction centerline

☐ For bents with buildups, note the elevation at the top of the buildups

☐ Include a table of elevations if the bent represents similar bents but different elevations

☐ Cap build-ups taller than 4”- BDM Section 20.1.6.3

☐ Steel Piles - BDM Section 20.2.7.1

- Type and size - HP 12x53, HP 14x73, HP 14x89, and HP 14x117
- Embedment length MEMO DM0209
- Note the minimum and maximum length that the pile is embedded into the bent cap
- Maximum recommended pile spacing - 10’-0” BDM Section 20.2.7.1
- Minimum pile spacing met - BDM Section 19.2.6.2
- Minimum edge distance met -BDM Section 19.2.6.2
- Minimum overhang distance met– BDM Section 20.2.7.1
- Minimum pile count is 4 piles - BDM Section 20.2.7.1
- For integral end bents, all end bent piling shall be driven vertically, and only one row of piling is permitted BDM Section 20.2.7.2
- Piles shall be a minimum of 10 ft. in length - BDM Section 19.2.4

☐ Prestressed Concrete Piles

- Verify embedment length matches Prestressed Concrete Pile sheet
- Typical sizes 18 in., 20 in., 24 in. square - BDM Section 19.2.3.3
- Typical Steel Pile extensions W8x58, HP10x57, and HP 12x53
- Maximum pile spacing - 10’-0” BDM Section 20.2.7.1
- Minimum pile spacing met - BDM Section 19.2.6.2 & LRFD Article 10.7.1.2
- Minimum edge distance met -BDM Section 19.2.6.2

- Minimum overhang distance met– MEMO DM0312
- Minimum pile count is 4 piles - BDM Section 20.2.7.1
- Piles shall be a minimum of 10 ft in length - BDM Section 19.2.4
- Pile connection to cap should be an equivalent of 1.3 pile widths – MEMO DM0312

☐ Columns/Drilled Shafts

- Use break lines to show the complete drilled shaft
- For columns, drilled shafts, and rock sockets, provide section views of the reinforcing details
- Show spacing of vertical reinforcing along the inside of the hoop
- Note the diameter of the columns, drilled shaft, and the diameter of the rock socket
- Maximum spacing = 25'-0" BDM Section 20.3.3.3
- Drilled shaft diameter shall be measured from the outside of the construction casing
- Construction joint detailed at bottom of cap
- All shafts detailed with construction casing. The portion of the shaft below the bottom of the casing, whether in soil or rock, shall be detailed with a diameter that is 6 in. smaller than the diameter of the construction casing -MEMO DM0111

☐ Staged Construction

- Construction joint(s) detailed
- Stages of cap dimensioned
- Splices for longitudinal bars located in subsequent stage and conform to MEMO DM0320
- For staged construction on large skews, ensure that the stirrups do not straddle construction joints

☐ Lateral guides must be provided for cored slab structures at the outside of each exterior slab unit. Detail per BDM Figure 20.1-3

☐ Shear keys/retainers at expansion joints for SDC B, C, and D bridges - BDM Section 20.1.9 & MEMO DM0115

- Shear key skewed parallel to girders - BDM Section 20.1.9 & BDM Figure 20.1-6
- Concrete shear key maximum height = 0.3 times length - SDS Section 9.2.2
- Steel shear keys detailed per - SDS Figure 9.3. Show a key on each side of the girder - SDS Section 9.2.3
- A minimum of 0.25 or $S_{D1\text{-}SEE}$ times the superstructure dead load shall be used for designing the shear restraints SDS Section 8.1

☐ Retainer blocks - SDS Section 9.4.3

- Placed on both ends of non-integral end bents when skew angle > 20 degrees
- Poured monolithically with cap
- Detailed per SDS Figure 9.6 with minimum 2" concrete cover

End Bent Details:

☐ Section through Cap

- Non-integral bent caps shall be used for flat slabs - BDM Section 12.3.2.2
- Reinforcing steel is shown, labeled with proper bar marks, and bar spacing is dimensioned.
- Pile is shown, labeled, and oriented in correct direction
- Minimum and maximum pile embedment is dimensioned
- Free-standing end bents - BDM Section 20.2.6
  - 12" minimum, constant backwall thickness
  - Construction joint detailed between top of bent cap and bottom of backwall
  - Level beam seats. The remaining exposed top surfaces - transversely sloped away from the fill face - AASHTO 2.5.2.1.2 and BDM Section 20.2.3
  - Expansion joint types may be different at the pavement rest. Use a shear key for any horizontal construction joints
- Integral end bents per BDM Section 20.2.4 and Semi-integral end bents per BDM Section 20.2.5

- End wall detailed full width of bent and cast with deck (Integral end bents only)-BDM Section 20.2
- Integral end bent in BDM Section 20.2.4 detailed as a semi-integral end bent with exception of hinge or bond-breaker detailed between the bent cap and end wall
- Concrete cover beyond edge of the girder at rear face of end wall - 4" minimum. This also applies to the pavement rest area
- Girder Anchorage: Bar spacing is 12 in. maximum through the webs of steel girders and through prestressed I-beams to allow reinforcing bars to be inserted to further anchor the girder to the end wall. Position the holes so that, when the reinforcing bars are inserted, they will be within the end wall reinforcing cage
- Bar inserts
  - 12" max spacing of holes in webs of girders
  - Holes and bars within end wall rebar cage
- Deck Slab Bars: L-shaped bars extending from end wall into top of slab at max 12" spacing
- No battered piles at integral end bents – BDM Section 20.2.7
- Construction joint detailed between top of bent cap and bottom of end wall

o Minimum support length at expansion bents - SDS Section 9.1
- Length measured from end of superstructure to edge of cap

o Centerlines shown
- Bearing(s)
- Piles or shafts
- Bent

o Concrete clear cover - BDM Figure 15.3-2
- Typically, 3" bottom cover, 2" side and top cover

o A 180° hook detailed with vertical reinforcing projecting from the cap or use protective devices to cover the ends- MEMO DM0206

o The top of the bent cap - minimum of 12 in above the surrounding grade (including any rip rap placed on earth berm). The bottom of the bent cap detailed a minimum of 12 in below the earthen berm -BDM Section 20.2.3. Account for rip-rap thickness resting on top of earthen berm when determining cap depth – RDWG 804-105-00

o Vertical expansion joints should be considered for cap lengths exceeding 90 ft. In this case, a water stop, or other means of water control shall be used to prevent joint leakage - BDM Section 20.2.3

o For staged construction on large skews, ensure that the stirrups do not straddle construction joints in both back wall and diaphragm

o The construction joint between the end wall and the bent cap shall be waterproofed - BDM Section 20.2.3

☐ Steel HP Pile Anchorage Detail - BDM Section 19.2.6.3.1 and MEMO DM0209 & MEMO DM0320

☐ Quantities Table

o Verify individual quantities are captured and also shown on Summary of Estimated Quantities

o Class 4000 concrete - BDM Figure 15.2-1

o Quantities table for each bent presented on a Bent Sheet. If the bents are the same, only include the quantities for one bent and note in the header to which bents the quantities apply - See BDM Figure 7.1-1 or the SCDOT Standard Specifications for a list of applicable quantities.

o For projects requiring stage construction, quantities shall be broken down by stage - BDM Section 6.3.2

☐ Reinforcing steel schedule - BDM Section 6.3.11.5 & and Section 15.3.1.4

o Uncoated steel max length is 60 ft.

o Galvanized steel max length is 40 ft.

o #4 (#13 metric) max length is 30 ft.

☐ Verify Beam Seat Detail

o Cap build-ups taller than 4" - BDM Section 20.1.6.3

- Verify Buildup details match what is shown on End Bent Elevation View

☐ Verify with FBGER the following data
- Pile or shaft load data,
- Estimated pile tip elevations
- Minimum pile tip elevation to maintain lateral stability

☐ For end bents with MSE walls located within 30 feet from edge of travel lane shall have provisions for redirecting or absorbing a collision load – MEMO DM0213

☐ Minimum distance of 3 ft. maintained on the fill side between inside face of MSE wall and face of piling

☐ End bent design was verified though independent design performed by experienced engineer different from the original designer

☐ Information provided in Reinforcing Steel Schedule verified though independent calculations performed by an experienced engineer different from the original designer

☐ Quantities verified though independent calculations performed by experienced engineer different from the original designer

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the end bent sheets is consistent with the other all other plans sheets

Wing Wall Details

☐ Verify that all preliminary plan comments are addressed

☐ Minimum thickness 12 in. – BDM Section 20.2.8

☐ For bridges having parallel wing walls, the designer shall use approach slabs, and the wing walls shall be detailed adjacent to the outside edge of the approach slab. See BDM Figure 20.2-3.

☐ Parallel wing walls to the centerline of bridge for structures other than flat slabs and cored slabs - BDM Section 20.2.8

☐ Wing walls shall be designed per - BDM Figure 20.2-2

☐ If the wing wall is tied to the end bent (i.e., there is no joint), design shall be for at-rest pressure; ensure all wing wall reinforcement is developed sufficiently into the end bent - MEMO DM0320

☐ Design unattached wing walls as retaining walls

☐ Construction joint detailed at elevation at top of bent cap

☐ Generally, the slope of the fill should not be steeper than 2H: 1V, and the wing wall lengths should be established on this basis

☐ Joint with filler material between wing wall and approach slab - BDM Figure 20.2-3

☐ Top of wall sloped ¼:12 away from approach slab - SCDOT BDM Figure 20.2-3

☐ Wing wall plan view is provided

☐ Wind wall elevation view provided

☐ Wind wall section view provided

☐ Connection to bent cap is detailed

☐ Reinforcing is shown in all views, labeled with correct bar marks, and bar spacing is properly and clearly dimensioned

☐ Concrete clear cover is dimensioned

☐ Upside down U shaped bars are used for vertical reinforcing of wing walls

☐ Geometric layout of wing walls along curved alignments is clearly demonstrated in the plans

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the wing wall sheets is consistent with the other all other plans sheets

Interior Bent: **BDM Section 6.3.11**

<u>Plan View</u>

☐ Centerlines shown

- Bearing(s)
- Piles, columns, shafts, footings
- Cap and Bent
- Route
- Construction, survey, and/or bridge
- Girder/beam

☐ Dimensions - Overall Cap Width and Length and include the following:

- Width from bent centerline to each side of bent
- Distance from bent centerline to begin/end of bridge
- Distance from end of bent to CL construction, bridge, or survey
- Distance from end of bent to first and last girder
- Distance between centerlines of girders
- Distance from nearest girder to construction centerline
- Staged construction distances

  - Direction of stationing
  - Minimum cap width for pile bents met - BDM Figure 20.1-1 and MEMO DM0312
  - Minimum cap width =diameter of column/shaft plus 3" on each side -BDM Section 20.1.3.1
  - If cap length exceeds 70 feet, verify construction joint provided BDM Section 20.1.4 and detailed per BDWG 700-05
  - Prestressed concrete pile bent caps length set to provide a minimum overhang equivalent of 2 pile widths - MEMO DM0312
  - Bent cap length - BDM Section 20.1.3.2
    - minimum 9 in from the centerline of the anchor bolt to the end of the bent cap
    - minimum 9 in from the edge or corner of the elastomeric bearing or masonry plate to the end of the bent cap
    - Exterior centerline girder not located on bent cap cantilever for pile bents
  - Cored slab units - BDM Figure 20.1-3
    - bent cap detailed with a concrete lateral guide at the outside face of the exterior slab units
    - 1½-in expansion joint material between the cored slab and lateral guide

☐ Beam Seats

- Provide note to contractor to see bearing details sheet for additional information
- Location, size, and applicable dimensions to the anchor bolts
- Horizontal rebar size and spacing shown
- Width and length dimensions
- Beam seats shall be level - BDM Section 20.2.3

<u>Elevation View</u>

☐ Overall dimensions

- Cap Depth
  - For single row of piles and double row of piles -BDM Figure 20.1-2
  - Square prestressed concrete pile bent, supporting slab superstructure - MEMO DM0312
  - For pile bents with piles larger than 18" square, maximum pile embedment may dictate that deeper pile caps be used for constructability and due to the effects of punching shear- MEMO DM0312
  - For pile bents supporting beams, regardless of pile size, the effects of punching shear shall be investigated - MEMO DM0312
- Distance from end of cap to exterior pile/shaft/column shown

- Distance from construction centerline to nearest piles/shafts/columns shown

☐ Centerlines shown

- Cap
- Route
- Piles, shafts, columns
- Construction, survey, and/or bridge

☐ Longitudinal cap reinforcement -BDM Section 20.1.6.1

- Minimum reinforcement - BDM Figure 20.1-4
- Verify bars are not bundled
- Verify no more than two layers of main reinforcing bars
- Splice lengths per MEMO DM0320 for appropriate Class splice and/or top bar placement
- Verify the development length at cap overhangs and footings- MEMO DM0320

☐ Transverse cap reinforcement - BDM Section 20.1.6.2

- Maximum bar spacing = 12 in.
- Stirrups between supports are S-bar bend details with 135-degree seismic hook. Hook extensions not less than larger of 10 bar diameters or 6 in.
- A 180° hook detailed with vertical reinforcing projecting from the cap or use protective devices to cover the ends- MEMO DM0206

☐ The strut-and-tie design model of LRFD Article 5.8.2 should be considered where the distance between the centers of applied load and/or the supporting reactions is less than approximately twice the cap depth. Otherwise, the sectional models for moment and shear are appropriate. See BDM Section 20.1.8.

☐ Cap must be sloped for superelevated roadways if build-up exceeds 12” on a level cap - BDM Section 20.1.7

☐ Top of caps slope between buildups transversely a minimum of 5% at expansion joints - AASHTO 2.5.2.1.2 and BDM Section 20.2.3

- If beam seat elevation difference between any two adjacent beam seats is:
  - less than 3/16 in, detail the build-up level and use the lower elevation for both beam seats;
  - 3/16 in. to 1 in, use the lower elevation for both beam seats, detail a booster plate with the bearing plate, and allow the contractor the option to combine the booster plate with the bearing plate; or
  - 1 in or greater, detail a split-level build-up

☐ For level caps, note the elevation at the top of cap

☐ For sloped caps, note the elevation at the top corners of the cap and at the construction centerline

☐ For bents with buildups, note the elevation at the top of the buildups

☐ Include a table of elevations if the bent represents similar bents but different elevations

☐ Cap build-ups taller than 4”- BDM Section 20.1.6.3

☐ Prestressed Concrete Piles

- Verify embedment length matches Prestressed Concrete Pile sheet
- Typical sizes 18 in., 20 in., 24 in. square - BDM Section 19.2.3.3
- Typical Steel Pile extensions W8x58, HP10x57, and HP 12x53
- Maximum pile spacing - 10’-0” BDM Section 20.2.7.1
- Minimum pile spacing met - BDM Section 19.2.6.2
- Minimum edge distance met -BDM Section 19.2.6.2
- Minimum overhang distance met– MEMO DM0312
- Minimum pile count is 4 piles - BDM Section 20.2.7.1

- Side Distance of any pile to the nearest edge shall be greater than 9 in.
- Pile connection to cap should be an equivalent of 1.3 pile widths

☐ Columns/Drilled Shafts

- Use break lines to show the complete drilled shaft
- For columns, drilled shafts, and rock sockets, provide section views of the reinforcing details
- Show spacing of vertical reinforcing along the inside of the hoop
- Note the diameter of the columns, drilled shaft, and the diameter of the rock socket
- Maximum spacing = 25'-0" BDM Section 20.3.3.3
- Drilled shaft diameter shall be measured from the outside of the construction casing
- Locate all construction joints at least 5 ft. above the water elevation expected during construction -MEMO DM0111
- Construction joint detailed at bottom of cap and top of shaft

☐ Staged Construction

- Construction joint(s) detailed
- Stages of cap dimensioned
- Splices for longitudinal bars located in subsequent stage and conform to MEMO DM0320
- For staged construction on large skews, ensure that the stirrups do not straddle construction joints

☐ Lateral guides must be provided for cored slab structures at the outside of each exterior slab unit. Detail per BDM Figure 20.1-3

☐ Shear keys/retainers at expansion joints for SDC B, C, and D bridges - BDM Section 20.1.9 & MEMO DM0115

- Shear key skewed parallel to girders - BDM Section 20.1.9 & BDM Figure 20.1-6
- Concrete shear key maximum height = 0.3 times length - SDS Section 9.2.2
- Steel shear keys detailed per - SDS Figure 9.3. Show a key on each side of the girder - SDS Section 9.2.3
- A minimum of 0.25 or $S_{D1\text{-}SEE}$ times the superstructure dead load shall be used for designing the shear restraints SDS Section 8.1

☐ Retainer blocks - SDS Section 9.4.3

- Placed on both ends of interior expansion bents and non-integral end bents when skew angle > 20 degrees
- Poured monolithically with cap
- Detailed per SDS Figure 9.6 with minimum 2" concrete cover

☐ Section through Cap

- Bent Cap Reinforcement - BDM Section 15.3.1.1
- Minimum support length at expansion bents SDS Section 9.1
- Concrete clear cover - BDM Figure 15.3-2
- In tidal water, no construction joints shall be located in the zone between extreme low tide and extreme high tide. This requirement also applies to the pile-to-footing connection - BDM Section 20.3.1

☐ Quantities Table

- Class 4000 concrete - BDM Figure 15.2-1

☐ Reinforcing steel schedule - BDM Section 6.3.11.5.

☐ Beam Seat Detail

- Cap build-ups taller than 4" BDM Section 20.1.6.3
- Verify Buildup details match what is shown on the Interior Bent Elevation View

☐ Interior bents within 25 feet to 50 feet of CL of railroad tracks – Comply with MEMO DM0213

☐ For interior bents within 30 feet from edge of travel lane (or within 25 feet to 50 feet from centerline of railroad track), provide either – MEMO DM0213:

☐ Bents supporting bridges over railways with a clear distance of less than 25.0 ft. from the centerline of a railroad track shall be of heavy construction or protected by a reinforced concrete crash wall per - BDM Section 22.2.3.5

Section View for Columns, Drilled Shafts, and Rock Sockets

- Detail locations of cross-hole sonic logging tubes. For shafts and sockets, provide cross-hole sonic logging tubes per 2007 Standard Specs:

Shaft Diameter	Number of Tubes Required	Configuration around the inside of a Circular Reinforcement Cage
36 to 48 inches	4	90 degrees apart
Greater than 48 inches	1 tube per 12 inches of shaft OD	(360 degrees / No. of tubes)

- Columns- BDM Section 20.3.2 & and MEMO DM0111
  - Circular or oblong
  - Minimum diameter - BDM Section 20.3.2.1 & BDM Section 20.3.3.3 & and MEMO DM0111
  - When supported on drilled shafts, a minimum 3" from edge of shaft to edge of column at interface -BDM Section 20.3.2.1 & MEMO DM0111
  - If column is less than 5' long and supported on a drilled shaft, option to extend shaft to the bottom of the cap - MEMO DM0111
  - Bottom of a hammerhead cap at a minimum of 6 ft above the finished ground line on stream crossings to prevent debris accumulation –BDM Section 20.3.4
  - Hammerhead cap longitudinal reinforcement and limitations of length of cantilever (maximum 2 rows of reinforcing and no bundling of bars in cap) - BDM Section 20.3.4

- Columns/Drilled Shafts Longitudinal Reinforcement - SDS Figure 8.2, SDS Figure 8.3, or MEMO DM0115
  - Absolute minimum #8 (25M) longitudinal bars - BDM Section 20.3.2.2
  - Verify there is no conflict between the column longitudinal bars and the cap bottom layer longitudinal bars
  - Minimum reinforcement amount - BDM Section 19.3.3 and SDS Section 8.4.4
  - Maximum longitudinal steel spacing - BDM Section 20.3.2.2
  - Maximum reinforcement amount - SDS Section 8.4.3
  - The vertical column reinforcing bars fully developed where these bars enter the bent cap and the spread footing or pile cap - BDM Section 20.3.2.2 and SDS Section 8.4.6
  - Minimum development length into cap or footing – larger of requirements of MEMO DM0320
  - Minimum development length into oversized drilled shaft - MEMO DM0115
  - Minimum clear distance between longitudinal bars is greater of: (MEMO DM0107)
    - 5"
    - 5 times maximum aggregate size
    - 3 times the bar diameter
  - Ultimate mechanical couplers for splicing longitudinal bars - SDS Section 8.4.5
    - 2' stagger between adjacent splices - BDM Section 15.3.1.7.1 & Section 20.3.2.2.
  - No splice zones dimensioned at maximum moment and/or interface
  - Reinforce columns with oblong cross sections with interlocking hoops with a center-to-center spacing not to exceed ¾ times the diameter of the cage. Overlaps interlocked by a minimum of four bars - BDM Figure 20.3-1 & BDM Section 20.3.2.2

- Locate all construction joints at least 5 ft. above the water elevation expected during construction - MEMO DM0111
- All shafts detailed with construction casing unless approved otherwise by the RPG Engineer. The portion of the shaft below the bottom of the casing, whether in soil or rock, shall be detailed with a diameter that is six inches smaller than the diameter of the construction casing -MEMO DM0111

o Columns/Drilled Shafts Transverse Reinforcement– SDS Figure 8.2, SDS Figure 8.3, or MEMO DM0115
- Minimum #6 (19M) bars
- Minimum clear distance between transverse bars is the greater of:
  - 5 times the maximum aggregate size
  - 5”
- Note stating “Butt-welds of adjacent hoops shall be staggered around the perimeter of the column/shaft by a minimum distance of 1/3 of the hoop circumference - BDM Section 6.3.11.3
- Max hoop spacing outside of no splice zones = 12” max. or 2 times spacing inside of no splice zones whichever is less - SDS Section 8.4.11 and SDS Section 8.4.12
- Max hoop spacing inside of “no splice” plastic hinge zones = smallest of 6” (8” for bundled hoops), 1/5 the least dimension of the column cross section, or 6 times bar diameter of longitudinal rebar - SDS Section 8.4.12, SDS Table 6.1

o Reinforcement for column on a footing - SDS Figure 8.3
o Reinforcement for column on a non-oversized drilled shaft - SDS Figure 8.2
o Reinforcement for column on oversized drilled shaft - MEMO DM0115

Spread Footings and Pile/Shaft Supported Footings **BDM Section 19.5**

☐ Spread footings may be used at grade separations where suitable soils or rock are located at a relatively shallow depth (less than 10 ft.). Spread footings are prohibited at:
- o at stream crossings where they may be susceptible to scour,
- o on fills, and
- o beneath bents that are located within the reinforced soil mass associated with MSE walls

☐ Spread footing- settlement criteria is met per BDM Section 12.5.3.3 and consistent with FBGER recommendations

☐ Minimum Footing Thickness:
- o Spread Footings: 2’-6”
- o Pile/Shaft-Supported Footings: 3’-6”

☐ Avoid shear reinforcement in footings, unless required due to seismic demand. If concrete shear governs the thickness use thicker footing

☐ For grade-separation projects, set the footing elevation to maintain a minimum of 2 ft. of backfill above the top of the footing. Consideration shall also be given to future widening

☐ For “waterline” footings, the bottom of the footing elevation shall be set a minimum of 1 ft. below the mean low-water elevation.

☐ In navigable waters, top of the footing shall be below a point to present a hazard to the waterway traffic or be set above water and be clearly visible to the waterway traffic

☐ The required foundation geotechnical information shall be included on the plans -BDM Section 6.3 and MEMO DM0410

☐ Top of Footing reinforcement: For pile/shaft-supported footings provide tension reinforcement to anchor the piles in the top of the footing to resist the potential negative bending under seismic action

☐ Top of footing minimum reinforcement - #6 bars at 12 in on center each way

☐ Embedment Length: Vertical steel hooked on the bottom of footing and bar embedment lengths shown on the plans – MEMO DM0320

☐ Spacing: Minimum 6 in on center either direction or maximum 12 in on center

☐ Construction joints – not typical. Where used, footing construction joints should be offset 2 ft. from expansion joints or construction joints and constructed with 3-in deep keyways placed in the joint.

☐ Adjacent stepped footings difference in elevation not less than 6 in. Extend lower footing at least 2 ft. under the adjacent footing

☐ Steel Piles - BDM Section 20.2.7.1

- Type and size – Minimum HP size: 12x53
- Embedment length - MEMO DM0209
- Note the minimum and maximum length that the pile is embedded into the footing
- Maximum pile spacing - 10'-0" BDM Section 20.2.7.1
- Minimum pile spacing met - LRFD Article 10.7.1.2
- Minimum edge distance met -BDM Section 19.2.6.2
- Piles shall be a minimum of 10 ft. in length - BDM Section 19.2.4

Prestressed Concrete Piles: BDWG 704-01 (piles w/o points), BDWG 704-02 (piles with points), BDM Section 6.3.12

- Concrete Class 5000 to 8000 - BDM Figure 15.2-1
  - Consistent between design data and material notes
- Pile point orientation is consistent with other sheets
- Dimensions
  - min. build-up length below bottom of cap = 1.5 times pile width MEMO DM0115
  - Unembedded pile point
- Verify pile data and strand data are specified on plans
- Verify pile point material strength is specified on Summary of Estimated Quantities sheet
- Pile embedment 1.3 pile width (MEMO DM0312)

☐ Interior bent design was verified though an independent design performed by an experienced engineer different from the original designer

☐ Information provided in Reinforcing Steel Schedule verified though independent calculations performed by an experienced engineer different from the original designer

☐ Quantities verified though independent calculations performed by an experienced engineer different from the original designer

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Superstructure Plan: BDM Section 6.3.13

☐ Verify span lengths match the Preliminary set of plans previously submitted - SCDOT BDM Figure 12.3-1

☐ Each bar, top and bottom rows: Include the bar mark, size, and type, spacing. If reinforcing similar throughout the cross section, representative portion of the reinforcing to be shown

☐ Provide all necessary dimensions from the bent and/or roadway centerlines to determine the location and placement of miscellaneous reinforcing bars

☐ Dimension the concrete outlines. If dimensions are on horizontal curve, then add "(arc)" next to dimension

☐ For decks constructed on horizontal curves, provide radii at CL roadway and edge of each deck

☐ For decks constructed on horizontal curves, provide dimensions along CL roadway and each edge of deck for each span

☐ Dimension the spacing and orientation of reinforcing bars

☐ Dimension the splice lengths required for slab reinforcing steel MEMO DM0320

☐ Dimension the width of the barrier

☐ Dimension the distance between the barrier and the edge of slab

☐ Dimension the overall width of the slab

☐ Identify the construction centerline of the roadway

☐ Identify the centerlines of each bent

☐ Dimension the skew angle

- ☐ Identify the high and low sides of superelevated sections
- ☐ Identify sections cut labels for beams, girders, diaphragms, etc.
- ☐ Identify any section call-outs (e.g., A-A, B-B). If the detailed section is located on another sheet, reference the sheet number where the detail can be found.
- ☐ Identify any construction joints
- ☐ Identify the gutter lines
- ☐ Identify utilities if attached to the superstructure
- ☐ Include applicable special notes
- ☐ If transverse reinforcing steel in a bridge deck is lapped near a longitudinal construction joint, place the entire lap splice on the side of the construction joint that will be poured last - BDM Section 15.3.1.7
- ☐ All steel and concrete beam or girder spans shall be anchored to the substructure on both ends with anchor bolts or dowels. Design of the anchor system shall address both horizontal and vertical loads- BDM Section 20.1.10
- ☐ Connections between slabs and caps on flat slab bridges shall also be designed for seismic loads - BDM Section 20.1.10
- ☐ Superstructure side elevation view, if included, show the type and size of steel girder or concrete beam used on the structure. Show reinforcing steel within the sidewalk and barrier parapet/ railing wall, spacing and locations for the placement of reinforcing bars. Bridge barrier shown on this sheet or included as a separate detail sheet – BDM Section 6.3.14
- ☐ Bridge deck slab designed to extend 1½ in past the back face of the barrier parapet to accommodate slip forming. Revise to 1" for cored slab structures and 2" for bridges with sidewalks - BDM Section 17.3.7.3 and MEMO DM0119 and BDWG 705-01a-e.
- ☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Prestressed Concrete Girder – Continuous Span Superstructure: **BDM Section 6.3.14**

- ☐ Partial Plan/Plan View
    - Dimensions
        - Concrete outlines
        - Spacing and orientation of rebar
        - Splice lengths
        - Barrier width
        - Distance between barrier and edge of slab
        - Overall deck width
    - Label the top of rail
    - Label the top of sidewalk if applicable
    - Label the top of slab/deck
    - Show any construction joints
    - Intermediate Diaphragms per MEMO DM0311 and BDM Sections 15.5.7 and Section 17.3.6
    - Reinforcement
        - Bar detailing – mark, size, type, spacing, count, and concrete cover
        - For skews up to 30 degrees, transverse bars are permitted to run parallel to skew - BDM Section 17.3.1.9
        - For skews above 30 degrees, transverse bars shall be placed perpendicular to longitudinal rebar - BDM Section 17.3.1.9
    - Miscellaneous information:
        - Construction/roadway centerline
        - Bent centerlines
        - Skew angle
        - High and low sides of superelevated structures

- Partial sections of girders, diaphragms, etc.
- Section call-outs
- Construction joints
- Gutter lines
- Utilities if applicable
- Top of sidewalk
- Top of slab/deck
- Location of guardrail attachments
- Construction joints

☐ Partial Side Elevation/ Side Elevation View

- Intermediate Diaphragms per DM0311 and BDM Sections 15.5.7 and 17.3.6
- Show the location of guardrail attachments Concrete barrier drawn
  - Reference BDWG 705-01 for concrete barrier rebar marks, sizing, and spacing
  - Splice between horizontal bars noted and dimensioned - BDWG 705-01a

Structural Steel Girder – Continuous Span Structure: **BDM Section 6.3.14**

☐ Welded plate girders specified if: (BDM Section 16.1.1.1)
- the bridge has a radius less than 1200 ft.
- the span lengths exceed the span capacity of rolled sections, or
- the camber is too large to be accommodated by the natural camber of the beam

☐ The location of the exterior girder controlled by:
- The minimum and maximum overhang widths specified in BDM Section 12.2
- The space required for deck drains may have an effect on the location of the exterior girder lines
- Aesthetics should be considered when determining the location of the exterior girder lines

☐ Plate girders shall be made composite with the bridge deck and should be continuous over interior supports where possible - BDM Sections 12.2.5.1 & 16.1.2.1

☐ All girders identical - BDM Section 12.2.5.4 & 16.1.2.1

☐ Minimum dimensions - BDM Section 16.5.2:
- Plate girder flanges - BDM Section 16.1.2.3:
  - Minimum flange plate size = 12” x ¾”
  - Minimum flange thickness for curved girders = 1”
  - Maximum flange thickness = 3”
  - Flange widths in increments of 2”
  - Within a single field section, the width of each flange should be constant width
- Plate girder webs per BDM Section 16.1.2.6:
  - Minimum web thickness = ½”
  - Minimum change in web thickness at splices = 1/8”
- Stiffener plates:
  - Minimum thickness = 3/8”
  - Longitudinal stiffened webs must end in zones of little or no applied tensile stresses - BDM Section 16.1.2.8
- Connection plates:
  - Minimum thickness = ½”
- Angles/Channels:
  - Minimum thickness = ¼”

☐ Shop splices - BDM Section 16.1.2.5:

☐ Field splice lengths not to exceed 120 ft. – BDM Section 16.1.2.4

☐ Flat bar transverse stiffeners proportioned in ¼" increments in width and 1/8" increments in thickness - BDM Section 16.1.2.7

☐ Bearing plates must match material of girders

☐ Bolts, nuts, washers, and direct tension indicators are ASTM F3125, ASTM A563, and ASTM F959 Type 3

- BDM Section 16.2.2, MEMO DM0220, and Standard Specifications:
  - All bolted connections designed as slip-critical at the Service II limit state, except for secondary bracing members
  - Slip Resistance. LRFD Table 6.13.2.8-3 provides values for the surface condition. Use Class B surface condition for the design of slip-critical connections. Class B is applicable to unpainted, blast-cleaned surfaces and to blast-cleaned surfaces with a Class B coating
  - Provide at least two lines of bolts on each side of the web splice. See BDM 16.7.3

☐ Paint limits - BDM Section 16.2.1.3.5 and Figure 16.2-1:

- For semi-integral and integral end bents, girder must be painted a distance of 12" from the end wall at each end of bridge
- For end bents with MSE walls, all superstructure steel must be painted 10 feet beyond the MSE wall
- At joints, all superstructure steel must be painted within the greater of 10 feet of the joint or within 1.5 times the web depth
- For interior bents supporting continuous spans, all superstructure steel must be painted 10 feet beyond each side of the centerline of bent
- Paint system = NS2, Federal Shade # 30045 (brown)

☐ Steel for all splices must be same material as web and flanges of plate girders - BDM Section 16.2.3

☐ Transverse stiffeners on exterior girders placed on inside face of web - BDM Section 16.6.3.1

☐ Intermediate transverse stiffeners welded near side and far side to the compression flange. Transverse stiffeners should not be welded to tension flanges - BDM Section 16.6.3.1.

☐ The distance between the end of the web-to-stiffener weld and the near toe of the web-to-flange fillet weld should be between 4tw and 6tw - BDM Section 16.6.3.1

☐ Transverse stiffeners, except when used as diaphragm or cross frame connections, should be placed on only one side of the web. The width of the projecting stiffener element, moment of inertia of the transverse stiffener, and stiffener area shall satisfy the requirements of LRFD Article 6.10.11.1 - BDM Section 16.6.3.1

☐ Longitudinal stiffeners used in conjunction with transverse stiffeners on spans with deeper webs should be placed on the opposite side of the web from the transverse stiffener. Where this is not practical (e.g., at intersections with cross frame connection plates), the longitudinal stiffener should be continuous and not be interrupted for the transverse stiffener - BDM Section 16.6.3.1

☐ Bearing stiffeners are required at the bearing points of rolled beams and plate girders. See BDM Section 16.6.3.2

☐ Bearing stiffeners detailed with the stiffener ends bearing on the loaded flange being milled to bear. The opposite end will be tight fit only to the flange. Where bearing stiffeners are also used as diaphragm or cross frame connection plates, the stiffeners shall be detailed as previously described with the addition of fillet welds to the girder flanges. See BDM Section 16.6.3.2

☐ Bearing stiffeners milled to bear on loaded flange and tight fit on unloaded flange - BDM Section 16.6.3.2

☐ Diaphragm/Cross Framing Placement - BDM Section 16.5.3.1:
  - Horizontally curved girders
    - Diaphragms (except end diaphragms) placed radially
    - End diaphragms placed parallel to centerline of bearings
  - Intermediate diaphragms/cross frames perpendicular to girders
  - Interior support and end diaphragms/cross frames placed parallel to centerline of bearings

Framing Plan **BDM Section 6.3.14.2**

- ☐ Show the placement of steel girders, concrete beams, splice locations, stiffener locations, diaphragm/cross frame locations, skew angle(s), and other details
- ☐ The Framing Plan Sheet for the steel bridge will consist of the plan view and one or more of the following details depending on the space on the sheet:
    - o longitudinal elevation
    - o stiffener details
    - o cross frame elevations
    - o dead load deflection table
    - o shear connector/welded stud details
    - o paint limits
    - o other miscellaneous details
- ☐ Consecutively number the girders/beams left to right in the direction of stationing
- ☐ Tie all dimensions to the construction, bearing, or bent centerlines
- ☐ Stiffener locations for steel girders shown
- ☐ Intermediate diaphragms or cross frames shown
    - o Distances between bearing centerlines and the diaphragm or cross frame
    - o Distance between intermediate diaphragms or cross frames
- ☐ Chord Layout Sketch if roadway is on a curve
    - o Long chord drawn
    - o Work points at each bent labeled and dimensioned from long chord
- ☐ Girder/Beam Spacing: All distances are measured from the centerlines of the girders/beams
    - o Dimensions tied to construction, bearing, and bent centerlines
    - o Spacing of girder centerlines (radial/skewed and non-radial/skewed)
    - o Distance between construction centerline and adjacent girders
    - o Overall width between the exterior girders
- ☐ For steel structures, indicate the location of the field splice and distance between:
    - o Distances between bearing centerlines and the field splice
    - o Distance between intermediate field splices
- ☐ Label the spacing of diaphragms/cross frames measured from the centerline of the beginning of the girder to the centerline of the end of the girder
- ☐ For steel structures, provide dimensions to the location of all stiffeners
- ☐ Include a Dead Load Deflection Table showing the dead load in kips/ft. and the deflection in inches for the following elements:
    - o structural steel
    - o slabs
    - o stay-in-place forms
    - o sidewalks/rails
- ☐ For continuous steel girders, this table is located on the Camber/Blocking Diagram Sheet.
- ☐ Note the construction centerline
- ☐ Note the bearing and bent centerlines
- ☐ Note the degree of skew
- ☐ Note the girder or beam type
- ☐ Chord Layout Sketch if roadway is on a curve
    - o Long chord drawn

- Work points at each bent labeled and dimensioned from long chord

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Prestressed Concrete Girder or Steel Girder Superstructure: **BDM Section 6.3.14**

☐ Verify that all preliminary plan comments are addressed

☐ Typical Section

- Dimension the thickness of the slab
- Indicate the cross slope of the slab
- Show the finished grade location
- Indicate the size and location of the drip groove
- Show the barrier parapet/railing wall
- Include special construction notes
- Minimum depth for single superstructure span is met per BDM Section 12.2.2.2 & AASHTO LRFD Table 2.5.2.6.3-1
- Minimum number of girders per span = 4 - BDM Section 12.2.5.2
- Maximum girder spacing = 10'-6" BDM Section 12.2.5.3
- Maximum girder length - optimized span lengths for the beam types, and layout that could be transported

- Deck
  - Minimum deck thickness - BDM Section 17.3.1.1
  - Minimum haunch/build-down - BDM Section 17.3.2.1 & BDM Figure 17.3-1 to Figure 17.3-3
  - Rebar edge cover = 3"
  - Slab extension past back face of barrier to accommodate slip forming - BDM Section 17.3.7.3
  - Use a galvanized rebar for bridge decks on Interstate and other National Highway System routes located North of a line along SC Route 72 from the Georgia State line to Chester, SC and North of SC Route 9 from Chester, SC to Interstate Route I-77 and West of a line along Interstate Route I-77 from the intersection of SC Route 9 and I-77 to the North Carolina State line - BDM Section 15.3.1.5
  - Concrete build-downs are a minimum of ½". This dimension is calculated using calculated camber, vertical curve ordinate, deck cross-slope, and maximum allowable camber tolerance
  - Net camber after all superimposed dead loads are applied is positive (upwards)

- Deck Overhang - BDM Section 12.2.5.5
  - ¾" drip groove located 2" from edge of deck BDM Section 17.3.7.3
  - Maximum overhang = lesser of 50% average girder spacing and BDM Figure 12.2-1 (below)
  - For chorded girders, the overhang at any point shall not exceed 50% of the average girder spacing. See BDM Section 12.2.5.5

Type of Beam	Depth of Beam[1]	Maximum Deck Overhang
Prestressed Concrete	< 54"	42"
	54" – 63"	48"
	> 63"	54"
Structural Steel	< 36"	Depth of Beam
	36" – 48"	42"
	> 48"	45"

1 - For structural steel girders, depth of beam = depth of web

  - Minimum overhang - BDM Section 12.2.5.5

- Barrier and Sidewalk BDM Section 17.6.1.5, DM0119 and BDWG 705-01a-e

        - V ≤ 45 mph – Concrete barrier is located on the outside edge of the sidewalk
        - V ≥ 50 mph – Concrete barrier is located on the inside edge of the sidewalk between pedestrian and roadway. A pedestrian rail is located on the outside edge of the sidewalk
    - Reinforcement size and spacing BDM Sections 17.3.1
        - Minimum vertical spacing between top and bottom reinforcing mats = 1.5". Where conduits are present, increase 1½ in to accommodate conduit - BDM Section 15.3.1.3.3 and 17.3.1
        - Minimum horizontal spacing = 5.5"
        - Maximum transverse bar spacing = 9"
        - Minimum deck bar size = #5 (16M)
            - #4 (13M) bars may be bundled with primary bars at deck overhangs
            - #6 (19M) bars may be used if deck thickness exceeds 8.5"

☐ Dimension minimum concrete cover for top and bottom reinforcement

☐ For prestressed girder bridges, verify that the stirrups extending from the beam will not interfere with the placement of the deck reinforcing

☐ For prestressed girder bridges, verify that the number of strands shown is consistent with bridge design calculations

☐ All girders within a span designed identically to the governing condition, either interior or exterior girder - BDM Section 12.2.5.4

☐ Stay-in-place forms not allowed in bays having longitudinal joints - BDM Section 17.3.3

☐ Rebar Schedule
- SBU and BBU heights are specified and do not conflict with the Bar Support Detail on the General Notes

☐ Quantities
- Class 4000 concrete for deck - BDM Figure 15.2-1

☐ Deck Pouring Sequence - BDM Section 17.3.5.1 and BDM Figure 17.3-5
- Slab Pouring Sequence (BDM Section 6.3.13.4.2)
- Note the pour sequence with numbers inscribed in circles
- Show the length and width of each pour segment
- Include the direction of pour for each segment
- Include the minimum pour rate
- Show the centerline of bents
- Use different hatching for adjacent segments
- Note the location of the various project stages
- Required if deck volume > 300 yd^3
- Recommended if 225 yd^3 > deck volume > 300 yd^3
- Pouring rates specified or referenced by 2007 Standard Specs - BDM Section 17.3.5
    - Maximum rate = 60 yd^3/hr.
    - Minimum rate = 45 yd^3/hr.
- Positive moment regions in spans shall be poured first, and negative moment regions shall be poured last
- For pours on a grade of 3% or greater, the pouring direction must be uphill
- Note a minimum of 96 hours between pours or if previous pour is at 75% f'_c – MEMO DM0314
- For integral end bents, the end wall concrete shall be cast concurrently with the deck pour of the end span - BDM Section 17.3.5
- For continuous prestressed beam spans, closure diaphragms at the interior bents shall be cast concurrently with the deck slab above the support.
- For expansion ends of continuous spans or simple span supports diaphragms may be cast prior to the placement of the deck slab – MEMO DM0311
- Construction Joints
    - Transverse construction joints must be placed parallel to transverse bars

- Place transverse construction joints at end spans where uplift is a concern (end span = 60% or less of interior span) - BDM Section 17.3.5
- For deck widths greater than 60 ft. the designer shall make provisions to permit placing the deck in practical widths due to screeding limitations - BDM Section 17.3.6
- For decks wider than 90 feet, detail longitudinal open joint or closure pour
  - Minimum closure pour width = 3'-0"
  - Transverse bar lap splices located within closure pour
  - Not located in wheel path

☐ Staged construction projects where the deflection from the deck slab weight exceeds ½ in, a closure pour shall be used to connect the slab between stages - BDM Section 17.3.6. A minimum closure width of 3 ft. is recommended When a closure pour is used, the following apply:

- Stay-in-place forms shall not be used under the closure pour
- Diaphragms/cross frames in the staging bay of structural steel beams or girders shall not be rigidly connected until after the adjacent stages of the deck have been poured. Unless required by design, intermediate diaphragms may be omitted in the staging bay of prestressed concrete beams
- Reinforcing steel between different stages shall not be tied or coupled until after the adjacent stages of the deck have been poured - BDM Section 17.3.6

☐ Deck design was verified through independent design performed by engineer experienced in prestressed concrete beam design other than original design engineer

☐ Girder design was verified through independent design performed by engineer experienced in prestressed concrete beam design other than original design engineer

☐ Information provided in Reinforcing Steel Schedule verified though an independent calculations performed by an experienced engineer different from the original designer

☐ Quantities verified though an independent calculations performed by an experienced engineer different from the original designer

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Flat Slab Span Unit Superstructure: **BDM Section 6.3.13**

☐ Verify that all preliminary plan comments are addressed

☐ Plan

- Maximum number of spans in one continuous unit = 4 - BDM Section 15.4.1.1
- Skew angle of bridge CL
- Bents, begin/end bridge, joints, etc. labeled
- Section cut labels for build-down
- Slab, roadway, and barrier dimensions noted
- For both end bents and interior bents, use non-integral bents in conjunction with flat slabs - BDM Section 15.4.1.3
- Top and bottom transverse reinforcement detailed and dimensioned – BDWG 702
  - For skews up to 30 degrees, transverse bars permitted to run parallel to skew - BDM Section 15.4.12
  - For skews over 30 degrees, transverse bars shall be placed perpendicular to CL bridge - BDM Section 15.4.12
- Top and bottom longitudinal reinforcement detailed and dimensioned-BDM 15.4.6
  - Refer to BDWG for representative bar sizing and spacing
  - Minimum bar spacing = 6 in o. c. in the deck
  - Minimum bar spacing = 4 in on center in edge beam
  - Non-continuous bars with stagger dimensions

- Continuous bars with splice dimensions - MEMO DM0320
- Longitudinal steel detailed in a two-bar alternating pattern, with one of the bars continuous through the slab. The maximum difference between the alternating reinforcing bars no more than two standard bar sizes. See BDM Section 15.4.6

o Staged Construction
- Slab stages labeled and dimensioned
- Transverse bar splices dimensioned in the subsequent stage of construction per - BDM Section 15.4.3

☐ Side Elevation
- o Construction joints (horizontal and vertical) specified
- o Longitudinal bar splices noted and dimensioned – MEMO DM320
- o Vertical bars spaced at 12” max- BDWS 702
- o Constant slab thickness for multiple span flat slabs - BDM Section 15.4.1.2

☐ Camber for dead-load deflection shall be 1/8” in. for 22 ft., 3/16” for 30 ft. span and 3/8” in for 40 feet span– BDWG 700-04

☐ Notes
- o Concrete placement and pour rates
- o Drain details and locations
- o Bar bending details sheet
- o Splice lengths per - MEMO DM320
  - Lap splices between two different sized bars are governed by the smaller bar per - BDM Section 15.3.1.7.2

☐ Rebar Schedule
- o Verify bar marks are used
- o Barrier rebar is included
- o Maximum rebar length - BDM Section 6.3.11.5.
- o SB and CHCU heights are specified and do not conflict with the Bar Support Detail on the General Notes

☐ Quantities
- o Class 4000 concrete - BDM Figure 15.2-1

☐ Barrier Section
- o Conforms to - BDWG 705-01a-e and MEMO DM119. for MASH Barrier Parapet/Railing Wall

☐ Flat slab design was verified through independent design performed by engineer experienced in reinforced concrete design other than original design engineer

☐ Information provided in Reinforcing Steel Schedule verified though independent calculations performed by experienced engineer different from the original designer

☐ Quantities verified though an independent calculations performed by an experienced engineer different from the original designer

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Prestressed Concrete Cored Slab Superstructure: **BDM Section 6.3.13**

☐ Verify that all preliminary plan comments are addressed

☐ Prohibited on any National Highway System route or route with an ADT ≥ 3000 v.p.d. - BDM Section 12.3.2.5

☐ Minimum allowable width of cored slab bridges for common two-lane roadway sections on tangent alignment MEMO DM0120

Approach Roadway Width	Bridge Roadway Width	Bridge Width Out-to-Out	Cored Slab Units per Span	Approach Roadway Lane Width	Approach Roadway Should. Width	Bridge Shoulder Width
28'-0"	27' -10"	30"-0"	10	10' -0"	4'-0"	3'-11"
34'-0"	33'-10"	36' -0"	12	11'-0"	6'-0"	5'-11"
40' -0"	39'-10"	42' -0"	14	12'-0''	8'-0"	7'-11"
44' -0"	45'-10"	48'-0"	16	12'-0"	10'-0"	10'-11"

☐ Maximum skew angle = 15 degrees BDM Section 12.3.2.5

☐ Skewed chorded spans to create horizontal curves is not allowed -MEMO DM0120

☐ Strand Data table

☐ Prestressing Stand Size ½", ½" Special, 0.6" or 9/16" –BDM 15.3.2.1

☐ Camber and Deflection table for both cored-slab units and solid units (without voids)

☐ Concrete Class 5000 to 10,000 - BDM Figure 15.2-1

- Consistent between interior slab section and quantities

☐ Debonding requirements met - BDM Section 15.5.3.3

☐ Cored slab design was verified through independent design performed by engineer experienced in prestressed concrete beam design other than original design engineer

☐ Information provided in Reinforcing Steel Schedule verified though independent calculations performed by experienced engineer different from the original designer

☐ Quantities verified though an independent calculations performed by an experienced engineer different from the original designer

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Prestressed Concrete Girder Details: **SCDOT BDM Section 6.3.14.3**

☐ Reinforcing Steel Schedule included in the top right-hand corner of the sheet

☐ Quantity items required for one beam included (e.g., concrete, class, reinforcing steel, strands, structural steel) in a table directly underneath the Reinforcing Steel Schedule

☐ All applicable notes below the quantities table included

☐ Half Side Elevation: Provide an elevation view of the beam noting dimensions, reinforcing steel, centerlines, etc.

☐ Beam Camber and Deflection Table: Include a table presenting the beam camber and deflections in inches due to:

- stay-in-place forms
- slab and diaphragm
- sidewalks/rails

☐ Sections through Beam: Include details of beam sections at the end elevation, at the center of the beam, and at the end of the beam.

☐ Include design data

☐ Include prestressing strand data

☐ Show tolerances

☐ Include other applicable details

☐ Ensure the locations for the holes for diaphragms are consistent with the diaphragm details sheet.

☐ Prestressed concrete girder bridges shall be designed as simply supported and continuous per MEMO DM0108

☐ Minimum web width = 7" (except for AASHTO Type II)

- ☐ Concrete Class 5000 to 10,000 - BDM Figure 15.2-1
- ☐ Strand data table - acceptable to use ½-in, ½-in Special, 9/16 in, and 0.6 in - BDM Section 15.3.2.1
- ☐ Concrete strength at release = 60% to 90% of f'c but not less than 4 ksi - BDM Section 15.5.3.2
- ☐ Minimum top flange reinforcement = # 4 bars at 24 in on center
- ☐ For skewed bridges, beam ends are square except for the top flange, which can be cast parallel to skew - BDM Section 15.5.11.2
- ☐ Verify no conflict between beam stirrup and diaphragm tension rod holes

- ☐ Notes
  - o Remove inapplicable notes
  - o Specify strand diameter and corresponding tensioning load
- ☐ Minimum strand spacing = 2" - BDM Section 15.3.2.2
- ☐ Draped strands - BDM Section 15.3.2.3.2
  - o At ends of girders, minimum 4" between the top draped strands and straight strands located directly above
  - o Max slope of strands = 9 degrees
  - o Hold-down points located 5 feet on each side of the center of girder
  - o Check potential location conflict between draped strands and diaphragm tension rod / insert holes
  - o Ensure that draped strands do not conflict with any holes placed in girder web and have adequate clear cover

- ☐ Debonding - BDM Section 15.5.3.3
  - o Maximum number of strands debonded = 25% of total strands
  - o Maximum number of strands debonded in a row = 40% of total strands in row
  - o Debonded strands are symmetrical about vertical axis of slab unit
  - o Debonded strands not allowed in rows with 3 or less strands
  - o Exterior strands must be fully bonded (including entire bottom row)
  - o Maximum debonding length = 15% of entire beam length
  - o Maximum number of debonded strands ending at any section = 40% of strands or 4 strands
  - o Verify debonding sequence or debonding pattern

- ☐ Beams of the same size and similar length in the same bridge or within bridges should consider using the same number and pattern of strands (including height of draping) for these beams to facilitate fabrication
- ☐ Verify that the number of strands shown is consistent with bridge design calculations
- ☐ Beam design was verified through independent design performed by engineer experienced in prestressed concrete beam design other than original design engineer
- ☐ Information provided in Reinforcing Steel Schedule verified though independent calculations performed by experienced engineer different from the original designer
- ☐ Quantities verified though an independent calculations performed by an experienced engineer different from the original designer
- ☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown is consistent with the other all other plans sheets.

Superstructure Details - Structural Steel/ Girder Details: **BDM Sections 6.3.14.4 and Sections 6.3.14.5**

- ☐ Verify that all preliminary plan comments are addressed
- ☐ Detail and dimension:
  - o All plate sizes and lengths for the top flange, web, and bottom flange
  - o Typical end cross frame
  - o Typical intermediate cross frame

- Bearing stiffeners
- Transverse stiffeners
- Intermediate cross frame
- Studs
- Splice plates

☐ Girder elevation view

- Steel dimensions
  - Identify rolled beams
  - Note plate size for stiffeners
  - Note plate sizes and lengths for top flange, web, and bottom flange of plate girders
- Shear connector location, count, and spacing above the girder BDM Section 16.6.2
  - Shear stud size = 7/8" diameter by 5" length
    - 2" minimum penetration of stud into deck
  - Skew studs parallel to bottom deck rebar
- Field splices
  - Distances between end bearing and first splice
  - Distances between splices
- Tension zone locations and distances
- Centerlines of bearings

☐ Field splice details

- Welded splices
  - Weld types and sizes
    - Absolute minimum weld size = ¼" - BDM Section 16.7.2.4
    - Prohibited weld types - BDM Section 16.7.2.4:
      - Intersecting welds
      - Intermittent fillet welds (except for connecting stop bars at expansion joints)
      - Partial penetration groove welds (except for connecting tubular members in handrails)
  - Test requirements
  - Prohibited welding processes BDM Section 16.7.2.1
    - Electro-slag and electro-gas welding
    - Gas metal arc and flux-cored arc welding require approval by SCDOT
  - Permissible field welding applications BDM Section 16.7.2.2
    - Connecting bearing plates to girders
    - Connector plates between new and existing portions of widened bridges at ends of simply supported spans
- Bolted splices
  - Bolt hole locations
    - At least two lines of bolts on each side of web splice BDM Section 16.7.3
  - Bolt hole diameter
  - Bolt holes as filled
  - Splice and fill plates and their sizes
  - A note stating size and type of bolts BDM Section 16.7.1
    - Type = ASTM F3125 (Type 3) for unpainted weathering steel
    - Type = ASTM F3125 (Type 1) for painted steel
    - Design = slip-critical at Service II limit state (except for secondary bracing members)
    - Class B surface condition for slip-critical connections
- Shear connector detail with location, edge distance, spacing, and size

Superstructure Details - Intermediate Diaphragms: **BDM Section 16.5.3**

- ☐ Used BDWG 704-05a and 704-05b for Steel Intermediate Diaphragm Details
- ☐ Used BDWG 704-05c and 704-05d for Steel Intermediate Diaphragm (Cross Frame) Details
- ☐ Verify channel corresponds with the correct concrete beam
- ☐ For skew = 0 or > 20 degrees, use Drawing 704-05b or 704-05d
  - o Diaphragms perpendicular to girder
- ☐ For 0 < skews ≤ 20 degrees, use Drawing 704-05a or 704-05c
  - o Diaphragms parallel to skew
- ☐ Concrete diaphragms for prestressed concrete girders with bottom flange below 20 MSL - MEMO DM0311
- ☐ Prestressed girder spans greater than 40 ft. long must have intermediate diaphragms
- ☐ Spans with intermediate concrete diaphragms, the slabs to not be poured until a minimum concrete compressive strength of 3000 psi or seven days - BDM Section 15.5.7 and MEMO DM0311
- ☐ Two lines of intermediate diaphragms at third points if span is equal or greater than 100 ft.
- ☐ Minimum clearance between top of diaphragm and bottom of top flange for interior diaphragms for rolled beams = 3" - BDM Section 16.5.3.2
- ☐ For rolled beams, level diaphragms for normal crown roads BDM Section 16.5.3.2
- ☐ For rolled beams, diaphragms parallel to slab for superelevated roads BDM Section 16.5.3.2
- ☐ For plate girders with web depth > 48", use cross frames BDM Section 16.5.3.2
- ☐ Holes consistent with holes on girder sheets
- ☐ Cross Frame Details BDM Section 16.5.3.3:
  - K-frame cross frame used when girder spacing dictates that the diaphragm angle < 30 degrees
  - Cross frame transverse connection plates welded to both tension and compression flanges Connection plate minimum width = 5"

- ☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Superstructure Details - Flat Slab Span Unit: **BDM Section 6.3.13**

Reference: BDWG 702-05a, BDWG 702-10a, BDWG 702-12a, BDWG 702-15a, BDWG 702-16a, BDWG 702-20a, BDWG 702-21a, BDWG 702-25a

- ☐ Section thru Span
  - o Slab thickness
    - Check span-to-depth ratio per BDM Section 15.4.10 & AASHTO LRFD Table 2.5.2.6.3-1
    - Top and bottom concrete clear cover per SCDOT BDM Figure 15.3-2
  - o Top and bottom longitudinal and transverse reinforcement matches plan view
  - o Shrinkage and temperature reinforcement - BDM Figure 15.4-1
  - o Barrier and Sidewalk - BDM Section 17.6.1.5 & MEMO DM0119
    - V ≤ 45 mph – Concrete barrier is located on the outside edge of the sidewalk.
    - V ≥ 50 mph – Concrete barrier is located on the inside edge of the sidewalk between pedestrian and roadway. A pedestrian rail is located on the outside edge of the sidewalk
  - o Rebar Spacing - BDM Section 15.4.6
- ☐ Slab Build-down Details variable height
- ☐ Cross-slope or superelevation shown and dimensioned
- ☐ Wing Wall Section and Details
- ☐ Notes
  - o Drain details per BDWG

- Elastomeric bearing details per BDWG

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Prestressed Concrete Cored Slab Details: **BDM Section 6.3.13**

☐ Reference BDWG 704-29
- Remove any inapplicable details or notes

☐ Notes
- Specify strand diameter and corresponding tensioning load
- Sheet reference to prestressed strand layout

☐ Staged Construction tie bar location and details

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Camber/Blocking Diagram: **BDM Section 6.3.14.6**

☐ Table of camber information - List amount of deflection to the hundredth of an inch at the tenth points of each span and at field splices

- Dead load weight of diaphragms and girders
- Stay-in-place forms
- Dead load of superstructure components
- Superelevation
- Correction for bridges on vertical curves
- Total camber required

☐ Girder camber/blocking diagram

- Location of the deflections for each tenth point of the span
- Location of field splices
- Vertical curve offset

☐ Camber note – "The information on the sheet is for use in the fabrication of the girder. The cambers shown are based on each girder deflecting independently and on all deck, concrete being place simultaneously. The contractor shall determine the screed grades required to achieve the proper finished grade, concrete depth, and reinforcing steel cover based on his/her equipment, procedures, and pouring sequence."

☐ Cambers and deflections are verified through independent calculations performed by experienced engineer other than original design engineer.

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Bearing Details **BDM Section 6.3.14.7**

☐ Side and End Elevations for bearing assemblies at End Bents and Interior Bents shown

☐ Following dimensions for Side Elevation of Bearing Assemblies shown– BDM Figure 21.2-5
- CL Bearing to edge of Bearing Pad
- Edge of Bearing Pad to edge of Bearing Plate
- Edge of Bearing Plate to Edge of Beam
- Edge of Beam to Beg /End of Bridge or CL Interior Bent

☐ Bearing Plate Plan and Elevation provided along with - BDM Section 21.2.1.8 & MEMO DM0212
- Plate Width
- Plate Length
- Plate Thicknesses dimensioned
- Plate Direction of Placement for Beveled
- Plates
- At integral bents, bearing plate plan dimensions = plain elastomeric pad plan dimensions – MEMO DM0212
- At non-integral bents, bearing plate is 1in. wider than the elastomeric bearing -MEMO DM0212
- Minimum thickness = 1 ½ in. - at the center of the plate – BDM 21.2.9.8
- Beveled bearing plates, use a minimum thickness of 1 ½ in. at the centerline of bearing while maintaining 1 inch minimum at the low side of the bevel
- Slotted holes at expansion bearings
- BDM Figure 21.2-2 illustrates minimum requirements for anchor bolt details that shall be used
- Holes for anchor bolts shall be ¼ in larger in diameter than the diameter of the anchor bolt - BDM Section 21.2.1.7
- Minimum bearing plate/bolt edge distances -BDM Figure 21.2-3

Anchor Bolt Hole Diameter or Slot Width	Minimum Edge Distance from Centerline of Hole
1 ¼ in	1 ½ in
1 ½ in	2 in

☐ Booster Plates
- Plate Width
- Plate Length
- Plate Thicknesses
- Booster Plate Layout
- Note booster plate could be incorporated into the bearing plate at no additional cost to the Department

☐ Bearing Pad Plan and Elevation provided along with
- Pad Width
- Pad Length
- Pad Overall Depth
- Pad min. edge distance = 3 in. from the edge of the build-up - BDM Section 21.2.4
- Shim Plates and Thicknesses, if applicable
- Internal Elastomer Layer Thickness, if applicable
- External Elastomer Thicknesses
- Rib Dimensions
- Grade and Durometer of Elastomer
- Method of Design (Method A or B)
- Bearing Design Load

☐ Elastomeric bearings - BDM Section 21.2.1.6, 21.2.2, and 21.2.3

- Steel-reinforced elastomeric bearings for girder bridges
  - Holes prohibited
  - Minimum clearance between edge of elastomeric bearing and the edge of the bearing plate in the direction parallel to girder =1”- BDM Section 21.2.2.6
  - Minimum clearance between edge of elastomeric bearing and anchor bolt in direction perpendicular to girder = ½” - BDM Section 21.2.2.6
  - Minimum length or width = 6”
  - Minimum edge cover of steel shims = 1/8”

- Plain elastomeric bearing pads shown for cored slab and flat slab bridges
- At integral bents, use plain elastomeric pads – BDM Section 21.2.1.9 & MEMO DM0212
  - Minimum thickness = ¼"
  - Plan dimensions of pad = plan dimensions of bearing plate
- Minimum edge distance on beam seat = 3" - BDM Section 21.2.2.4
- Shore A Durometer hardness of 50 or 60
- Bearing Design Load Data
  - Elastomer Grade 2
  - Method A procedure of LRFD noted
  - Design loads listed

☐ Field Weld Detail - fillet weld along each side of sole plate

☐ Field Weld Note: "Exercise caution where a field weld will be made while elastomeric bearing pad is in contact with metal. Keep the elastomer or elastomer band from being exposed to instantaneous temperatures greater than 400 degrees F or manufacturer's recommended maximum temperature, whichever is less. Any damage to elastomeric bearing due to welding will be cause for rejection. Control temperature by use of heat crayons provided by the contractor." - BDM Section 6.3.14.7.4

☐ Sole plate dimensions

☐ Flange clip details

☐ Fixed or Expansion Bearing Assemblies

☐ Bearing pad design was verified by independent design calculations performed by an experienced engineer other than the design engineer.

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Joint Details (Beam Supported Decks or Flat Slabs) **BDM Section 6.3.14.9**

Joint Type	Maximum Joint Opening	Usage	Reference
Compression Seal Expansion Joint (Elastomeric or Evazote Seal)	< or = to 3½ in	Preferred joint where skew ≤ 30°	BDM Section 21.1.1.5 BDWG 702-33
Strip Seal	4 in	Where compression seals are not applicable	BDM Section 21.1.1.6 BDWG 723-01
Open Finger Plate, Modular Expansion, or other joint type	> 4 in	Where large movements are anticipated, and the drainage requirements of finger joints are undesirable	BDM Figure 21.1-1, BDM Section 21.1.1.7 & 21.1.1.8

☐ Applicable joint width and thermal movement information included - BDWG 702-33, 723-01 & 723-01a

☐ Sidewalk details applied, as applicable - BDWG 702-33, 723-01

- Cover plates required over expansion joints - BDM Section 21.1.1.11

☐ Design data table included

☐ Dimensions specified in the notes

☐ Manufacturer and designation specified

☐ Longitudinal open joints are not required in concrete bridge decks with widths of 90 ft. or less. For decks wider than 90 ft., a longitudinal open joint may be used or a longitudinal closure pour, preferably not less than 3 ft. wide, may be used. Per BDM Section 17.3 see information on longitudinal closure pours for decks. No longitudinal expansion joints should be detailed, except for locations where concrete barrier rail or raised concrete median is placed on each side of the joint. See BDM Section 21.1.2

☐ Typical overhang treatments at expansion joints - BDM Figure 17.3-8

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Top of Slab Elevations (for Bridges with Transition Superelevation) **BDM Section 6.3.14.10**

☐ Include a cross section of the bridge deck and top of slab elevations tables. More than one sheet may be required
☐ Deck Elevations provided every 5 ft. or 10 ft. in equal station intervals – BDM Section 6.3.14.10
☐ Deck Elevations at begin and end bridge and CL bents – BDM Section 6.3.14.10
☐ Deck Elevations shown at – BDM Section 6.3.14.10
- o Left Edge of Slab
- o Left Gutter
- o Finished Grade
- o Longitudinal Construction Joints
- o Right Gutter
- o Right Edge of Slab

☐ Top of Slab Elevations Tables including all Elevations are displayed to three decimal places
☐ Top slab elevations were verified by independent design calculations performed by an experienced engineer other than the design engineer.
☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Sidewalk and Railing Wall Details **BDM Section 6.3.14.11 & MEMO 0119**

☐ Side Elevations. Provide a side elevation of each span that includes the length of the span to the beginning or ending of bridge, whichever is applicable. Also, show the following:
- o location of joints,
- o location of bridge rail attachment,
- o dimensions of bridge rail, and
- o Section call-outs (where necessary).

☐ Place a cross section for all section call-outs on the side elevation view. Include all necessary dimensions.
☐ 42-in. MASH compliant concrete wall -MEMO DM0119 and BDWG 705-01a-e
Guardrail approach stiffness attachment to railing transition BDWG 705-01a-e
Minimum reinforcing steel placement – BDWG 705-01a-e
- o maximum bar spacing = 12”
- o bar spacing over 5 ft. at open joints and adjacent to transition = 5”
- o maximum bar spacing near transition = 5”
- o horizontal bars = (10) #5 (M16) (5 rows with 2 bars in each row)

☐ Barrier Parapet minimum height of above overlay is 36 in. (no bicycle pedestrian accommodations) – MEMO DM0119
☐ Barrier Parapet minimum height of above overlay is 42 in. (pedestrian accommodations)
☐ Barrier conduit details and notes added – BDWG 705-01c-d
☐ Appropriate fitting noted at each open joint – BDWG 705-01c-d
☐ Pull box details and notes added when barrier exceeds 300 ft. in length – BDWG 705-01c-d.
☐ Railing wall design was verified by independent design calculations performed by an experienced engineer other than the design engineer.
☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Approach Slab **BDM Sections 6.3.15 & 17.4**

☐ Reference BDWG 702-30a, 702-30b, and 702-30.01 for approach slabs without sleeper slabs
☐ Approach slabs are provided when one of the following conditions exist – BDM Section 12.2.7
- o Bridge is located on US or SC route
- o Bridge is on Secondary Route where current traffic volume exceeds 400 vpd

- Bridge has parallel wing walls

☐ Plan View. Include a plan view of the beginning and ending of bridge. If the beginning and ending of the bridge are similar, only show one end and note that the other end of the bridge is similar. Include the following:
- all necessary dimensions
- gutter line
- sidewalk, if applicable
- type and location of reinforcement
- skew angle
- centerline of bridge
- centerline of survey
- deflection joints; and
- any section call-outs

☐ Applicable details (e.g., deflection joints, sidewalk reinforcing, transition barrier)

☐ Cross Sections for each call-out of the plan view with all of the necessary dimensions and labels

☐ Reinforcing Steel Schedule for the reinforcing quantities included in the approach slab (see BDM Section 6.3.11)

☐ Quantities table that provides the total quantities for the approach slab (e.g., concrete)

☐ Provide all necessary notes for the elements of the approach slab

☐ Appropriate Approach Slab Sheets provided when Sleeper Slab is required – BDWG 702-32a-c.

☐ Approach Slab thickness– BDM Section 17.4.2

☐ Slab length = 20'-0"

☐ Minimum asphalt overlay provided when approach roadway pavement is asphalt =2" (when sleeper slab is not used) – MEMO DM114 & BDWG 702-30a

☐ Minimum concrete cover = 3 in. bottom and 2 in. top (increase top cover to 2 ½ in. when approach roadway pavement is concrete, or sleeper slab is used – for grooved surface finish) – BDM Section 17.4.2

☐ Distribution Steel – BDWG 702-30a & 702-32a, BDM Section 17.4.2

☐ Top Primary Steel – BDWG 702-30a & 702-32a, BDM Section 17.4.2

☐ Bottom Primary Steel – BDWG 702-30a & 702-32a, BDM Section 17.4.2

☐ All approach slabs shall be doweled to the end bent or pavement rest with #6 bars at 12 in on center. See MEMO DM0114

☐ CHCU height are specified and do not conflict with the Bar Support Detail on the General Notes

☐ Concrete Class 4000 concrete - BDM Figure 15.2-1

☐ Where the project requires sidewalks on the bridge, the approach slab must be widened to allow for the sidewalks

☐ The minimum pavement rest dimension is 8 in. See BDM Section 17.4.2

☐ Where concrete pavement is used for the approaching roadway, approach slabs shall be constructed at grade. Where asphalt pavement is used for the approaching roadway, approach slabs shall be constructed 2 in below grade. See BDM Section 17.4.2 (except for Cored-Slab Bridges)

☐ Where skews of 30º or greater exist, a redesign of the approach slab may be necessary - BDM Section 17.4.3

☐ The approach slab design should be reevaluated where the structure depth equals or exceeds one-half of the approach slab length - BDM Section 17.4.3.

☐ When sleeper slabs are used, the approach slab must be designed to span the entire distance between the sleeper slab and the pavement rest - BDM Section 17.4.3.

☐ Approach slab design was verified by independent design calculations performed by an experienced engineer other than the design engineer.

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

☐ Verify Guardrail post does not conflict with cap at barrier connection for the guardrail type specified is approach slab is omitted

Sleeper Slab **BDM Section 12.2.8, MEMO DM0114**

☐ Required by MEMO DM0114 and used to provide an off-bridge joint at the end of the approach slab, where:

- Jointless bridge > 240 feet total length for steel girder bridges
- Jointless bridge > 300 feet total length for prestressed concrete beam bridges
- Distance from an integral or semi-integral end bent to nearest expansion joint > 240 feet for steel girder bridges
- Distance from an integral or semi-integral end bent to nearest expansion joint > 300 feet for prestressed concrete beam bridges
- An integral or semi-integral end bent is used and the end of the approach slab interfaces with a moment slab and railing
- An integral or semi-integral end bent is used and the roadway pavement is constructed of concrete
- Slab thickness- If approach slab rests on sleeper slab, thickness may be increased since approach slab spans the entire distance between sleeper slab and pavement rest

☐ Sleeper slabs not used when staged construction is required or future widening expected – MEMO DM0114

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Slope Protection Paving **BDM Section 6.3.16, BDWG 804-01**

Plan View

☐ Show the beginning and ending of bridge

☐ Show slope dimensions

☐ Show the construction centerline of the bridge

☐ Show the limits of slope protection

☐ Indicate the type of slope protection

☐ Show the location/type of underdrain

☐ Label the edge of roadway shoulder treatment

☐ Label the edge of superstructure

☐ Label the beginning of berm

☐ Provide any section call-outs

Section View along Construction Centerline of the Bridge

☐ Label the slope rate

☐ Indicate the depth of slope protection

☐ Show the location of fill

☐ Label the beginning of bridge

☐ Show the edge of curb and gutter, if applicable

☐ Provide any detail call-outs

Miscellaneous

☐ Details and Cross Sections. Provide the applicable details and cross sections with all necessary information

☐ Pouring Diagram. Include a pouring diagram that includes dimensions between pours and a description of the pouring sequence

☐ Include all applicable notes

☐ Clear plan view presented – BDM 6.3.16, BDWG 804-01

☐ Slope Protection extends beyond open drainage of close drainage outfall and appears to catch discharge - BDWG 804-01

☐ QC review performed to ensure the information provided is accurate and complete. Ensure all information shown on the interior bent sheets is consistent with the other all other plans sheets.

Drainage Details (Closed Drainage) **BDM Section 6.3.17**

☐ When a closed drainage system is required, include a sheet depicting the drainage for the bridge. Verify the closed drainage system matches what is shown the roadway plans
- material
- clean-outs
- each run of pipe between drains
- catch basin location
- pipe diameter and length
- downspouts
- outfall location
- gradient, and
- fittings and hardware

☐ Provide a cross section of the pipe showing all necessary dimensions (e.g., diameter, type, length)

☐ Minimum collector & downspout pipe diameter of 8 inches – BDM Section 18.3.2

☐ Grated, 6" minimum diameter deck drains in general compliance with BDWG 700-05.01

☐ Use fiberglass drains meeting requirements of ASTM D2996 and ASTM G154 – BDM 18.3.2, BDM 18.3.4

☐ Cleanouts provided at key points – BDM Section 18.3.3.3

☐ All metal components galvanized or stainless steel – BDM Section 18.1.2.3

☐ No drains or discharge pipes allowed inside of structural elements other than the bridge deck

☐ Downspouts and collector pipes shall be fiberglass and shall be colored (not painted) to match the finished bridge color

☐ Collector pipes are not to extend below the bottom of the girders except for downspout locations

☐ Pipe diameters dimensioned. Hanger anchor location verified to clear conflict with beam strand or reinforcement if Hung on concrete beams

☐ Minimum velocity is 3 ft. /sec – BDM 18.3.2

☐ Grated inlets do not interfere with bicycle traffic, if applicable

☐ Verification of hydraulic design performed by independent design performed by experienced engineer other than the original designer

☐ QC performed to ensure that details are complete and accurate and consistent with superstructure and substructure plan sheets

Utility Attachments Details **BDM 6.3.18 & BDM Section 17.6.5**

☐ Utility lines not attached to the outside edge of the bridge where the structure crosses another highway – UAM Section 6.9

☐ Utilities not permitted under the approach slabs – UAM Section 6.9

☐ Weight of the attachment does not exceed 110 pounds per foot – UAM Section 6.9

☐ Utility lines do not hang below the bottom of the beams or below the bottom of the deck on flat slab bridges UAM Section 6.9

☐ No field welding is allowed on steel beams – UAM Section 6.9

☐ No field drilling is allowed on concrete beams or steel beams – UAM Section 6.9

☐ For new construction, all attachments to concrete shall be made with threaded inserts that are cast into the concrete – UAM Section 6.9

☐ All attachments to concrete shall be made with inserts or adhesive anchors. Attachment hardware shall be galvanized or stainless steel.

- Adhesive anchors cannot be installed overhead or upwardly inclined (see MEMO DM0408 Figure 1.3)
- No field welding is allowed on steel beams – UAM Section 6.9

☐ Verification of design performed by independent design performed by experienced engineer other than the original designer

☐ QC performed to ensure that details are complete and accurate

Utilities Details Sheet **BDM Section 6.3.18**

☐ If necessary, provide a separate sheet detailing the type and size of the utility. Include the following:

- Section Views. Include a section view where the utility is located. Include the size and
- Type of conduits and any applicable notes.
- Typical Conduit Layout at End Bents. Provide a typical conduit layout and any applicable notes. Include the location of the conduit, parapet, and slip coupling.
- Notes. Include general notes at the right-hand side of the sheet.

☐ Verification of design performed by independent design performed by experienced engineer other than the original designer

☐ QC performed to ensure that details are complete and accurate

Existing Bridge Plans **BDM Section 6.3.19**

☐ Existing Bridge Plans included

☐ Note “For Information Only” included on each sheet

☐ New sheet numbers and Project ID added at tops of sheets

Notes: