| YEAR | MEMO | PDF_FILE | DESCRIPTION |
|---|---|---|---|
| 1988 | DM0188 | DM198801.PDF | Prestressing Strands For Pretensioning Applications |
| 1988 | DM0288 | DM198802.PDF | Slip Critical Joints |
| 1988 | DM0388 | DM198803.PDF | Cold Applied Bridge Joint Sealant |
| 1988 | DM0488* | DM198804.PDF | Bridge Ends Drainage (Replace By DM0299) |
| 1988 | DM0588 | DM198805.PDF | Deck Overhang For Beam Or Girder Spans |
| 1988 | DM0688 | DM198806.PDF | Welding Specifications |
| 1989 | DM0189 | DM198901.PDF | Asphalt Curb & Flume For Bridge End Drainage (Changed To DM0194) (Replaced By DM0299) |
| 1989 | DM0289* | DM198902.PDF | Criteria For Railroad Overpasses (Changed To DM0294) |
| 1989 | DM0389 | DM198903.PDF | Prestressed Concrete Pile Lengths / Prestressed Concrete Beam Design |
| 1989 | DM0489 | DM198904.PDF | Diaphragms For Prestressed Beam Spans |
| 1989 | DM0589 | DM198905.PDF | Cap Dimensions For Pile Type Bents |
| 1989 | DM0689 | DM198906.PDF | Prestressed Beam Design |
| 1989 | DM0789 | DM198907.PDF | Slab Coping At Top Flange Of Steel Beams And Girders |
| 1989 | DM0889 | DM198908.PDF | AASHTO Standard Specifications For Highway Bridges, Fourteenth Edition, 1989 |
| 1989 | DM0989 | DM198909.PDF | Pile Foundations |
| 1989 | DM1089 | DM198910.PDF | Approach Slabs |
| 1989 | DM1189 | DM198911.PDF | Seismic Requirements For Bridges |
| 1989 | DM1289 | DM198912.PDF | Safety Factors For Driven Pile Foundations |
| 1990 | DM0190 | DM199001.PDF | Welding Of Skewed Connection Plates |
| 1990 | DM0290 | DM199002.PDF | Structural Steel Details (Shear Studs & Diaphragms) |
| 1990 | DM0390 | DM199003.PDF | Seismic Hooks For Stirrups And Ties |
| 1990 | DM0490 | DM199004.PDF | Bridge Deck Sealer |
| 1990 | DM0590 | DM199005.PDF | Grooved Surface Finish And Bridge Deck Rideability |
| 1990 | DM0690 | DM199006.PDF | Cofferdams |
| 1990 | DM0790 | DM199007.PDF | Concrete Cover For Reinforcing Steel |
| 1990 | DM0890 | DM199008.PDF | Concrete Dimensions For Slab Design |
| 1990 | DM0990 | DM199009.PDF | Telephone Conversations With Consultants |
| 1990 | DM1090 | DM199010.PDF | New Approach Slab Standard, Revised Standard Details And Revised Compression Seal Joint Details |
| 1990 | DM1190 | DM199011.PDF | Geotechnical Design And Review Policy |
| 1991 | DM0191 | DM199101.PDF | Safety Factors For Driven Pile Foundations |
| 1991 | DM0291 | DM199102.PDF | Structural Steel |
| 1991 | DM0391 | DM199103.PDF | Seismic Requirements For Bridges |
| 1991 | DM0491 | DM199104.PDF | Stay-In Place Bridge Deck Forms |
| 1991 | DM0591 | DM199105.PDF | Air-Entrainment In Prestressed Concrete |
| 1991 | DM0691* | | (Now DM02/92) |
| 1991 | DM0791 | DM199107.PDF | Approach Slabs Details |
| 1991 | DM0891 | DM199108.PDF | Elastomeric Bearing Design |
| 1992 | DM0192 | DM199201.PDF | Pile Spacing - AASHTO 1991 Interim Spec. 4.5.15.1.1. |
| 1992 | DM0292* | DM199202.PDF | Criteria For Railroad Overpasses (Supersedes DM02/89) |
| 1992 | DM0392 | DM199203.PDF | Special Provisions |
| 1992 | DM0492 | DM199204.PDF | Design Methodology & Live Load Requirements |
| 1993 | DM0193 | DM199301.PDF | Prestressed Beams |
| 1993 | DM0293 | DM199302.PDF | Stand, End Term, Detail Col. Spiral Rein. (Changed To DM0495) |
| 1993 | DM0393 | DM199303.PDF | Standardized Load Factor Des. For Br. Slabs |
| 1993 | DM0493 | DM199304.PDF | 24" Octagonal Pres. Conc. Piles & 14" Sq. Pres. Conc. Piles |
| 1993 | DM0593 | DM199305.PDF | Design Of Pres. Conc. Beams |
| 1993 | DM0693 | DM199306.PDF | Bearing Stiffeners |
| 1993 | DM0793 | DM199307.PDF | Conc. Barrier Parapet Reinf. |
| 1993 | DM0893 | DM199308.PDF | Substructure Concrete |
| 1994 | DM0194* | DM199401.PDF | Criteria For Rr Overpasses (Supersedes DM0189 Dated 2/28/89) |
| 1994 | DM0294 | DM199402.PDF | Procedure For Showing Water Elev On Plans |
| 1995 | DM0195 | DM199501.PDF | Silane Bridge Deck Sealer |
| 1995 | DM0295 | DM199502.PDF | Beam Bearing At End Bents |
| 1995 | DM0395 | DM199503.PDF | Debonding Of Strands In Prestressed Members |
| 1995 | DM0495* | DM199504.PDF | Column Reinforcing Steel (Supersedes DM02/93 & Modifies DM03/91) |
| 1995 | DM0595 | DM199505.PDF | Use Of Low Relaxation Strands In Beams |
| 1996 | DM0196 | DM199601.PDF | Concrete Cover On Slabs |
| 1996 | DM0296 | DM199602.PDF | Bridge Railing Wall - Slip Forming Alternate |
| 1996 | DM0396 | DM199603.PDF | Dimension Of Bridge Plans |
| 1996 | DM0496 | DM199604.PDF | Thrie Beam Connector Details |
| 1996 | DM0596 | DM199605.PDF | Finish Grades On Fast Track Projects |
| 1996 | DM0696 | DM199606.PDF | Double 3/4" Chamfer On Barrier Parapet Face |
| 1996 | DM0796 | DM199607.PDF | End Walls On Prestressed Beams |
| 1996 | DM0896 | | Void |
| 1996 | DM0996 | DM199609.PDF | Anchor Bolt Details |
| 1996 | DM1096 | DM199610.PDF | Availability Of Various Steel H-Pile Sizes |
| 1996 | DM1196 | DM199611.PDF | Soft Metric Reinforcing Bars |

| YEAR | MEMO | PDF_FILE | DESCRIPTION |
|---|---|---|---|
| 1997 | DM0197 | DM199701.PDF | Payment Of Spiral Reinforcing Steel In Columns And Drilled Shafts |
| 1997 | DM0297* | DM199702.PDF | Classes Of Concrete For National Highway System Bridges And "Other Select Bridges" (Replaced By |
| 1997 | DM0397 | DM199703.PDF | Detailing Approach Slabs When Adjoining A Trend Guardrail |
| 1997 | DM0497 | DM199704.PDF | Payment Of Reinforcing Steel Used For Pile Anchorage |
| 1997 | DM0597* | DM199705.PDF | Revised Control Joint Details (See DM0998) |
| 1997 | DM0697 | DM199706.PDF | Splicing Column Reinforcing |
| 1997 | DM0797* | DM199707.PDF | Column Confinement Reinforcing (Modifies DM0391, Figure 4) |
| 1997 | DM0897 | DM199708.PDF | Bridge Title Plan Sheet |
| 1997 | DM0997 | DM199709.PDF | Spiral Reinforcement In Prestressed Concrete Pile |
| 1997 | DM1097* | DM199710.PDF | Breaking Spiral Reinforcement At Cap/Column Connection (See Dsmemo 04/98) |
| 1998 | DM0198 | DM199801.PDF | Implementation Of Performance Audit As It Relates To Constructability |
| 1998 | DM0298 | DM199802.PDF | New Drip Groove Location |
| 1998 | DM0398 | DM199803.PDF | Steel Pile Anchorage Into Cap/Footing |
| 1998 | DM0498 | DM199804.PDF | Breaking Spiral Reinforcement At Cap/Column Connection |
| 1998 | DM0598 | DM199805.PDF | Prestressed Beams |
| 1998 | DM0698 | DM199806.PDF | Approach Slabs |
| 1998 | DM0798 | DM199807.PDF | Substructure & Superstructure Location Conflicts Between New And Existing Bridges |
| 1998 | DM0898 | DM199808.PDF | Printing Of Completed Bridge Plans |
| 1998 | DM0998* | DM199809.PDF | Joints In Bridge Barrier Parapet/Railing Wall(Replaces March 25, 1997 Memorandum) |
| 1999 | DM0199 | DM199901.PDF | New Pay Items |
| 1999 | DM0299 | DM199902.PDF | Bridge End Drainage Details (Replaces DM0488&DM0189) |
| 1999 | DM0399* | DM199903.PDF | Corrison Protection Systems For Bridges (Replaces DM0297) |
| 1999 | DM0499 | DM199904.PDF | Value Engineering Proposals |
| 1999 | DM0599 | DM199905.PDF | Beam Slab Designs |
| 1999 | DM0699 | DM199906.PDF | New Field Welding Note & Supplemental Specification |
| 1999 | DM0799 | DM199907.PDF | Revised Shop Plan Policy And Standard Notes |
| 2000 | DM0100 | DM200001.PDF | AASHTO LRFD Bridge Design Specifications |
| 2000 | DM0200 | DM200002.PDF | Evazote Joints |
| 2000 | DM0300 | DM200003.PDF | SCDOT Standard Specifications for Highway Construction Edition of 2000 |
| 2000 | DM0400 | DM200004.PDF | Elastomeric Bearings |
| 2000 | DM0500 | DM200005.PDF | End Wall Backfill |
| 2000 | DM0600 | DM200006.PDF | Sidewalk Width |
| 2000 | DM0700 | DM200007.PDF | Revisions to Prestressed Concrete Pile-Pile Cap Connections |
| 2001 | DM0101 | DM200101.PDF | Prestressed Beam Members |
| 2001 | DM0201 | DM200102.PDF | Bulb Tee Beams |
| 2001 | DM0301 | DM200103.PDF | Structural Steel Fasteners |
| 2001 | DM0401 | DM200104.PDF | Flat Slab Units |
| 2001 | DM0501 | DM200105.PDF | Title Sheet |
| 2001 | DM0601 | DM200106.PDF | Camber Note |
| 2001 | DM0701 | DM200107.PDF | Procedure for Plan Distribution of Constr. Ch'nges and VE Ch'nges on Br Projects |
| 2001 | DM0801 | DM200108.PDF | Railroad Correspondence on Behalf of SCDOT |
| 2001 | DM0901 | DM200109.PDF | Weathering Steel |
| 2001 | DM1001 | DM200110.PDF | A Policy on Geometric Design of Highways and Streets (Green Book 2001) |
| 2001 | DM1101 | DM200111.PDF | Shop Plan Policy for SCDOT Bridge Consultant Projects |
| 2002 | DM0102 | DM200201.PDF | Final Finish of Exposed Concrete Surfaces |
| 2002 | DM0202 | DM200202.PDF | New SCDOT Seismic Design Specifications |
| 2002 | DM0302 | DM200203.PDF | Section 709.06 of the Standard Specifications |
| 2002 | DM0402 | DM200204.PDF | Bridge Deck Drainage |
| 2002 | DM0502 | DM200205.PDF | Optional Backwall at End Bents |
| 2002 | DM0602 | DM200206.PDF | Slope Paving |
| 2002 | DM0702 | DM200207.PDF | Perforated Pipe Underdrain |
| 2002 | DM0802 | DM200208.PDF | Weathering Steel Accessories |
| 2002 | DM0902 | DM200209.PDF | Prestressed Concrete Girder Build-downs |
| 2002 | DM1002 | DM200210.PDF | Core Slab Unit Bridges |
| 2002 | DM1102 | DM200211.PDF | Removal of Existing Structures |
| 2002 | DM1202 | DM200212.PDF | Concrete Slab Extension |
| 2002 | DM1302 | DM200213.PDF | Use of ASTM A-706 Grade 60 Reinforcing Steel |
| 2002 | DM1402 | DM200214.PDF | Bridges Over Navigable Waters |
| 2002 | DM1502 | DM200215.PDF | Seismic Requirements for Highway Bridges |
| 2002 | DM1602 | DM200216.PDF | Concrete Curb and Gutter With Flume |
| 2002 | DM1702 | DM200217.PDF | Temporary Sheet Piles |
| 2002 | DM1802 | DM200218.PDF | Bridge Drainage Requirements |
| 2003 | DM0103 | DM200301.PDF | Drilled Shaft Reinforcing Steel |
| 2003 | DM0203 | DM200302.PDF | New SCDOT Seismic Hazard Maps |
| 2003 | DM0303 | DM200303.PDF | Diaphragms for Prestressed Girder Spans |
| 2004 | DM0104 | DM200401.PDF | Importance Classification (IC) of Bridges |
| 2004 | DM0204 | DM200402.PDF | Steel Plate Recess at Deck Joints |
| 2004 | DM0304 | DM200403.PDF | Concrete Stress Limits for Prestressed Concrete Members |
| 2004 | DM0404 | DM200404.PDF | Wing Walls |
| 2004 | DM0504 | DM200405.PDF | End Wall Details |

DM0288

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

October 3, 1988

MEMORANDUM TO SQUAD LEADERS & CONSULTANTS

Subject: Slip Critical Joints

Section 10.32.3 Fasteners (Rivets and Bolts) of the AASHTO Standard Specifications for Highway Bridges has been significantly revised by the 1988 AASHTO Interim Specifications. In accordance with the definition given in paragraph 10.24.1.4, all bolted structural steel connections shall be designated as slip-critical connections.

The Research and Materials Lab has advised that the solvent based inorganic zinc primer as currently specified on all projects has a slip coefficient of 0.52 and qualifies as a Class B coating. Therefore, bolted connections should be designed as slip-critical connections with Class B contact surfaces.

This requirement applies to all projects now in the design phase. Also, please be advised that the note on the Standard Note sheet specifying the class of contact surface will need to be changed for projects designed in accordance with the above requirements.

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Bridge Engineer-Design

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RLK/ddg

DM0388

SOUTH CAROLINA
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COLUMBIA, S.C. 29202

October 5, 1988

MEMORANDUM TO SQUAD LEADERS & CONSULTANTS

Subject: Cold Applied Bridge Joint Sealant

All deflection joints and those expansion joints which do not require compression seals shall be sealed using a cold applied joint sealant. The notes on Bridge Design Standard drawings 190eR, Standard Details for Flat Slabs, and 283A, Joint Details, specifying hot poured joint sealer will be changed to read "Joint sealant shall be a cold applied bridge joint sealant meeting the requirements of the Special Provisions."

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DM0488

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
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COLUMBIA, S.C. 29202

October 17, 1988

MEMORANDUM TO SQUAD LEADERS & CONSULTANTS

Subject: Bridge Ends Drainage

Due to the expense and difficulty of construction, the curb and gutter with catch basin (Standard No. 292) will not be detailed on future projects. Curb and gutter with flume (Standard No. 803-1) should be detailed for all projects requiring end drainage structures that have not been previously detailed.

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DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
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October 17, 1988

MEMORANDUM TO SQUAD LEADERS & CONSULTANTS

Subject: Deck Overhang for Beam or Girder Spans

The projection of the bridge deck slab past the exterior beam or girder is generally constructed by bracing the falsework against the web or bottom flange of the exterior beam or girder. Large overhang widths will cause excessive lateral distortion of the bottom flange and web of the beam or girder. Therefore, the spacing of beams or girders should generally be such that the deck slab overhang width is within the range of 2'-6" to 3'-6" as measured from the centerline of the exterior beam or girder.

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SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
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COLUMBIA, S.C. 29202

November 4, 1988

**MEMORANDUM TO SQUAD LEADERS & CONSULTANTS**

Subject: Welding Specifications

The specifications for welding on all future projects shall be the latest edition of the ANSI/AASHTO/AWS D1.5 Bridge Welding Code with additions and revisions as stated in the Special Provisions. The standard welding sheet, Standard No. 118, will no longer be included in the plans.

Notes concerning the welding specifications and Charpy V-Notch Toughness Test requirements as shown on the attached sheet should be added to the standard note sheet. Standard No. 189, Standard Notes, will be revised to include these notes.

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## CHARPY V-NOTCH TOUGHNESS TEST

THE LONGITUDINAL CHARPY V-NOTCH TOUGHNESS TEST SHALL BE APPLIED TO ALL STRUCTURAL STEEL MEMBERS OR COMPONENTS SUBJECT TO TENSILE STRESS AS SPECIFIED BELOW.

THE TEST SHALL BE REQUIRED AS FOLLOWS:

(a) SIMPLE SPAN ROLLED BEAM - THE BEAM ITSELF AS WELL AS BOTTOM COVER PLATE, IF APPLICABLE.

(b) SIMPLE SPAN PLATE GIRDER - THE WEB, BOTTOM FLANGE PLATE AND SPLICE PLATES FOR WEB AND BOTTOM FLANGE EXCLUDING ANY FILLER PLATES.

(c) CONTINUOUS SPAN ROLLED BEAM - THE BEAM ITSELF AS WELL AS ANY TOP OR BOTTOM COVER PLATE LOCATED IN A TENSION REGION AS INDICATED IN THE PLANS. ALSO, ALL SPLICE PLATES FOR WEB AND TOP AND BOTTOM FLANGE PLATES EXCLUDING ANY FILLER PLATES.

(d) CONTINUOUS SPAN PLATE GIRDER - ALL WEB PLATES, THE TOP FLANGE PLATES AND THE BOTTOM FLANGE PLATES LOCATED IN A TENSION REGION AS INDICATED IN THE PLANS. ALSO, ALL SPLICE PLATES FOR WEB AND TOP AND BOTTOM FLANGE PLATES EXCLUDING ANY FILLER PLATES.

THE ABSORBED ENERGY REQUIREMENT AND TEST TEMPERATURE SHALL BE AS SPECIFIED IN THE LATEST AASHTO STANDARD SPECIFICATIONS OR SPECIAL PROVISIONS FOR ZONE 2. SAMPLING AND TESTING PROCEDURES SHALL BE IN ACCORDANCE WITH AASHTO T-243. THE (H) FREQUENCY OF HEAT TESTING SHALL BE USED.

## SPECIFICATIONS

ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE (LATEST EDITION) WITH ADDITIONS AND REVISIONS AS STATED IN THE SPECIAL PROVISIONS.

DM#0189

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

February 22, 1989

**MEMORANDUM TO SQUAD LEADERS**

Subject: Asphalt Curb & Flume for Bridge End Drainage

Concrete curb and gutter with flume will continue to be detailed on the plans where the slope going off the bridge is 1% or greater. All other corners of the bridge will have asphalt curb and flume as shown on Road Standard 721-1 detailed in the approach plans. The exception to this will be the high side of a superelevated section where no end drainage details will be required.

B. A. Meetze, Jr.
Bridge Engineer-Design

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DM0289
RAILROAD
Changed - Now
DM-0292

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

February 28, 1989

**MEMORANDUM TO DESIGN GROUP LEADERS**

Subject: Criteria for Railroad Overpasses

The following criteria is to be observed when establishing bridge and span lengths and developing preliminary plans for railroad overpasses.

1. General
   - A. The distance to the nearest mile post from the intersection of the centerline track and centerline of the bridge shall be shown on the plan and profile sheet.
   - B. Horizontal and vertical clearances shall be clearly marked on the plan and profile sheet.
   - C. A minimum of one boring shall be taken at each bent adjacent to the track. The design group leader should specify this when making a request for borings.
   - D. Surveys of railroad grade separations should now included five profiles parallel to the centerline of the bridge. These profiles are to be made at the centerline of survey, the approximate toe line for the side slopes and midway between centerline of survey and the toe line for the side slopes. The Road Section will plot these profiles and provide them to Bridge Design for inclusion in the preliminary plans to be submitted to the railroad company. These profiles should not be included in the final structure plans.

2. Clearances
   - A. Horizontal clearance shall, whenever possible, be set at a minimum of 25 feet from the face of the column or pier to the centerline of track, measured perpendicular to the track. Existing horizontal clearances should be maintained for widening projects.
   - B. Vertical clearances shall be set at a minimum of 23 feet from the top of rail to the bottom of the superstructure. Existing vertical clearances should be maintained for widening projects.
   - C. Temporary construction clearances shall be noted on the plans as 10.0 feet horizontal and 22.0 feet vertical. Increased temporary clearances may be requested by the railroad company after review of the preliminary plans.

3. Crashwalls

Crashwalls will be required on all new and existing bents when the face of the pier or column is closer than 25.0 feet to the centerline of track, measured perpendicular to the tracks, except as noted below.

Crashwalls shall meet the following requirements:

A. Crashwalls for single column piers shall be minimum 2'-6" thick and shall extend a minimum of 6'-0" above the top of high rail. The wall shall extend a minimum of 6'-0" beyond the column on each side in the direction parallel to the track.

B. For multiple column piers, the columns shall be connected with a wall of the same thickness as the columns or 2'-6" whichever is greater. The wall shall extend a minimum of 2'-6" beyond the end of outside columns in a direction parallel to the track.

C. Reinforcing steel to adequately anchor the crashwalls to the column and footing shall be provided.

D. For piers of heavy construction, crashwalls may be omitted. Solid piers with a minimum thickness of 2'-6" and length of 20'-0", single column piers of minimum 4'-0" x 12'-6" dimensions or any other solid pier sections with equivalent cross sections and minimum 2'-6" thickness are considered as heavy construction.

4. Drainage

Deck drains shall not be used on railroad overpass structures.

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Bridge Engineer-Design

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DM0389

PRESTRESSED PILES
PRESTRESSED BEAMS

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

March 8, 1989

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: 1) Prestressed Concrete Pile Lengths
2) Prestressed Concrete Beam Design

1) Prestressed Concrete Pile Lengths

All piles within a particular bent should be detailed to be the same length whenever practical. Pile lengths should be shown in whole foot increments. When piles are to be driven to a particular tip elevation, the required tip elevation shown in the plans may vary for each pile or a minimum pile tip elevation may be set for all piles in the bent.

2) Prestressed Concrete Beam Design

When prestressed concrete beams are required to be cast in varying lengths, the designer should consider using a constant number of prestressing strands in as many beams as practical and varying the height of the draped strands within individual beams. This will allow the fabricator to achieve a more efficient utilization of the casting bed length.

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SOUTH CAROLINA
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P.O. BOX 191
COLUMBIA, S.C. 29202

March 21, 1989

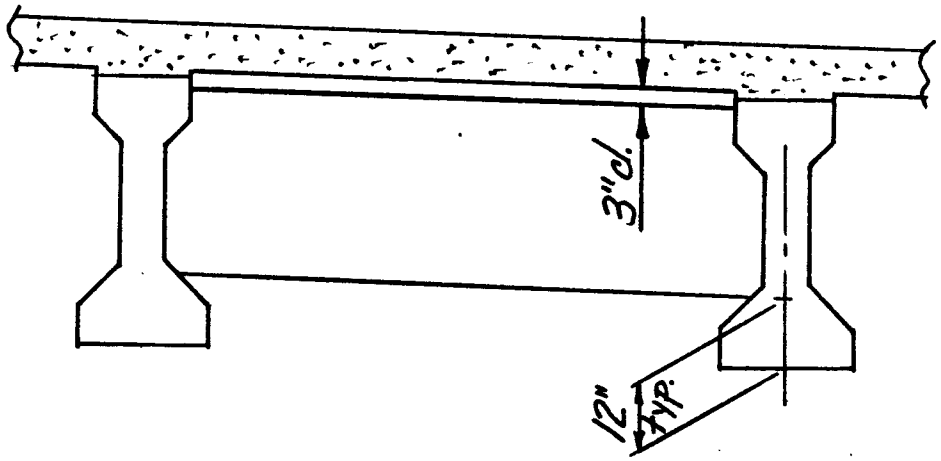
**MEMORANDUM TO DESIGN GROUP LEADERS**

Subject: Diaphragms for Prestressed Beam Spans

Diaphragms for prestressed beam spans should be detailed without the 5" fillets on the bottom face. The bottom of the diaphragm should be detailed 12" above the bottom of the beam. See the sketch below.

Interior diaphragms will be used only for grade separation projects and should be located over the centerline of the traffic lanes or railroad tracks. When interior diaphragms are used, the tops of the interior diaphragms shall be detailed 3" below the bottom of the slab.

This memorandum supersedes the design memorandum of November 24, 1982.

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SOUTH CAROLINA
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March 27, 1989

**MEMORANDUM TO DESIGN GROUP LEADERS**

Subject: Cap Dimensions for Pile Type Bents

When using a single line of piles in a trestle type pile bent the cap dimensions listed below should be used unless conditions of loading, batter of piles or beam seat requirements indicate otherwise. This requirement applies only to those projects not previously detailed.

| Pile | Cap Width | Cap Depth |
|---|---|---|
| 18" Sq. Prestressed | 3'-0" | 2'-6" |
| 16" Sq. Prestressed | 2'-10" | 2'-6" |
| 14" Sq. Prestressed | 2'-8" | 2'-6" |
| HP12x53 or HP10x42 | 2'-6" | 2'-6" |

B. A. Meetze, Jr.
Bridge Engineer-Design

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DM 0689

April 25, 1989

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Prestressed Beam Design

Tension in the pre-compressed tensile zones of prestressed concrete girders shall be limited to no tension for projects in the coastal counties and to 3 f'c for projects in all other counties. Please note that this requirement is more stringent than the requirements of paragraph 9.15.2.2(a) of the AASHTO specifications.

It will continue to be the Department's standard practice to design Class "X" Concrete for a concrete compressive strength of 4000 psi at the time of strand release as stated in paragraph 704.13(b) of the SCDHPT Standard Specifications. When required by design the concrete strength at release may be specified as 4500 psi. When concrete strengths higher than 5000 psi are specified release strength should be a minimum of 0.8f'c but not greater than 0.9f'c.

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DM07/89

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
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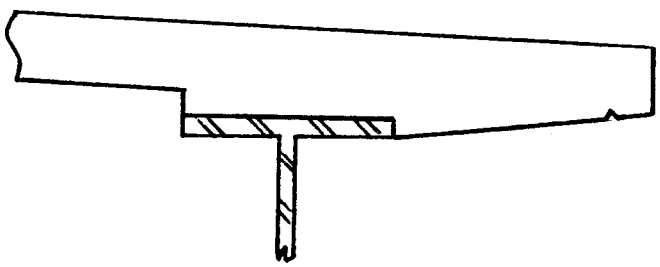
July 24, 1989

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Slab Coping at Top Flange of Steel Beams and Girders

It has been the Department's practice to detail a 4 inch projection of the slab build-down past the edges of the top flange of steel beams and girders. This detail is routinely eliminated when metal or concrete deck forms are used on a project.

On projects not already detailed, this 4 inch projection should be eliminated and the build-down detailed flush with the edge of the beam flange as shown below. The cantilevered slab and build-down at the exterior beams shall continue to be detailed in accordance with current practice.



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Mr. Kneece
Design Group Leaders
Consultants

RLK/ddg

DM0889

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

August 28, 1989

**MEMORANDUM TO DESIGN GROUP LEADERS**

Subject: AASHTO Standard Specifications For Highway Bridges, Fourteenth Edition, 1989

Beginning with the January 1990 Letting, all projects being developed in-house shall be designed in accordance with the 1989 AASHTO specifications. The notes on the standard note sheet should be revised to reflect this change.

The 1989 AASHTO specifications have changed the steel designations. All steel designations in the plans should be changed in accordance with the new AASHTO specifications. The office standards will also be revised to show the new designations.

B. A. Meetze, Jr.
Bridge Design Engineer

BAM/RLK/ddg

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

September 14, 1989

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Pile Foundations

Beginning with the January 1990 letting, wave equation analyses will be required for all driven pile foundations. A wave equation analysis will be required in the design phase to verify the results of the static analysis and insure driveability without damage to the pile or the driving equipment. Another wave equation analysis will be made in the construction phase for the purpose of approving the specific driving equipment and methods proposed by the contractor. The contractor will be required to submit the necessary information on his proposed driving equipment and methods for this analysis.

The design engineer will provide the results of the wave equation analysis for the proposed driving equipment and methods along with his approval of the same. These results should include a graph of hammer blows per inch versus ultimate bearing capacity. Also, the number of hammer blow per inch corresponding to the required ultimate bearing capacity as stated in the plans shall be clearly stated.

In order to standardize the method of indicating the bearing capacity in the plans, the design bearing, safety factor and required ultimate bearing shall be shown on the individual bent sheets in the following form.

| PILE BEARING | |
|---|---|
| Design Bearing | XX Tons |
| Safety Factor | X.XX |
| Required Ultimate Bearing | XX Tons |

Sincerely,

B. A. Meetze, Jr.
Bridge Design Engineer

cc:
Structural Engineer, FHWA
Mr. Rush
Mr. Martin
Mr. LaBoone
Mr. Kneece
Design Group Leaders
Consultants
RLK/ddg

DM1089

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

September 26, 1989

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Approach Slabs

Approach slabs will be required on projects meeting one or more of the following conditions.

1. Bridge located on state primary, federal primary or interstate route.
2. Bridge located on secondary or county road having a current ADT of 400 VPD or greater.
3. Bridge located on secondary or county road with new approach fill height exceeding 10 feet.

All approach slabs not detailed prior to this memorandum shall be detailed with the roadway ends of the slabs parallel to the bridge ends. The length of the approach slab shall be 20 feet measured parallel to the roadway. All approach slabs shall be doweled to the end bent or pavement rest with #5 dowels at 18" o.c. The reinforcement in approach slabs shall be as follows:

A. Top bars parallel to roadway - #6 @ 12"
B. Bottom bars parallel to roadway - #6 @ 6"
C. Top and Bottom distribution bars - #4 @ 12"

The following revised note shall be placed on all approach slab detail sheets:

"All costs of materials, equipment and labor necessary to compact the fill beneath the approach slab to not less than 95% of maximum density using suitable construction procedures shall be included in the unit price bid for Concrete for Structures, Class D."

This memorandum supersedes memorandums of June 8, 1984; March 1, 1985; January 7, 1987; and April 8, 1987.

B. A. Meetze, Jr.
Bridge Design Engineer

cc:
FHWA, Structural Engineer
R. E. LaBoone
R. L. Kneece
R. W. Rush
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Group Leaders
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DM1189

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

October 11, 1989

**MEMORANDUM TO GROUP LEADERS**

Subject: Seismic Requirements for Bridges

All bridges shall be detailed and/or designed for seismic loadings as specified for seismic performance category B (SPC B) in the 1983 AASHTO Guide Specifications for Seismic Design including subsequent revisions. The level of seismic considerations given to each structure shall be based on one of the following two categories.

1. Major Bridges
   All major coastal bridges and other major bridges as designated by the Bridge Design Engineer shall be designed and detailed for seismic loadings in accordance with the Guide Specifications. An acceleration coefficient of 0.15 shall be used for the design and analysis of these bridges.

2. Other Bridges
   All bridges not specified in Item 1. above to receive a seismic design shall be detailed in accordance with the minimum requirements set forth in the Guide Specifications. These minimum requirements include the following:

   A. Minimum Support Length
      The minimum support length requirements of Section 4.9.1 shall be provided.

   B. Special Pile Requirements
      The special pile requirements of Section 6.3.1(C) shall be provided.

      (1) Prestressed Concrete Piles
          The details shown on Bridge Design standard drawing number 712 are sufficient to meet these requirements.

(2) Steel H Piles
When steel piles are used in footings or caps, the pile shall be anchored in the footing by placing a reinforcing bar through a hole in the web of the pile similar to the detail shown in Figure 1 attached to this memorandum.

C. Footing Reinforcement
The anchorage of piles into footings will require tension reinforcement in the top of the footing to resist the potential negative bending. The minimum reinforcement in the top of the footing shall be #5 bars at 12" on center in both directions.

D. Transverse Column Reinforcement
The minimum transverse reinforcement for the top and bottom of columns as specified in Section 8.3 shall be provided. Transverse reinforcement for round columns shall be #4 ties with 135° seismic hooks as shown in Figure 2. The maximum spacing of #4 ties in the confinement length and the vertical extension as shown in Figure 4 is 4" for a 3'-0" diameter column. The spacing of ties between the areas of confinement at the top and bottom of columns will be 12" on center.

E. Cap Stirrups
All cap stirrups located between columns or piles shall be one piece enclosed hoops having 135° seismic hooks at one corner as shown in Figure 3.

F. Beam and Girder Anchorage
All beams and girders, including both steel and concrete, shall be positively anchored to the substructure on both ends by means of anchor bolts or dowels.

B. A. Meetze, Jr.
Bridge Design Engineer

cc:
Mr. Rush
Mr. LaBoone
Mr. Kneece
Mr. Martin
Group Leaders
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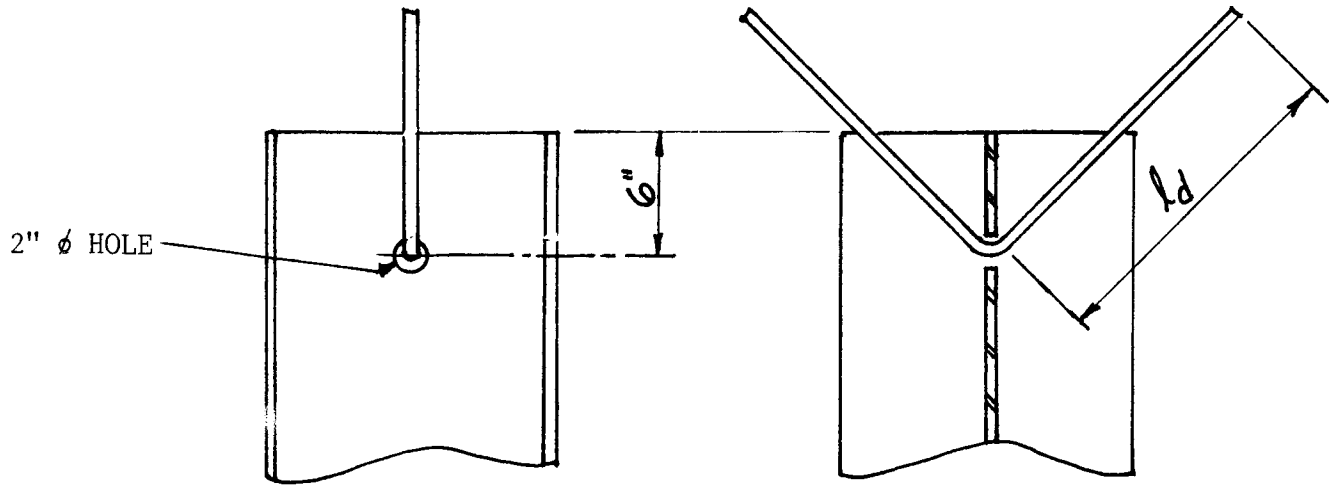


Note: Size reinforcing bar to carry in tension 10% of the Design Bearing of the pile.

FIGURE 1

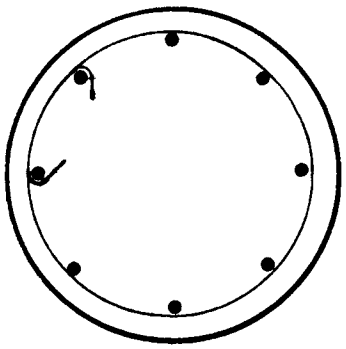

FIGURE 2

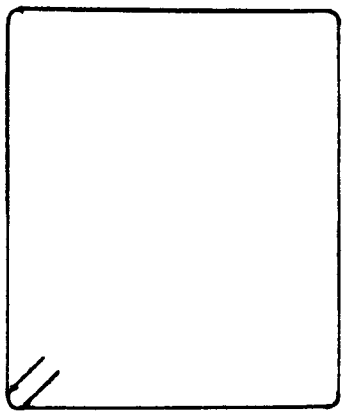

FIGURE 3

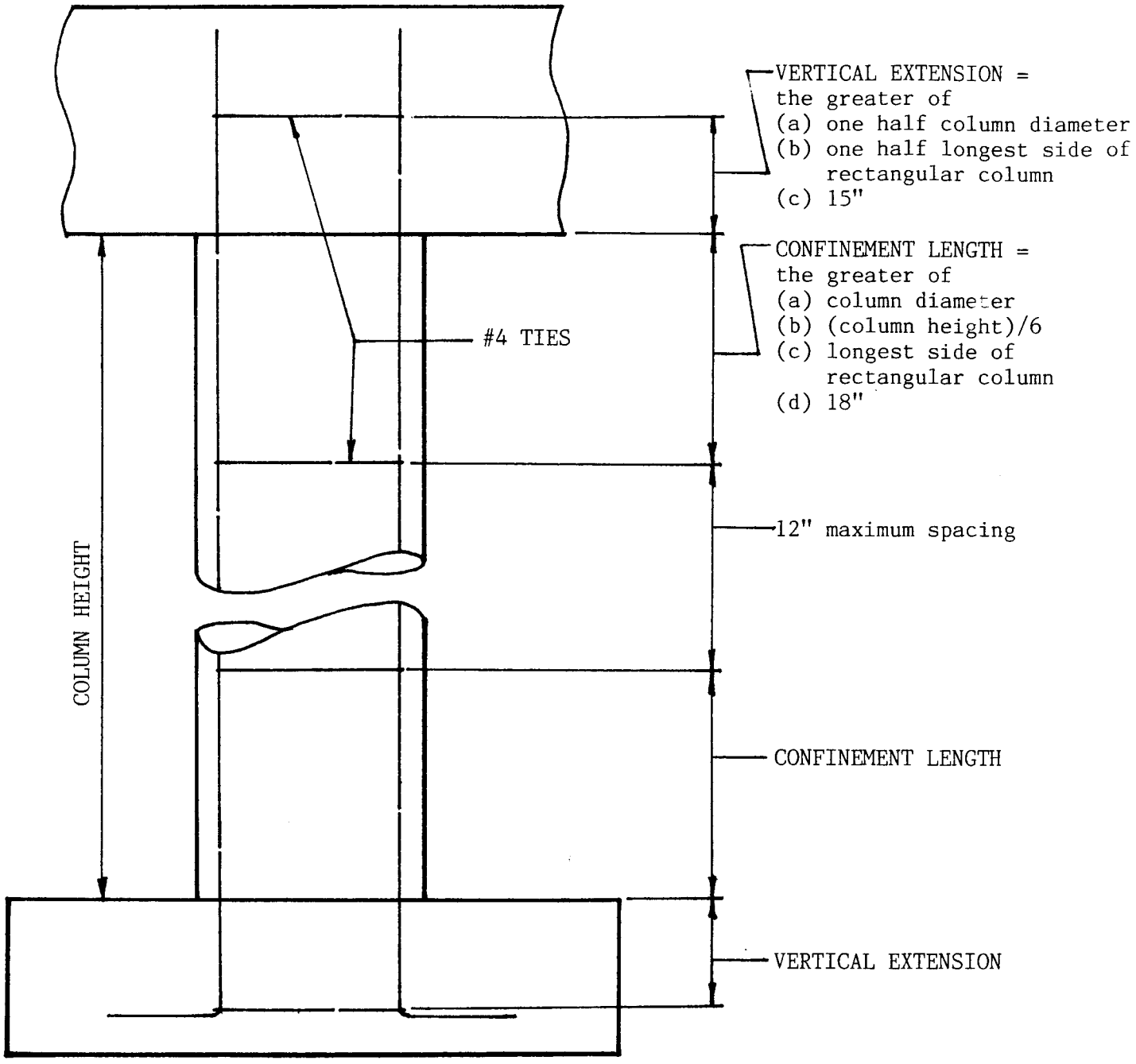
VERTICAL EXTENSION =
the greater of
(a) one half column diameter
(b) one half longest side of
rectangular column
(c) 15"
CONFINEMENT LENGTH =
the greater of
(a) column diameter
(b) (column height)/6
(c) longest side of
rectangular column
(d) 18"
#4 TIES
12" maximum spacing
COLUMN HEIGHT
CONFINEMENT LENGTH
VERTICAL EXTENSION

FIGURE 4

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

October 25, 1989

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Safety Factors for Driven Pile Foundations

Design Memorandum DM0989 dated September 14, 1989 requires the safety factors for driven pile foundations to be shown on the plans. The safety factor selected will depend on design factors such as quantity of subsurface information and geotechnical analysis, as well as construction factors such as the use of load test, index piles and wave equation. The following safety factors are to be used based on the construction control procedures to be specified in the Special Provisions:

| | |
|---|---|
| Static Load Test/Wave Equation | 2.00 |
| Dynamic Load Test (PDA)/Wave Equation | 2.25 |
| Index Piles/Wave Equation | 2.50 |
| Wave Equation | 2.75 |

These safety factors may be modified to fit the requirements of individual projects after consultation with the appropriate Assistant Bridge Design Engineer. Some conditions for which modifications may be considered are piles bearing on rock, uniform soil stratum, and additional geotechnical information exceeding the normal level of information.

Group Leaders should consult with the appropriate Assistant Bridge Design Engineer to determine the level of construction monitoring that will be required for each individual project. Consultants should discuss construction monitoring with the Consultant Coordinator in the Bridge Design Office.

B. A. Meetze, Jr.
Bridge Design Engineer

cc:
FHWA, Structural Engineer
R. E. LaBoone
R. L. Kneece
R. W. Rush
J. E. Martin
Group Leaders
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BAM/RLK/ddg

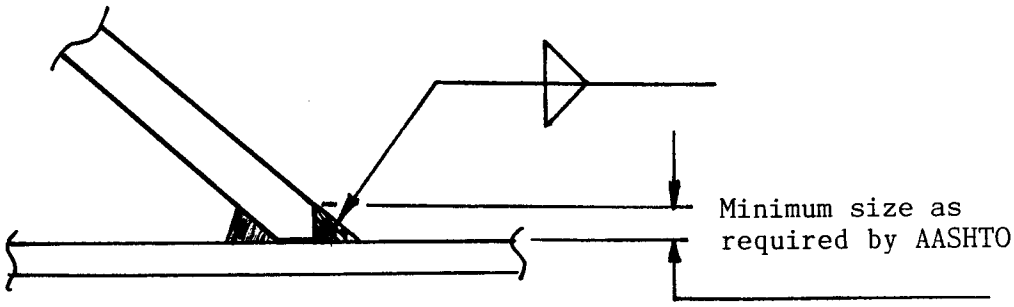
SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

February 13, 1990

**MEMORANDUM TO DESIGN GROUP LEADERS**

Subject: Welding of Skewed Connection Plates

The ANSI/AASHTO/AWS D1.5 Bridge Welding Code does not provide a fillet weld connection of a Tee joint when the connection plate is skewed more than 30 degrees from perpendicular. The use of a full penetration weld at this location results in warping and distortion of the web and the connection plate. In order to avoid this problem the fillet weld detail as shown below should be used for connection plate to web welds when skew is in excess of 30 degrees.




B. A. Meetze, Jr.
Bridge Design Engineer

cc:
Mr. Rush
Mr. LaBoone
Mr. Kneece
Mr. Martin
Group Leaders
BAM/RLK/ddg

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA S.C. 29202

March 12, 1990

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Structural Steel Details
1) Shear Studs
2) Diaphragms

1) The standard size for shear studs to be used on the flanges of beams and girders shall be 7/8" ϕ x 5". Studs should be detailed 2 per row unless design considerations dictate otherwise. The minimum distance from the edge of flange to the center of the stud shall be 4 inches and the minimum distance center to center of stud shall be 3 inches. Studs placed on relatively thin elements such as beam and girder webs should be detailed as 3/4" diameter.

2) Interior diaphragms for rolled beam spans shall be detailed with 3 inches minimum clearance between the top of the diaphragm and the bottom of the top beam flange. For bridges having a normal roadway crown, the diaphragms shall be level. For bridges having a superelevated roadway, the diaphragms shall be placed parallel to the slab.

These requirements shall apply to all projects not already detailed.

B. A. Meetze, Jr.
Bridge Design Engineer

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DM0390

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

March 16, 1990

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Seismic Hooks for Stirrups and Ties

The chart of seismic stirrups and ties on page 6-4 of the 1990 CRSI Manual of Standard Practice (MSP-1-90) will not be used to detail seismic hooks. All ties and stirrups shall have 135° hooks with extensions not less than the larger of ten tie diameters or 6 inches as specified in Section 8.4.1(D) of the 1983 AASHTO Guide Specifications for Seismic Design with revisions. Extensions for 135° hooks should also be indicated in the bending details.

The note on the standard note sheet regarding reinforcing fabrication has been changed to reflect the above. This change is effective immediately for all projects.

B. A. Meetze, Jr.
Bridge Design Engineer

cc:
FHWA, Structural Engineer
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SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

March 22, 1990

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Bridge Deck Sealer

A bridge deck sealer shall be specified for all new concrete bridge decks on all routes and roads. The following note will be required on the standard note sheet when the bridge deck sealer is called for in the plans.

"The Bridge Deck Sealer shall be applied in accordance with the Special Provisions."

The bridge deck sealer shall be applied to the top surface of new concrete bridge decks excluding those areas not exposed to traffic such as area under medians, barriers or sidewalks. Barriers, medians, sidewalks, concrete overlays and approach slabs shall not be treated. The bridge deck sealer shall be measured by the square yard and shall be bid as "Bridge Deck Sealer."

The use of linseed oil for concrete protection shall be discontinued.

B. A. Meetze, Jr.
Bridge Design Engineer

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DM0590

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

June 14, 1990

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Grooved Surface Finish and Bridge Deck Rideability

Grooved Surface Finish shall be required on all future bridge projects. Grooved Surface Finish shall be listed as a bid item on the Bridge Title Sheet.

Bridge Deck Rideability will also be required on the following projects:

1. structures on interstate routes
2. structures on U.S. or S.C. primary routes
3. structures on secondary roads in urban areas
4. structures on secondary roads with a future ADT or 2000 VPD or greater

Bridge Deck Rideability shall not be listed as a bid item, but shall be considered as incidental to the contract.

This memorandum supersedes the design memorandum of October 10, 1986.

B.A. Meetze, Jr.
Bridge Design Engineer

cc:
FHWA, Structural Engineer
R. E. LaBoone
R. L. Kneece
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SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

DM06/90

August 27, 1990

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Cofferdams

Due to the Department's implementation of the new BID ANALYSIS MANAGEMENT SYSTEM (BAMS), the bid item for "Cofferdam" shown on the Title Sheet will be as follows:

| ITEM NO. | BID ITEM | UNIT |
|---|---|---|
| 2045010 | COFFERDAM (TYPE 1) | EACH |
| 2045020 | COFFERDAM (TYPE 2) | EACH |
| 2045030 | COFFERDAM (TYPE 3) | EACH |
| 2045040 | COFFERDAM (TYPE 4) | EACH |
| 2045050 | COFFERDAM (TYPE 5) | EACH |
| 2045060 | COFFERDAM (TYPE 6) | EACH |

For the purpose of determining which type of cofferdam to specify in the plans the following volumes will be used:

| COFFERDAM | VOLUME (CUBIC FEET) |
|---|---|
| TYPE 1 | LESS THAN 10,000 |
| TYPE 2 | 10,000 TO 20,000 |
| TYPE 3 | 20,001 TO 30,000 |
| TYPE 4 | 30,001 TO 40,000 |
| TYPE 5 | 40,001 TO 50,000 |
| TYPE 6 | OVER 50,000 |

The volume will be computed as the cofferdam plan area times the cofferdam height.

For bents with seals, the height will be computed as the elevation of normal water plus five feet minus the elevation of the bottom of the seal or the mean high tide elevation plus five feet minus the elevation of the bottom of the seal. The plan area will be computed as the seal width times the seal length.

For bents without seals, the height will be computed as the elevation of normal water plus five feet minus the elevation of the bottom of the footing or the mean high tide elevation plus five feet minus the elevation of the bottom of the footing. The plan area will be computed as the footing width plus three feet times the footing length plus three feet.

The above method of designating cofferdams by type should be followed beginning with the October, 1990 letting.

B. A. Meetze, Jr.
Bridge Design Engineer

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FHWA, Structural Engineer
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Group Leaders
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DM0790

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

September 12, 1990

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Concrete Cover for Reinforcing Steel

The tolerances for bending stirrups and ties as given in the CRSI Manual of Standard Practice allow the stirrups or ties to be up to 1 inch larger than the detailed dimensions depending on the bar size and overall length. In order to provide the minimum concrete cover when stirrups and ties are bent to dimensions exceeding the plan details but still within allowable tolerances, the minimum concrete cover detailed on the plans shall be the minimum specified in Section 8.22.1 of the AASHTO Standard Specifications for Highway Bridges plus one half inch. Specifically, where stirrups and ties are used the minimum concrete cover for concrete exposed to earth or weather shall be:

Primary reinforcing..... 2 1/2 inches
Stirrups, ties and spirals..... 2 inches

It should be noted that the concrete cover dimensions specified above are minimums and should be increased based on conditions of exposure and any design criteria established for a particular project.

In order that the construction inspector may know what the minimum acceptable concrete cover is after placement of the reinforcing, the following note will be added to the standard note sheet: "The minimum acceptable concrete cover for reinforcing steel may be one half inch less than the plan dimensions when required by reinforcing bar fabrication tolerances." A half size copy of the revised standard note sheet is enclosed for Consultants and FHWA.

The requirements of this memorandum should be incorporated into all plans now in the plan preparation stage.

B.A. Meetze, Jr.
Bridge Design Engineer

Enclosure
cc:
FHWA, Structural Engineer
R. E. LaBoone
R. L. Kneece
R. W. Rush
BAM/RLK/ddg

J. E. Martin
Design Group Leaders
Consultants

DM08/90

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

September 12, 1990

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Concrete Dimensions for Slab Design

The top one fourth inch of all concrete slabs shall be considered to be a wearing surface and shall not be included in the slab depth used for design purposes. However, the top one fourth inch shall continue to be included in the calculations of slab weight and quantities.

The standard note sheet and the standard drawing for prestressed concrete deck panels have been revised to reflect the above and are enclosed for Consultants and FHWA.

B. A. Meetze, Jr.
Bridge Design Engineer

Enclosure
cc:
FHWA, Structural Engineer
R. E. LaBoone
R. L. Kneece
R. W. Rush
J. E. Martin
Group Leaders
Consultants

BAM/RLK/ddg

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

DM09/90

September 13, 1990

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Telephone Conversations with Consultants

As a result of a FHWA audit review of the Department's policies, procedures and practices for Non-Construction Contracts the following policy is being implemented.

Effective immediately, all telephone contacts with Consultants who have active contracts with the Department must be documented on the attached form. This form should be completed in brief, concise terms and forwarded to the secretary for placement in the project file. If you desire a copy of the form be returned to you, please place your name under "Distribution" on the form.

B. A. Meetze, Jr.
Bridge Design Engineer

Enclosure
cc:
FHWA, Structural Engineer
R. E. LaBoone
R. L. Kneece
R. W. Rush
J. E. Martin
Group Leaders
Consultants

BAM/ddg

# BRIDGE DESIGN OFFICE

## TELEPHONE CONVERSATION MEMORANDUM

FILE:_____ DATE:_____

PROJECT NAME:_____

FROM:_____ TALKED TO:_____

_____ _____

ITEM DISCUSSED:_____

_____

_____

INFORMATION OBTAINED:_____

_____

_____

_____

_____

_____

_____

_____

ACTION REQUIRED:_____

_____

_____

_____

DISTRIBUTION: BY:

DM1090

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

October 30, 1990

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: New Approach Slab Standard, Revised Standard Details and Revised Compression Seal Joint Details

Attached is a half size copy of a new standard drawing No. 702-13 showing Approach Slab Details. The drawing will need to be modified and/or completed as necessary to match particular project roadway width. The standard drawing shows a condition of no skew and does not need to be revised for a skewed condition.

Attached is a half size copy of the Revised Standard Drawing No. 709-1 showing Standard Details. The armor plate details and anchor bolt details have been revised to allow substitution of ASTM Steels for the AASHTO Steels shown.

Also, attached is a half size copy of the revised standard drawing No. 702-1 showing Compression Seal Joint Details. The Deflection Joint Details are removed from the drawing and are now shown on the new standard drawing No. 702-13.

The methods of measurement and payment for compression seal joints are also revised by addition of the following notes:

ALL COSTS FOR FURNISHING MATERIALS, FABRICATING AND INSTALLING ARMOR PLATES AND ELASTOMERIC SEALS COMPLETE AND IN PLACE SHALL BE INCLUDED IN THE UNIT PRICE BID PER LINEAR FOOT FOR "COMPRESSION SEAL JOINT".

MEASUREMENT OF EXPANSION JOINT LENGTH WILL BE TAKEN ALONG THE CENTERLINE OF JOINT FROM GUTTER LINE TO GUTTER LINE. PAYMENT FOR THE MEASURED LENGTH WILL BE FULL COMPENSATION FOR ANY ADDITIONAL DETAILED EXTENSION REQUIRED TO TERMINATE THE JOINT AT THE FACE OF PARAPET, CURB OR SIDEWALK PARAPET.

This change requires the addition of the following new bid item to the quantities shown on the Bridge Title Sheet.

| Item No. | Bid Item | Unit | Quantity |
|---|---|---|---|
| 7092305 | Compression Seal Joint | L.F. | -------- |

The requirements of this memorandum should be incorporated into all plans now in the plan preparation stage.

B.A. Meetze, Jr.
Bridge Design Engineer

Attachments
cc:
FHWA, Structural Engineer
R. E. LaBoone
R. L. Kneece
R. W. Rush
J. E. Martin
Design Group Leaders
Consultants
BAM/REL/ddg

DM1190

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P O BOX 191
COLUMBIA S C 29202

November 26, 1990

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANT COORDINATOR:**

Subject: Geotechnical Design and Review Policy

The Bridge Design Office has recently established a geotechnical design unit in order to gain expertise and consistency in the design of structure foundations. The Bridge Geotechnical Engineer will have general responsibility for the review of foundation designs, pile driving equipment approvals, and the collection of geotechnical data for the Bridge Design Office. He may also monitor drilling of bore holes, soils testing, pile load testing and pile installation at his discretion.

In order to define the responsibilities of this unit and its relationship to the in-house design groups and the Consultant Coordinator, the following policy is established for "in-house" designs and consultant designs.

**IN-HOUSE DESIGNS**

**BORINGS:** The design group will present 4 sets of preliminary plans to the Bridge Geotechnical Engineer as early in the plan preparation process as practical in order that borings may be requested. It will be the Bridge Geotechnical Engineer's responsibility to review the preliminary plans relative to geotechnical matters and to submit a formal request for subsurface exploration and soils testing to the Research and Materials Engineer. Boring logs and soils data, when received from the Research and Materials Engineer, shall be reviewed by the Bridge Geotechnical Engineer for completeness then passed to the design group for inclusion in the plans. The design group will be responsible for the plotting and checking of the borings.

**DESIGN:** After the borings have been plotted the design group should consult with the Bridge Geotechnical Engineer as to the appropriate foundation type to be considered in design. The design group will make a static analysis of the proposed foundation. In addition, a driveability analysis using the wave equation should be made for pile foundations. These analyses need not receive an independent check within the design group. The completed analyses and plan and profile with the plotted borings will be submitted to the Bridge Geotechnical Engineer. Upon completion of an independent check of the foundation design the Bridge Geotechnical Engineer will submit his recommendation to the design group. The design group will incorporate the recommendations into the plans.

**CONSTRUCTION SUPPORT:** Pile driving equipment submitted by the Contractor shall be logged and reviewed by the Bridge Geotechnical Engineer who will forward it to the responsible design group. The design group will make a wave equation analysis of the pile driving equipment and submit the results to the Bridge Geotechnical Engineer. The Bridge Geotechnical Engineer will check the analysis and make a recommendation to the Bridge Construction Engineer along with any necessary driving information.

**CONSULTANT DESIGNS**

The Bridge Geotechnical Engineer will have an advisory role in the review and monitoring of consultant projects. The Bridge Geotechnical Engineer will review the scope of service with regard to geotechnical service for consultant agreements. Preliminary and final geotechnical reports, boring layouts, pile load test specifications, preliminary and final plans showing foundations, and construction specifications should also be submitted to the Bridge Geotechnical Engineer for his review. The level of review required will be subject to the Bridge Geotechnical Engineer's discretion. After review, comments and recommendations will be made to the Consultant Coordinator.

The Consultant Coordinator, with the advice and recommendations of the Bridge Geotechnical Engineer, will be responsible for formulating the Department's position on geotechnical matters relative to individual projects and transmitting the same to the design consultant and other concerned parties. Meetings with the design consultants, geotechnical subconsultants and/or FHWA which specifically address foundation and geotechnical aspects of a project should include the Bridge Geotechnical Engineer. During construction, the Bridge Geotechnical Engineer will review the design consultant's driveability analysis of the Contractor's pile driving equipment.

B.A. Meetze, Jr.
Bridge Design Engineer

cc:
FHWA, Structural Engineer
BAM/RLK/ddg

DM0191

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

January 2, 1991

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Safety Factors for Driven Pile Foundations

Design Memorandum DM0989 dated September 14, 1989 requires the safety factors for driven pile foundations to be shown on the plans and Design Memorandum DM1289 dated October 25, 1989 specified the safety factor to be used based on the construction control procedures to be specified in the Special Provisions.

As noted in DM1289, the safety factor selected will depend on design factors such as quality of subsurface information and geotechnical analysis, as well as construction factors such as the use of load tests, index piles and wave equation. Since DM1289 was issued, we have received the draft report of Research Project No. 541 conducted by Dr. Baus. Based on this research, the safety factors specified in DM1289 have been modified and the following factors of safety are to be used based on the construction control procedures to be specified in the Special Provisions:

| | |
|---|---|
| Static Load Test/Wave Equation | 2.00 |
| Dynamic Load Test (PDA)/Wave Equation | 2.50 |
| Index Piles/Wave Equation | 3.00 |
| Wave Equation | 3.00 |

These safety factors may be modified to fit the requirements of individual projects after consultation with the appropriate Assistant Bridge Design Engineer and the Bridge Geotechnical Engineer. Some conditions for which modifications may be considered are piles bearing on rock, uniform soil stratum, and additional geotechnical information exceeding the normal level of information.

Group Leaders should consult with the appropriate Assistant Bridge Design Engineer to determine the level of construction monitoring that will be required for each individual project. Consultants should discuss construction monitoring with the Consultant Coordinator in the Bridge Design Office.

This Memorandum supersedes Bridge Design Memorandum DM1289 dated October 25, 1989.

B.A. Meetze, Jr.
Bridge Design Engineer

cc:
FHWA, Structural Engineer
R. E. LaBoone
R. L. Kneece
R. W. Rush
R. R. Cannon
J. E. Martin
Design Group Leaders
Consultants
BAM/RRC/ddg

DM0291

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

January 3, 1991

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Structural Steel

When designing rolled beam spans the designer should make a comparison of designs using M270 Grade 36 and Grade 50 steels to determine the most economical design. The attached price list from Bethlehem Steel Corporation should be used as a guide for this comparison. In general, M270 Grade 50 should be specified if a savings in weight of 8% or more over a comparable design using M270 Grade 36 can be achieved.

B.A. Meetze, Jr.
Bridge Design Engineer

Attachment
cc:
FHWA, Structural Engineer
R. E. LaBoone
R. L. Kneece
R. W. Rush
R. R. Cannon
J. E. Martin
Design Group Leaders
Consultants
BAM/RLK/ddg

## Cost of Wide Flange and Standard Structural Shapes in Dollars per Foot:

| SECTION | ASTM SPECIFICATIONS | | |
|---|---|---|---|
| | A-36 | A-572 GRADE 50 | A-588 GRADE B |
| W36 x 393 | 96.29 | 104.15 | 123.99 |
| W36 x 359 | 87.95 | 95.13 | 113.26 |
| W36 x 328 | 80.36 | 86.92 | 103.48 |
| W36 x 300 | 73.50 | 79.50 | 94.65 |
| W36 x 280 | 68.60 | 74.20 | 88.34 |
| W36 x 260 | 63.70 | 68.90 | 82.03 |
| W36 x 245 | 60.03 | 64.93 | 77.30 |
| W36 x 230 | 56.35 | 60.95 | 72.56 |
| W36 x 256 | 62.72 | 67.84 | 80.77 |
| W36 x 232 | 56.84 | 61.48 | 73.20 |
| W36 x 210 | 51.45 | 55.65 | 66.25 |
| W36 x 194 | 47.53 | 51.41 | 61.21 |
| W36 x 182 | 44.59 | 48.23 | 57.42 |
| W36 x 170 | 41.65 | 45.05 | 53.64 |
| W36 x 160 | 39.20 | 42.40 | 50.48 |
| W36 x 150 | 36.75 | 39.75 | 47.32 |
| W36 x 135 | 33.08 | 35.78 | 42.59 |
| W33 x 291 | 71.30 | 77.12 | 91.81 |
| W33 x 263 | 64.44 | 69.70 | 82.98 |
| W33 x 241 | 59.05 | 63.87 | 76.04 |
| W33 x 221 | 54.15 | 58.57 | 69.73 |
| W33 x 201 | 49.25 | 53.27 | 63.42 |
| W33 x 169 | 41.41 | 44.79 | 53.32 |
| W33 x 152 | 37.24 | 40.28 | 47.96 |
| W33 x 141 | 34.54 | 37.36 | 44.49 |
| W33 x 130 | 31.85 | 34.45 | 41.02 |
| W33 x 118 | 28.91 | 31.27 | 37.23 |
| W30 x 326 | 79.87 | 86.39 | 102.85 |
| W30 x 292 | 71.54 | 77.38 | 92.13 |
| W30 x 235 | 57.57 | 62.28 | 74.14 |
| W30 x 211 | 51.69 | 55.91 | 66.57 |
| W30 x 191 | 46.80 | 50.62 | 60.26 |
| W30 x 173 | 42.39 | 45.85 | 54.58 |
| W30 x 148 | 36.26 | 39.22 | 46.69 |
| W30 x 132 | 32.34 | 34.98 | 41.65 |
| W30 x 124 | 30.38 | 32.86 | 39.12 |
| W30 x 116 | 28.42 | 30.74 | 36.60 |
| W30 x 108 | 26.46 | 28.62 | 34.07 |
| W30 x 99 | 24.26 | 26.24 | 31.23 |
| W27 x 217 | 53.17 | 57.51 | 68.46 |
| W27 x 194 | 47.53 | 51.41 | 61.21 |
| W27 x 178 | 43.61 | 47.17 | 56.16 |
| W27 x 161 | 39.45 | 42.67 | 50.80 |
| W27 x 146 | 35.77 | 38.69 | 46.06 |
| W27 x 129 | 31.61 | 34.18 | 40.70 |
| W27 x 114 | 27.93 | 30.21 | 35.97 |
| W27 x 102 | 24.99 | 27.03 | 32.18 |
| W27 x 94 | 23.03 | 24.91 | 29.66 |
| W27 x 84 | 20.58 | 22.26 | 26.50 |
| W24 x 176 | 43.12 | 46.64 | 55.53 |
| W24 x 162 | 39.69 | 42.93 | 51.11 |
| W24 x 146 | 35.77 | 38.69 | 46.06 |
| W24 x 131 | 32.09 | 34.72 | 41.33 |
| W24 x 117 | 28.67 | 31.01 | 36.91 |
| W24 x 104 | 25.48 | 27.56 | 32.81 |
| W24 x 94 | 20.68 | 22.09 | 27.31 |
| W24 x 84 | 18.48 | 19.74 | 24.40 |
| W24 x 76 | 16.72 | 17.86 | 22.08 |
| W24 x 68 | 14.96 | 15.98 | 19.75 |
| W24 x 62 | 13.64 | 14.57 | 18.01 |
| W24 x 55 | 12.10 | 12.93 | 15.98 |
| W21 x 147 | 32.34 | 34.55 | 42.70 |
| W21 x 132 | 29.04 | 31.02 | 38.35 |
| W21 x 122 | 26.84 | 28.67 | 35.44 |
| W21 x 111 | 24.42 | 26.09 | 32.25 |
| W21 x 101 | 22.22 | 23.74 | 29.34 |

Based on Bethlehem Steel Corporation Structural Shapes Price Book.
Effective September 2, 1990.
Prices will be those in effect at time of shipment.

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

February 26, 1991

**MEMORANDUM TO DESIGN GROUP LEADERS AND CONSULTANTS**

Subject: Seismic Requirements for Bridges

This memorandum supersedes and replaces DM1189 dated October 11, 1989.

All bridges shall be detailed and/or designed for seismic loadings as specified for seismic performance category B (SPC B) in the 1983 AASHTO Guide Specifications for Seismic Design including subsequent revisions. The level of seismic considerations given to each structure shall be based on one of the following two categories.

1. Major Bridges
   All major coastal bridges and other major bridges as designated by the Bridge Design Engineer shall be designed and detailed for seismic loadings in accordance with the Guide Specifications. An acceleration coefficient of 0.15 shall be used for the design and analysis of these bridges.

2. Other Bridges
   All bridges not specified in Item 1. above to receive a seismic design shall be detailed in accordance with the minimum requirements set forth in the Guide Specifications. These minimum requirements include the following:

   A. Minimum Support Length
      The minimum support length requirements of Section 4.9.1 shall be provided.

   B. Special Pile Requirements
      The special pile requirements of Section 6.3.1(C) shall be provided.

      (1) Prestressed Concrete Piles
          The details shown on Bridge Design standard drawings number 712 and/or 712P are sufficient to meet these requirements.

(2) Steel H Piles

When steel piles are used in footings or caps, the pile shall be anchored in the footing by placing a reinforcing bar through a hole in the web of the pile similar to the detail shown in Figure 1 attached to this memorandum. For piles in footings, this anchorage bar should be detailed with sufficient length so as to have an extension equal to the development length above the bottom mat of reinforcing. For piles in bent caps the anchorage bar should be detailed with a minimum leg length equal to the development length.

C. Footing Reinforcement

The anchorage of piles into footings will require tension reinforcement in the top of the footing to resist the potential negative bending. The minimum reinforcement in the top of the footing shall be #5 bars at 12" on center in both directions. Spread footings should also be detailed with this minimum top reinforcing.

D. Transverse Column Reinforcement

The minimum transverse reinforcement for the top and bottom of columns as specified in Section 8.3 shall be provided. Transverse reinforcement for round columns shall be ties with 135° seismic hooks as shown in Figure 2. The maximum spacing of #4 ties in the confinement length and the vertical extension as shown in Figure 4 is 4" for a 3'-0" diameter column. The spacing of ties between the areas of confinement at the top and bottom of columns should be set to allow the column to be lengthened by 2'-0" and this spacing adjusted to accommodate the column lengthening without exceeding a 12" maximum spacing.

E. Cap Stirrups

All cap stirrups located between columns or piles shall be one piece enclosed hoops having 135° seismic hooks at one corner as shown in Figure 3.

F. Shear Keys

(1) All concrete beam spans of AASHTO Type III or larger beams shall have shear keys cast on the bent or pier cap to provide a positive shear transfer between the superstructure and substructure. The shear keys shall be capable of transferring a load equal to two-tenths of the superstructure dead load. The preferred detail is shown in Figure 5.

(2) Steel beam and girder spans shall have sufficient anchor bolts to transfer a load equal two-tenths of the superstructure dead load in shear to the substructure. Additional shear guides may be required.

G. Beam and Girder Anchorage

All beam or girder spans, including both steel and concrete, shall be positively anchored to the substructure on both ends by means of anchor bolts or dowels.

B.A. Meetze, Jr.
Bridge Design Engineer

cc:
FHWA
R. W. Rush
R. E. LaBoone
R. L. Kneece
R. R. Cannon
J. E. Martin
Design Group Leaders
Consultants
BAM/RLK/ddg

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

DM0491

April 17, 1991

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

Subject: Stay-In-Place Bridge Deck Forms

Due to continuing construction difficulties and durability concerns associated with the use of precast concrete deck panels, their use will be discontinued effective with projects scheduled for letting in June, 1991 or later. Bridge standard drawing 700-1 will be revised to reflect this change.

Steel stay-in-place forms will continue to be allowed on all projects having beams or girders. The design loads should continue to include 16 psf for the metal forms and 15 psf for future wearing surface. Field welding to steel beam or girder flanges continues to be prohibited.

This memorandum supersedes the previous design memorandum dated June 26, 1985.

B.A. Meetze, Jr.
Bridge Design Engineer

cc:
FHWA, Mr. Schroeder
Bridge Construction Engineer
Design Group Leaders
Consultants
Wayne Rush
Rocque Kneece
Eddie Laboone

BAM/RLK/slb

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

**MEMORANDUM**

**TO:** DIRECTOR OF PRECONSTRUCTION

**FROM:** DIRECTOR OF CONSTRUCTION

**DATE:** APRIL 10, 1991

**SUBJECT:** STAY IN PLACE PRESTRESSED CONCRETE DECK PANELS

---

The Bridge Construction Engineer has advised me of numerous constructability problems that contractors are having concerning the subject panels. They are listed below:

1. Camber in prestressed concrete girders usually causes grading difficulties in maintaining concrete and rebar clearances.

2. Finish of tops of prestressed concrete girders are not providing adequate tolerance for minimum clearances with panels.

3. Bearing strips used for panel grading compress in a short time frame causing minimum clearance problems.

4. Shear reinforcing steel in top of panels sometimes conflict with top mat of reinforcing steel.

5. Panels are easily damaged during shipment and handling.

6. Problems are compounded on sag vertical curves and skewed bents.

7. Reflective cracks in top portion of deck occurs at numerous panel joints causing concern for long term durability.

In summary, the Bridge Construction Engineer believes that the Department should consider eliminating these panels as an option in bridge decks. I concur in his recommendation. He will be glad to discuss this matter with you or your assistants if necessary.

W. A. Keller, III

W. A. Keller, III

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

DM0591

August 14, 1991

MEMORANDUM TO DESIGN GROUP LEADERS AND CONSULTANTS

SUBJECT: Air-Entrainment in Prestressed Concrete

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Air-entrainment in concrete may reduce the early strength gain of the concrete. This may result in additional cure time in the precasting bed and loss of productivity in the casting operation.

The use of air-entraining admixtures in prestressed concrete shall not be required in the Special Provisions. Air-entraining admixtures may be used at the contractor's option as stated in subsection 704.02 of SCDHPT Standard Specification, Edition of 1986.

B. A. Meetze, Jr.
Bridge Design Engineer

cc: Design Group Leaders
Mr. Rush
Mr. Kneece
Mr. LaBoone
Mr. Schroeder, FHWA
Mr. Matthews, Bridge Construction Engineer

BAM/RLK/slb

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

DM0791

October 23, 1991

**MEMORANDUM TO DESIGN GROUP LEADERS AND CONSULTANTS**

SUBJECT: Approach Slab Details

In response to Contractor suggestions and requests by the Bridge Construction Office, future approach slabs will be constructed 2 inches below the final finished grade except where concrete pavement is specified. This eliminates the need for grooved surface finish, rideability testing and armor plates on approach slabs. During final paving operations 2 inches of asphalt will be placed over the approach slabs thus matching the final finished bridge deck grade.

This change required revision to the following Special Provisions and Standard Drawings.

| Special Provisions | Standard Drawings |
|---|---|
| Bridge Deck Rideability (1-9-92) | 702-2 |
| Bridge Deck Rideability (1-10-92) | 702-13 & 702-14 |
| Grooved Surface Finish For Concrete Bridge Decks (1-8-92) | 709-1<br>803-1 & 803-2 |

When the approach plans specify concrete paving, the approach slabs will be constructed at grade and the new attached Standard Drawings 702-14 and 803-2 used.

Attached are half size copies of the new Standard Drawings which are revised to reflect this change. Also, attached are copies of the new Special Provisions which have been revised to reflect this change.

The requirements of this memorandum shall apply to all projects not already detailed.

B. A. Meetze, Jr.
Bridge Design Engineer

Attachments
cc: FHWA, Mr. Schroeder
Consultants
Bridge Construction Engineer, Mr. Matthews
Design Group Leaders
R. W. Rush
J. E. Martin
R. E. LaBoone
R. L. Kneece
BAM/REL/slb

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

DM0891

November 1, 1991

**MEMORANDUM TO DESIGN GROUP LEADERS AND CONSULTANTS**

SUBJECT: Elastomeric Bearing Design

Elastomeric bearings shall be designed in accordance with the provisions of Section 14 of the AASHTO Standard Specifications for Highway Bridges, Fourteenth Edition, 1989, including the latest Interim Specifications. The following shall be observed in the application of the provisions of Section 14:

Compressive Stress

1. For Bearings in which shear deformation will occur,

   (a) Unreinforced bearings shall be designed for an average compressive stress not to exceed the lesser of $GS/\beta$ or 800 psi.
   (b) Steel reinforced bearings shall be designed for an average compressive stress in any layer not to exceed the lesser of $GS/\beta$ or 1000 psi.

Shape Modification Factor

The shape modification factor $\beta$ shall have a value of 1.0 for internal layers of steel reinforced bearings, 1.4 for cover layers, and 1.8 for unreinforced bearings.

Compressive Deflection

The shape factor used to determine compressive strain from Figures 14.2.4A and 14.2.4B shall be the modified shape factor $S/\beta$ . The modification factor shall have the appropriate value as given above.

The requirements of this memorandum shall be effective immediately and shall be applied to in-progress designs as well as completed designs. Designs which have been completed shall be reviewed for conformance and modified as necessary.

Sincerely,

B. A. Meetze, Jr.
Bridge Design Engineer

BAM/RLK/slb

DM0192

March 31, 1992

MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS

Subject: Pile Spacing - AASHTO 1991 Interim Spec. 4.5.15.1.1

Your attention is called to the latest AASHTO 1991 Interim Specification 4.15.1.1 which indicates that "center-to-center pile spacing shall exceed the greater of 2 feet 6 inches or 2.5 pile diameters/widths". The previous specification (AASHTO 1989 4.3.6.1.1) was merely 2 feet 6 inches. This may entail revisions on some plans, especially for our prestressed concrete piles.

B. A. Meetze, Jr.
Bridge Design Engineer

cc: Design Group Leaders
Mr. Rush
Mr. Kneece
Mr. LaBoone

BAM/RRC/slb

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

ROBERT N. McLELLAN
EXECUTIVE DIRECTOR

DM0292

April 22, 1992

**MEMORANDUM TO DESIGN GROUP LEADERS AND CONSULTANTS**

SUBJECT: CRITERIA FOR RAILROAD OVERPASSES
(This memorandum supersedes Design Memorandum DM0289 dated February 28, 1989)

The following criteria is to be observed when establishing bridge and span lengths and developing preliminary plans for railroad overpasses.

1. General

A. The distance to the nearest mile post from the intersection of the centerline track and centerline of the bridge shall be shown on the plan and profile sheet.

B. Horizontal and vertical clearances shall be clearly marked on the plan and profile sheet.

C. A minimum of one boring shall be taken at each bent adjacent to the track. This should be specified when making a request for borings.

D. Surveys of railroad grade separations should now include cross sections of the railroad from railroad right-of-way to railroad right-of-way, taken at 25 ft. intervals for 100 ft. on each side of the centerline of bridge. The new and fill slopes should be plotted on these cross sections. For projects developed in-house the Road Section will plot these cross sections and provide them to Bridge Design for inclusion in the preliminary plans to be submitted to the railroad company. These cross sections should not be included in the final structure plans.

2. Clearances

A. Horizontal clearance shall, whenever possible, be set at a minimum of 25 feet from the face of the column or pier to the centerline of track, measured perpendicular to the track. Existing horizontal clearances should be maintained for widening projects.

B. Vertical clearances shall be set between a minimum of 23.0 feet and a maximum of 23.4 feet from the top of rail to the bottom of the superstructure. Existing vertical clearances should be maintained for widening projects.

C. Temporary horizontal construction clearances shall be noted on the plans as a minimum of 13.0 feet for tangent tracks and 14.0 feet for curved tracks measured from the centerline of track. Temporary vertical construction clearance shall be noted as 22.0 above the top of rail. Increased temporary clearances may be requested by the railroad company after review of the preliminary plans.

3. Bridge Length

The length of the bridge shall be established by locating the toes of the end fill slopes to accommodate the standard railroad road bed profile with open ditches as shown on the attached sheet. End fills shall be sloped at 2 horizontal to 1 vertical taken perpendicular to the tracks. Slopes flatter than 2 to 1 may be used when required by geotechnical analysis. Piping of railroad ditches shall be avoided.

Please note that the above method of establishing the bridge length conflicts with the current final rule which allows a 20 foot maximum distance from the centerline of track to the face of the fill slope. Therefore, it will be necessary for the Department to request the FHWA to grant an exception to the final rule on an individual project basis.

4. Crashwalls

Crashwalls will be required on all new and existing bents when the face of the pier or column is closer than 25.0 feet to the centerline of track, measured perpendicular to the tracks, except as noted below.

Crashwalls shall meet the following requirements:

A. Crashwalls for single column piers shall be minimum 2'-6" thick and shall extend a minimum of 10'-0" above the top of high rail. The wall shall extend a minimum of 6'-0" beyond the column on each side in the direction parallel to the track.

B. For multiple column piers, the columns shall be connected with a wall of the same thickness as the columns or 2'-6" whichever is greater. The wall shall extend a minimum of 2'-6" beyond the end of outside columns in a direction parallel to the track.

C. Reinforcing steel to adequately anchor the crashwalls to the column and footing shall be provided.

D. For piers of heavy construction, crashwalls may be omitted. Solid piers with a minimum thickness of 2'-6" and length of 20'-0", single column piers of minimum 4'-0" x 12'-6" dimensions or any other solid pier sections with equivalent cross sections and minimum 2'-6" thickness are considered as heavy construction.

5. Drainage

Deck drains shall not be used between the railroad ditches and preferably should not be used over the railroad right-of-way.

6. Protection of End Slopes

Concrete slope protection pavement shall be provided for bridges on primary or interstate routes when practical to do so. Generally, concrete slope protection will not be provided when the tracks are located in a cut section having steep slopes or for bridges on secondary or county roads. When concrete slope protection is not provided, consideration should be given to providing a low retaining wall attached to the bents adjacent to the track in order to prevent the fill from sloughing into the railroad ditches.

B. A. Meetze, Jr.
Bridge Design Engineer

Attachment
BAM/RLK/slb
cc: FHWA, Mr. Schroeder
Consultants
Group Leaders
E. LaBoone
W. Rush
R. Cannon
R. Kneece
G. Martin
G. Peck
D. McClure

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

ROBERT N. McLELLAN
EXECUTIVE DIRECTOR

DM0392

April 22, 1992

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

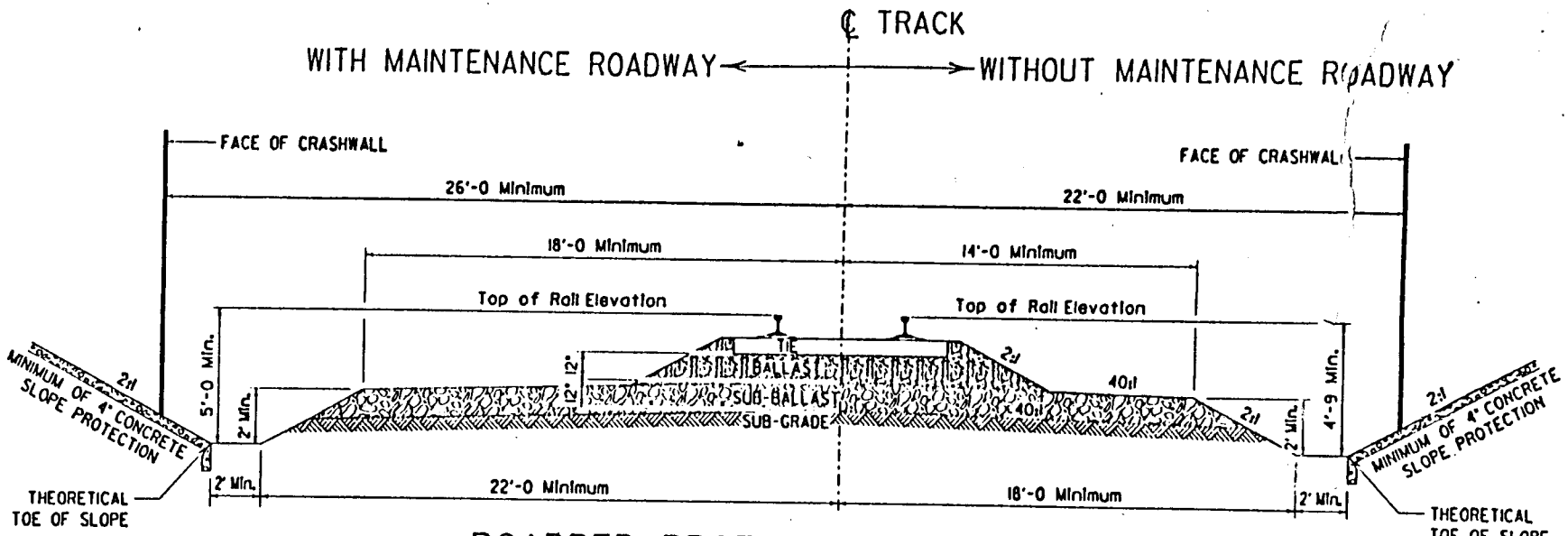
SUBJECT: SPECIAL PROVISIONS

When federal standards or specifications are cited within a special provision prepared by a consultant, the consultant shall furnish the Department a copy of the standard or specification at the time the special provision is submitted for review. This will allow the Department to evaluate the impact and the appropriateness of the federal standard or specification for its intended purpose.

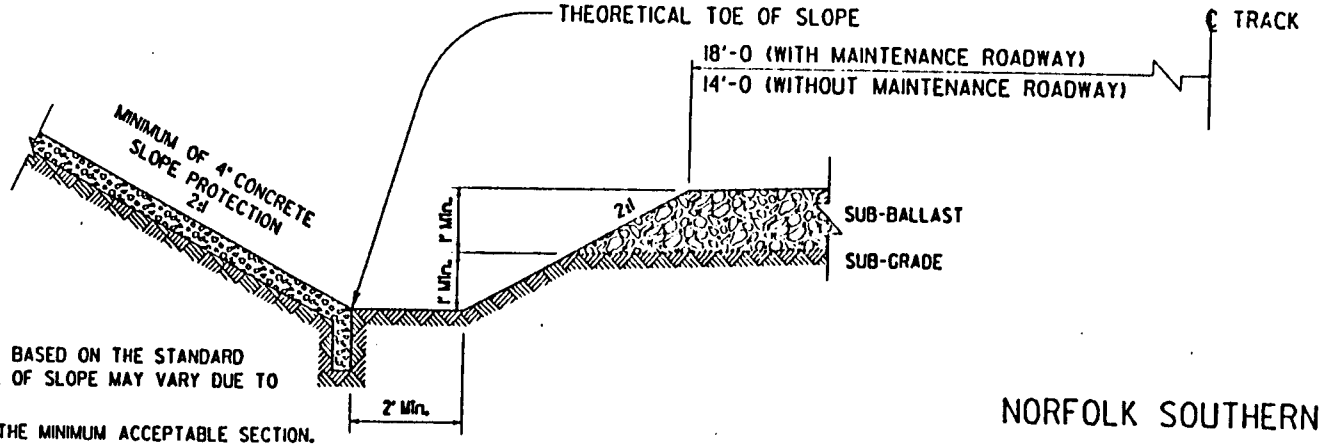
B. A. Meetze, Jr.
Bridge Design Engineer

cc: FHWA, Mr. Schroeder
Consultants
Design Group Leaders
E. LaBoone
W. Rush
R. Cannon
R. Kneece
G. Martin
G. Peck
D. McClure

BAM/RLK/slb




## ROADBED PROFILE WITH OPEN DITCHES




NOTE:

THEORETICAL TOE OF SLOPE IS BASED ON THE STANDARD ROADBED SECTION. ACTUAL TOE OF SLOPE MAY VARY DUE TO EXISTING GROUND LINE.

THE DITCH SECTION SHOWN IS THE MINIMUM ACCEPTABLE SECTION.

THE DITCH SECTION IS TO BE INCREASED AS REQUIRED BY LOCAL CONDITIONS, BASED ON HYDROLOGICAL AND HYDRAULIC STUDIES.

THE ROADBED SECTION SHALL ALSO BE IN ACCORDANCE WITH NORFOLK SOUTHERN STANDARD PLANS.

## DITCH DETAIL

NORFOLK SOUTHERN CORP

# STANDARD OVERHEAD BRIDGE DETAILS

## DITCH AND DRAINAGE DETAILS

OFFICE OF CHIEF ENGINEER OF BRIDGES & STRUCTURES

JANUARY, 1991

January 8, 1992

# GROOVED SURFACE FINISH FOR CONCRETE BRIDGE DECKS

Concrete bridge decks shall be finished in accordance with Section 702.27 of the Standard Specifications except that a transverse screed may be used. The transverse screed shall be rigidly supported on unyielding templates such that no appreciable deflection will be realized.

After concrete has been cured and any applicable rideability specifications have been satisfied, all deck slabs shall be grooved perpendicular to the centerline except on rehabilitated decks with staged construction where the slab may be grooved longitudinal or parallel to the centerline. The grooves shall be cut into the hardened concrete using a mechanical saw device which will leave grooves 1/8 inch wide and 1/8 inch deep. Grooves shall have a center to center spacing which varies randomly from 1/2 inch to 1 inch as approved by the Engineer.

Deck surface within one foot of the gutter lines and two inches of any expansion or contraction joint normal to the centerline shall not be grooved. Also, the deck surface within one foot of each side of the raised concrete median shall not be grooved. Contractor may groove across expansion or contraction joints skewed to the centerline provided that the steel armored plates are lowered 1/4 inch maximum below the finish roadway elevation.

All residue from the sawing operation shall be removed from the deck by vacuum or other methods. All residue shall be legally disposed of off the construction site. It shall not remain on the deck nor be washed into the bridge drainage system.

Grooved Surface Finish shall be measured as the actual number of square yards of slab area grooved and accepted by the Engineer. Deck areas not grooved such as within one foot of gutterlines, within 2 inches of joints and expansion devices will not be measured for payment.

Payment for Grooved Surface Finish will be per square yard and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for doing all work involved in grooving, including removing residue as shown on the plans, as specified in the special provisions and/or as directed by the Engineer.

Payment will be made under:

| Item No. | Pay Item | Pay Unit |
|---|---|---|
| 7011700 | Grooved Surface Finish | S.Y. |

January 9, 1992

# BRIDGE DECK RIDEABILITY

(WITH CONTRACTOR STAKES, LINES AND GRADES)

The bridge decks on this project shall be subjected to smoothness tests using a rolling straight edge as specified in Subsection 702.27 and the Rainhart Profilograph and a Profile Index Value determined in accordance with test method entitled "Determining Profile Index value using the Rainhart Profilograph." The rolling straight edge test shall be performed first. All corrective work associated with this test shall be completed before the Rainhart Profilograph test is performed. Profiles will be obtained by the Department as directed by the Engineer to within 6 feet of the barrier or curb line. The profile index shall not exceed 12 for each wheel path and individual bumps or depressions shall not exceed 0.10 inch from the 0.20 inch blanking band. In addition, the surface shall meet a 0.20 inch in 10 foot straight edge check made transversely across the deck.

Decks not meeting the above requirements shall be corrected at the Contractor's expense. The Contractor shall provide the Engineer a written plan of corrective action for approval before implementation. Approval of the corrective plan will in no way relieve the Contractor of responsibility for meeting rideability requirements. In all cases a minimum of 1 1/2 inches of cover over reinforcing steel will be maintained. After corrective action, all decks will be subject to retesting to insure compliance with specifications. All requirements for rideability shall be satisfied before the Grooved Surface Finish is applied to the bridge deck.

Expansion joint installation shall be delayed and the joint temporarily bridged to facilitate operation of the profilograph and corrective equipment across the joint wherever feasible.

It shall be the Contractor's responsibility to schedule profilograph testing. Requests for testing shall be made through the Resident Engineer. The Contractor shall insure that the area to be tested has been cleaned and cleared of all obstructions.

The Contractor shall be required to provide all necessary layouts as described in the accompanying Special Provision entitled "Construction Stakes, Lines and Grades."

January 10, 1992

**BRIDGE DECK RIDEABILITY**
(WITH PARTIAL DEPARTMENT LINES AND GRADES)

The bridge decks on this project shall be subjected to smoothness tests using a rolling straight edge as specified in Subsection 702.27 and the Rainhart Profilograph and a Profile Index Value determined in accordance with test method entitled "Determining Profile Index value using the Rainhart Profilograph." The rolling straight edge test shall be performed first. All corrective work associated with this test shall be completed before the Rainhart Profilograph test is performed. Profiles will be obtained by the Department as directed by the Engineer to within 6 feet of the barrier or curb line. The profile index shall not exceed 12 for each wheel path and individual bumps or depressions shall not exceed 0.10 inch from the 0.20 inch blanking band. In addition, the surface shall meet a 0.20 inch in 10 foot straight edge check made transversely across the deck.

Decks not meeting the above requirements shall be corrected at the Contractor's expense. The Contractor shall provide the Engineer a written plan of corrective action for approval before implementation. Approval of the corrective plan will in no way relieve the Contractor of responsibility for meeting rideability requirements. In all cases a minimum of 1 1/2 inches of cover over reinforcing steel will be maintained. After corrective action, all decks will be subject to retesting to insure compliance with specifications. All requirements for rideability shall be satisfied before the Grooved Surface Finish is applied to the bridge deck.

Expansion joint installation shall be delayed and the joint temporarily bridged to facilitate operation of the profilograph and corrective equipment across the joint wherever feasible.

It shall be the Contractor's responsibility to schedule profilograph testing. Requests for testing shall be made through the Resident Engineer. The Contractor shall insure that the area to be tested has been cleaned and cleared of all obstructions.

The Department will furnish lines and grades as specified in Subsection 105.08 except for all lines and grades affecting the bridge superstructure. This exception includes screed, overhang, beam, and header lines and grades as well as parapet, rail, sidewalk, curb or median lines and grades. The Contractor will be responsible for computing and setting these lines and grades. The Engineer will make random checks of the lines and grades set by the contractor to determine if the work is in substantial conformance with the plans. The cost of the above work will be considered as incidental to the contract and no additional compensation will be allowed for the performance of said work.

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

DM0492

October 8, 1992

**MEMORANDUM TO BRIDGE DESIGN GROUP LEADERS AND CONSULTANTS**

Subject: 1) Design Methodology
2) Live Load Requirements

The Strength Design Method (Load Factor Design) as defined in the AASHTO Standard Specifications For Highway Bridges shall be the design methodology used for the design of highway structures. In using the strength design method, the design strength of Class D Concrete shall be 4000 psi (i.e., f'c = 4000 psi). Service load (allowable stress) design will be used only for those structural components for which AASHTO does not provide a strength design method.

The minimum highway live loading shall be HS 25-44. HS 25-44 live load is defined as 1.25 times the standard HS 20-44 live loading given in the AASHTO Standard Specifications For Highway Bridges.

The design method and live loading shall be stated on the standard note sheet for all projects. The standard drawing entitled "Standard Notes" will be revised to reflect these changes.

Projects for which the design has already been substantially completed shall not be revised or redesigned to reflect the above changes. All new designs shall incorporate the above requirements.

B. A. Meetze, Jr.
Bridge Design Engineer

RLK/slb

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202



March 8, 1993

**MEMORANDUM TO BRIDGE DESIGN GROUPS AND CONSULTANTS**

**SUBJECT:** Prestressed Beams

---

The following items shall be standard practice for the design and detailing of prestressed beam spans.

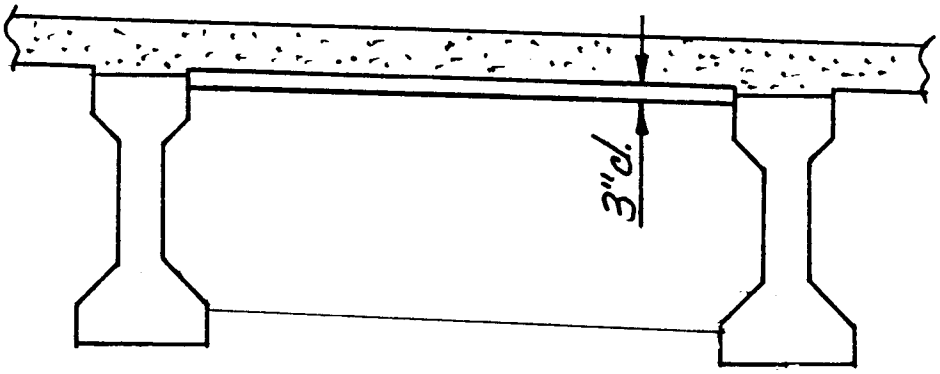
1. Tension in the pre-compressed tensile zone of prestressed concrete beams shall be limited to $3\sqrt{f'c}$ for all projects regardless of site location. Please note that this requirement is more stringent than those given in paragraph 9.15.2.2 of the AASHTO Standard Specifications for Highway Bridges.

2. Concrete for prestressed beams shall be Class "X" having a 28 day compressive strength of 5000 psi and an initial compressive strength at the time of strand release of 4000 psi as stated in paragraph 704.13(b) of the SCDHPT Standard Specifications.

3. Special provisions for prestressed concrete in beams and girders shall not require the use of air-entrainment. The use of air-entrainment shall be left to the contractor's preference as stated in subsection 701.01 of the SCDHPT Standard Specifications.

4. Multiple spans of prestressed beams shall be designed as continuous for live load. The bottom flanges of adjoining prestressed beams shall be connected at the bents by reinforcing projecting from beam ends into a common diaphragm.

5. Interior diaphragms shall be used in accordance with paragraph 9.10.1 of the AASHTO Standard Specifications For Highway Bridges. Diaphragms shall be placed along the skew of the bridge for skew angles of 30 degrees or less. For skew angles in excess of 30 degrees, the diaphragms shall be placed perpendicular to the beams. Interior diaphragms shall be detailed as shown on the sketch below.




This memorandum supersedes memorandum DM 0489 and DM 0689. Designs and plans previously completed shall not be revised to comply with this memorandum.

B. A. Meetze, Jr.
Bridge Design Engineer

cc: Mr. Gerald Schroeder, FHWA

RLK/slb

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

DANIEL P. FANNING
EXECUTIVE DIRECTOR

DM 0293

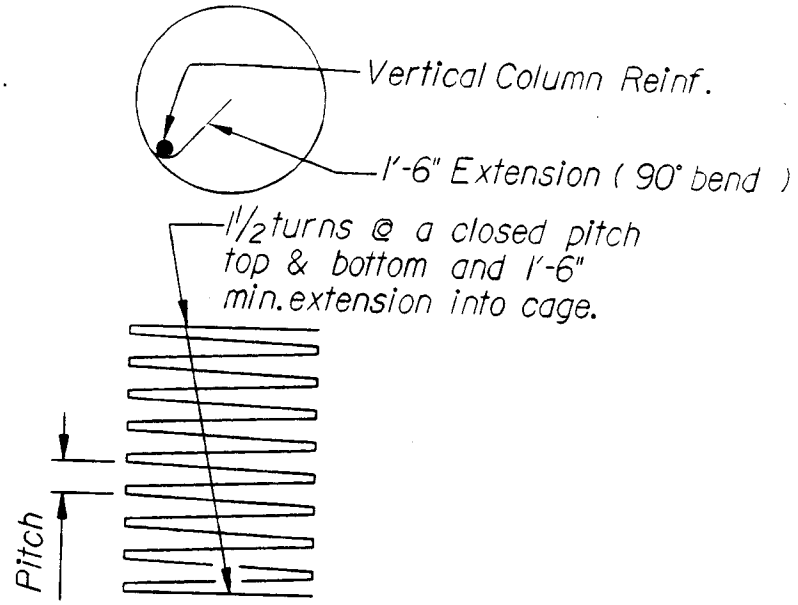
Changed to
DM 0495

March 30, 1993

**MEMORANDUM TO BRIDGE DESIGN GROUPS AND CONSULTANTS**

**SUBJECT:** Standardized End Termination Detail For Column Spiral Reinforcement

The following detail should be used for termination of spiral reinforcement.




Spiral Reinforcing Steel

This detail should be used at both ends of each spiral column reinforcing cage, unless required otherwise by design. Designs and plans previously completed need not be revised to comply with this memorandum.

B. A. Meetze, Jr.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Design Group Leaders
Consultants

REL/slb

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

DANIEL P. FANNING
EXECUTIVE DIRECTOR

DM 0393

March 30, 1993

**MEMORANDUM TO BRIDGE DESIGN GROUPS**

**SUBJECT:** Standardized Load Factor Design For Bridge Slabs

The attached "Slab Design Table" is provided for use in detailing in-house plans. This design table can be used for slab detailing of normal multiple girder spans.

The designer should independently check unusual designs. These include designs with large cantilever overhangs, design spans not included in table and staged or new construction with less than three girders.

For designs that require a slab thickness exceeding 8 1/2 inches, the designer may elect to use #6 bar main reinforcing and do an independent design.

Designs and plans previously completed need not be revised to comply with this memorandum.

B. A. Meetze, Jr.
Bridge Design Engineer

Attachment

cc: Assistant Bridge Design Engineers
Design Group Leaders

REL/slb

S. C. DEPT. OF HWYS. & PUBLIC TRANS.
BRIDGE DESIGN
SLAB DESIGN TABLE
LOAD FACTOR DESIGN

DESIGN CRITERIA :
-> HS-25 TRUCK LOADING IMPACT = 0.3
-> GRADE 60 REINFORCING STEEL (fy = 60,000 psi)
-> CLASS D CONCRETE (f'c = 4,000 psi)
-> FUTURE WEARING SURFACE = 15 psf
-> CONTINUITY FACTOR = 0.8

| Design Span (ft.) | Slab Thick. (in.) | Design Moment (k - ft) | Main Reinforcement # | Main Reinforcement @ | Distr. Steel (Middle Half) # | Distr. Steel (Middle Half) @ |
|---|---|---|---|---|---|---|
| 5.0000 | 7.000 | 10.21 | 5 | 7.00 | 5 | 10.25 |
| 5.0833 | 7.000 | 10.34 | 5 | 6.75 | 5 | 10.00 |
| 5.1667 | 7.000 | 10.47 | 5 | 6.75 | 5 | 10.00 |
| 5.2500 | 7.000 | 10.60 | 5 | 6.75 | 5 | 10.00 |
| 5.3333 | 7.000 | 10.73 | 5 | 6.50 | 5 | 9.50 |
| 5.4167 | 7.000 | 10.86 | 5 | 6.50 | 5 | 9.50 |
| 5.5000 | 7.000 | 10.99 | 5 | 6.50 | 5 | 9.50 |
| 5.5833 | 7.000 | 11.12 | 5 | 6.25 | 5 | 9.25 |
| 5.6667 | 7.000 | 11.25 | 5 | 6.25 | 5 | 9.25 |
| 5.7500 | 7.000 | 11.38 | 5 | 6.25 | 5 | 9.25 |
| 5.8333 | 7.000 | 11.51 | 5 | 6.00 | 5 | 8.75 |
| 5.9167 | 7.000 | 11.64 | 5 | 6.00 | 5 | 8.75 |
| 6.0000 | 7.000 | 11.77 | 5 | 6.00 | 5 | 8.75 |
| 6.0833 | 7.000 | 11.90 | 5 | 5.75 | 5 | 8.50 |
| 6.1667 | 7.000 | 12.03 | 5 | 5.75 | 5 | 8.50 |
| 6.2500 | 7.000 | 12.16 | 5 | 5.75 | 5 | 8.50 |
| 6.3333 | 7.000 | 12.29 | 5 | 5.50 | 5 | 8.00 |
| 6.4167 | 7.000 | 12.43 | 5 | 5.50 | 5 | 8.00 |
| 6.5000 | 7.000 | 12.56 | 5 | 5.50 | 5 | 8.00 |
| 6.5833 | 7.000 | 12.69 | 5 | 5.50 | 5 | 8.00 |
| 6.6667 | 7.500 | 12.86 | 5 | 6.00 | 5 | 8.75 |
| 6.7500 | 7.500 | 12.99 | 5 | 6.00 | 5 | 8.75 |
| 6.8333 | 7.500 | 13.13 | 5 | 6.00 | 5 | 8.75 |
| 6.9167 | 7.500 | 13.26 | 5 | 5.75 | 5 | 8.50 |
| 7.0000 | 7.500 | 13.39 | 5 | 5.75 | 5 | 8.50 |
| 7.0833 | 7.500 | 13.53 | 5 | 5.75 | 5 | 8.50 |
| 7.1667 | 7.500 | 13.66 | 5 | 5.75 | 5 | 8.50 |
| 7.2500 | 7.500 | 13.80 | 5 | 5.50 | 5 | 8.00 |
| 7.3333 | 7.500 | 13.93 | 5 | 5.50 | 5 | 8.00 |
| 7.4167 | 7.500 | 14.07 | 5 | 5.50 | 5 | 8.00 |
| 7.5000 | 7.500 | 14.20 | 5 | 5.50 | 5 | 8.00 |
| 7.5833 | 7.750 | 14.36 | 5 | 5.75 | 5 | 8.50 |
| 7.6667 | 7.750 | 14.50 | 5 | 5.50 | 5 | 8.00 |
| 7.7500 | 7.750 | 14.63 | 5 | 5.50 | 5 | 8.00 |
| 7.8333 | 7.750 | 14.77 | 5 | 5.50 | 5 | 8.00 |
| 7.9167 | 7.750 | 14.91 | 5 | 5.50 | 5 | 8.00 |
| 8.0000 | 8.000 | 15.07 | 5 | 5.75 | 5 | 8.50 |
| 8.0833 | 8.000 | 15.21 | 5 | 5.50 | 5 | 8.00 |
| 8.1667 | 8.000 | 15.34 | 5 | 5.50 | 5 | 8.00 |
| 8.2500 | 8.000 | 15.48 | 5 | 5.50 | 5 | 8.00 |
| 8.3333 | 8.000 | 15.62 | 5 | 5.50 | 5 | 8.00 |

| Design Span (ft.) | Slab Thick. (in.) | Design Moment (k - ft) | Main Reinforcement # | Main Reinforcement @ | Distr. Steel (Middle Half) # | Distr. Steel (Middle Half) @ |
|---|---|---|---|---|---|---|
| 8.4167 | 8.000 | 15.76 | 5 | 5.50 | 5 | 8.00 |
| 8.5000 | 8.250 | 15.93 | 5 | 5.50 | 5 | 8.00 |
| 8.5833 | 8.250 | 16.07 | 5 | 5.50 | 5 | 8.00 |
| 8.6667 | 8.250 | 16.21 | 5 | 5.50 | 5 | 8.00 |
| 8.7500 | 8.250 | 16.35 | 5 | 5.50 | 5 | 8.00 |
| 8.8333 | 8.250 | 16.49 | 5 | 5.50 | 5 | 8.00 |
| 8.9167 | 8.500 | 16.66 | 5 | 5.50 | 5 | 8.00 |
| 9.0000 | 8.500 | 16.80 | 5 | 5.50 | 5 | 8.00 |
| 9.0833 | 8.500 | 16.94 | 5 | 5.50 | 5 | 8.00 |
| 9.1667 | 8.500 | 17.08 | 5 | 5.50 | 5 | 8.00 |
| 9.2500 | 8.500 | 17.22 | 5 | 5.50 | 5 | 8.00 |
| 9.3333 | 8.750 | 17.40 | 5 | 5.50 | 5 | 8.00 |
| 9.4167 | 8.750 | 17.54 | 5 | 5.50 | 5 | 8.00 |
| 9.5000 | 8.750 | 17.69 | 5 | 5.50 | 5 | 8.00 |
| 9.5833 | 8.750 | 17.83 | 5 | 5.50 | 5 | 8.00 |
| 9.6667 | 8.750 | 17.97 | 5 | 5.50 | 5 | 8.00 |
| 9.7500 | 9.000 | 18.16 | 5 | 5.50 | 5 | 8.00 |
| 9.8333 | 9.000 | 18.30 | 5 | 5.50 | 5 | 8.00 |
| 9.9167 | 9.000 | 18.45 | 5 | 5.50 | 5 | 8.00 |
| 10.0000 | 9.000 | 18.59 | 5 | 5.50 | 5 | 8.00 |

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX
COLUMBIA, S.C.

DANIEL P. FANNING
EXECUTIVE DIRECTOR

DM0493

**MAY 17, 1993**

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

**SUBJECT**: 24" Octagonal Prestressed Concrete Piles and 14" Square Prestressed Concrete Piles

---

Due to observed excessive strand slippage at piles ends and possible resulting loss of load carrying capacity, the use of 24" Octagonal Prestressed Concrete Piles is discontinued effective immediately. Also, due to cracking problems during installation, the use of 14" Square Prestressed Concrete Piles is discontinued effective immediately.

The use of other types and sizes of prestressed concrete piles is unaffected by this memorandum.

B. A. Meetze, Jr.
Bridge Design Engineer

cc: FHWA, Mr. Schroeder
Bridge Construction Engineer
Design Group Leaders
Consultants
Assistant Bridge Design Engineers

REL/slb

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

DM0593

September 20, 1993

**MEMORANDUM TO DESIGN GROUP LEADERS**

**SUBJECT**: Design of Prestressed Concrete Beams

---

The Bridge Design Office has recently purchased the CONSPAN computer program from Leap Software, Inc. This program designs both simple spans and prestressed concrete beam spans made continuous for live load.

The CONSPAN computer program is currently installed only on the computer located in Mr. Bill Phipps' squad. The program manual is available for use and Mr. Yassin Askar will assist in operating the program.

The use of the outdated Georgia and North Carolina prestressed concrete beam programs shall be limited to preliminary design only. All final prestressed concrete beam design shall utilize the CONSPAN program.

B. A. Meetze, Jr.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers

REL/slb

BLF

DM0693

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

**MEMORANDUM TO DESIGN GROUP LEADERS AND CONSULTANTS**

**SUBJECT**: Bearing Stiffeners

---

AASHTO Standard Specifications For Highway Bridges does not specify an effective column length for the design of bearing stiffeners. Since the reaction load applied at one end of the stiffener pair is resisted by forces distributed to the web instead of by a force concentrated at the opposite end, as in columns, it is not necessary to consider the stiffeners as a end-hinged column even when the flanges are free to rotate. Accordingly, it shall be the Department's policy to use an effective column length of three fourths the web depth as stipulated in Part 5, paragraph K1.8 of the AISC Manual of Steel Construction, Allowable Stress Design, Ninth Edition.

Bearing stiffeners will continue to be 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. When bearing stiffeners are also used as diaphragm or crossframe connection plates, the stiffeners shall be detailed as previously described with the addition of fillet welds to the girder flanges as shown on the Department's Standard Details, drawing No. 709-1.

B. A. Meetze, Jr.
Bridge Design Engineer

RLK/slb

BDF

DM0793

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P O BOX 191
COLUMBIA, S C. 29202

September 30, 1993

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

**SUBJECT**: Concrete Barrier Parapet Reinforcement

---

The standard concrete barrier parapet details have been revised as shown on the attached detail. The revisions are a result of problems with insufficient concrete cover after reinforcement placement.

The detailer should pay special attention to barrier reinforcing steel placement for structures with superelevated sections as this magnifies the problems.

Plans that are completed need not be revised unless your review identifies a reinforcing problem.

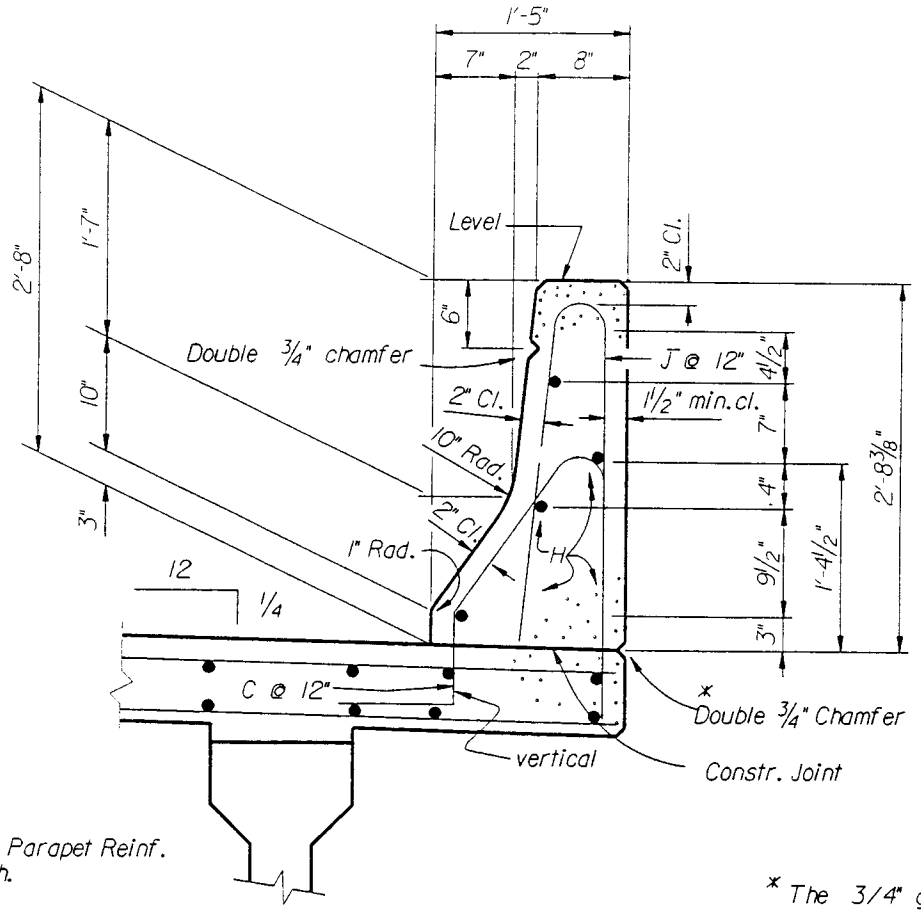
B. A. Meetze, Jr.
Bridge Design Engineer

Attachment

cc: FHWA, Mr. Schroeder
Consultants
Design Group Leaders
Assistant Bridge Design Engineer
Bridge Construction Engineer

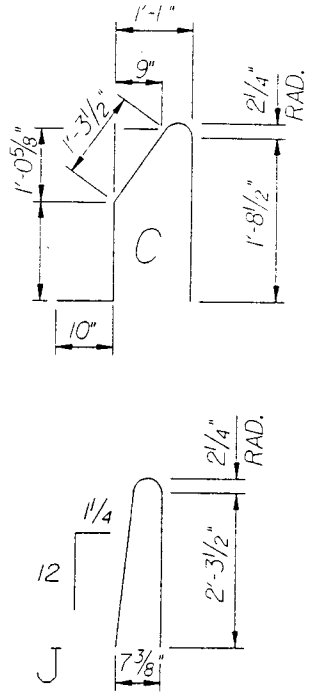
REL/slb

Note: A 1 1/2" extension of the concrete slab beyond the outside face of the barrier parapet will be required if the contractor elects to slip form the barrier parapets. No additional reinforcing steel is required and the payment for class "D" concrete in slab will be for quantity shown on the plans.




Note:
For Barrier Parapet Reinf. Alternate, see sh.

## BENDING DETAILS




* The 3/4" groove at construction joint may be omitted when slip form is used.

# BARRIER PARAPET DETAILS

| REV. | |
|---|---|
| REV. | |
| REV. | |
| REVIEWED | |
| QUAN. | |
| DR. | |
| DES. | |
| | BY |

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

DANIEL P. FANNING
EXECUTIVE DIRECTOR

DM0893

November 16, 1993

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

**SUBJECT: SUBSTRUCTURE CONCRETE**

---

All cast-in-place concrete substructure elements, except foundation seals, shall be designed and detailed utilizing "Concrete For Structures - Class D".

Substructure elements shall be designed using a specified compressive strength of f'c = 4000 psi for Class D Concrete. Foundation seals shall continue to be constructed using Class AA Concrete in accordance with Section 702.15 of the Standard Specifications. The use of concrete classes other than those shown above requires approval of the Bridge Design Engineer.

The above requirements shall apply to all projects currently under design. Projects which are completed need not be revised.

Rocque L. Kneece, P. E.
Bridge Design Engineer

cc: Consultants
Design Group Leaders
FHWA, Mr. Schroeder
Assistant Bridge Design Engineers
Bridge Construction Engineer

REL/slb

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P.O. BOX 191
COLUMBIA, S.C. 29202

DANIEL P. FANNING
EXECUTIVE DIRECTOR

DM0194

January 3, 1994

**MEMORANDUM TO DESIGN GROUP LEADERS AND CONSULTANTS**

SUBJECT: CRITERIA FOR RAILROAD OVERPASSES
(This memorandum supersedes Design Memorandum DM0189 dated February 28, 1989)

The following criteria is to be observed when establishing bridge and span lengths and developing preliminary plans for railroad overpasses.

1. General

A. The distance to the nearest mile post from the intersection of the centerline track and centerline of the bridge shall be shown on the plan and profile sheet.

B. Horizontal and vertical clearances shall be clearly marked on the plan and profile sheet.

C. A minimum of one boring shall be taken at each bent adjacent to the track. This should be specified when making a request for borings.

D. Surveys of railroad grade separations should now include cross sections of the railroad from railroad right-of-way to railroad right-of-way, taken at 25 ft. intervals for 100 ft. on each side of the centerline of bridge. The new and fill slopes should be plotted on these cross sections. For projects developed in-house, the Road Section will plot these cross sections and provide them to Bridge Design for inclusion in the preliminary plans to be submitted to the railroad company. These cross sections should not be included in the final structure plans.

2. Clearances

A. Horizontal Clearances: Abutments and/or piers for overhead bridge structures shall be located to clear the ditches of a typical track roadbed section and where possible be set with a minimum of 25.0 ft. from the face of column or pier to the centerline of track. Sketches from CSX

Transportation and Norfolk Southern Corp. showing track sections and clearances are attached for your reference. Edges of footing shall not be closer than 11'-0" from centerline of the track to provide adequate room for sheeting. Existing horizontal clearances should be maintained for widening projects.

B. Vertical clearances shall be set between a minimum of 23.0 feet and a maximum of 23.4 feet from the top of rail to the bottom of the superstructure. Existing vertical clearances should be maintained for widening projects.

C. Temporary horizontal construction clearances shall be noted on the plans as a minimum of 13.0 feet for tangent tracks and 14.0 feet for curved tracks measured from the centerline of track. Temporary vertical construction clearance shall be noted as 22.0 above the top of rail. Increased temporary clearances may be requested by the railroad company after review of the preliminary plans.

3. Bridge Length

The length of the bridge shall be established by locating the toes of the end fill slopes to accommodate the standard railroad road bed profile with open ditches as shown on the attached sheet. End fills shall be sloped at 2 horizontal to 1 vertical taken perpendicular to the tracks. Slopes flatter than 2 to 1 may be used when required by geotechnical analysis. Piping of railroad ditches shall be avoided.

Please note that the above method of establishing the bridge length conflicts with the current final rule which allows a 20 foot maximum distance from the centerline of track to the face of the fill slope. Therefore, it will be necessary for the Department to request the FHWA to grant an exception to the final rule on an individual project basis.

4. Crashwalls

Crashwalls will be required on all new and existing bents when the face of the pier or column is closer than 25.0 feet to the centerline of track, measured perpendicular to the tracks, except as noted below.

A. Crashwalls for single column piers shall be minimum 2'-6" thick and shall extend a minimum of 10'-0" above the top of high rail. The wall shall extend a minimum of 6'-0" beyond the column on each side in the direction parallel to the track.

B. For multiple column piers, the columns shall be connected with a wall of the same thickness as the columns or 2'-6" whichever is greater. The wall shall extend a minimum of 2'-6" beyond the end of outside columns in a direction parallel to the track and shall extend at least 4' below the lowest surrounding grade.

C. Reinforcing steel to adequately anchor the crashwalls to the column and footing shall be provided.

D. For piers of heavy construction, crashwalls may be omitted. Solid piers with a minimum thickness of 2'-6" and length of 20'-0", single column piers of minimum 4'-0" x 12'-6" dimensions or any other solid pier sections with equivalent cross sections and minimum 2'-6" thickness are considered as heavy construction.

5. Drainage

Deck drains shall not be used over the railroad right-of-way.

6. Protection of End Slopes

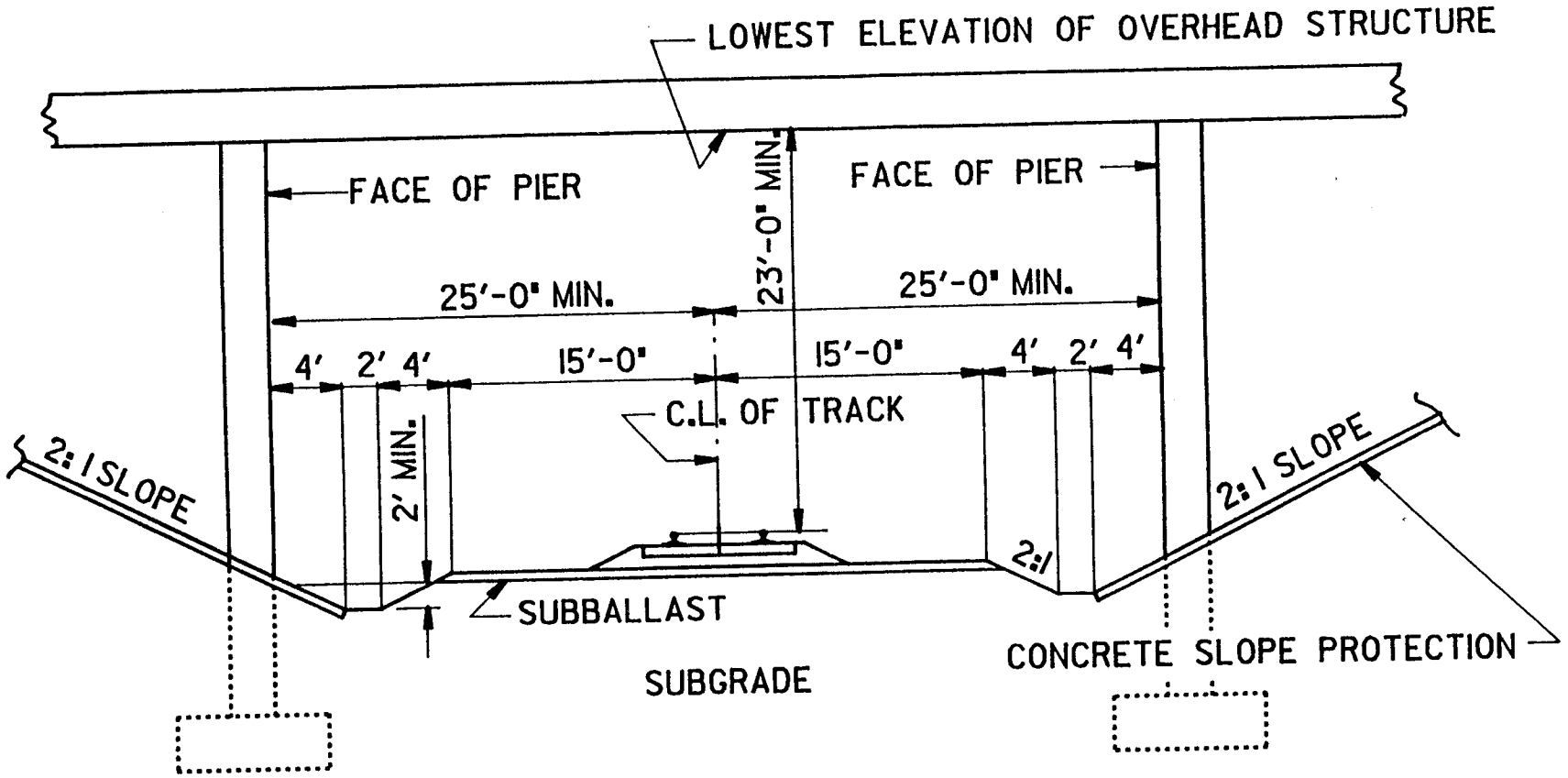
Concrete slope protection pavement shall be provided for bridges on primary or interstate routes when practical to do so. Generally, concrete slope protection will not be provided when the tracks are located in a cut section having steep slopes or for bridges on secondary or county roads. When concrete slope protection is not provided, consideration should be given to providing a low retaining wall attached to the bents adjacent to the track in order to prevent the fill from sloughing into the railroad ditches.

Rocque L. Kneece
Bridge Design Engineer

Attachment

RLK/JLC/slb

cc: FHWA, Mr. Schroeder
Consultants
Group Leaders
Assistant Bridge Design Engineers




# CLEARANCES REQUIRED FOR OVERHEAD STRUCTURES

## TYPICAL ROADBED SECTION WITH STANDARD DITCHES

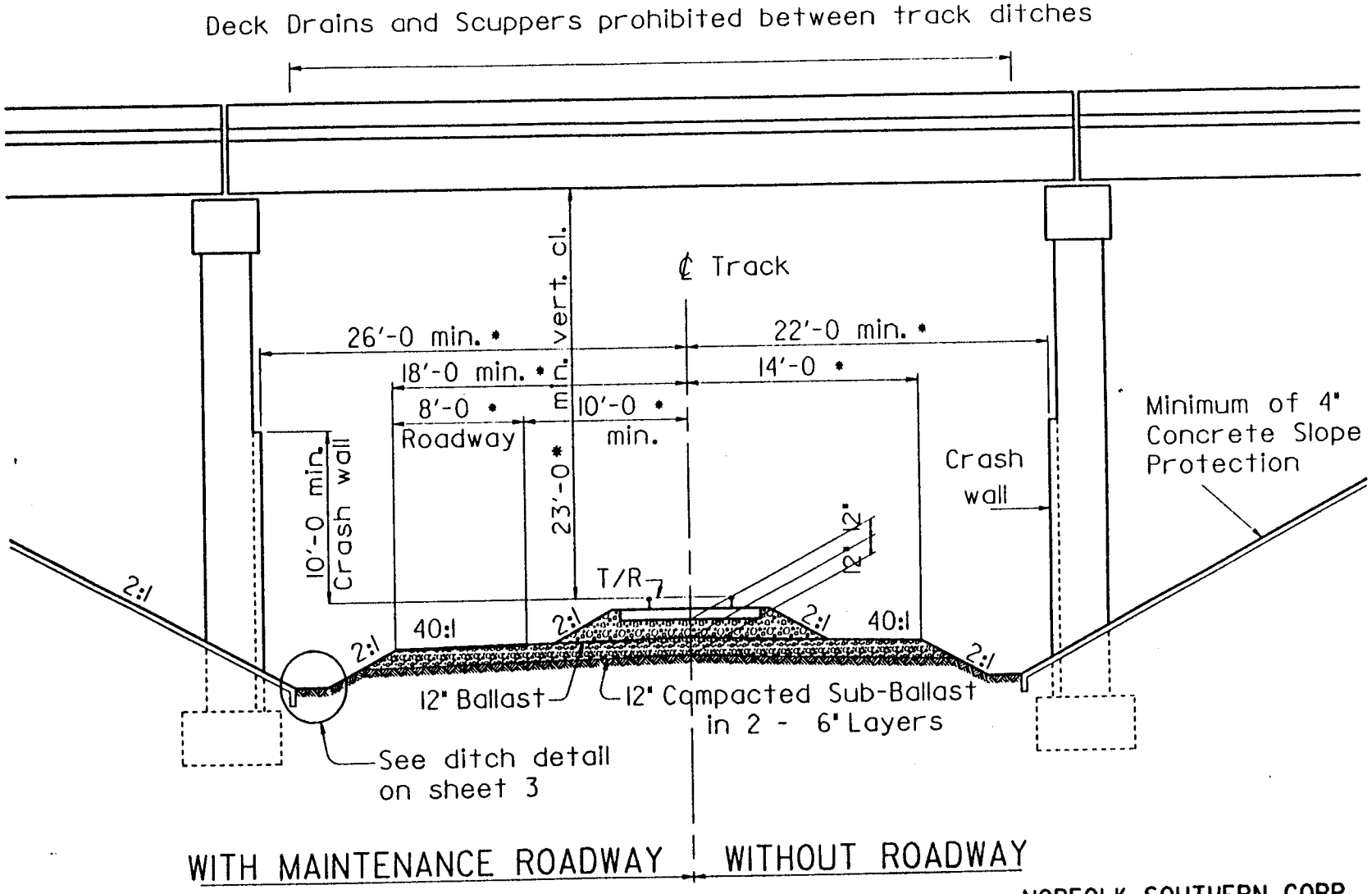
NOTE: FOR MULTIPLE TRACKS, STANDARD TRACK CENTERS IS 15'-0".

CSX TRANSPORTATION

ENGINEERING DEPARTMENT

**STANDARD CLEARANCES FOR OVERHEAD STRUCTURES**

NOVEMBER 1, 1993




# PROFILE

- Horizontal dimensions shown are perpendicular to ℄ of track. Horizontal dimensions shown are the minimum which will allow the construction of Norfolk Southern's standard roadbed section. Actual required horizontal clearances may need to be increased due to existing roadbed section, location of parallel ditches, and hydrological conditions.

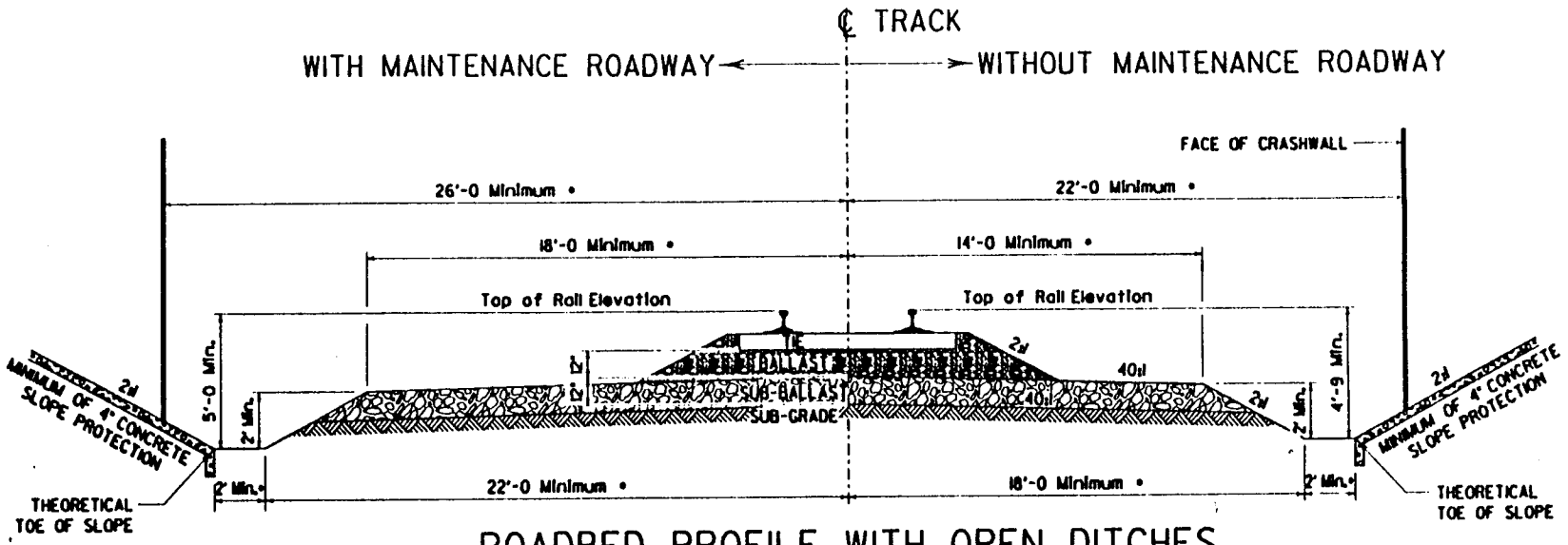
NORFOLK SOUTHERN CORP

## STANDARD OVERHEAD BRIDGE DETAILS

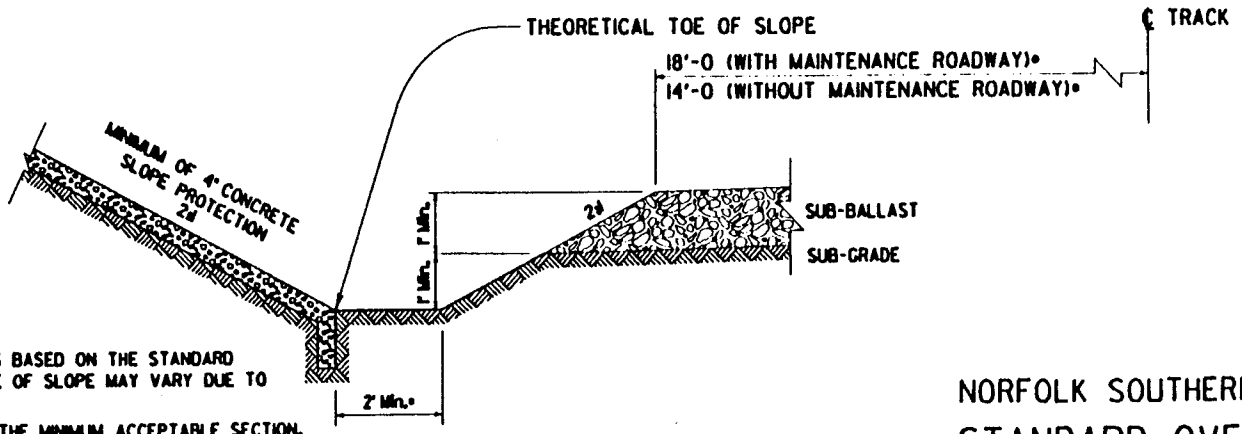
## PERMANENT CLEARANCES DETAILS

OFFICE OF CHIEF ENGINEER BRIDGES & STRUCTURES

JANUARY, 1992




## ROADBED PROFILE WITH OPEN DITCHES




NOTE:

THEORETICAL TOE OF SLOPE IS BASED ON THE STANDARD ROADBED SECTION, ACTUAL TOE OF SLOPE MAY VARY DUE TO EXISTING GROUND LINE.

THE DITCH SECTION SHOWN IS THE MINIMUM ACCEPTABLE SECTION.

THE DITCH SECTION IS TO BE INCREASED AS REQUIRED BY LOCAL CONDITIONS, BASED ON HYDROLOGICAL AND HYDRAULIC STUDIES.

## DITCH DETAIL

- Horizontal dimensions shown are perpendicular to ℄ of track. Horizontal dimensions shown are the minimum which will allow the construction of Norfolk Southern's standard roadbed section. Actual required horizontal clearances may need to be increased due to existing roadbed section, location of parallel ditches, and hydrological conditions.

NORFOLK SOUTHERN CORP

# STANDARD OVERHEAD BRIDGE DETAILS

## DITCH AND DRAINAGE DETAILS

OFFICE OF CHIEF ENGINEER BRIDGES & STRUCTURES

JANUARY, 1992

SOUTH CAROLINA
DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
P O BOX 191
COLUMBIA, S C 29202

DANIEL P FANNING
EXECUTIVE DIRECTOR

DM0294

January 6, 1994

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

**SUBJECT**: Procedure For Showing Water Elevations on Bridge Plans

---

When indicating an elevation of the water surface on bridge plans, the following symbol and data should be used.

**Water Elevation = (insert elev.)**
**(Date Observed)**

Also, the following note should accompany the above data.

"The water elevation shown was observed at the time of survey (substitute boring for survey when appropriate). The elevation is for information only and the actual water elevation during construction may vary depending on weather conditions and seasonal fluctuations".

The above requirements should be incorporated in all project plans beginning with the March 1994 Letting.

Rocque L. Kneece, P. E.
Bridge Design Engineer

cc: Design Group Leaders
Consultants
FHWA, Mr. Schroeder
Assistant Bridge Design Engineers
Bridge Construction Engineer

REL/slb

South Carolina
Department of Transportation
P.O. Box 191
Columbia, S.C. 29202-0191

DMO195

February 10, 1995

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

**SUBJECT:** Silane Bridge Deck Sealer

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The use of Silane Bridge Deck Sealers will be discontinued on all future bridge projects. All references to Bridge Deck Sealer should be deleted from plans.

The above requirements shall apply to all projects currently under design. Projects which are completed need not be revised.

Rocque L. Kneece, P.E.
Bridge Design Engineer

cc: Consultants
Design Group Leaders
FHWA, Mr. Schroeder
Assistant Bridge Design Engineer
Bridge Construction Engineer

RLK/slb

BDF

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October 17, 1995

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS**

**SUBJECT:** BEAM BEARING AT END BENTS

---

The use of structural grout under the beams at the end bents will be discontinued. A 6 mm neoprene pad under the bearing plate will be used to give a uniform bearing on the end bent. Plans already detailed with grout under the beams shall not be altered.

Rocque L. Kneece
Bridge Design Engineer

cc: Assistant Bridge Design Engineers

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DM0395

October 20, 1995

**MEMORANDUM TO DESIGN GROUP LEADERS & CONSULTANTS**

**SUBJECT:** Debonding of Strands in Prestressed Members

---

Debonding (shielding) of strands in precast/prestressed concrete members will be allowed. When debonding is used, the design and details of the member shall comply with the attached Policy for Debonding of Strands for Precast/Prestressed Concrete Girders dated October 20, 1995.

Rocque L. Kneece
Bridge Design Engineer

Attachment:
cc: Assistant Bridge Design Engineers

# POLICY FOR DEBONDING OF STRANDS IN PRESTRESSED CONCRETE GIRDERS

October 20, 1995

---

Debonding (shielding) of strands at the end of precast/prestressed concrete girders will be allowed on projects for the SCDOT with the following restrictions:

- A maximum of 25 % of the total prestressing strands may be debonded to satisfy the allowable stress limits. In any row, debonded strands shall not exceed 50 % of the total strands in that row.

- Not more than 40 % of the shielded strands, or four strands, whichever is greater, shall be terminated at any section.

- Strands shall be debonded in a pattern that is symmetrical about the vertical axis of the beam.

- The theoretical number of debonded strands shall be rounded to the closest even number (pairs) of strands except that debonded strands will not be permitted in rows containing three strands or less.

- All exterior strands shall be fully bonded (including bottom row).

In analyzing stresses and/or determining the required length of debonding, stresses shall be limited to the following values (see AASHTO 9.15.2):

At Release :

- Tension at top of beam $0.498\sqrt{f'_{ci}}$ Mpa ($6\sqrt{f'_{ci}}$ psi)
- Tension at bottom of beam 0
- Compression at top of beam $0.6f'_{ci}$
- Compression at bottom of beam $0.6f'_{ci}$

At Final:

- Tension at top of beam $0.249\sqrt{f'_{ci}}$ or 1.4 Mpa ($3\sqrt{f'_{ci}}$ or 200 psi)
- Tension at bottom of beam $0.249\sqrt{f'_{c}}$ Mpa ($3\sqrt{f'_{c}}$ psi)
- Compression at top of beam $0.4f'_{c}$
- Compression at bottom of beam $0.4f'_{c}$

Computations for stirrups in the end zone areas should be based on the reduced prestress force due to transfer length and the shielding of the strands. Transfer length and development length of strands shall comply with the requirements of AASHTO Sections 9.20.2.4 and 9.27, respectively.

The following notes should appear on the plans:

- Fully bonded strands shall be detensioned prior to debonded strands.
- Tying reinforcing steel to debonded strands will not be allowed.

The following specifications shall apply:

(a) All debonding material (sheathing) shall be tubular conduit capable of resisting the pressure exerted by the concrete. Slit conduits may be used provided double conduits are used with slits placed on opposing sides. The conduit used shall be of high density polyethylene or polyprophylene with a minimum wall thickness of 600 µm (0.025 in). The inside diameter of the conduit shall be of sufficient size to allow free movement of the encased strand but it shall not be greater than the diameter of the strand plus 3 mm ($\frac{1}{8}$ in). The conduit shall be secured so that longitudinal movement along the strand will be prevented, and bonding of the strand will be prevented at the location shown on the plans plus or minus 25 mm (1 in). Concrete shall be prevented from entering the conduit by taping. The tape shall be manufactured from a non-corrosive material compatible with the concrete, conduit, and steel.

(b) Release of the strands shall be in accordance with Sec. 704.13 (b) of the Standard Specifications, except that fully bonded strands shall be cut first, followed progressively by those strands having the minimum length of tubular sheathing through to those strands having the maximum length of tubular sheathing. The strand release schedule shall be an integral part of the shop drawings.

(c) After beams are cast and detensioned, openings between strands and sheathing shall be sealed within 48 hours of detensioning by use of either an approved epoxy or silicone sealant. The silicone sealant shall be a low modulus silicone sealant, white in color.

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DM0495

October 27, 1995

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT:** Column Reinforcing Steel

---

The main (vertical) reinforcing steel in columns will be detailed continuous with a maximum spacing of 200 mm (8") between bars (see Figure 2). A note shall be added to the bent sheet allowing splices provided they are only mechanical splices. A minimum stagger of 600 mm (2'-0") between adjacent splice shall be required and the splice must be within the middle 1/3 of the column height.

Spirals are to be used and shall be continuous from the footing to the cap with extension into the cap and footing. The spirals may be spliced with a full strength lap weld or a mechanical coupler capable of providing 125% Fy of the bar. If the Contractor elects to weld, he shall submit his welding procedure and be approved before fabricating reinforcing welded splices. All welding of reinforcing steel shall be in accordance with AWS D1.4 "Structural Welding Code - Reinforcing Steel".

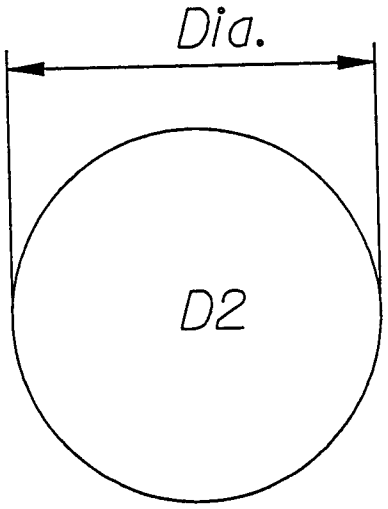
The preferred column shapes shall be round or oblong with rounded ends. When the columns are oblong in shape, they shall be reinforced with all main reinforcement enclosed within circular spirals spaced a maximum of 0.75 diameter of the core center to center. Spirals shall overlap a minimum of four (4) main reinforcing bars. See Figure (2).

This memorandum supersedes Memorandum DM0293. Memorandum DM0391 shall be modified by: deleting paragraph 2(D), deleting Figure 4, and replacing Figure 2 with Figure 2 on the attachment.

Rocque L. Kneece
Bridge Design Engineer

Attachments:

cc: Assistant Bridge Design Engineers



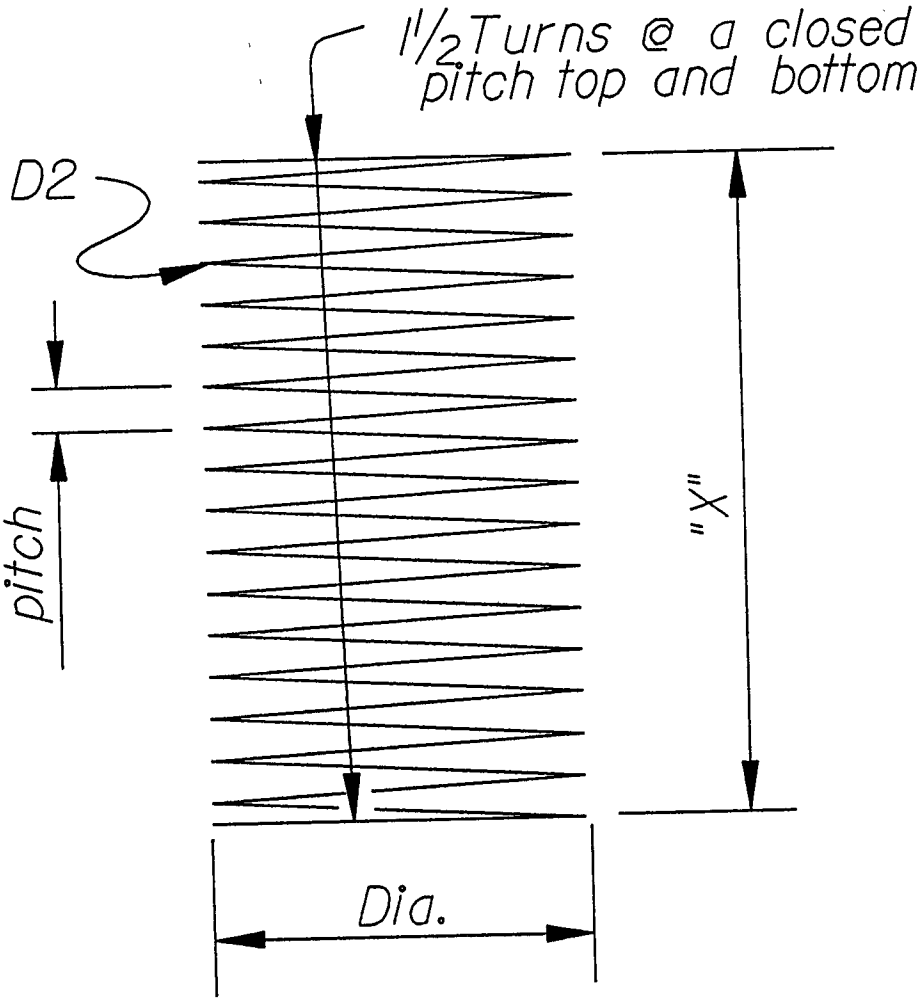
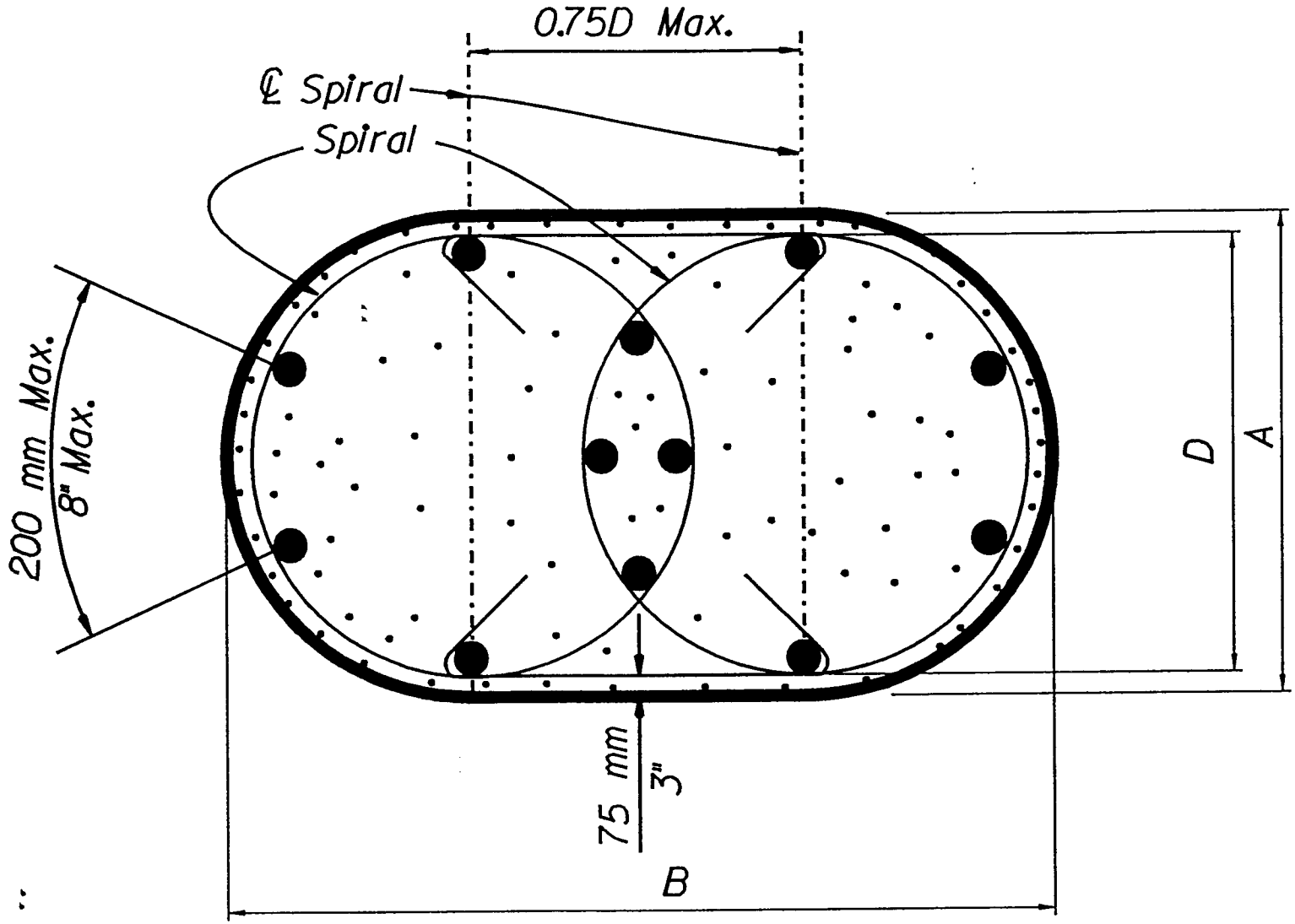




FIGURE 1




# FIGURE 2

Section Thru Column

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DM0595

November 9, 1995

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS**

**SUBJECT:** Use of low relaxation strands in beams

---

Prestressed beams shall be detailed with 1/2 " diameter low relaxation strands on all projects for which the design has not already been completed. This should minimize the redesigning of beams by the fabricator.

Rocque L. Kneece
Bridge Design Engineer

cc: Assistant Bridge Design Engineers

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DM0196

February 14, 1996

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT:** Concrete cover on slabs

---

The present 50 mm (2 ") concrete cover over the top mat of slab reinforcing is to be increased to 65 mm (2 1/2 "). This is to be incorporated into all future projects. Projects that have already been designed and detailed should not be changed.

Roeque L. Kneece
Bridge Design Engineer

cc: Assistant Bridge Design Engineers

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**DM0296**

**ARPIL 2, 1996**

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT: Bridge Railing Wall - Slip Forming Alternate**

---

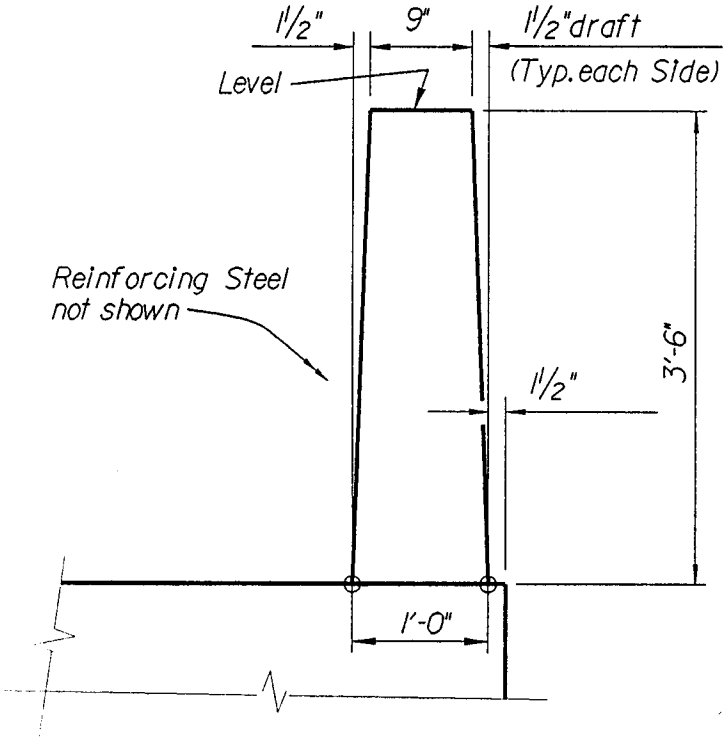
The attached detail should be shown in plans as an alternate to allow slip forming of bridge railing walls. This detail is to be incorporated into future projects that include smooth faced railing walls. Projects that are completed should not be revised.

Rocque L. Kneece
Bridge Design Engineer

Attachment

cc: Assistant Bridge Design Engineers

REL/slb




# RAILING WALL DETAILS (SLIP FORM ALTERNATE)

*Note:*

*If the Contractor elects to slip form the railing wall, all chamfered wall edges may be eliminated. The concrete used in slip formed walls shall be Class "D" with a min. 685 lbs. of cement per cubic yard. The Contractor shall submit his mix design to the Department's Research and Materials Lab for approval.*

Watts Barrier Walls
RT. 1, BOX 371-A, MOUNTVILLE, SC 29370
(803) 994-4054

March 7, 1996

S. C. Dept. of HPT
P. O. Drawer 191
Columbia, South Carolina 29202

REF: Slipform Mix Design for
Alternate Railing Wall

ATTN: Mr. Rocque Kneece

Dear Mr. Kneece:

In November, 1994, we requested several exceptions to the 9" x 42" railing wall to accomodate slipforming. One exception that was not approved as standard was the mix design.

After discussing this mix with Mr. Bill Berrian, we were made aware that what we needed changed for this wall was the amount of cement, not a different class.

We are requesting a note be made for the alternate railing wall for Class "D" slipform with 685# of cement. In our experience, this is needed to slipform the tall, thin wall producing a stronger mix for the height and a smoother finish.

Thank you for considering this request. If this note is made in the plans, the contractor can be prepared for the higher cost of the concrete at the time of bid.

Sincerely,

Diane W. Highsmith
President

cc: Bill Berrian
file

will wait to hear back from B. Berrian
3/12/96

RT. 1, BOX 371-A
MOUNTVILLE,SC 29370

Watts Barrier Walls

PHONE: (803) 994-4054

November 14, 1994

S. C. Dept. of Highways
P.O. Drawer 191
Columbia, South Carolina 29202

REF: Request for Exception for Slipforming
for 9"x42" Railing Wall

ATTN: Mr. Rocque Kneece

Dear Mr. Kneece:

Per our telephone conversation last week, I am requesting the following exceptions to slipforming the 9"x42" railing wall:

1. Alter dimensions of railing wall to be 9"x12"x42", which allows more stability at the base with a 1½" draft on each side at base.
2. Eliminate the beauty strip or chamfer strip in face of wall.
3. Eliminate chamfered edges.
4. Concrete changed to Class "AA" slipform mix, straight cement.

As you remember, these are the changes we made on the Greenville County project with Blythe. George Gibson and Bill Berrian observed our test pour of this wall in Salisbury, N. C. on June 22, 1994 and noted these changes made for a better looking wall as well as more structurally sound.

I am requesting that future plans have these exceptions for slipforming so that a special request will not have to be made with each project for this change.

If you need any further information, please let me know.

I appreciate your considering my request.

Sincerely,

Diane W. Highsmith

Diane W. Highsmith
President

/dwh

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DM0396

# MEMORANDUM TO GROUP LEADERS & CONSULTANTS

## SUBJECT: DIMENSIONING OF BRIDGE PLANS

Beginning June 1, 1996, all new bridge projects should be detailed using only millimeter dimensions. This change will promote the use of the "automatic dimensioning" tools in the microstation software.

Detailing of reinforcing steel, bending details, borings and reinforcing schedules should use millimeter dimensions. Completed plans and partially completed plans need not be reworked.

The attached sheets indicate the procedures and required CAD settings needed to use the "automatic dimensioning" features of microstation software.

Roque L. Kneece
Bridge Design Engineer

Attachments

cc: Asst. Bridge Design Engineers

REL/slb

# DIMENSIONING OF BRIDGE PLAN DETAILS
# FOR
# SCDOT BRIDGE DESIGN OFFICE

The TQI team formed to improve production of bridge plans, recommended to the Bridge Engineer and Assistant Bridge Engineers to change all dimensions to millimeters on bridge plans. This will help with the automatic dimensioning tools in microstation. Due to this change, there are a few settings that need to be changed as follows:

1) Working Units
   a) Leave the master units blank
   b) Change resolutions to 10 mm per and 1 position unit per mm

2) Dimension Placement Settings
   a) Change dimension unit accuracy to zero
   b) Change attributes fonts to 1.
   c) Change geometry terminator to 1 and 3000.

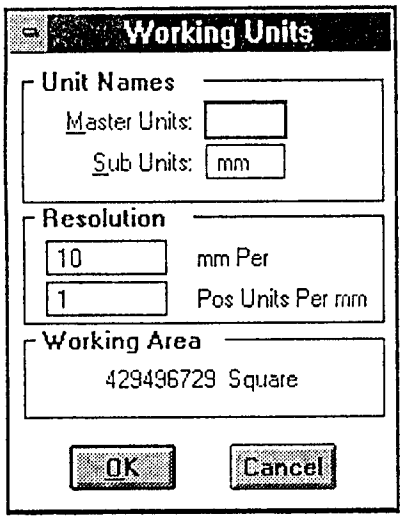
These settings should be changed in the file seed2dm.dgn for creating new files.

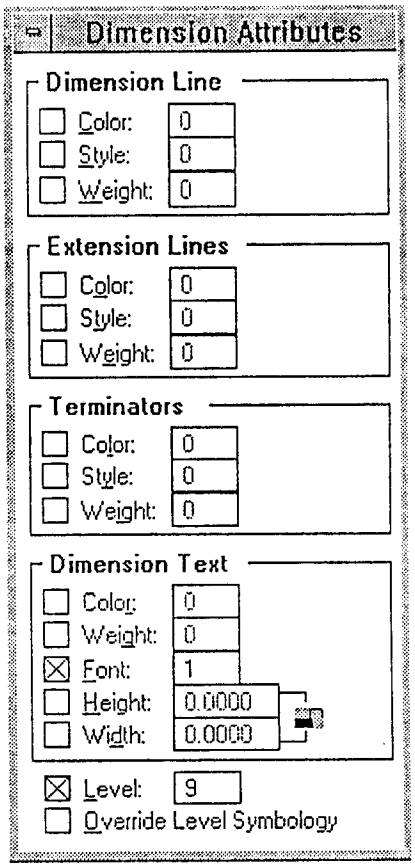
If you have any question about these changes, contact James Reese or Walter Reed. The new format for dimensions shall be as follows:

Examples: 1500 (1500 mm)
195 000 (195 meters)
10 000 (10 meters)
430 (430 mm)

Hopefully, this will help eliminate a lot of dimension editing in the future because most of the dimension will be four (4) digits or less. In the cases where there is more than four (4) digits, you will have to add the space as shown above.

If there are any suggestions to make this a better transition, please let someone know.


Working Units
Unit Names
Master Units:
Sub Units: mm
Resolution
10 mm Per
1 Pos Units Per mm
Working Area
429496729 Square
OK
Cancel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Terminators
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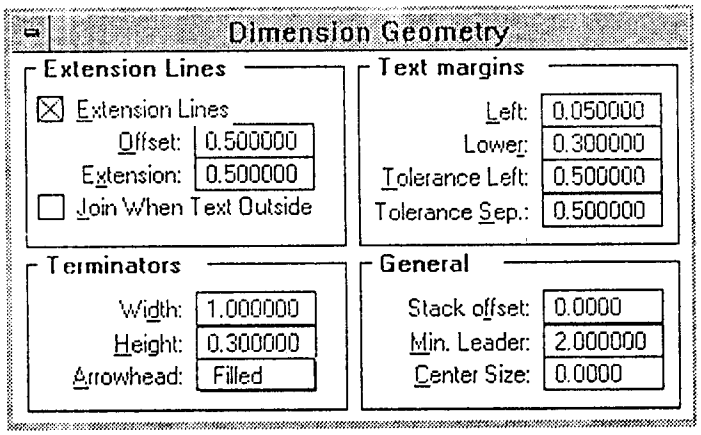
Override Level Symbology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Lower: 0.300000
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Tolerance Sep.: 0.500000
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General
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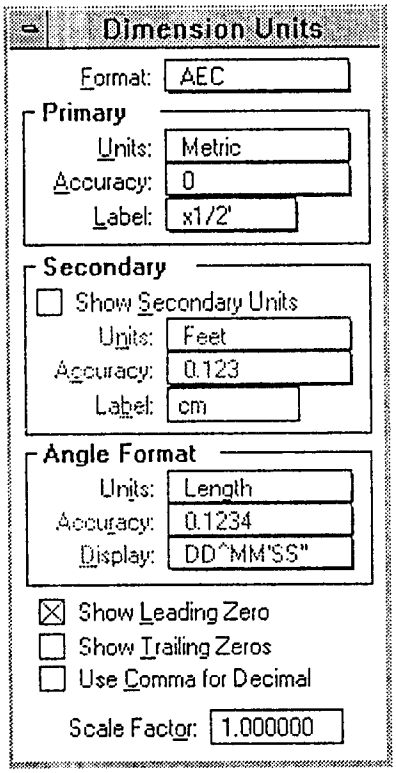
Center Size: 0.0000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Secondary
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Units: Feet
Accuracy: 0.123
Label: cm
Angle Format
Units: Length
Accuracy: 0.1234
Display: DD^MM'SS"
Show Leading Zero
Show Trailing Zeros
Use Comma for Decimal
Scale Factor: 1.000000

BDF

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DM0496

**MEMORANDUM TO GROUP LEADERS AND CONSULTANTS**

**SUBJECT: Thrie Beam Connector Details**

It has been brought to our attention that the present dimensioning shown on Road Standard Drawing No. 805-7, 805-9 and 805-9A for the Thrie Beam Terminal Connector pattern does not correspond with (AASHTO-AGC-ARTBA) TAST FORCE NO. 13 MANUAL.

The attached drawing shows the correct dimensions. Beginning with the September, 1996 Letting, all projects should be detailed using these dimensions.

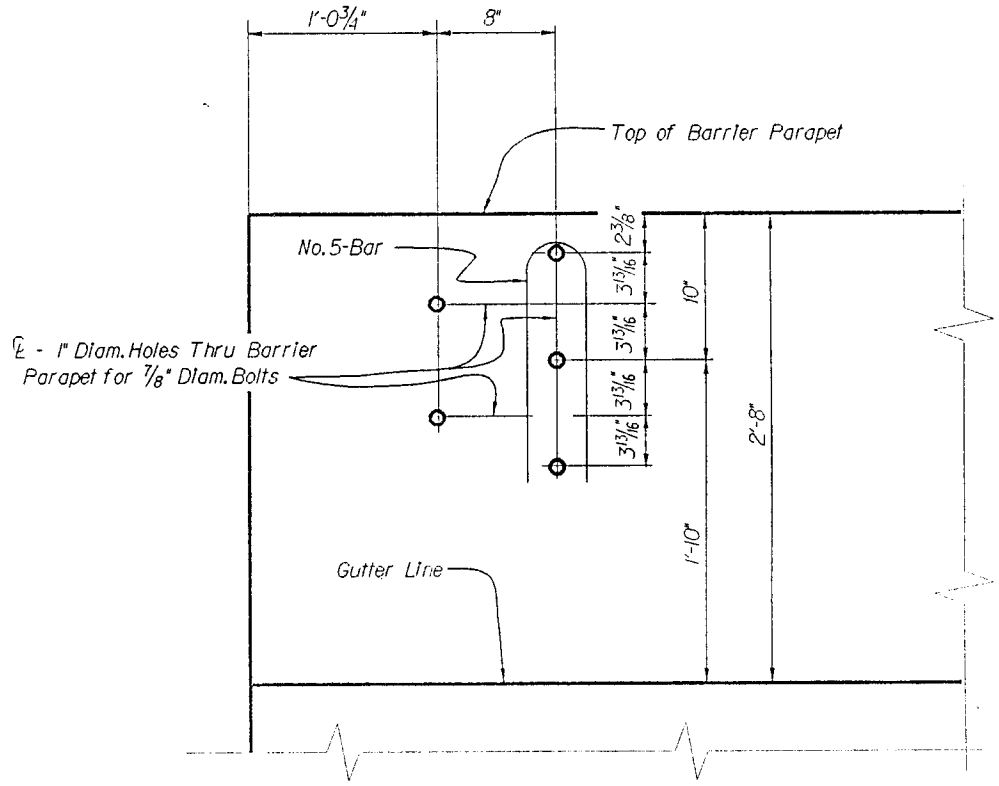
The affected Road Standard Drawings will be revised and are scheduled for disbursement this fall.

Roque L. Kneece
Bridge Design Engineer

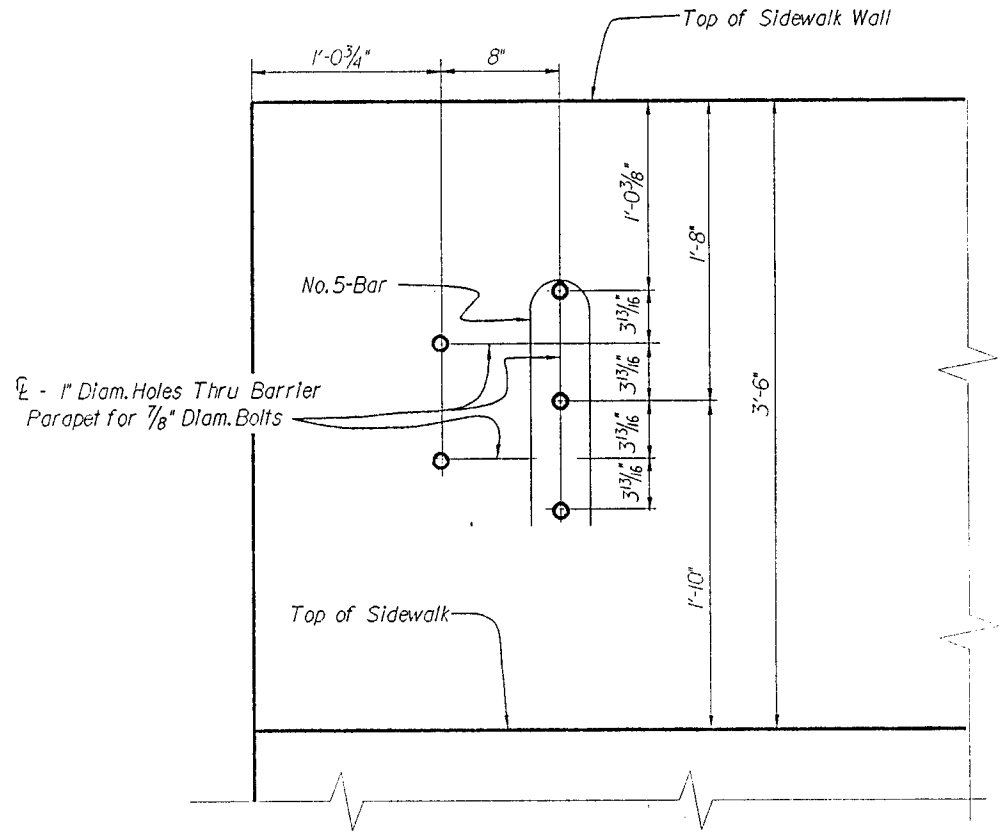
Attachment

cc: Assistant Bridge Design Engineers

REL/slb




# THRIE BEAM GUARD RAIL ATTACHMENT TO PARAPET




# THRIE BEAM GUARD RAIL ATTACHMENT TO SIDEWALK WALL

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**Deputy Director of Mass Transit**
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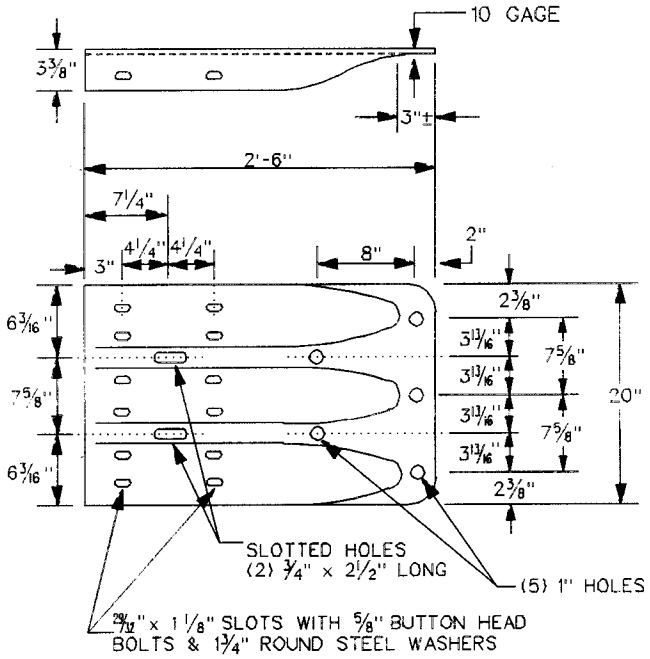
June 17, 1996

**MEMORANDUM TO**: BRIDGE DESIGN ENGINEER KNEECE

SUBJECT: Standard Drawings for Guardrail

It has been brought to our attention that the present dimensioning shown on Standard Drawing No. 805-7, 805-9, & 805-9A for the Thrie Beam Terminal Connector pattern does not correspond with the (AASHTO-AGC-ARTBA) Task Force No. 13 Manual. Below is the revised drawing. The new dimensions will appear in our revisions scheduled for disbursement by this fall.

TERMINAL CONNECTOR




E. S. Eargle
Road Design Engineer

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BDE

DM0596

June 20, 1996

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT:** Finish Grades on Fast Track Projects

---

The New F.G. note on the bent and superstructure sheets shall be revised to read " New F.G. to be set in accordance with Typical Section." This revision is effective with the September 1996 letting. The Typical Section shall always show the amount the new F.G. is to be raised at the bridge.

Rocque L. Kneece
Bridge Design Engineer

cc: Assistant Bridge Design Engineers

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DM0696

June 25, 1996

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

SUBJECT: Double 3/4 " Chamfer on Barrier Parapet Face

---

The double 3/4 " chamfer shown on the traffic face of the barrier parapet shall not be detailed in the future. Plans already detailed with the chamfer need not be changed.

Rocque L. Kneece
Bridge Design Engineer

cc: Assistant Bridge Design Engineers

RDF

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DM0796

July 1, 1996

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

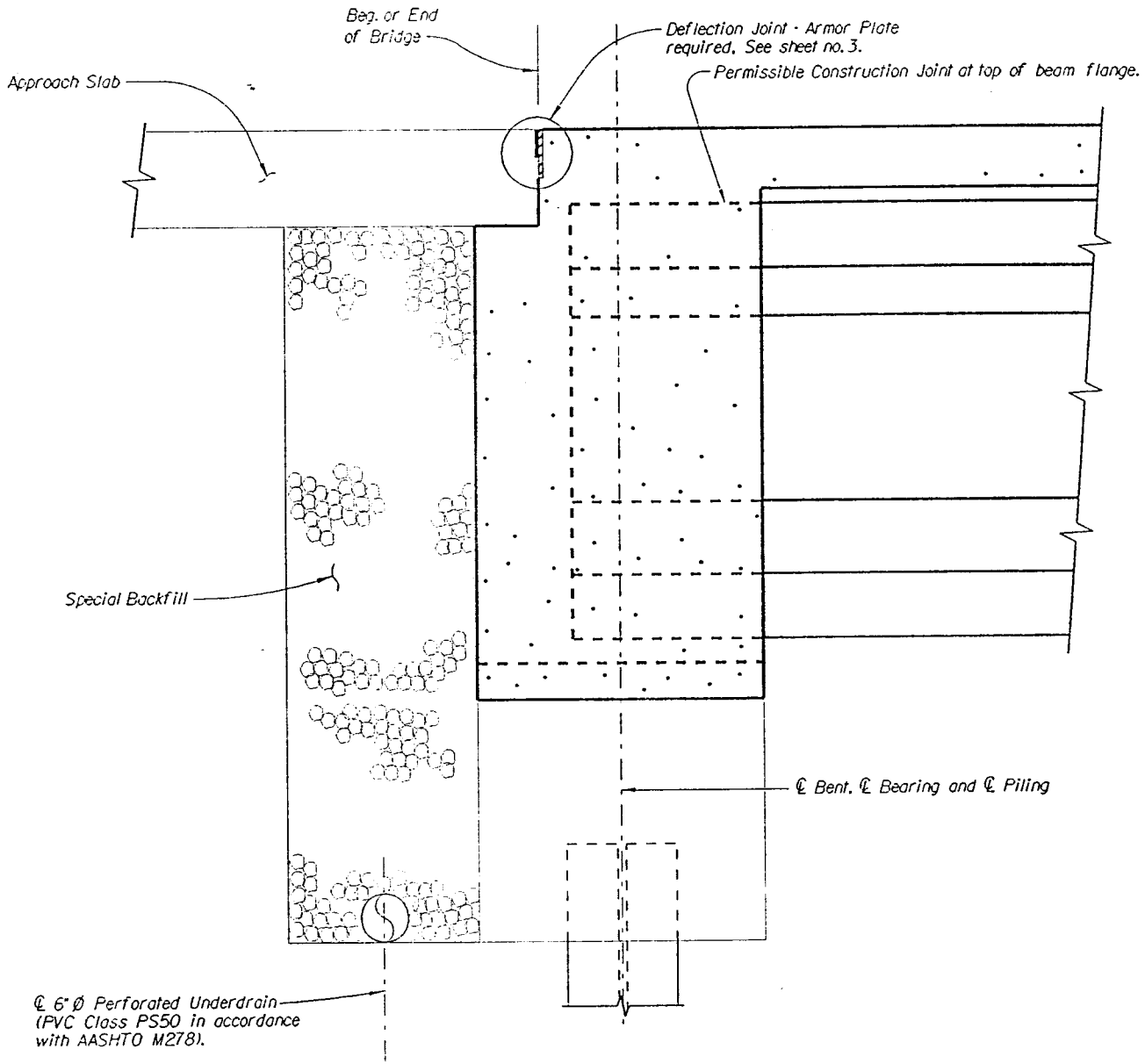
**SUBJECT:** End Walls on Prestressed Beams

---

The end walls at the bridge ends on continuous prestressed beam spans are to be detailed the full width of the end bent. This detail is for integral continuous beam bridges that are jointless. This detail may be altered when designs warrant. See attached Detail "A".

Rocque L. Kneece
Bridge Design Engineer

cc: Assistant Bridge Design Engineers


Beg. or End of Bridge
Deflection Joint - Armor Plate required. See sheet no. 3.
Approach Slab
Permissible Construction Joint at top of beam flange.
Special Backfill
℄ Bent, ℄ Bearing and ℄ Piling
℄ 6" Ø Perforated Underdrain (PVC Class PS50 in accordance with AASHTO M278).

## DETAIL "A"

SCDOT
South Carolina
Department of Transportation

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**Deputy Director of Mass Transit**
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**DM0996**

**August 5, 1996**

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS**

**SUBJECT: Anchor Bolt Details**

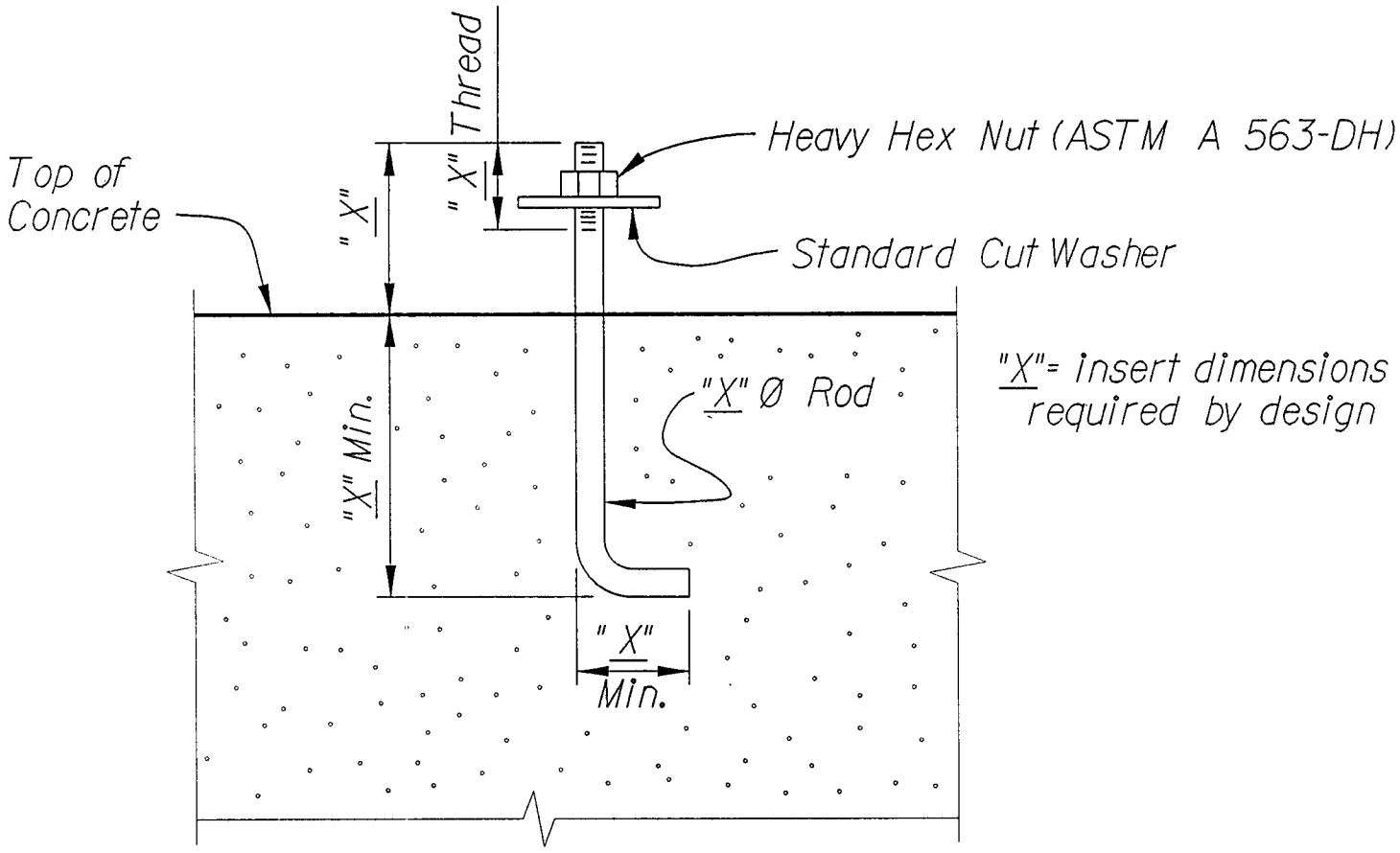
---

The attached "Anchor Bolt Details" are to be used when detailing Anchor Bolts. The dimensions shown as "X" should be removed and the Detailer must insert the proper dimensions required by the project design requirements.

Projects which have been completed need not be revised to reflect these requirements.

Rocque L. Kneece
Bridge Design Engineer

cc: Assistant Bridge Design Engineers




# ANCHOR BOLT DETAILS

NOTES:

For length and number of anchor bolt assemblies required see reinforcing steel schedule on Bent sheets.

Anchor bolts shall conform with ASTM F 1554 (Gr.36).

Anchor bolts and nuts shall be shipped assembled.

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**DM1096**

**August 28, 1996**

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS**

**SUBJECT: Availability of Various Steel H-Pile Sizes**

---

Attached you will find a copy of a memorandum from Bridge Construction Engineer C. L. Matthews. Due to this request, please use the following H-Pile Sizes on normal S.C.D.O.T. projects:

| English Designation | Metric Designation |
|---|---|
| HP 10x42 | HP 250x62 |
| HP 12x53 | HP 310x79 |
| HP 14x73 | HP 360x108 |

On special projects where recommended by the Geotechnical Report, HP 14x117 (HP 360x174) may be used where penetration is minimal and the piles are driven to very large ultimate bearings.

On large projects, where a significant savings may be realized by using non-standard sizes, or where the design dictates, other standard AISC sizes may be used. We will also continue to use HP 10x57 (HP 250x85) for prestressed pile points.

Projects which have been completed need not be revised to reflect these changes.

Rocque L. Kneece
Bridge Design Engineer

cc: Assistant Bridge Design Engineers

BDF

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DM1196

October 3, 1996

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT:** Soft Metric Reinforcing Bars

---

Beginning with the March, 1997 Letting, the Bridge Design Office will design and detail all new bridge projects using "Soft Metric" reinforcing bars. Projects which are completed or which are in progress need not be reworked for "Soft Metric".

Mr. Bowers and Mr. Phipps will be developing new standard drawings using "Soft Metric" reinforcing bars. Group leaders should check the status of new standards prior to designing and detailing new projects. Also, a new "Soft Metric" special provision is being developed and will be furnished when completed.

This conversion to "Soft Metric" reinforcing bars was proposed by CRSI and ASTM subcommittees and approved by AASHTO.

Rocque L. Kneece
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
RLK/rel

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DM0197

February 25, 1997

**MEMORANDUM TO GROUP LEADERS AND CONSULTANTS**

**SUBJECT**: Payment of Spiral Reinforcing Steel in Columns and Drilled Shafts

---

Beginning with the June, 1997 Letting, the Bridge Design Office will detail all new bridge projects using the following method for measurement and payment of spiral reinforcing bars used in columns and drilled shafts. Projects which are completed or which are near completion need not be reworked.

The spiral reinforcing bars used in columns and drilled shafts shall be separated from the other project reinforcing steel quantities and shall be measured and paid for using the following bid item.

| Item No. | Pay Item | Pay Unit |
|---|---|---|
| 7031210 | Spiral Reinf. Steel for Column (Bridge) | kg (Metric) lbs. (English) |

This revision is the result of an AGC request to separate the more costly spiral reinforcing steel from the other project reinforcing steel.

Roeque L. Kneece
Bridge Design Engineer

cc: Assistant Bridge Design Engineer

REL/slb

BDF

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DM0297

February 28, 1997

**MEMORANDUM TO GROUP LEADERS AND CONSULTANTS**

SUBJECT: Classes of Concrete for National Highway System Bridges and "Other Select Bridges"

---

Beginning immediately, the Bridge Design Office will require new and replacement bridge decks on the National Highway System to use either Class E Concrete or Class 45 Concrete for bridge deck concrete. Class E Concrete will be specified for projects using English units and Class 45 Concrete will be specified for projects using Metric units. Approach slab concrete shall be the same as specified for the bridge deck concrete.

When designing structures with Class E Concrete a f'c = 4,000 psi should be used in design. When designing structures with Class 45 Concrete a f'c = 30 MPa should be used in design.

Substructure concrete shall be specified as Class D Concrete for English projects and specified as Class 30 MPa for Metric projects.

The class of concrete specified in bridge barrier parapets shall be Class D Concrete or Class 30 MPa as applicable.

For "Other Select Bridges" with an estimated deck area of 50,000 square feet or more, the designer should verify the required concrete types with the Bridge Design Engineer.

Rocque L. Kneece
Bridge Design Engineer

cc: Assistant Bridge Design Engineers

REL/slb

BDP

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DM0397

March 3, 1997

**MEMORANDUM TO GROUP LEADERS AND CONSULTANTS**

SUBJECT: Detailing Approach Slabs when Adjoining a Trend Guardrail

---

When detailing an approach slab that has an adjoining Trend guardrail, the approach slab edge shall be terminated 4 1/2 inches (115 mm) inside the bridge gutter line. This is necessary to avoid conflicting with the concrete pad footing required for the Trend Guardrail. (See attached detail).

The detailer shall also eliminate the concrete curb from the approach slab edge when adjoining a Trend guardrail.

The above detail changes only apply where approach slabs adjoin Trend type guardrails. The detailer can determine the type of guardrail to be used by looking at the road plan and profile sheet.

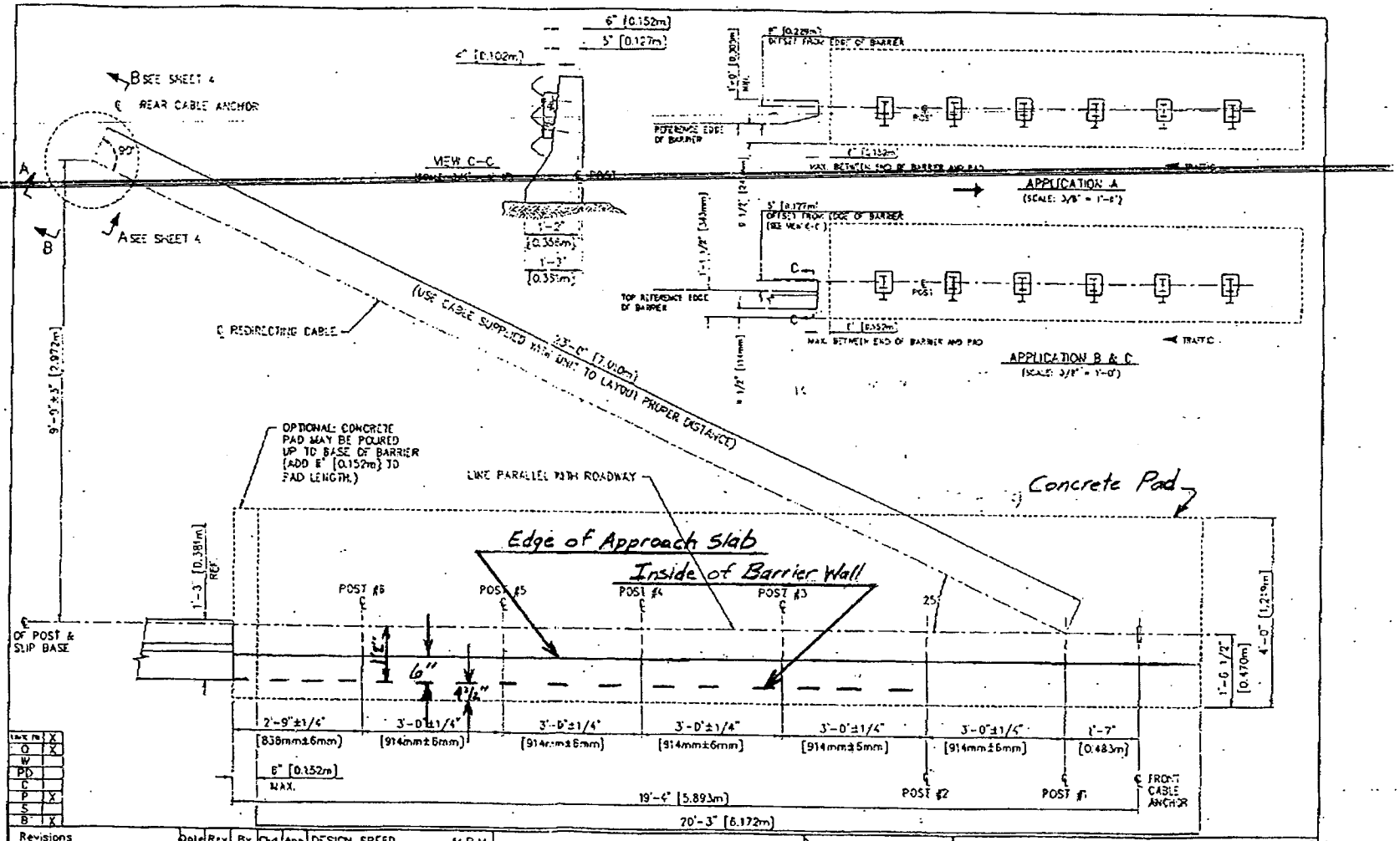
Randy R. Cannon
Interim Bridge Design Engineer

Attachment

cc: Assistant Bridge Design Engineers

REL/slb

REDUCED




| Revisions | Date | Rev. | By | Chd. | App. |
|---|---|---|---|---|---|
| TOTAL REDRAW, SPACING WAS 3'-1 1/2" | 8/9/96 | F | BD | SPT | BBS |
| UPDATED DWG TO SHOW 3" PCF ANCHOR | 5/1/90 | G | JR | MBS | PBS |
| ADDED ±1/4" TO POST SPACING | 11/1/90 | H | TD | BP | SPT |
| REVISED DWG. SEE DWG. | 7/10/96 | I | SC | SP | AP |

| | |
|---|---|
| DESIGN SPEED | M.P.H. |
| AVERAGE G's | |
| EST. FORCE ON BACKUP STRUCTURE | KIPS |
| Designed | Date |
| Drawn — Bill Bailey | 03/22/90 |
| Checked — S.P. Timm | 5/01/90 |
| Approved — C.S.S. | 5/01/90 |

REFERENCES

Project No. _____ Sales Order No. _____
Serial No. _____ Color _____

ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

# TREND LAYOUT DETAIL

| SCALE | SIZE | DWG. NUMBER | SHEET | REV. |
|---|---|---|---|---|
| (1:16) 3/4"=1'-0" | C | 85-02-01 | 3 OF 4 | 1 |

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DM0497

March 6, 1997

**MEMORANDUM TO GROUP LEADERS AND CONSULTANTS**

SUBJECT: Payment of Reinforcing Steel used for Pile Anchorage

---

Beginning with the June 1997 Letting, the Bridge Design Office will detail reinforcing bars used for anchorage of prestressed concrete piles on the bent sheets. The summary of quantities for the bents shall include the weight (mass) for these reinforcing bars.

New standard drawings for both the English and Metric prestressed concrete piles are attached and have been to revised to reflect necessary changes.

This revision is the result of an AGC request that allows the Contractor to purchase all reinforcing steel from a single source.

Randy R. Cannon
Interim Bridge Design Engineer

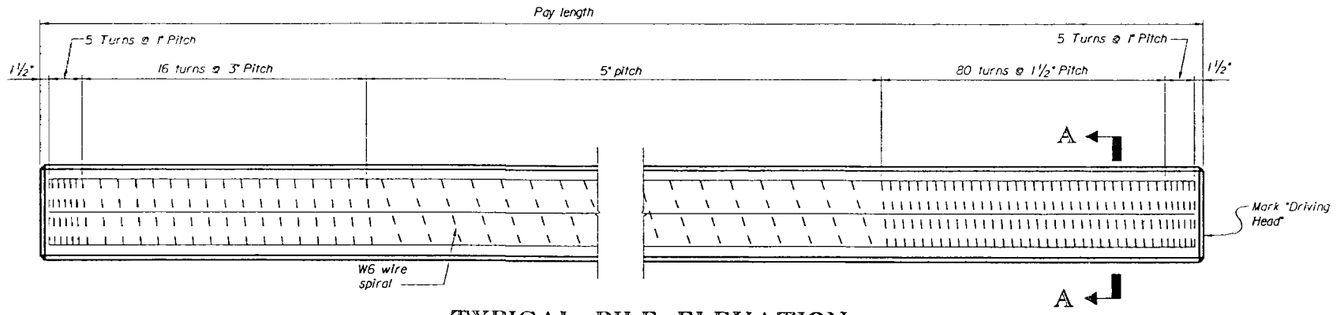
Attachments:

cc: Assistant Bridge Design Engineers

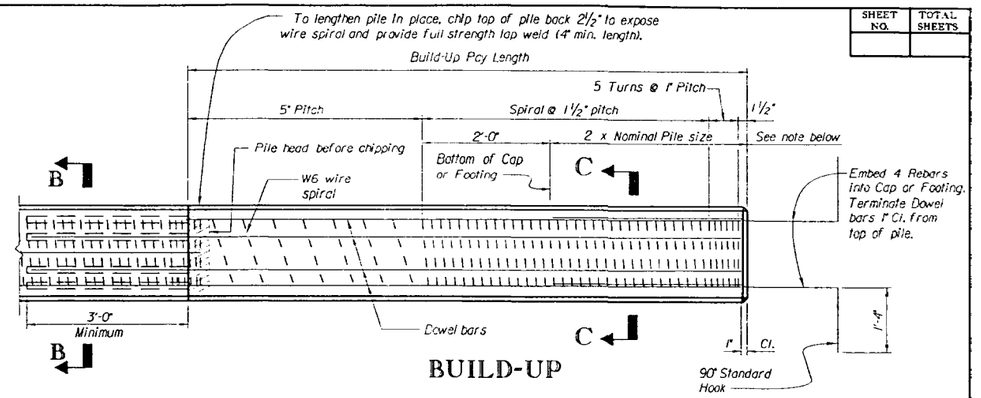
REL/slb

b712.std

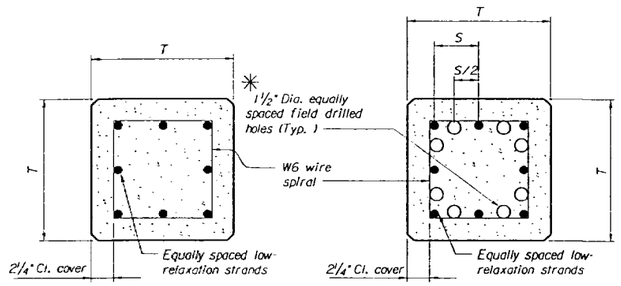
| SHEET NO. | TOTAL SHEETS |
|---|---|
| | |




## TYPICAL PILE ELEVATION



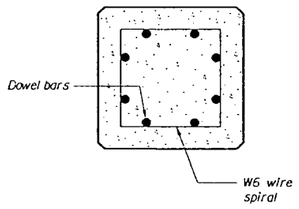

## BUILD-UP



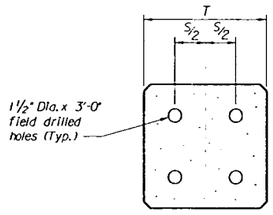

SECT. A-A




SECT. B-B



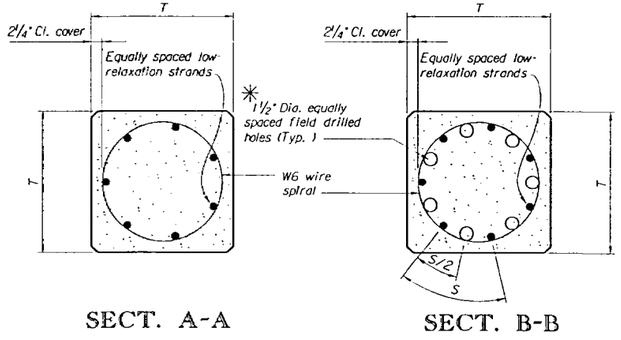

SECT. C-C




SECT. D-D

T = Nominal pile size

## SQUARE STRAND PATTERN

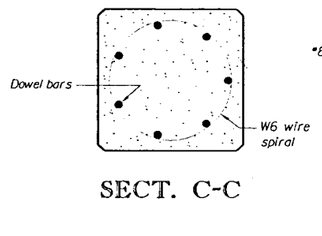



SECT. A-A



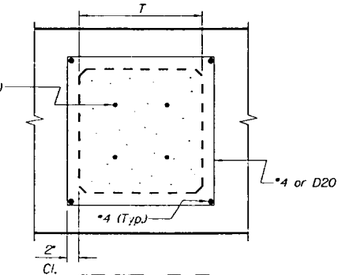

SECT. B-B

✳ Edge of field drilled dowel holes shall be ½" cl. from wire spiral.

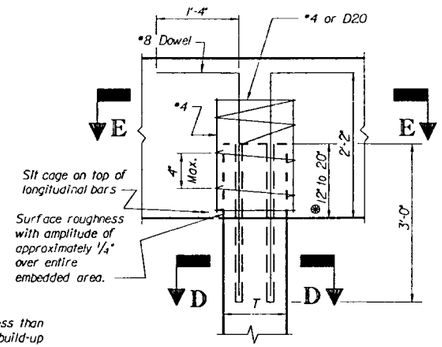



SECT. C-C

## CIRCULAR STRAND PATTERN




SECT. E-E




## PILE ANCHORAGE DETAILS

*8 and *4 or D20 bars are for pile anchorage and are detailed on bent sheets and included in bent quantities. Any additional reinf. for pile build-up shall be included in the unit price bid for prestressed concrete piling. *8 bars shall be spliced a min. of 3'-0" with a dowel bar in the pile build-up when build-ups are required.

Note:
All piles shall be anchored into the Bent Caps or Footings using the details shown on this sheet. All costs for this work shall be included in the unit price bid for prestressed concrete piling.

● If this dimension is less than 12", the pile shall have build-up as detailed above.

### NOTES FOR BUILD-UP

Chip back top of piles as shown in build-up detail and field drill holes in top of pile as shown in Section B-B. Dowel bar shall be grouted (f'c = 5000 psi, non-shrink) in the holes.

When length of required build-up permits, the 1½" pitch of the spiral shall be extended 2'-0" below bottom of cap or footing. Piles shall not be cut off an additional length in order to provide spiral at 1½" pitch for 2'-0" below the cap or footing.

If Pile Build-up is required with further driving, Dowel bars may be terminated at the top of Build-up and Pile Anchorage accomplished as shown in the Pile Anchorage Detail.

Piles having an embedment length less than 12" shall be built up as shown above and measurement shall be made for Pile Build-up Preparation. Build-up may be cast with bent cap provided rebar, pile spiral and *4 spiral cage are in place and the cap is cast with Class "X" Concrete. Concrete in the cap will be paid for as normal bent concrete regardless of the class used. Measurement of prestressed pile build-ups for payment shall include an embedment length of 20" when the build-up is cast with the bent cap.

Costs for dowel bars, wire spirals, concrete and surface roughness for build-ups shall be included in the unit price bid for prestressed concrete piling.

### GENERAL NOTES

The splice of wire spiral shall be made by full strength lap welds.

The Contractor shall submit dowel bar lengths to the Resident Engineer for approval.

Chamfer all exposed edges ¾" unless noted otherwise.

All dimensions relative to reinforcing steel are to centers of bars (except as noted).

Release alternate strands simultaneously at opposite ends without shock.

Wire spiral shall be tied to cables and reinforcing bars as required to maintain pitch of the spiral.

### MATERIALS

| | | |
|---|---|---|
| Prestressing Strand | - Grade 270, Low Relaxation | AASHTO M203 |
| Wire Spiral | - | AASHTO M32, M225 |
| Reinforcing Steel | - Grade 60 | AASHTO M31 |
| Concrete | - Class "X" | SCDHPT Sect. 701 |

## TOLERANCES

| | |
|---|---|
| Length | -1", -3" |
| Pile width | -⅛", +½" (including form draft) |
| Sweep (Variation from straight line parallel to centerline of member) (considered to be a form tolerance) | ± ⅛" per 10' |
| Position of strands | ¼" |
| Position of pick-up points | ± 6" |
| Variation from specified end squareness or skew | ±¼" per 12" |
| Longitudinal spacing of spiral | +¾" |

### PILE DATA

| | Pile size T | Strands | Stress (psi) | Dowel Bars | Maximum L: 1 pick-up point | 2 pick-up points | 3 pick-up points |
|---|---|---|---|---|---|---|---|
| Square strand pattern | 16" | 8 - ½" | 835 | 8 * 8 | 62' | 88' | 126' |
| | 18" | 8 - ½" S | 729 | 8 * 8 | 63' | 89' | 128' |
| | 20" | 12 - ½" | 804 | 12 * 8 | 69' | 97' | 140' |
| Circular strand pattern | 16" | 6 - 9/16" | 790 | 6 * 9 | 61' | 87' | 124' |
| | | 7 - ½" | 739 | 7 * 8 | 60' | 85' | 121' |
| | 18" | 7 - 9/16" | 733 | 7 * 9 | 63' | 89' | 128' |
| | | 8 - ½" S | 729 | 8 * 9 | 63' | 89' | 128' |
| | | 9 - ½" | 750 | 9 * 8 | 64' | 90' | 129' |
| | 20" | 9 - 9/16" | 761 | 9 * 9 | 67' | 96' | 137' |
| | | 10 - ½" S | 737 | 10 * 8 | 67' | 95' | 135' |
| | | 11 - ½" | 743 | 11 * 8 | 67' | 95' | 136' |

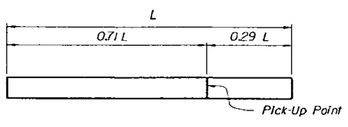
Note:
Piles shall be marked at pick-up points to indicate proper points for attaching handling lines.

### DESIGN DATA

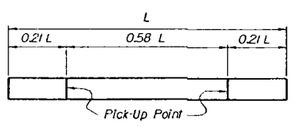
Low Relaxation Strands
F's = 270,000 psi
Fsi = 202,500 psi
Class "X" Concrete
F'c = 5000 psi
Fci = 3500 psi
Fc = 2000 psi

### STRAND DATA

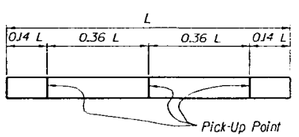
| Diameter | Area (in²) | Ult. Strength | 75% Ultimate |
|---|---|---|---|
| ½" | 0.153 | 41,310 lbs. | 30,982 lbs. |
| ½" Special | 0.167 | 45,090 lbs. | 33,817 lbs. |
| 9/16" | 0.192 | 51,840 lbs. | 38,880 lbs. |




SINGLE POINT PICK-UP




DOUBLE POINT PICK-UP




TRIPLE POINT PICK-UP

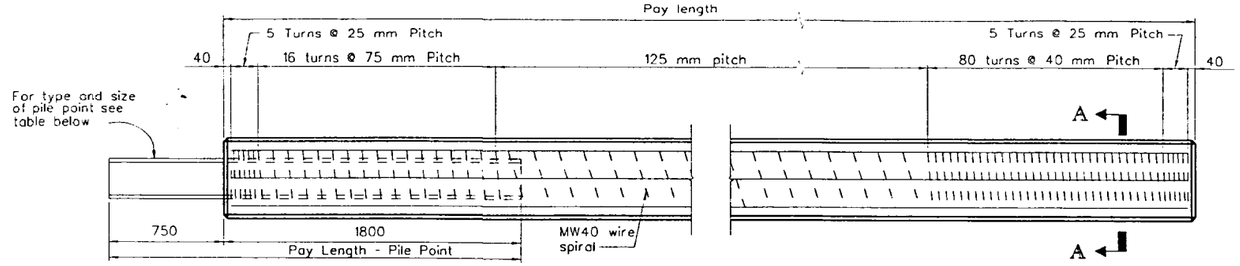
| REV. | DWM | BDP | 11-94 |
|---|---|---|---|
| | BAR CLEARANCE | | |
| REV. | DWM | BDP | 7-94 |
| | M225 | | |
| REV. | TBK | JLC | 5-93 |
| | REMOVE 14" PILE | | |
| REVIEWED | | | |
| QUAN. | | | |
| DR. | MSA | BWB | 9-89 |
| DES. | MSA | BWB | 7-89 |
| | BY | CHK. | DATE |

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN COLUMBIA, S.C.

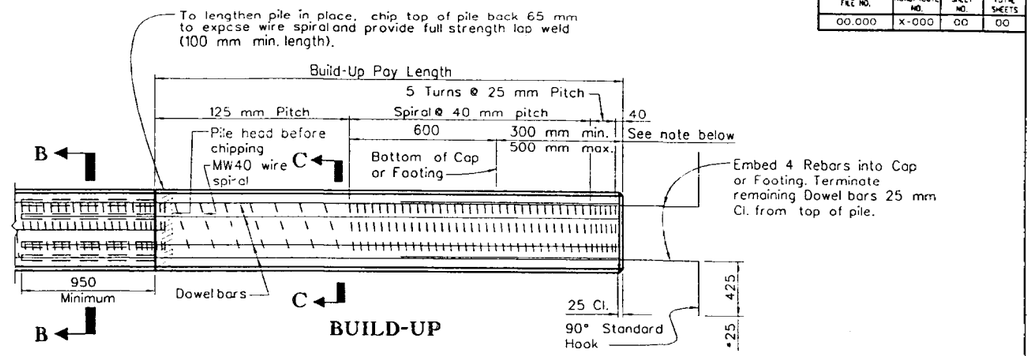
# PREST. CONC. PILES

| FILE NO. | ROUTE | COUNTY | DRAWING NO. |
|---|---|---|---|
| | | | 712 |

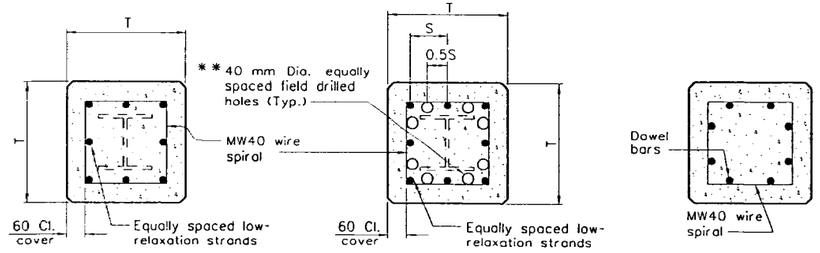
| FILE NO. | ROAD/ROUTE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| 00.000 | x-000 | 00 | 00 |




## TYPICAL PILE ELEVATION




## BUILD-UP




SECT. A-A SECT. B-B

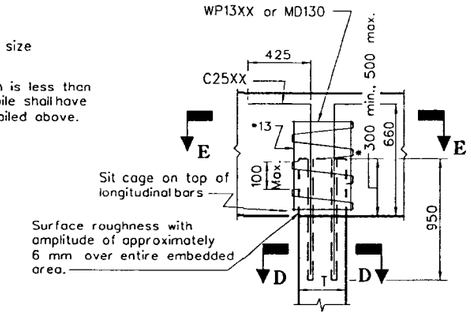



SECT. C-C

## SQUARE STRAND PATTERN

T • Nominal pile size

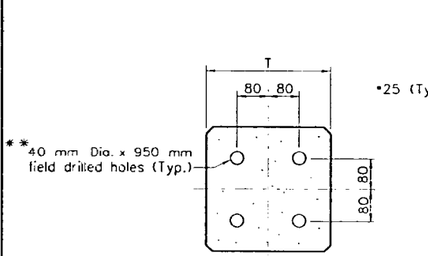
* If this dimension is less than 300 mm, the pile shall have build-up as detailed above.



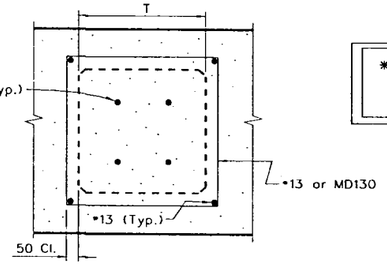

## PILE ANCHORAGE DETAILS

C25XX and WP13XX or MD130 bars are for pile anchorage and are detailed on bent sheets and included in bent quantities. Any additional reinf. for pile build-up shall be included in the unit price bid for prestressed concrete piling. C25XX bars shall be spliced a min. of 900 mm with a dowel bar in the pile build-up when build-ups are required.

Note:
All piles shall be anchored into the Bent Caps or Footings using the details shown on this sheet. All costs for this work shall be included in the unit price bid for prestressed concrete piling.




SECT. D-D




SECT. E-E

** Edge of field drilled dowel holes shall be 13 mm cl. from wire spiral.

## P I L E D A T A

| | Pile size T | Strands | Stress (MPa) | Dowel Bars | Maximum L 1 pick-up pt. | Maximum L 2 pick-up pts. | Maximum L 3 pick-up pts. | Pile point size |
|---|---|---|---|---|---|---|---|---|
| Square strand patt. | 457 mm | 8 - 13 mmSp | 5.03 | 8 *25 | 16 400 | 24 900 | 38 100 | HP250x85 |

Note:
Piles shall be marked at pick-up points to indicate proper points for attaching handling lines.

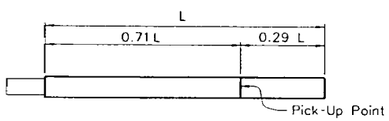
| STRAND DATA | | | |
|---|---|---|---|
| Diameter | Area (mm²) | Ult. Strength | 75% Ultimate |
| 13 mm Spec. | 107.74 | 200.6 kN | 150.4 kN |

## MATERIALS

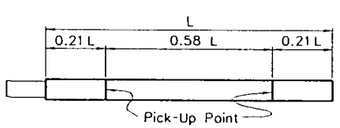
| | | |
|---|---|---|
| Prestressing Strand | - Grade 270, Low Relaxation | AASHTO M203 |
| Wire Spiral | - | AASHTO M32, M225 |
| Reinforcing Steel | - Grade 420 | ASTM A 615M-96a |
| Concrete | - Class 35 | SPEC. PROV. |
| HP Pile Point | - Grade 250 | AASHTO M270M |

## TOLERANCES

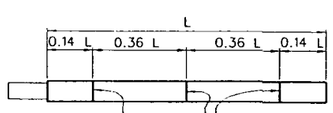
| | |
|---|---|
| Length | -25 mm, +76 mm |
| Pile width | - 10 mm, + 13 mm (Including form draft) |
| Sweep (Variation from straight line parallel to centerline of member) (considered to be a form tolerance) | ±3 mm per 3.048 m |
| Position of strands | 6 mm |
| Position of pick-up points | ±152 mm |
| Variation from specified end squareness or skew | ±6 mm per 305 mm |
| Longitudinal spacing of spiral | ±19 mm |
| Position of steel pile point | ±13 mm |
| Alignment of steel pile point | ±13 mm |
| Length of steel pile point | -76 mm, +152 mm |
| Projection of steel pile point from end of pile | ±25 mm |




SINGLE POINT PICK-UP




DOUBLE POINT PICK-UP




TRIPLE POINT PICK-UP

## NOTES FOR BUILD-UP

Chip back top of piles as shown in build-up detail and field drill holes in top of pile as shown in Section B-B. Dowel bar shall be grouted (f'c • 35 MPa, non-shrink) in the holes.

When length of required build-up permits, the 40 mm pitch of the spiral shall be extended 600 mm below bottom of cap or footing. Piles shall not be cut off an additional length in order to provide spiral at 40 mm pitch for 600 mm below the cap or footing.

If Pile Build-up is required with further driving, Dowel bars may be terminated at the top of Build-up and Pile Anchorage accomplished as shown in the Pile Anchorage Detail.

Piles having an embedment length less than 300 mm shall be built up as shown above and measurement shall be made for Pile Build-up Preparation. Build-up may be cast with bent cap provided rebar, pile spiral and *13 spiral cage are in place and the cap is cast with Class 35 Concrete. Concrete in the cap will be paid for as normal bent concrete regardless of the class used. Measurement of prestressed pile build-ups for payment shall include an embedment length of 500 mm when the build-up is cast with the bent cap.

Costs for dowel bars, wire spirals, concrete and surface roughness for build-ups shall be included in the unit price bid for prestressed concrete piling.

## PRESTRESSED PILE POINTS

The Department reserves the right to extend prestressed pile points by field welding additional lengths of prestressed pile points, and to shorten the lengths of prestressed pile points be cutting off some of the prestressed pile points. Therefore, any reinforced pile tips used shall not be welded onto the prestressed pile points until directed by the Engineer, normally just prior to driving. If splices are necessary, they shall be made as indicated in section 713.05 of the Special Provisions. All costs for additional lengths of prestressed pile points will be paid for at the unit cost bid for prestressed pile points, with an allowance of 600 mm of prestressed pile point for each splice eligible for payment.

## REINFORCED PILE TIPS

When specified in the contract, prestressed pile points shall be reinforced with manufactured cast steel pile tips conforming to AASHTO M103M (ASTM A-27M). The pile tips shall be installed in accordance with the manufacturer's recommendations except that as a minimum, the welds shall extend across the full width of each flange. The reinforced steel pile tips shall be approved by the Engineer prior to installation and the welds shall be visually inspected by the Resident Engineer in the field. All costs for installing reinforced pile tips to prestressed pile points shall be included in the unit price bid for reinforced pile tips.

## FIELD WELDING

Field welding shall comply with the special provisions for field welding.

## GENERAL NOTES

The splice of wire spiral shall be made by full strength lap welds.

The Contractor shall submit dowel bar lengths to the Resident Engineer for approval.

Chamfer all exposed edges 20 mm unless noted otherwise.

All dimensions relative to reinforcing steel are to centers of bars (except as noted).

Release alternate strands simultaneously at opposite ends without shock.

Wire spiral shall be tied to cables and reinforcing bars as required to maintain pitch of the spiral.

## DESIGN DATA

Low Relaxation Strands

f's = 1862 MPa
fsi = 1396 MPa

Class 35 Concrete

f'c = 35.0 MPa
f'ci = 24.5 MPa
fc = 14.0 MPa

NOTE TO DETAILER:
Maximum pile lengths shall be adjusted if length of pile point is increased.

| CADD PILE INFORMATION | |
|---|---|
| USER NAME | by X |
| FILE NAME | b000000pp.dgn |
| DATE | XX-9X |
| CHK | XXX |
| BY | XXX |
| DR. | WAR |
| DES. | |
| QUAN | |
| REVIEWED | |
| | 1-97 |

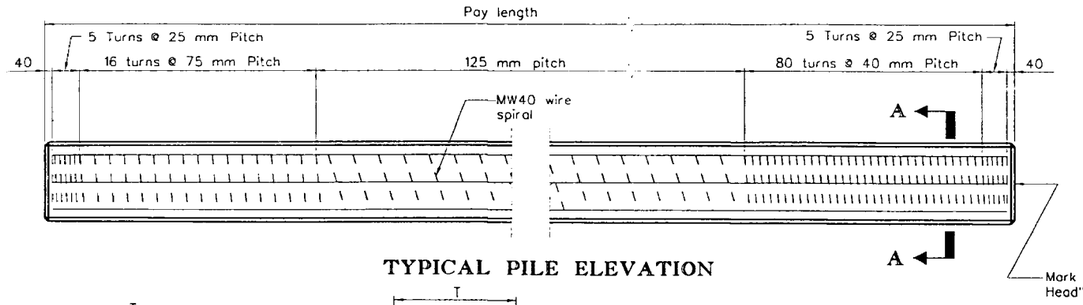
South Carolina Department of Transportation

**BRIDGE DESIGN**

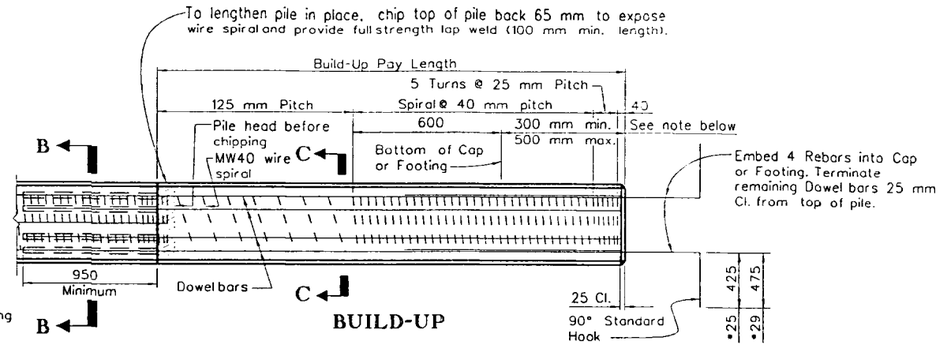
| REV. | MADE | AUTH | DATE | DESCRIPTION |
|---|---|---|---|---|
| 3 | | | | |
| 2 | | | | |
| 1 | XXX | XXX | XX-9X | FROM STANDARD |

# PRESTR. CONC. PILES WITH POINTS

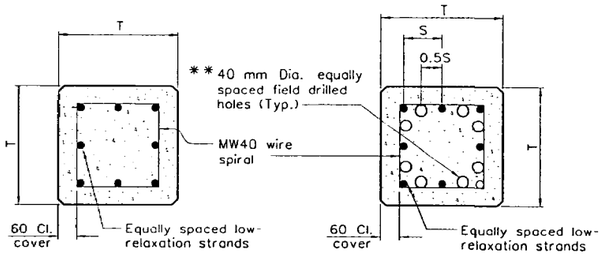
| FILE NO. | ROAD/ROUTE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| 00.000 | X-000 | 00 | 00 |




## TYPICAL PILE ELEVATION

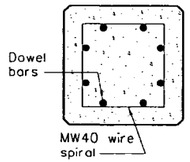



## BUILD-UP




SECT. A-A SECT. B-B

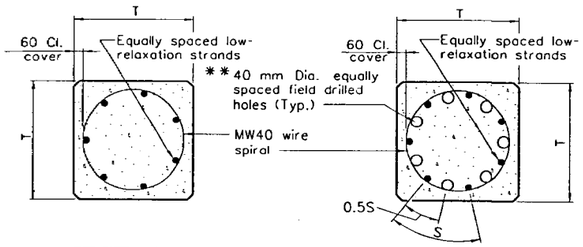
## SQUARE STRAND PATTERN




SECT. C-C

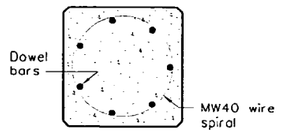
T = Nominal pile size

* If this dimension is less than 300 mm, the pile shall have build-up as detailed above.

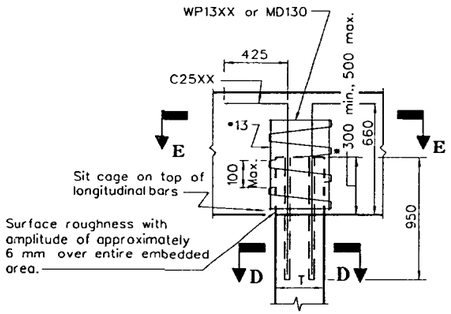



SECT. A-A SECT. B-B

## CIRCULAR STRAND PATTERN




SECT. C-C




## PILE ANCHORAGE DETAILS

C25XX and WP13XX or MD130 bars are for pile anchorage and are detailed on bent sheets and included in bent quantities. Any additional reinf. for pile build-up shall be included in the unit price bid for prestressed concrete piling. C25XX bars shall be spliced a min. of 900 mm with a dowel bar in the pile build-up when build-ups are required.

Note:
All piles shall be anchored into the Bent Caps or Footings using the details shown on this sheet. All costs for this work shall be included in the unit price bid for prestressed concrete piling.

| STRAND DATA | | | |
|---|---|---|---|
| Diameter | Area ($mm^2$) | Ult. Strength | 75% Ultimate |
| 13 mm | 98.71 | 183.8 kN | 137.8 kN |
| 13 mm Spec. | 107.74 | 200.6 kN | 150.4 kN |
| 14 mm | 123.87 | 230.6 kN | 172.9 kN |

**DESIGN DATA**

Low Relaxation Strands
f's = 1862 MPa
fsi = 1396 MPa

Class 35 Concrete
f'c = 35.0 MPa
f'ci = 24.5 MPa
fc = 14.0 MPa

## NOTES FOR BUILD-UP

Chip back top of piles as shown in build-up detail and field drill holes in top of pile as shown in Section B-B. Dowel bar shall be grouted (f'c = 35 MPa, non-shrink) in the holes.

When length of required build-up permits, the 40 mm pitch of the spiral shall be extended 600 mm below bottom of cap or footing. Piles shall not be cut off an additional length in order to provide spiral at 40 mm pitch for 600 mm below the cap or footing.

If Pile Build-up is required with further driving, Dowel bars may be terminated at the top of Build-up and Pile Anchorage accomplished as shown in the Pile Anchorage Detail.

Piles having an embedment length less than 300 mm shall be built up as shown above and measurement shall be made for Pile Build-up Preparation. Build-up may be cast with bent cap provided rebar, pile spiral and •13 spiral cage are in place and the cap is cast with Class 35 Concrete. Concrete in the cap will be paid for as normal bent concrete regardless of the class used. Measurement of prestressed pile build-ups for payment shall include an embedment length of 500 mm when the build-up is cast with the bent cap.

Costs for dowel bars, wire spirals, concrete and surface roughness for build-ups shall be included in the unit price bid for prestressed concrete piling.

## GENERAL NOTES

The splice of wire spiral shall be made by full strength lap welds.

The Contractor shall submit dowel bar lengths to the Resident Engineer for approval.

Chamfer all exposed edges 20 mm unless noted otherwise.

All dimensions relative to reinforcing steel are to centers of bars (except as noted).

Release alternate strands simultaneously at opposite ends without shock.

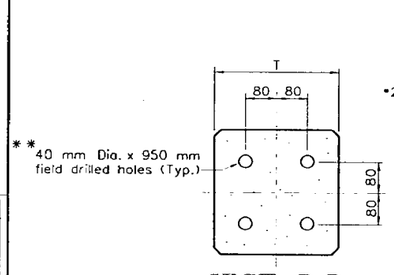
Wire spiral shall be tied to cables and reinforcing bars as required to maintain pitch of the spiral.

### MATERIALS

| | | |
|---|---|---|
| Prestressing Strand | - Grade 270, Low Relaxation | AASHTO M203 |
| Wire Spiral | - | AASHTO M32, M225 |
| Reinforcing Steel | - Grade 420 | ASTM A 615M-96a |
| Concrete | - Class 35 | SPEC. PROV. |

## TOLERANCES

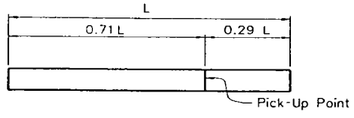
Length ---------- -25 mm, +76 mm
Pile width ------ - 10 mm, + 13 mm (including form draft)
Sweep (Variation from straight line parallel to centerline of member)
(considered to be a form tolerance) ------- ±3 mm per 3.048 m
Position of strands ---------- 6 mm
Position of pick-up points ---------- ±152 mm
Variation from specified end squareness or skew ---------- ±6 mm per 305 mm
Longitudinal spacing of spiral ---------- -19 mm



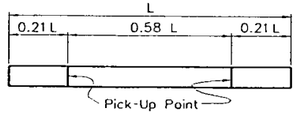

SECT. D-D SECT. E-E

** Edge of field drilled dowel holes shall be 13 mm cl. from wire spiral.

| PILE DATA | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Pile size T | Strands | Stress (MPa) | Dowel Bars | Maximum L: 1 pick-up pt. | Maximum L: 2 pick-up pts. | Maximum L: 3 pick-up pts. |
| Square strand patt. | 457 mm | 8 - 13 mmSp | 5.03 | 8-•25 | 19 200 | 27 100 | 39 000 |
| Circular Strand Pattern | 457 mm | 7 - 14 mm | 5.05 | 7-•29 | 19 200 | 27 100 | 39 000 |
| | | 8 - 13 mmSp | 5.03 | 8-•29 | 19 200 | 27 100 | 39 000 |
| | | 9 - 13 mm | 5.17 | 9-•25 | 19 500 | 27 400 | 39 300 |

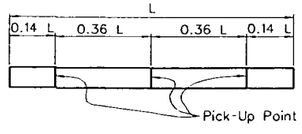



## SINGLE POINT PICK-UP




## DOUBLE POINT PICK-UP

Note:
Piles shall be marked at pick-up points to indicate proper points for attaching handling lines.




## TRIPLE POINT PICK-UP

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FILE NAME =
DATE = 1-97
CHK. = XXX
LEM = XXX
DES. = XXX
DR. = WAR
QUAN = WAR
REVIEWED =

South Carolina Department of Transportation

INTERNATIONAL Metric SYSTEM OF UNITS

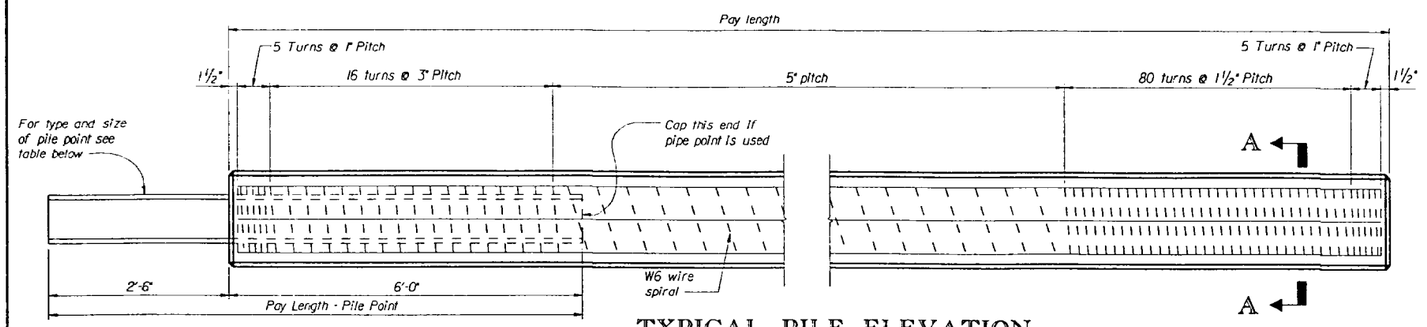
**BRIDGE DESIGN**

| REV. | MADE | AUTH. | DATE | DESCRIPTION |
|---|---|---|---|---|
| 3 | | | | |
| 2 | WAR | REL | 2-97 | PILE ANCH./B. U. NOTE |
| 1 | XXX | XXX | XX-9X | FROM STANDARD |

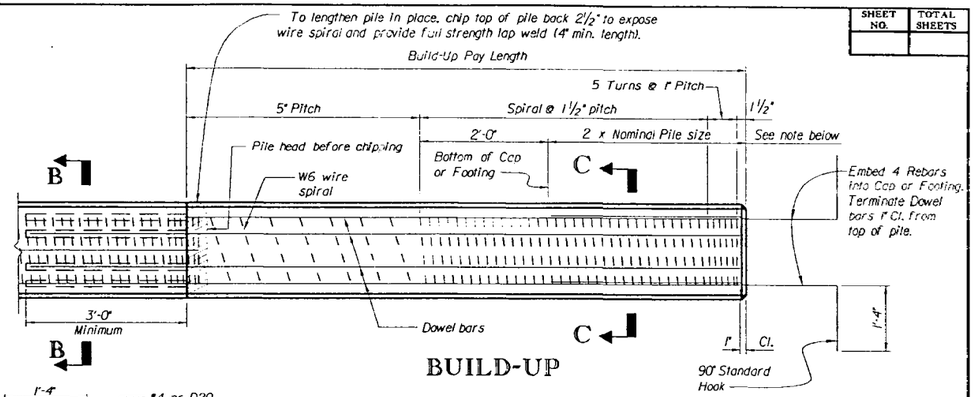
# PRESTR. CONC. PILES

b712p.std

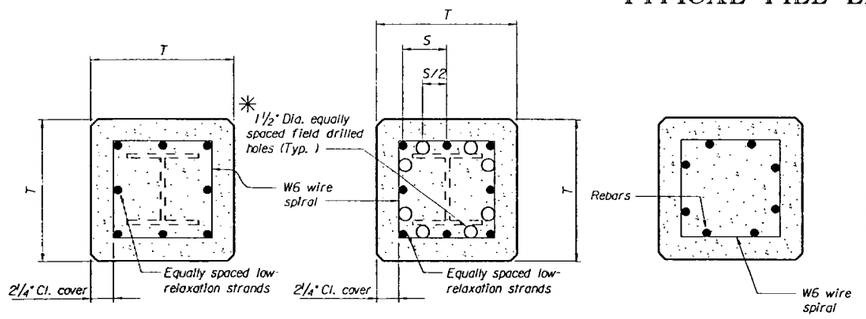
| SHEET NO. | TOTAL SHEETS |
|---|---|
| | |




## TYPICAL PILE ELEVATION




## BUILD-UP



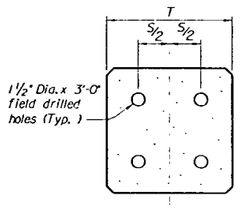

SECT. A-A




SECT. B-B

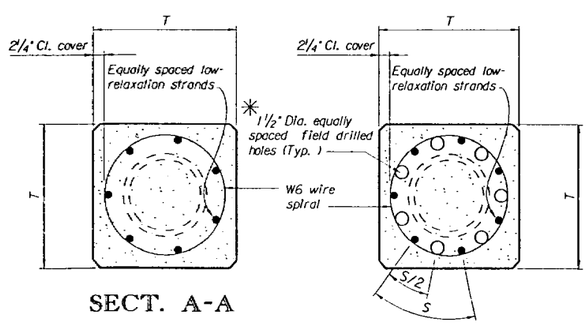



SECT. C-C



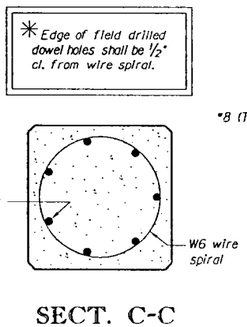

SECT. D-D

## SQUARE STRAND PATTERN

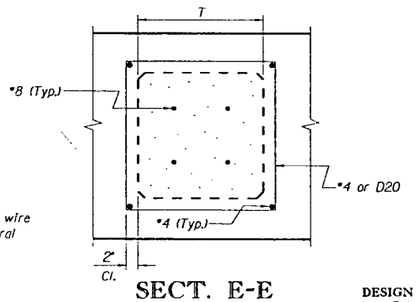



SECT. A-A

SECT. B-B




SECT. C-C



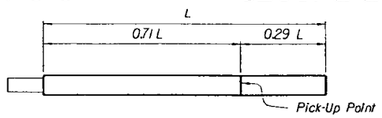

SECT. E-E

## CIRCULAR STRAND PATTERN

### P I L E  D A T A

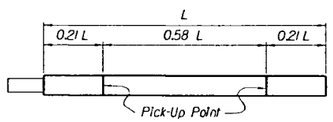
| | Pile size T | Strands | Stress (psi) | Rebar | Maximum L: 1 pick-up point | Maximum L: 2 pick-up points | Maximum L: 3 pick-up points | Pile Point Size |
|---|---|---|---|---|---|---|---|---|
| Square strand pattern | 16" | 8 - ½" | 835 | 8 * 8 | 60' | 88' | 126' | HP8x36 |
| | 18" | 8 - ½" S | 729 | 8 * 8 | 61' | 89' | 128' | HP10X57 †† |
| | 20" | 12 - ½" | 804 | 12 * 8 | 66' | 97' | 140' | |
| Circular strand pattern | | | | | | | | Double Extra Strong 6" dia. Pipe |
| | 16" | 6 - 9/16" | 790 | 6 * 9 | 59' | 87' | 124' | |
| | | 7 - ½" | 739 | 7 * 8 | 58' | 85' | 121' | |
| | 18" | 7 - 9/16" | 733 | 7 * 9 | 61' | 89' | 128' | Double Extra Strong 8" dia. Pipe |
| | | 8 - ½" S | 729 | 8 * 9 | 61' | 89' | 128' | |
| | | 9 - ½" | 750 | 9 * 8 | 61' | 90' | 129' | |
| | 20" | 9 - 9/16" | 761 | 9 * 9 | 64' | 96' | 137' | |
| | | 10 - ½" S | 737 | 10 * 8 | 64' | 95' | 135' | |
| | | 11 - ½" | 743 | 11 * 8 | 64' | 95' | 136' | |

NOTE TO DETAILER:
Maximum pile length for single point pick-up shall be adjusted if length of pile point is increased.



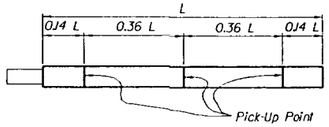

## SINGLE POINT PICK-UP

†† Note:
Double Extra Strong Pipe may be substituted for the HP pile point at the Contractor's option and at no additional cost to the department.

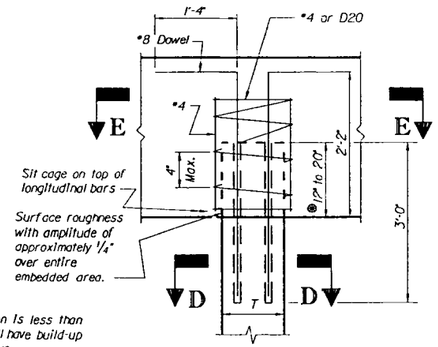



## DOUBLE POINT PICK-UP

Note:
Piles shall be marked at pick-up points to indicate proper points for attaching handling lines.




## TRIPLE POINT PICK-UP




● If this dimension is less than 12", the pile shall have build-up as detailed above.

## PILE ANCHORAGE DETAILS

*8 and *4 or D20 bars are for pile anchorage and are detailed on bent sheets and included in bent quantities. Any additional reinf. for pile build-up shall be included in the unit price bid for prestressed concrete piling. *8 bars shall be spliced a min. of 3'-0" with a dowel bar in the pile build-up when build-ups are required.

Note:
All piles shall be anchored into the Bent Caps or Footings using the details shown on this sheet. All costs for this work shall be included in the unit price bid for prestressed concrete piling.

| STRAND DATA | | | |
|---|---|---|---|
| Diameter | Area (in²) | Ult. Strength | 75% Ultimate |
| ½" | 0.153 | 41,310 lbs. | 30,982 lbs. |
| ½" Special | 0.157 | 45,090 lbs. | 33,817 lbs. |
| 9/16" | 0.192 | 51,840 lbs. | 38,880 lbs. |

**DESIGN DATA**

Low Relaxation Strands
F's = 270,000 psi
Fsi = 202,500 psi
Class "X" Concrete
F'c = 5000 psi
F'ci = 3500 psi
Fc = 2000 psi

**MATERIALS**

| | | |
|---|---|---|
| Prestressing Strand | - Grade 270, Low Relaxation | AASHTO M203 |
| Wire Spiral | - | AASHTO M32, M225 |
| Reinforcing Steel | - Grade 60 | AASHTO M31 |
| Concrete | - Class "X" | SCDHPT Sect. 701 |
| HP Pile Point | - Grade 36 | AASHTO M270 |
| Pipe Pile Point | - Grade B | ASTM A53 |

## TOLERANCES

| | |
|---|---|
| Length | -1", -3" |
| Pile width | -⅜", +½" (including form draft) |
| Sweep (Variation from straight line parallel to centerline of member) (considered to be a form tolerance) | ± 1/8" per 10' |
| Position of strands | 1/4" |
| Position of pick-up points | ± 6" |
| Variation from specified end squareness or skew | ±¼" per 12" |
| Longitudinal spacing of spiral | +¼" |
| Position of steel pile point | ± ½" |
| Alignment of steel pile point | ± ½" |
| Length of steel pile point | -3", +6" |
| Projection of steel pile point from end of pile | ± 1" |

**NOTES FOR BUILD-UP**

Chip back top of piles as shown in build-up detail and field drill holes in top of pile as shown in Section B-B. Dowel bar shall be grouted if f'c = 5000 psi, non-shrink) in the holes.

When length of required build-up permits, the 1½" pitch of the spiral shall be extended 2'-0" below bottom of cap or footing. Piles shall not be cut off an additional length in order to provide spiral at 1½" pitch for 2'-0" below the cap or footing.

If Pile Build-up is required with further driving, Dowel bars may be terminated at the top of Build-up and Pile Anchorage accomplished as shown in the Pile Anchorage Detail.

Piles having an embedment length less than 12" shall be built up as shown above and measurement shall be made for Pile Build-up Preparation. Build-up may be cast with bent cap provided rebar, pile spiral and *4 spiral cage are in place and the cap is cast with Class "X" Concrete. Concrete in the cap will be paid for as normal bent concrete regardless of the class used. Measurement of prestressed pile build-ups for payment shall include an embedment length of 20" when the build-up is cast with the bent cap.

Costs for dowel bars, wire spirals, concrete and surface roughness for build-ups shall be included in the unit price bid for prestressed concrete piling.

**PRESTRESSED PILE POINTS**

The Department reserves the right to extend prestressed pile points by field welding additional lengths of prestressed pile points, and to shorten the lengths of prestressed pile point by cutting off some of the prestressed pile points. Therefore, any reinforced pile tips used shall not be welded onto the prestressed pile points until directed by the Engineer, normally just prior to driving. If splices are necessary, they shall be made as indicated in section 713.05 of the Standard Specifications for Highway Construction. All costs for additional lengths of prestressed pile points will be paid for at the unit cost bid for prestressed pile points, with an allowance of two feet of prestressed pile point for each splice eligible for payment.

**REINFORCED PILE TIPS**

When specified in the contract, prestressed pile points shall be reinforced with manufactured cast steel pile tips conforming to AASHTO M103 (ASTM A-27). The pile tips shall be installed in accordance with the manufacturer's recommendations except that as a minimum, the welds shall extend across the full width of each flange. The reinforced steel pile tips shall be approved by the Engineer prior to installation and the welds shall be visually inspected by the Resident Engineer in the field. All costs for installing reinforced pile tips to prestressed pile points shall be included in the unit price bid for reinforced pile tips.

**FIELD WELDING**

Field welding shall comply with the special provisions for field welding.

**GENERAL NOTES**

The splice of wire spiral shall be made by full strength lap welds.
The Contractor shall submit dowel bar lengths to the Resident Engineer for approval.
Chamfer all exposed edges ¾" unless noted otherwise.
All dimensions relative to reinforcing steel are to centers of bars except as noted).
Release alternate strands simultaneously at opposite ends without shock.
Wire spiral shall be tied to cables and reinforcing bars as required to maintain pitch of the spiral.

| REV. | DWM | BDP | 11-94 |
|---|---|---|---|
| | BAR CLEARANCE | | |
| REV. | DWM | BDP | 7-94 |
| | M225 | | |
| REV. | WGP | JP | 5-94 |
| | PILE POINTS | | |
| REVIEWED | | | |
| QUAN. | | | |
| DR. | MSA | BWB | 9-89 |
| DES. | MSA | BWB | 7-89 |
| | BY | CHK. | DATE |

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN COLUMBIA, S.C.

# STANDARD FOR PREST. CONC. PILES WITH POINTS

| FILE NO. | ROUTE | COUNTY | DRAWING NO. |
|---|---|---|---|
| | | | 712P |

South Carolina
Department of Transportation

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DM0597

March 25, 1997

**MEMORANDUM TO GROUP LEADERS AND CONSULTANTS**

SUBJECT: Revised Control Joint Details

---

Beginning with the July 1997 Letting, the attached control joint details should be used on all projects.

This revised control joint detail requires a 3 mm (1/8") open joint between barrier sections.

This revision is a result of a Bridge Construction Office request to reduce barrier concrete cracking near joints.

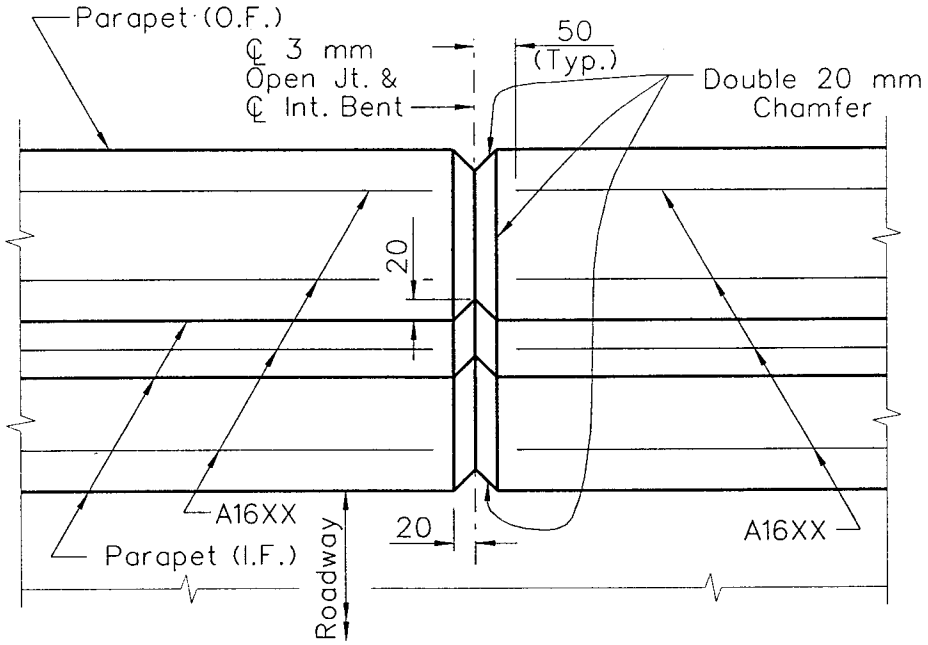
Randy R. Cannon, P. E.
Bridge Design Engineer

RRC/slb

Attachment

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer

File: PC/REL




**NOTE:** Place Double 20 mm Chamfer on each face of Parapet at ℄ Int. Bent.

# PART PLAN SHOWING CONTROL JOINT

SL 13

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DM0697

June 17, 1997

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT:** Splicing column reinforcing

An allowable splice in the main (vertical) steel should be detailed above the shaft and below the cap between the confinement regions in the column. The confinement regions are as defined in design memorandum DM0391. See Figure 1 on the attachment.

This memorandum supplements design memorandum DM0495.

Randy R. Cannon
Bridge Design Engineer

Attachment:
cc: Assistant Bridge Design Engineers

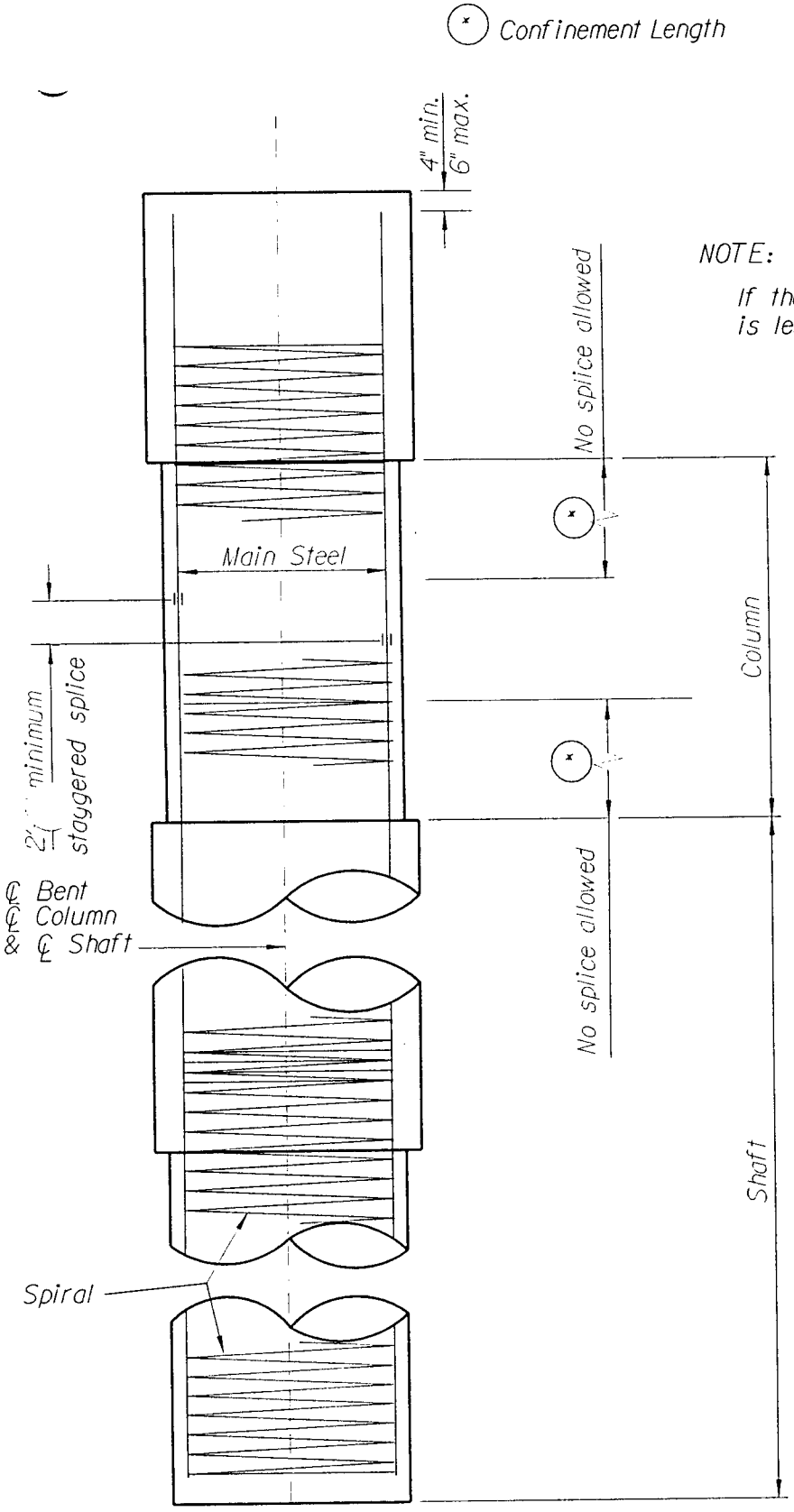
Confinement Length
4" min.
6" max.
NOTE:
If the distance between confinement lengths is less than 2'-0", a splice is not allowed.
No splice allowed
Main Steel
Column
2'-0" minimum staggered splice
℄ Bent
℄ Column
& ℄ Shaft
No splice allowed
Shaft
Spiral

Figure 1

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DM0797

August 6, 1997

# MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT:** Column Confinement Reinforcing

---

The spirals in columns shall extend into the cap and/or footing as shown on the attachment in the End Elevation.

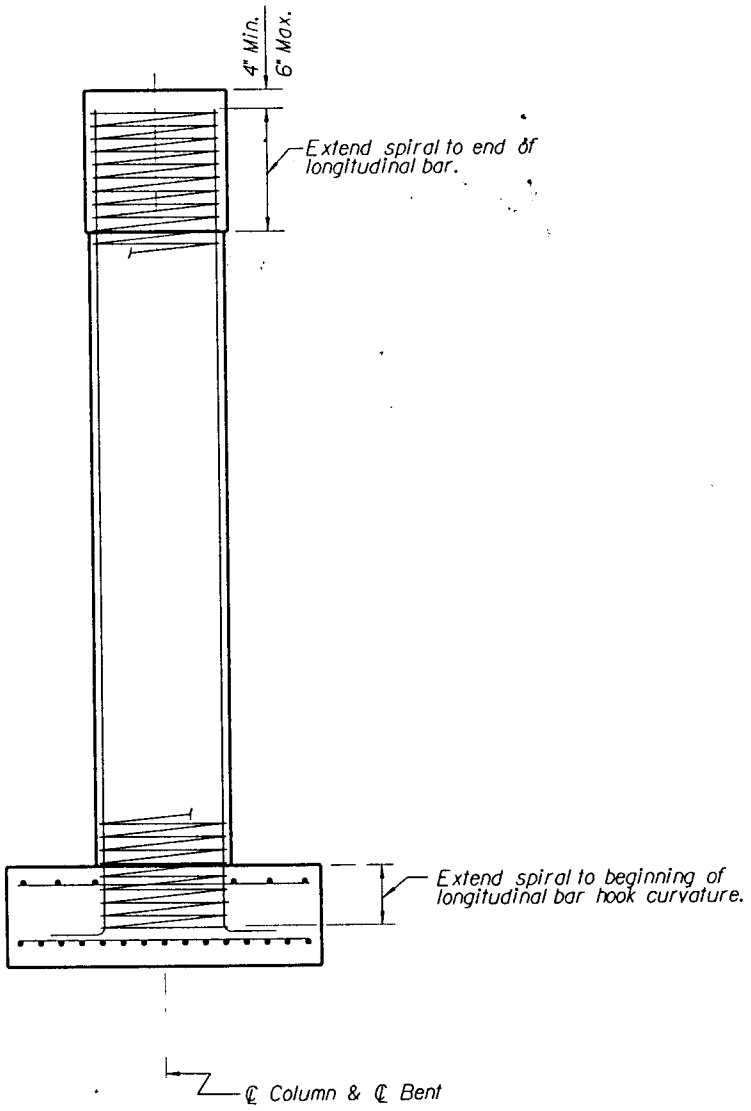
This memorandum modifies design memorandum DM0391, Figure 4.

Randy R. Cannon
Bridge Design Engineer

Attachment:

cc: Assistant Bridge Design Engineers

# CONFINEMENT RENFORCING DETAIL AT BEAM-CAP & FOOTING




## END ELEVATION

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DM0897

August 20, 1997

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT:** Bridge Plan Title Sheet

---

Beginning immediately all Bridge Plan Title Sheets should include both the road number and the local road name. This information is available from the Project Planning Reports (PPR) or from the Bridge Project Engineer.

The road number and the road name should be shown on the same line where possible. (See example below).

Road S-220 (Lister Road)

The addition of the local road name was requested by the Bridge Construction Engineer to make the identification of the project site easier.

Randy R. Cannon
Bridge Design Engineer

cc: Assistant Bridge Design Engineers

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DM0997

August 29, 1997

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS**

**SUBJECT:** Spiral Reinforcement in Prestressed Concrete Piles

---

The square spiral reinforcement pattern in prestressed concrete piles will be replaced with a circular spiral reinforcement pattern only. To accommodate this change, the following pile points will be used when geotechnical conditions warrant:

W8x58 for 18" Square Prestressed Concrete Piles
HP10x57 for 20" Square Prestressed Concrete Piles
8" Extra Strong Pipe for 18" & 20" Square Prestressed Concrete Piles
8" Double Extra Strong Pipe for 18" & 20" Square Prestressed Concrete Piles

This change is being made because the circular spiral pattern will confine the concrete core more effectively than the square spiral pattern during seismic events.

A new set of pile standards are being prepared by Mr. Reed and will be available soon. These new standards shall be incorporated into new projects as applicable. Of course, the determination whether to use pile points and which points to use will be based on recommendations by the geotechnical engineer.

Randy R. Cannon
Bridge Design Engineer

RRC/tbk

CC: Assistant Bridge Design Engineers

File: PC/TBK

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DM1097

October 13, 1997

MEMORANDUM TO GROUP LEADERS AND CONSULTANTS

**SUBJECT:** Breaking Spiral Reinforcement at Cap/Column Connection

---

On all future projects, there shall be a "break" in spiral reinforcement where the primary steel in the cap intersects with the spiral from the column. This is being done to aid in the constructability of column bents. The spiral cage in the column shall extend to within 1" of the top of column. As before, the designer may still detail the spiral 2 ft. longer than required to allow lowering the bottom of shaft or footing. A short spiral cage will extend from the bottom layer of the primary cap reinforcement to within 6" of the top of cap as per design memorandum DM0797. All ends of the spirals shall be wrapped 1 ½ turns and secured with a lap weld or mechanical coupler to prevent unraveling during a seismic event. The phrase "1 ½ turns @ a closed pitch" on the Reinforcing Bending Details sheet shall be modified to read "1 ½ turns @ a closed pitch secured by lap weld or mechanical coupler capable of developing 125% $F_y$ of the bar". See attached page.

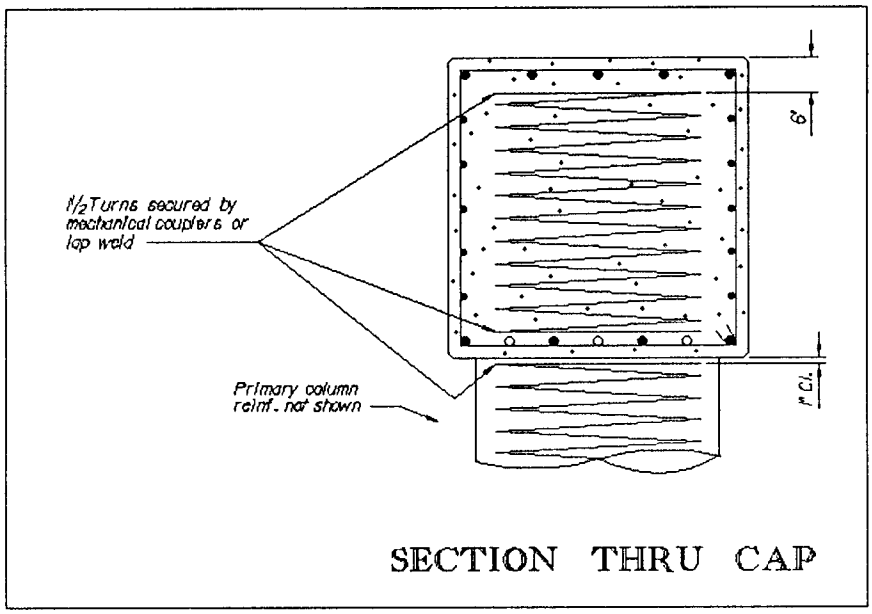
Current projects already detailed need not be changed.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers

Attachment

File: PC/TBK


1½ Turns secured by mechanical couplers or lap weld
Primary column reinf. not shown
6"
1" Cl.
SECTION THRU CAP

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DM01198

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS**

**SUBJECT:** CONSTRUCTABILITY REVIEW

---

The Performance Audit performed on the SCDOT identified one area that affects Bridge Design, and that is Constructability Review. I have discussed this with Mr. Charles Matthews of the Bridge Construction Office and we feel that there is good communication between Bridge Design and Construction. Bridge Construction does not have the staff to perform constructability reviews on all projects.

Therefore, for routine projects that are designed in house and that do not include staging we recommend that these projects continue according to the current practice. For projects with complex staging, or different construction techniques, Bridge Construction should be consulted for construction comments.

For major projects utilizing Consultants, the project scope of services should contain a Constructability Review during the design phase, and this should be performed by the Consultant.

The Department will perform Constructability Reviews as time and staffing levels permit for both in-house and consultant projects.

If you have additional questions, please let us know.

Randy Cannon
Bridge Design Engineer

RRC:rrc

cc: Assistant Bridge Design Engineers

File: PC/RRC

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DM0298

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS**

**SUBJECT:** New Drip Groove Location

---

Due to a complaint from the field engineers about insufficient cover for the bottom slab reinforcing steel at the drip groove, the drip groove shall be detailed 2" from the edge of slab instead of the 3" currently being shown.

The attached sketch shows a typical condition when slip forming is used. The transverse slab bar lengths should be computed to provide 2" clear to edge of slab as currently done. This will provide 3 ½" clear when slip forming is used.

Plans that are completed need not be changed. Office standard details will be revised accordingly.

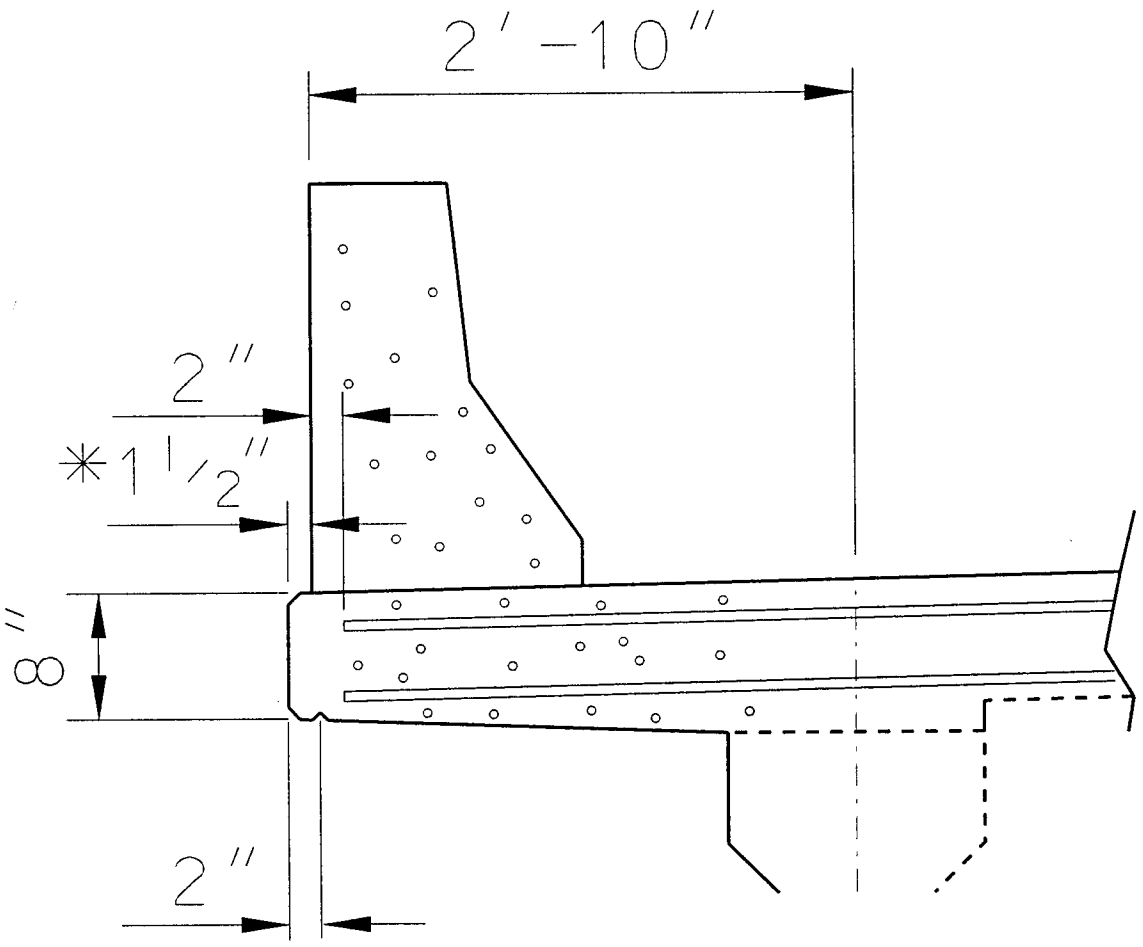
Randy Cannon
Bridge Design Engineer

RRC/slb

Attachment

cc: Assistant Bridge Design Engineers

File: PC/REL




*1 1/2" additional slab for slip forming Barrier parapet.

1" = 1'-0"

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DM0398

June 22, 1998

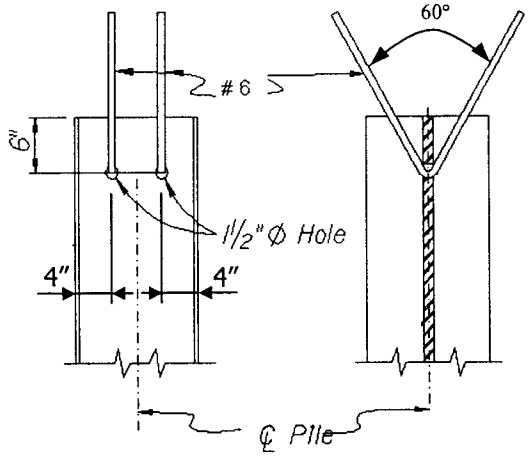
**MEMORANDUM TO GROUP LEADERS AND CONSULTANTS**

SUBJECT: Steel Pile Anchorage into Cap/Footing

In order to improve and standardize seismic detailing of pile anchorage, the following detail shall be incorporated into all bridge plans using steel piling, unless seismic analysis dictates otherwise.

Two V shaped #6 rebars should be used to anchor steel piles to the cap/footing. The diameter of the hole should be limited to 2 times the bar diameter (1.5"). The rebars should be tied or wedged tightly against the top of the hole to reduce the possibility of slip between the rebar anchor and the pile. The rebars should extend into the cap or footing a minimum of 1'-8" beyond the bottom mat of reinforcement.

Plans already detailed according to previous policy need not be changed.




Notes:
Holes shall be drilled or punched.
Rebars shall be tied or wedged tightly against the top of the hole

PILE ANCHOR DETAIL

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
File: PC/MA

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DM0498

July 20, 1998

# MEMORANDUM TO GROUP LEADERS AND CONSULTANTS

**SUBJECT:** Breaking Spiral Reinforcement at Cap/Column Connection

---

As you are aware, Design Memo DM1097 (dated October 13, 1997) requires a detail showing a break in the spiral reinforcement where the bottom layer of cap steel passes. This detail was developed with the idea that it would be easier to construct than threading the spiral through the bottom layer of cap steel. Contractors have expressed that they were not particularly fond of the detail. Therefore for the time being, detail all bridge plans as per Design Memo 1097, but add the following note to the appropriate plan sheets:

> ***Note: The Contractor may order WS00 and WS00 as one continuous bar and not discontinue spiral reinforcement at the cap/column connection as detailed on this sheet. Determining the length of the alternate reinforcement shall be the sole responsibility of the Contractor. This alternate reinforcement may be used at no additional expense the Department.***

Randy R. Cannon
Bridge Design Engineer

cc: Assistant Bridge Design Engineers

File: PC/TBK

South Carolina
Department of Transportation

DM0598

September 28, 1998

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT:** Prestressed Beams

---

The following note shall be placed on all prestressed beam sheets:

SHOP DRAWINGS:

Shop drawings for prestressed beams shall be submitted in accordance with paragraph 704.10 of the Standard Specifications.

The shop drawings shall be sealed by a South Carolina Registered Professional Engineer certifying conformance with SCDOT plans, and/or when any deviation or change from the design or details shown on this sheet are indicated on the shop drawings. Elongation calculations shall also be submitted and signed and sealed by SC Registered Professional Engineer.

Randy R. Cannon, P.E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
File: PC/JLC

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SCDOT

South Carolina
Department of Transportation

DM0698

October 29, 1998

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT:** Approach Slabs

This memorandum replaces the previous April 8, 1987 memorandum.

The standard approach slab length, measured parallel to the roadway, shall be 20 feet (6 m). Approach slab thickness shall be 12 inches (300 mm) with 2 inches (50 mm) concrete cover to top steel and 3 inches (75 mm) concrete cover to bottom steel. Concrete shall be Class D (Class 30) and reinforcing steel shall be ASTM A615M-96a (Grade 420).

Approach slabs shall be detailed with the top surface of concrete at grade when the plans indicate concrete pavement and detailed 2 inches (50 mm) below grade when road plans indicate asphalt pavement.

The main (longitudinal) reinforcing in the bottom of approach slabs shall be #22 bar at 6 inches (150 mm) on center. The main (longitudinal) reinforcing in the top of approach slabs shall be #22 bar at 12 inches (300 mm) on center. Top and bottom (transverse) distribution steel shall be #16 bar at 12 inches (300 mm) on center.

The outside edges shall be detailed as an 18 inch (450 mm) wide longitudinal edge beam reinforced with #22 bar located 3 inches (75 mm) from the edge and with three adjacent rows of #22 bar spaced at 5 inches (125 mm) on center.

When any of the following special conditions exist, the designer shall evaluate the above requirements and redesign and/or redetail approach slabs accordingly.

1) Seismic category C or D (See Attached seismic category listing)
2) Skews 30° or greater
3) Deep end spans where structure depth equals or exceeds ½ of approach slab length.
4) Sidewalks on bridge

These requirements apply to all future projects and no changes will be made in projects that have been previously detailed.

Randy R. Cannon, P.E.
Bridge Design Engineer

Attachment
cc: Assistant Bridge Design Engineers
File: PC/REL

TABLE 3.1. Spectral Acceleration Coefficient and Seismic Performance Categories in South Carolina by County

| | | Acceleration | | Seismic Performace Categories (SPC) | |
|---|---|---|---|---|---|
| COUNTY | CODE | Sa(0.3) | Sa(1.0) | ESSENTIAL | NORMAL |
| Abbeville | 1 | 0.24 | 0.09 | A | A |
| Aiken | 2 | 0.35 | 0.13 | B | B |
| Allendale | 3 | 0.37 | 0.15 | B | B |
| Anderson | 4 | 0.23 | 0.09 | A | A |
| Bamberg | 5 | 0.51 | 0.18 | B | B |
| Barnwell | 6 | 0.33 | 0.13 | B | B |
| Beaufort | 7 | 0.47 | 0.19 | B | B |
| Berkeley | 8 | 1.07 | 0.33 | D | C |
| Calhoun | 9 | 0.55 | 0.19 | B | B |
| Charleston | 10 | 1.07 | 0.33 | D | C |
| Cherokee | 11 | 0.23 | 0.1 | B | B |
| Chester | 12 | 0.26 | 0.11 | B | B |
| Chesterfield | 13 | 0.31 | 0.13 | B | B |
| Clarendon | 14 | 0.73 | 0.27 | C | C |
| Colleton | 15 | 0.77 | 0.26 | C | C |
| Darlington | 16 | 0.43 | 0.18 | B | B |
| Dillon | 17 | 0.37 | 0.17 | B | B |
| Dorchester | 18 | 1.07 | 0.33 | D | C |
| Edgefield | 19 | 0.27 | 0.11 | B | B |
| Fairfield | 20 | 0.31 | 0.13 | B | B |
| Florence | 21 | 0.71 | 0.27 | C | C |
| Georgetown | 22 | 1.07 | 0.33 | D | C |
| Greenville | 23 | 0.23 | 0.1 | B | B |
| Greenwood | 24 | 0.25 | 0.11 | B | B |
| Hampton | 25 | 0.41 | 0.17 | B | B |
| Horry | 26 | 0.63 | 0.23 | C | C |
| Jasper | 27 | 0.37 | 0.16 | B | B |
| Kershaw | 28 | 0.35 | 0.15 | B | B |
| Lancaster | 29 | 0.27 | 0.12 | B | B |
| Laurens | 30 | 0.25 | 0.11 | B | B |
| Lee | 31 | 0.48 | 0.19 | B | B |
| Lexington | 32 | 0.38 | 0.15 | B | B |
| McCormick | 33 | 0.25 | 0.1 | B | B |
| Marion | 34 | 0.68 | 0.25 | C | C |
| Marlboro | 35 | 0.37 | 0.15 | B | B |
| Newberry | 36 | 0.29 | 0.11 | B | B |
| Oconee | 37 | 0.23 | 0.09 | A | A |
| Orangeburg | 38 | 0.77 | 0.27 | C | C |
| Pickens | 39 | 0.23 | 0.09 | A | A |
| Richland | 40 | 0.42 | 0.17 | B | B |
| Saluda | 41 | 0.29 | 0.11 | B | B |
| Spartanburg | 42 | 0.23 | 0.1 | B | B |
| Sumter | 43 | 0.57 | 0.21 | C | C |
| Union | 44 | 0.25 | 0.11 | B | B |
| Williamsburg | 45 | 1.07 | 0.33 | D | C |
| York | 46 | 0.23 | 0.1 | B | B |

SCDOT

South Carolina
Department of Transportation

DM0798

October 28, 1998

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT:** Substructure and Superstructure Location Conflicts Between New and Existing Bridges

---

In order to determine if a new bridge substructure or superstructure will conflict with the location of the existing bridge during construction, a plan view drawing should be prepared to show both the new and existing features. New bridges should avoid all conflicts with the existing structure if possible. When location conflicts cannot be avoided, the plans and specifications should include construction instructions on how to address the situation. All conflicts should be brought to the attention of the Structural, Geotechnical, and Construction Engineers as early in the project as possible in order to eliminate possible delays.

When conflicts will possibly occur during construction, the plan view drawing shall be included on the Bridge Plan and Profile Sheet.

Randy R. Cannon, P.E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
File: PC/JCS

South Carolina
Department of Transportation

DM0898

October 26, 1998

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT:** Printing of Completed Bridge Plans

---

Due to the ever-increasing cost of printing bridge plans, the requirement for printing completed bridge plans on vellum paper is rescinded immediately. Future completed plans should be printed on bond paper.

We have been assured that our prior concerns about the longevity of bond prints is no longer a problem. The cost saving of using bond prints is a considerable amount. Your cooperation in this matter is appreciated.

Randy R. Cannon, P.E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Project Development Engineer Kneece
Project Development Engineer Pratt
Road Design Engineer Eargle

File: PC/REL

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BDF

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South Carolina
Department of Transportation

DM0998

December 23, 1998

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT:** Joints in Bridge Barrier Parapet/Railing Wall

This memorandum replaces the previous March 25, 1997 memorandum.

The AASHTO LRFD Design Specifications in Article 9.4.3 states that barrier parapets should be made structurally continuous without joints between bridge deck expansion joints. Field observations of bridge projects constructed with open joints in the barrier confirm the presence of deck cracks at the joint locations.

Future projects shall be detailed without joints in the barrier parapet/railing wall except where required to match bridge deck expansion joints. Projects that are detailed need not be changed but the following note should be added to the control joint detail shown in the plans.

"At the Contractor's option, control joints may be deleted and the barrier parapet/railing wall reinforcing made continuous between the bridge deck expansion joints. All cost for this option shall be at the Contractor's expense."

Randy R. Cannon, P.E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
File: PC/REL

SCDOT

South Carolina
Department of Transportation

DM0199

January 5, 1999

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT: New Pay Items**

The attached Instructional Bulletin No. 98-12 provides for three new pay items that may be required on road and bridge projects. The Project Manager or his representative will determine at the time of the PS & E if these new pay items will apply to a project.

The Design Group Leader can find out from the Bridge Project Manager or the Assistant Bridge Design Engineer if these new pay items apply to a project. These new pay items are to be included in the CATS file for a project, but are not to be shown on the bridge title sheet for the project.

These new pay items should be included in the CATS file for projects beginning with the February 1999 Letting.

Also, attached is a copy of the new Special Provisions that apply to the new pay items.

Randy R. Cannon, P.E.
Bridge Design Engineer

Attachments:
cc: Assistant Bridge Design Engineers
File: PC/REL

South Carolina
Department of Transportation

September 9, 1998

**INSTRUCTIONAL BULLETIN NO. 98-12**

**SUBJECT:** PS&E (Field Review) Plans Title Sheet
**EFFECTIVE DATE:** September 15, 1998
**SUPERSEDES:** None
**RE:** None

Three new pay items have been added to the pay item list. They are:

| | | |
|---|---|---|
| 1050800 | Construction Stakes, Lines and Grades | EA |
| 1050810 | Construction Stakes, Lines and Grades (For Bridge Only) | EA |
| 1090100 | Construction Estimates and Final Plans | LS |

These items also have been added to the PS&E Title Sheet. It will be the responsibility of the Design Group employee to find out from the District representative on the field review whether or not these items will be included in the project.

The item "Construction Stakes, Lines and Grades" will be bid "Each" for each roadway in the project plans with its own "Summary of Estimated Quantities" Sheet. It is desirable for each roadway in a project to be handled the same as for construction staking. If the District plans to do its own staking then no bid item will be necessary.

A bid item of "Construction Stakes, Lines and Grades (For Bridge Only)" has been added also. This item should be used in a project when the road is to be staked by the District and the bridge is to be staked by the Contractor. If the road is to be staked by the contractor, then the bridge will be included in the pay item of " Construction Stakes, Lines and Grades" in the roadway estimated quantities. No separate pay item for contractor staking of the bridge will be necessary when the roadway carries the pay item.

The item "Construction Estimates and Final Plans" is to be added to the plan quantities when the Contractor is to provide for the monthly progress estimates and the final estimate and plans. During the PS&E Field Review, the District representative should advise the Road Design Group employee on the inclusion of this item.

Approved: _____
E. S. Eargle
Road Design Engineer

ESE:adf

cc:
Federal Proj. Dev. Engr. Pratt
"C" Proj. Dev. Engr. Kneece

**(2) MONTHLY CONSTRUCTION ESTIMATE - FINAL CONSTRUCTION PLANS – FINAL CONSTRUCTION ESIMATE:**

The Contractor shall prepare and submit for the Engineer's approval, the following items:

**Monthly Construction Estimate:**

The Monthly Construction Estimate (Form 607) is a summary of the total value of the work performed to date and the cumulative total of the previous payments to the Contractor. The amount due the Contractor is the difference in these figures (plus or minus penalties and incentives, and less retainage.) See Section 109.06 of the Standard Specifications for payment schedule.

**Contractor's Tasks:**

Prior to beginning work, furnish for approval by the SCDOT a system of record keeping that accumulates quantities for each pay item and extends them using the unit bid prices to provide a cumulative value of work for each pay item. The total value of work for each Contract Group is the summation of value of work for each pay item in the group.

Provide the equipment, tools, material, products and personnel to implement, operate, and maintain the record keeping system.

Collect, calculate, and/or otherwise provide the necessary substantiation normally required by the Department for each pay item.

Submit worksheets and/or notes along with the required documentation for ratification by the Engineer for completed items of work, either daily, weekly, and/or monthly.

Make corrections and/or revisions in the Monthly Construction Estimate (Form 607) as requested by the Engineer.

To aid the Contractor in his tasks the Department will furnish a diskette with SCDOT Final Construction Plans Worksheet Nos. FP102 through FP113. These worksheets are currently used by the Department to tabulate such items as asphalt items, earthwork, pipe, and structural items. These worksheets may be filled in by computer or manually. The Department will also provide a 3-hour training session in the policies and procedures for the preparation of Construction Estimates (Form 607) and Final Construction Plans for the successful bidder's "Clerk of the Works."

The Engineer will review the Contractor's Construction Estimate, and submit for processing and payment the "Engineer Accepted" Monthly Construction Estimate.

**Final Construction Plans:**

The Final Construction Plans consist of full size "Final Construction Plans Title Sheet"(FP201), "Final Construction Plans Summary Sheet"(FP203),"Pile Driving Record"(FP204)(if necessary), As-Built Plans, and any other sheets as necessary, such as revised roadway profiles, revised typical sections, roadway cross-sections, and borrow pit cross-sections. Field notes, referenced in the Final Construction plans, shall be submitted with the plans.

The As-Built plans shall consist of a set of blue/black line prints with approved field changes delineated in red ink. All redline revisions shall be located properly on the drawing and shall be true to scale. In addition, the Contractor shall provide two (2) extra copies of the final As-Built plans.

The Final Construction Plans shall be submitted within ninety (90) days following the date of the Departments final acceptance of the project. It is the Department's intent to check the Final Construction Plans and issue its listing of final quantities and unit prices within forty-five (45) days from the receipt of the plans.

After the Final Construction Plans have been checked by the Department, a listing of the final construction quantities and unit prices will be issued by the Department's Final Construction Plans unit.

**Final Construction Estimate:**

The Final Construction Estimate is similar to the Monthly Construction Estimate. The value of work is calculated using the listing of final quantities and unit prices issued by the Department. Over-runs and/or under-runs of the contract plan quantity of each pay item are calculated and explanations for the deviations are provided. Retainage is not withheld on this estimate, and liquidated damages and other penalties, if applicable, are applied on this estimate.

Any survey work required in the execution of this project shall be performed by a registered land surveyor or a registered engineer in the State of South Carolina. All work performed by the designated RLS or PE, affecting the layout cross sections, computations, etc. shall be accompanied by the designated RLS's or PE's seal and signature.

**MEASUREMENT:**

Measurement is to be on a lump sum basis.

**PAYMENT:**

Payment for this item is to be as follows:

75% of the contract amount is to be distributed over the duration of the project, and paid in amounts proportional to the amount of contract work completed.

The remaining 25% of the contract amount is to be paid on the Final Construction Estimate.

In no case is the payment for this item to be in excess of the contract amount.

The Bid Item for this work is as follows:

| Item Number | Item | Unit |
|---|---|---|
| 1090100 | Construction Estimates and Final Plans | LS |

(1) **CONSTRUCTION STAKES, LINES AND GRADES:**
Section 105.08 of the Standard Specifications is amended to the extent that the Contractor will be responsible for this work.

The Contractor will be required to provide all the layouts necessary to construct the elements of this project. The SCDOT will provide adequate reference points to the center line of survey and bench marks as shown in the plans or as provided by the Engineer. Any additional control points set by the SCDOT shall be identified in the field and documented in writing to the Contractor and the field notes shall be kept in the office of the Resident Construction Engineer.

The Contractor shall provide field personnel and set all additional stakes for this project, which are needed to establish offset stakes, reference points, and any other horizontal or vertical controls, including supplementary bench marks, necessary to secure a correct layout of the work. The Contractor will not be required to determine the property line between properties.

Any survey work required in the execution of this project shall be performed by a registered land surveyor or a registered engineer in the State of South Carolina. All work performed by the RLS or PE, affecting the layout, cross sections, computations, etc. shall be accompanied by the designated RLS's or PE's seal and signature.

The Contractor shall be responsible for having the finished work substantially conform to the lines, grades, elevations and dimensions called for in the plans or as provided by the Engineer. Any inspection or checking of the Contractor's layout by the Engineer and the acceptance of all or any part of it shall not relieve the Contractor of his responsibility to secure the proper dimensions, grades and elevations of the several parts of the work. The Contractor shall exercise care in the preservation of stakes and bench marks, and shall have them reset at his expense when any are damaged, lost, displaced or removed. The Contractor shall use competent personnel and suitable equipment for the layout work required. The Contractor shall not engage the services of any person or persons in the employ of the SCDOT for the performance of any work covered by this item.

The Engineer will make random checks of the Contractor's staking to determine if the work is in substantial conformance with the plans. Where the Contractor's work will tie into work that is being or will be done by others, checks will be made to determine if the work is in conformance with the proposed overall grade and horizontal alignment. For bridge construction projects, the Contractor shall be required to provide bridge deck grades to the Engineer for review prior to placing deck forms.

If during the course of staking or construction work, unforeseen utilities and/or field conditions arise which conflict with construction as shown in the plans, the Contractor shall immediately notify the Resident Construction Engineer. The Engineer will review the Contractor's findings and adjust the lines and grades accordingly or make arrangements for the utility to relocate its facilities. The resulting adjustments will be provided to the Contractor so that his survey crew can perform the adjusted staking. Adjusted staking as described above shall be considered a normal consequence of construction. No additional compensation will be due to the Contractor for this work, or for any delays due to adjustments to staking.

**MEASUREMENT:**
Measurement is to be for each item of "CONSTRUCTION STAKES , LINES AND GRADES" bid in the project.

**PAYMENT:**
Payment for each item of "CONSTRUCTION STAKES, LINES AND GRADES" in the project is to be proportional to the amount of the relevant contract work completed. In no case is the payment for this item to be in excess of the contract amount.

The Bid Item for this work is as follows:

| Bid Item Number | Item | Unit |
|---|---|---|
| 1050800 | CONSTRUCTION STAKES, LINES AND GRADES | EA |

**(1) CONSTRUCTION STAKES, LINES AND GRADES (FOR BRIDGES ONLY):**
Section 105.08 of the Standard Specifications is amended to the extent that the Contractor will be responsible for this work.

The Contractor will be required to provide all the layouts necessary to construct the bridge elements of this project. The SCDOT will provide adequate reference points to the center line of survey and bench marks as shown in the plans or as provided by the Engineer. Any additional control points set by the SCDOT shall be identified in the field and documented in writing to the Contractor and the field notes shall be kept in the office of the Resident Construction Engineer.

The Contractor shall provide field personnel and set all additional stakes for the bridge elements of this project, which are needed to establish offset stakes, reference points, and any other horizontal or vertical controls, including supplementary bench marks, necessary to secure a correct layout of the work. The Contractor will not be required to determine the property line between properties.

Any survey work required in the execution of this project shall be performed by a registered land surveyor or a registered engineer in the State of South Carolina. All work performed by the RLS or PE, affecting the layout, cross sections, computations, etc. shall be accompanied by the designated RLS's or PE's seal and signature.

The Contractor shall be responsible for having the finished work substantially conform to the lines, grades, elevations and dimensions called for in the plans or as provided by the Engineer. Any inspection or checking of the Contractor's layout by the Engineer and the acceptance of all or any part of it shall not relieve the Contractor of his responsibility to secure the proper dimensions, grades and elevations of the several parts of the work. The Contractor shall exercise care in the preservation of stakes and bench marks, and shall have them reset at his expense when any are damaged, lost, displaced or removed. The Contractor shall use competent personnel and suitable equipment for the layout work required. The Contractor shall not engage the services of any person or persons in the employ of the SCDOT for the performance of any work covered by this item.

The Engineer will make random checks of the Contractor's staking to determine if the work is in substantial conformance with the plans. Where the Contractor's work will tie into work that is being or will be done by others, checks will be made to determine if the work is in conformance with the proposed overall grade and horizontal alignment. For bridge construction projects, the Contractor shall be required to provide bridge deck grades to the Engineer for review prior to placing deck forms.

If during the course of staking or construction work, unforeseen utilities and/or field conditions arise which conflict with construction as shown in the plans, the Contractor shall immediately notify the Resident Construction Engineer. The Engineer will review the Contractor's findings and adjust the lines and grades accordingly or make arrangements for the utility to relocate its facilities. The resulting adjustments will be provided to the Contractor so that his survey crew can perform the adjusted staking. Adjusted staking as described above shall be considered a normal consequence of construction. No additional compensation will be due to the Contractor for this work, or for any delays due to adjustments to staking.

**MEASUREMENT:**
Measurement is to be on a lump sum basis for each item of "CONSTRUCTION STAKES , LINES AND GRADES (FOR BRIDGE ONLY)(____)" bid in the project.

**PAYMENT:**
Payment for each item of "CONSTRUCTION STAKES, LINES AND GRADES (FOR BRIDGE ONLY)(___)" in the project is to be proportional to the amount of the relevant contract work completed. In no case is the payment for this item to be in excess of the contract amount.

The Bid Item for this work is as follows:

| Bid Item Number | Item | Unit |
|---|---|---|
| 1050810 | CONSTRUCTION STAKES, LINES AND GRADES(FOR BRIDGE ONLY) | EA |

BDF

SCDOT

South Carolina
Department of Transportation

DM0299

FEBRUARY 19, 1999

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS**

**SUBJECT:** Bridge End Drainage Details

---

This memorandum replaces the previous Design Memorandums DM0488 and DM0189 dated October 17, 1988 and February 22, 1989 respectively.

Bridge Design has received reports of erosion problems at bridge ends and ends of approach slabs on bridges without deck drains. The field engineers have requested that the concrete curb and gutter with flume be detailed, in the bridge plans, for these projects. The concrete curb and gutter with flume should be detailed on bridges that have no bridge deck drains regardless of the slope coming off the bridge.

Bridges with bridge deck drains and a slope coming off the bridge less than 1% can continue to use the road department's standard concrete curb and gutter. Bridges with bridge deck drains and a slope coming off the bridge more than 1%, should be detailed in the bridge plans, with the concrete curb and gutter with flume.

The attached drawings "BCGFLUME" and "BCGFLUMEA" detailing the concrete curb and gutter at the end of approach slab, with or without asphalt approaches, should be revised as necessary to fit each project.

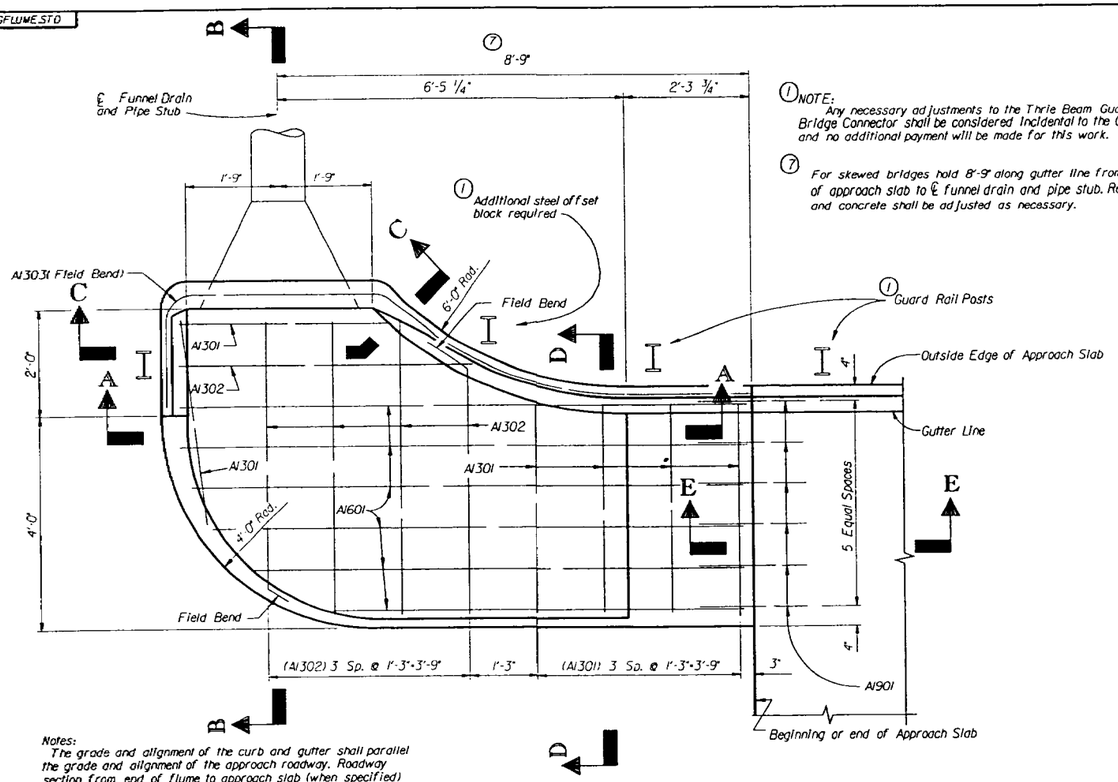
The attached drawing "BCGFLUME1" detailing the concrete curb and gutter at the end of bridge, with or without asphalt approaches, should be revised as necessary to fit each project.

All of the above drawings can be found in the Bridge Standards File under the file name BCGFLUME.STD.

Randy R. Cannon, P.E.
Bridge Design Engineer

Attachments:
cc: Assistant Bridge Design Engineers
File: PC/REL

BCGFLUME.STD




P L A N

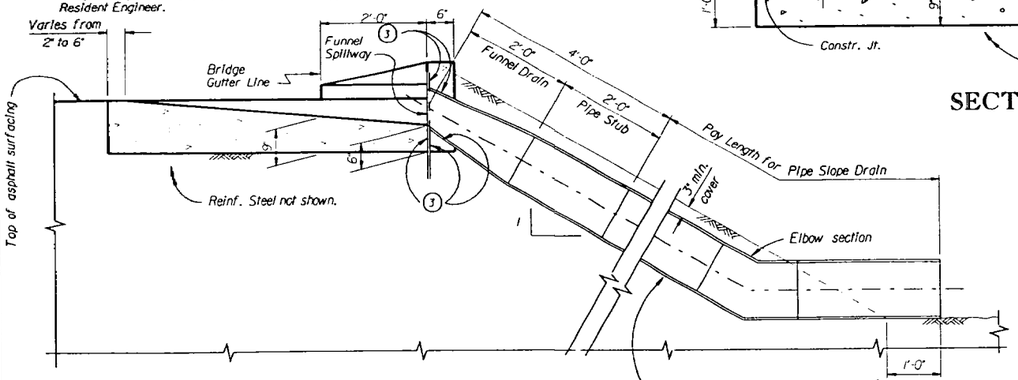
① NOTE: Any necessary adjustments to the Thrie Beam Guard Rail Bridge Connector shall be considered Incidental to the Contract and no additional payment will be made for this work.

⑦ For skewed bridges hold 8'-9" along gutter line from end of approach slab to ℄ funnel drain and pipe stub. Reinforcing steel and concrete shall be adjusted as necessary.

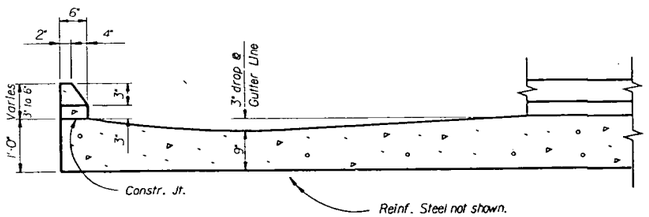
Notes:
The grade and alignment of the curb and gutter shall parallel the grade and alignment of the approach roadway. Roadway section from end of flume to approach slab (when specified) shall be built to the same crown as the bridge roadway.

⑥ Steel shall be galvanized after fabrication in accordance with ASTM A-123. If the galvanizing for the funnel drain or pipe stub is damaged before final acceptance, the area affected shall be field galvanized in accordance with ASTM A-780. Application, including cleaning shall be in accordance with manufacturer's instructions.

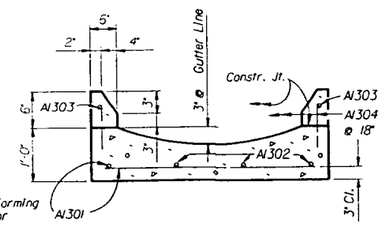
③ If the Contractor elects to use the aluminum Funnel Drain then one coat of asphaltic paint shall be applied to area of Funnel Drain and Spillway in contact with concrete. An alternate method of preventing contact may be used if desired by the Contractor. Asphaltic paint or alternate method shall be approved by the Resident Engineer.



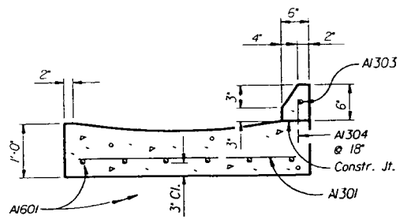

SECTION B-B




SECTION A-A




SECTION C-C

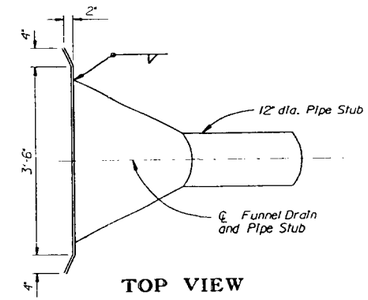



SECTION D-D

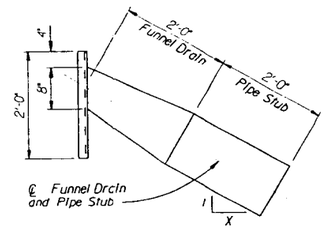
12" dia. 16 Gauge Galv. C. M. ② Pipe or
12" dia. Corrugated Polyethylene (PE) Drainage ② Tubing conforming to the current AASHTO Spec. M-294 (Type C) as applicable or
12" dia. Corrugated Aluminum Alloy Culvert, Type 1 (0.075" Min.) conforming to the current AASHTO Spec. M-196.

② Pipe or Tubing shall not be perforated.

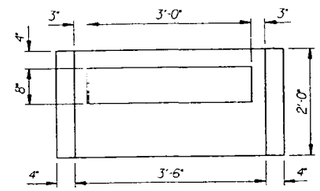
## METAL FUNNEL DETAILS




TOP VIEW




SIDE VIEW




FRONT VIEW
(Spillway)

Metal Funnel Drain shall include the spillway, funnel drain and pipe stub. Spillway and funnel drain shall be fabricated from flat smooth metal sheets. Metal for the spillway, funnel drain and pipe stub may be 0.064" (min.) thick steel (See note ⑥) or 0.075" (min.) thick aluminum (See note ③).

All costs for materials, equipment and labor necessary to fabricate and install the metal funnel, including the pipe stub, shall be included in the unit price bid for Curb and Gutter with Flume.

| SHEET NO. | TOTAL SHEETS |
|---|---|
| XX | XX |

## REINF. STEEL SCHEDULE
(ONE CURB & GUTTER)

| MARK | NO. REQ'D | DIMENSION "a" | "b" | "c" | LENGTH |
|---|---|---|---|---|---|
| A1301 | 6 | 4'-0" | | | 4'-0" |
| A1302 | 5 | 5'-6" | | | 5'-6" |
| A1303 | 1 | 13'-2" | | | 13'-2" |
| A1304 | 9 | 0'-10" | | | 0'-10" |
| A1601 | 6 | 10'-8" | | | 10'-8" |
| A1901 | 6 | 2'-0" | | | 2'-0" |

## QUANTITIES
(ONE CURB & GUTTER)

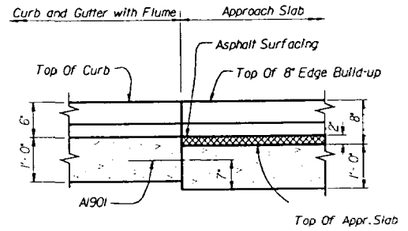
| | |
|---|---|
| Class "D" Concrete | 2.2 C.Y. |
| Reinforcing Steel ④ | 133 Lbs. |

## ⑤ QUANTITIES
PIPE SLOPE DRAIN

| | |
|---|---|
| 12" Dia. Pipe Slope Drain | XX L.F. |

④ Includes 5 Lbs. for A1304 and 18 lbs. for A1901. At no additional expense to the Department, Resin Anchors may be substituted for A1304 or A1901.

⑤ For one bridge end drainage.




SECTION E-E

Notes:

For location of bridge end drainage see Bridge Plan and Profile.

All costs of materials, equipment, and labor necessary to construct the required number of curbs and gutters with flumes, including excavation and backfilling for such, shall be included in the unit price bid for Curb and Gutter with Flume.

All costs for materials, equipment and labor necessary to construct the pipe slope drains, including excavation and backfilling for such, shall be included in the unit price bid for 12" Pipe Slope Drains. Elbow sections shall be considered as part of the pipe slope drains and no additional payment will be made for these items.

| REV. | BY | CHK. | DATE |
|---|---|---|---|
| | REJ | JAR | 2-99 |
| | UPDATE | | |
| REV. | REJ | HEB | 10-91 |
| | APPR. SLAB ATT. | | |
| REV. | KMG | MCM | 9-91 |
| | NOTE 7 | | |
| REVIEWED | | | |
| QUAN. | | | |
| DR. | MSA | ARC | 10-88 |
| DES. | | | |

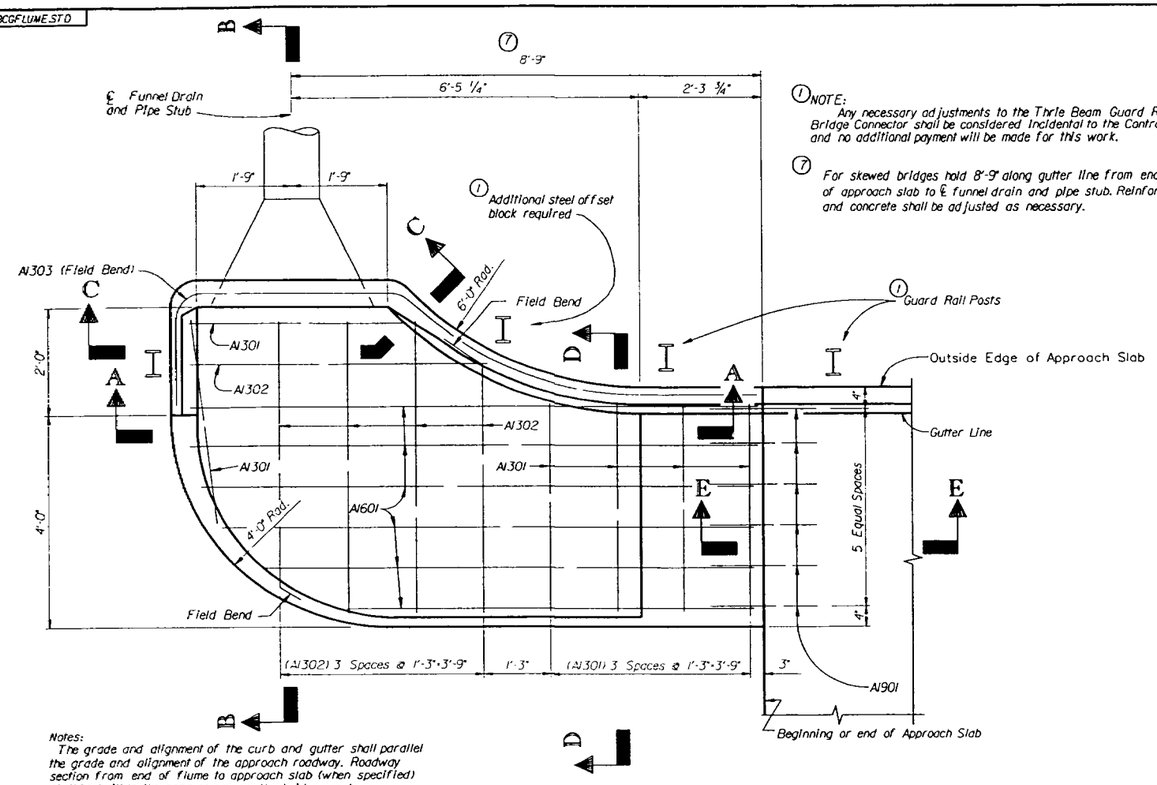
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN — COLUMBIA, S.C.

# CURB AND GUTTER WITH FLUME (ASPHALT APPROACHES)

| FILE NO. | ROUTE | COUNTY | DRAWING NO. |
|---|---|---|---|
| XXXXX | X-XX | XXXXXX | BCGFLUME |

As of 2/18/99 KEG

BCGFLUME.STD




PLAN

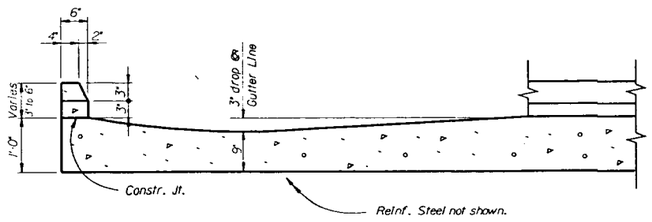
① NOTE:
Any necessary adjustments to the Thrie Beam Guard Rail Bridge Connector shall be considered incidental to the Contract and no additional payment will be made for this work.

⑦ For skewed bridges hold 8'-9" along gutter line from end of approach slab to ℄ funnel drain and pipe stub. Reinforcing steel and concrete shall be adjusted as necessary.

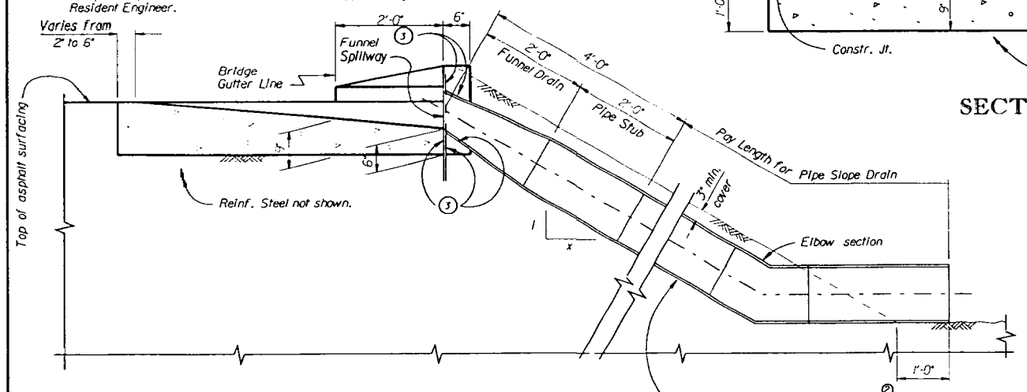
Notes:
The grade and alignment of the curb and gutter shall parallel the grade and alignment of the approach roadway. Roadway section from end of flume to approach slab (when specified) shall be built to the same crown as the bridge roadway.

⑥ Steel shall be galvanized after fabrication in accordance with ASTM A-123. If the galvanizing for the funnel drain or pipe stub is damaged before final acceptance, the area affected shall be field galvanized in accordance with ASTM A-780. Application, including cleaning shall be in accordance with manufacturer's instructions.

③ If the Contractor elects to use the aluminum Funnel Drain then one coat of asphaltic paint shall be applied to area of Funnel Drain and Spillway in contact with concrete. An alternate method of preventing contact may be used if desired by the Contractor. Asphaltic paint or alternate method shall be approved by the Resident Engineer.



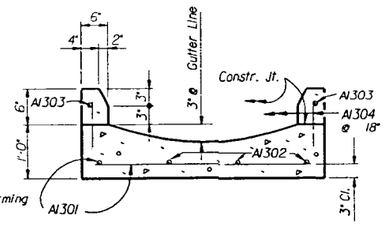

SECTION A-A



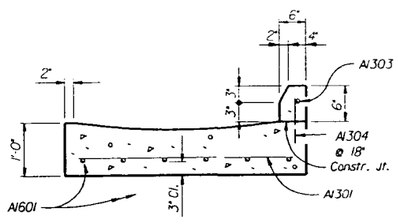

SECTION B-B

② 12" dia. 16 Gauge Galv. C. M. Pipe or
12" dia. Corrugated Polyethylene (PE) Drainage ② Tubing conforming to the current AASHTO Spec. M-294 (Type C) as applicable or
12" dia. Corrugated Aluminum Alloy Culvert, Type 1 (0.075" Min.) conforming to the current AASHTO Spec. M-196.

② Pipe or Tubing shall not be perforated.

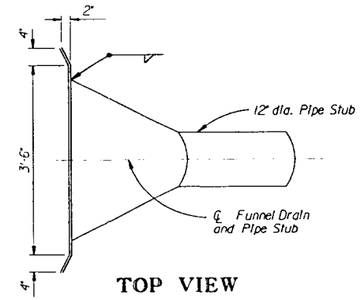



SECTION C-C

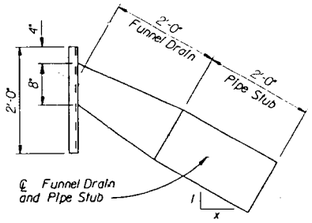



SECTION D-D

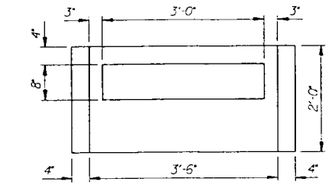
## METAL FUNNEL DETAILS




TOP VIEW




SIDE VIEW




FRONT VIEW
(Spillway)

Metal Funnel Drain shall include the spillway, funnel drain and pipe stub. Spillway and funnel drain shall be fabricated from flat smooth metal sheets. Metal for the spillway, funnel drain and pipe stub may be 0.064" (min.) thick steel (See note ⑥) or 0.075" (min.) thick aluminum (See note ③).

All costs for materials, equipment and labor necessary to fabricate and install the metal funnel, including the pipe stub, shall be included in the unit price bid for Curb and Gutter with Flume.

| SHEET NO. | TOTAL SHEETS |
|---|---|
| XX | XX |

## REINF. STEEL SCHEDULE
(ONE CURB & GUTTER)

| MARK | NO. REQ'D | DIMENSION "A" | DIMENSION "B" | DIMENSION "C" | LENGTH |
|---|---|---|---|---|---|
| A1301 | 6 | 4'-0" | | | 4'-0" |
| A1302 | 5 | 5'-6" | | | 5'-6" |
| A1303 | 1 | 13'-2" | | | 13'-2" |
| A1304 | 9 | 0'-10" | | | 0'-10" |
| A1601 | 6 | 10'-8" | | | 10'-8" |
| A1901 | 6 | 2'-0" | | | 2'-0" |

## QUANTITIES
(ONE CURB & GUTTER)

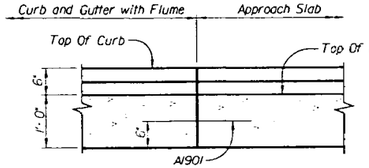
| | |
|---|---|
| Class "D" Concrete | 2.2 C.Y. |
| Reinforcing Steel ④ | 133 Lbs. |

## ⑤ QUANTITIES
PIPE SLOPE DRAIN

| | |
|---|---|
| 12" Dia. Pipe Slope Drain | XX L.F. |

④ Includes 5 Lbs. for A1304 and 18 lbs. for A1901. At no additional expense to the Department, Resin Anchors may be substituted for A1304 or A1901.

⑤ For one bridge end drainage.




SECTION E-E

Notes:

For location of bridge end drainage see Bridge Plan and Profile.

All costs of materials, equipment, and labor necessary to construct the required number of curbs and gutters with flumes, including excavation and backfilling for such, shall be included in the unit price bid for Curb and Gutter with Flume.

All costs for materials, equipment and labor necessary to construct the pipe slope drains, including excavation and backfilling for such, shall be included in the unit price bid for 12" Pipe Slope Drains. Elbow sections shall be considered as part of the pipe slope drains and no additional payment will be made for these items.

| REV. | | | |
|---|---|---|---|
| REV. | | | |
| REV. | REJ | JAR | 2-99 |
| | UPDATE | | |
| REVIEWED | | | |
| QUAN. | | | |
| DR. | MSA | RRC | 10-88 |
| DES. | | | |
| | BY | CHK. | DATE |

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN COLUMBIA, S.C.

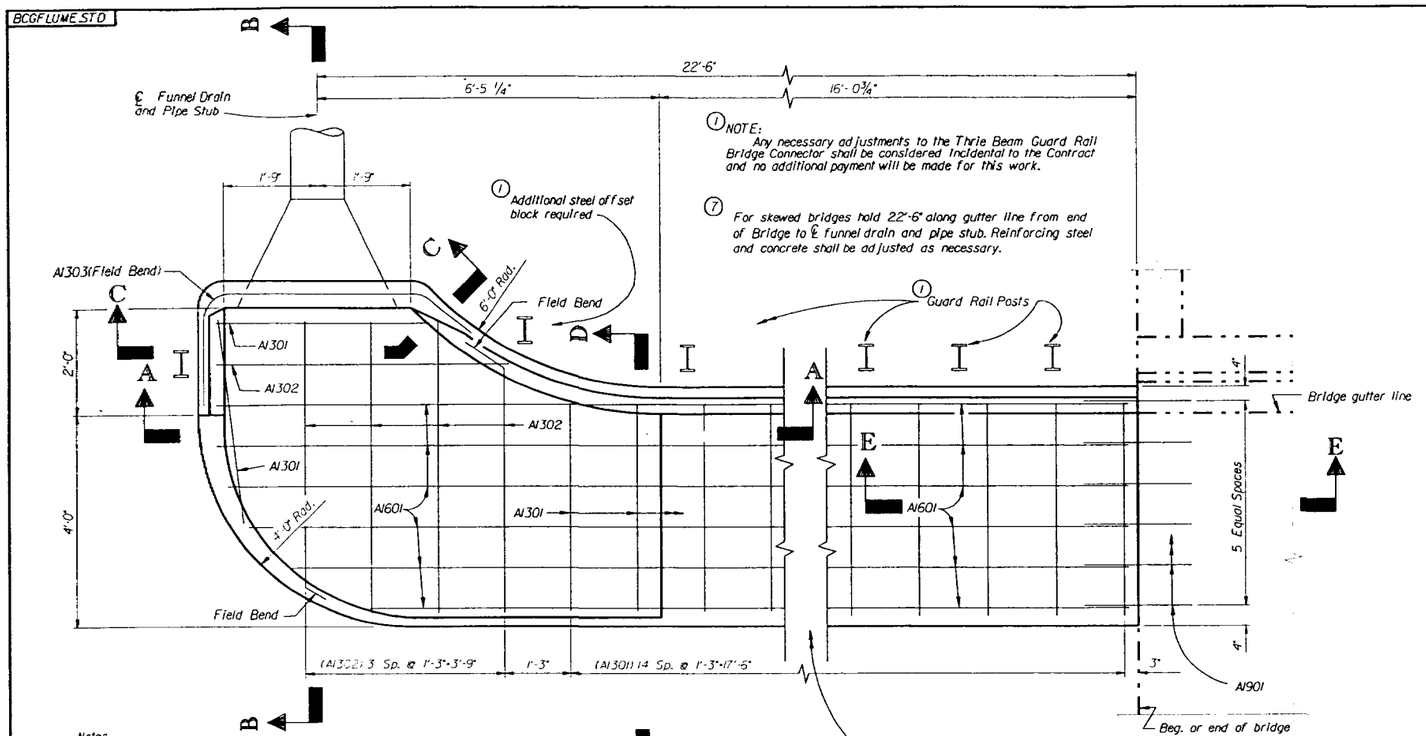
# CURB AND GUTTER WITH FLUME (CONCRETE APPROACHES)

| FILE NO. | ROUTE | COUNTY | DRAWING NO. |
|---|---|---|---|
| XXXXX | X-XX | XXXXXX | BCGFLUME |

As of 2/10/99 KED

BCGFLUME.STD

| SHEET NO. | TOTAL SHEETS |
|---|---|
| XX | XX |




1 NOTE:
Any necessary adjustments to the Thrie Beam Guard Rail Bridge Connector shall be considered incidental to the Contract and no additional payment will be made for this work.

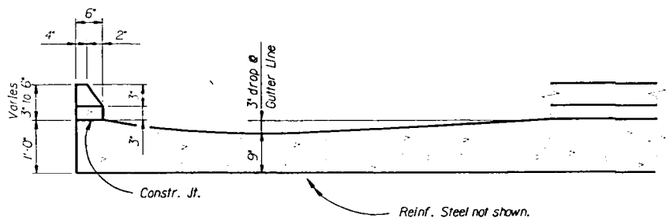
7 For skewed bridges hold 22'-6" along gutter line from end of Bridge to ℄ funnel drain and pipe stub. Reinforcing steel and concrete shall be adjusted as necessary.

A1601 bar splice not shown, 1'-8" min. splice required.

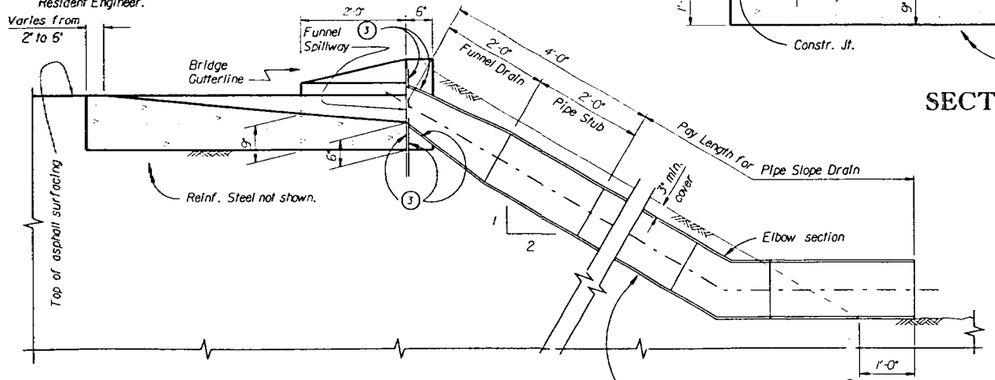
Notes:
The grade and alignment of the curb and gutter shall parallel the grade and alignment of the approach roadway. Roadway section from end of flume to end of bridge (when specified) shall be built to the same crown as the bridge roadway.

6 Steel shall be galvanized after fabrication in accordance with ASTM A-123. If the galvanizing for the funnel drain or pipe stub is damaged before final acceptance, the area affected shall be field galvanized in accordance with ASTM A-780. Application, including cleaning shall be in accordance with manufacturer's instructions.

3 If the Contractor elects to use the aluminum Funnel Drain then one coat of asphaltic paint shall be applied to area of Funnel Drain and Spillway in contact with concrete. An alternate method of preventing contact may be used if desired by the Contractor. Asphaltic paint or alternate method shall be approved by the Resident Engineer.



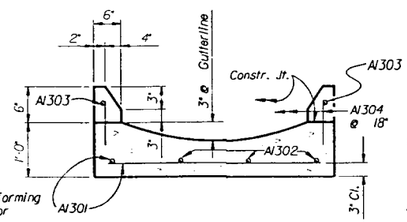

SECTION A-A



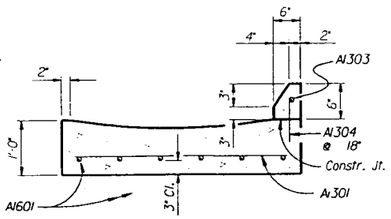

SECTION B-B

12" dia. 16 Gauge Galv. C. M. Pipe or
12" dia. Corrugated Polyethylene (PE) Drainage 2 Tubing conforming to the current AASHTO Spec. M-294 (Type C) as applicable or
12" dia. Corrugated Aluminum Alloy Culvert, Type I (0.075" Min.) conforming to the current AASHTO Spec. M-196.

2 Pipe or Tubing shall not be perforated.

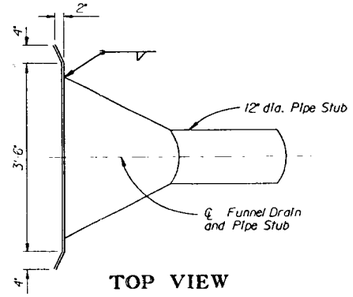



SECTION C-C

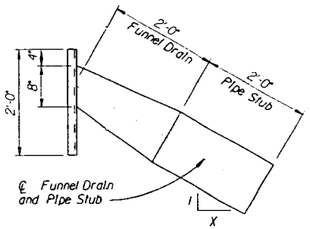



SECTION D-D

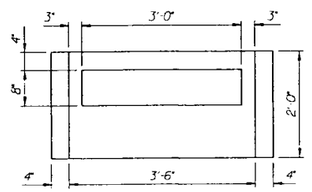
## METAL FUNNEL DETAILS




TOP VIEW




SIDE VIEW




FRONT VIEW
(Spillway)

Metal Funnel Drain shall include the spillway, funnel drain and pipe stub. Spillway and funnel drain shall be fabricated from flat smooth metal sheets. Metal for the spillway, funnel drain and pipe stub may be 0.064" (min.) thick steel (See note 6) or 0.075" (min.) thick aluminum (See note 3).

All costs for materials, equipment and labor necessary to fabricate and install the metal funnel, including the pipe stub, shall be included in the unit price bid for Curb and Gutter with Flume.

## REINF. STEEL SCHED.
(ONE CURB & GUTTER)

| MARK | NO. REQ'D | DIMENSION "A" | DIMENSION "L" | DIMENSION "C" | LENGTH |
|---|---|---|---|---|---|
| A1301 | 17 | 4'-0" | | | 4'-0" |
| A1302 | 5 | 5'-6" | | | 5'-6" |
| A1303 | 1 | 13'-2" | | | 13'-2" |
| A1304 | 18 | 0'-10" | | | 0'-10" |
| A1601 | 12 | 13'-0" | | | 13'-0" |
| A1901 | 6 | 2'-0" | | | 2'-0" |

## QUANTITIES
(ONE CURB & GUTTER)

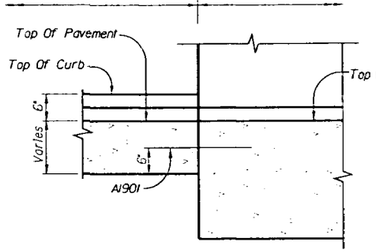
| | |
|---|---|
| Class "D" Concrete | 4.5 C.Y. |
| Reinforcing Steel 4 | 250 Lbs. |

## 5 QUANTITIES
PIPE SLOPE DRAIN

| | |
|---|---|
| 12" Dia. Pipe Slope Drain | XX L.F. |

4 Includes 10 Lbs. for A1304 and 18 lbs. for A1901. At no additional expense to the Department. Resin Anchors may be substituted for A1304 or A1901.

5 For one bridge end drainage.




SECTION E-E
(Drawn For Flat Slab Only)

Notes:

For location of bridge end drainage see Bridge Plan and Profile.

All costs of materials, equipment, and labor necessary to construct the required number of curbs and gutters with flumes, including excavation and backfilling for such, shall be included in the unit price bid for Curb and Gutter with Flume.

All costs for materials, equipment and labor necessary to construct the pipe slope drains, including excavation and backfilling for such, shall be included in the unit price bid for 12" Pipe Slope Drains. Elbow sections shall be considered as part of the pipe slope drains and no additional payment will be made for these items.

| REV. | | | |
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| REV. | | | |
| REV. | REJ | JAR | 2-99 |
| | UPDATE | | |
| REVIEWED | | | |
| QUAN. | YIA | JAR | 8-94 |
| DR. | MSA | RRC | 10-88 |
| DES. | | | |
| | BY | CHK. | DATE |

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN COLUMBIA, S.C.

# CURB AND GUTTER WITH FLUME

| FILE NO. | ROUTE | COUNTY | DRAWING NO. |
|---|---|---|---|
| XX.XXX | X-XXX | XXXXXX | BCGFLUME1 |

As of 2/18/99 REJ

SCDOT

South Carolina
Department of Transportation

DM0399

MARCH 1, 1999

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS**

**SUBJECT:** CORRISION PROTECTION SYSTEMS FOR BRIDGES

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This memorandum replaces the previous Design Memorandum DM0297 dated February 28, 1997.

A corrosion protection system shall be used for bridge decks on Interstate and National Highway System routes located North of a line along S. C. Route 72 from the Georgia state line to Chester, S. C. and North of S. C. Route 9 from Chester, S. C. to Interstate Route I-77 and West of a line along Interstate Route I-77 from the intersection of S. C. Route 9 and I-77 to the North Carolina state line (see attached map).

The following corrosion protection systems are approved for use on bridge decks. Prior to detailing the plans, the designer shall verify with the Bridge Design Engineer which system to use.

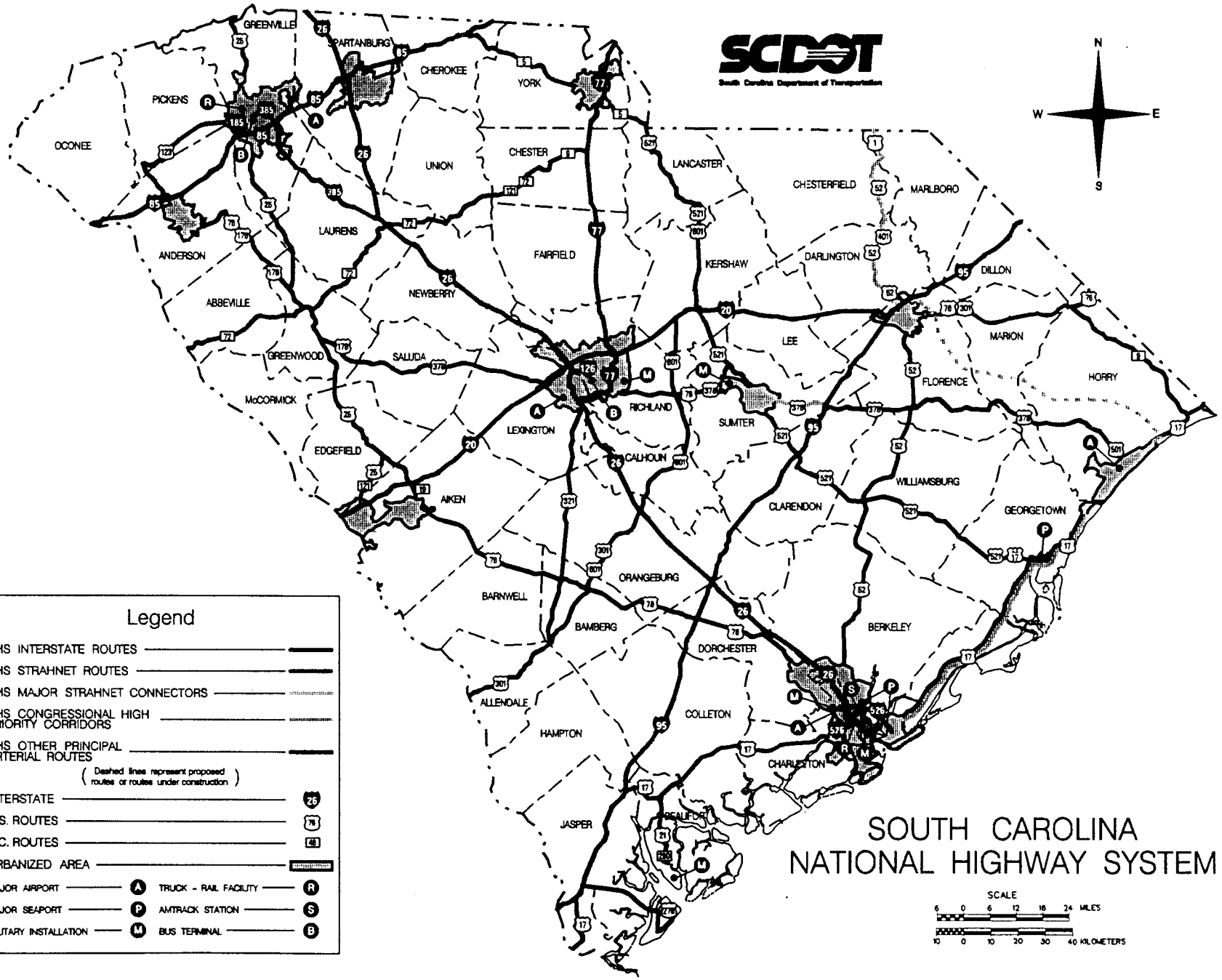
1.) Class E Concrete with uncoated steel reinforcing bars
2.) Class D Concrete with galvanized steel reinforcing bars
3.) Class D Concrete with epoxy coated steel reinforcing bars

The mixing or connecting of galvanized or epoxy coated and uncoated bars within the bridge deck will not be allowed.

The Bridge Design Engineer shall determine the need for a corrosion protection system for each project located in a coastal county. The Bridge Design Engineer will determine requirements of the corrosion protection system for the bridge deck, other concrete superstructure elements and concrete substructure elements for coastal projects.

Randy R. Cannon, P.E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Attachment
File: PC/REL




Produced by Mapping Unit, Engineering / Planning Division SCDOT.

DECEMBER 31, 1995 REV 2.0.A

SCDOT
South Carolina
Department of Transportation

DM0499

March 5, 1999

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT: VALUE ENGINEERING PROPOSALS**

The attached revised Bridge Design standard notes sheets should be used for bridge projects beginning with the May 1999 letting. The old "Alternates to Plan Details" note has been removed and a new "Value Engineering Proposals" note added in it's place.

This change is required to avoid conflict when road and bridge plans are let in the same contract. The attached new special provision entitled "Value Engineering Proposal" will be included in all bridge projects beginning with the May 1999 letting.

Plans that are complete and that will be let in May 1999 or later must be revised to include this revision. Your cooperation in this matter is appreciated.

Randy R. Cannon, P.E.
Bridge Design Engineer

Attachments:
cc: Assistant Bridge Design Engineers
File: PC/REL

Post Office Box 191
Columbia, South Carolina 29202-0191

Phone: (803) 737- 2314
TTY: (803) 737- 3870

**(1) VALUE ENGINEERING PROPOSAL:**

This value engineering specification is to provide an incentive to the Contractor to initiate, develop, and present to the Department of Transportation for consideration, any cost reduction proposals conceived by them involving changes in the drawings, designs, specifications, or other requirements of the contract. This specification does not apply unless the proposal submitted is specifically identified by the Contractor as being presented for consideration as a Value Engineering Proposal.

Value Engineering Proposals contemplated are those that would result in a net savings to the Department by providing a decrease in the total cost of construction or reduce the construction time without increasing the cost to construct the project. The affects the Proposal may have on the following items, but not limited to these items, will be considered by the Department when evaluating the proposal:

1) Service Life
2) Safety
3) Reliability
4) Economy of Operation
5) Ease of Maintenance
6) Desired Aesthetics
7) Design
8) Standardized Features

The Department reserves the right to reject the Proposal or deduct from the savings identified in the Proposal to compensate for any adverse effects to these items which may result form implementation of the Proposal.

The Department reserves the right to reject at its discretion any Value Engineering Proposal submitted which would require additional right-of-way. Substitution of another design alternate, which is detailed in the contract plans, for the one on which the Contractor bid, will not be allowed. Plan errors which are identified by the Contractor and which result in a cost reduction will not qualify for submittal as a Value Engineering Proposal. Pending execution of a formal supplemental agreement, implementing an approved Value Engineering Proposal, the Contractor shall remain obligated to perform in accordance with the terms of the existing contract. No time extension will be granted due to the time required to review a Value Engineering Proposal.

The Contractor is encouraged to include this specification in contracts with subcontractors. The Contractor shall encourage submissions of Value Engineering Proposals from subcontractors, however, it is not mandatory that the Contractor accept or transmit to the Department Value Engineering Proposals proposed by the subcontractors. The Contractor may choose any arrangement for the subcontractor value engineering payments, provided that these payments shall not reduce the Department's share of the savings resulting from the Value Engineering Proposal.

Should the Contractor desire a preliminary review of a possible Value Engineering Proposal, prior to expending considerable time and expense in full development, a copy of the preliminary proposal shall be submitted to the Resident Engineer. The submittal shall state, Preliminary Value Engineering Proposal Review Request and must contain sufficient drawings, cost estimates and written information that can be clearly understood and interpreted. Also, include the identity of any Private Engineering Firms proposed by the Contractor to prepare designs or revisions to designs. The Department will review the preliminary submittal only to the extent necessary to determine if it has a possible merit as a Value Engineering Proposal. This review does not obligate the Department to approve the final proposal should a preliminary review indicate the proposal has possible merit. The Department is under no obligation to consider any Value Engineering Proposal (Preliminary or Final) that is submitted.

A copy of the Final Value Engineering Proposal shall be submitted by the Contractor to the Resident Engineer. The proposal shall contain, as a minimum, the following:

(1) A statement that the request for the modification is being made as a Value Engineering Proposal.

(2) A description of the difference between the existing contract requirements and the proposed modifications, with the comparative advantages and disadvantages of each.

(3) If applicable, a complete drawing of the details covering the proposed modifications and supporting design computations shall be included in the final submittal. The preparation of new

designs or revisions or modifications to the designs shown in the contract drawings shall be accomplished and sealed by a Professional Engineer registered in the State of South Carolina. Further, the Department may require a review, and possibly the redesign, be accomplished by the project's original designer, or an approved equal. The Department may contract with private engineering firms, when needed, for reviews requested by the Department. The Contractor shall contract with the original project designer, or an approved equal, when required by the Department, for any design work needed to completely and accurately prepare contract drawings. The Department may waive the requirements to have the preparation of contract drawings accomplished by a Professional Engineer or the project's original designer based on the extent, detail, and complexity of the design needed to implement the Value Engineering Proposal.

(4) An itemized list of the contract requirements that would be modified and a recommendation of how to make each modification.

(5) A detailed estimate of the cost of performing work under the proposed modification.

(6) A statement of the time by which approval of the Value Engineering Proposal must be issued by the Department to obtain the total estimated cost reduction during the remainder of the contract, noting any effect on the contract completion or delivery schedule.

To facilitate the preparation of revisions to contract drawings, the Contractor may purchase reproducible copies of drawings for their use through the Department. The preparation of new design drawings by or for the Contractor shall be coordinated with the appropriate Department Branch. The Contractor shall provide, at no charge to the Department, one set of reproducible drawings of the approved design needed to implement the Value Engineering Proposal.

The Engineer will be the sole judge of the acceptability of a Value Engineering Proposal requested in accordance with these provisions and of the estimated net savings resulting from the approval of all or any part of the Proposal. The Contractor has the right to withdraw, in whole or in part, any Value Engineering Proposal not accepted by the Department within the period to be specified in the Proposal per Item (6) of the preceding paragraph.

If a Value Engineering Proposal is approved, the necessary changes will be effected by Supplemental Agreement. Included as a part of the Supplemental Agreement will be provisions for price adjustment giving the Contractor 50 percent of the net savings to the project resulting from the modifications.

The Department reserves the right to include in the Supplemental Agreement any conditions it deems appropriate for consideration, approval, and implementation of the proposal. Acceptance of the Supplemental Agreement by the Contractor shall constitute acceptance of such conditions.

The final net savings to be distributed will be the difference in cost between the existing contract cost for the involved bid items and the actual final cost occurring as a result of the modification. Only those unit bid items directly affected by the Supplemental Agreement will be considered in making the final determination of net savings. In determining the estimated net savings, the Department reserves the right to disregard the contract prices if, in the judgement of the Department, such prices do not represent a fair measure of the value of the work to be performed or to be deleted. Subsequent change documents affecting the modified unit bid items but not related to the Value Engineering Proposal will be excluded from such determination. The Department's review and administrative costs for Value Engineering Proposals will be borne by the Department. The Contractor's costs for designs and /or revisions to designs and the preparation of design drawings will be borne by the Contractor. The costs to either party will not be considered in determining the net saving obtained by implementing the Value Engineering Proposal. The Contractor's portion of the net savings shall constitute full compensation to them for effecting all changes pursuant to the agreement. The new savings will be prorated, 50 percent for the Contractor and 50 percent for the Department, for all accepted Value Engineering Proposals.

Upon execution of the Supplemental Agreement, the Department will thereafter have the right to use, duplicate or disclose in whole or in part any data necessary for utilization of the modification on other projects without obligation or compensation of any kind to the Contractor. Restrictions or conditions imposed by the Contractor for use of proposal on other projects shall not be valid.

Except as may otherwise precluded by this specification, the Contractor may submit a previously approved Value Engineering Proposal on another project.

Unless and until a Supplemental Agreement is executed and issued by the Department, the Contractor shall remain obligated to perform the work in accordance with the terms of the existing contract.

Acceptance of the modification and its implementation will not modify the completion date of the contract unless specifically provided for in the Supplemental Agreement.

The Contractor shall not be entitled to additional compensation for alterations in the plans or in the details of construction pursuant to the Value Engineering Proposal.

The Department will not be liable to the Contractor for failure to accept or act upon any Value Engineering Proposal submitted pursuant to this provision nor for any delays to the work attributable to any such proposal.

The Department reserves the right to negotiate desired changes with the Contractor under the provisions of the contract even though the changes are the result of a Value Engineering Proposal submitted on another contract. In this instance the savings will be prorated in accordance with the terms of the negotiated agreement.

STDNOTES.STD

NOTE TO DESIGNER:
REVISE POURING NOTES AS NEC.

## WIDENING EXISTING CONCRETE STRUCTURE

WHERE NEW CONCRETE IS TO BE CAST AGAINST EXISTING CONCRETE, THE CONTACT SURFACE OF THE OLD CONCRETE SHALL BE CLEANED OF ALL LOOSE CONCRETE, DIRT, OIL, GREASE AND ANY OTHER DELETERIOUS SUBSTANCE. IN ADDITION, BEFORE PLACING NEW DECK SLAB CONCRETE, THE EDGE OF EXISTING DECK SLAB SHALL BE THOROUGHLY ROUGHENED TO AN AMPLITUDE OF APPROXIMATELY 1/4". JUST PRIOR TO PLACING NEW CONCRETE, THE PORTION OF THE EXISTING SLAB FROM THE TOP SURFACE OF THE SLAB TO THE TOP LAYER OF REINFORCING SHALL BE COATED WITH A BONDING AGENT CONFORMING TO AASHTO SPECIFICATION M235 TYPE II APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. THE REMAINING PORTION OF THE VERTICAL FACE OF THE EXISTING SLAB SHALL BE FLUSHED WITH A 1:2 CEMENT MORTAR IMMEDIATELY PRIOR TO PLACING THE NEW CONCRETE.

ALL REINFORCING STEEL PROTRUDING BEYOND THE SURFACE AFTER REMOVAL OF CONCRETE SHALL BE IMBEDDED IN THE NEW CONCRETE IF FEASIBLE. REINFORCING STEEL WHICH CANNOT BE IMBEDDED IN NEW CONCRETE SHALL BE CUT OFF FLUSH WITH THE SURFACE OF THE CONCRETE WHEN IT WILL BE COVERED WITH A DECK OVERLAY. OTHERWISE, CUT REINFORCING OFF 1" BELOW THE CONCRETE SURFACE AND PATCH THE RESULTING HOLE WITH AN EPOXY MORTAR APPROVED BY THE ENGINEER.

THE ENTIRE COST OF THE ABOVE WORK INCLUDING ALL DRILLING, CHIPPING, REMOVING AND DISPOSING OF PORTIONS OF OLD STRUCTURE NECESSARY TO CONSTRUCT NEW STRUCTURE SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR "REMOVAL AND DISPOSAL OF DESIGNATED PORTIONS OF EXISTING BRIDGES."

THE CONTRACTOR SHALL REPAIR OR REPLACE AT HIS OWN EXPENSE, AND IN A MANNER SATISFACTORY TO THE ENGINEER, ANY PORTION OF THE EXISTING STRUCTURE DAMAGED AS A RESULT OF HIS CARELESSNESS OR NEGLIGENCE.

UNLESS OTHERWISE SPECIFIED IN THESE PLANS OR THE SPECIAL PROVISIONS, THE CONTRACTOR SHALL PROVIDE NECESSARY TEMPORARY SUPPORTS FOR UTILITIES ATTACHED TO THE BRIDGE TO MAINTAIN SERVICE DURING CONSTRUCTION. THE OWNER WILL MAKE ALL NECESSARY CHANGES IN ALIGNMENT AND ELEVATION OF THE UTILITY AND FURNISH PERMANENT SUPPORTS WHICH SHALL BE PLACED IN THE CONCRETE BY THE CONTRACTOR. ALL COSTS OF THIS WORK TO BE PERFORMED BY THE CONTRACTOR SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

ANY NECESSARY REPAIRS TO THE EXISTING STRUCTURE, IN THE OPINION OF THE ENGINEER, ARE TO BE PAID FOR AS EXTRA WORK, IF SUCH WORK IS NOT CALLED FOR IN THESE PLANS OR IN THE SPECIAL PROVISIONS FOR THIS PROJECT.

ALL DIMENSIONS OF NEW CONSTRUCTION ARE SUBJECT TO EXISTING CONDITIONS. IT IS RECOMMENDED THAT ALL DIMENSIONS WHICH MAY AFFECT MATERIALS AND QUANTITIES AS SHOWN ON THESE PLANS BE VERIFIED BY THE CONTRACTOR PRIOR TO ORDERING THE MATERIALS.

## DRIVING PILES THROUGH FILL

WHERE PILES OCCUR IN FILL EXCEEDING 10 FEET IN HEIGHT, THE FILL SHALL BE IN PLACE BEFORE PILES ARE DRIVEN.

TIMBER OR PRESTRESSED CONCRETE PILES WHICH ARE TO BE DRIVEN THROUGH FILL, SHALL BE INSTALLED IN PRE-BORED HOLES EXTENDING TO THE ORIGINAL GROUND.

HOLES FOR TIMBER PILES SHALL HAVE A 14" MINIMUM DIAMETER. HOLES FOR SQUARE PRESTRESSED CONCRETE PILES SHALL HAVE A MINIMUM DIAMETER OF 1.25 TIMES THE NOMINAL PILE SIZE. ALL COST OF PRE-BORING FILLS FOR PILE INSTALLATION SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE PILES.

## REINFORCING STEEL

GRADE 420 REINFORCING STEEL CONFORMING TO ASTM A 615M-96a WILL BE USED ON THIS PROJECT. UNLESS SHOWN OTHERWISE, ALL TIES & STIRRUPS SHALL HAVE 135° HOOKS WITH EXTENSIONS NOT LESS THAN THE LARGER OF TEN BAR DIAMETERS OR 6 INCHES.

REINFORCING BAR FABRICATION SHALL CONFORM TO THE CURRENT C.R.S.I. MANUAL OF STANDARD PRACTICE EXCEPT AS NOTED ABOVE.

THE CONTRACTOR MAY ELECT TO SUBSTITUTE MECHANICAL REINFORCING COUPLERS FOR THE LAP SPLICES DETAILED IN THE PLANS. ALL MECHANICAL REINFORCING COUPLERS SHALL COMPLY WITH THE SPECIAL PROVISIONS.

ALL COSTS FOR FURNISHING AND INSTALLING COUPLERS SHALL BE CONSIDERED INCIDENTAL TO PLACING REINFORCING STEEL. PAYMENT FOR MECHANICAL REINFORCING COUPLERS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR REINFORCING STEEL.

WHEN APPROVED BY THE ENGINEER, WELDED LAP SPLICES SHALL BE MADE WITH LOW HYDROGEN TYPE ELECTRODES AND SHALL CONFORM WITH REQUIREMENTS OF AWS D1.4 STRUCTURAL WELDING CODE.

THE WELDING PROCEDURE AND TWO TEST SAMPLES SHALL BE SUBMITTED FOR APPROVAL BY THE DEPARTMENT PRIOR TO BEGINNING THE FABRICATION OF THE SPLICES.

LAP SPLICES IN COLUMN AND SHAFT REINFORCING STEEL SHALL NOT BE ALLOWED.

## MATERIAL AND WORKMANSHIP

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SOUTH CAROLINA DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, 1986 EDITION.

## STRUCTURAL STEEL

BEAMS SHALL BE CAMBERED FOR VERTICAL CURVE AND DEAD LOAD DEFLECTION, EITHER IN MILL OR IN SHOP.

LAYOUT DIMENSIONS AND STANDARD LENGTHS OF BEAMS SHOWN ARE HORIZONTAL DIMENSIONS WHICH MUST BE INCREASED WHEN BRIDGE IS ON GRADE.

SHOP INSPECTION OF THE STRUCTURAL STEEL WILL BE PERFORMED BY THE DEPARTMENT OR ITS AUTHORIZED INSPECTION AGENCY AND THE CONTRACTOR SHALL SO STIPULATE IN HIS ORDER TO THE FABRICATOR. ALSO, THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF THE NAME AND ADDRESS OF THE FABRICATOR OF THE STRUCTURAL STEEL AS SOON AS THE FABRICATOR HAS BEEN GIVEN THE CONTRACT TO FABRICATE SO THAT THE INSPECTION PROCEDURE CAN BE SET UP.

WELDING TO THE BEAMS AND PLATE GIRDERS FOR THE PURPOSE OF ATTACHING ERECTION HARDWARE, EITHER FIELD OR SHOP, WILL NOT BE PERMITTED.

PAINTING OF STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH SPECIAL PROVISIONS.

## CHARPY V-NOTCH TOUGHNESS TEST

ALL STEEL FOR USE IN MAIN LOAD-CARRYING MEMBER COMPONENTS SUBJECT TO TENSILE STRESS SHALL CONFORM TO THE APPLICABLE CHARPY V-NOTCH IMPACT TEST REQUIREMENTS OF AASHTO M 270 (ASTM A 709) AS SPECIFIED FOR ZONE 2.

SPECIFICALLY, CHARPY TESTING SHALL BE REQUIRED AS FOLLOWS:

A) SIMPLE SPAN ROLLED BEAM - THE BEAM ITSELF AS WELL AS BOTTOM COVER PLATE, IF APPLICABLE.

B) SIMPLE SPAN PLATE GIRDER - THE WEB, BOTTOM FLANGE PLATE AND SPLICE PLATES FOR WEB AND BOTTOM FLANGE EXCLUDING ANY FILLER PLATES.

C) CONTINUOUS SPAN ROLLED BEAM - THE BEAM ITSELF AS WELL AS ANY TOP OR BOTTOM COVER PLATE LOCATED IN A TENSION REGION AS INDICATED IN THE PLANS. ALSO, ALL SPLICE PLATES FOR WEB AND TOP AND BOTTOM FLANGE PLATES EXCLUDING ANY FILLER PLATES.

D) CONTINUOUS SPAN PLATE GIRDER - ALL WEB PLATES, THE TOP FLANGE PLATES AND THE BOTTOM FLANGE PLATES LOCATED IN A TENSION REGION AS INDICATED IN THE PLANS. ALSO, ALL SPLICE PLATES FOR WEB AND TOP AND BOTTOM FLANGE PLATES EXCLUDING ANY FILLER PLATES.

E) CURVED GIRDER STRUCTURES -IN ADDITION TO CHARPY TESTING OF WEB, FLANGE & SPLICE PLATES AS APPLICABLE AND AS SPECIFIED IN (A) THRU (D) ABOVE, ALL DIAPHRAGM MEMBERS, CONNECTION PLATES AND GUSSET PLATES SHALL REQUIRE CHARPY TESTING.

## HIGH STRENGTH BOLTED CONNECTIONS

ALL BOLTED CONNECTIONS SHALL HAVE 7/8" DIAM. ASTM A325 BOLTS. SEE SPECIAL PROVISIONS FOR STRUCTURAL STEEL FASTENERS. ALL BOLTED CONNECTIONS ARE DESIGNED AS SLIP-CRITICAL CONNECTIONS HAVING CLASS "B" CONTACT SURFACES.

GENERALLY, HOLES FOR 7/8" BOLTS SHALL BE 15/16" DIAM., HOWEVER, OVERSIZE HOLES, 3/16" LARGER THAN BOLT DIAM. MAY BE USED IN DIAPHRAGMS AND/OR CROSSFRAMES AND THEIR CONNECTION PLATES PROVIDED HARDENED WASHERS ARE INSTALLED OVER OVERSIZE HOLES IN THE OUTER PLY OF THE MATERIAL GRIPPED. IN EVERY CASE A HARDENED WASHER SHALL BE INSTALLED UNDER THE ELEMENT TURNED FOR EACH BOLT OF A BOLTED CONNECTION. THE SHOP PLANS SHALL INDICATE WHICH HOLES ARE TO BE OVERSIZE AND WHERE HARDENED WASHERS ARE REQUIRED. ALL COSTS OF USING OVERSIZE HOLES, TO INCLUDE FURNISHING ADDITIONAL HARDENED WASHERS AS NECESSARY, SHALL BE AT NO EXPENSE TO THE DEPARTMENT.

THE MINIMUM DISTANCE BETWEEN CENTERS OF 7/8" DIAM. BOLTS FOR DIAPHRAGM CONNECTIONS SHALL BE 3" AND THE EDGE DISTANCE SHALL BE 1 1/2" FROM THE CENTERLINE OF BOLTS.

## ANCHOR BOLTS

ALL COMPONENTS OF ANCHOR BOLT ASSEMBLIES SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 OR M232 AS APPLICABLE. THE WEIGHT OF ANCHOR BOLT ASSEMBLIES IS INCLUDED IN THE BENT QUANTITIES FOR REINFORCING STEEL. ALL COSTS OF FURNISHING AND INSTALLING ANCHOR BOLT ASSEMBLIES SHALL BE INCLUDED IN AND PAID FOR AT THE UNIT PRICE BID FOR REINFORCING STEEL.

## BEARING ASSEMBLIES

ALL STEEL BEARING ASSEMBLY COMPONENTS SHALL MEET AASHTO M270 GR. 36 (ASTM A709 GR. 36) UNLESS OTHERWISE SPECIFIED IN THE PLANS AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 OR M232 AS APPLICABLE.

AFTER THE REQUIRED FIELD WELDING OF HOT-DIP GALVANIZED BEARING ASSEMBLIES, THE WELD AREAS AND/OR ANY DAMAGED AREAS TO THE GALVANIZED COATING SHALL BE FIELD REPAIRED IN ACCORDANCE WITH ASTM A-780.

ALL COST OF FURNISHING AND INSTALLING STEEL BEARING ASSEMBLY COMPONENTS SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR STRUCTURAL STEEL IF A BID ITEM FOR STRUCTURAL STEEL IS INCLUDED IN THE PROJECT. OTHERWISE, THE COST SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED BEAMS.

## ALLOWANCE FOR DEAD LOAD DEFLECTION AND SETTLEMENT

IN SETTING FORMS FOR STRUCTURAL STEEL OR PRESTRESSED CONCRETE BEAM SPANS, AN ALLOWANCE SHALL BE APPLIED TO DESIGN FINISH GRADE TO COMPENSATE FOR COMPUTED DEAD LOAD DEFLECTIONS.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK AND LONG-TIME DEFLECTION SUCH THAT ON REMOVAL OF FALSEWORK THE TOP OF THE STRUCTURE SHALL CONFORM TO THEORETICAL FINISH GRADE PLUS THE ALLOWANCE FOR LONG-TIME DEFLECTION.

FOR CONCRETE FLAT SLAB SPANS TWENTY TO THIRTY FEET IN LENGTH, SUB- SECTION 702.27 OF THE STANDARD SPECIFICATION IS AMENDED IN PART TO REQUIRE 1/8" OF CAMBER FOR DEAD LOAD AND LONG-TIME DEFLECTION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

## CONTRACTOR'S OPTIONAL STAY-IN-PLACE FORMS

PERMANENT STEEL BRIDGE DECK FORMS MAY BE USED ON THIS PROJECT AT THE CONTRACTOR'S OPTION. AN EXTRA DEAD LOAD OF 16 P.S.F. HAS BEEN INCORPORATED INTO THE DESIGN OF THIS STRUCTURE TO ACCOMMODATE THE USE OF SUCH FORMS. SEE SUBSECTION 702.11(d) OF THE STANDARD SPECIFICATIONS FOR REQUIREMENTS.

SECTION 702.11 (d)-3 (b) OF THE STANDARD SPECIFICATIONS IS AMENDED TO REQUIRE THAT DEFLECTIONS CALCULATED USING THE WEIGHT OF THE FORMS, THE PLASTIC CONCRETE AND REINFORCEMENT SHALL MEET THE FOLLOWING CRITERIA AND IN NO CASE SHALL THIS LOADING BE LESS THAN 120 P.S.F. TOTAL.

DEFLECTIONS FOR FORM SPANS LESS THAN OR EQUAL TO 10 FEET SHALL NOT EXCEED 1/180 OF THE SPAN OR 1/2 INCH WHICHEVER IS LESS. DEFLECTIONS FOR FORM SPANS GREATER THAN 10 FEET SHALL NOT EXCEED 1/240 OF THE SPAN OR 3/4 INCH WHICHEVER IS LESS.

THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT AND THE FABRICATOR IF HE ELECTS TO USE THIS OPTION SO THAT SHOP PLANS CAN BE PROPERLY DETAILED.

## CONCRETE

THE CLASS OF CONCRETE SHALL BE AS NOTED ON OTHER SHEETS OF THESE PLANS.

BUILD-UPS ON BENT CAPS SHALL BE CAST MONOLITHIC WITH CAP UNLESS INDICATED OTHERWISE IN THESE PLANS. THE TOP OF EACH BUILD-UP SHALL BE LEVEL.

PAYMENT FOR CONCRETE IN SLAB WILL BE BASED ON THEORETICAL PLAN QUANTITY. ANY NECESSARY ADJUSTMENT IN QUANTITY DUE TO VARIATION IN CAMBER SHALL BE AT THE CONTRACTOR'S EXPENSE.

SIMPLE SPANS 80 FEET OR LESS SHALL BE POURED WITHOUT A TRANSVERSE CONSTRUCTION JOINT. FOR SIMPLE SPANS OVER 80 FEET IN LENGTH, A TRANSVERSE STRIP OF THE SLAB CENTERED AT MID-SPAN AND COMPRISING APPROXIMATELY 2/3 OF THE SLAB SHALL BE POURED FIRST AND ALLOWED TO CURE FOR NOT LESS THAN 4 DAYS BEFORE THE REMAINING END SECTIONS ARE POURED. HOWEVER, WHEN FAVORABLE WEATHER CONDITIONS EXIST THE ENGINEER MAY PERMIT THE ENTIRE SLAB TO BE POURED PROVIDED A SUITABLE RETARDING AGENT IS USED IN SUCH AMOUNTS THAT NONE OF THE CONCRETE OF THE POUR SHALL REACH INITIAL SET PRIOR TO COMPLETION OF THE POUR.

ALL EXPOSED EDGES SHALL BE CHAMFERED 3/4" UNLESS OTHERWISE NOTED.

THE MINIMUM ACCEPTABLE CONCRETE COVER FOR REINFORCING STEEL MAY BE ONE HALF INCH LESS THAN THE PLAN DIMENSIONS WHEN REQUIRED BY REINFORCING BAR FABRICATION TOLERANCES.

THE TOP ONE FOURTH INCH OF ALL CONCRETE SLABS SHALL BE CONSIDERED AS A WEARING SURFACE AND SHALL NOT BE INCLUDED IN THE SLAB DEPTH USED FOR THE CALCULATION OF SECTION PROPERTIES.

## REMOVAL OF FALSEWORK AND FORMS

SECTION 702.18 OF THE STANDARD SPECIFICATIONS IS AMENDED IN PART TO THE EXTENT THAT "UNDER URGENT CONDITIONS AND WITH THE WRITTEN APPROVAL OF THE ENGINEER, ADDITIONAL STRENGTH CONTROL CYLINDERS MAY BE MADE AND THE FALSEWORK STRUCK WHEN THESE CYLINDERS, CURED UNDER THE SAME CONDITIONS AS THE CONCRETE IN THE STRUCTURE, DEVELOP A UNIT STRENGTH OF 3,200 PSI. HOWEVER, SUCH CONCRETE SHALL NOT BE SUBJECTED TO A SUPERIMPOSED LOAD UNTIL THE COMPRESSIVE STRENGTH IS AT LEAST 4,000 PSI.

## WORKING DRAWINGS

WHEN REQUIRED BY THE PLANS, SPECIFICATIONS OR SPECIAL PROVISIONS, THE CONTRACTOR SHALL SUBMIT SHOP PLANS, ERECTION PLANS, FALSEWORK PLANS, COFFERDAM PLANS OR ANY OTHER SUPPLEMENTARY PLANS TO THE ENGINEER FOR REVIEW. THESE PLANS, ALONG WITH ANY ASSOCIATED DESIGN CALCULATIONS, SHALL BEAR THE SEAL AND SIGNATURE OF A SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER WITH THE FOLLOWING EXCEPTIONS:

A) SHOP PLANS FOR ARMOR PLATES LOCATED AT BRIDGE ENDS OR APPROACH SLAB ENDS
B) SHOP PLANS FOR PRESTRESSED CONCRETE PILING THAT ARE FABRICATED IN ACCORDANCE WITH THE DETAILS SHOWN IN THE PLANS.

ALL COSTS FOR THE PREPARATION AND FURNISHING OF THE WORKING DRAWINGS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE VARIOUS PAY ITEMS OF WORK.

| SHEET NO. | TOTAL SHEETS |
|---|---|
| | |

## PRESTRESSED BEAMS

MEMBRANE CURING COMPOUND SHALL NOT BE USED ON TOPS OR ENDS OF BEAMS.

BEAM LENGTHS GIVEN ARE BASED ON HORIZONTAL SPAN ONLY. LENGTHS SHALL BE INCREASED TO CORRECT FOR CONCRETE SHRINKAGE, CONCRETE SHORTENING WHEN THE STRANDS ARE CUT, AND FOR BEAMS BEING ON A GRADE.

SECTION 704.15 AND 704.16 OF THE STANDARD SPECIFICATIONS ARE AMENDED IN PART TO REQUIRE THAT PRESTRESSED CONCRETE BEAMS BE MEASURED AND PAID FOR AT THE CONTRACT UNIT PRICE PER LINEAR FOOT.

## SPECIFICATIONS:

AASHTO 1996 STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES AND INTERIMS.

ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE (LATEST EDITION) WITH ADDITIONS AND REVISIONS AS STATED IN THE SPECIAL PROVISIONS.

## LIVE LOAD:

AASHTO HS25-44 LOADING OR AN ALTERNATE MILITARY LOADING OF 2 AXLES 4 FEET APART WITH EACH AXLE WEIGHING 24,000 POUNDS, WHICHEVER PRODUCES THE GREATEST STRESS.

## DESIGN DATA:

STRENGTH DESIGN METHOD (LOAD FACTOR DESIGN)

CONCRETE: CLASS "D", $f'_c$ = 4,000 P.S.I.

## SPECIAL NOTE:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES ON THIS SHEET AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE STANDARD SPECIFICATIONS SEC. 105.04.

## VALUE ENGINEERING PROPOSALS:

THE CONTRACTOR MAY INITIATE, DEVELOP, AND PRESENT TO THE DEPARTMENT OF TRANSPORTATION FOR CONSIDERATION, ANY COST REDUCTION PROPOSALS CONCEIVED BY THEM INVOLVING CHANGES IN THE DRAWINGS, DESIGNS, SPECIFICATIONS, OR OTHER REQUIREMENTS OF THE CONTRACT. ALL VALUE ENGINEERING PROPOSALS SHALL COMPLY WITH THE REQUIREMENTS OF THE SPECIAL PROVISIONS.

## EXCAVATION FOR END BENT

ALL COST OF EXCAVATION NECESSARY TO CONSTRUCT END BENTS AND TO REMOVE MATERIAL UNDER SUPERSTRUCTURE TO AN ELEVATION 1'-0" BELOW TOPS OF END BENT CAPS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

IF A CONCRETE FOOTING IS USED FOR THE END BENT, THE EXCAVATION BELOW THAT INCLUDED FOR THE CAP AND BERM IN THE ABOVE PARAGRAPH WILL BE PAID FOR AT THE UNIT PRICE BID FOR EXCAVATION. EXCAVATION ABOVE THIS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

## COMPLETION DATES

THE CONTRACTOR SHALL PLACE YEAR OF COMPLETION ON INSIDE FACE OF RIGHT SIDE BARRIER PARAPET/RAIL AT BEGINNING OF BRIDGE AND ON LEFT SIDE BARRIER PARAPET/RAIL AT END OF BRIDGE. NUMBERS ARE TO BE RECESSED IN THE CONCRETE USING NUMBERS THAT ARE FABRICATED FROM REUSABLE/DURABLE MATERIAL AND APPROVED BY THE ENGINEER. THE CONTRACTOR WILL BE RESPONSIBLE FOR SUPPLYING THE NUMBERS WITH THE DIMENSIONS SHOWN ON STANDARD DRAWING NUMBERS.STD FOUND ON SCDOT INTERNET FTP SITE AT FTP.DOT.STATE.SC.US LOGON AS ANONYMOUS. LOCATED IN DIR-PUB/BR CONSULTANT/ESTANDARD OR A COPY CAN BE OBTAINED FROM THE RESIDENT ENGINEER.

| REV. | BY | CHK. | DATE |
|---|---|---|---|
| | REJ | JAR | 3-99 |
| | VALUE ENG. PRO. | | |
| REV. | REJ | JAR | 1-99 |
| | COMPL. DATE | | |
| REV. | REJ | JAR | 11-98 |
| | WORK DWGS. | | |
| REVIEWED | | | |
| QUAN. | | | |
| DR. | GLP | BWB | 9-89 |
| DES. | | | |

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN — COLUMBIA, S.C.

# STANDARD NOTES

| FILE NO. | ROUTE | COUNTY | DRAWING NO. |
|---|---|---|---|
| | | | 700-1 |

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| SHEET NO. | TOTAL SHEETS |
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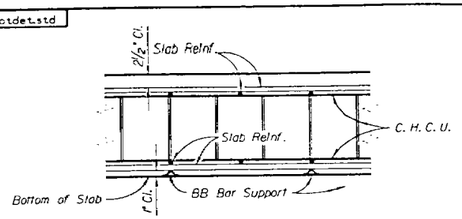
| | |




## BAR SUPPORT DETAIL

**SECTION PARALLEL TO ℄ ROADWAY**

NOTE:

TERMS AND SYMBOLS USED BELOW REFER TO STANDARD TYPE BAR SUPPORTS AND CLASSES OF PROTECTION AS SPECIFIED IN C.R.S.I. MANUAL OF STANDARD PRACTICE, DATED 1997.

BAR SUPPORTS SHALL BE SPACED TO PROVIDE ADEQUATE SUPPORT FOR SLAB REINFORCING STEEL. THE LOWER LAYER OF SLAB STEEL SHALL BE SUPPORTED BY BEAM BOLSTERS (BB) BAR SUPPORTS WITH ONE ROW NEAR EACH END OF SPAN AND INTERIOR ROWS SPACED APPROXIMATELY 2'-0" ON CENTER. BB BAR SUPPORTS SHALL HAVE CLASS 1 MAXIMUM PROTECTION. TOP REINFORCING STEEL SHALL BE SUPPORTED BY CONTINUOUS HIGH CHAIRS UPPER (CHCU) AS SHOWN IN THE ABOVE DETAIL. SPACED 2'-6" ON CENTER MAXIMUM.

WEIGHT OF BAR SUPPORTS ARE NOT INCLUDED IN THE REINFORCING STEEL QUANTITIES. BAR SUPPORTS SHALL BE CONSIDERED INCIDENTAL TO THE REINFORCING STEEL AND ALL COSTS OF FURNISHING AND PLACING BAR SUPPORTS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR REINFORCING STEEL.

### PLASTIC BAR SUPPORTS:

PLASTIC BAR SUPPORTS MAY BE USED IN LIEU OF BB WIRE SUPPORTS.

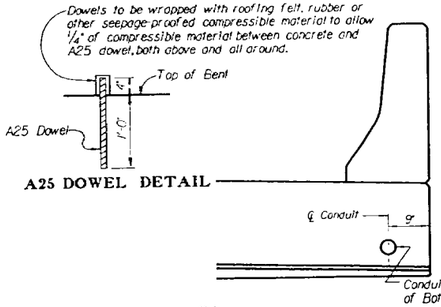
PLASTIC BAR SUPPORTS SHALL MEET THE FOLLOWING REQUIREMENTS:

1. CHAIRS AND BOLSTERS MUST BE OF ADEQUATE STRENGTH TO RESIST A 300 POUND CONCENTRATED LOAD WITHOUT PERMANENT DEFORMATION OR BREAKAGE.
2. THE MATERIAL FROM WHICH PLASTIC BAR SUPPORTS ARE MANUFACTURED SHALL BE EITHER VIRGIN RESIN OR FIRST GENERATION RECYCLED THERMOPLASTIC RESIN, BE COLORED WHITE, GRAY, OR BLACK, AND BE CHEMICALLY INERT IN CONCRETE.
3. PLASTIC REBAR SUPPORTS SHALL BE MOLDED IN A CONFIGURATION WHICH DOES NOT RESTRICT CONCRETE FLOW AND CONSOLIDATION AROUND AND UNDER THE REBAR SUPPORT.

### INDEX PILES:

NOTE:

THE PILE LENGTHS GIVEN ARE FOR BID ESTIMATION PURPOSES ONLY. ONE 18-IN. SQUARE PRESTRESSED INDEX PILE 41 FT. LONG SHALL BE DRIVEN AT AN INTERIOR BENT AS DIRECTED BY THE ENGINEER. THE DEPARTMENT RESERVES THE RIGHT TO ADD, DELETE, OR SHIFT INDEX PILINGS. ANY ADDITIONAL INDEX PILES WILL BE PAID FOR AS PRESTRESED INDEX PILE (18-IN. SQ.). THE REMAINDER OF THE PILES SHALL NOT BE CAST UNTIL ALL INDEX PILES FOR THAT BRIDGE HAVE BEEN DRIVEN AND PILE LENGTHS APPROVED BY THE ENGINEER. ALL COSTS OF MATERIAL, EQUIPMENT, AND LABOR NECESSARY TO INSTALL THE INDEX PILES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED INDEX PILING (18-IN. SQ.). THE ENGINEERING MAY REQUIRE THE CONTRACTOR TO PRE-DRILL OR SPUD IN ORDER TO OBTAIN THE NECESSARY PENETRATION. ALL COST FOR PRE-DRILLING OF SPUDDING WILL BE INCLUDED IN THE PRICE BID FOR PRESTRESSED CONCRETE PILING (18-IN. SQ.).

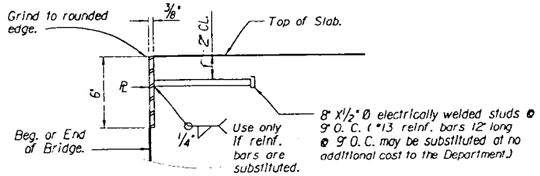



**A25 DOWEL DETAIL**




*Note:*
*Conduits necessary for utilities to be furnished by the utility company and placed at no expense to the department. Use Slip Coupling on Conduits at Expansion Joints.*

**DETAIL SHOWING CONDUIT PLACEMENT**




## ARMOR PLATE DETAIL

NOTE:
THE 3/8" THICK PLATES WILL BE REQUIRED AT THE BEGINNING AND END OF THE BRIDGE.

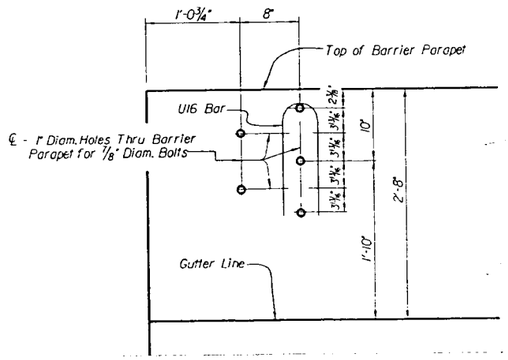
STEEL FOR THE ARMOR PLATES SHALL CONFORM TO THE LATEST AASHTO M270 GRADE 50W (ASTM A709 GR. 50W) STEEL AND NEITHER THE PLATES NOR THE ANCHOR STUDS NEED BE PAINTED.

THE FABRICATED PLATES SHALL CONFORM TO THE CROWN AND GRADE OF THE ROADWAY AND SHALL EXTEND FROM GUTTER LINE TO GUTTER LINE. THE PLATES MAY BE FABRICATED IN REASONABLE LENGTHS AND CONNECTED AT THE JOB SITE WITH FULL PENETRATION BUTT WELDS GROUND FLUSH ALONG THE TOP FACE OF CONNECTED PLATES.

IF NECESSARY, LONGITUDINAL REINFORCING BARS OF THE SLAB MAY BE SHIFTED LATERALLY TO CLEAR ANCHOR STUDS.

IF DESIRED BY THE CONTRACTOR, 9/16"Ø HOLES SPACED APPROXIMATELY 2'-0" O.C., MAY BE PROVIDED IN LOWER PORTION OF THE PLATES TO BOLT THE PLATES TO THE FORMS.

ALL COSTS OF MATERIAL AND WORKMANSHIP TO FABRICATE, FURNISH AND INSTALL THE ARMOR PLATES AND ANCHOR STUDS COMPLETE IN PLACE SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.




### ① THRIE BEAM GUARD RAIL ATTACHMENT TO PARAPET

① NOTE:

THE 1" DIAM. HOLES MAY BE FORMED WITH PLASTIC OR PVC PIPE HAVING AN I.D. OF 1" (+ 1/8") OR 1" I.D. GALVANIZED STANDARD WEIGHT STEEL PIPE.

ALL COST OF PIPE AND INSTALLATION SHALL BE INCLUDED IN THE PRICE BID FOR REINFORCING STEEL.

ALL PIPE TO REMAIN IN PLACE WHEN FORMS ARE REMOVED.

THE RESIDENT ENGINEER SHALL CHECK THE LOCATION OF THE HOLES TO INSURE THAT THE GUARDRAIL SHOE WILL FIT PROPERLY WHEN INSTALLED.

ALL GUARDRAIL AND BOLTS TO BE FURNISHED AND INSTALLED BY CONTRACTOR.

### WORKING DRAWINGS

WHEN REQUIRED BY THE PLANS, SPECIFICATIONS OR SPECIAL PROVISIONS, THE CONTRACTOR SHALL SUBMIT SHOP PLANS, ERECTION PLANS, FALSEWORK PLANS, COFFERDAM PLANS OR ANY OTHER SUPPLEMENTARY PLANS TO THE ENGINEER FOR REVIEW. THESE PLANS, ALONG WITH ANY ASSOCIATED DESIGN CALCULATIONS, SHALL BEAR THE SEAL AND SIGNATURE OF A SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER WITH THE FOLLOWING EXCEPTIONS:

A) SHOP PLANS FOR ARMOR PLATES LOCATED AT BRIDGE ENDS OR APPROACH SLAB ENDS
B) SHOP PLANS FOR PRESTRESSED CONCRETE PILING THAT ARE FABRICATED IN ACCORDANCE WITH THE DETAILS SHOWN IN THE PLANS.

ALL COSTS FOR THE PREPARATION AND FURNISHING OF THE WORKING DRAWINGS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE VARIOUS PAY ITEMS OF WORK.

### CONCRETE

THE CLASS OF CONCRETE SHALL BE AS NOTED ON OTHER SHEETS OF THESE PLANS.

BUILD-UPS ON BENT CAPS SHALL BE CAST MONOLITHIC WITH CAP UNLESS INDICATED OTHERWISE IN THESE PLANS. THE TOP OF EACH BUILD-UP SHALL BE LEVEL.

PAYMENT FOR CONCRETE IN SLAB WILL BE BASED ON THEORETICAL PLAN QUANTITY. ANY NECESSARY ADJUSTMENT IN QUANTITY DUE TO VARIATION IN CAMBER SHALL BE AT THE CONTRACTOR'S EXPENSE.

ALL EXPOSED EDGES SHALL BE CHAMFERED 3/4" UNLESS OTHERWISE NOTED.

THE MINIMUM ACCEPTABLE CONCRETE COVER FOR REINFORCING STEEL MAY BE ONE HALF INCH LESS THAN THE PLAN DIMENSIONS WHEN REQUIRED BY REINFORCING BAR FABRICATION TOLERANCES.

THE TOP ONE FOURTH INCH OF ALL CONCRETE SLABS SHALL BE CONSIDERED AS A WEARING SURFACE AND SHALL NOT BE INCLUDED IN THE SLAB DEPTH USED FOR THE CALCULATION OF SECTION PROPERTIES.

### VALUE ENGINEERING PROPOSALS:

THE CONTRACTOR MAY INITIATE, DEVELOP, AND PRESENT TO THE DEPARTMENT OF TRANSPORTATION FOR CONSIDERATION, ANY COST REDUCTION PROPOSALS CONCEIVED BY THEM INVOLVING CHANGES IN THE DRAWINGS, DESIGNS, SPECIFICATIONS, OR OTHER REQUIREMENTS OF THE CONTRACT. ALL VALUE ENGINEERING PROPOSALS SHALL COMPLY WITH THE REQUIREMENTS OF THE SPECIAL PROVISIONS.

### REINFORCING STEEL

GRADE 420 REINFORCING STEEL CONFORMING TO ASTM A 615M-96a WILL BE USED ON THIS PROJECT, UNLESS SHOWN OTHERWISE. ALL TIES & STIRRUPS SHALL HAVE 135° HOOKS WITH EXTENSIONS NOT LESS THAN THE LARGER OF TEN BAR DIAMETERS OR 6 INCHES.

REINFORCING BAR FABRICATION SHALL CONFORM TO THE CURRENT C.R.S.I. MANUAL OF STANDARD PRACTICE EXCEPT AS NOTED ABOVE.

THE CONTRACTOR MAY ELECT TO SUBSTITUTE MECHANICAL REINFORCING COUPLERS FOR THE LAP SPLICES DETAILED IN THE PLANS. ALL MECHANICAL REINFORCING COUPLERS SHALL COMPLY WITH THE SPECIAL PROVISIONS.

ALL COSTS FOR FURNISHING AND INSTALLING COUPLERS SHALL BE CONSIDERED INCIDENTAL TO PLACING REINFORCING STEEL. PAYMENT FOR MECHANICAL REINFORCING COUPLERS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR REINFORCING STEEL.

WHEN APPROVED BY THE ENGINEER, WELDED LAP SPLICES SHALL BE MADE WITH LOW HYDROGEN TYPE ELECTRODES AND SHALL CONFORM WITH REQUIREMENTS OF AWS D1.4 STRUCTURAL WELDING CODE.

THE WELDING PROCEDURE AND TWO TEST SAMPLES SHALL BE SUBMITTED FOR APPROVAL BY THE DEPARTMENT PRIOR TO BEGINNING THE FABRICATION OF THE SPLICES.

LAP SPLICES IN COLUMN AND SHAFT REINFORCING STEEL SHALL NOT BE ALLOWED.

### ALLOWANCE FOR DEAD LOAD DEFLECTION AND SETTLEMENT

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK AND LONG-TIME DEFLECTION SUCH THAT ON REMOVAL OF FALSEWORK THE TOP OF THE STRUCTURE SHALL CONFORM TO THEORETICAL FINISH GRADE PLUS THE ALLOWANCE FOR LONG-TIME DEFLECTION.

FOR CONCRETE FLAT SLAB SPANS TWENTY TO THIRTY FEET IN LENGTH, SUB-SECTION 702.27 OF THE STANDARD SPECIFICATION IS AMENDED IN PART TO REQUIRE 1/8" OF CAMBER FOR DEAD LOAD AND LONG-TIME DEFLECTION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

### COMPLETION DATES

THE CONTRACTOR SHALL PLACE YEAR OF COMPLETION ON INSIDE FACE OF RIGHT SIDE BARRIER PARAPET/RAIL AT BEGINNING OF BRIDGE AND ON LEFT SIDE BARRIER PARAPET/RAIL AT END OF BRIDGE. NUMBERS ARE TO BE RECESSED IN THE CONCRETE USING NUMBERS THAT ARE FABRICATED FROM REUSABLE/DURABLE MATERIAL AND APPROVED BY THE ENGINEER. THE CONTRACTOR WILL BE RESPONSIBLE FOR SUPPLYING THE NUMBERS WITH THE DIMENSIONS SHOWN ON STANDARD DRAWING NUMBERS. STD FOUND ON SCDOT INTERNET FTP SITE AT FTP.DOT.STATE.SC.US LOCON AS ANONYMOUS. LOCATED IN DIR=PUB/BR CONSULTANT/ESTANDARD CR A COPY CAN BE OBTAINED FROM THE RESIDENT ENGINEER.

### EXCAVATION FOR END BENT

ALL COST OF EXCAVATION NECESSARY TO CONSTRUCT END BENTS AND TO REMOVE MATERIAL UNDER SUPERSTRUCTURE TO AN ELEVATION 1'-0" BELOW TOPS OF END BENT CAPS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

IF A CONCRETE FOOTING IS USED FOR THE END BENT, THE EXCAVATION BELOW THAT INCLUDED FOR THE CAP AND BERM IN THE ABOVE PARAGRAPH WILL BE PAID FOR AT THE UNIT PRICE BID FOR EXCAVATION. EXCAVATION ABOVE THIS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

### BEARINGS

FOR CONCRETE SLABS BEARING ON CONCRETE, THE TOP OF CAPS UNDER BEARING AREAS SHALL RECEIVE A SUITABLE TROWEL FINISH TO INSURE A SMOOTH AND LEVEL BEARING SURFACE. SEE STANDARD SPECIFICATIONS PARAGRAPH 702.26.

### DRIVING PILES THROUGH FILL

WHERE PILES OCCUR IN FILL EXCEEDING 10 FEET IN HEIGHT, THE FILL SHALL BE IN PLACE BEFORE PILES ARE DRIVEN.

TIMBER OR PRESTRESSED CONCRETE PILES WHICH ARE TO BE DRIVEN THROUGH FILL, SHALL BE INSTALLED IN PRE-BORED HOLES EXTENDING TO THE ORIGINAL GROUND.

HOLES FOR TIMBER PILES SHALL HAVE A 14" MINIMUM DIAMETER. HOLES FOR SQUARE PRESTRESSED CONCRETE PILES SHALL HAVE A MINIMUM DIAMETER OF 1.25 TIMES THE NOMINAL PILE SIZE. ALL COST OF PRE-BORING FILLS FOR PILE INSTALLATION SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE PILES.

### REMOVAL OF FALSEWORK AND FORMS

SECTION 702.18 OF THE STANDARD SPECIFICATIONS IS AMENDED IN PART TO THE EXTENT THAT "UNDER URGENT CONDITIONS AND WITH THE WRITTEN APPROVAL OF THE ENGINEER, ADDITIONAL STRENGTH CONTROL CYLINDERS MAY BE MADE AND THE FALSEWORK STRUCK WHEN THESE CYLINDERS, CURED UNDER THE SAME CONDITIONS AS THE CONCRETE IN THE STRUCTURE, DEVELOP A UNIT STRENGTH OF 3,200 PSI. HOWEVER, SUCH CONCRETE SHALL NOT BE SUBJECTED TO A SUPERIMPOSED LOAD UNTIL THE COMPRESSIVE STRENGTH IS AT LEAST 4,000 PSI.

### SPECIFICATIONS:

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ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE (LATEST EDITION) WITH ADDITIONS AND REVISIONS AS STATED IN THE SPECIAL PROVISIONS.

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### DESIGN DATA:

STRENGTH DESIGN METHOD (LOAD FACTOR DESIGN)

CONCRETE: CLASS "D", $f'_c$ = 4,000 P.S.I.

### SPECIAL NOTE:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES ON THIS SHEET AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE STANDARD SPECIFICATIONS SEC. 105.04.

### MATERIAL AND WORKMANSHIP

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SOUTH CAROLINA DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, 1986 EDITION.

### NOTE:

LEFT AND RIGHT SIDES, WHERE REFERRED TO IN THESE PLANS, ARE IN RELATION TO DIRECTION OF STATIONING.

| REV. | REJ | JAR | 3-99 |
|---|---|---|---|
| | VALUE ENG. PRO. | | |
| REV. | REJ | JAR | 11-98 |
| | COMPL. DATE | | |
| REV. | REJ | JAR | 11-98 |
| | WORK DWGS. | | |
| REVIEWED | | | |
| QUAN. | | | |
| DR. | REJ | HDJ | 7-90 |
| DES. | | | |
| | BY | CHK. | DATE |

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN COLUMBIA, S.C.

STANDARD NOTES AND DETAILS FOR FLAT SLABS

| FILE NO. | ROUTE | COUNTY | DRAWING NO. |
|---|---|---|---|
| | | | 702-2A |

HS25LLOAD FACTOR

SCDOT
South Carolina
Department of Transportation

DM0599

May 26, 1999

## MEMORANDUM TO GROUP LEADERS & CONSULTANTS

**SUBJECT:** Beam Slab Designs

---

Design Memo DM0196 requires two and one-half (2 1/2 ") inches of cover over the top mat of reinforcing steel; therefore, design memo DM 0393 (Standarized Load Factor Design For Bridge Slabs) is no longer applicable for designing slabs. The slab thickness and reinforcing requirements should be project specific. A minimum of one and one-half inches (1 1/2 ") between top and bottom mats of slab reinforcing steel is to be maintained. A minimum bar spacing of five and one-half inches (5 1/2 ") shall be maintained between adjacent reinforcing bars in each mat. These spacing minimums are to ensure adequate room to properly consolidate the concrete.

Mr. Reese, please indicate on the Bridge Design web page that DM 0393 has been deleted.

Randy R. Cannon, P.E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
James Reese

File: PC/JLC

Post Office Box 191
Columbia, South Carolina 29202-0191

Phone: (803) 737- 2314
TTY: (803) 737- 3870

SCDOT
South Carolina
Department of Transportation

DM0699

May 28, 1999

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS**

**SUBJECT: NEW FIELD WELDING NOTE & SUPPLEMENTAL SPECIFICATION**

---

The attached revised Bridge Design standard notes sheets should be used for bridge projects beginning with the August 1999 letting. Your attention is directed to a new note entitled, **"FIELD WELDING"**.

This change was required to address concerns about the quality of welding done by the Contractor's personnel. The note and the new Supplemental Specification allows for selective inspection and testing of field welding.

The attached new Supplemental Specification entitled "FIELD WELDING" will be included in all bridge projects beginning with the August 1999 letting.

Plans that are complete and that will be let in August 1999 or later must be revised to include this revision. Your cooperation in this matter is appreciated.

Randy R. Cannon, P.E.
Bridge Design Engineer

Attachments:

cc: Assistant Bridge Design Engineers

File: PC/REL

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Columbia, South Carolina 29202-0191

Phone: (803) 737- 2314
TTY: (803) 737- 3870

July 19, 1999

# FIELD WELDING

South Carolina Department of Transportation Standard Specifications for Highway Construction, Edition of 1986 are revised as follows:

Subsection 709.22 "Structural Welding" is revised by removing the last sentence in paragraph A.1.(b) and all of part B "Field Welding" and replaced with the following Subsection 709.22B "Field Welding".

709.22B "Field Welding":

(1) General. All field welding, except welding of reinforced pile tips, temporary false-work (unless specified), SIP form-work, armor plate at bridge ends and armor plate at expansion joints shall be considered structural welding and shall be performed by a SCDOT certified welder. All field personnel welding structural steel, steel reinforcement, steel pile splices, and other types of field structural welds shall have been qualified to perform the type of welding in accordance with the qualification procedure of ANSI/AASHTO/AWS D 1.5 Bridge Welding Code as follows: A welder or tacker (hereafter known as "welder") may be qualified by preparing test specimens in accordance with section 5.22, figure 5.7A, Position 2G for limited thickness groove welding (butt welding) and section 5.23, figure 5.8A, Position 2F for fillet welding. Testing as shown in Figure 5.8B will not suffice for fillet welding qualification.

The above testing is minimum and will qualify the welder for general welding at the job site. By choice of the welder, he may qualify for additional positions and unlimited metal thickness as part of the above testing. Specialized welding and welding positions at the job site may require additional welder qualification testing if required by the Engineer.

The test specimens shall be prepared in the presence of and tested and evaluated by an independent laboratory person qualified as a Welding Inspector. All radiographic nondestructive testing shall be performed by an ASNT Level II or III technician. The independent laboratory shall furnish a welder qualification test report on company letterhead stationery stating the type welding approved, name of the welder, the welder's social security number, along with a statement that the welder is duly qualified as a field welder in accordance with the SCDOT requirements. The report shall show the name of the independent laboratory technician(s) making the evaluation and be signed by the independent laboratory manager.

The independent laboratory shall submit a copy of the report to: Research and Materials Engineer, Research and Materials Laboratory, SCDOT, P. O. Box 191, Columbia, SC 29202, for processing. The welder will be forwarded a SCDOT certification good for two years and renewable every two years provided the welder has been engaged in welding procedures during the preceding two year period.

A list of qualified independent laboratories capable of administering this testing may be obtained from the SCDOT Research and Materials Laboratory. An independent laboratory may request to be included on the list by furnishing to the Research and Materials Engineer a letter stating their qualifications to perform the testing and the names of their personnel who will be performing the evaluations.

(2) **Submittals. The Contractor shall notify the Resident Construction Engineer and the Research and Material Engineer ten (10) calendar days prior to performing any field welding including the welding of reinforced pile tips, armored plated at bridge joints, temporary false-work and SIP form-work. The Contractor shall document this notification by completing the attached form Entitled "SCDOT Sample Welding Procedure Specification" and forwarding one copy each to the Resident Construction Engineer and the Research and Materials Engineer.**

Date 99-07-19

# SCDOT WELDING PROCEDURE SPECIFICATION

Material specification _____
Welding process _____
Manual or machine _____
Position of welding _____
Filler metal specification _____
Filler metal classification _____
Flux _____
Shielding gas _____ Flow rate _____
Single or multiple pass _____
Single or multiple arc _____
Welding current _____
Polarity _____
Welding progression _____
Root treatment _____
Preheat and interpass temperature _____
Postheat temperature _____
Heat input Min. _____ Max. _____
Welder's Name _____ Certified Welder Required: Yes _____ No _____
If required Welder's SCDOT Certification No. _____

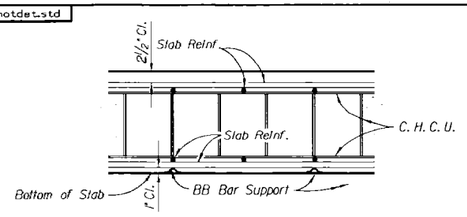
## WELDING PROCEDURE

| Pass No. | Electrode size | Welding current | | Travel speed | Joint detail |
|---|---|---|---|---|---|
| | | Amperes | Volts | | |
| | | | | | |

This procedure may vary due to fabrication sequence, fit-up, pass size, etc., within the limitations of variables given in AWS D1.5, section 5.

Procedure no. _____ Contractor _____
Revision no. _____ Authorized By _____
Date _____

stdnotdet.std




## BAR SUPPORT DETAIL
**SECTION PARALLEL TO ℄ ROADWAY**

NOTE:

TERMS AND SYMBOLS USED BELOW REFER TO STANDARD TYPE BAR SUPPORTS AND CLASSES OF PROTECTION AS SPECIFIED IN C.R.S.I. MANUAL OF STANDARD PRACTICE, DATED 1997.

BAR SUPPORTS SHALL BE SPACED TO PROVIDE ADEQUATE SUPPORT FOR SLAB REINFORCING STEEL. THE LOWER LAYER OF SLAB STEEL SHALL BE SUPPORTED BY BEAM BOLSTERS (BB) BAR SUPPORTS WITH ONE ROW NEAR EACH END OF SPAN AND INTERIOR ROWS SPACED APPROXIMATELY 2'-0" ON CENTER. BB BAR SUPPORTS SHALL HAVE CLASS 1 MAXIMUM PROTECTION. TOP REINFORCING STEEL SHALL BE SUPPORTED BY CONTINUOUS HIGH CHAIRS UPPER (CHCU) AS SHOWN IN THE ABOVE DETAIL. SPACED 2'-6" ON CENTER MAXIMUM.

WEIGHT OF BAR SUPPORTS ARE NOT INCLUDED IN THE REINFORCING STEEL QUANTITIES. BAR SUPPORTS SHALL BE CONSIDERED INCIDENTAL TO THE REINFORCING STEEL AND ALL COSTS OF FURNISHING AND PLACING BAR SUPPORTS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR REINFORCING STEEL.

### PLASTIC BAR SUPPORTS:

PLASTIC BAR SUPPORTS MAY BE USED IN LIEU OF BB WIRE SUPPORTS.

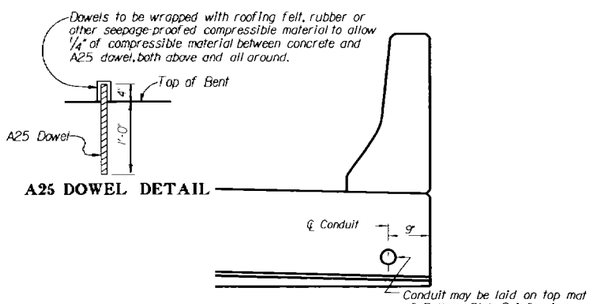
PLASTIC BAR SUPPORTS SHALL MEET THE FOLLOWING REQUIREMENTS:

1. CHAIRS AND BOLSTERS MUST BE OF ADEQUATE STRENGTH TO RESIST A 300 POUND CONCENTRATED LOAD WITHOUT PERMANENT DEFORMATION OR BREAKAGE.
2. THE MATERIAL FROM WHICH PLASTIC BAR SUPPORTS ARE MANUFACTURED SHALL BE EITHER VIRGIN RESIN OR FIRST GENERATION RECYCLED THERMOPLASTIC RESIN, BE COLORED WHITE, GRAY, OR BLACK, AND BE CHEMICALLY INERT IN CONCRETE.
3. PLASTIC REBAR SUPPORTS SHALL BE MOLDED IN A CONFIGURATION WHICH DOES NOT RESTRICT CONCRETE FLOW AND CONSOLIDATION AROUND AND UNDER THE REBAR SUPPORT.

### INDEX PILES:

NOTE:

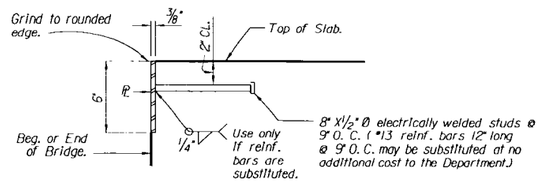
THE PILE LENGTHS GIVEN ARE FOR BID ESTIMATION PURPOSES ONLY. ONE 18-IN. SQUARE PRESTRESSED INDEX PILE 41 FT. LONG SHALL BE DRIVEN AT AN INTERIOR BENT AS DIRECTED BY THE ENGINEER. THE DEPARTMENT RESERVES THE RIGHT TO ADD, DELETE, OR SHIFT INDEX PILINGS. ANY ADDITIONAL INDEX PILES WILL BE PAID FOR AS PRESTRESED INDEX PILE (18-IN. SQ.). THE REMAINDER OF THE PILES SHALL NOT BE CAST UNTIL ALL INDEX PILES FOR THAT BRIDGE HAVE BEEN DRIVEN AND PILE LENGTHS APPROVED BY THE ENGINEER. ALL COSTS OF MATERIAL, EQUIPMENT, AND LABOR NECESSARY TO INSTALL THE INDEX PILES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED INDEX PILING (18-IN. SQ.). THE ENGINEERING MAY REQUIRE THE CONTRACTOR TO PRE-DRILL OR SPUD IN ORDER TO OBTAIN THE NECESSARY PENETRATION. ALL COST FOR PRE-DRILLING OF SPUDDING WILL BE INCLUDED IN THE PRICE BID FOR PRESTRESSED CONCRETE PILING (18-IN. SQ.).




**A25 DOWEL DETAIL**

*Note:*
*Conduits necessary for utilities to be furnished by the utility company and placed at no expense to the department. Use Slip Coupling on Conduits at Expansion Joints.*

**DETAIL SHOWING CONDUIT PLACEMENT**




## ARMOR PLATE DETAIL

NOTE:
THE 3/8 " THICK PLATES WILL BE REQUIRED AT THE BEGINNING AND END OF THE BRIDGE.

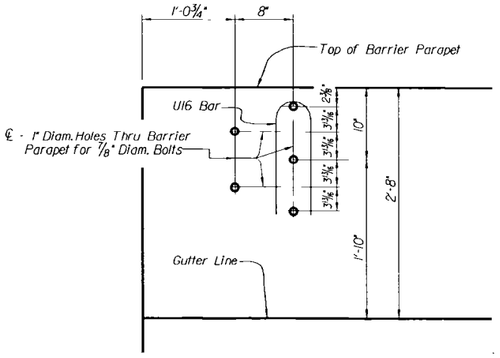
STEEL FOR THE ARMOR PLATES SHALL CONFORM TO THE LATEST AASHTO M270 GRADE 50W (ASTM A709 GR. 50W) STEEL AND NEITHER THE PLATES NOR THE ANCHOR STUDS NEED BE PAINTED.

THE FABRICATED PLATES SHALL CONFORM TO THE CROWN AND GRADE OF THE ROADWAY AND SHALL EXTEND FROM GUTTER LINE TO GUTTER LINE. THE PLATES MAY BE FABRICATED IN REASONABLE LENGTHS AND CONNECTED AT THE JOB SITE WITH FULL PENETRATION BUTT WELDS GROUND FLUSH ALONG THE TOP FACE OF CONNECTED PLATES.

IF NECESSARY, LONGITUDINAL REINFORCING BARS OF THE SLAB MAY BE SHIFTED LATERALLY TO CLEAR ANCHOR STUDS.

IF DESIRED BY THE CONTRACTOR, 9/16 "Ø HOLES SPACED APPROXIMATELY 2'-0" O.C., MAY BE PROVIDED IN LOWER PORTION OF THE PLATES TO BOLT THE PLATES TO THE FORMS.

ALL COSTS OF MATERIAL AND WORKMANSHIP TO FABRICATE, FURNISH AND INSTALL THE ARMOR PLATES AND ANCHOR STUDS COMPLETE IN PLACE SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.




## ① THRIE BEAM GUARD RAIL ATTACHMENT TO PARAPET

① NOTE:

THE 1" DIAM. HOLES MAY BE FORMED WITH PLASTIC OR PVC PIPE HAVING AN I.D. OF 1" (+ 1/8") OR 1" I.D. GALVANIZED STANDARD WEIGHT STEEL PIPE.

ALL COST OF PIPE AND INSTALLATION SHALL BE INCLUDED IN THE PRICE BID FOR REINFORCING STEEL.

ALL PIPE TO REMAIN IN PLACE WHEN FORMS ARE REMOVED.

THE RESIDENT ENGINEER SHALL CHECK THE LOCATION OF THE HOLES TO INSURE THAT THE GUARDRAIL SHOE WILL FIT PROPERLY WHEN INSTALLED.

ALL GUARDRAIL AND BOLTS TO BE FURNISHED AND INSTALLED BY CONTRACTOR.

### WORKING DRAWINGS

WHEN REQUIRED BY THE PLANS, SPECIFICATIONS OR SPECIAL PROVISIONS, THE CONTRACTOR SHALL SUBMIT SHOP PLANS, ERECTION PLANS, FALSEWORK PLANS, COFFERDAM PLANS OR ANY OTHER SUPPLEMENTARY PLANS TO THE ENGINEER FOR REVIEW. THESE PLANS, ALONG WITH ANY ASSOCIATED DESIGN CALCULATIONS, SHALL BEAR THE SEAL AND SIGNATURE OF A SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER WITH THE FOLLOWING EXCEPTIONS:

A) SHOP PLANS FOR ARMOR PLATES LOCATED AT BRIDGE ENDS OR APPROACH SLAB ENDS
B) SHOP PLANS FOR PRESTRESSED CONCRETE PILING THAT ARE FABRICATED IN ACCORDANCE WITH THE DETAILS SHOWN IN THE PLANS.

ALL COSTS FOR THE PREPARATION AND FURNISHING OF THE WORKING DRAWINGS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE VARIOUS PAY ITEMS OF WORK.

### CONCRETE

THE CLASS OF CONCRETE SHALL BE AS NOTED ON OTHER SHEETS OF THESE PLANS.

BUILD-UPS ON BENT CAPS SHALL BE CAST MONOLITHIC WITH CAP UNLESS INDICATED OTHERWISE IN THESE PLANS. THE TOP OF EACH BUILD-UP SHALL BE LEVEL.

PAYMENT FOR CONCRETE IN SLAB WILL BE BASED ON THEORETICAL PLAN QUANTITY. ANY NECESSARY ADJUSTMENT IN QUANTITY DUE TO VARIATION IN CAMBER SHALL BE AT THE CONTRACTOR'S EXPENSE.

ALL EXPOSED EDGES SHALL BE CHAMFERED 3/4" UNLESS OTHERWISE NOTED.

THE MINIMUM ACCEPTABLE CONCRETE COVER FOR REINFORCING STEEL MAY BE ONE HALF INCH LESS THAN THE PLAN DIMENSIONS WHEN REQUIRED BY REINFORCING BAR FABRICATION TOLERANCES.

THE TOP ONE FOURTH INCH OF ALL CONCRETE SLABS SHALL BE CONSIDERED AS A WEARING SURFACE AND SHALL NOT BE INCLUDED IN THE SLAB DEPTH USED FOR THE CALCULATION OF SECTION PROPERTIES.

### VALUE ENGINEERING PROPOSALS:

THE CONTRACTOR MAY INITIATE, DEVELOP, AND PRESENT TO THE DEPARTMENT OF TRANSPORTATION FOR CONSIDERATION, ANY COST REDUCTION PROPOSALS CONCEIVED BY THEM INVOLVING CHANGES IN THE DRAWINGS, DESIGNS, SPECIFICATIONS, OR OTHER REQUIREMENTS OF THE CONTRACT. ALL VALUE ENGINEERINC PROPOSALS SHALL COMPLY WITH THE REQUIREMENTS OF THE SPECIAL PROVISIONS.

### REINFORCING STEEL

GRADE 420 REINFORCING STEEL CONFORMINC TO ASTM A 615M-96a WILL BE USED ON THIS PROJECT. UNLESS SHOWN OTHERWISE, ALL TIES & STIRRUPS SHALL HAVE 135° HOOKS WITH EXTENSIONS NOT LESS THAN THE LARGER OF TEN BAR DIAMETERS OR 6 INCHES.

REINFORCING BAR FABRICATION SHALL CONFORM TO THE CURRENT C.R.S.I. MANUAL OF STANDARD PRACTICE EXCEPT AS NOTED ABOVE.

THE CONTRACTOR MAY ELECT TO SUBSTITUTE MECHANICAL REINFORCING COUPLERS FOR THE LAP SPLICES DETAILED IN THE PLANS. ALL MECHANICAL REINFORCING COUPLERS SHALL COMPLY WITH THE SPECIAL PROVISIONS.

ALL COSTS FOR FURNISHING AND INSTALLING COUPLERS SHALL BE CONSIDERED INCIDENTAL TO PLACING REINFORCING STEEL. PAYMENT FOR MECHANICAL REINFORCING COUPLERS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR REINFOFCING STEEL.

WHEN APPROVED BY THE ENGINEER, WELDED LAP SPLICES SHALL BE MADE WITH LOW HYDROGEN TYPE ELECTRODES AND SHALL CONFORM WITH REQUIREMENTS OF AWS D1.4 STRUCTURAL WELDING CODE.

THE WELDING PROCEDURE AND TWO TEST SAMPLES SHALL BE SUBMITTED FOR APPROVAL BY THE DEPARTMENT PRIOR TO BEGINNING THE FABRICATION OF THE SPLICES.

LAP SPLICES IN COLUMN AND SHAFT REINFORCING STEEL SHALL NOT BE ALLOWED.

### ALLOWANCE FOR DEAD LOAD DEFLECTION AND SETTLEMENT

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK AND LONG-TIME DEFLECTION SUCH THAT ON REMOVAL OF FALSEWORK THE TOP OF THE STRUCTURE SHALL CONFORM TO THEORETICAL FINISH GRADE PLUS THE ALLOWANCE FOR LONG-TIME DEFLECTION.

FOR CONCRETE FLAT SLAB SPANS TWENTY TO THIRTY FEET IN LENGTH, SUB- SECTION 702.27 OF THE STANDARD SPECIFICATION IS AMENDED IN PART TO REQUIRE 1/8" OF CAMBER FOR DEAD LOAD AND LONG-TIME DEFLECTION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

### COMPLETION DATES

THE CONTRACTOR SHALL PLACE YEAR OF COMPLETION ON INSIDE FACE OF RIGHT SIDE BARRIER PARAPET/RAIL AT BEGINNING OF BRIDGE AND ON LEFT SIDE BARRIER PARAPET/RAIL AT END OF BRIDGE. NUMBERS ARE TO BE RECESSED IN THE CONCRETE USING NUMBERS THAT ARE FABRICATED FROM REUSABLE/DURABLE MATERIAL AND APPROVED BY THE ENGINEER. THE CONTRACTOR WILL BE RESPONSIBLE FOR SUPPLYING THE NUMBERS WITH THE DIMENSIONS SHOWN ON STANDARD DRAWING NUMBERS.STD FOUND ON SCDOT INTERNET FTP SITE AT FTP.DOT.STATE.SC.US LOGON AS ANONYMOUS. LOCATED IN DIR=PUB/BR CONSULTANT/ESTANDARD OR A COPY CAN BE OBTAINED FROM THE RESIDENT ENGINEER.

### FIELD WELDING

ANY AUTHORIZED STRUCTURAL FIELD WELDING THAT IS REQUIRED ON THIS PROJECT MAY BE SUBJECT TO INSPECTION AND TESTING, SEE SUPPLEMENTAL SPECIFICATIONS. FINAL DETERMINATION OF THE EXTENT OF INSPECTION AND TESTING WILL BE THE RESPONSIBILITY OF THE CONSTRUCTION OFFICE AND/OR THE RESEARCH AND MATERIALS ENGINEER. THE CONSTRUCTION OFFICE AND/OR THE RESEARCH AND MATERIALS ENGINEER MUST BE NOTIFIED WHEN ANY FIELD WELDING IS PERFORMED.

| SHEET NO. | TOTAL SHEETS |
|---|---|
| | |

### EXCAVATION FOR END BENT

ALL COST OF EXCAVATION NECESSARY TO CONSTRUCT END BENTS AND TO REMOVE MATERIAL UNDER SUPERSTRUCTURE TO AN ELEVATION 1'-0" BELOW TOPS OF END BENT CAPS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

IF A CONCRETE FOOTING IS USED FOR THE END BENT, THE EXCAVATION BELOW THAT INCLUDED FOR THE CAP AND BERM IN THE ABOVE PARAGRAPH WILL BE PAID FOR AT THE UNIT PRICE BID FOR EXCAVATION. EXCAVATION ABOVE THIS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

### BEARINGS

FOR CONCRETE SLABS BEARING ON CONCRETE, THE TOP OF CAPS UNDER BEARING AREAS SHALL RECEIVE A SUITABLE TROWEL FINISH TO INSURE A SMOOTH AND LEVEL BEARING SURFACE. SEE STANDARD SPECIFICATIONS PARAGRAPH 702.26.

### DRIVING PILES THROUGH FILL

WHERE PILES OCCUR IN FILL EXCEEDING 10 FEET IN HEIGHT, THE FILL SHALL BE IN PLACE BEFORE PILES ARE DRIVEN.

TIMBER OR PRESTRESSED CONCRETE PILES WHICH ARE TO BE DRIVEN THROUGH FILL, SHALL BE INSTALLED IN PRE-BORED HOLES EXTENDING TO THE ORIGINAL GROUND.

HOLES FOR TIMBER PILES SHALL HAVE A 14" MINIMUM DIAMETER. HOLES FOR SQUARE PRESTRESSED CONCRETE PILES SHALL HAVE A MINIMUM DIAMETER OF 1.25 TIMES THE NOMINAL PILE SIZE. ALL COST OF PRE-BORING FILLS FOR PILE INSTALLATION SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE PILES.

### REMOVAL OF FALSEWORK AND FORMS

SECTION 702.18 OF THE STANDARD SPECIFICATIONS IS AMENDED IN PART TO THE EXTENT THAT "UNDER URGENT CONDITIONS AND WITH THE WRITTEN APPROVAL OF THE ENGINEER, ADDITIONAL STRENGTH CONTROL CYLINDERS MAY BE MADE AND THE FALSEWORK STRUCK WHEN THESE CYLINDERS, CURED UNDER THE SAME CONDITIONS AS THE CONCRETE IN THE STRUCTURE, DEVELOP A UNIT STRENGTH OF 3,200 PSI. HOWEVER, SUCH CONCRETE SHALL NOT BE SUBJECTED TO A SUPERIMPOSED LOAD UNTIL THE COMPRESSIVE STRENGTH IS AT LEAST 4,000 PSI.

### SPECIFICATIONS:

AASHTO 1996 STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, AND INTERIMS.

ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE (LATEST EDITION) WITH ADDITIONS AND REVISIONS AS STATED IN THE SPECIAL PROVISIONS.

### LIVE LOAD:

AASHTO HS25-44 LOADING OR AN ALTERNATE MILITARY LOADING OF 2 AXLES 4 FEET APART WITH EACH AXLE WEIGHING 24,000 POUNDS. WHICHEVER PRODUCES THE GREATEST STRESS.

### DESIGN DATA:

STRENGTH DESIGN METHOD (LOAD FACTOR DESIGN)

CONCRETE: CLASS "D", $f'_c$ = 4,000 P.S.I.

### SPECIAL NOTE:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES ON THIS SHEET AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE STANDARD SPECIFICATIONS SEC. 105.04.

### MATERIAL AND WORKMANSHIP

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SOUTH CAROLINA DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, 1986 EDITION.

### NOTE:

LEFT AND RIGHT SIDES, WHERE REFERRED TO IN THESE PLANS, ARE IN RELATION TO DIRECTION OF STATIONING.



| | | | |
|---|---|---|---|
| REV. | REJ | JAR | 3-99 |
| | VALUE ENG. PRO. | | |
| REV. | REJ | JAR | 11-98 |
| | COMPL. DATE | | |
| REV. | REJ | JAR | 11-98 |
| | WORK DWGS. | | |
| REVIEWED | | | |
| QUAN. | | | |
| DR. | REJ | HDJ | 7-90 |
| DES. | | | |
| | BY | CHK. | DATE |

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN COLUMBIA, S.C.

# STANDARD NOTES AND DETAILS FOR FLAT SLABS

| FILE NO. | ROUTE | COUNTY | DRAWING NO. |
|---|---|---|---|
| | | | STDNOTDET.STD |

1425LOAD FACTOR

bsn.dgn

| SHEET NO. | TOTAL SHEETS |
|---|---|
| 2 | |

## WIDENING EXISTING CONCRETE STRUCTURE

WHERE NEW CONCRETE IS TO BE CAST AGAINST EXISTING CONCRETE, THE CONTACT SURFACE OF THE OLD CONCRETE SHALL BE CLEANED OF ALL LOOSE CONCRETE, DIRT, OIL, GREASE AND ANY OTHER DELETERIOUS SUBSTANCE. IN ADDITION, BEFORE PLACING NEW DECK SLAB CONCRETE, THE EDGE OF EXISTING DECK SLAB SHALL BE THOROUGHLY ROUGHENED TO AN AMPLITUDE OF APPROXIMATELY 1/4". JUST PRIOR TO PLACING NEW CONCRETE, THE PORTION OF THE EXISTING SLAB FROM THE TOP SURFACE OF THE SLAB TO THE TOP LAYER OF REINFORCING SHALL BE COATED WITH A BONDING AGENT CONFORMING TO AASHTO SPECIFICATION M235 TYPE II APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. THE REMAINING PORTION OF THE VERTICAL FACE OF THE EXISTING SLAB SHALL BE FLUSHED WITH A 1:2 CEMENT MORTAR IMMEDIATELY PRIOR TO PLACING THE NEW CONCRETE.

ALL REINFORCING STEEL PROTRUDING BEYOND THE SURFACE AFTER REMOVAL OF CONCRETE SHALL BE IMBEDDED IN THE NEW CONCRETE IF FEASIBLE. REINFORCING STEEL WHICH CANNOT BE IMBEDDED IN NEW CONCRETE SHALL BE CUT OFF FLUSH WITH THE SURFACE OF THE CONCRETE WHEN IT WILL BE COVERED WITH A DECK OVERLAY. OTHERWISE, CUT REINFORCING OFF 1" BELOW THE CONCRETE SURFACE AND PATCH THE RESULTING HOLE WITH AN EPOXY MORTAR APPROVED BY THE ENGINEER.

THE ENTIRE COST OF THE ABOVE WORK INCLUDING ALL DRILLING, CHIPPING, REMOVING AND DISPOSING OF PORTIONS OF OLD STRUCTURE NECESSARY TO CONSTRUCT NEW STRUCTURE SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR "REMOVAL AND DISPOSAL OF DESIGNATED PORTIONS OF EXISTING BRIDGES."

THE CONTRACTOR SHALL REPAIR OR REPLACE AT HIS OWN EXPENSE, AND IN A MANNER SATISFACTORY TO THE ENGINEER, ANY PORTION OF THE EXISTING STRUCTURE DAMAGED AS A RESULT OF HIS CARELESSNESS OR NEGLIGENCE.

UNLESS OTHERWISE SPECIFIED IN THESE PLANS OR THE SPECIAL PROVISIONS, THE CONTRACTOR SHALL PROVIDE NECESSARY TEMPORARY SUPPORTS FOR UTILITIES ATTACHED TO THE BRIDGE TO MAINTAIN SERVICE DURING CONSTRUCTION. THE OWNER WILL MAKE ALL NECESSARY CHANGES IN ALIGNMENT AND ELEVATION OF THE UTILITY AND FURNISH PERMANENT SUPPORTS WHICH SHALL BE PLACED IN THE CONCRETE BY THE CONTRACTOR. ALL COSTS OF THIS WORK TO BE PERFORMED BY THE CONTRACTOR SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

ANY NECESSARY REPAIRS TO THE EXISTING STRUCTURE, IN THE OPINION OF THE ENGINEER , ARE TO BE PAID FOR AS EXTRA WORK, IF SUCH WORK IS NOT CALLED FOR IN THESE PLANS OR IN THE SPECIAL PROVISIONS FOR THIS PROJECT.

ALL DIMENSIONS OF NEW CONSTRUCTION ARE SUBJECT TO EXISTING CONDITIONS. IT IS RECOMMENDED THAT ALL DIMENSIONS WHICH MAY AFFECT MATERIALS AND QUANTITIES AS SHOWN ON THESE PLANS BE VERIFIED BY THE CONTRACTOR PRIOR TO ORDERING THE MATERIALS.

## DRIVING PILES THROUGH FILL

WHERE PILES OCCUR IN FILL EXCEEDING 10 FEET IN HEIGHT, THE FILL SHALL BE IN PLACE BEFORE PILES ARE DRIVEN.

TIMBER OR PRESTRESSED CONCRETE PILES WHICH ARE TO BE DRIVEN THROUGH FILL, SHALL BE INSTALLED IN PRE-BORED HOLES EXTENDING TO THE ORIGINAL GROUND.

HOLES FOR TIMBER PILES SHALL HAVE A 14" MINIMUM DIAMETER. HOLES FOR SQUARE PRESTRESSED CONCRETE PILES SHALL HAVE A MINIMUM DIAMETER OF 1.25 TIMES THE NOMINAL PILE SIZE. ALL COST OF PRE-BORING FILLS FOR PILE INSTALLATION SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE PILES.

## REINFORCING STEEL

GRADE 420 REINFORCING STEEL CONFORMING TO ASTM A 615M-96a WILL BE USED ON THIS PROJECT. UNLESS SHOWN OTHERWISE, ALL TIES & STIRRUPS SHALL HAVE 135° HOOKS WITH EXTENSIONS NOT LESS THAN THE LARGER OF TEN BAR DIAMETERS OR 6 INCHES.

REINFORCING BAR FABRICATION SHALL CONFORM TO THE CURRENT C.R.S.I. MANUAL OF STANDARD PRACTICE EXCEPT AS NOTED ABOVE.

THE CONTRACTOR MAY ELECT TO SUBSTITUTE MECHANICAL REINFORCING COUPLERS FOR THE LAP SPLICES DETAILED IN THE PLANS. ALL MECHANICAL REINFORCING COUPLERS SHALL COMPLY WITH THE SPECIAL PROVISIONS.

ALL COSTS FOR FURNISHING AND INSTALLING COUPLERS SHALL BE CONSIDERED INCIDENTAL TO PLACING REINFORCING STEEL. PAYMENT FOR MECHANICAL REINFORCING COUPLERS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR REINFORCING STEEL.

WHEN APPROVED BY THE ENGINEER, WELDED LAP SPLICES SHALL BE MADE WITH LOW HYDROGEN TYPE ELECTRODES AND SHALL CONFORM WITH REQUIREMENTS OF AWS D1.4 STRUCTURAL WELDING CODE.

THE WELDING PROCEDURE AND TWO TEST SAMPLES SHALL BE SUBMITTED FOR APPROVAL BY THE DEPARTMENT PRIOR TO BEGINNING THE FABRICATION OF THE SPLICES.

LAP SPLICES IN COLUMN AND SHAFT REINFORCING STEEL SHALL NOT BE ALLOWED.

## MATERIAL AND WORKMANSHIP

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SOUTH CAROLINA DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, 1986 EDITION.

## STRUCTURAL STEEL

BEAMS SHALL BE CAMBERED FOR VERTICAL CURVE AND DEAD LOAD DEFLECTION, EITHER IN MILL OR IN SHOP.

LAYOUT DIMENSIONS AND STANDARD LENGTHS OF BEAMS SHOWN ARE HORIZONTAL DIMENSIONS WHICH MUST BE INCREASED WHEN BRIDGE IS ON GRADE.

SHOP INSPECTION OF THE STRUCTURAL STEEL WILL BE PERFORMED BY THE DEPARTMENT OR ITS AUTHORIZED INSPECTION AGENCY AND THE CONTRACTOR SHALL SO STIPULATE IN HIS ORDER TO THE FABRICATOR. ALSO, THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF THE NAME AND ADDRESS OF THE FABRICATOR OF THE STRUCTURAL STEEL AS SOON AS THE FABRICATOR HAS BEEN GIVEN THE CONTRACT TO FABRICATE SO THAT THE INSPECTION PROCEDURE CAN BE SET UP.

WELDING TO THE BEAMS AND PLATE GIRDERS FOR THE PURPOSE OF ATTACHING ERECTION HARDWARE, EITHER FIELD OR SHOP, WILL NOT BE PERMITTED.

PAINTING OF STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH SPECIAL PROVISIONS.

## CHARPY V-NOTCH TOUGHNESS TEST

ALL STEEL FOR USE IN MAIN LOAD-CARRYING MEMBER COMPONENTS SUBJECT TO TENSILE STRESS SHALL CONFORM TO THE APPLICABLE CHARPY V-NOTCH IMPACT TEST REQUIREMENTS OF AASHTO M 270 (ASTM A 709) AS SPECIFIED FOR ZONE 2.

SPECIFICALLY, CHARPY TESTING SHALL BE REQUIRED AS FOLLOWS:

A) SIMPLE SPAN ROLLED BEAM - THE BEAM ITSELF AS WELL AS BOTTOM COVER PLATE, IF APPLICABLE.

B) SIMPLE SPAN PLATE GIRDER - THE WEB, BOTTOM FLANGE PLATE AND SPLICE PLATES FOR WEB AND BOTTOM FLANGE EXCLUDING ANY FILLER PLATES.

C) CONTINUOUS SPAN ROLLED BEAM - THE BEAM ITSELF AS WELL AS ANY TOP OR BOTTOM COVER PLATE LOCATED IN A TENSION REGION AS INDICATED IN THE PLANS. ALSO, ALL SPLICE PLATES FOR WEB AND TOP AND BOTTOM FLANGE PLATES EXCLUDING ANY FILLER PLATES.

D) CONTINUOUS SPAN PLATE GIRDER - ALL WEB PLATES, THE TOP FLANGE PLATES AND THE BOTTOM FLANGE PLATES LOCATED IN A TENSION REGION AS INDICATED IN THE PLANS. ALSO, ALL SPLICE PLATES FOR WEB AND TOP AND BOTTOM FLANGE PLATES EXCLUDING ANY FILLER PLATES.

E) CURVED GIRDER STRUCTURES -IN ADDITION TO CHARPY TESTING OF WEB, FLANGE & SPLICE PLATES AS APPLICABLE AND AS SPECIFIED IN (A) THRU (D) ABOVE, ALL DIAPHRAGM MEMBERS, CONNECTION PLATES AND GUSSET PLATES SHALL REQUIRE CHARPY TESTING.

## HIGH STRENGTH BOLTED CONNECTIONS

ALL BOLTED CONNECTIONS SHALL HAVE 7/8" DIAM. ASTM A325 BOLTS. SEE SPECIAL PROVISIONS FOR STRUCTURAL STEEL FASTENERS. ALL BOLTED CONNECTIONS ARE DESIGNED AS SLIP-CRITICAL CONNECTIONS HAVING CLASS "B" CONTACT SURFACES.

GENERALLY, HOLES FOR 7/8" BOLTS SHALL BE 15/16" DIAM., HOWEVER, OVERSIZE HOLES, 3/16" LARGER THAN BOLT DIAM. MAY BE USED IN DIAPHRAGMS AND/OR CROSSFRAMES AND THEIR CONNECTION PLATES PROVIDED HARDENED WASHERS ARE INSTALLED OVER OVERSIZE HOLES IN THE OUTER PLY OF THE MATERIAL GRIPPED. IN EVERY CASE A HARDENED WASHER SHALL BE INSTALLED UNDER THE ELEMENT TURNED FOR EACH BOLT OF A BOLTED CONNECTION. THE SHOP PLANS SHALL INDICATE WHICH HOLES ARE TO BE OVERSIZE AND WHERE HARDENED WASHERS ARE REQUIRED. ALL COSTS OF USING OVERSIZE HOLES, TO INCLUDE FURNISHING ADDITIONAL HARDENED WASHERS AS NECESSARY, SHALL BE AT NO EXPENSE TO THE DEPARTMENT.

THE MINIMUM DISTANCE BETWEEN CENTERS OF 7/8" DIAM. BOLTS FOR DIAPHRAGM CONNECTIONS SHALL BE 3" AND THE EDGE DISTANCE SHALL BE 1 1/2" FROM THE CENTERLINE OF BOLTS.

## ANCHOR BOLTS

ALL COMPONENTS OF ANCHOR BOLT ASSEMBLIES SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 OR M232 AS APPLICABLE. THE WEIGHT OF ANCHOR BOLT ASSEMBLIES IS INCLUDED IN THE BENT QUANTITIES FOR REINFORCING STEEL. ALL COSTS OF FURNISHING AND INSTALLING ANCHOR BOLT ASSEMBLIES SHALL BE INCLUDED IN AND PAID FOR AT THE UNIT PRICE BID FOR REINFORCING STEEL.

## BEARING ASSEMBLIES

ALL STEEL BEARING ASSEMBLY COMPONENTS SHALL MEET AASHTO M270 GR. 36 (ASTM A709 GR. 36) UNLESS OTHERWISE SPECIFIED IN THE PLANS AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 OR M232 AS APPLICABLE.

AFTER THE REQUIRED FIELD WELDING OF HOT-DIP GALVANIZED BEARING ASSEMBLIES, THE WELD AREAS AND/OR ANY DAMAGED AREAS TO THE GALVANIZED COATING SHALL BE FIELD REPAIRED IN ACCORDANCE WITH ASTM A-780.

ALL COST OF FURNISHING AND INSTALLING STEEL BEARING ASSEMBLY COMPONENTS SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR STRUCTURAL STEEL IF A BID ITEM FOR STRUCTURAL STEEL IS INCLUDED IN THE PROJECT. OTHERWISE, THE COST SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED BEAMS.

## ALLOWANCE FOR DEAD LOAD DEFLECTION AND SETTLEMENT

IN SETTING FORMS FOR STRUCTURAL STEEL OR PRESTRESSED CONCRETE BEAM SPANS, AN ALLOWANCE SHALL BE APPLIED TO DESIGN FINISH GRADE TO COMPENSATE FOR COMPUTED DEAD LOAD DEFLECTIONS.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK AND LONG-TIME DEFLECTION SUCH THAT ON REMOVAL OF FALSEWORK THE TOP OF THE STRUCTURE SHALL CONFORM TO THEORETICAL FINISH GRADE PLUS THE ALLOWANCE FOR LONG-TIME DEFLECTION.

FOR CONCRETE FLAT SLAB SPANS TWENTY TO THIRTY FEET IN LENGTH, SUB- SECTION 702.27 OF THE STANDARD SPECIFICATION IS AMENDED IN PART TO REQUIRE 1/8" OF CAMBER FOR DEAD LOAD AND LONG-TIME DEFLECTION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

## CONTRACTOR'S OPTIONAL STAY-IN-PLACE FORMS

PERMANENT STEEL BRIDGE DECK FORMS MAY BE USED ON THIS PROJECT AT THE CONTRACTOR'S OPTION. AN EXTRA DEAD LOAD OF 16 P.S.F. HAS BEEN INCORPORATED INTO THE DESIGN OF THIS STRUCTURE TO ACCOMMODATE THE USE OF SUCH FORMS. SEE SUBSECTION 702.11(d) OF THE STANDARD SPECIFICATIONS FOR REQUIREMENTS.

SECTION 702.11 (d)-3 (b) OF THE STANDARD SPECIFICATIONS IS AMENDED TO REQUIRE THAT DEFLECTIONS CALCULATED USING THE WEIGHT OF THE FORMS, THE PLASTIC CONCRETE AND REINFORCEMENT SHALL MEET THE FOLLOWING CRITERIA AND IN NO CASE SHALL THIS LOADING BE LESS THAN 120 P.S.F. TOTAL.

DEFLECTIONS FOR FORM SPANS LESS THAN OR EQUAL TO 10 FEET SHALL NOT EXCEED 1/180 OF THE SPAN OR 1/2 INCH WHICHEVER IS LESS. DEFLECTIONS FOR FORM SPANS GREATER THAN 10 FEET SHALL NOT EXCEED 1/240 OF THE SPAN OR 3/4 INCH WHICHEVER IS LESS.

THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT AND THE FABRICATOR IF HE ELECTS TO USE THIS OPTION SO THAT SHOP PLANS CAN BE PROPERLY DETAILED.

## CONCRETE

THE CLASS OF CONCRETE SHALL BE AS NOTED ON OTHER SHEETS OF THESE PLANS.

BUILD-UPS ON BENT CAPS SHALL BE CAST MONOLITHIC WITH CAP UNLESS INDICATED OTHERWISE IN THESE PLANS. THE TOP OF EACH BUILD-UP SHALL BE LEVEL.

PAYMENT FOR CONCRETE IN SLAB WILL BE BASED ON THEORETICAL PLAN QUANTITY. ANY NECESSARY ADJUSTMENT IN QUANTITY DUE TO VARIATION IN CAMBER SHALL BE AT THE CONTRACTOR'S EXPENSE.

SIMPLE SPANS 80 FEET OR LESS SHALL BE POURED WITHOUT A TRANSVERSE CONSTRUCTION JOINT. FOR SIMPLE SPANS OVER 80 FEET IN LENGTH, A TRANSVERSE STRIP OF THE SLAB CENTERED AT MID-SPAN AND COMPRISING APPROXIMATELY 2/3 OF THE SLAB SHALL BE POURED FIRST AND ALLOWED TO CURE FOR NOT LESS THAN 4 DAYS BEFORE THE REMAINING END SECTIONS ARE POURED. HOWEVER, WHEN FAVORABLE WEATHER CONDITIONS EXIST THE ENGINEER MAY PERMIT THE ENTIRE SLAB TO BE POURED PROVIDED A SUITABLE RETARDING AGENT IS USED IN SUCH AMOUNTS THAT NONE OF THE CONCRETE OF THE POUR SHALL REACH INITIAL SET PRIOR TO COMPLETION OF THE POUR.

ALL EXPOSED EDGES SHALL BE CHAMFERED 3/4" UNLESS OTHERWISE NOTED.

THE MINIMUM ACCEPTABLE CONCRETE COVER FOR REINFORCING STEEL MAY BE ONE HALF INCH LESS THAN THE PLAN DIMENSIONS WHEN REQUIRED BY REINFORCING BAR FABRICATION TOLERANCES.

THE TOP ONE FOURTH INCH OF ALL CONCRETE SLABS SHALL BE CONSIDERED AS A WEARING SURFACE AND SHALL NOT BE INCLUDED IN THE SLAB DEPTH USED FOR THE CALCULATION OF SECTION PROPERTIES.

## REMOVAL OF FALSEWORK AND FORMS

SECTION 702.18 OF THE STANDARD SPECIFICATIONS IS AMENDED IN PART TO THE EXTENT THAT "UNDER URGENT CONDITIONS AND WITH THE WRITTEN APPROVAL OF THE ENGINEER, ADDITIONAL STRENGTH CONTROL CYLINDERS MAY BE MADE AND THE FALSEWORK STRUCK WHEN THESE CYLINDERS, CURED UNDER THE SAME CONDITIONS AS THE CONCRETE IN THE STRUCTURE, DEVELOP A UNIT STRENGTH OF 3,200 PSI. HOWEVER, SUCH CONCRETE SHALL NOT BE SUBJECTED TO A SUPERIMPOSED LOAD UNTIL THE COMPRESSIVE STRENGTH IS AT LEAST 4,000 PSI.

## WORKING DRAWINGS

WHEN REQUIRED BY THE PLANS, SPECIFICATIONS OR SPECIAL PROVISIONS, THE CONTRACTOR SHALL SUBMIT SHOP PLANS, ERECTION PLANS, FALSEWORK PLANS, COFFERDAM PLANS OR ANY OTHER SUPPLEMENTARY PLANS TO THE ENGINEER FOR REVIEW. THESE PLANS, ALONG WITH ANY ASSOCIATED DESIGN CALCULATIONS, SHALL BEAR THE SEAL AND SIGNATURE OF A SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER WITH THE FOLLOWING EXCEPTIONS:

A.) SHOP PLANS FOR ARMOR PLATES LOCATED AT BRIDGE ENDS OR APPROACH SLAB ENDS

B.) SHOP PLANS FOR PRESTRESSED CONCRETE PILING THAT ARE FABRICATED IN ACCORDANCE WITH THE DETAILS SHOWN IN THE PLANS.

ALL COSTS FOR THE PREPARATION AND FURNISHING OF THE WORKING DRAWINGS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE VARIOUS PAY ITEMS OF WORK.

## PRESTRESSED BEAMS

MEMBRANE CURING COMPOUND SHALL NOT BE USED ON TOPS OR ENDS OF BEAMS.

BEAM LENGTHS GIVEN ARE BASED ON HORIZONTAL SPAN ONLY. LENGTHS SHALL BE INCREASED TO CORRECT FOR CONCRETE SHRINKAGE, CONCRETE SHORTENING WHEN THE STRANDS ARE CUT, AND FOR BEAMS BEING ON A GRADE.

SECTION 704.15 AND 704.16 OF THE STANDARD SPECIFICATIONS ARE AMENDED IN PART TO REQUIRE THAT PRESTRESSED CONCRETE BEAMS BE MEASURED AND PAID FOR AT THE CONTRACT UNIT PRICE PER LINEAR FOOT.

## SPECIFICATIONS:

AASHTO 1996 STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES AND INTERIMS.

ANSI/AASHTO/AWS C1.5 BRIDGE WELDING CODE (LATEST EDITION) WITH ADDITIONS AND REVISIONS AS STATED IN THE SPECIAL PROVISIONS.

## LIVE LOAD:

AASHTO HS25-44 LOADING OR AN ALTERNATE MILITARY LOADING OF 2 AXLES 4 FEET APART WITH EACH AXLE WEIGHING 24,000 POUNDS, WHICHEVER PRODUCES THE GREATEST STRESS.

## DESIGN DATA:

STRENGTH DESIGN METHOD (LOAD FACTOR DESIGN)

CONCRETE: CLASS "D" . $f'_c$ = 4,000 P.S.I.

## SPECIAL NOTE:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES ON THIS SHEET AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE STANDARD SPECIFICATIONS SEC. 105.04.

## VALUE ENGINEERING PROPOSALS:

THE CONTRACTOR MAY INITIATE, DEVELOP, AND PRESENT TO THE DEPARTMENT OF TRANSPORTATION FOR CONSIDERATION, ANY COST REDUCTION PROPOSALS CONCEIVED BY THEM INVOLVING CHANGES IN THE DRAWINGS, DESIGNS, SPECIFICATIONS, OR OTHER REQUIREMENTS OF THE CONTRACT. ALL VALUE ENGINEERING PROPOSALS SHALL COMPLY WITH THE REQUIREMENTS OF THE SPECIAL PROVISIONS.

## EXCAVATION FOR END BENT

ALL COST OF EXCAVATION NECESSARY TO CONSTRUCT END BENTS AND TO REMOVE MATERIAL UNDER SUPERSTRUCTURE TO AN ELEVATION 1'-0" BELOW TOPS OF END BENT CAPS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

IF A CONCRETE FOOTING IS USED FOR THE END BENT, THE EXCAVATION BELOW THAT INCLUDED FOR THE CAP AND BERM IN THE ABOVE PARAGRAPH WILL BE PAID FOR AT THE UNIT PRICE BID FOR EXCAVATION. EXCAVATION ABOVE THIS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

## COMPLETION DATES

THE CONTRACTOR SHALL PLACE YEAR OF COMPLETION ON INSIDE FACE OF RIGHT SIDE BARRIER PARAPET/RAIL AT BEGINNING OF BRIDGE AND ON LEFT SIDE BARRIER PARAPET/RAIL AT END OF BRIDGE. NUMBERS ARE TO BE RECESSED IN THE CONCRETE USING NUMBERS THAT ARE FABRICATED FROM REUSABLE/DURABLE MATERIAL AND APPROVED BY THE ENGINEER. THE CONTRACTOR WILL BE RESPONSIBLE FOR SUPPLYING THE NUMBERS WITH THE DIMENSIONS SHOWN ON STANDARD DRAWING NUMBERS.STD FOUND ON SCDOT INTERNET FTP SITE AT FTP.DOT.STATE.SC.US LOGON AS ANONYMOUS. LOCATED IN DIR=PUB/BR CONSULTANT/ESTANDARDS OR A COPY CAN BE OBTAINED FROM THE RESIDENT ENGINEER.

## FIELD WELDING

ANY AUTHORIZED STRUCTURAL FIELD WELDING THAT IS REQUIRED ON THIS PROJECT MAY BE SUBJECT TO INSPECTION AND TESTING, SEE SUPPLEMENTAL SPECIFICATIONS. FINAL DETERMINATION OF THE EXTENT OF INSPECTION AND TESTING WILL BE THE RESPONSIBILITY OF THE CONSTRUCTION OFFICE AND/OR THE RESEARCH AND MATERIALS ENGINEER. THE CONSTRUCTION OFFICE AND/OR THE RESEARCH AND MATERIALS ENGINEER MUST BE NOTIFIED WHEN ANY FIELD WELDING IS PERFORMED.

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| REV. | | | | SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION |
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## WIDENING EXISTING CONCRETE STRUCTURE

WHERE NEW CONCRETE IS TO BE CAST AGAINST EXISTING CONCRETE, THE CONTACT SURFACE OF THE OLD CONCRETE SHALL BE CLEANED OF ALL LOOSE CONCRETE, DIRT, OIL, GREASE AND ANY OTHER DELETERIOUS SUBSTANCE. IN ADDITION, BEFORE PLACING NEW DECK SLAB CONCRETE, THE EDGE OF EXISTING DECK SLAB SHALL BE THOROUGHLY ROUGHENED TO AN AMPLITUDE OF APPROXIMATELY 6 mm. JUST PRIOR TO PLACING NEW CONCRETE, THE PORTION OF THE EXISTING SLAB FROM THE TOP SURFACE OF THE SLAB TO THE TOP LAYER OF REINFORCING SHALL BE COATED WITH A BONDING AGENT CONFORMING TO AASHTO SPECIFICATION M235 TYPE II APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. THE REMAINING PORTION OF THE VERTICAL FACE OF THE EXISTING SLAB SHALL BE FLUSHED WITH A 1:2 CEMENT MORTAR IMMEDIATELY PRIOR TO PLACING THE NEW CONCRETE.

ALL REINFORCING STEEL PROTRUDING BEYOND THE SURFACE AFTER REMOVAL OF CONCRETE SHALL BE IMBEDDED IN THE NEW CONCRETE IF FEASIBLE. REINFORCING STEEL WHICH CANNOT BE IMBEDDED IN NEW CONCRETE SHALL BE CUT OFF FLUSH WITH THE SURFACE OF THE CONCRETE WHEN IT WILL BE COVERED WITH A DECK OVERLAY. OTHERWISE, CUT REINFORCING OFF 25 mm BELOW THE CONCRETE SURFACE AND PATCH THE RESULTING HOLE WITH AN EPOXY MORTAR APPROVED BY THE ENGINEER.

THE ENTIRE COST OF THE ABOVE WORK INCLUDING ALL DRILLING, CHIPPING, REMOVING, AND DISPOSING OF PORTIONS OF OLD STRUCTURE NECESSARY TO CONSTRUCT NEW STRUCTURE SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR "REMOVAL AND DISPOSAL OF DESIGNATED PORTIONS OF EXISTING BRIDGES."

THE CONTRACTOR SHALL REPAIR OR REPLACE AT HIS OWN EXPENSE, AND IN A MANNER SATISFACTORY TO THE ENGINEER, ANY PORTION OF THE EXISTING STRUCTURE DAMAGED AS A RESULT OF HIS CARELESSNESS OR NEGLIGENCE.

UNLESS OTHERWISE SPECIFIED IN THESE PLANS OR SPECIAL PROVISIONS, THE CONTRACTOR SHALL PROVIDE NECESSARY TEMPORARY SUPPORTS FOR UTILITIES ATTACHED TO THE BRIDGE TO MAINTAIN SERVICE DURING CONSTRUCTION. THE OWNER WILL MAKE ALL NECESSARY CHANGES IN ALIGNMENT AND ELEVATION OF THE UTILITY AND FURNISH PERMANENT SUPPORTS WHICH SHALL BE PLACED IN THE CONCRETE BY THE CONTRACTOR. ALL COSTS OF THIS WORK TO BE PERFORMED BY THE CONTRACTOR SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS 30 CONCRETE.

ANY NECESSARY REPAIRS TO THE EXISTING STRUCTURE, IN THE OPINION OF THE ENGINEER, ARE TO BE PAID FOR AS EXTRA WORK, IF SUCH WORK IS NOT CALLED FOR IN THESE PLANS OR IN THE SPECIAL PROVISIONS FOR THIS PROJECT.

ALL DIMENSIONS OF NEW CONSTRUCTION ARE SUBJECT TO EXISTING CONDITIONS. IT IS RECOMMENDED THAT ALL DIMENSIONS WHICH MAY AFFECT MATERIALS AND QUANTITIES AS SHOWN ON THESE PLANS BE VERIFIED BY THE CONTRACTOR PRIOR TO ORDERING THE MATERIALS.

## DRIVING PILES THROUGH FILL

WHERE PILES OCCUR IN FILL EXCEEDING 3.0 m IN HEIGHT, THE FILL SHALL BE IN PLACE BEFORE PILES ARE DRIVEN.

TIMBER OR PRESTRESSED CONCRETE PILES WHICH ARE TO BE DRIVEN THROUGH FILL, SHALL BE INSTALLED IN PRE-BORED HOLES EXTENDING TO THE ORIGINAL GROUND.

HOLES FOR TIMBER PILES SHALL HAVE A 355 mm MINIMUM DIAMETER. HOLES FOR SQUARE PRESTRESSED CONCRETE PILES SHALL HAVE A MINIMUM DIAMETER OF 1.25 TIMES THE NOMINAL PILE SIZE. ALL COST OF PRE-BORING FILLS FOR PILE INSTALLATION SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE PILES.

## REINFORCING STEEL

GRADE 420 REINFORCING STEEL CONFORMING TO ASTM A 615M-96a WILL BE USED ON THIS PROJECT. UNLESS SHOWN OTHERWISE, ALL TIES & STIRRUPS SHALL HAVE 135° HOOKS WITH EXTENSIONS NOT LESS THAN THE LARGER OF TEN BAR DIAMETERS OR 150 mm.

REINFORCING BAR FABRICATION SHALL CONFORM TO THE CURRENT C.R.S.I. MANUAL OF STANDARD PRACTICE EXCEPT AS NOTED ABOVE.

THE CONTRACTOR MAY ELECT TO SUBSTITUTE MECHANICAL REINFORCING COUPLERS FOR THE LAP SPLICES DETAILED IN THE PLANS. ALL MECHANICAL REINFORCING COUPLERS SHALL COMPLY WITH THE SPECIAL PROVISIONS.

ALL COSTS FOR FURNISHING AND INSTALLING COUPLERS SHALL BE CONSIDERED INCIDENTIAL TO PLACING REINFORCING STEEL. PAYMENT FOR MECHANICAL REINFORCING COUPLERS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR REINFORCING STEEL.

LAP SPLICES IN COLUMN AND SHAFT REINFORCING STEEL SHALL NOT BE ALLOWED.

WHEN APPROVED BY THE ENGINEER, WELDED LAP SPLICES SHALL BE MADE WITH LOW HYDROGEN TYPE ELECTRODES AND SHALL CONFORM WITH REQUIREMENTS OF AWS D1.4 STRUCTURAL WELDING CODE. THE WELDING PROCEDURE AND TWO TEST SAMPLES SHALL BE SUBMITTED FOR APPROVAL BY THE DEPARTMENT PRIOR TO BEGINNING THE FABRICATION OF THE SPLICES.

## DIMENSIONS AND ELEVATIONS

UNLESS OTHERWISE INDICATED, ALL DIMENSIONS ARE SHOWN IN MILLIMETERS AND ALL STATIONS AND ELEVATIONS ARE SHOWN IN METERS.

## STRUCTURAL STEEL

BEAMS SHALL BE CAMBERED FOR VERTICAL CURVE AND DEAD LOAD DEFLECTION, EITHER IN MILL OR IN SHOP.

LAYOUT DIMENSIONS AND STANDARD LENGTHS OF BEAMS SHOWN ARE HORIZONTAL DIMENSIONS WHICH MUST BE INCREASED WHEN BRIDGE IS ON GRADE.

SHOP INSPECTION OF THE STRUCTURAL STEEL WILL BE PERFORMED BY THE DEPARTMENT OR ITS AUTHORIZED INSPECTION AGENCY AND THE CONTRACTOR SHALL SO STIPULATE IN HIS ORDER TO THE FABRICATOR. ALSO, THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF THE NAME AND ADDRESS OF THE FABRICATOR OF THE STRUCTURAL STEEL AS SOON AS THE FABRICATOR HAS BEEN GIVEN THE CONTRACT TO FABRICATE SO THAT THE INSPECTION PROCEDURE CAN BE SET UP.

WELDING TO THE BEAMS AND PLATE GIRDERS FOR THE PURPOSE OF ATTACHING ERECTION HARDWARE, EITHER FIELD OR SHOP, WILL NOT BE PERMITTED.

PAINTING OF STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH SPECIAL PROVISIONS.

## CHARPY V-NOTCH TOUGHNESS TEST

ALL STEEL FOR USE IN MAIN LOAD-CARRYING MEMBER COMPONENTS SUBJECT TO TENSILE STRESS SHALL CONFORM TO THE APPLICABLE CHARPY V-NOTCH IMPACT TEST REQUIREMENTS OF AASHTO M270M (ASTM A709M) AS SPECIFIED FOR ZONE 2.

SPECIFICALLY, CHARPY TESTING SHALL BE REQUIRED AS FOLLOWS:

A) SIMPLE SPAN ROLLED BEAM - THE BEAM ITSELF AS WELL AS BOTTOM COVER PLATE, IF APPLICABLE.

B) SIMPLE SPAN PLATE GIRDER - THE WEB, BOTTOM FLANGE PLATE AND SPLICE PLATES FOR WEB AND BOTTOM FLANGE EXCLUDING ANY FILLER PLATES.

C) CONTINUOUS SPAN ROLLED BEAM - THE BEAM ITSELF AS WELL AS ANY TOP OR BOTTOM COVER PLATE LOCATED IN A TENSION REGION AS INDICATED IN THE PLANS. ALSO, ALL SPLICE PLATES FOR WEB AND TOP AND BOTTOM FLANGE PLATES EXCLUDING ANY FILLER PLATES.

D) CONTINUOUS SPAN PLATE GIRDER - ALL WEB PLATES, THE TOP FLANGE PLATES AND THE BOTTOM FLANGE PLATES LOCATED IN A TENSION REGION AS INDICATED IN THE PLANS. ALSO, ALL SPLICE PLATES FOR WEB AND TOP AND BOTTOM FLANGE PLATES EXCLUDING ANY FILLER PLATES.

E) CURVED GIRDER STRUCTURES - IN ADDITION TO CHARPY TESTING OF WEB, FLANGE, & SPLICE PLATES AS APPLICABLE AND AS SPECIFIED IN (A) THROUGH (D) ABOVE, ALL DIAPHRAGM MEMBERS, CONNECTION PLATES AND GUSSET PLATES SHALL REQUIRE CHARPY TESTING.

## HIGH STRENGTH BOLTED CONNECTIONS

ALL BOLTED CONNECTIONS SHALL HAVE 22 mm DIAM. ASTM A325M BOLTS, SEE SPECIAL PROVISIONS FOR STRUCTURAL STEEL FASTENERS. ALL BOLTED CONNECTIONS ARE DESIGNED AS SLIP-CRITICAL CONNECTIONS HAVING CLASS "B" CONTACT SURFACES.

GENERALLY, HOLES FOR 22 mm DIAM. BOLTS SHALL BE 24 mm DIAM. HOWEVER, OVERSIZE HOLES, 6 mm LARGER THAN BOLT DIAM. MAY BE USED IN DIAPHRAGMS AND/OR CROSSFRAMES AND THEIR CONNECTION PLATES PROVIDED HARDENED WASHERS ARE INSTALLED OVER OVERSIZE HOLES IN THE OUTER PLY OF THE MATERIAL GRIPPED. IN EVERY CASE A HARDENED WASHER SHALL BE INSTALLED UNDER THE ELEMENT TURNED FOR EACH BOLT OF A BOLTED CONNECTION. THE SHOP PLANS SHALL INDICATE WHICH HOLES ARE TO BE OVERSIZE AND WHERE HARDENED WASHERS ARE REQUIRED. ALL COSTS OF USING OVERSIZE HOLES, TO INCLUDE FURNISHING ADDITIONAL HARDENED WASHERS AS NECESSARY, SHALL BE AT NO EXPENSE TO THE DEPARTMENT.

THE MINIMUM DISTANCE BETWEEN CENTERS OF 22 mm DIAM. BOLTS FOR DIAPHRAGM CONNECTIONS SHALL BE 75 mm AND THE EDGE DISTANCE SHALL BE 40 mm FROM THE CENTERLINE OF BOLTS.

## ANCHOR BOLTS

ALL COMPONENTS OF ANCHOR BOLT ASSEMBLIES SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 OR M232 AS APPLICABLE. THE MASS OF ANCHOR BOLT ASSEMBLIES IS INCLUDED IN THE BENT QUANTITIES FOR REINFORCING STEEL. ALL COSTS OF FURNISHING AND INSTALLING ANCHOR BOLT ASSEMBLIES SHALL BE INCLUDED IN AND PAID FOR AT THE UNIT PRICE BID FOR REINFORCING STEEL.

## BEARING ASSEMBLIES

ALL STEEL BEARING ASSEMBLY COMPONENTS SHALL MEET AASHTO M270M GR. 250 (ASTM A709M GR. 250) UNLESS OTHERWISE SPECIFIED IN THE PLANS AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 OR M232 AS APPLICABLE.

AFTER THE REQUIRED FIELD WELDING OF HOT-DIP GALVANIZED BEARING ASSEMBLIES, THE WELD AREAS AND/OR ANY DAMAGED AREAS TO THE GALVANIZED COATING SHALL BE FIELD REPAIRED IN ACCORDANCE WITH ASTM A-780.

ALL COST OF FURNISHING AND INSTALLING STEEL BEARING ASSEMBLY COMPONENTS SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR STRUCTURAL STEEL IF A BID ITEM FOR STRUCTURAL STEEL IS INCLUDED IN THE PROJECT. OTHERWISE, THE COST SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED BEAMS.

## ALLOWANCE FOR DEAD LOAD DEFLECTION AND SETTLEMENT

IN SETTING FORMS FOR STRUCTURAL STEEL OR PRESTRESSED CONCRETE BEAM SPANS, AN ALLOWANCE SHALL BE APPLIED TO DESIGN FINISH GRADE TO COMPENSATE FOR COMPUTED DEAD LOAD DEFLECTIONS.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK AND LONG-TIME DEFLECTION SUCH THAT ON REMOVAL OF FALSEWORK THE TOP OF THE STRUCTURE SHALL CONFORM TO THEORETICAL FINISH GRADE PLUS THE ALLOWANCE FOR LONG-TIME DEFLECTION.

FOR CONCRETE FLAT SLAB SPANS 6 m TO 10 m IN LENGTH, SUB-SECTION 702.27 OF THE STANDARD SPECIFICATIONS IS AMENDED IN PART TO REQUIRE 4 mm OF CAMBER FOR DEAD LOAD AND LONG-TIME DEFLECTION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

## CONTRACTOR'S OPTIONAL STAY-IN-PLACE FORMS

PERMANENT STEEL BRIDGE DECK FORMS MAY BE USED ON THIS PROJECT AT THE CONTRACTOR'S OPTION. AN EXTRA DEAD LOAD OF 0.766 kPa HAS BEEN INCORPORATED INTO THE DESIGN OF THIS STRUCTURE TO ACCOMMODATE THE USE OF SUCH FORMS. SEE SUBSECTION 702.11(d) OF THE STANDARD SPECIFICATIONS FOR REQUIREMENTS.

SECTION 702.11(d)-3(b) OF THE STANDARD SPECIFICATIONS IS AMENDED TO REQUIRE THAT DEFLECTIONS CALCULATED USING THE WEIGHT OF THE FORMS, THE PLASTIC CONCRETE AND REINFORCEMENT SHALL MEET THE FOLLOWING CRITERIA AND IN NO CASE SHALL THIS LOADING BE LESS THAN 5.750 kPa TOTAL.

DEFLECTIONS FOR FORM SPANS LESS THAN OR EQUAL TO 3.0 m SHALL NOT EXCEED 1/180 OF THE SPAN OR 12 mm WHICHEVER IS LESS. DEFLECTIONS FOR FORM SPANS GREATER THAN 3.0 m SHALL NOT EXCEED 1/240 OF THE SPAN OR 19 mm WHICHEVER IS LESS.

THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT AND THE FABRICATOR IF HE ELECTS TO USE THIS OPTION SO THAT SHOP PLANS CAN BE PROPERLY DETAILED.

## CONCRETE

THE CLASS OF CONCRETE SHALL BE AS NOTED ON OTHER SHEETS OF THESE PLANS.

BUILD-UPS ON BENT CAPS SHALL BE CAST MONOLITHIC WITH CAP UNLESS INDICATED OTHERWISE IN THESE PLANS. THE TOP OF EACH BUILD-UP SHALL BE LEVEL.

PAYMENT FOR CONCRETE IN SLAB WILL BE BASED ON THEORETICAL PLAN QUANTITY. ANY NECESSARY ADJUSTMENT IN QUANTITY DUE TO VARIATION IN CAMBER SHALL BE AT THE CONTRACTOR'S EXPENSE.

SIMPLE SPANS 24 m OR LESS SHALL BE POURED WITHOUT A TRANSVERSE CONSTRUCTION JOINT. FOR SIMPLE SPANS OVER 24 m IN LENGTH, A TRANSVERSE STRIP OF THE SLAB CENTERED AT MID-SPAN AND COMPRISING APPROXIMATELY 2/3 OF THE SLAB SHALL BE POURED FIRST AND ALLOWED TO CURE FOR NOT LESS THAN 4 DAYS BEFORE THE REMAINING END SECTIONS ARE POURED. HOWEVER, WHEN FAVORABLE WEATHER CONDITIONS EXIST THE ENGINEER MAY PERMIT THE ENTIRE SLAB TO BE POURED PROVIDED A SUITABLE RETARDING AGENT IS USED IN SUCH AMOUNTS THAT NONE OF THE CONCRETE OF THE POUR SHALL REACH INITIAL SET PRIOR TO COMPLETION OF THE POUR.

ALL EXPOSED EDGES SHALL BE CHAMFERED 20 mm UNLESS OTHERWISE NOTED.

THE MINIMUM ACCEPTABLE CONCRETE COVER FOR REINFORCING STEEL MAY BE 12 mm LESS THAN THE PLAN DIMENSIONS WHEN REQUIRED BY REINFORCING BAR FABRICATION TOLERANCES.

THE TOP 6 mm OF ALL CONCRETE SLABS SHALL BE CONSIDERED AS A WEARING SURFACE AND SHALL NOT BE INCLUDED IN THE SLAB DEPTH USED FOR THE CALCULATION OF SECTION PROPERTIES.

## REMOVAL OF FALSEWORK AND FORMS

SECTION 702.18 OF THE STANDARD SPECIFICATIONS IS AMENDED IN PART TO THE EXTENT THAT "UNDER URGENT CONDITIONS AND WITH THE WRITTEN APPROVAL OF THE ENGINEER, ADDITIONAL STRENGTH CONTROL CYLINDERS MAY BE MADE AND THE FALSEWORK STRUCK WHEN THESE CYLINDERS, CURED UNDER THE SAME CONDITIONS AS THE CONCRETE IN THE STRUCTURE, DEVELOP A UNIT STRENGTH OF 22.5 MPa. HOWEVER, SUCH CONCRETE SHALL NOT BE SUBJECTED TO A SUPERIMPOSED LOAD UNTIL THE COMPRESSIVE STRENGTH IS AT LEAST 30 MPa.

## PRESTRESSED BEAMS

MEMBRANE CURING COMPOUND SHALL NOT BE USED ON TOPS OR ENDS OF BEAMS.

BEAM LENGTHS GIVEN ARE BASED ON HORIZONTAL SPAN ONLY. LENGTHS SHALL BE INCREASED TO CORRECT FOR CONCRETE SHRINKAGE, CONCRETE SHORTENING WHEN THE STRANDS ARE CUT, AND FOR BEAMS BEING ON A GRADE.

SECTION 704.15 AND 704.16 OF THE STANDARD SPECIFICATIONS ARE AMENDED IN PART TO REQUIRE THAT PRESTRESSED CONCRETE BEAMS BE MEASURED AND PAID FOR AT THE CONTRACT UNIT PRICE PER METER.

## EXCAVATION FOR END BENT

ALL COST OF EXCAVATION NECESSARY TO CONSTRUCT END BENTS AND TO REMOVE MATERIAL UNDER SUPERSTRUCTURE TO AN ELEVATION 300 mm BELOW TOPS OF END BENT CAPS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS 30 CONCRETE.

IF A CONCRETE FOOTING IS USED FOR THE END BENT, THE EXCAVATION BELOW THAT INCLUDED FOR THE CAP AND BERM IN THE ABOVE PARAGRAPH WILL BE PAID FOR AT THE UNIT PRICE BID FOR EXCAVATION. EXCAVATION ABOVE THIS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS 30 CONCRETE.

## SPECIFICATIONS:

AASHTO 1996 STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES AND INTERIMS.

ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE (LATEST EDITION) WITH ADDITIONS AND REVISIONS AS STATED IN THE SPECIAL PROVISIONS.

## LIVE LOAD

AASHTO MS22.5-44 LOADING OR AN ALTERNATE MILITARY LOADING OF 2 AXLES 1.22 m APART WITH EACH AXLE WEIGHING 106.8 kN, WHICHEVER PRODUCES THE GREATEST STRESS.

## DESIGN DATA

STRENGTH DESIGN METHOD (LOAD FACTOR DESIGN )

CONCRETE:CLASS 30, $f'c$ = 30 MPa

## SPECIAL NOTE

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES ON THIS SHEET AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL.
SEE STANDARD SPECIFICATIONS SEC. 105.04.

## MATERIAL AND WORKMANSHIP

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SOUTH CAROLINA DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, 1986 EDITION.

## VALUE ENGINEERING PROPOSALS:

THE CONTRACTOR MAY INITIATE, DEVELOP, AND PRESENT TO THE DEPARTMENT OF TRANSPORTATION FOR CONSIDERATION, ANY COST REDUCTION PROPOSALS CONCEIVED BY THEM INVOLVING CHANGES IN THE DRAWINGS, DESIGNS, SPECIFICATIONS, OR OTHER REQUIREMENTS OF THE CONTRACT. ALL VALUE ENGINEERING PROPOSALS SHALL COMPLY WITH THE REQUIREMENTS OF THE SPECIAL PROVISIONS.

## COMPLETION DATES

THE CONTRACTOR SHALL PLACE YEAR OF COMPLETION ON INSIDE FACE OF RIGHT SIDE BARRIER PARAPET/RAIL AT BEGINNING OF BRIDGE AND ON LEFT SIDE BARRIER PARAPET/RAIL AT END OF BRIDGE. NUMBERS ARE TO BE RECESSED IN THE CONCRETE USING NUMBERS THAT ARE FABRICATED FROM REUSABLE/DURABLE MATERIAL AND APPROVED BY THE ENGINEER. THE CONTRACTOR WILL BE RESPONSIBLE FOR SUPPLYING THE NUMBERS WITH THE DIMENSIONS SHOWN ON STANDARD DRAWING NUMBERS.STD FOUND ON SCDOT INTERNET FTP SITE AT FTP.DOT.STATE.SC.US LOGON AS ANONYMOUS. LOCATED IN DIR=PUB/BR CONSULTANT/ESTANDARD OR A COPY CAN BE OBTAINED FROM THE RESIDENT ENGINEER.

## WORKING DRAWINGS

WHEN REQUIRED BY THE PLANS, SPECIFICATIONS OR SPECIAL PROVISIONS, THE CONTRACTOR SHALL SUBMIT SHOP PLANS, ERECTION PLANS, FALSEWORK PLANS, COFFERDAM PLANS OR ANY OTHER SUPPLEMENTARY PLANS TO THE ENGINEER FOR REVIEW. THESE PLANS, ALONG WITH ANY ASSOCIATED DESIGN CALCULATIONS, SHALL BEAR THE SEAL AND SIGNATURE OF A SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER WITH THE FOLLOWING EXCEPTIONS:

A) SHOP PLANS FOR ARMOR PLATES LOCATED AT BRIDGE ENDS OR APPROACH SLAB ENDS.
B) SHOP PLANS FOR PRESTRESSED CONCRETE PILING THAT ARE FABRICATED IN ACCORDANCE WITH THE DETAILS SHOWN IN THE PLANS.

ALL COSTS FOR THE PREPARATION AND FURNISHING OF THE WORKING DRAWINGS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE VARIOUS PAY ITEMS OF WORK.

## FIELD WELDING

ANY AUTHORIZED STRUCTURAL FIELD WELDING THAT IS REQUIRED ON THIS PROJECT MAY BE SUBJECT TO INSPECTION AND TESTING. SEE SUPPLEMENTAL SPECIFICATIONS. FINAL DETERMINATION OF THE EXTENT OF INSPECTION AND TESTING WILL BE THE RESPONSIBILITY OF THE CONSTRUCTION OFFICE AND/OR THE RESEARCH AND MATERIALS ENGINEER. THE CONSTRUCTION OFFICE AND/OR THE RESEARCH AND MATERIALS ENGINEER MUST BE NOTIFIED WHEN ANY FIELD WELDING IS PERFORMED.

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Auto Drawn 06-99

bmsn.dgn

South Carolina Department of Transportation

Metric Conversion Program

**BRIDGE DESIGN**

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**STANDARD NOTES**

South Carolina
Department of Transportation

DM0799

July 20, 1999

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS**

**SUBJECT: REVISED SHOP PLAN POLICY AND STANDARD NOTES**

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The attached standard notes sheets should be used for bridge projects beginning with the October 1999 letting. Your attention is directed to the revised note entitled, "WORKING DRAWINGS".

This change was required to address conflicts between the current shop plan policy and the "Working Drawing" note. The revised note and revised shop plan policy now contain the same wording with respect to exceptions.

The revised "SCDOT Bridge Design Policy On Shop Plan Submittals" dated July 13, 1999 should be used when reviewing shop plan submittals.

Plans that are complete and that will be let in October 1999 or later must be revised to include this revision. Your cooperation in this matter is appreciated.

Randy R. Cannon, P.E.
Bridge Design Engineer

Attachments:

cc: Assistant Bridge Engineers
Bridge Construction Engineer

File: PC/REL

Post Office Box 191
Columbia, South Carolina 29202-0191
Phone (803) 737-2414
TTY (803) 737-2373

F.) Prestressed Concrete Beam or Girder on 22x36 inch (ISO A1) or 11x17 inch (ISO A3).
G.) Post-tensioned Concrete Beam or Girder on 22x36 inch (ISO A1).
H.) Prestressed Concrete Piling on 11x17 inch (ISO A3).
I.) Miscellaneous Prestressed and Post-tensioned Concrete Members. on 11x17 inch (ISO A3) or 22x36 inch (ISO A1) as needed.
J.) Other items as may be required in the project plans or in the Special Provisions on 11x17 inch (ISO A3) or 22x36 inch (ISO A1) as needed.

5.) Shop plan submittals shall bear the seal and signature of a South Carolina Registered Professional Engineer with the exception of submittals for the following items that are fabricated in accordance with details shown in plans.
A.) Armor plates.
B.) Prestressed concrete piling.
C.) Bearing or sole plates, shims and booster plates.
D.) Anchor bolt assemblies and tie rod assemblies.

6.) Temporary FAX submittals will only be accepted when approved by the Bridge Design Engineer and **MUST** be followed by submittal of the proper number and size of shop plans.

7.) Fabricators shall electronically submit "as fabricated" drawings to the Bridge Design Engineer for the Department's project records. The "as fabricated" drawings are required for all items, except item E, defined under item number 4 above.

8.) Submittals for falsework/form systems shall be submitted to the Bridge Construction Engineer at the following address:

South Carolina Department of Transportation
Bridge Construction Engineer-Room 504
955 Park Street
Columbia, S.C. 29201

Submittals are required for the following falsework/form system items:

A.) Cofferdams
B.) Temporary Sheet Piling used as walls or construction aids.
C.) New falsework/form systems used for the first time.
D.) Miscellaneous falsework/form systems as may be required in the Standard Specifications or Special Provisions.

The Contractor shall send to the Bridge Construction Engineer seven (7) copies for review and acceptance on all projects except railroad projects. On railroad projects, the Contractor shall submit nine (9) copies for review and acceptance.

# SCDOT BRIDGE DESIGN POLICY ON SHOP PLAN SUBMITTALS

The following policy shall be adhered to when submitting shop plans for review and acceptance for fabrication to either the Bridge Design Office or directly to the Department's Design Consultant. Failure to follow the policy on shop plan submittals will delay processing of submittals. This policy is intended to include only those items which will remain as a permanent part of the structure. Submittals of design calculations and drawings for Contractor proposed falsework/form systems shall continue as required by the Special Provisions and item number eight below.

1.) Shop plan submittals to the Department shall be forwarded to the following address:

South Carolina Department of Transportation
Bridge Design Engineer - Room 508
955 Park Street
Columbia, S.C. 29201
Attention Mr. Howard Ingle

Shop plan submittals for Consultant designed projects shall be sent directly to the Department's Design Consultant. The Contractor will be provided the necessary mailing information at the Preconstruction Conference.

For all submittals, a copy of the transmittal letter shall be sent to the Bridge Construction Engineer and to the Resident Construction Engineer. When submittals are sent directly to the Department's Design Consultant, a copy of the transmittal letter shall also be sent to the Bridge Design Engineer.

2.) All shop plan submittals shall be clearly marked as containing **"SHOP PLANS"**.

3.) All shop plan submittals shall contain seven (7) white print sets of drawings. Shop plan submittals shall be on either 22x36 inch (ISO A1 METRIC size 841.0 mm x 594.0 mm) or 11x17 inch (ISO A3 METRIC size 420.0 mm x 297.0 mm) paper as indicated below.

4.) Shop plan submittals are required for the following items:

A.) Structural Steel Members on 22x36 inch (ISO A1).
B.) Structural Steel Parts of Expansion Joint on 22x36 inch (ISO A1).
C.) Structural Steel Parts of Bearings on 22x36 inch (ISO A1).
D.) Miscellaneous Steel Members except piling and sway bracing on 22x36 inch (ISO A1).
E.) SIP Bridge Deck Forms 22x36 inch (ISO A1).

stdnotdet.std

| SHEET NO. | TOTAL SHEETS |
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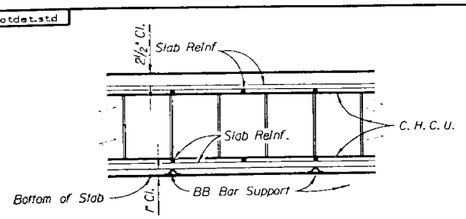



# BAR SUPPORT DETAIL

**SECTION PARALLEL TO ℄ ROADWAY**

NOTE:

TERMS AND SYMBOLS USED BELOW REFER TO STANDARD TYPE BAR SUPPORTS AND CLASSES OF PROTECTION AS SPECIFIED IN C.R.S.I. MANUAL OF STANDARD PRACTICE, DATED 1997.

BAR SUPPORTS SHALL BE SPACED TO PROVIDE ADEQUATE SUPPORT FOR SLAB REINFORCING STEEL. THE LOWER LAYER OF SLAB STEEL SHALL BE SUPPORTED BY BEAM BOLSTERS (BB) BAR SUPPORTS WITH ONE ROW NEAR EACH END OF SPAN AND INTERIOR ROWS SPACED APPROXIMATELY 2'-0" ON CENTER. BB BAR SUPPORTS SHALL HAVE CLASS 1 MAXIMUM PROTECTION. TOP REINFORCING STEEL SHALL BE SUPPORTED BY CONTINUOUS HIGH CHAIRS UPPER (CHCU) AS SHOWN IN THE ABOVE DETAIL. SPACED 2'-6" ON CENTER MAXIMUM.

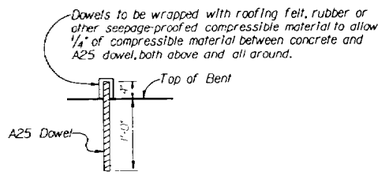
WEIGHT OF BAR SUPPORTS ARE NOT INCLUDED IN THE REINFORCING STEEL QUANTITIES. BAR SUPPORTS SHALL BE CONSIDERED INCIDENTAL TO THE REINFORCING STEEL AND ALL COSTS OF FURNISHING AND PLACING BAR SUPPORTS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR REINFORCING STEEL.

## PLASTIC BAR SUPPORTS:

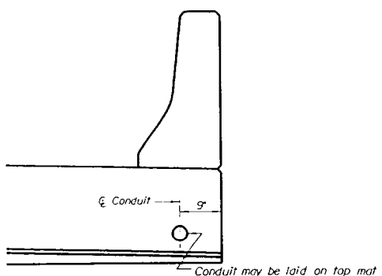
PLASTIC BAR SUPPORTS MAY BE USED IN LIEU OF BB WIRE SUPPORTS.

PLASTIC BAR SUPPORTS SHALL MEET THE FOLLOWING REQUIREMENTS:

1. CHAIRS AND BOLSTERS MUST BE OF ADEQUATE STRENGTH TO RESIST A 300 POUND CONCENTRATED LOAD WITHOUT PERMANENT DEFORMATION OR BREAKAGE.
2. THE MATERIAL FROM WHICH PLASTIC BAR SUPPORTS ARE MANUFACTURED SHALL BE EITHER VIRGIN RESIN OR FIRST GENERATION RECYCLED THERMOPLASTIC RESIN, BE COLORED WHITE, GRAY, OR BLACK, AND BE CHEMICALLY INERT IN CONCRETE.
3. PLASTIC REBAR SUPPORTS SHALL BE MOLDED IN A CONFIGURATION WHICH DOES NOT RESTRICT CONCRETE FLOW AND CONSOLIDATION AROUND AND UNDER THE REBAR SUPPORT.

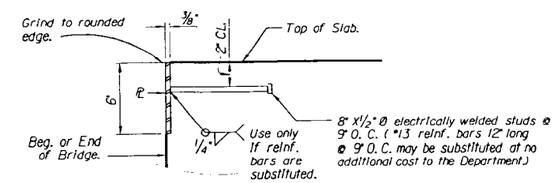



**A25 DOWEL DETAIL**




Note:
Conduits necessary for utilities to be furnished by the utility company and placed at no expense to the department. Use Slip Coupling on Conduits at Expansion Joints.

**DETAIL SHOWING CONDUIT PLACEMENT**




# ARMOR PLATE DETAIL

NOTE:
THE 3/8 " THICK PLATES WILL BE REQUIRED AT THE BEGINNING AND END OF THE BRIDGE.

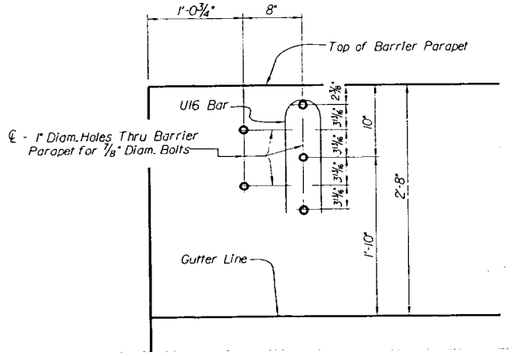
STEEL FOR THE ARMOR PLATES SHALL CONFORM TO THE LATEST AASHTO M270 GRADE 50W (ASTM A709 GR. 50W) STEEL AND NEITHER THE PLATES NOR THE ANCHOR STUDS NEED BE PAINTED.

THE FABRICATED PLATES SHALL CONFORM TO THE CROWN AND GRADE OF THE ROADWAY AND SHALL EXTEND FROM GUTTER LINE TO GUTTER LINE. THE PLATES MAY BE FABRICATED IN REASONABLE LENGTHS AND CONNECTED AT THE JOB SITE WITH FULL PENETRATION BUTT WELDS GROUND FLUSH ALONG THE TOP FACE OF CONNECTED PLATES.

IF NECESSARY, LONGITUDINAL REINFORCING BARS OF THE SLAB MAY BE SHIFTED LATERALLY TO CLEAR ANCHOR STUDS.

IF DESIRED BY THE CONTRACTOR, 9/16 "Ø HOLES SPACED APPROXIMATELY 2'-0" O.C., MAY BE PROVIDED IN LOWER PORTION OF THE PLATES TO BOLT THE PLATES TO THE FORMS.

ALL COSTS OF MATERIAL AND WORKMANSHIP TO FABRICATE, FURNISH AND INSTALL THE ARMOR PLATES AND ANCHOR STUDS COMPLETE IN PLACE SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.




## ① THRIE BEAM GUARD RAIL ATTACHMENT TO PARAPET

① NOTE:

THE 1" DIAM. HOLES MAY BE FORMED WITH PLASTIC OR PVC PIPE HAVING AN I.D. OF 1" (+ 1/8") OR 1" I.D. GALVANIZED STANDARD WEIGHT STEEL PIPE.

ALL COST OF PIPE AND INSTALLATION SHALL BE INCLUDED IN THE PRICE BID FOR REINFORCING STEEL.

ALL PIPE TO REMAIN IN PLACE WHEN FORMS ARE REMOVED.

THE RESIDENT ENGINEER SHALL CHECK THE LOCATION OF THE HOLES TO INSURE THAT THE GUARDRAIL SHOE WILL FIT PROPERLY WHEN INSTALLED.

ALL GUARDRAIL AND BOLTS TO BE FURNISHED AND INSTALLED BY CONTRACTOR.

## WORKING DRAWINGS

WHEN REQUIRED BY THE PLANS, SPECIFICATIONS OR SPECIAL PROVISIONS, THE CONTRACTOR SHALL SUBMIT SHOP PLANS, ERECTION PLANS, FALSEWORK PLANS, COFFERDAM PLANS OR ANY OTHER SUPPLEMENTARY PLANS TO THE ENGINEER FOR REVIEW. THESE PLANS, ALONG WITH ANY ASSOCIATED DESIGN CALCULATIONS, SHALL BEAR THE SEAL AND SIGNATURE OF A SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER WITH THE EXCEPTION OF SUBMITALS FOR THE FOLLOWING ITEMS THAT ARE FABRICATED IN ACCORDANCE WITH DETAILS SHOWN IN PLANS.

A.) ARMOR PLATES.
B.) PRESTRESSED CONCRETE PILING.
C.) BEARING OR SOLE PLATES, SHIMS AND BOOSTER PLATES.
D.) ANCHOR BOLT ASSEMBLIES AND TIE ROD ASSEMBLIES.

ALL COSTS FOR THE PREPARATION AND FURNISHING OF THE WORKING DRAWINGS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE VARIOUS PAY ITEMS OF WORK.

## CONCRETE

THE CLASS OF CONCRETE SHALL BE AS NOTED ON OTHER SHEETS OF THESE PLANS.

BUILD-UPS ON BENT CAPS SHALL BE CAST MONOLITHIC WITH CAP UNLESS INDICATED OTHERWISE IN THESE PLANS. THE TOP OF EACH BUILD-UP SHALL BE LEVEL.

PAYMENT FOR CONCRETE IN SLAB WILL BE BASED ON THEORETICAL PLAN QUANTITY. ANY NECESSARY ADJUSTMENT IN QUANTITY DUE TO VARIATION IN CAMBER SHALL BE AT THE CONTRACTOR'S EXPENSE.

ALL EXPOSED EDGES SHALL BE CHAMFERED 3/4" UNLESS OTHERWISE NOTED.

THE MINIMUM ACCEPTABLE CONCRETE COVER FOR REINFORCING STEEL MAY BE ONE HALF INCH LESS THAN THE PLAN DIMENSIONS WHEN REQUIRED BY REINFORCING BAR FABRICATION TOLERANCES.

THE TOP ONE FOURTH INCH OF ALL CONCRETE SLABS SHALL BE CONSIDERED AS A WEARING SURFACE AND SHALL NOT BE INCLUDED IN THE SLAB DEPTH USED FOR THE CALCULATION OF SECTION PROPERTIES.

## VALUE ENGINEERING PROPOSALS:

THE CONTRACTOR MAY INITIATE, DEVELOP, AND PRESENT TO THE DEPARTMENT OF TRANSPORTATION FOR CONSIDERATION, ANY COST REDUCTION PROPOSALS CONCEIVED BY THEM INVOLVING CHANGES IN THE DRAWINGS, DESIGNS, SPECIFICATIONS, OR OTHER REQUIREMENTS OF THE CONTRACT. ALL VALUE ENGINEERING PROPOSALS SHALL COMPLY WITH THE REQUIREMENTS OF THE SPECIAL PROVISIONS.

## REINFORCING STEEL

GRADE 420 REINFORCING STEEL CONFORMING TO ASTM A 615M-96a WILL BE USED ON THIS PROJECT. UNLESS SHOWN OTHERWISE, ALL TIES & STIRRUPS SHALL HAVE 135° HOOKS WITH EXTENSIONS NOT LESS THAN THE LARGER OF TEN BAR DIAMETERS OR 6 INCHES.

REINFORCING BAR FABRICATION SHALL CONFORM TO THE CURRENT C.R.S.I. MANUAL OF STANDARD PRACTICE EXCEPT AS NOTED ABOVE.

THE CONTRACTOR MAY ELECT TO SUBSTITUTE MECHANICAL REINFORCING COUPLERS FOR THE LAP SPLICES DETAILED IN THE PLANS. ALL MECHANICAL REINFORCING COUPLERS SHALL COMPLY WITH THE SPECIAL PROVISIONS.

ALL COSTS FOR FURNISHING AND INSTALLING COUPLERS SHALL BE CONSIDERED INCIDENTAL TO PLACING REINFORCING STEEL. PAYMENT FOR MECHANICAL REINFORCING COUPLERS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR REINFORCING STEEL.

WHEN APPROVED BY THE ENGINEER, WELDED LAP SPLICES SHALL BE MADE WITH LOW HYDROGEN TYPE ELECTRODES AND SHALL CONFORM WITH REQUIREMENTS OF AWS D1.4 STRUCTURAL WELDING CODE.

THE WELDING PROCEDURE AND TWO TEST SAMPLES SHALL BE SUBMITTED FOR APPROVAL BY THE DEPARTMENT PRIOR TO BEGINNING THE FABRICATION OF THE SPLICES.

LAP SPLICES IN COLUMN AND SHAFT REINFORCING STEEL SHALL NOT BE ALLOWED.

## ALLOWANCE FOR DEAD LOAD DEFLECTION AND SETTLEMENT

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK AND LONG-TIME DEFLECTION SUCH THAT ON REMOVAL OF FALSEWORK THE TOP OF THE STRUCTURE SHALL CONFORM TO THEORETICAL FINISH GRADE PLUS THE ALLOWANCE FOR LONG-TIME DEFLECTION.

FOR CONCRETE FLAT SLAB SPANS TWENTY TO THIRTY FEET IN LENGTH, SUB- SECTION 702.27 OF THE STANDARD SPECIFICATION IS AMENDED IN PART TO REQUIRE 1/8" OF CAMBER FOR DEAD LOAD AND LONG-TIME DEFLECTION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

## COMPLETION DATES

THE CONTRACTOR SHALL PLACE YEAR OF COMPLETION ON INSIDE FACE OF RIGHT SIDE BARRIER PARAPET/RAIL AT BEGINNING OF BRIDGE AND ON LEFT SIDE BARRIER PARAPET/RAIL AT END OF BRIDGE. NUMBERS ARE TO BE RECESSED IN THE CONCRETE USING NUMBERS THAT ARE FABRICATED FROM REUSABLE/DURABLE MATERIAL AND APPROVED BY THE ENGINEER. THE CONTRACTOR WILL BE RESPONSIBLE FOR SUPPLYING THE NUMBERS WITH THE DIMENSIONS SHOWN ON STANDARD DRAWING NUMBERS. STD FOUND ON SCDOT INTERNET FTP SITE AT FTP.DOT.STATE.SC.US LOGON AS ANONYMOUS. LOCATED IN DIR=PUB/BR CONSULTANT/ESTANDARD OR A COPY CAN BE OBTAINED FROM THE RESIDENT ENGINEER.

## FIELD WELDING

ANY AUTHORIZED STRUCTURAL FIELD WELDING THAT IS REQUIRED ON THIS PROJECT MAY BE SUBJECT TO INSPECTION AND TESTING. SEE SUPPLEMENTAL SPECIFICATIONS. FINAL DETERMINATION OF THE EXTENT OF INSPECTION AND TESTING WILL BE THE RESPONSIBILITY OF THE CONSTRUCTION OFFICE AND/OR THE RESEARCH AND MATERIALS ENGINEER. THE CONSTRUCTION OFFICE AND/OR THE RESEARCH AND MATERIALS ENGINEER MUST BE NOTIFIED WHEN ANY FIELD WELDING IS PERFORMED.

## EXCAVATION FOR END BENT

ALL COST OF EXCAVATION NECESSARY TO CONSTRUCT END BENTS AND TO REMOVE MATERIAL UNDER SUPERSTRUCTURE TO AN ELEVATION 1'-0" BELOW TOPS OF END BENT CAPS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

IF A CONCRETE FOOTING IS USED FOR THE END BENT, THE EXCAVATION BELOW THAT INCLUDED FOR THE CAP AND BERM IN THE ABOVE PARAGRAPH WILL BE PAID FOR AT THE UNIT PRICE BID FOR EXCAVATION. EXCAVATION ABOVE THIS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

## BEARINGS

FOR CONCRETE SLABS BEARING ON CONCRETE, THE TOP OF CAPS UNDER BEARING AREAS SHALL RECEIVE A SUITABLE TROWEL FINISH TO INSURE A SMOOTH AND LEVEL BEARING SURFACE. SEE STANDARD SPECIFICATIONS PARAGRAPH 702.26.

## DRIVING PILES THROUGH FILL

WHERE PILES OCCUR IN FILL EXCEEDING 10 FEET IN HEIGHT, THE FILL SHALL BE IN PLACE BEFORE PILES ARE DRIVEN.

TIMBER OR PRESTRESSED CONCRETE PILES WHICH ARE TO BE DRIVEN THROUGH FILL, SHALL BE INSTALLED IN PRE-BORED HOLES EXTENDING TO THE ORIGINAL GROUND.

HOLES FOR TIMBER PILES SHALL HAVE A 14" MINIMUM DIAMETER. HOLES FOR SQUARE PRESTRESSED CONCRETE PILES SHALL HAVE A MINIMUM DIAMETER OF 1.25 TIMES THE NOMINAL PILE SIZE. ALL COST OF PRE-BORING FILLS FOR PILE INSTALLATION SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE PILES.

## REMOVAL OF FALSEWORK AND FORMS

SECTION 702.18 OF THE STANDARD SPECIFICATIONS IS AMENDED IN PART TO THE EXTENT THAT UNDER URGENT CONDITIONS AND WITH THE WRITTEN APPROVAL OF THE ENGINEER, ADDITIONAL STRENGTH CONTROL CYLINDERS MAY BE MADE AND THE FALSEWORK STRUCK WHEN THESE CYLINDERS, CURED UNDER THE SAME CONDITIONS AS THE CONCRETE IN THE STRUCTURE, DEVELOP A UNIT STRENGTH OF 3,200 PSI. HOWEVER, SUCH CONCRETE SHALL NOT BE SUBJECTED TO A SUPERIMPOSED LOAD UNTIL THE COMPRESSIVE STRENGTH IS AT LEAST 4,000 PSI.

## SPECIFICATIONS:

AASHTO 1996 STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, AND INTERIMS.

ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE (LATEST EDITION) WITH ADDITIONS AND REVISIONS AS STATED IN THE SPECIAL PROVISIONS.

## LIVE LOAD:

AASHTO HS25-44 LOADING OR AN ALTERNATE MILITARY LOADING OF 2 AXLES 4 FEET APART WITH EACH AXLE WEIGHING 24,000 POUNDS, WHICHEVER PRODUCES THE GREATEST STRESS.

## DESIGN DATA:

STRENGTH DESIGN METHOD (LOAD FACTOR DESIGN)

CONCRETE: CLASS "D", $f'_c$ = 4,000 P.S.I.

## SPECIAL NOTE:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES ON THIS SHEET AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE STANDARD SPECIFICATIONS SEC. 105.04.

## MATERIAL AND WORKMANSHIP

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SOUTH CAROLINA DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, 1986 EDITION.

## NOTE:

LEFT AND RIGHT SIDES, WHERE REFERRED TO IN THESE PLANS, ARE IN RELATION TO DIRECTION OF STATIONING.

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| | WORK DWGS. | | |
| REV. | REJ | JAR | 3-99 |
| | VALUE ENG. PRO. | | |
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| DR. | REJ | HDJ | 7-98 |
| DES. | | | |
| | BY | CHK. | DATE |

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN COLUMBIA, S.C.

# STANDARD NOTES AND DETAILS FOR FLAT SLABS

| FILE NO. | ROUTE | COUNTY | DRAWING NO. |
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| | | | STDNOTDET.STD |

HS25LL-LOAD FACTOR

bjerson.dgn

| SHEET NO. | TOTAL SHEETS |
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## WIDENING EXISTING CONCRETE STRUCTURE

WHERE NEW CONCRETE IS TO BE CAST AGAINST EXISTING CONCRETE, THE CONTACT SURFACE OF THE OLD CONCRETE SHALL BE CLEANED OF ALL LOOSE CONCRETE, DIRT, OIL, GREASE AND ANY OTHER DELETERIOUS SUBSTANCE. IN ADDITION, BEFORE PLACING NEW DECK SLAB CONCRETE, THE EDGE OF EXISTING DECK SLAB SHALL BE THOROUGHLY ROUGHENED TO AN AMPLITUDE OF APPROXIMATELY 1/4". JUST PRIOR TO PLACING NEW CONCRETE, THE PORTION OF THE EXISTING SLAB FROM THE TOP SURFACE OF THE SLAB TO THE TOP LAYER OF REINFORCING SHALL BE COATED WITH A BONDING AGENT CONFORMING TO AASHTO SPECIFICATION M235 TYPE II APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. THE REMAINING PORTION OF THE VERTICAL FACE OF THE EXISTING SLAB SHALL BE FLUSHED WITH A 1:2 CEMENT MORTAR IMMEDIATELY PRIOR TO PLACING THE NEW CONCRETE.

ALL REINFORCING STEEL PROTRUDING BEYOND THE SURFACE AFTER REMOVAL OF CONCRETE SHALL BE IMBEDDED IN THE NEW CONCRETE IF FEASIBLE. REINFORCING STEEL WHICH CANNOT BE IMBEDDED IN NEW CONCRETE SHALL BE CUT OFF FLUSH WITH THE SURFACE OF THE CONCRETE WHEN IT WILL BE COVERED WITH A DECK OVERLAY. OTHERWISE, CUT REINFORCING OFF 1" BELOW THE CONCRETE SURFACE AND PATCH THE RESULTING HOLE WITH AN EPOXY MORTAR APPROVED BY THE ENGINEER.

THE ENTIRE COST OF THE ABOVE WORK INCLUDING ALL DRILLING, CHIPPING, REMOVING AND DISPOSING OF PORTIONS OF OLD STRUCTURE NECESSARY TO CONSTRUCT NEW STRUCTURE SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR "REMOVAL AND DISPOSAL OF DESIGNATED PORTIONS OF EXISTING BRIDGES."

THE CONTRACTOR SHALL REPAIR OR REPLACE AT HIS OWN EXPENSE, AND IN A MANNER SATISFACTORY TO THE ENGINEER, ANY PORTION OF THE EXISTING STRUCTURE DAMAGED AS A RESULT OF HIS CARELESSNESS OR NEGLIGENCE.

UNLESS OTHERWISE SPECIFIED IN THESE PLANS OR THE SPECIAL PROVISIONS, THE CONTRACTOR SHALL PROVIDE NECESSARY TEMPORARY SUPPORTS FOR UTILITIES ATTACHED TO THE BRIDGE TO MAINTAIN SERVICE DURING CONSTRUCTION. THE OWNER WILL MAKE ALL NECESSARY CHANGES IN ALIGNMENT AND ELEVATION OF THE UTILITY AND FURNISH PERMANENT SUPPORTS WHICH SHALL BE PLACED IN THE CONCRETE BY THE CONTRACTOR. ALL COSTS OF THIS WORK TO BE PERFORMED BY THE CONTRACTOR SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

ANY NECESSARY REPAIRS TO THE EXISTING STRUCTURE, IN THE OPINION OF THE ENGINEER, ARE TO BE PAID FOR AS EXTRA WORK, IF SUCH WORK IS NOT CALLED FOR IN THESE PLANS OR IN THE SPECIAL PROVISIONS FOR THIS PROJECT.

ALL DIMENSIONS OF NEW CONSTRUCTION ARE SUBJECT TO EXISTING CONDITIONS. IT IS RECOMMENDED THAT ALL DIMENSIONS WHICH MAY AFFECT MATERIALS AND QUANTITIES AS SHOWN ON THESE PLANS BE VERIFIED BY THE CONTRACTOR PRIOR TO ORDERING THE MATERIALS.

## DRIVING PILES THROUGH FILL

WHERE PILES OCCUR IN FILL EXCEEDING 10 FEET IN HEIGHT, THE FILL SHALL BE IN PLACE BEFORE PILES ARE DRIVEN.

TIMBER OR PRESTRESSED CONCRETE PILES WHICH ARE TO BE DRIVEN THROUGH FILL, SHALL BE INSTALLED IN PRE-BORED HOLES EXTENDING TO THE ORIGINAL GROUND.

HOLES FOR TIMBER PILES SHALL HAVE A 14" MINIMUM DIAMETER. HOLES FOR SQUARE PRESTRESSED CONCRETE PILES SHALL HAVE A MINIMUM DIAMETER OF 1.25 TIMES THE NOMINAL PILE SIZE. ALL COST OF PRE-BORING FILLS FOR PILE INSTALLATION SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE PILES.

## REINFORCING STEEL

GRADE 420 REINFORCING STEEL CONFORMING TO ASTM A 615M-96a WILL BE USED ON THIS PROJECT. UNLESS SHOWN OTHERWISE, ALL TIES & STIRRUPS SHALL HAVE 135° HOOKS WITH EXTENSIONS NOT LESS THAN THE LARGER OF TEN BAR DIAMETERS OR 6 INCHES.

REINFORCING BAR FABRICATION SHALL CONFORM TO THE CURRENT C.R.S.I. MANUAL OF STANDARD PRACTICE EXCEPT AS NOTED ABOVE.

THE CONTRACTOR MAY ELECT TO SUBSTITUTE MECHANICAL REINFORCING COUPLERS FOR THE LAP SPLICES DETAILED IN THE PLANS. ALL MECHANICAL REINFORCING COUPLERS SHALL COMPLY WITH THE SPECIAL PROVISIONS.

ALL COSTS FOR FURNISHING AND INSTALLING COUPLERS SHALL BE CONSIDERED INCIDENTAL TO PLACING REINFORCING STEEL. PAYMENT FOR MECHANICAL REINFORCING COUPLERS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR REINFORCING STEEL.

WHEN APPROVED BY THE ENGINEER, WELDED LAP SPLICES SHALL BE MADE WITH LOW HYDROGEN TYPE ELECTRODES AND SHALL CONFORM WITH REQUIREMENTS OF AWS D1.4 STRUCTURAL WELDING CODE.

THE WELDING PROCEDURE AND TWO TEST SAMPLES SHALL BE SUBMITTED FOR APPROVAL BY THE DEPARTMENT PRIOR TO BEGINNING THE FABRICATION OF THE SPLICES.

LAP SPLICES IN COLUMN AND SHAFT REINFORCING STEEL SHALL NOT BE ALLOWED.

## MATERIAL AND WORKMANSHIP

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SOUTH CAROLINA DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, 1986 EDITION.

## STRUCTURAL STEEL

BEAMS SHALL BE CAMBERED FOR VERTICAL CURVE AND DEAD LOAD DEFLECTION, EITHER IN MILL OR IN SHOP.

LAYOUT DIMENSIONS AND STANDARD LENGTHS OF BEAMS SHOWN ARE HORIZONTAL DIMENSIONS WHICH MUST BE INCREASED WHEN BRIDGE IS ON GRADE.

SHOP INSPECTION OF THE STRUCTURAL STEEL WILL BE PERFORMED BY THE DEPARTMENT OR ITS AUTHORIZED INSPECTION AGENCY AND THE CONTRACTOR SHALL SO STIPULATE IN HIS ORDER TO THE FABRICATOR. ALSO, THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF THE NAME AND ADDRESS OF THE FABRICATOR OF THE STRUCTURAL STEEL AS SOON AS THE FABRICATOR HAS BEEN GIVEN THE CONTRACT TO FABRICATE SO THAT THE INSPECTION PROCEDURE CAN BE SET UP.

WELDING TO THE BEAMS AND PLATE GIRDERS FOR THE PURPOSE OF ATTACHING ERECTION HARDWARE, EITHER FIELD OR SHOP, WILL NOT BE PERMITTED.

PAINTING OF STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH SPECIAL PROVISIONS.

## CHARPY V-NOTCH TOUGHNESS TEST

ALL STEEL FOR USE IN MAIN LOAD-CARRYING MEMBER COMPONENTS SUBJECT TO TENSILE STRESS SHALL CONFORM TO THE APPLICABLE CHARPY V-NOTCH IMPACT TEST REQUIREMENTS OF AASHTO M 270 (ASTM A 709) AS SPECIFIED FOR ZONE 2.

SPECIFICALLY, CHARPY TESTING SHALL BE REQUIRED AS FOLLOWS:

A) SIMPLE SPAN ROLLED BEAM - THE BEAM ITSELF AS WELL AS BOTTOM COVER PLATE, IF APPLICABLE.

B) SIMPLE SPAN PLATE GIRDER - THE WEB, BOTTOM FLANGE PLATE AND SPLICE PLATES FOR WEB AND BOTTOM FLANGE EXCLUDING ANY FILLER PLATES.

C) CONTINUOUS SPAN ROLLED BEAM - THE BEAM ITSELF AS WELL AS ANY TOP OR BOTTOM COVER PLATE LOCATED IN A TENSION REGION AS INDICATED IN THE PLANS. ALSO, ALL SPLICE PLATES FOR WEB AND TOP AND BOTTOM FLANGE PLATES EXCLUDING ANY FILLER PLATES.

D) CONTINUOUS SPAN PLATE GIRDER - ALL WEB PLATES, THE TOP FLANGE PLATES AND THE BOTTOM FLANGE PLATES LOCATED IN A TENSION REGION AS INDICATED IN THE PLANS. ALSO, ALL SPLICE PLATES FOR WEB AND TOP AND BOTTOM FLANGE PLATES EXCLUDING ANY FILLER PLATES.

E) CURVED GIRDER STRUCTURES -IN ADDITION TO CHARPY TESTING OF WEB, FLANGE & SPLICE PLATES AS APPLICABLE AND AS SPECIFIED IN (A) THRU (D) ABOVE, ALL DIAPHRAGM MEMBERS, CONNECTION PLATES AND GUSSET PLATES SHALL REQUIRE CHARPY TESTING.

## HIGH STRENGTH BOLTED CONNECTIONS

ALL BOLTED CONNECTIONS SHALL HAVE 7/8" DIAM. ASTM A325 BOLTS. SEE SPECIAL PROVISIONS FOR STRUCTURAL STEEL FASTENERS. ALL BOLTED CONNECTIONS ARE DESIGNED AS SLIP-CRITICAL CONNECTIONS HAVING CLASS "B" CONTACT SURFACES.

GENERALLY, HOLES FOR 7/8" BOLTS SHALL BE 15/16" DIAM., HOWEVER, OVERSIZE HOLES, 3/16" LARGER THAN BOLT DIAM. MAY BE USED IN DIAPHRAGMS AND/OR CROSSFRAMES AND THEIR CONNECTION PLATES PROVIDED HARDENED WASHERS ARE INSTALLED OVER OVERSIZE HOLES IN THE OUTER PLY OF THE MATERIAL GRIPPED. IN EVERY CASE A HARDENED WASHER SHALL BE INSTALLED UNDER THE ELEMENT TURNED FOR EACH BOLT OF A BOLTED CONNECTION. THE SHOP PLANS SHALL INDICATE WHICH HOLES ARE TO BE OVERSIZE AND WHERE HARDENED WASHERS ARE REQUIRED. ALL COSTS OF USING OVERSIZE HOLES, TO INCLUDE FURNISHING ADDITIONAL HARDENED WASHERS AS NECESSARY, SHALL BE AT NO EXPENSE TO THE DEPARTMENT.

THE MINIMUM DISTANCE BETWEEN CENTERS OF 7/8" DIAM. BOLTS FOR DIAPHRAGM CONNECTIONS SHALL BE 3" AND THE EDGE DISTANCE SHALL BE 1 1/2" FROM THE CENTERLINE OF BOLTS.

## ANCHOR BOLTS

ALL COMPONENTS OF ANCHOR BOLT ASSEMBLIES SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 OR M232 AS APPLICABLE. THE WEIGHT OF ANCHOR BOLT ASSEMBLIES IS INCLUDED IN THE BENT QUANTITIES FOR REINFORCING STEEL. ALL COSTS OF FURNISHING AND INSTALLING ANCHOR BOLT ASSEMBLIES SHALL BE INCLUDED IN AND PAID FOR AT THE UNIT PRICE BID FOR REINFORCING STEEL.

## BEARING ASSEMBLIES

ALL STEEL BEARING ASSEMBLY COMPONENTS SHALL MEET AASHTO M270 GR. 36 (ASTM A709 GR. 36) UNLESS OTHERWISE SPECIFIED IN THE PLANS AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 OR M232 AS APPLICABLE.

AFTER THE REQUIRED FIELD WELDING OF HOT-DIP GALVANIZED BEARING ASSEMBLIES, THE WELD AREAS AND/OR ANY DAMAGED AREAS TO THE GALVANIZED COATING SHALL BE FIELD REPAIRED IN ACCORDANCE WITH ASTM A-780.

ALL COST OF FURNISHING AND INSTALLING STEEL BEARING ASSEMBLY COMPONENTS SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR STRUCTURAL STEEL IF A BID ITEM FOR STRUCTURAL STEEL IS INCLUDED IN THE PROJECT. OTHERWISE, THE COST SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED BEAMS.

## ALLOWANCE FOR DEAD LOAD DEFLECTION AND SETTLEMENT

IN SETTING FORMS FOR STRUCTURAL STEEL OR PRESTRESSED CONCRETE BEAM SPANS, AN ALLOWANCE SHALL BE APPLIED TO DESIGN FINISH GRADE TO COMPENSATE FOR COMPUTED DEAD LOAD DEFLECTIONS.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK AND LONG-TIME DEFLECTION SUCH THAT ON REMOVAL OF FALSEWORK THE TOP OF THE STRUCTURE SHALL CONFORM TO THEORETICAL FINISH GRADE PLUS THE ALLOWANCE FOR LONG-TIME DEFLECTION.

FOR CONCRETE FLAT SLAB SPANS TWENTY TO THIRTY FEET IN LENGTH, SUB- SECTION 702.27 OF THE STANDARD SPECIFICATION IS AMENDED IN PART TO REQUIRE 1/8" OF CAMBER FOR DEAD LOAD AND LONG-TIME DEFLECTION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

## CONTRACTOR'S OPTIONAL STAY-IN-PLACE FORMS

PERMANENT STEEL BRIDGE DECK FORMS MAY BE USED ON THIS PROJECT AT THE CONTRACTOR'S OPTION. AN EXTRA DEAD LOAD OF 16 P.S.F. HAS BEEN INCORPORATED INTO THE DESIGN OF THIS STRUCTURE TO ACCOMMODATE THE USE OF SUCH FORMS. SEE SUBSECTION 702.11(d) OF THE STANDARD SPECIFICATIONS FOR REQUIREMENTS.

SECTION 702.11 (d)-3 (b) OF THE STANDARD SPECIFICATIONS IS AMENDED TO REQUIRE THAT DEFLECTIONS CALCULATED USING THE WEIGHT OF THE FORMS, THE PLASTIC CONCRETE AND REINFORCEMENT SHALL MEET THE FOLLOWING CRITERIA AND IN NO CASE SHALL THIS LOADING BE LESS THAN 120 P.S.F. TOTAL.

DEFLECTIONS FOR FORM SPANS LESS THAN OR EQUAL TO 10 FEET SHALL NOT EXCEED 1/180 OF THE SPAN OR 1/2 INCH WHICHEVER IS LESS. DEFLECTIONS FOR FORM SPANS GREATER THAN 10 FEET SHALL NOT EXCEED 1/240 OF THE SPAN OR 3/4 INCH WHICHEVER IS LESS.

THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT AND THE FABRICATOR IF HE ELECTS TO USE THIS OPTION SO THAT SHOP PLANS CAN BE PROPERLY DETAILED.

## CONCRETE

THE CLASS OF CONCRETE SHALL BE AS NOTED ON OTHER SHEETS OF THESE PLANS.

BUILD-UPS ON BENT CAPS SHALL BE CAST MONOLITHIC WITH CAP UNLESS INDICATED OTHERWISE IN THESE PLANS. THE TOP OF EACH BUILD-UP SHALL BE LEVEL.

PAYMENT FOR CONCRETE IN SLAB WILL BE BASED ON THEORETICAL PLAN QUANTITY. ANY NECESSARY ADJUSTMENT IN QUANTITY DUE TO VARIATION IN CAMBER SHALL BE AT THE CONTRACTOR'S EXPENSE.

SIMPLE SPANS 80 FEET OR LESS SHALL BE POURED WITHOUT A TRANSVERSE CONSTRUCTION JOINT. FOR SIMPLE SPANS OVER 80 FEET IN LENGTH, A TRANSVERSE STRIP OF THE SLAB CENTERED AT MID-SPAN AND COMPRISING APPROXIMATELY 2/3 OF THE SLAB SHALL BE POURED FIRST AND ALLOWED TO CURE FOR NOT LESS THAN 4 DAYS BEFORE THE REMAINING END SECTIONS ARE POURED. HOWEVER, WHEN FAVORABLE WEATHER CONDITIONS EXIST THE ENGINEER MAY PERMIT THE ENTIRE SLAB TO BE POURED PROVIDED A SUITABLE RETARDING AGENT IS USED IN SUCH AMOUNTS THAT NONE OF THE CONCRETE OF THE POUR SHALL REACH INITIAL SET PRIOR TO COMPLETION OF THE POUR.

ALL EXPOSED EDGES SHALL BE CHAMFERED 3/4" UNLESS OTHERWISE NOTED.

THE MINIMUM ACCEPTABLE CONCRETE COVER FOR REINFORCING STEEL MAY BE ONE HALF INCH LESS THAN THE PLAN DIMENSIONS WHEN REQUIRED BY REINFORCING BAR FABRICATION TOLERANCES.

THE TOP ONE FOURTH INCH OF ALL CONCRETE SLABS SHALL BE CONSIDERED AS A WEARING SURFACE AND SHALL NOT BE INCLUDED IN THE SLAB DEPTH USED FOR THE CALCULATION OF SECTION PROPERTIES.

## REMOVAL OF FALSEWORK AND FORMS

SECTION 702.18 OF THE STANDARD SPECIFICATIONS IS AMENDED IN PART TO THE EXTENT THAT "UNDER URGENT CONDITIONS AND WITH THE WRITTEN APPROVAL OF THE ENGINEER, ADDITIONAL STRENGTH CONTROL CYLINDERS MAY BE MADE AND THE FALSEWORK STRUCK WHEN THESE CYLINDERS, CURED UNDER THE SAME CONDITIONS AS THE CONCRETE IN THE STRUCTURE, DEVELOP A UNIT STRENGTH OF 3,200 PSI. HOWEVER, SUCH CONCRETE SHALL NOT BE SUBJECTED TO A SUPERIMPOSED LOAD UNTIL THE COMPRESSIVE STRENGTH IS AT LEAST 4,000 PSI.

## COMPLETION DATES

THE CONTRACTOR SHALL PLACE YEAR OF COMPLETION ON INSIDE FACE OF RIGHT SIDE BARRIER PARAPET/RAIL AT BEGINNING OF BRIDGE AND ON LEFT SIDE BARRIER PARAPET/RAIL AT END OF BRIDGE. NUMBERS ARE TO BE RECESSED IN THE CONCRETE USING NUMBERS THAT ARE FABRICATED FROM REUSABLE/DURABLE MATERIAL AND APPROVED BY THE ENGINEER. THE CONTRACTOR WILL BE RESPONSIBLE FOR SUPPLYING THE NUMBERS WITH THE DIMENSIONS SHOWN ON STANDARD DRAWING NUMBERS.STD FOUND ON SCDOT INTERNET FTP SITE AT FTP.DOT.STATE.SC.US LOGON AS ANONYMOUS. LOCATED IN DIR=PUB/BR CONSULTANT/ESTANDARDS OR A COPY CAN BE OBTAINED FROM THE RESIDENT ENGINEER.

## PRESTRESSED BEAMS

MEMBRANE CURING COMPOUND SHALL NOT BE USED ON TOPS OR ENDS OF BEAMS.

BEAM LENGTHS GIVEN ARE BASED ON HORIZONTAL SPAN ONLY. LENGTHS SHALL BE INCREASED TO CORRECT FOR CONCRETE SHRINKAGE, CONCRETE SHORTENING WHEN THE STRANDS ARE CUT, AND FOR BEAMS BEING ON A GRADE.

SECTION 704.15 AND 704.16 OF THE STANDARD SPECIFICATIONS ARE AMENDED IN PART TO REQUIRE THAT PRESTRESSED CONCRETE BEAMS BE MEASURED AND PAID FOR AT THE CONTRACT UNIT PRICE PER LINEAR FOOT.

## SPECIFICATIONS:

AASHTO 1996 STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES AND INTERIMS.

ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE (LATEST EDITION) WITH ADDITIONS AND REVISIONS AS STATED IN THE SPECIAL PROVISIONS.

## LIVE LOAD:

AASHTO HS25-44 LOADING OR AN ALTERNATE MILITARY LOADING OF 2 AXLES 4 FEET APART WITH EACH AXLE WEIGHING 24,000 POUNDS, WHICHEVER PRODUCES THE GREATEST STRESS.

## DESIGN DATA:

STRENGTH DESIGN METHOD (LOAD FACTOR DESIGN)

CONCRETE: CLASS "D", $f'_c$ = 4,000 P.S.I.

## SPECIAL NOTE:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES ON THIS SHEET AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE STANDARD SPECIFICATIONS SEC. 105.04.

## VALUE ENGINEERING PROPOSALS:

THE CONTRACTOR MAY INITIATE, DEVELOP, AND PRESENT TO THE DEPARTMENT OF TRANSPORTATION FOR CONSIDERATION, ANY COST REDUCTION PROPOSALS CONCEIVED BY THEM INVOLVING CHANGES IN THE DRAWINGS, DESIGNS, SPECIFICATIONS, OR OTHER REQUIREMENTS OF THE CONTRACT. ALL VALUE ENGINEERING PROPOSALS SHALL COMPLY WITH THE REQUIREMENTS OF THE SPECIAL PROVISIONS.

## EXCAVATION FOR END BENT

ALL COST OF EXCAVATION NECESSARY TO CONSTRUCT END BENTS AND TO REMOVE MATERIAL UNDER SUPERSTRUCTURE TO AN ELEVATION 1'-0" BELOW TOPS OF END BENT CAPS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

IF A CONCRETE FOOTING IS USED FOR THE END BENT, THE EXCAVATION BELOW THAT INCLUDED FOR THE CAP AND BERM IN THE ABOVE PARAGRAPH WILL BE PAID FOR AT THE UNIT PRICE BID FOR EXCAVATION. EXCAVATION ABOVE THIS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR CLASS "D" CONCRETE.

## WORKING DRAWINGS

WHEN REQUIRED BY THE PLANS, SPECIFICATIONS OR SPECIAL PROVISIONS, THE CONTRACTOR SHALL SUBMIT SHOP PLANS, ERECTION PLANS, FALSEWORK PLANS, COFFERDAM PLANS OR ANY OTHER SUPPLEMENTARY PLANS TO THE ENGINEER FOR REVIEW. THESE PLANS, ALONG WITH ANY ASSOCIATED DESIGN CALCULATIONS, SHALL BEAR THE SEAL AND SIGNATURE OF A SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER WITH THE EXCEPTION OF SUBMITALS FOR THE FOLLOWING ITEMS THAT ARE FABRICATED IN ACCORDANCE WITH DETAILS SHOWN IN PLANS.

A.) ARMOR PLATES.
B.) PRESTRESSED CONCRETE PILING.
C.) BEARING OR SOLE PLATES, SHIMS AND BOOSTER PLATES.
D.) ANCHOR BOLT ASSEMBLIES AND TIE ROD ASSEMBLIES.

ALL COSTS FOR THE PREPARATION AND FURNISHING OF THE WORKING DRAWINGS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE VARIOUS PAY ITEMS OF WORK.

## FIELD WELDING

ANY AUTHORIZED STRUCTURAL FIELD WELDING THAT IS REQUIRED ON THIS PROJECT MAY BE SUBJECT TO INSPECTION AND TESTING. SEE SUPPLEMENTAL SPECIFICATIONS. FINAL DETERMINATION OF THE EXTENT OF INSPECTION AND TESTING WILL BE THE RESPONSIBILITY OF THE CONSTRUCTION OFFICE AND/OR THE RESEARCH AND MATERIALS ENGINEER. THE CONSTRUCTION OFFICE AND/OR THE RESEARCH AND MATERIALS ENGINEER MUST BE NOTIFIED WHEN ANY FIELD WELDING IS PERFORMED.

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| DES. | | | | |

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN — COLUMBIA, S.C.

# STANDARD NOTES

| FILE NO. | ROUTE | COUNTY | DRAWING NO. |
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AUTO DRAWN 07-99

SCDOT
South Carolina
Department of Transportation

DM0100

February 8, 2000

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS**

SUBJECT: *AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS*

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The Bridge Design Section currently uses the AASHTO *Standard Specifications for Highway Bridges* as the guide for the design of all bridges. Starting this year, the Department intends to take the steps necessary to adopt the *AASHTO LRFD Bridge Design Specifications* as the standard for all new bridge designs. To insure that Department schedules are maintained, the transition to the use of these specifications will be made over a period of approximately one and one half years.

Initially, a small number of bridge replacement projects will be designated to be designed using the LRFD Specifications. These projects will be selected by July of this year and assignments of these projects will be distributed between "in-house" design groups and Consultants. This part of the transition is intended to give designers the opportunity to become familiar with the new specifications. A training course will be provided to SCDOT staff during this time.

Between January of 2001 and December of 2001, the Department will select projects that shall be designed using the LRFD Specifications. Consideration will be given to project types and schedules when making these selections. If a project is not specifically designated, the designer will have the option of using either the AASHTO *Standard Specifications for Highway Bridges* or the *AASHTO LRFD Bridge Design Specifications*. However, projects that are grouped together and included in one contract shall all be designed using the same specifications.

All Bridge replacement projects that are initiated after December of 2001 shall be designed using the *AASHTO LRFD Bridge Design Specifications* unless approved otherwise by the Department.

Your cooperation in making this transition to the use of the LRFD Specifications is greatly appreciated.

Randy R. Cannon, P.E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
File: PC/BWB

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AN EQUAL OPPORTUNITY/

SCDOT
South Carolina
Department of Transportation

DM0200

April 17, 2000

# MEMORANDUM TO GROUP LEADERS AND CONSULTANTS

**SUBJECT:** Evazote Joints

---

The use of evazote joints may be used on structures with 20 degrees or less skew. The joint shall be sized and detailed on the joint sheet (see Detail "B"). The size of the joint shall be determined by using the attachments. The joints are to be paid for as Compression Joint Seal, LF.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
File: PC/JLC

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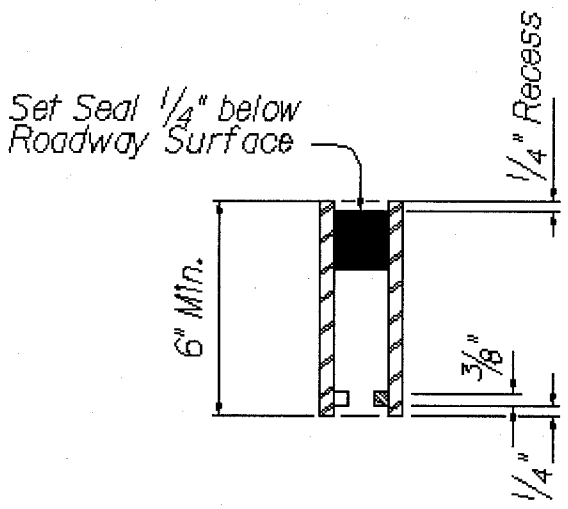



**DETAIL "B"**

To select the appropriate uncompressed seal width, compute $M_{tot}$ and enter chart below. The chart is based on a minimum compression of 25% @ 30° F, a maximum compression of 60% @ 100° F and a maximum joint opening of 3 1/2" @ 20° F.

$M_{tot}$ = Total Movement Normal to Joint = $1.5 \times (6 \times 10^{-6}) \times L \times 12 \times 80° \times \cos \theta$
$= 0.00864 \times L \times \cos \theta$

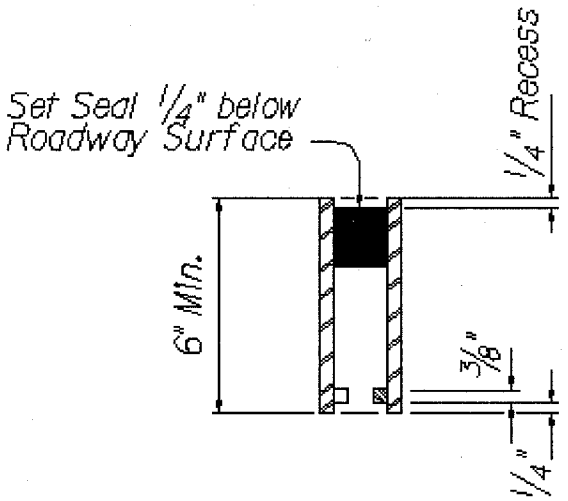
Where:

1.5 = a factor to account for end rotation due to creep and shrinkage
$6 \times 10^{-6}$ = coefficient of thermal expansion, per ° F
L = length of superstructure expanding, feet
80° F = range of temperature for concrete superstructure, (20° F to 100° F )
$\theta$ = skew angle of joint, degrees

| $M_{tot}$ | W (Seal) | W @ 60° |
|---|---|---|
| $M_{tot} \leq 1.125"$ | 2 13/16" | 1 11/16" |
| $1.125" < M_{tot} \leq 1.250"$ | 3 1/8" | 1 7/8" |
| $1.250" < M_{tot} \leq 1.375"$ | 3 7/16" | 2 1/16" |
| $1.375" < M_{tot} \leq 1.500"$ | 3 3/4" | 2 1/4" |
| $1.500" < M_{tot} \leq 1.625"$ | 4 1/16" | 2 7/16" |
| $1.625" < M_{tot} \leq 1.750"$ | 4 3/8" | 2 5/8" |

W = Width of uncompressed Evazote seal

**EVAZOTE JOINT SEALS FOR CONCRETE SUPERSTRUCTURE**




**DETAIL "B"**

To select the appropriate uncompressed seal width, compute $M_{tot}$ and enter chart below. The chart is based on a minimum compression of 25% @ 30° F, a maximum compression of 60% @ 120° F and a maximum joint opening of 3 1/2" @ 0° F.

$M_{tot}$ = Total Movement Normal to Joint = $1.25 \times (6.5 \times 10^{-6}) \times L \times 12 \times 120° \times \cos \theta$
$= 0.0117 \times L \times \cos \theta$

Where:

1.25 = a factor to account for end rotation due to creep and shrinkage
$6.5 \times 10^{-6}$ = coefficient of thermal expansion, per ° F
L = length of superstructure expanding, feet
120° F = range of temperature for steel superstructure, (0° F to 120° F )
$\theta$ = skew angle of joint, degrees

| $M_{tot}$ | W (Seal) | W @ 60° |
|---|---|---|
| $M_{tot} \leq 1.313"$ | 2 13/16" | 1 13/16" |
| $1.313" < M_{tot} \leq 1.458"$ | 3 1/8" | 2" |
| $1.458" < M_{tot} \leq 1.604"$ | 3 7/16" | 2 3/16" |
| $1.604" < M_{tot} \leq 1.750"$ | 3 3/4" | 2 3/8" |
| $1.750" < M_{tot} \leq 1.896"$ | 4 1/16" | 2 9/16" |

W = Width of uncompressed Evazote seal

**EVAZOTE JOINT SEALS FOR STEEL SUPERSTRUCTURE**

evazote_jt.dgn

Design Data
Coefficient of Exp and Contr - 0.0000065 per °F
Temp range for Concrete structures 30°F - 100°F
Temp range for Steel structures 0°F - 110°F

### Seals

The seals shall be preformed, compatible with concrete and resistant to abrasion, oxidation, oils, gasoline, salt and other materials that may be spilled on or applied to the surface. The seal shall be a low-density closed cell, cross-linked ethylene vinyl acetate polyethylene copolymer nitrogen blown material.

The seals are to be manufactured with grooves along the bond surface running the length of the joint. The grooves shall be 1/8" wide by 1/8" deep and spaced between 1/4 and 1/2 inch apart. The depth of the seal shall be as recommended by the manufacturer, but shall not be less than 70% of the uncompressed width. The seal shall be designed so that, when compressed, the center portion of the top will not extend upward above the original height of the seal by more than 1/4 inch. Splicing of the seal shall be done using the heat welding method by placing the joint material ends against a teflon heating iron of 350°F for 7 - 10 seconds, then pressing the ends together tightly. Do not test the welding until the material has completely cooled. The material shall be resistant to weathering and ultra-violet rays. The seal shall have a working range of 30% tension and 60% compression. A watertight seal shall be provided along the entire length including the ends of the Evazote Seal.

The seal shall be shop marked to indicate the top side of the seal in such a way as to be clearly visible upon installation.

### Adhesives

The adhesive to be used with the seal shall be two component, 100% solid, modified epoxy adhesive meeting the requirements of ASTM C881, Type I, Grade 3, Class B & C.

The adhesive shall also have the following physical properties:

| | |
|---|---|
| Tensile strength | 3500 psi min. |
| Compressive streth | 7000 psi min |
| Shore D Hardness | 75 psi min |
| Water Absorption | 0.25% by weight |

The adhesive shall be workable to 40°F. For installation temperatures below 40°F or for application on moist, hard to dry concrete surfaces, the adhesive shall be as specified by the manufacturer of the joint material.

### Joint Preparation

The armored joint opening shall be cleaned with a pressure washer rated at 3000 psi minimum. The cleaned surface shall be dry prior to seal installation.

The cleaned surface shall be examined for traces of oil, grease or smudge deposited during the cleaning operations.

The seal shall be bonded to the cleaned surface on the same day the cleaning is done.

### Seal Installation

The joint seal shall be installed according to the procedures and recommendations of the manufacturer and as recommended below. A manufacturer's representative shall be present during the installation of the first seal of the project.

Start installation at low end of joint after applying the mixed epoxy to the sides of both the joint material and both sides of the joint, being certain to completely fill the grooves with the epoxy. With gloved hands, compress the material and with the help of a blunt probe, push it down into the joint until it is recessed approximately 1/4 inch below the surface. Care is to be taken so as not to push at an angle that would stretch the material. Once started on a joint, do not stop until completed. Clean the excess epoxy off the surface of the joint material quickly and thoroughly. The use of solvents to remove excess epoxy is not allowed. Excess epoxy shall be removed in accordance with the joint manufacturer's recommendations.

The installed seal shall be watertight. No testing of the joint seal will be required, but it will be observed until final inspection.

The seal shall comply with th erequirements given in the table below

| TEST | TEST METHOD | REQUIREMENT |
|---|---|---|
| Elongation at break | ASTM D3575 | 210 - 15% |
| Tensile strength (psi) | ASTM D3575 | 110 - 15 |
| Compression Recovery (% of original width) | AASHTO T42 50% compr for 22 hr. @ 73°F 1/2 hr recovery | 87 - 3 |
| Weather/Deterioration | AASHTO T42 Accelerated Weathering | No deterioration for 10 years min |
| Compression/Deflection | @ 50% deflection of original width<br>@50% deflection of original width | 10 psi min<br>60 psi max |
| Tear Strength (psi) | ASTM D624 | 16 - 3 |
| Density | ASTM D545 | 2.8 to 3.4 |
| Water Absorption (% vol/vol) | ASTM D3575 Total Immersion for 3 months | 3 |

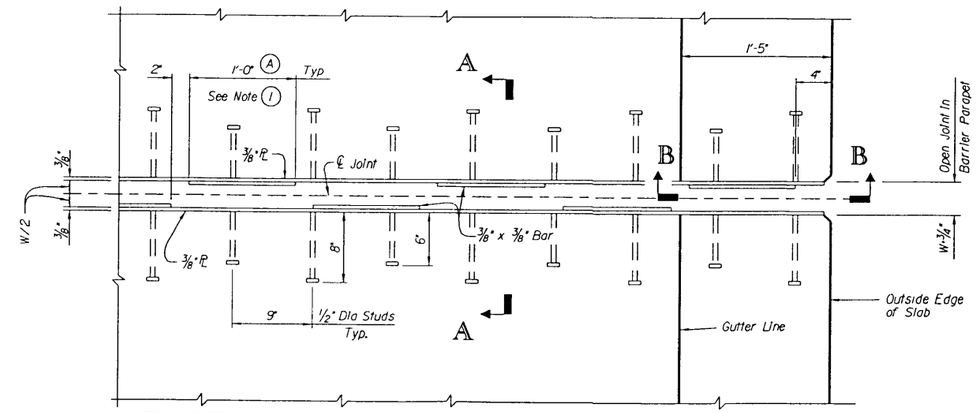
# EVAZOTE SEALS

The nominal joint width, "W", shall be equal to 1 7/8" @ 60°F. At the time of construction, decrease the joint opening by 0.07" for each 10°F that the temperature exceeds 60°F or increase the joint opening by 0.07" for each 10°F that the temperature is below 60°F. The temperature shall be the actual air temperature averaged over the preceding 24 hour period measured in the shade.

. Prior to installation of seals, the Contractor shall furnish the Engineer 3 copies of certifications of conformance with the specifications for seals and lubricant/adhesive. These certifications shall consist of a copy of the manufacture's test reports, or a statement by the supplier accompanied by the test results, certifying that the materials have been sampled, tested and inspected. Certifications shall be signed by an authorized agent of the manufacturer or supplier. Failure to provide the above certification for seals and lubricant/adhesives may be considered grounds for rejection of the seals.

Each lot of seal shall be marked to show the lot number and shall be identifiable as to the manufacturer. Each container of lubricant/adhesive shall be clearly marked with the manufacturer, the lot number and the shelf life expiration date. The seal shall be shop marked to indicate the top side of the seal in such a way as to be clearly visible upon installation.

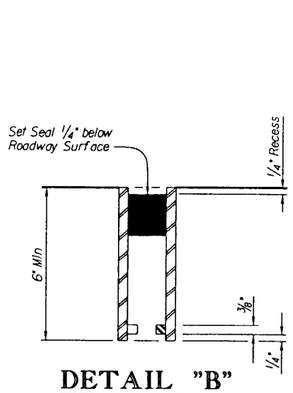
Normal Uncompressed Seal Width = 3 1/8"



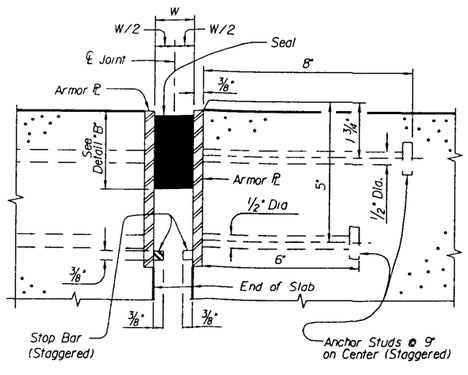

## PART PLAN - EXPANSION JOINT

SEAL NOT SHOWN

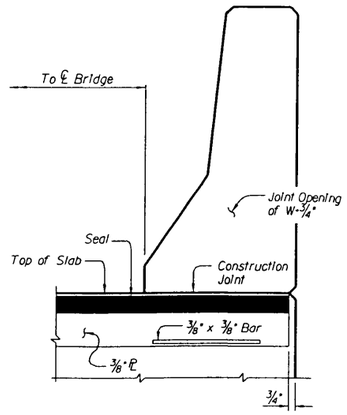
(A) Vary length of 3/8" x 3/8" Bar as necessary at ends of Armor ℄



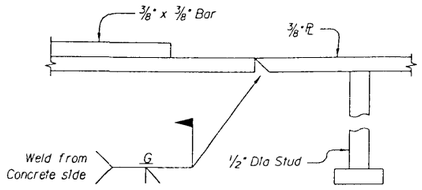

## DETAIL "B"



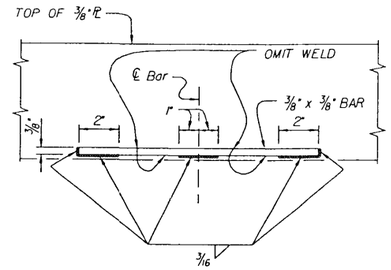

## SECTION A-A




## SECTION B-B




## FIELD BUTT WELD DETAIL




## WELDING DETAILS

FOR 3/8" x 3/8" BAR

# NOTES FOR EXPANSION JOINTS

All Plates shall conform to the requirements of the latest AASHTO M270 Grade 50W (ASTM A709 Gr.50W) and shall be of weldable quality. 3/8" x 3/8" Stop Bars may be AASHTO M270 Grade 36 Steel (ASTM A709 Gr.36).

Top surface of 3/8" Plates shall conform to crown of finished roadway and shall have smooth edges. 3/8" Plates may be fabricated in reasonable lengths and connected at job site with full penetration butt welds. Top and inside surfaces of welds shall be ground flush after welding. Splices shall be welded before bonding seals if desired by the contractor. 9/16" dia. holes at approximately 2 ft on center may be provided in lower portions of 3/8" Plates to bolt Plates to forms.

All studs shall be Electrically Welded.

Exposed areas of armor plates, including stop bars, shall be painted with one shop coat of Inorganic Zinc Silicate paint. A minimum of 3.5 mils dry film thickness will be required. Field painting will not be required. Anchor studs need not be painted.

Field bend top slab reinforcing as required to prevent fouling Anchor Studs.

Expansion joint dimensions shown on this sheet to be adjusted for the temperature at time of casting slabs.

Installation of Seals shall be in accordance with manufacturer's instructions unless otherwise stipulated in these plans or the Special Provisions for this project.

All cost for furnishing materials, fabricating and installing armor plates and seals complete and in place shall be included in the unit price bid per linear foot for "Compression Seal Joint".

Measurement of expansion joint length will be taken along the centerline of joint from edge of slab to edge of slab.

| SHEET NO | TOTAL SHEETS |
|---|---|
| | |

| REV | | | | |
|---|---|---|---|---|
| REV | | | | |
| REV | | | | |
| REVIEWED | | | | |
| QUAN | | | | |
| DR. | JLC | XXX | 02-00 | |
| DES. | JLC | XXX | 02-00 | |
| | BY | CHK | DATE | |

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN — COLUMBIA, SC

# EVAZOTE JOINT DETAIL

| FILE NO. | ROUTE | COUNTY | DRAWING NO |
|---|---|---|---|
| | | | |

Auto Drawn 02-00

SCDOT
South Carolina
Department of Transportation

DM0300

May 4, 2000

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS:**

**SUBJECT: SCDOT Standard Specifications for Highway Construction Edition of 2000**

Attached is a memorandum from Director of Preconstruction Robert I. Pratt regarding the above mentioned standard specifications. The "Standard Specifications for Highway Construction" has been revised and is now available from the Department's Contract Engineer's Office at (803) 737-1249. Beginning with the July 2000 Letting, bridge projects developed using English units must be in compliance with the 2000 Edition of the Standard Specifications.

The Bridge Design Office is currently revising the Standard Drawings to be in compliance with the 2000 Edition of the Standard Specifications. The revised drawings can be found at the Bridge 2000 Standards FTP site. Questions concerning revised Standard Drawings should be directed to Mr. James Reese at (803) 737-2093.

Plans must have correct item numbers and pay item descriptions to match the 2000 Specifications. If a bid item does not have a 2000 Specification number contact Mr. James Reese to obtain a number for that bid item.

It has been determined that some English projects will be let after July 2000 using the 1986 Standard Specifications and pre-2000 item numbers. Only projects that present a specific advantage for not changing will be considered. Please contact the appropriate Project Manager if you have questions concerning your project. Consultant Engineers may contact Mr. Jeff Sizemore at (803) 737-1420 with questions.

Until the Spring of 2002, metric projects will continue to be let using the 1986 Standard Specifications as amended by Metric Supplemental Specifications. Metric pay item numbers and pay item descriptions should match current pre-2000 usage and in no case should the 2000 Specifications be used.

Your cooperation in making this transition to the 2000 Standard Specifications is greatly appreciated.

Randy R. Cannon, P.E.
Bridge Design Engineer

Attachments:
cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
File: PC/REL

April 28, 2000

«Title» «FirstName» «LastName»
«JobTitle»
«Company»
«Address1»
«Address2»
«City», «State» «PostalCode»

Reference: Standard Specifications for Highway Construction, Edition of 2000

Dear «Title» «LastName»:

The "Standard Specifications for Highway Construction" has been revised and is now available from the Department's Contract Engineer's Office at (803) 737-1249. Beginning with the July 2000 Highway Letting, all highway project plans developed in English units must be in compliance with the revised 2000 Edition of the Standard Specifications.

Plans must have the correct pay items with the 2000 spec. yr. when the 2000 spec. yr. pay item is available. All pay items, however, will not have a 2000 spec. yr. Those that do must be used in order to match the sections of the new Standard Specifications. Otherwise, the non-2000 spec. yr. pay item will be used when the section number of the pay item did not change.

Metric projects will continue to be let using the 1986 Standard Specifications and non-2000 spec. yr. pay items until the Spring 2002. Some metric pay items may have a spec. yr. other than 1986, but no metric items should have a spec. yr. of 2000.

It has been determined that some English projects will be let using the 1986 Standard Specifications after July 2000. Please contact your Program Manager if there are any questions concerning your project. Generally, all English projects will be changed to comply with the 2000 Standard Specifications. Only those that present a specific advantage for not changing will be considered for retaining and letting under the old specifications.

If you have specific questions concerning special provisions and Supplemental Specifications, or the revised specifications, please contact Jim Frick, Specifications and Estimates Manager at (803) 737-1380.

If you have specific questions concerning plan changes, please contact Ned Joye, Operations Manager at (803) 737-2020.

If you have questions concerning revised pay items and their spec. yr., please contact Ed Eargle, Road Design Engineer at (803) 737-1377.

Thank you for your cooperation in this effort.

Sincerely,

Robert I. Pratt
Director of Preconstruction

RIP:afg

cc:
"C" Proj. Dev. Engr. Kneece
Federal Proj. Dev. Engr. Walsh
Bridge Design Engineer Cannon
Road Design Engineer Eargle
Director of Construction Shealy

SCDOT
South Carolina
Department of Transportation

DM0400

May 5, 2000

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS:**

**SUBJECT: ELASTOMERIC BEARINGS**

---

Section 724 of the 2000 Edition of the Standard Specifications requires that all elastomeric bearings be measured for payment. Beginning with the July 2000 Letting, bridge projects using English units shall be detailed with all elastomeric bearings as a bid item. The current practice of including the cost of some elastomeric bearings in other items of work will be discontinued. Notes that refer to payment of elastomeric bearings should be revised accordingly. Payment for elastomeric bearings shall be made under the following item numbers.

| Item No. | Pay Item | Pay Unit |
|---|---|---|
| 7243100 | Elastomeric Bearing | Each |
| 7243150 | Elastomeric Bearing Assembly (Flat Slab) | Each |
| 7243200 | Replace Elastomeric Bearing | Each |

Please refer to Bridge Design Memorandum 0300 dated May 4, 2000 for other information regarding the transition to the 2000 Edition of the Standard Specifications, including metric projects. If you have any questions, please contact Assitant Bridge Design Engineer Ed LaBoone.

Randy R. Cannon, P.E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
File: PC/REL

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South Carolina
Department of Transportation

DM0500

May 26, 2000

**MEMORANDUM TO GROUP LEADERS AND CONSULTANTS**

**SUBJECT:** End Wall Backfill

This memorandum will supercede memorandum DM0796. The end walls of integral end bents are to be cast after the concrete for the slab has been cast. No construction joint will be allowed at the top of the end wall unless designed and detailed for this joint. The embankment is to be sloped on a 1:2 for construction purposes and backfilled with a special material. See attached Detail "A".

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer

File: PC/JLC

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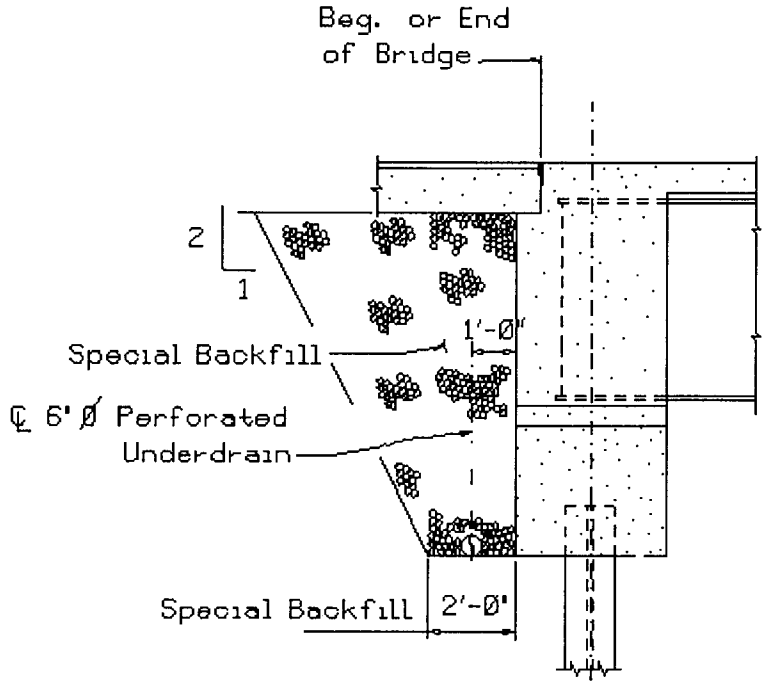
Beg. or End
of Bridge
2
1
1'-Ø"
Special Backfill
℄ 6" Ø Perforated
Underdrain
Special Backfill
2'-Ø"

DETAIL "A"

South Carolina
Department of Transportation



August 21, 2000

# MEMORANDUM TO GROUP LEADERS AND CONSULTANTS

**SUBJECT:** Sidewalk width

---

The width of all sidewalks on bridges will be increasing from 5'-0" to 5'-6" to match the sidewalk width on the approaches. This change will begin with the October 2000 letting unless the detailing is complete. The approach sheets are to be reviewed to ensure the latest road sheets are in the bridge plans.

Bridges designed and detailed may not need to be changed. Discuss this with the appropriate Assistant Bridge Design Engineer.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer

File: PC/JLC

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South Carolina
Department of Transportation

DM 0700

November 27, 2000

# MEMORANDUM TO GROUP LEADERS AND CONSULTANTS

**SUBJECT:** Revisions to Prestressed Concrete Pile-Pile Cap Connections

---

Based upon research conducted for the Department by the University of South Carolina, the Bridge Design Office is revising the details currently used for the prestressed concrete pile-pile cap connection. The current procedure is to embed the pile 12 inches minimum, roughen the pile, insert C25 bars in the pile tops and enclose the pile with WP13 square spirals.

The piles may now be connected to the caps by simply being embedded into the caps an equivalent of one pile width. No roughening of the pile is required. However, the pile surface to be embedded shall be clean and free of any laitance prior to pouring of the cap concrete.

In order to allow for constructability, the pile embedment shall have a tolerance of ± 6 inches. Under no circumstances, shall the pile embedment be less than 12 inches.

For pile bents supporting flat slab superstructures, the depth of the pile caps may be maintained at 30 inches for 18-inch square piles. For pile bents with piles larger than 18 inch square, maximum pile embedment may dictate that deeper pile caps be used for constructability reasons, as well as, due to the effects of punching shear. For pile bents supporting beams, regardless of pile size, the effects of punching shear shall be investigated. The designer shall determine the appropriate depth of pile cap required based on punching shear and other applicable design requirements. If conditions warrant, the designer may reduce the 6-inch tolerance above the one pile width embedment in order to keep the pile cap depth at a minimum.

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Please ensure that this policy is used for all current projects designed by the LRFD and Standard Specifications. Plans already designed and detailed need not be revised.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
File: PC/Seismic

South Carolina
Department of Transportation



March 23, 2001

# MEMORANDUM TO GROUP LEADERS AND CONSULTANTS

**SUBJECT:** Prestressed Members

---

The use of 0.6 inch diameter strands in prestressed concrete members is now allowed based on FHWA memorandum. The spacing of strands shall not be less than 2 inches on centers. The embedment length shall be as defined in Section 5.11.4 of the AASHTO LRFD Bridge Design Specifications. This supercedes design MEMO 0788 dated December 20, 1988.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
File: PC/JLC

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SCDOT
South Carolina
Department of Transportation

DM 0201

March 23, 2001

# MEMORANDUM TO GROUP LEADERS AND CONSULTANTS

**SUBJECT:** Bulb Tee Beams

---

The capacity of all bulb tee and AASHTO Types V & VI beam flanges shall be investigated to insure adequate capacity to support construction loads. This may require transverse steel in the top flange. As a minimum, #13 rebars at 24 inches shall be placed in the top flange.

Bridges already designed and detailed shall be changed.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer

File: PC/JLC

SCDOT
South Carolina
Department of Transportation



March 23, 2001

## MEMORANDUM TO GROUP LEADERS AND CONSULTANTS

**SUBJECT:** Structural Steel Fasteners

---

Section 709.36 of the Standard Specifications For Highway Construction, Edition of 2000 shall be deleted. Section 709.06 is adequate to cover all steel fasteners. This change is effective immediately.

Assistant Bridge Design Engineer Askar is requested to ascertain that this is included in the supplemental specifications.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer

File: PC/JLC

SCDOT
South Carolina
Department of Transportation

DM0401

May 8, 2001

**MEMORANDUM TO GROUP LEADERS AND CONSULTANTS**

**SUBJECT:** Flat Slab Units

---

Unless approved by the Bridge Design Engineer, continuous flat slabs shall be limited to a maximum of four units. An exception to this is five units when it is the entire length of the structure. This is to facilitate construction and minimize deck cracking.

Bridges already designed and detailed should be brought to the attention of the appropriate Assistant Bridge Design Engineer, and a decision will be made on a case-by-case basis.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer

File: PC/JLC

Phone: 803-737-6814

SCDOT
South Carolina
Department of Transportation

DM0501

June 8, 2001

**MEMORANDUM TO GROUP LEADERS AND CONSULTANTS**

**SUBJECT:** Title Sheet

---

The "SUMMARY OF ESTIMATED QUANTITIES" will be placed on sheet 2 of the plans. Sheet 2 is also to contain the detailed "summary of quantities" that is presently detailed on the bending detail sheet. This change is to take effect for the September 2001 letting. This will eliminate the need for resigning signatures on the title sheet when changes are necessary, after initial signing of plans. This will help when city councils are involved.

Plans already detailed need not be changed unless a quantity change is necessary.

Randy R. Cannon, P.E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer

File: PC/JLC

SCDOT
South Carolina
Department of Transportation



July 10, 2001

## MEMORANDUM TO GROUP LEADERS AND CONSULTANTS

**SUBJECT:** Camber Note

---

The following note shall be placed on the camber sheet for structural steel bridge projects beginning with September 2001 letting:

"The information on this sheet is for use in the fabrication of the beams. The cambers shown are based on each beam deflecting independently and on all deck concrete being placed simultaneously. The Contractor shall determine the screed grades required to achieve the proper finished grade, concrete depth, and rebar cover based on his/her equipment, procedures, and pouring sequence."

Plans that are complete and that will be let in September 2001 or later must be revised to include this revision. Your cooperation in this matter is appreciated.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer

File: PC/YIA

South Carolina
Department of Transportation

DM0701

August 6, 2001

**MEMORANDUM TO GROUP LEADERS, CONSULTANTS, CRM EAST AND CRM WEST, DISTRICT ENGINEERING ADMINISTRATORS**

**SUBJECT:** Procedures for Plan Distribution of Construction Changes and Value Engineering (VE) Changes on Bridge Projects.

---

There have recently been questions regarding the distribution of the construction and VE changes to the plans. This memorandum is intended as a guide for SCDOT, CRM's, and Consultants to determine the distribution of plans due to construction and VE changes.

**A) SCDOT Managed Projects:**

For construction changes, the original reproducible drawing(s) will be submitted to Bridge Design, attention Mr. Howard O. Ingle. For VE changes, after all changes have been approved, the Contractor shall submit the original reproducible drawing(s) to the Resident Construction Engineer who will review and forward to the Bridge Construction Office, attention Mr. Charles Matthews. Mr. Matthews will review and forward to Bridge Design, attention Mr. Howard O. Ingle. For both construction and VE changes, Mr. Ingle will obtain prints from SCDOT sources and will distribute as follows:

1) The Contractor will receive 3 full size and 3 half-size prints.
2) Bridge Construction will receive 1 half-size print.
3) District will receive 7 full size and 8 half-size prints.
4) FHWA will receive 1 half-size print (where applicable – mainly Interstate Projects).
5) The appropriate Bridge Design Team, or Consultant Coordinator, will receive 1 half-size print.

**B) CRM Managed Projects:**

For construction changes, the original reproducible drawing(s) will be submitted to the CRM. For VE changes, after all changes have been approved, the Contractor shall submit the original reproducible drawing(s) to the CRM, who will review. For both construction and VE changes, the CRM will submit to the SCDOT prints as follows:

1) 1 full size print will be submitted to Bridge Design, attention Mr. Howard O. Ingle.
2) 1 half-size print will be submitted to Bridge Design, attention Mr. Douglas McClure.
3) 1 half-size print will be submitted to Bridge Construction, attention Mr. Charles Matthews.
4) 6 full-size and 3 half-size prints will be submitted to the CRM Construction Manager, Mr. Al Barwick.
5) Where applicable (mainly Interstate Projects) 1 half-size print will be submitted to Federal Highway Administration, attention Mr. Gerald Schroeder.

The CRM will then distribute the construction and VE changes as per their normal distribution. The original reproducible drawing(s) of the construction or VE changes along with all other original plans drawings will be submitted to the Bridge Design Office at the conclusion of the project.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer, Charles Matthews
Director of Construction, Danny Shealy
Director of CRM Operations, John Walsh
Mr. Howard Ingle, Bridge Design
CRM Construction Manager, Al Barwick
Mr. Gerald Schroeder - FHWA

File: PC/RRC

SCDOT
South Carolina
Department of Transportation

DM0801

August 6, 2001

**MEMORANDUM TO CONSULTANTS**

**SUBJECT:** Railroad Correspondence on Behalf of SCDOT

---

Please be advised, when sending correspondence to the railroad companies on behalf of SCDOT, it is necessary for you to specify in your cover letter that you are working for the SCDOT, or consultant working for Construction Resource Management through SCDOT. This will avoid any misunderstanding or questions as to the validity to obligate State funds.

Thank you for your attention to this matter.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Bridge Design Engineer Assistants
Director of CRM Operations Walsh
Utilities Engineer Leaphart

RRC/slb

South Carolina
Department of Transportation

DM0901

September 5, 2001

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Weathering Steel

---

When structural steel is planned, the use of weathering steel shall be considered on all inland stream crossings and railroad crossings that are not adjacent to other overpasses. The end of beams/girders shall be painted 1.5 d (depth of beam/girder) from the expansion joints (see Figure 1). The beam/girder shall be painted one foot past the end wall at the beginning and end of bridge (see Figure 2). The paint system shall be NS2 with the color of paint being brown (Federal Shade No. 30045).

Guidelines found in the FHWA Technical Advisory, Uncoated Weathering Steel in Structures, T5140.22, dated October 3, 1989, shall be adhered to. These guidelines are attached for your convenience. If there is a question as to the use of weathering steel on a structure, contact the appropriate Assistant Bridge Design Engineer.

Bridges already designed and detailed should be brought to the attention of the appropriate Assistant Bridge Design Engineer and a decision will be made on a case-by-case basis.

Randy R. Cannon, P. E.
Bridge Design Engineer

Attachments

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Gerald Schroeder, FHWA
Bridge Maintenance Engineer

File: PC/JLC

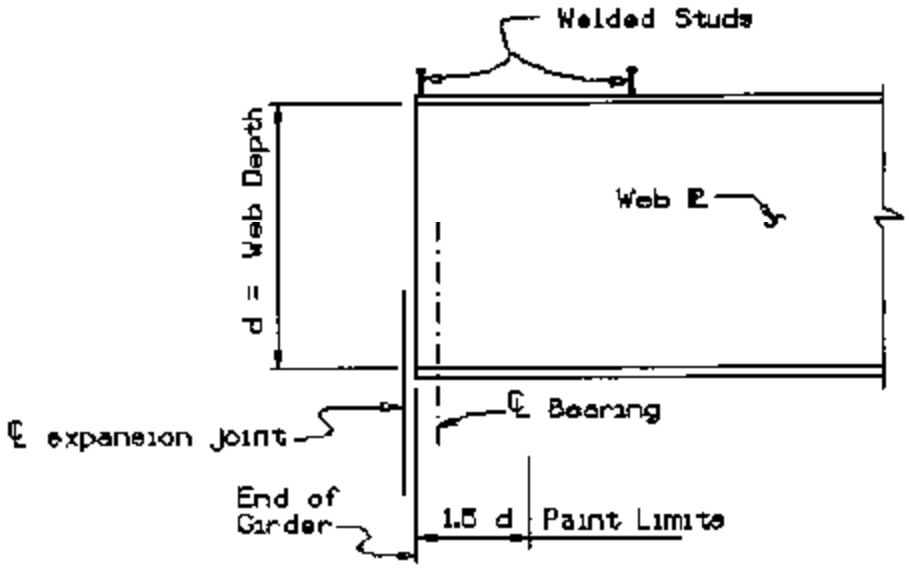


**FIGURE 1**

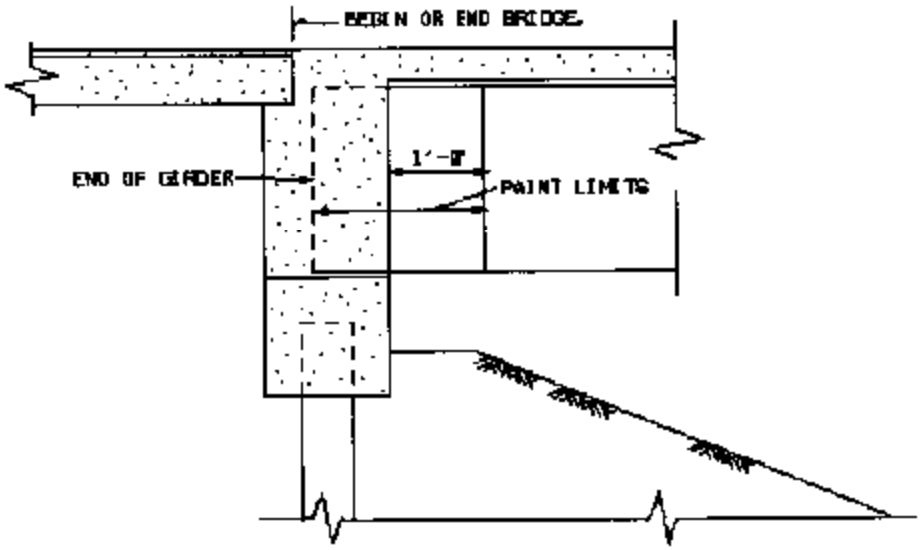


**FIGURE 2**

U.S. Department of Transportation
Federal Highway Administration

TECHNICAL ADVISORY

# UNCOATED WEATHERING STEEL IN STRUCTURES

T 5140.22
October 3, 1989

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Par.



1. PURPOSE. To provide engineers with suggested guidelines for proper application of uncoated (unpainted) weathering grade steels in highway structures and recommendations for maintenance to ensure continued successful performance of the steel.

2. BACKGROUND

   a. Uncoated weathering grade steels have been available to the bridge engineering profession for many years. The cost-effectiveness of use of this material has been demonstrated in both short and long-term savings. The additional cost of this grade of steel is offset by theelimination of the need for initial painting of the structure. These steels are currently supplied under American Association of State Highway and Transportation Officials (AASHTO) Specification M270 (ASTM A709 with grades 50, 70 and 100 available. Where enhanced atmospheric corrosion resistance is desired, the letter "W" follows the grade.

   b. Environmental benefits also result from the use of this material. The reduction in initial painting reduces emissions of volatile organic compounds (VOC) when oil based coatings are used. The elimination of removal of the coating and disposal of contaminated blast cleaning debris over the life span of the structure is another significant environmental benefit. There are documented cases where the estimated cost of the collection and disposal of materials from a structure repainting project were so great that the structure was either abandoned or replaced with a new bridge.

      (1) At the same time, there are documented cases where application of this material in improper locations or under improper conditions has resulted in less than desirable performance of the structure.

      (2) In most cases, this poor performance was the result of a lack of understanding of the limitations of weathering grade steels, or from poor detailing which caused exposure conditions which would cause distress in any structure, coated or uncoated, concrete or steel.

c. To better define the performance record of this material, the FHWA sponsored a Weathering Steel Forum in July of 1988 where knowledgeable speakers from across the nation were invited to present case histories and research data on the performance of this product in highway structures. The outgrowth of this forum was the suggested guidelines included herein. If these guidelines are followed, the potential for satisfactory performance and long-term durability of weathering grade steels in highway structures is greatly enhanced. Proceedings from this forum are available from the Federal Highway Administration Office of Implementation, HRT-10.

3. GUIDELINES. If the proposed structure is to be located at a site with any of the characteristics noted in paragraph 3a or 3b below, the use of uncoated (AASHTO M270 Weathering Grade steels) should be considered with caution and a study of both the macro-environment and micro-environment by a corrosion consultant may be required. In all environments, the designer must pay careful attention to detailing, specifically noted in paragraph 3c, and the owner should implement, as a minimum, the maintenance actions as noted in paragraph 3d.

   a. Environment

      (1) Marine Coastal Areas.

      (2) Frequent High Rainfall, High Humidity or Persistent Fog (Condensing Conditions).

      (3) Industrial Areas where concentrated chemical fumes may drift directly onto the structure.

   b. Location

      (1) Grade Separations in "Tunnel-Like" Conditions.

      (2) Low Level Water Crossings.

         (a) Ten feet or less over stagnant, sheltered water.

         (b) Eight feet or less over moving water.

   c. Design Details. For uncoated steel in bridges and other highway structures, the following items should receive careful consideration:

      (1) Eliminate bridge joints where possible.

      (2) Expansion joints must be able to control water that is on the deck. Consider the use of a trough under the deck joint to divert water away from vulnerable elements.

      (3) Paint all superstructure steel within a distance of 1 1/2 times the depth of girder from bridge joints.

      (4) Do not use welded drip bars where fatigue stresses may be critical.

      (5) Minimize the number of bridge deck scuppers.

      (6) Eliminate details that serve as water and debris "traps".

      (7) "Hermetically seal" box members when possible, or provide weep holes to allow proper drainage and circulation of air.

      (8) Cover or screen all openings in boxes that are not sealed.

(9) Consider protecting pier caps and abutment walls to minimize staining.

(10) Seal overlapping surfaces exposed to water (to prevent capillary penetration action).

d. Maintenance Actions

(1) Implement maintenance and inspection procedures designed to detect and minimize corrosion.

(2) Control roadway drainage:

(a) Divert roadway drainage away from the bridge structure.

(b) Clean troughs or reseal deck joints.

(c) Maintain deck drainage systems.

(d) Periodically clean and, when needed, repaint all steel with in a minimum distance of 1 1/2 times the depth of the girder from bridge joints.

(3) Regularly remove all dirt, debris and other deposits that trap moisture.

(4) Regularly remove all vegetation which can prevent the natural drying of wet steel surfaces.

(5) Maintain covers and screens over access holes.

4. DISCUSSION

a. General. Controlling the corrosion of steel highway bridges and other steel appurtenances and mitigating the corrosion related damage is a major problem facing bridge owners. A special aspect of the problem is ensuring that highway structures utilizing uncoated (AASHTO M270 Weathering Grade) steels are located in an environment, and incorporate details, that will ensure cost-effective performance over the expected service life of the structure. For existing weathering steelstructures, where proper guidelines have not been followed, another part of the problem is controlling the corrosion damage of uncoated steel. In a number of cases, bridges, light poles and guardrail have experienced excessive corrosion damage, and some have ultimately experienced loss of section and/or localized structural failure because of improper applications of this material. Further work is needed to quantify and understand the performance of uncoated weathering steel in a variety of circumstances and conditions. These guidelines are intended to aid the engineer in making a prudent decision to use coated or uncoated steel in highway environments and applications. A more precise technical evaluation of the suitability of uncoated weathering steel for a particular site may be obtained from a corrosion consultant, from conducting standardized environmental tests, or from both. If serious doubt remains after applying the guidelines in the selection process, then engineering judgment should lean towards coated steel.

(1) Application of these guidelines will be reflected in decisions to use uncoated versus coated steel for new structures, in decisions on geometrics and design, and also in future maintenance activities to control corrosion damage. Many of these guidelines apply to coated structures as well and represent good engineering practice for all steel structures. The guidelines are structured as follows:

(a) Environmental/Climatic factors effecting the selection of type of steel for new structures.

(b) Geometric and location features considered for new structures.

(c) Design details for new structures.

(d) Maintenance actions to maximize the service life of existing structures.

(2) Fatigue Damage - The question of fatigue damage to uncoated weathering steel members as a result ofcorrosion is not addressed by these guidelines. However, application of the guidelines will minimize unexpected corrosion damage and provide more fatigue resistant details. The question of fatigue life of uncoated steel is being addressed by an AASHTO Task Force.

b. Selection of Type (Uncoated or Coated) of Steel for Highway Structures

(1) Environment/Climate. The following situations represent conditions where uncoated weathering steel cannot be expected to perform as intended and continuing corrosion could result in significant damage:

(a) Marine Coastal Areas - Salt-laden air that is generated along the Atlantic, Pacific, and Gulf Coast may be transported inland by the prevailing winds. The level of chloride concentration caused by the salt-laden air and its effect on the performance of uncoated weathering steel structures depends on the direction of the prevailing winds, the distance from the shore line, and the topographical and environmental characteristics of the area. Thus, the weathering behavior of uncoated weathering steel structures can vary significantly from one location to another along the three coastlines. The suitability of uncoated weathering steel for use at a specific site in marine coastal areas can be determined from the behavior of neighboring metal and concrete structures and, when necessary, by measuring the average daily ambient chloride concentration as determined by the ASTM Test G92 "Characterization of Atmospheric Test Sites," Method B, using the "Wet Candle" method. This method is extracted from a referenced paper in the ASTM Specification. ASTM is currently balloting for approval of the "wet candle" test procedures. In the interim, the International Standards Organization draft proposal ISO/DIS #9225, "Corrosion of Metalsand Alloys-Corrosivity of Atmospheres-Methods of Measurement of Pollutants," can be utilized. The United Kingdom Department of Transport Standard BD/7/81, "The Use of Weathering Steel for Highway Structures," suggests that uncoated steel should not be used when the chloride level exceeds 0.1 mg/100 $cm^2$/day, average.

However, corrosion rates in the United States are substantially lower than in the United Kingdom, presumably because of lower latitude and, therefore, shorter times of wetness in the United States. Therefore, a higher level of chloride contamination can be tolerated in the United States. It is known for example, that at the 250 meter lot at Kure Beach, North Carolina, where average chloride levels are determined by wet candle tests, over a 30-year period, ambient levels range from 0.8 to 1.8 and average 1.0 mg/100 $cm^2$/day. Under these conditions weathering steels perform satisfactorily in this location when boldly exposed as flat panels, although the performance may be marginal for actual structures containing crevices and sheltered areas. Based on available information, it is estimated that weathering steels can be used safely in the United States at chloride levels up to at least 0.5 mg/100 $cm^2$/day, average.

(b) Areas of Frequent High Rainfall, High Humidity or Persistent Fog - These climatic conditions can result in excessive condensation and prolonged periods of wetness of the steel. Selection of uncoated steel for use in areas where these conditions persist should not be made without an evaluation of the expected time of wetness of the steel at the particular bridge site. This factor can be evaluated by employing ASTM Test G84, "Time of Wetness Determination (On Surfaces Exposed to Cyclic Atmospheric Conditions)." Some areas in the Pacific Northwest, West of the Cascade Mountains, are examples of these conditions where high annual rainfall can contribute to excessive corrosion of uncoated steel. If the yearly average time of wetness exceeds 60 percent, caution should be used in the use of bare weathering steel (see ISO/DIS draftproposal #9223, "Corrosion of Metals and Alloys - Classification of Corrosivity of

Atmospheres).

(c) Industrial Areas - in heavy industrial areas with chemical and other manufacturing plants, the air may contain chemical impurities that can be deposited on and decompose the steel surfaces. The United Kingdom Department of Transport Standard BD/7/8l advises that when the threshold level for sulfur trioxide exceeds 2.1 mg/100 $cm^2$/day average, uncoated weathering steel should not be used.

(d) If necessary, the suitability of uncoated weathering steel for a particular site can be determined by a corrosion consultant.

(2) Location and Geometrics - the following factors have a major impact on the performance of steel highway structures and should be carefully considered in the decision to use uncoated or coated steel:

(a) Grade Separations - the so-called "tunnel effect" is produced by the combination of narrow depressed roadway sections between vertical retaining walls, narrow shoulders, bridges with minimum vertical clearances and deep abutments adjacent to the shoulders as are found at many urban/suburban grade separations. These roadway/bridge geometrics combine to prevent roadway spray from being dissipated by air currents and can result in excessive salt in the spray being deposited on the bridge steel. The illustration below is representative of situations where use of uncoated weathering steel should be avoided where winter deicing salt use is significant.

Depressed Roadway: Tunnel-like Condition 

**Note**: Where the longitudinal extent of the vertical walls is limited to the deep abutment (i.e., short or no approach retaining walls) there is no evidence of salt spray causing excessive corrosion.

(b) Low Level Water Crossings - sufficient clearance over bodies of water must be maintained so that spray or condensation of water vapor does not result in prolonged periods of wetness of the steel. Clearance to bottom flange of at least 10 feet over sheltered, stagnant water and at least 8 feet over running water is recommended.

c. Design Details - Proper design of structural features and details will eliminate many conditions which lead to excessive oxidation of steel structures. The following guidance should be applied to both coated and uncoated steel but it is most critical in the case of uncoated weathering steel:

(1) Controlling Roadway Drainage - This is the first line of defense against localized corrosion -eliminating the exposure of the steel to contact with drainage from the roadway above, especially in areas where roadway salts are used.

(a)Joints:

1 To the extent possible, bridge joints should be eliminated. Jointless steel bridges have been used to lengths of 400 feet and greater (and up to 1600 feet with joints only at the ends) in some States with no problems identified due to lack of joints. Virtually every bridge with joints has problems (corrosion, rideability, maintenance) attributable to the joint.

2 Extensive experience has shown that obtaining a permanent water-tight bridge joint is an elusive goal. Therefore, when joints are necessary, the assumptionshould be that the joints will leak and that drainage will contact the

U.S. Department of Transportation
Federal Highway Administration

TECHNICAL ADVISORY

# UNCOATED WEATHERING STEEL IN STRUCTURES

T 5140.22
October 3, 1989

Depressed Roadway (Tunnel-like Condition)

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FHWA

steel. Therefore, all steel within a minimum distance of 1 1/2 times the depth of the girder from the joint should be coated. In addition, measures must be incorporated to control the water that passes through the joint. Properly designed and maintained troughs beneath the joints will intercept most drainage runoff and prevent damage to superstructure and substructure elements.

3 Drip bars on the top and bottom of the lower flanges can be effective in intercepting drainage and preventing it from running long distances along the flange and causing corrosion of the uncoated steel. However, welding of any attachment to the tension flange should be considered only after a thorough analysis of the impact of the attachment on fatigue life of the member.

4 Fascia Girders - there is no evidence that coating the entire fascia girder will add to the service life of an otherwise uncoated bridge. On the other hand, coating the fascia girder does create future maintenance needs and aesthetic concerns.

(b)Scuppers:

1 The spacing between drainage scuppers should be maximized in accordance with established maximum hydrologic and hydraulic design. The FHWA Report No. FHWA/RD/87/014 "Bridge Deck Drainage Guidelines," provides sound recommendations in this regard. As scupper spacing increases, the volume of water required to pass through each scupper increases, thus creatingvelocities high enough to flush outlets clogged by deposits from low volume rainfalls. Where open (finger type) expansion joints are used, they will function as a drain. Again, increased flow into the joint will flush the below deck drainage trough.

2 Scupper downspouts should be designed and placed such that drainage will not contact the steel surface. However, details used to connect scuppers to drain pipes have often created more problems than they have prevented, by providing flat runs of piping and elbows which clog or connections that separate. Careful detailing is critical.

3 Scupper drain pipes should not be routed through closed box sections where leakage inside of the box is possible, and may go undetected for long periods of time.

(2)Other Features:

(a) Water Traps - all details must be designed to provide natural drainage. Small copes in corners of plates or small drain holes are easily plugged, and should not be relied on to provide drainage.

(b) Box Sections -

1 Box sections which are too small to provide for adequate visual inspection and access for maintenance personnel should be hermetically sealed, or provide weep holes to allow proper drainage and circulation of air.

2 Larger boxes should be detailed to minimize the entrance of water, debris and dirt which can promote corrosion. They must also provide for natural drainage ofwater that may enter and adequate access for inspection, cleaning and maintenance when necessary. Precautions should include:

a Locked covers or screens over access holes to prevent the entry of

animals and birds or unauthorized personnel. Covers over manholes should be on hinges and provided with a lock to allow easy access by inspection personnel.

b Provision of positive drainage and adequate ventilation to minimize the wetting of the interior surfaces from water or condensation.

(c) Concrete Surfaces - after passing over uncoated weathering steel, drainage leaves dark, nonuniform and often unsightly stains on concrete surfaces. This problem can be mitigated, if desired, by using one or more of the following approaches:

1 Wrapping the piers and abutments during construction to minimize staining while the steel is open to rainfall.

2 Allowing/requiring the contractor to remove staining with a commercial solvent after completion of construction.

3 Applying epoxy or some other material to coat and/or seal the concrete surfaces against staining.

(d) Overlapping surfaces - if water is allowed to flow over overlapping joints, capillary action can draw the water into the joint and cause "rust-pack" to form. Therefore, the contact surfaces of overlapping joints must be protected from intrusion of rainfall and runoff. This applies to nonslip-critical bolted joints as well as to overlapped joints such as those in tapered high mast lighting poles. The faying surfaces should be painted or sealed to prevent the capillary penetration. In slip-critical bolted splices, "rust-pack" should not occur when the bolts are spaced as per AASHTO specifications.

d. Maintenance Actions - effective inspection and maintenance programs are essential to ensure that all bridges reach their intended service life. This is especially true in the case of uncoated weathering steel bridges. The following maintenance actions should be routine:

(1) Inspection - implement inspection procedures that recognize the unique nature of uncoated weathering steel and the conditions resulting from excessive corrosion damage. Develop inspection guidelines that highlight the structural features to be inspected and also illustrate the difference between the desired oxide coating and excessive rust scaling.

(2) Controlling Roadway Drainage - to the extent feasible the following should be done:

(a) Divert approach roadway drainage away from the bridge structure.

(b) Clean troughs of open (finger) joints and reseal "watertight" deck joints.

(c) Maintain deck drainage systems (scuppers, troughs, etc.) in order to divert deck drainage away from the superstructure steel and substructure units.

(d) Periodically clean and repaint all steel within a minimum distance of 1 1/2 times depth of the girder from bridge joints.

(3) Other Maintenance

(a) Remove dirt, debris and other deposits that hold moisture and maintain a wet surface condition on the steel. In some situations, hosing down a bridge to remove debris andcontaminants may be practical and effective. Some agencies have a regularly scheduled program to hose down their bridges.

(b) Maintain screens over access holes in box sections to prevent entrance by animals and birds.

(c) Remove growth of nearby vegetation that prevents the natural drying of surfaces wet by rain, spray or other sources of moisture.

Thomas O. Willett, Director
Office of Engineering

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SCDOT
South Carolina
Department of Transportation



September 10, 2001

**MEMORANDUM TO GROUP LEADERS, CONSULTANTS, CRM EAST, CRM WEST**

**Subject:** A Policy on Geometric Design of Highways and Streets 2001 (Green Book 2001)

AASHTO has released the 2001 edition of the Green Book for use as design guidelines for the new construction of highways. The South Carolina Department of Transportation (SCDOT) is adopting this edition as the design standard for all projects.

Your cooperation is requested in order to have a smooth transition from the present Green Book to the 2001 edition. All new projects programmed after September 30, 2001, will use the 2001 edition as the design guide. Projects that have proceeded substantially beyond the design field review stage and are approaching right-of-way plan completion as of September 30, 2001, will continue to use the existing Green Book. For all other projects, the policy most applicable for that project will be used. To determine which edition should be used on an existing project, please contact the appropriate Consultant Coordinator Engineer in Bridge Design Office. Together you will determine which Green Book to reference. They will also see that any design conflicts that may occur on a specific project related to the design guide is resolved. When a decision is made on existing projects which edition to use, documentation will be provided to the Department of that decision, the prevailing conditions used to make that decision and those involved in making it.

In all future contracts, standard contract language should be revised to reference the new Green Book 2001. The Department's Highway Design Manual is scheduled to be updated over the next year and a half and will use the 2001 edition of the Green Book as a guide.

We encourage you to order as many copies of A Policy on Geometric Design of Highways and Streets 2001 (Green Book 2001) as your company may need. Orders may be mailed to: AASHTO Publications Sale, PO Box 96716, Washington, DC 20090-6716. To place an order by phone call 1-800-231-3475 or by fax to 1-800-525-5562. If you have any questions, please call Doug McClure at 803-737-1431.

Randy Cannon, P.E.
Bridge Design Engineer

RRC: dem

cc: Assistant Bridge Design Engineers
Director of CRM Operations Walsh

File:PC/DEM

South Carolina
Department of Transportation

DM1101

November 28, 2001

**MEMORANDUM TO BRIDGE CONSTRUCTION ENGINEER, BRIDGE CONSULTANTS, AND ASSISTANT BRIDGE DESIGN ENGINEERS**

**SUBJECT:** Shop Plan Policy for SCDOT Bridge Consultant Projects

---

The policy for shop plans for SCDOT bridge consultant projects is contained in Section 725 of the *South Carolina Department of Transportation Standard Specifications for Highway Construction edition of 2000.*

Following these procedures can help expedite the shop plan approval process. A condensed summary of this procedure is as follows:

1. The Contractor/Fabricator delivers 7 sets of shop plans directly to the SCDOT bridge consultant with a copy of the transmittal letter to the Bridge Design Engineer.

2. The SCDOT bridge consultant keeps 1 set of the approved shop plans for their records and delivers the remaining 6 sets of the approved shop plans to the Bridge Design Engineer.

3. The Bridge Design Engineer will then keep 1 set for the bridge design file and distribute 1 set to Contractor/Fabricator, 2 sets to the SCDOT Resident Engineer, 2 sets to the SCDOT Materials Testing Lab.

Please note that this policy applies only to non-CRM projects. CRM projects shall follow the shop policy as established in the CRM contract.

Deviating from this policy by sending shop plans directly to the SCDOT, as opposed to SCDOT bridge consultant, may delay the shop plan approval process by several business days. Please call Mr. Howard Ingle at 803-737-1420 if you have any questions concerning this procedure or the status of submitted shop plans.

By copy of this memorandum, I am requesting that the Bridge Construction Engineer inform the contractors as necessary regarding the above policy.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Gerald Schroeder & Ken Johnson, FHWA

File: PC/DEM

SCDOT
South Carolina
Department of Transportation

DM0102

February 7, 2002

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Final Finish of Exposed Concrete Surfaces

---

Section 702.26 of the Standard Specifications for Highway Construction, Edition of 2000, calls for the final finish to be applied to all exposed concrete surfaces, unless otherwise provided for on the plans or the special provisions. The plans shall have the following note placed on the Standard Notes Sheet to clarify the intended areas receiving final finish:

"The final surface finish on this bridge(s) shall be applied only to the following checked and designated bridge areas:

☐ a) Entire surface of all barrier rails, parapet walls, approach slab curbs, concrete utility supports, and wing walls; outside vertical edge of bridge deck slabs and sidewalks.

☐ b) Outside face of exterior prestressed girders.

☐ c) Entire surface of designated substructure units, except top of bent caps and piers.

☐ All units ☐ Designated Units: _____

☐ d) No final surface required."

The final finish shall be discontinued 6 inches below the final ground line or at the low water surface."

The final surface finish shall generally be applied to the superstructure of all interstate and primary bridges and the substructure of all overpasses over existing roadways. For long bridges over swamps/waterways and existing roadways, only designated portions of the substructure shall receive the final finish. In all cases, please contact the Bridge Construction Office to determine the specified final finish.

This Memorandum is effective on projects scheduled for letting on May 2002 and thereafter. Assistant Bridge Design Engineer Askar is requested to ascertain that Section 702.26 of the Standard Specifications is amended to reflect this change.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Gerald Schroeder, FHWA
Bridge Maintenance Engineer

File: PC/YIA

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South Carolina
Department of Transportation

DM0202

**MEMORANDUM TO TEAM LEADERS & CONSULTANTS**

**Subject:** New SCDOT Seismic Design Specifications

---

Please find enclosed for your information and use the 2001 SCDOT "Seismic Design Specifications for Highway Bridges". This updated version shall replace the South Carolina DOT version of the "Standard Specifications for Highway Bridges", February 1999 Draft.

The SCDOT-Seismic Design Specifications for Highway Bridges ("Seismic Specification") have been prepared to provide the South Carolina Department of Transportation (SCDOT) Bridge Design Section with a guide to design criteria, analysis methods, and detailing procedures for the preparation of highway bridge plans.

The Specifications are not intended to be a textbook on structural or seismic engineering. They are intended to be a guide to acceptable SCDOT practice. The Specifications do not cover all conceivable problems that may arise, but are intended to be sufficiently comprehensive to, along with sound engineering judgment, provide a guide for bridge engineering.

A thorough knowledge of the contents of the Specifications is essential for a high degree of efficiency in the engineering of SCDOT highway bridge structures.

The specifications were designed for SCDOT's use by the SCDOT Bridge Seismic Engineering Section. The SCDOT does not warrant the Specifications to be standards required by any other entity or for use for purposes other than SCDOT's own purposes.

The primary function of the Specifications is to provide minimum requirements for use in bridge design to maintain public safety in an earthquake likely to occur in the State of South Carolina. The Specifications are intended to safeguard against major failures and loss of life, to minimize damage, maintain functions, and/or provide for expedited repair.

Variations from these Specifications may be necessary for special or unusual conditions or in response to new or revised source documents. Therefore, these Specifications are not intended to preclude the exercise of individual initiative and engineering judgment in reaction to site-specific conditions or application of current state of the art practices. However, it is important that any deviations from the Specifications be documented, along with the rationale for the deviations. The degree of documentation depends on the exact nature of the deviation and its degree of importance in respect to safety and good design. The Bridge Design Engineer must approve all variations and/or modifications to the Specifications.

Post Office Box 191
Columbia, South Carolina 29202-0191

Phone: (803) 737- 2314

Even though, most of the bridge projects are covered by this document, for critical and essential bridges the SCDOT may require a site-specific study, which will be included in the seismic scope of service for those particular projects.

All projects shall show on the Standard Notes Sheet the following:

*Seismic Design: Seismic Design is in accordance with the 2001 SCDOT "Seismic Design Specifications for Highway Bridges", with the following parameters:*

- *Design Method:*
- *Importance Classification:*
- *Seismic Performance Category:*
- *Acceleration* Coefficient (s ): $S_{DS}$:
  $S_{D1}$:
  Soil Class:

Please ensure that these new seismic specifications are implemented on future projects.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Seismic Engineer
Bridge Construction Engineer
Program Development Engineer – East
Program Development Engineer – West
Director of CRM Operations
Director of Pre-Construction
FHWA

PC/YIA

South Carolina
Department of Transportation

DM0302

March 14, 2002

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Section 709.06 of the Standard Specifications

---

Please include the following special provision in all future projects.

**(1) SECTION 709.06:**

The following table is hereby added at the end of Section 709.06, Section H, paragraph 2, subparagraph "b":

| INSPECTION CRITERIA* | | | | | | |
|---|---|---|---|---|---|---|
| Number of spaces in washer | 4 | 5 | 6 | 7 | 8 | 9 |
| Minimum spaces gage is refused | 2 | 3 | 3 | 4 | 4 | 5 |

*The gage shall be refused in all spaces when a coated DTI is used under the turned element.

Randy R. Cannon, P. E.
Bridge Design Engineer

RRC/slb

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Gerald Schroeder, FHWA
Director of CRM Operations Walsh
CRM East
CRM West

File: PC/YIA

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SCDOT
South Carolina
Department of Transportation

DM0402

April 3, 2002

**MEMORANDUM TO TEAM LEADERS, ROAD DESIGN ENGINEER AND CONSULTANTS**

**SUBJECT:** Bridge Deck Drainage

---

Section C2.6.6.1 of the AASHTO LRFD Bridge Design Specifications states that: "A longitudinal gradient on bridges should be maintained. Zero gradients and sag vertical curves should be avoided."

Where possible, please avoid zero gradients and sag vertical curves on all future bridge projects that are in the planning stage for both LRFD and LFD designed bridges. Any zero gradients and/or sag vertical curves should be brought to the attention of the appropriate Assistant Bridge Design Engineer.

Randy R. Cannon, P. E.
Bridge Design Engineer

RRC/slb

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Gerald Schroeder, FHWA
Director of CRM Operations Walsh
Program Development East Engineer Kneece
Program Development West Engineer Lester
Preliminary Design Engineer Davis
CRM East
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South Carolina
Department of Transportation

DM0502

April 16,2002

## MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Optional Backwall at End Bents

---

The use of an optional construction joint at the beginning and end of bridges with fixed bearing shall be allowed. The construction joint shall be detailed on the plans and designed to retain the soil behind the end wall. This is to allow the contractor the option of building the wall and finishing the roadwork before placing beams on the bridge. Sample details are attached.

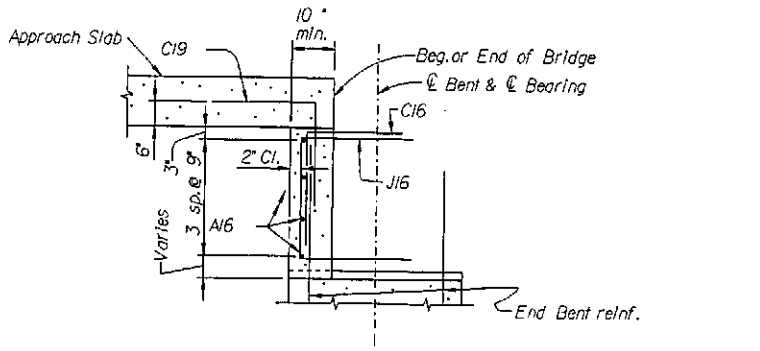
Randy R. Cannon, P. E.
Bridge Design Engineer

Attachment

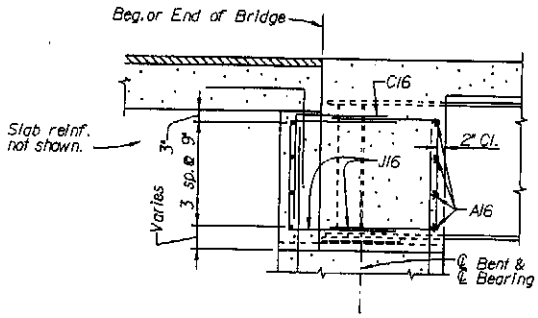
cc: Assistant Bridge Design Engineers
Bridge Construction Engineer

File: PC/JLC

Post Office Box 191
Phone: (803) 737- 2314




SECTION THRU
STAGE 1 CONSTR.




SECTION THRU
STAGE 2 CONSTR.

Note:
Splice J16 bars
1'-4" min.

Note:

At the Contractor's option, the construction of end wall and wing wall may be staged as shown. Prior to installation of beams, portion of end wall and wing wall (stage 1) shall be constructed to allow the Contractor to complete the work on backfill at bridge end and construct the approach slab. The remaining portion of end wall (Stage 2) shall be constructed after the installation of the beams and shall be cast monolithic with the slab. Mechanical couplers may be used to splice J16 bars.

This optional staging of End Wall and Wing Wall shall be constructed at no additional cost to the Department. All materials, labor and equipment necessary to complete the staged construction shall be considered incidental.

South Carolina
Department of Transportation

DM0602

April 17, 2002

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Slope Paving

---

All detailed slope paving on future projects shall be fiber reinforced slope paving. The only bid item for slope paving will be as shown in the table below. The wire mesh reinforced slope paving will be allowed upon the request of the Contractor. The detailing of wire mesh reinforced slope paving will not be necessary.

| ITEM NO. | BID ITEM | UNIT | QUANTITY |
|---|---|---|---|
| 8047041 | SLOPE PROTECTION – 4" CONCRETE (FIBER REINFORCED) | SY | |

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer

File: PC/JLC

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South Carolina
Department of Transportation

DM0702

May 17, 2002

## MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Perforated Pipe Underdrain

---

On all future projects, the 6" perforated pipe underdrain at the beginning and end of the bridge shall be replaced with a 4" perforated pipe underdrain. The bid item shall be as shown in the table below. If additional drainage is needed, additional 4" pipes shall be added and the need for additional pipes shall be justified.

| ITEM NO. | BID ITEM | UNIT | QUANTITY |
|---|---|---|---|
| 8021204 | 4" PERFORATED PIPE UNDERDRAIN | LF | |

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer

File: PC/JLC

South Carolina
Department of Transportation

DM0802

July 8, 2002

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Weathering Steel Accessories

---

The use of weathering steel brings new details to construction plans. The bearing plates shall be the same steel as the beams/girders that they support. The bolts/nuts and washers including DTIs shall be type 3 as specified in ASTM A325/ASTM A563 and ASTM F 959. A supplemental specification shall be included in the contract document that requires the DTIs to be the same or better corrosion resistant as the fasteners.

These requirements shall be included on all plans scheduled for letting in October 2002 and later.

Randy R. Cannon, P. E.
Bridge Design Engineer

RRC/slb

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
FHWA
CRM East
CRM West

File: PC/JLC

SCDOT
South Carolina
Department of Transportation

DM0902

August 9, 2002

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Prestressed Concrete Girder Build-downs

---

With the lengthening of prestressed concrete girders, the camber of girders continues to increase. To ensure there is enough build-down for construction, the vertical ordinate and girder camber with fabrication tolerances (one inch on girders $\geq$ 80 feet) shall be checked. This is crucial in sag curves. There shall be a minimum of ½" build-down at the centerline of girder after construction. If the stirrup lengths need to be varied due to minimum embedment and concrete cover, they shall be varied in bands to simplify placement and reduce the number of varying bars

These requirements shall be included on all plans immediately. If you have any questions, you may ask Mr. Coogler or the appropriate Assistant Bridge Design Engineer for clarification.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
FHWA
CRM East
CRM West

File: PC/JLC

SCDOT
South Carolina
Department of Transportation

DM1002

September 25, 2002

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Cored Slab Unit Bridges

---

Due to reduced construction schedules, precast cored slab units are being utilized on more and more projects. However, due to durability concerns with these types of structures, the following policy will be adhered to:

Precast cored slab units are not allowed on Interstate, National Highway System (NHS) routes, or any road with average daily traffic of 3,000 v.p.d. or greater, without prior approval of the Bridge Design Engineer and Federal Highway Administration (for Interstate and NHS routes). Additionally, if this type of structure is considered for any bridge, consideration shall be made for truck traffic that will be carried.

Substitution of precast cored slab units is not to be considered a valid Value Engineering (VE) proposal, and will not be considered as such. In the case of contractor-designed projects such as design-build projects, these units will only be allowed if specifically allowed in the bid documents.

The skew on the bridge shall not be greater than 15°, and care shall be taken to ensure proper fit on the bent caps when the bridge is on a grade or skewed. Consideration will also be given to vertical alignment such as in severe sag vertical that will increase the impact loading of truck traffic.

Precast cored slab bridges may be used for any temporary structure (design life less than 5 years).

If you have any questions, please contact the appropriate Assistant Bridge Design Engineer or myself.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
FHWA
CRM East
CRM West

File: PC/JLC

South Carolina
Department of Transportation

DM1102

November 7, 2002

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Removal of Existing Structures

---

Due to railroad requirements and to be consistent for all projects, the removal of the substructures of existing structures below natural ground line shall be changed from one foot to two feet.

This change is effective immediately on all DOT projects. Section 202.03 of the Standard Specifications for Highway Construction, Edition of 2000, shall be amended to reflect this change. Assistant Bridge Design Engineer Askar will provide supplemental specifications that indicate this.

Randy R. Cannon, P. E.
Bridge Design Engineer

RRC/slb

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Gerald Schroeder, FHWA
Director of CRM Operations Walsh
CRM East
CRM West

File: PC/YIA

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South Carolina
Department of Transportation

DM1202

November 14, 2002

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Concrete Slab Extension

---

Bridge deck slabs shall be detailed 1 ½ " past the back face of the barrier parapet for slip forming purposes. The transverse reinforcement shall be detailed to maintain 3" clearance from the edge of slab, to allow for construction tolerances. The additional concrete and reinforcing steel shall be included in the quantities shown on the plans.

This change is effective on all future DOT projects. Projects that have been detailed need not be changed.

Randy R. Cannon, P. E.
Bridge Design Engineer

RRC/slb

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Gerald Schroeder, FHWA
Director of CRM Operations Walsh
CRM East
CRM West

File: PC/YIA

SCDOT
South Carolina
Department of Transportation

DM1302

November 15, 2002

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT**: Use of ASTM A-706 Grade 60 Reinforcing Steel

---

The Bridge Design Standard Notes sheet should include the requirements for using ASTM A706 Grade 60 reinforcing steel, according to article 8.4.1 of the October 2001, SCDOT Seismic Design Specifications. This new pay item should be included in the CATS file for projects beginning with the February letting.

This requirement replaces the use of A-615 reinforcing steel.

Sincerely yours,

Randy R. Cannon, P.E.
Bridge Design Engineer

RRC/slb

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Gerald Schroeder, FHWA
Director of CRM Operations Walsh
CRM East
CRM West

File: PC/LM

South Carolina
Department of Transportation

DM1402

November 15, 2002

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Bridges Over Navigable Waters

---

Please see the attached important memo regarding any work activities on or around any bridges over navigable waters of the United States.

These procedures will remain in effect until further notice. More clarification of the definition of navigable waters will be forthcoming.

Sincerely,

Randy R. Cannon, P. E.
Bridge Design Engineer

RRC/slb

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Gerald Schroeder, FHWA
Director of CRM Operations Walsh
CRM East
CRM West

Cannon

South Carolina
Department of Transportation

November 7, 2002

**MEMORANDUM**

From: State Highway Engineer Freeman

To: District Engineering Administrators

Subject: Bridges Over Navigable Waters

Effective immediately notification is to be sent to the Coast Guard Homeland Security Command Center in Miami before engaging in any work activities on or around any bridges over navigable waters of the United States. These activities shall include inspections, routine maintenance, and repairs performed by our employees as well as that performed under contract.

The Command Center is manned 24 hours a day, seven days a week and notification should be made by phone at (305) 415-6800 or by email to d7commandcenter2@esumiami.uscg.mil prior to the commencement of any work or activity.

These procedures will remain in effect until further notice.

D. H. Freeman
State Highway Engineer

DHF: jjf

Cc: Carl Chase, Asset Manager
R. D. Hutson, Bridge Maintenance Engineer
R.I. Pratt, Director of Preconstruction
D. R. Shealy, Director of Construction

CTS No. 10304

File: Mnt/JJF

South Carolina
Department of Transportation

DM1502

November 20, 2002

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT: Seismic Requirements for Highway Bridges**

---

All bridges shall be detailed and designed to resist seismic loadings as specified in the latest edition of SCDOT Seismic Design Specifications for Highway Bridges including subsequent revisions, memorandum DM0202 and those contained in this memorandum.

This memorandum supersedes and replaces DM0391 dated February 26, 1991, DM0495 dated October 27,1995, DM 0697 dated June 17, 1997, DM0797 dated August 6, 1997, DM1097 dated October 13, 1997, DM0498 dated July 20, 1998, and LRFD00A dated September 5, 2000.

Grade 60 reinforcing steel conforming to ASTM A706 shall be used according to memorandum DM1302.

**1. Classification of Bridges**

The Department will classify all bridges as per article 3.2.1 of the SCDOT Seismic Design Specifications.

**2. Column Reinforcing Steel**

Columns shall conform to the requirements listed below:

- There shall be no splices in the longitudinal reinforcing in the plastic hinge zones. These zones shall be clearly identified as a "No-Splice Zone" by the design engineer, and detailed and shown on the plans. Outside the "No-Splice Zone", ultimate mechanical splices are permitted. A minimum stagger of 2'-0" between adjacent splices shall be required and the location shown on the drawings. Splices in bundle bars shall also be staggered at 2'-0". If coated bars are used, the couplers shall be tested with bars coated as required for the bridge and the couplers shall be coated with a compatible coating. The longitudinal reinforcing steel in columns will be detailed continuous with a maximum spacing of 8 inches center to center. The minimum size bar used for main vertical reinforcing shall be a No. 25 bar.
- Mechanical butt-welded spliced hoops shall be used as confinement steel.
- The hoops in columns shall extend into the bent cap, pile cap and/or footing as shown in figure 1.
- Columns shall have circular cross sections. If a circular column cannot be designed for the required loading, a column with an oblong cross section shall be used and shall meet the following requirements in addition to the above noted column requirements:
    - The center-to-center spacing of interlocking hoop cages in oblong columns shall not be greater than 0.75 times the diameter of the cage. The overlaps shall be interlocked by a minimum of four bars (see figure 2).
- Biased reinforcing in circular columns will not be allowed.

**3. Prestressed Concrete Pile Requirements**

The prestressed concrete piles shall meet seismic requirements as per seismic design of that particular bridge project. Spiral reinforcing will be permitted in prestressed concrete piles.

**4. Cap Stirrups**

All cap stirrups shall be one piece-enclosed hoops having 135° seismic hooks at one corner as shown in figure 3.

**5. Shear Keys**

All concrete beam spans shall have shear keys cast on the bent or pier cap to provide a positive shear transfer between the superstructure and substructure. Shear keys shall be skewed parallel to the girders as shown in figure 4. The substructure shall be checked for the loading transferred from the shear key. If other types of connections are used, the detail shall be approved by the Bridge Design Engineer before using, and the structure shall be analyzed and designed accordingly.

If seismic analysis is not performed, a minimum of 0.2 the superstructure dead load shall be used for designing the shear keys.

**6. Beams and Girder Anchorage**

All beam or girder spans, including both steel and concrete shall be anchored to the substructure on both ends by means of anchor bolts or other methods. The design of the anchor system shall address both horizontal and vertical loadings and shall be approved by the Bridge Design Engineer. Connections between slabs and caps on slab bridges shall also be designed for seismic loads.

**7. Barriers and Retaining Structures**

If barriers or retaining structures are placed adjacent to columns, they shall be considered during design of columns. If the barriers or retaining structures are not designed integrally with the columns, a 6" minimum spacing shall be detailed between the barrier or retaining structure and the columns. The 6" spacing shall be increased as required by design.

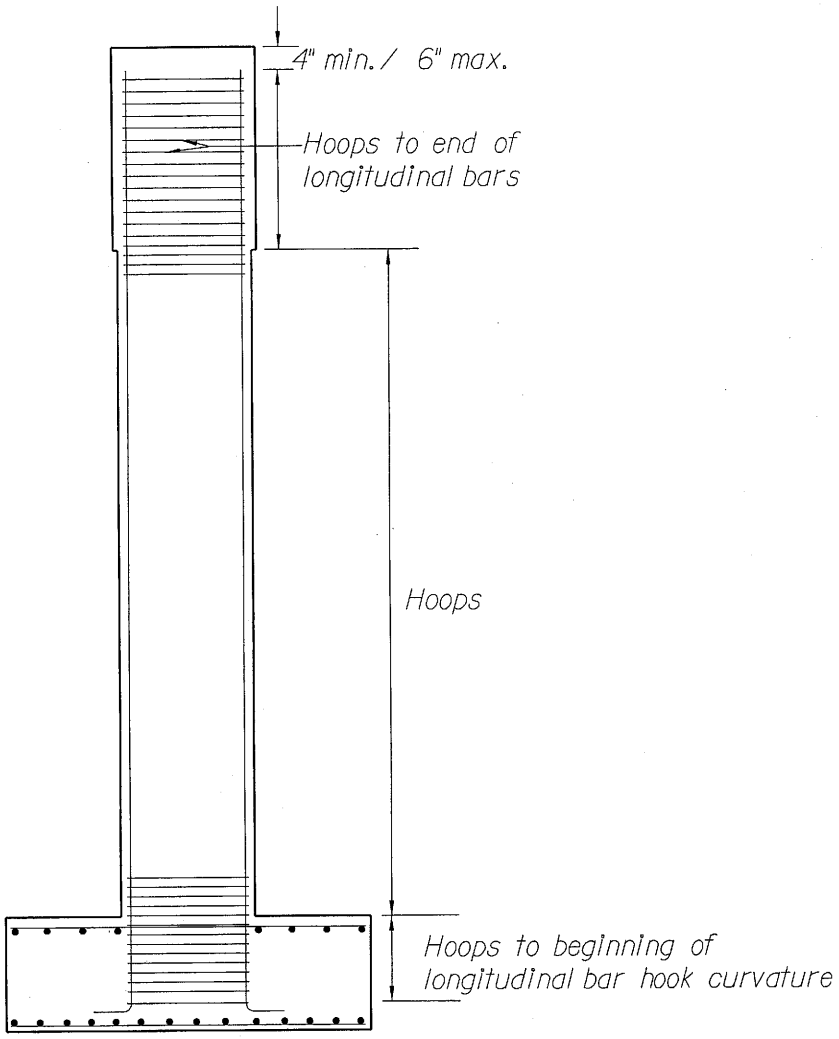
**8. Concrete Flow Ability**

The designer shall consider the maximum aggregate size in the concrete and the reinforcing spacing when evaluating the constructibility during placement of the concrete.

Randy R. Cannon, P.E.
Bridge Design Engineer

RRC/slb

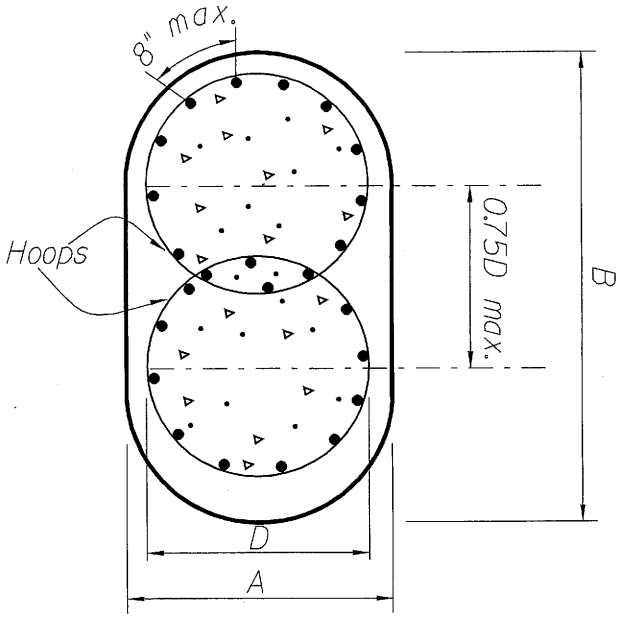
Attachments
cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
FHWA
CRM East
CRM West
File PC/LEM




(All hoops shall be butt welded hoops)

CONFINEMENT REINFORCING DETAIL
AT BENT CAP & FOOTING

Figure 1




COLUMN REINFORCING

Figure 2

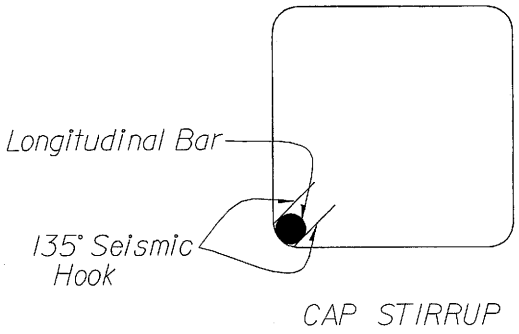



Figure 3

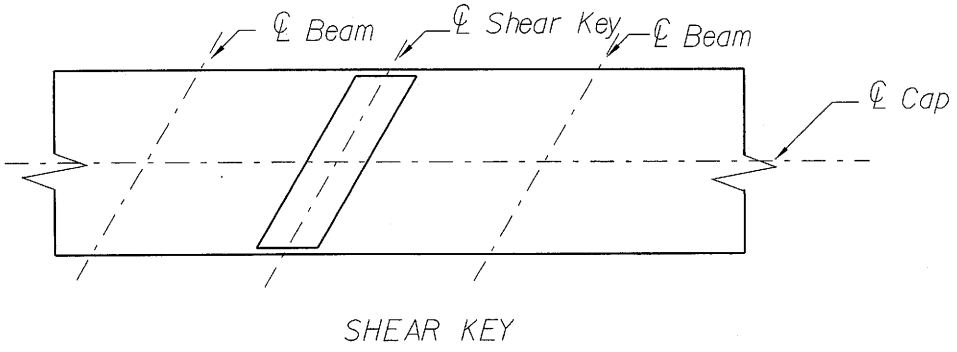



Figure 4

South Carolina
Department of Transportation

DM1602

November 20, 2002

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Concrete Curb and Gutter With Flume

---

This memorandum replaces the previous Design Memorandum DM0299 dated February 19, 1999.

Due to the complexity of constructing and maintenance of the presently used concrete curb & gutter with flume for grades 1% or greater, the concrete curb and gutter with asphalt flume as detailed by the Road Department will be used on all future project unless directed otherwise. See Road Standard Drawing No. 721-1. The Hydrology Department is to indicate when the asphalt flume will not be suitable and make recommendations for handling the water.

If you have any questions, please contact the appropriate Assistant Bridge Design Engineer or myself.

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Road Design Engineer
Hydrology Engineer
FHWA
CRM East
CRM West
File: PC/JLC

South Carolina
Department of Transportation

**DM1702**

November 20, 2002

**MEMORANDUM TO GROUP LEADERS & CONSULTANTS**

**SUBJECT:** Temporary Sheet Piles

Due to underground utility conflicts, constructibility issues and possible cost savings, Bridge Design has received requests to replace temporary sheet pile walls with Temporary Mechanically Stablized Earth (MSE ) walls with welded wire form facing and geosynthetic wrap ("Geogrid Retaining Wall").

The attached special provision does allow the use of "Geogrid Retaining Wall" as an alternative to Temporary Sheet Piles.

All future projects should use below pay item with attached specification instead of bid item #2047000 – Temporary Sheet Pile-[LF].

| Item No. | Pay Item | Pay Unit |
|---|---|---|
| 1072310 | Temporary Shoring Wall | Linear Feet (LF) |

This is to be incorporated into all future projects. Projects that have already been designed and detailed should be revised as necessary to accommodate this change.

If the designer wants to limit the temporary shoring wall to a particular type in the specification, the plans shall indicate this requirement with a note.

Randy R. Cannon, P.E.
Bridge Design Engineer

RRC/slb
Attachments
cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
FHWA
CRM East
CRM West
Ed Eargl, Road Design
Rick Werts, Traffic Engineering
File: PC/BA

APPROVED: Oct. 3, 2002
Division Administrator
By: David B Law
FEDERAL HIGHWAY ADMINISTRATION

**TEMPORARY SHORING WALL**

The Standard Specifications for Temporary Sheet Piling are hereby amended as follows:

Delete sub-sections **A, B, & C** of **Section 204.09** and replace them with the following:

**A. DESCRIPTION.** This work shall consist of the designing, furnishing, installing, maintaining, and removing (if required by the Engineer) the temporary shoring walls at the locations shown on the plans. A temporary shoring wall may be, but is not limited to one of the following types unless specified otherwise in plans:

a. Steel sheet pile wall – braced or tieback
b. Steel soldier piles with lagging – braced or tieback
c. Temporary Mechanically Stabilized Earth (MSE) wall with welded wire form facing and geosynthetic wrap for fill situations.

This item is designated as "temporary" due to its limited service life that is typically until construction of a permanent structure (i.e. embankment, bridge abutment, etc.) is completed. Even though the shoring is "temporary" it may remain in place at the end of construction due to the impracticality of removing the shoring components (i.e. tie backs, soil reinforcement, etc.) or the potential of damage to the permanent structure that may exist during extraction of the shoring components.

**B. DESIGN.** Temporary shoring walls shall be designed to resist all dead and live loadings (earth pressures, hydrostatic pressures, traffic loads, point loads, line loads, and surcharge loads) that the retaining system may experience during the service life of the structure. The temporary shoring walls shall be designed in accordance with the latest edition of the AASHTO Standard Specifications for Highway Bridges, with interim specifications, and the applicable requirements of section 702.10 entitled "Falsework Design and Inspection". Temporary shoring walls shall be designed, signed, and sealed by a Registered Professional Engineer, registered to practice in the State of South Carolina.

The Contractor shall be responsible for the external stability of all temporary shoring walls. Any geotechnical investigation necessary to verify the external stability shall be included in the unit price for Temporary Shoring Wall. Differential and absolute settlements of temporary walls shall be limited to ensure minimal detrimental effects.

Temporary shoring walls shall be designed in accordance with the design criteria provided below :

1. Design Methodology: Design methodology shall be in accordance with accepted AASHTO design methodology. Temporary MSE walls shall be designed using the Simplified Coherent Gravity approach of determining maximum reinforcement loads, $T_{max}$. Temporary shoring walls are not required to resist seismic forces from earthquake events.

2. Design Life: All temporary shoring walls shall be designed for a minimum of 3 years design life. Temporary shoring walls that will be in use for more than 5 years shall be designed as permanent retaining wall structures.

3. Soil Design Parameters: Temporary shoring walls shall be designed using appropriate soil properties relative to the anticipated service life. Temporary shoring that will be in-place for a period where excess pore pressures have not dissipated (typically less than 4 to 6 months) shall be designed using total (undrained) soil shear strength parameters. Effective (drained) soil shear strength (drained) parameters should be used when temporary shoring walls are in service sufficiently long (typically more than 4 to 6 months) for excess pore pressures to dissipate.

4. For Temporary MSE Walls use following External Stability Minimum Safety Factors:
   - Global Stability Factor of Safety, $FS_{Global} = 1.3$
   - Sliding Stability Factor of Safety @ Base, $FS_{Base} = 1.5$
   - Sliding Stability Factor of Safety @ Reinforcement, $SF_{Reinforcement} = 1.5$
   - Overturning Factor of Safety, $FS_{Overturning} = 2.0$
   - Eccentricity, $e < L/6$
     (Where L = Reinforcement Length for Temporary MSE Walls)
   - Bearing Capacity Factor of Safety, $FS_{Bearing} = 2.5$

5. For Temporary MSE Walls use following Internal Stability Minimum Safety Factors:
   - Pullout Factor of Safety, $FS_{Pullout} = 1.5$
   - Reinforcement Rupture Factor of Safety, $SF_{Rupture} = 1.2$

6. For Temporary MSE Wall Soil Reinforcement:
   - The soil reinforcement length should be selected based on the longest soil reinforcement length required to meet the following design requirements:

     a. Resist sliding along the wall base or at each soil reinforcement layer with the appropriate safety factor.

     b. The length, L, required for internal stability is the distance required to extend beyond the active zone, $L_a$, plus the length required to resist pullout in the resistant zone, $L_e$, with the appropriate safety factor. The minimum embedment in the resistant zone shall be 3 feet ($L_e \geq 3$ feet).

     c. AASHTO minimum soil reinforcement length requirements (8 feet or 0.7H where H is the wall design height).

   - Soil reinforcement shall be the same length, L, for each soil reinforcement layer within a design section. A soil reinforcement coverage ratio, $R_c$, of 1.0 shall be used for all types of geosynthetic sheet reinforcement.

   - AASHTO specifications for soil reinforcement performance (pullout coefficients, degradation, etc.) are based on using AASHTO reinforced backfill specifications. Any deviation in backfill specifications may require additional testing at the contractor 's expense or use of previous test results on similar materials.

7. For Temporary MSE Wall Geosynthetic Reinforcement:
   - The default temporary geosynthetic soil reinforcement total reduction factor, $RF_{Default}$, of 3.5 may be used provided that the geosynthetic manufacturer certifies that the geosynthetic reinforcement meets the requirements of AASHTO Table 5.8.6.1.2A. Geosynthetic reinforcements not meeting the requirements of AASHTO Table 5.8.6.1.2A shall use a default total reduction factor, $RF_{Default}$, of 5.

   - Use of total reduction factors, RF, less than default reduction factor, $RF_{Default}$, will require that the geosynthetic manufacturer certify and provide supporting documentation (field and laboratory test results), in accordance with AASHTO specifications, of individual reduction factors for installation damage, $RF_{ID}$, creep strength reduction, $RF_{CR}$, and material durability, $RF_D$ for the design life of the temporary wall structure.

   - The geosynthetic soil reinforcement manufacturer shall certify the ultimate tensile strength, $T_{Ult}$.

   - All strength values certified shall be the minimum average roll value, MARV, for that product.

   - All certifications shall consider the performance of the geosynthetic soil reinforcement in the actual or similar type of reinforced backfill being used.

8. For Temporary MSE Wall Facing

- Temporary facing with as welded wire form and geosynthetic wrap shall be designed in a manner which prevents the occurrence of bulging in excess of 2 inches when backfill behind the facing elements is compressed due to compaction stresses or self weight of the backfill. Bulging shall be measured as the maximum displacement from the theoretical vertical or sloped face of the temporary MSE wall that extends over a section of 1 foot or more along the theoretical wall face.

- The temporary facing shall be designed to the same structural requirements as the other components of the temporary MSE wall.

The Contractor shall submit design calculations, including soil design parameters used, methods of construction, and detailed drawings for all design cases. If permanent embankments are to be constructed against the temporary shoring walls, the Contractor shall also submit a method to prevent reflective cracking at the top of the embankment that may occur at the interface between the two construction phases. This may be accomplished by constructing a soil-reinforced mat below the pavement structure or approach slab that crosses over the two construction phases for sheet piles and horizontal layers of soil reinforcement that crosses the interface between both construction phases at various elevations along wall for Temporary Mechanically Stabilized Earth (MSE) wall with welded wire form facing and geosynthetic wrap.

All submittals shall have the seal and signature of the design engineer of record, for approval to the Engineer thirty (30) days prior to construction of the wall.

The Contractor shall be responsible for insuring all wall materials (i.e. reinforced MSE backfill) and wall components (i.e soil reinforcements, tie backs, etc.) are in conformance with the design of the temporary shoring wall. Any wall material or wall performance testing (i.e. anchor load testing, etc.) required by the contractor 's design shall be included in the unit price for the Temporary Shoring Wall.

**C. CONSTRUCTION.** The temporary shoring wall shall be constructed in a manner that protects adjacent buildings, bridges, roadways, or railway, and existing traffic, while allowing construction access for new bridge and roadway embankment construction. The Contractor's backfilling operations around existing piles shall be such that minimum lateral loads are exerted on existing piles. The Contractor shall be responsible for any damages or retrofit to adjacent structures that result from the construction of the temporary shoring wall.

Any wood lagging used shall be in accordance with Section 706 of the South Carolina State Highway Department Standard Specifications for Highway Construction, Edition of 2000.

All bracing, tiebacks, or other wall components used must provide access for new bridge substructure and superstructure construction, while maintaining the existing traffic flow without interruption.

Delete sub-section **E** of **Section 204.10** and replace it with the following:

**E. Temporary Shoring Wall**. The length of temporary shoring wall to be measured for payment shall be the actual horizontal length of wall in place and accepted by the Engineer.

Section **204.11** is hereby amended to include the following:

All cost for design, materials including geosynthetic reinforcement, wrap and welded wire form if used, installation, maintenance, removing the temporary shoring and other items or incidental work shall be included in the price bid for "Temporary Shoring Wall".

Payment will be made under:

| Item No. | Pay Item | Pay Unit |
|---|---|---|
| 1072310 | Temporary Shoring Wall | Linear Feet (LF) |

SCDOT

**DM1802**

South Carolina
Department of Transportation

December 3, 2002

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Bridge Drainage Requirements

The need for bridge deck drains shall be based on the AASHTO LRFD BRIDGE DESIGN SPECIFICATION latest Edition (Section 2.6.6.3-2.6.6.5 for 1998 edition) with interim revisions. Drain shall be 6″ diameter PVC (ASTM D 1785-89) or 6″ diameter fiberglass (ASTM D 2996) pipes. The requirements are detailed in the table below for allowable spreads.

(From Section 2.2.3 of the SCDOT REQUIREMENTS FOR HYDRAULIC DESIGN STUDIES)

| | | | |
|---|---|---|---|
| Interstate Routes, Routes and Roads: ADT > 10,000 | | | |
| | < 45 mph | 10-year | Shoulder + 3 ft. |
| | > 45 mph | 10-year | Shoulder |
| | Low point on bridge | 50-year | Shoulder + 3 ft. |
| | | | |
| Primary Routes: ADT < 10,000 | | | |
| | < 45 mph | 10-year | 1/2 driving lane |
| | > 45 mph | 10-year | Shoulder |
| | Low point on bridge | 10-year | 1/2 driving lane |
| | | | |
| Secondary Roads: ADT < 10,000 | | | |
| | | 10-year | 1/2 driving lane |
| | Paved shoulder | 10-year | Shoulder |
| | Low point on bridge | 10-year | 1/2 driving lane |

Drains shall be placed only where they are needed.

Permits and environmental issues may require a closed drainage systems. If a closed drainage system is required, it (size of pipes) shall be detailed in the construction plans. The contractor shall design all connections, hangers and expansion joints and this responsibility shall be indicated on the plans.

Drainage onto fill slopes shall be avoided if possible. A protection on the fill is required when water is drained onto the fill slopes.

All cost for drains shall be included in the price bid for concrete, unless a closed drainage system is needed. A closed drainage system shall be bid as

| | | | |
|---|---|---|---|
| 7094000 | STRUCTURE DRAINAGE SYSTEM | LS | |

Randy R. Cannon, P. E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
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Ken Johnson - FHWA
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SCDOT
South Carolina
Department of Transportation

DM0103

May 27, 2003

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Drilled Shaft Reinforcing Steel

---

The minimum size of longitudinal reinforcement used in drilled shafts shall be #25 (#8). The minimum clear distance between longitudinal reinforcement shall be four inches, but not less than five times the maximum size of aggregate nor 1.5 times the bar diameter, whichever is greater. For the clear distance limitation that is based on the bar diameter, a group of bundled bars shall be treated as a single bar of a diameter derived from the equivalent total area.

The minimum size of transverse reinforcement used in drilled shafts shall be #19 (#6). The minimum clear distance between transverse reinforcing bars shall be five times the maximum size of aggregate or three inches, whichever is greater. In cases where bundled transverse bars are used, consideration shall be given to increasing the minimum clear spacing requirements to ensure concrete will readily flow into the space between the reinforcing cage and the side of the drilled shaft.

These requirements are effective on all future projects. Projects that have been previously designed and detailed need not be revised.

Doug McClure

Douglas E. McClure, P. E.
State Bridge Design Engineer

cc: Assistant Bridge Design Engineers
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South Carolina
Department of Transportation

**DM0203**

September 3, 2003

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** New SCDOT Seismic Hazard Maps

The new SCDOT Seismic Hazard Maps for Bridges and Highways information will be provided by the Department for all new projects. These new SCDOT Seismic Hazard Maps take into account the sediment thickness and/or the near surface weathering, updating the State seismic hazard information, and therefore shall be used in the seismic design of all SCDOT bridge structures.

Section 3.3.1 of the SCDOT Seismic Design Specifications 2001, and October 2002 Interim Revisions (Seismic Loading) will be modified to reflect the SCDOT seismic hazard values.

The maps presented in Figures 3.4.2 and 3.4.3 of the SCDOT Seismic Design Specifications 2001, and October 2002 Interim Revisions shall not be used, nor shall the mapped design spectral acceleration values on Section 3.3.3 be obtained from the U.S Geological Survey. Generic site response model, such as that adopted by the USGS National Seismic Hazard Maps, including the 2002 update, does not reflect the actual geological conditions in South Carolina; therefore it should not be used.

If a site-specific hazard study is required, the Bridge Design Engineer shall determine the appropriate hazard map to be used.

Please ensure that this new information is implemented on all future projects. The Bridge Design Engineer reserves the right to modify this policy as needed on a case-by-case basis.

Douglas E. McClure

Douglas E. McClure, P.E.
Bridge Design Engineer

cc: Assistant Bridge Design Engineers
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SCDOT
South Carolina
Department of Transportation

DM0303

December 04, 2003

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Diaphragms for Prestressed Girder Spans

---

For prestressed girder spans, cast-in-place concrete diaphragms shall be used at all supports. For spans greater than 40 feet, intermediate diaphragms shall also be used and shall be constructed of cast-in-place concrete. At a minimum, one line of intermediate diaphragms shall be used in each span. For grade separation projects and for projects crossing navigable waterways, intermediate diaphragms shall be located over the centerline of the traffic lanes, railroad tracks, or navigational channels. For skews of 20 degrees or less, the intermediate diaphragms may be placed along the skew of the bridge. For skews in excess of 20 degrees, the intermediate diaphragms shall be placed perpendicular to the beams. The tops of the intermediate diaphragms should be detailed three inches below the tops of the girders. Slabs shall not be poured until a minimum of seven days after the interior diaphragms are poured or until the diaphragm concrete reaches a compressive strength of 3000 psi.

For continuous prestressed girder spans, the interior support diaphragms shall be cast concurrently with the deck slab above the support. For integral end supports, the end walls shall also be cast concurrently with the deck slab. At simple span supports and at expansion ends of continuous spans, the support diaphragms may be cast prior to the placement of the deck slab.

The intermediate diaphragm requirements specified in this memorandum replaces the requirements specified in design memorandum DM0193. For previously completed plans that do not conform to the requirements of this memorandum, the State Bridge Design Engineer will, on a case-by-case basis, assess the need for revisions.

Douglas E. McClure

Douglas E. McClure, P. E.
State Bridge Design Engineer

cc: Assistant State Bridge Design Engineers
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SCDOT
South Carolina
Department of Transportation

DM0104

January 6, 2004

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Importance Classification (IC) of Bridges

---

For seismic design considerations, the Importance Classification of bridges is as follows (refer to Sec. 3.2 of the SCDOT Seismic Design Specifications):

**CRITICAL:** Critical bridges will be designated on an individual basis by the State Bridge Design Engineer.

**ESSENTIAL:** All bridges not classified as critical and located on the Interstate system, US 17, US 378 from SC 441 east to I 95, I 20 Spur from I 95 east to US 76, and US 76 from I 20 Spur east to North Carolina and additional bridges as designated by the State Bridge Design Engineer are classified as "Essential".

**NORMAL:** All bridges that are not classified as "Critical" or "Essential" are classified as "Normal".

For vessel collision design considerations, the Importance Classification bridges crossing navigable waterways is as follows (refer to Sec. 3.14.3 of the AASHTO LRFD Bridge Design Specifications):

**CRITICAL:** Any bridge that is classified as "Critical" or "Essential" for seismic design considerations is classified as "Critical" for vessel collision design considerations.

**REGULAR**: All bridges that are not classified as "Critical" are classified as "Regular".

Douglas E. McClure

Douglas E. McClure, P. E.
State Bridge Design Engineer

DEM/slb

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SCDOT
South Carolina
Department of Transportation

DM0204

January 12, 2004

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Steel plate recess at deck joints

---

Top of armor plates at deflection and expansion joints, as well as top of steel extrusions at strip seal joints shall be recessed 1/4" from finish grade. This LRFD requirement (Sec 14.5.3.3) will help meet rideability if the contractor has to mill the concrete adjacent to the joints.

This change is effective on all future projects. Projects that have been previously designed and detailed need not be revised.

Douglas E. McClure

Douglas E. McClure, P. E.
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DEM/slb

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South Carolina
Department of Transportation

DM0304

April 27, 2004

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Concrete Stress Limits for Prestressed Concrete Members

---

Tensile stress limits for fully prestressed concrete members shall conform to the requirements for "Other Than Segmentally Constructed Bridges" in Article 5.9.4 of the AASHTO LRFD Bridge Design Specifications, except that the tensile stress at the Service Limit State, after losses, shall be limited as noted below.

For components with bonded prestressing tendons or reinforcement, the tensile stress in the precompressed tensile zone shall be limited to a maximum of $0.0948\sqrt{f'c}$ (ksi). This limit applies to all projects, regardless of the site location.

Previously completed designs and plans shall not be revised to comply with this memorandum.

Douglas E. McClure

Douglas E. McClure, P. E.
State Bridge Design Engineer

cc: Assistant State Bridge Design Engineers
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SCDOT
South Carolina
Department of Transportation

DM0404

May 26, 2004

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Wing Walls

---

Wing walls shall be of sufficient length to retain the roadway embankment and to furnish protection against erosion. The wing walls shall be designed to keep the embankment at least one foot below the top of the end bent cap at the front face of the cap. The wing walls shall also be designed to allow for a minimum berm width of two feet (measured perpendicular to the bent cap). See attached Detail "A". Generally, the slope of the fill should not be steeper than 2:1 (H:V), and the wing wall lengths should be established on this basis. The minimum thickness of wing walls shall be one foot.

For structure types other than flat slabs or cored slabs, parallel wing walls (wing walls that are parallel to the centerline of bridge) shall be used. For flat slab or cored slab structures, straight wing walls (wing walls that are parallel to the centerline of bearing) are preferred. Parallel wing walls may be used for these shallow depth structures if necessary to accommodate earthquake or thermal loads, when a certain type of aesthetics is desired, when there is interference between the existing and proposed structures, or when some other type of restriction exists.

For bridges having parallel wing walls, approach slabs shall be used and the wing walls shall be detailed adjacent to the outside edge of the approach slab. See attached Detail "B".

For previously completed plans that do not conform to the requirements of this memorandum, the State Bridge Design Engineer will, on a case-by-case basis, assess the need for revisions.

Douglas E. McClure

Douglas E. McClure, P. E.
State Bridge Design Engineer

Attachments

cc: Assistant State Bridge Design Engineers
Bridge Construction Engineer
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File: PC/BWB

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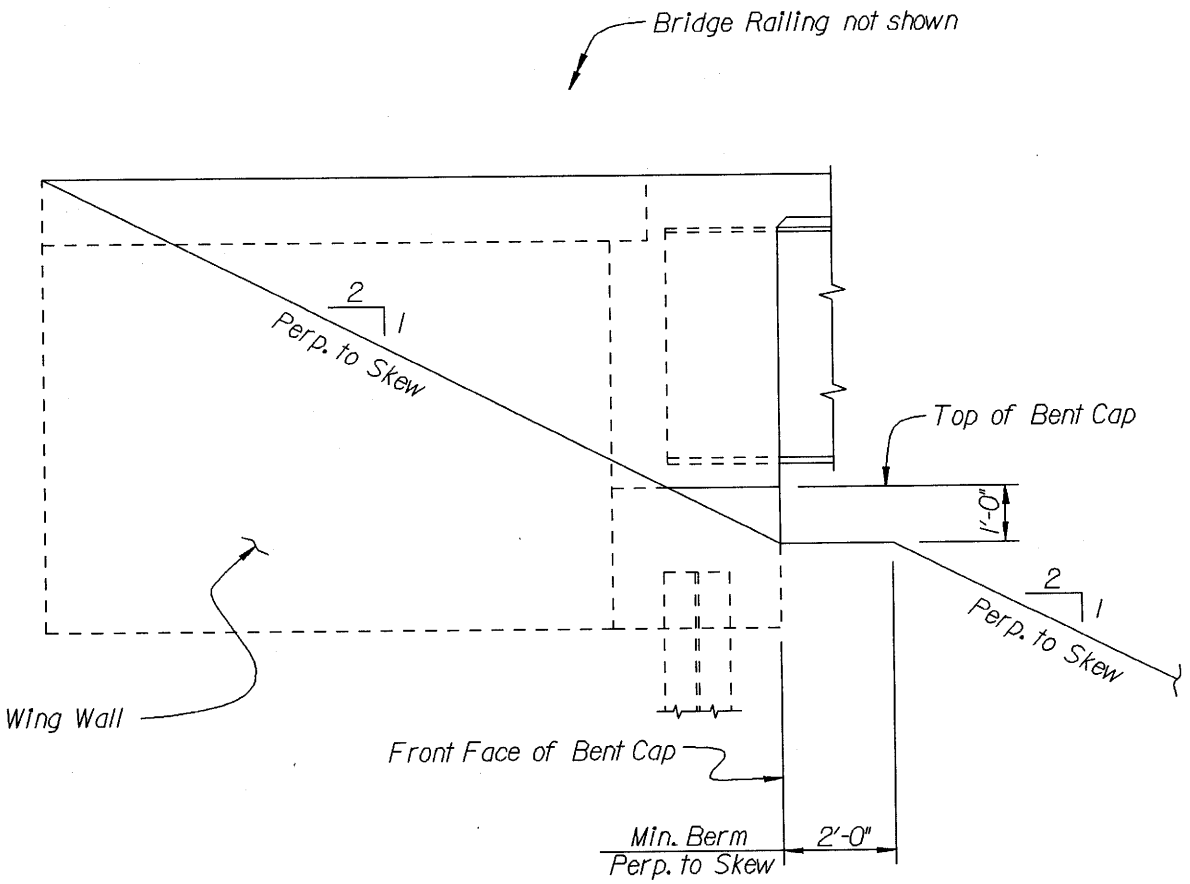
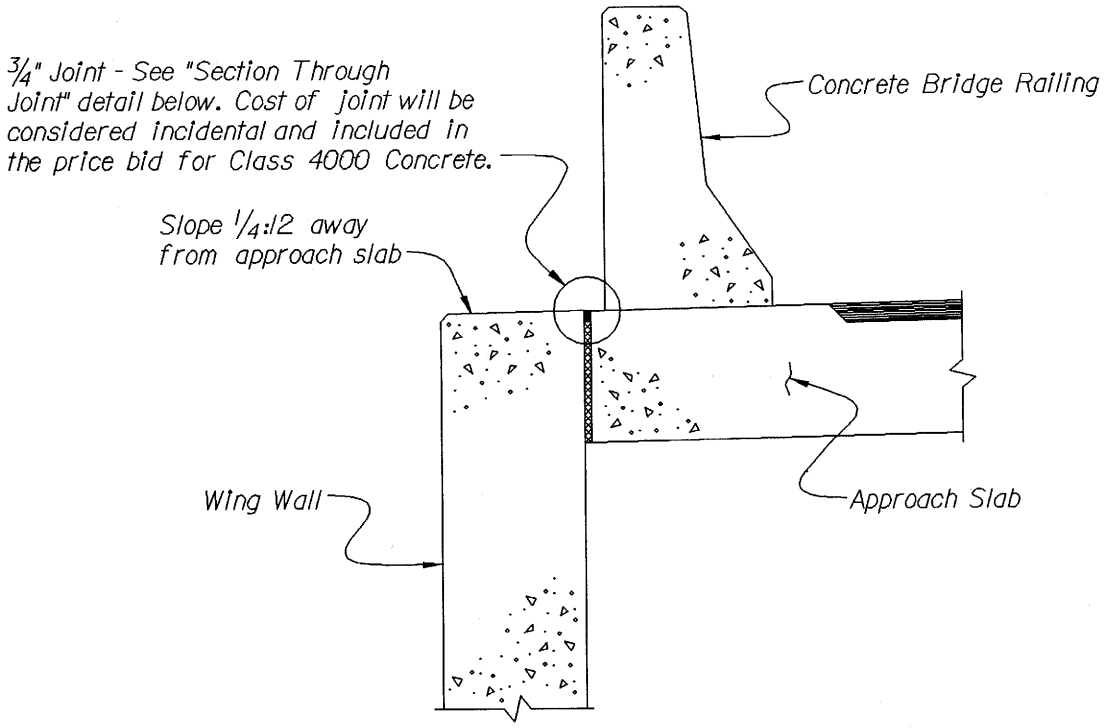
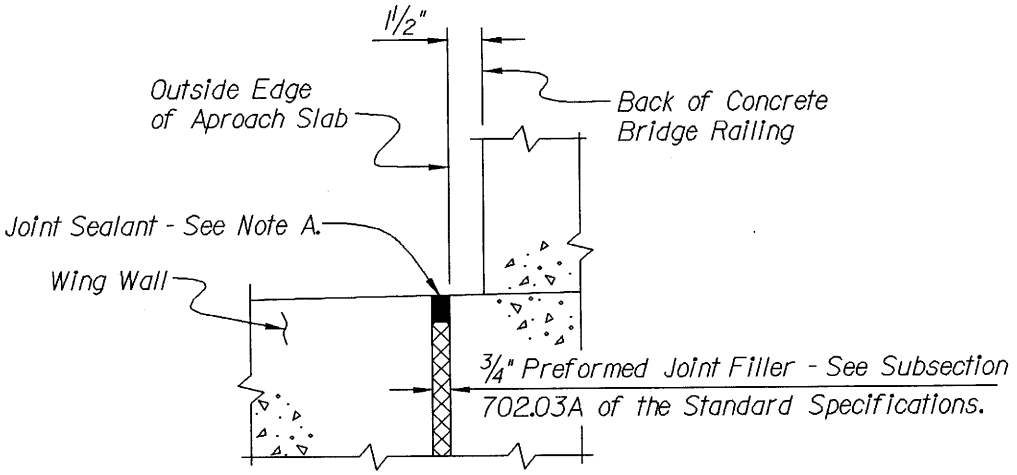

Bridge Railing not shown
2
1
Perp. to Skew
Top of Bent Cap
1'-0"
2
1
Perp. to Skew
Wing Wall
Front Face of Bent Cap
Min. Berm
Perp. to Skew
2'-0"

# DETAIL "A"




## SECTION THROUGH WING WALL / APPROACH SLAB




## SECTION THROUGH JOINT

Note A:
Joint sealant shall be a cold applied bridge joint sealant meeting the requirements of Subsection 702.03H of the Standard Specifications. The depth of the sealant shall be set in accordance with the Manufacturer's instructions.

# DETAIL "B"

SCDOT
South Carolina
Department of Transportation

DM0504

May 26, 2004

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** End Wall Details

---

The embankment adjacent to the end walls of all prestressed and structural steel end spans shall be detailed with a special backfill material and underdrain as shown on the attached drawing. Additionally, the construction joint between the end wall and the bent cap shall be waterproofed.

For integral end bents, the end wall shall be detailed the full width of the end bent and the end wall concrete shall be cast as the last portion of the deck pour of the end span.

The requirements of this memorandum replace the requirements of DM0500 and DM0502. For previously completed plans that do not conform to the requirements of this memorandum, the State Bridge Design Engineer will, on a case-by-case basis, assess the need for revisions.

Douglas E. McClure

Douglas E. McClure, P. E.
State Bridge Design Engineer

Attachment

cc: Assistant State Bridge Design Engineers
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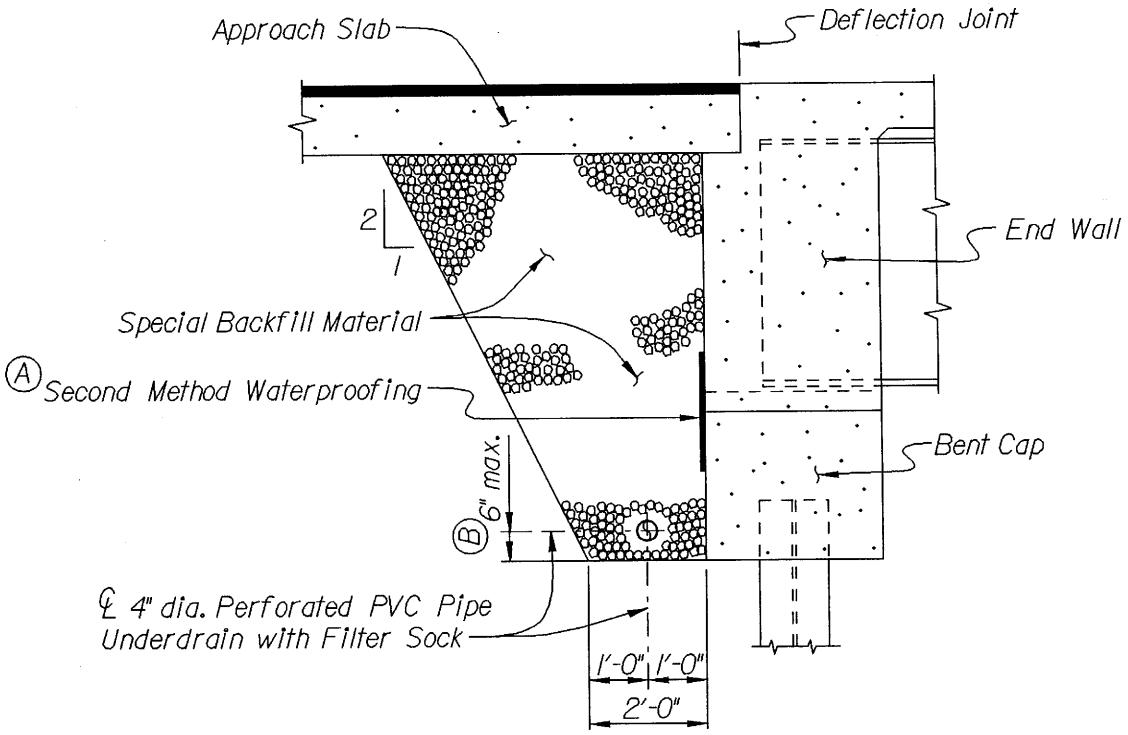
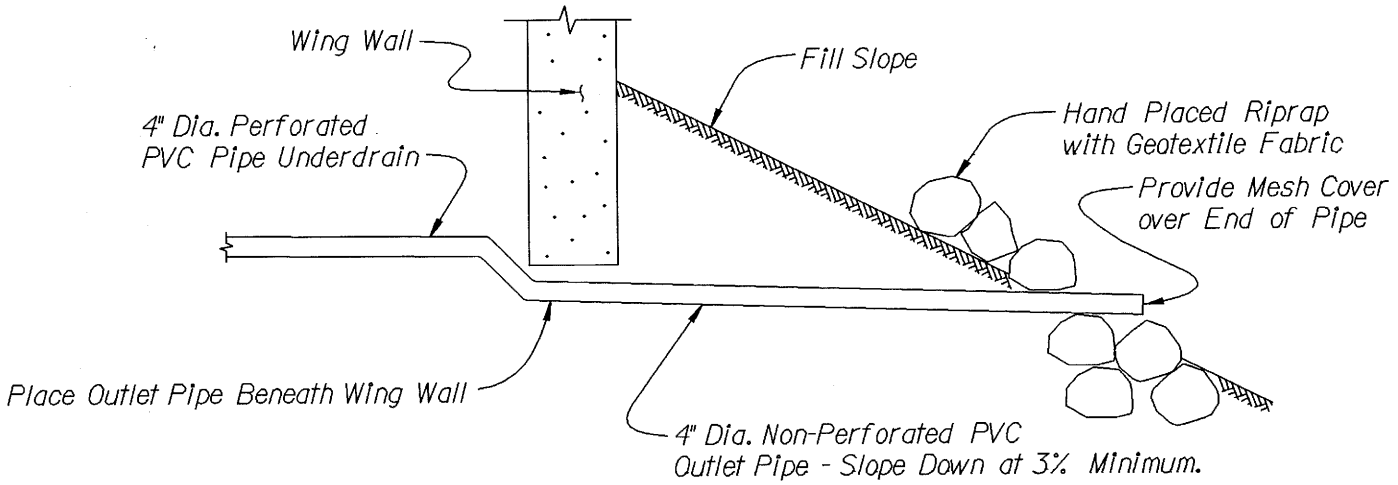



# PIPE UNDERDRAIN DETAIL

Note:
4" Dia. Perforated PVC Pipe Underdrain shall comply with Section 802.07 of the Standard Specifications. Special Backfill Material shall be #789 Coarse Aggregate, Uncompacted, and shall comply with Section 802.08 of the Standard Specifications. Filter Sock shall be Geotextile for Drainage Filtration, Class I Fabric (Protected) - See Special Provisions. All costs of furnishing and installing the 4" Dia. Perforated PVC Pipe Underdrain, Filter Sock, Special Backfill Material, 4" Dia. Non-Perforated PVC Outlet Pipe, Riprap, and Geotextile Fabric for Riprap shall be included in the unit price bid for 4" Perforated Pipe Underdrain. Measurement of the 4" Perforated Pipe Underdrain shall be taken along the back face of the End Wall from inside edge of Wing Wall to inside edge of Wing Wall and all costs associated with the construction of the Outlets shall be considered incidental and included in the unit price bid for the 4" Perforated Pipe Underdrain.

(A) Second Method Waterproofing shall extend the full length of the End Wall. See Section 814 of the Standard Specifications.

(B) Slope Pipe a minimum of 0.5% to drain.




# PIPE OUTLET DETAIL

South Carolina
Department of Transportation

DM0604

May 26, 2004

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Concrete Bridge Barrier Parapet Transitions and Approach Slabs

---

Effective with the November 2004 Letting, the Department will begin using a concrete bridge barrier parapet transition at all barrier ends where a thrie beam guardrail bridge connector is required. For bridges having parallel wing walls (wing walls that are parallel to the centerline of bridge), the transition shall be detailed as shown on the attached drawings. For bridges having straight wing walls (wing walls that are parallel to the centerline of bearing), the transition shall be placed on the end span, using details similar to the details shown on the attached drawing.

To accommodate the barrier parapet transition, approach slabs will be required for all bridges having parallel wing walls. For bridges with straight wing walls, approach slabs shall be detailed when any one of the following conditions exist:

1. The bridge is located on a primary route.
2. The bridge is located on a secondary or county road having a current ADT of 400 VPD or greater.
3. The bridge is located on a secondary or county road with a new approach fill height exceeding 10 feet.

For previously completed plans that do not conform to the requirements of this memorandum, the State Bridge Design Engineer will, on a case-by-case basis, assess the need for revisions.

Douglas E. McClure

Douglas E. McClure, P. E.
State Bridge Design Engineer

Attachments

cc: Assistant State Bridge Design Engineers
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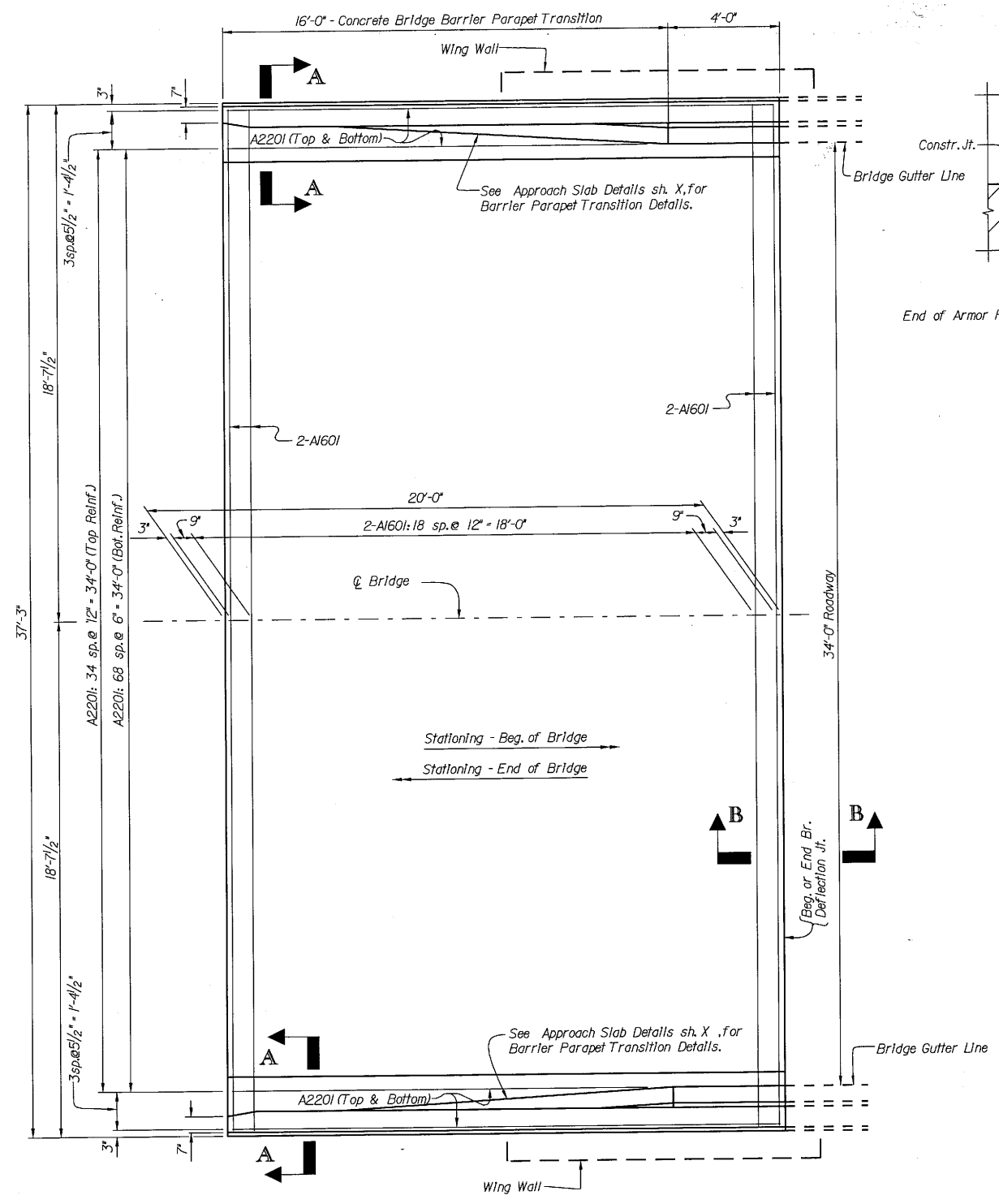
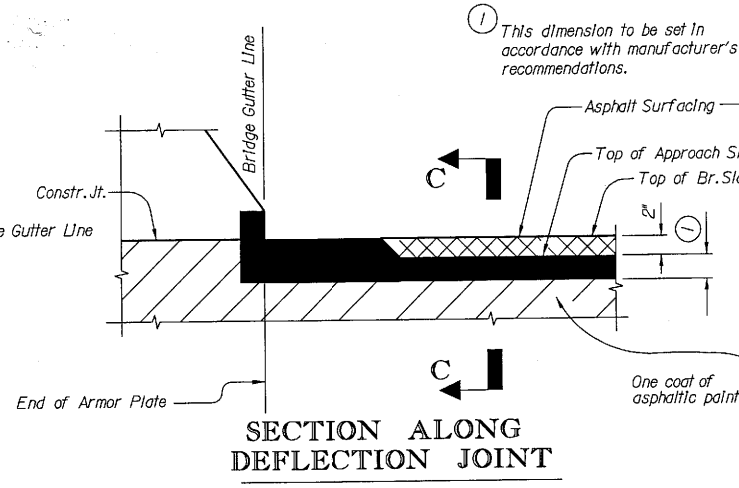
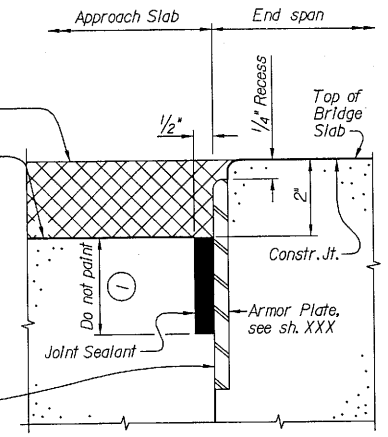
ASBM.Dgn




PLAN




SECTION ALONG DEFLECTION JOINT




SECTION C-C

## DEFLECTION JOINT DETAIL

Deflection Joint may be formed or saw cut.

One coat of asphaltic paint shall be applied to the joint to prevent bonding of end span and approach slab concrete. An alternate method of preventing bonding may be used if desired by the Contractor. Asphaltic paint or alternate method shall be approved by the Resident Construction Engineer.

Joint sealant shall be a cold applied bridge joint sealant meeting the requirements of Subsection 702.03H of the Standard Specifications.

All costs for furnishing and installing cold applied joint sealant shall be included in the unit price bid for Concrete for Structures - Class 4000.

| SHEET NO. | TOTAL SHEETS |
|---|---|
| XX | XX |

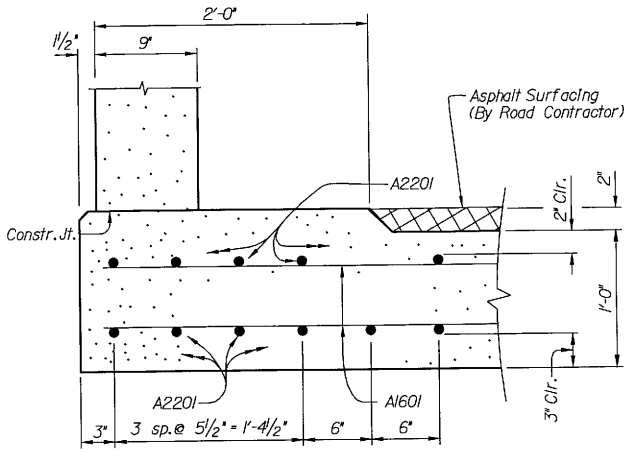
## REINF. STEEL SCHED.

| MARK | NO. REQ'D | DIMENSION "a" | "b" | "c" | "d" | LENGTH |
|---|---|---|---|---|---|---|
| A1601 | 42 | 36'-11" | — | — | — | 36'-11" |
| A1602 | 12 | 19'-8" | — | — | — | 19'-8" |
| A1603 | 2 | 16'-0" | — | — | — | 16'-0" |
| A2201 | 116 | 19'-8" | — | — | — | 19'-8" |
| | | | | | | |
| C1601 | 42 | 2'-3" | 10" | — | — | 3'-1" |
| L 1601 | 88 | 10" | 3'-4" | 5" | 3'-4" | 7'-11" |
| U1601 | 2 | 2'-0" | 5" | — | — | 4'-3" |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| CHCU | 4" Ht. | As Necessary | | | | |

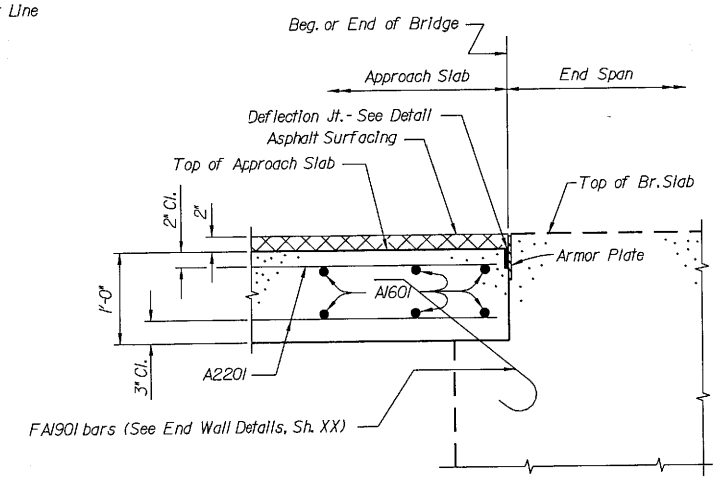
## QUANTITIES

| ITEM | UNIT | ONE APPR. SLAB |
|---|---|---|
| Concrete, Class 4000 | C.Y. | 281 |
| Reinforcing Steel | Lbs. | 7430 |
| Barrier Parapet Transition | EA | 2 |
| | | |
| | | |

For Bar Bending Details, see Sh. XXX




SECTION A-A




SECTION B-B

Notes:

Fill under approach slab shall be thoroughly compacted in accordance with paragraph 208.02 of the Standard Specifications and graded to a uniform surface 1'-2" below finished surface of roadway. Bottom reinforcing steel shall be supported by concrete block or similar material, so as to provide a minimum concrete cover of 3" below bottom reinforcing steel.

Approach slab shall be constructed to the grades and elevations shown on the Bridge Plan & Profile sheet, and approach slabs shall be constructed to the same crown as bridge roadway.

C.H.C.U. Bolsters shall be spaced so as to provide adequate support for top reinforcing steel and spaced approximately 2'-6" on center, parallel to center line of approach slab. Weights of bar supports are not included in the reinforcing steel quantities. Bar supports shall be considered incidental to the reinforcing steel and all costs for furnishing and placing bar supports shall be included in the unit price bid for Reinforcing Steel.

All costs of materials, equipment and labor necessary to compact the fill beneath the approach slab to not less than 95% of maximum density using suitable construction procedure shall be included in the unit price bid for Concrete for Structures - Class 4000.

THIS DRAWING IS FURNISHED FOR INFORMATION ONLY. ALL DIMENSIONS SHOWN ARE SHEET SPECIFIC. ANY USE OF THIS DESIGN AND DRAWING, INCLUDING DIMENSIONS, MUST BE CHECKED BY THE USER'S ENGINEER TO ENSURE DESIGN IS ADEQUATE FOR THE INTENDED USE. ALL DRAWINGS MUST BE SIGNED AND SEALED BY A SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER WHEN USED.

| REV. | | | |
|---|---|---|---|
| REV. | | | |
| REV. | JAR | JP | 4/04 |
| | Barrier Parapet | | |
| REVIEWED | | | |
| QUAN. | XXX | | |
| DR. | XXX | | |
| DES. | | | |
| | BY | CHK. | DATE |

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN COLUMBIA, S.C.

# APPROACH SLABS (34'-0" ROADWAY)

| FILE NO. | ROUTE | COUNTY | DRAWING NO. |
|---|---|---|---|
| XXXXXXXXXX | XXXXXXXXXX | XXXXXXXXXXXXXXXX | 702-30a |

Printed: Wednesday, May 19, 2004 8:06:06 AM

AS.dgn

| SHEET NO. | TOTAL SHEETS |
|---|---|
| XX | XX |

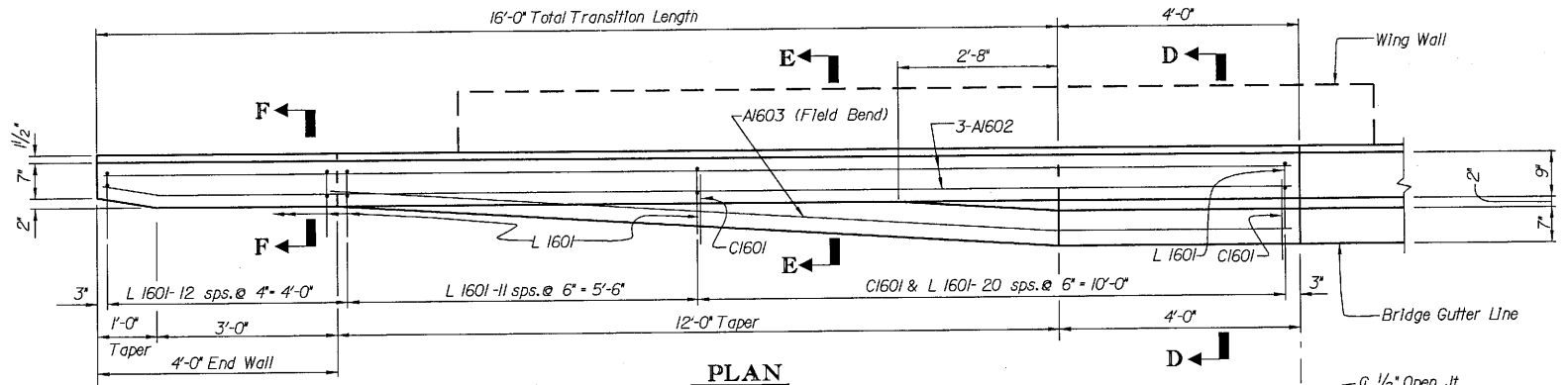
## ① THRIE BEAM GUARD RAIL ATTACHMENT TO PARAPET

THE 1" DIAM. HOLES MAY BE FORMED WITH PLASTIC OR PVC PIPE HAVING AN I.D. OF 1" ( ± 1/8") OR 1" I.D. GALVANIZED STANDARD WEIGHT STEEL PIPE.

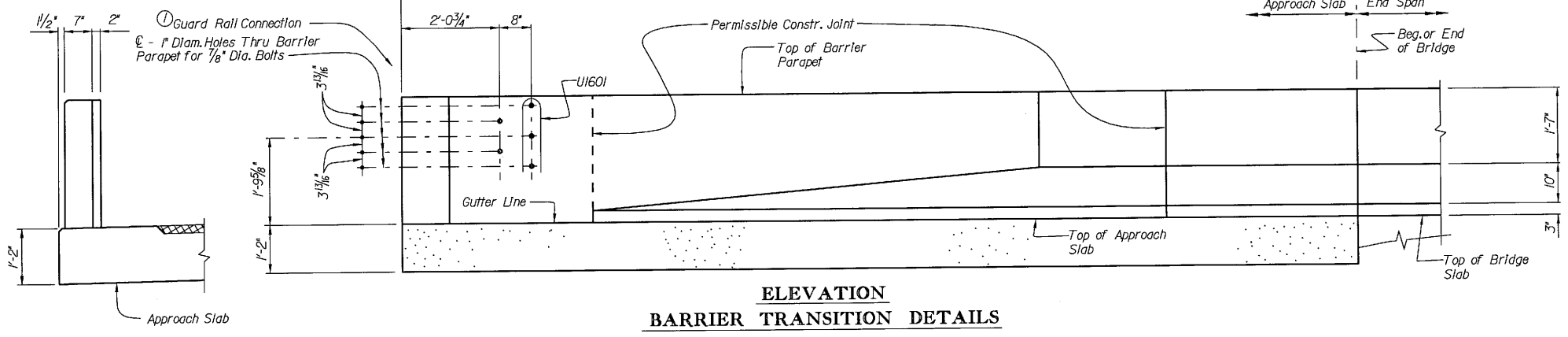
ALL COST OF PIPE AND INSTALLATION SHALL BE INCLUDED IN THE PRICE BID FOR REINFORCING STEEL.

ALL PIPE TO REMAIN IN PLACE WHEN FORMS ARE REMOVED.

THE RESIDENT ENGINEER SHALL CHECK THE LOCATION OF THE HOLES TO INSURE THAT THE GUARDRAIL SHOE WILL FIT PROPERLY WHEN INSTALLED.

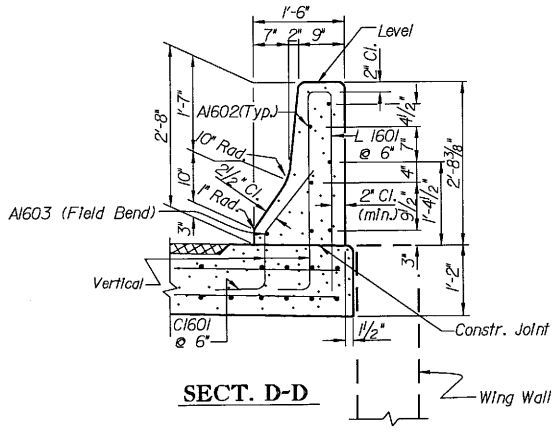



PLAN
(Approach Slab not shown)

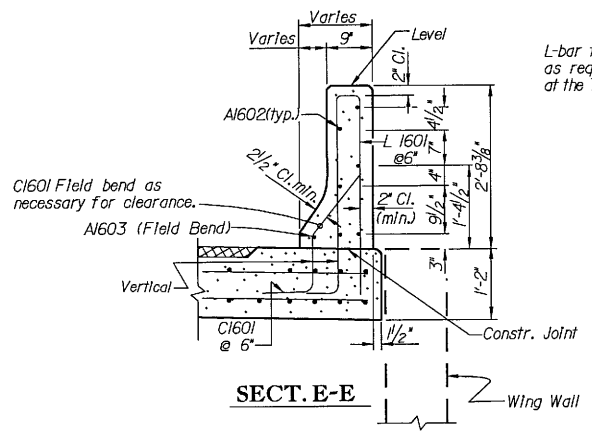



END ELEVATION

ELEVATION
BARRIER TRANSITION DETAILS




SECT. D-D

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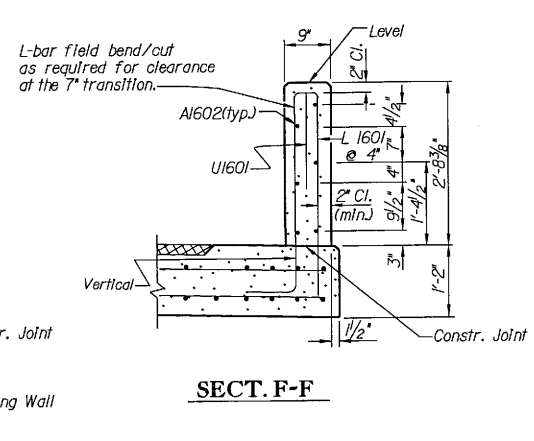


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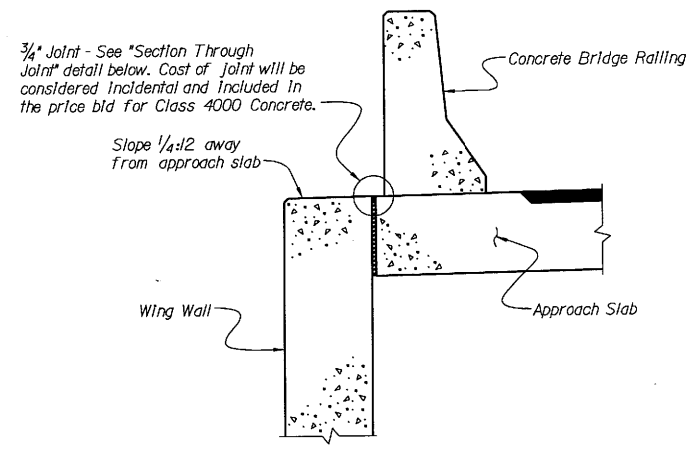
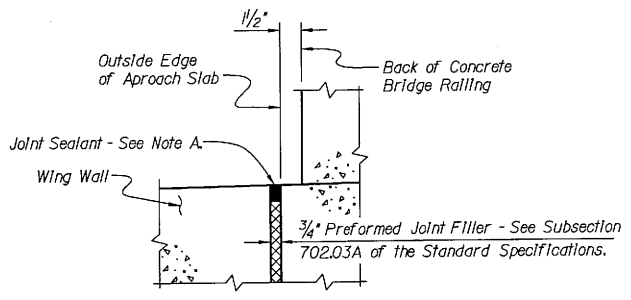



SECTION THROUGH WING WALL/APPROACH SLAB




SECTION THROUGH JOINT

Note A:
Joint sealant shall be a cold applied bridge joint sealant meeting the requirements of Subsection 702.03H of the Standard Specifications. The depth of the sealant shall be set in accordance with the Manufacturer's Instructions.

NOTE:
THE CONCRETE BRIDGE BARRIER PARAPET TRANSITION SHALL CONFORM TO THE REQUIREMENTS OF SECTION 705 OF THE STANDARD SPECIFICATIONS. THE UNIT PRICE BID FOR CONCRETE BRIDGE BARRIER PARAPET TRANSITION SHALL INCLUDE ALL COSTS OF FURNISHING, PREPARING, AND PLACING CONRETE, EXPANSION JOINT MATERIAL, PIPE, AND ALL OF THE MATERIALS REQUIRED IN THE FINISHED RAILING TRANSITION, EXCEPT FOR THE REINFORCING STEEL. THE REINFORCING STEEL WILL BE PAID FOR AS SPECIFIED IN SECTION 703 OF THE STANDARD SPECIFICATIONS.

THIS DRAWING IS FURNISHED FOR INFORMATION ONLY. ALL DIMENSIONS SHOWN ARE SHEET SPECIFIC. ANY USE OF THIS DESIGN AND DRAWING, INCLUDING DIMENSIONS, MUST BE CHECKED BY THE USER'S ENGINEER TO ENSURE DESIGN IS ADEQUATE FOR THE INTENDED USE. ALL DRAWINGS MUST BE SIGNED AND SEALED BY A SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER WHEN USED.

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| DR. | JAR | JP | 4/04 | |
| DES. | | | | |
| | BY | CHK. | DATE | |

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN COLUMBIA, S.C.

# APPROACH SLABS DETAILS

| FILE NO. | ROUTE | COUNTY | DRAWING NO. |
|---|---|---|---|
| XXXXX | XXXXX | XXXXX | 702-30b |

Printed: Friday, May 21, 2004 12:26:35 PM

SCDOT
South Carolina
Department of Transportation

DM0704

May 26, 2004

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Concrete Bridge Barrier Parapet Width

---

Effective with the November 2004 Letting, the concrete bridge barrier parapet width will be increased from 1'-5" to 1'-6". The reinforcing steel dimensions for the 1'-6" parapet shall be the same as the details that were previously used for the 1'-5" parapet. The concrete cover shall be detailed as 2 ½" on the traffic face of the parapet and 2" minimum on the back face of the parapet. To accommodate slip forming operations, the slab overhang beyond the back of the parapet shall be detailed as 1 ½" for cast-in-place decks and 1" for cored slab bridges.

For previously completed plans having the 1'-5" wide parapet details, the designer shall determine if the following note can be placed on the plans:

"The Contractor may elect, at no additional cost to the Department, to construct a 1'-6" wide barrier parapet in place of the 1'-5" wide parapet that is detailed in the plans. To accommodate the 1'-6" wide parapet, the slab overhang beyond the back of the parapet shall be reduced from 1 ½" to 1" and the traffic face of the parapet shall be shifted ½" towards the centerline of the bridge. The parapet reinforcing steel dimensions and placement locations will remain as detailed."

For cases where designs cannot accommodate the above note, the designer shall consult with the appropriate Assistant State Bridge Design Engineer to determine the necessary course of action.

Douglas E. McClure

Douglas E. McClure, P.E.
State Bridge Design Engineer

cc: Assistant State Bridge Design Engineers
Bridge Construction Engineer
Road Design Engineer
FHWA
CRM East
CRM West

File: PC/BWB

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SCDOT
South Carolina
Department of Transportation

DM0804

September 20, 2004

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Reinforced Concrete Columns

---

Reinforced concrete columns shall be either circular with a minimum diameter of three feet or oblong with circular ends and have a minimum cross section dimension of three feet. At the column/shaft interface, a minimum of three inches shall be detailed from the edge of shaft to the edge of column.

The details shown on the attached sketches shall be considered as minimum requirements for all projects, regardless of site location. The maximum spacing of the transverse column reinforcement shall be decreased as necessary to comply with applicable design specifications.

These requirements are effective on all future projects. Projects that have been previously designed and detailed need not be revised.

Douglas E. McClure

Douglas E. McClure, P. E.
State Bridge Design Engineer

Attachments
cc: Assistant State Bridge Design Engineers
Bridge Construction Engineer
Bridge Maintenance Engineer
FHWA

File: PC/LEM/BWB

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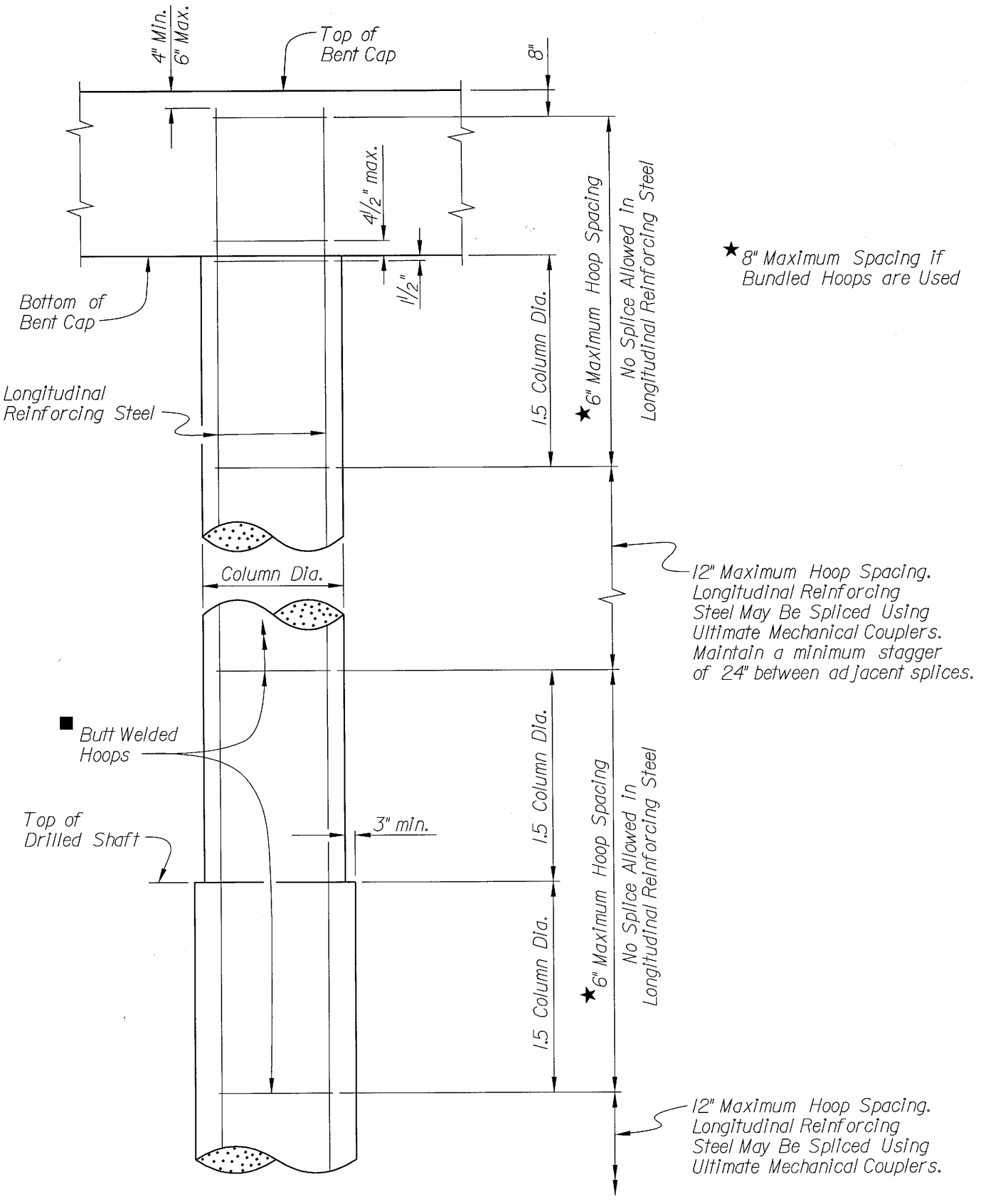
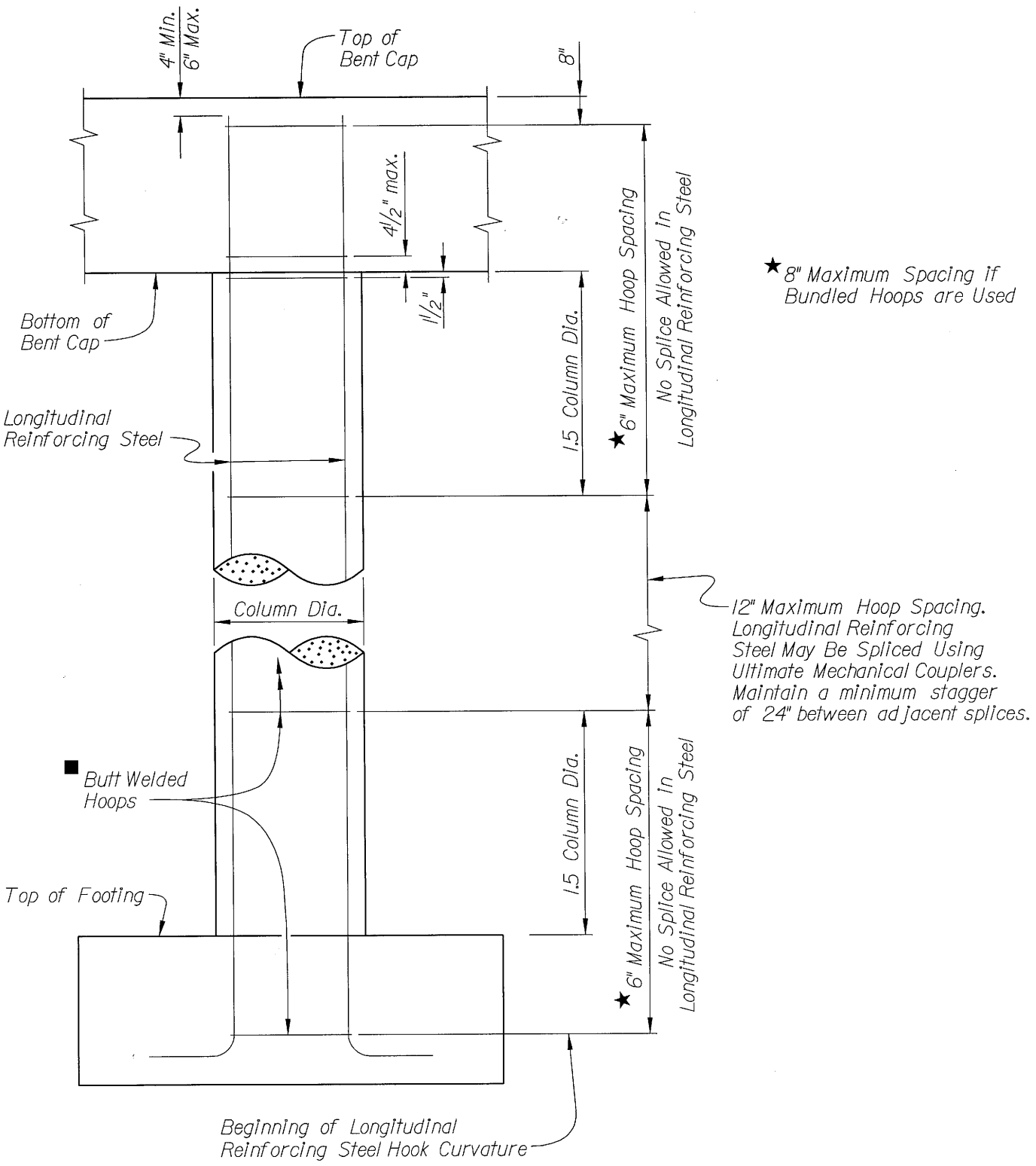



■ *Hoops shall have butt welded splices and the minimum size shall be #19 (#6). To prevent the hoop weld splices from being located on the same vertical plane, the locations of the splices shall be staggered around the perimeter of the column by a minimum distance of 1/3 of the hoop circumference.*

# MINIMUM COLUMN REINFORCING DETAILS

## (FOR COLUMNS SUPPORTED BY DRILLED SHAFTS)




■ Hoops shall have butt welded splices and the minimum size shall be #19 (#6). To prevent the hoop weld splices from being located on the same vertical plane, the locations of the splices shall be staggered around the perimeter of the column by a minimum distance of 1/3 of the hoop circumference.

# MINIMUM COLUMN REINFORCING DETAILS

## (FOR COLUMNS SUPPORTED BY FOOTINGS)

South Carolina
Department of Transportation

DM0904

November 01, 2004

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** End Transition for Concrete Bridge Railing Wall

---

Effective with the April 2005 Letting, the Department will begin using a concrete bridge railing wall transition at all railing ends where a thrie beam guardrail bridge connector is required. The transition shall be dimensioned as shown on the attached detail. For concrete bridge railing walls with heights other than 42 inches, the length of the transition shall be modified as necessary to maintain the 6 to 1 taper shown on this detail.

A separate bid item will not be required for the concrete bridge railing wall transition. The length of the transition shall be included in the quantity for the concrete bridge railing wall.

For previously completed plans that do not conform to the requirements of this memorandum, the State Bridge Design Engineer will, on a case-by-case basis, assess the need for revisions.

Douglas E. McClure

Douglas E. McClure, P. E.
State Bridge Design Engineer

Attachment
cc: Assistant State Bridge Design Engineers
Bridge Construction Engineer
Bridge Maintenance Engineer
Road Design Engineer
FHWA

File: PC/BWB

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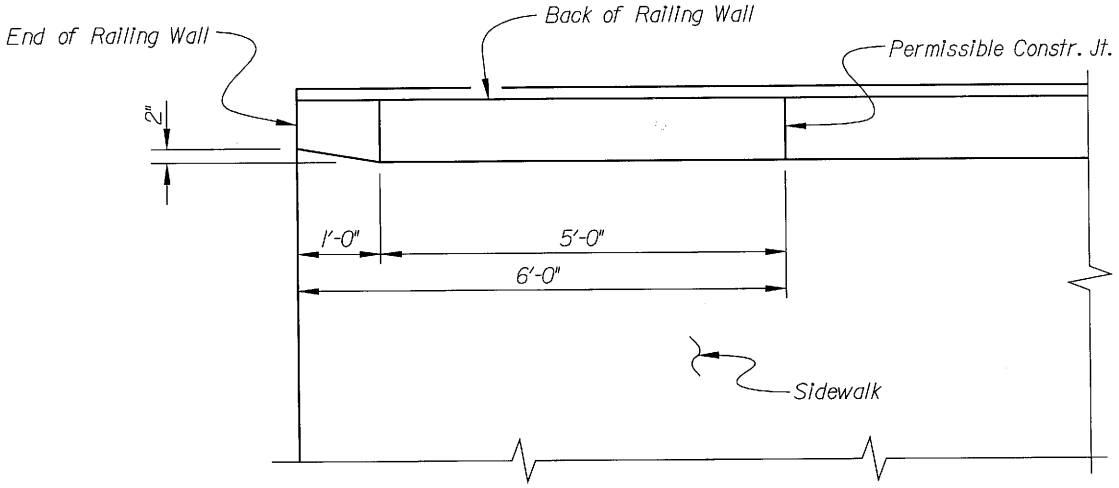
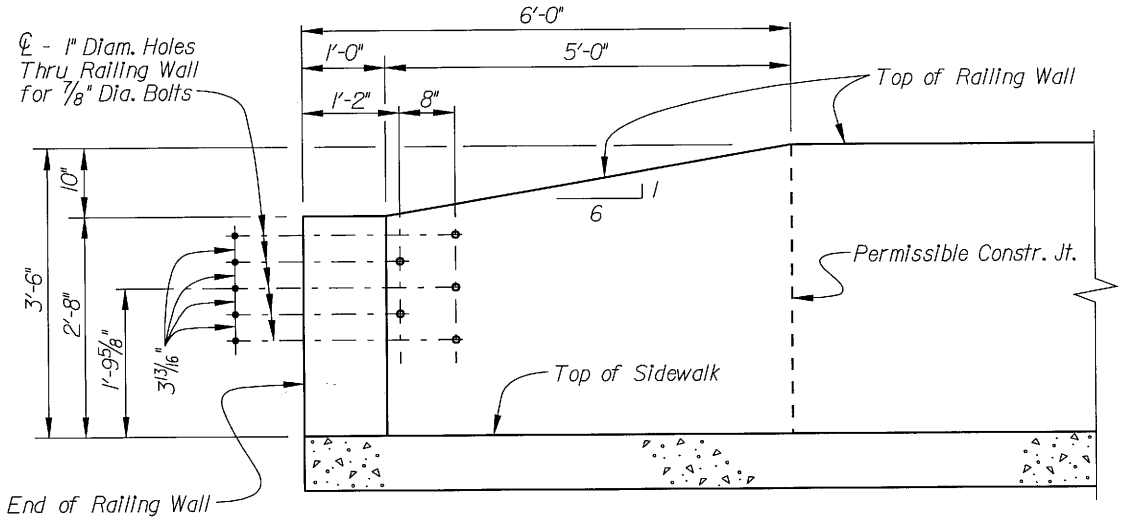



PLAN




ELEVATION

# END TRANSITION FOR CONRETE BRIDGE RAILING WALL

SCDOT
South Carolina
Department of Transportation

**DM0105**

April 13, 2005

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Attachment of Soil Reinforcements to Bridge Components

Soil reinforcements such as steel strips, bar mats, and geosynthetics are commonly used in mechanically stabilized earth (MSE) wall construction to provide a tensile resistance within the reinforced soil mass. In some cases, these types of soil reinforcements have been attached to bridge end bent caps and end walls to resist the lateral loads placed on these components.

Soil reinforcements do not mobilize their tensile strength capacity until they have displaced relative to the soil. The amount of displacement required to mobilize the soil reinforcement tensile strength capacity varies and is dependent on the type of soil reinforcement and type of backfill used. Relative displacement of ¾" to 1" has been observed when reinforcements are placed in well-compacted "select" backfill. Larger displacements of MSE walls have been observed when soil reinforcements have been placed in loose fill and/or fill not meeting "select" backfill specifications. Predicting the soil-structure interaction between the soil reinforcement and the reinforced backfill is very complex and currently the accuracy of predicting movements is not sufficient for the purposes of designing bridge wall abutments.

Therefore, the practice of attaching soil reinforcements to bridge components shall be discontinued. For previously completed plans that do not conform to the requirements of this memorandum, the Bridge Design Engineer will, on a case-by-case basis, assess the need for revisions.

DEM

Douglas E. McClure, P.E.
Bridge Design Engineer

DEM/slb
cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Bridge Maintenance Engineer
FHWA
File: PC/JS

South Carolina
Department of Transportation

DM0205

April 20, 2005

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Bid Item for Aggregate Underdrain (Aggr.#789)

---

Payment for the aggregate underdrain and perforated pipe at the beginning and end of bridge and ends of approach slabs shall be made under:

| Item No. | Bid Item | Unit | Quantity |
|---|---|---|---|
| 8011210 | Aggregate Underdrain #789 W/4" Perf. Pipe For Structures | Ton | |

For estimating the weight of the aggregate, a 1 ½ ton per cubic yard weight shall be assumed. The weight shall be rounded to the nearest ton.

The attachment of this memorandum shall replace the attachment of DM0504. For previously completed plans that do not conform to the requirements of this memorandum, the Bridge Design Engineer will, on a case-by-case basis, assess the need for revisions.

DEM

Douglas E. McClure, P. E.
Bridge Design Engineer

DEM/slb
Attachment
cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Bridge Maintenance Engineer
FHWA

File: PC/YIA

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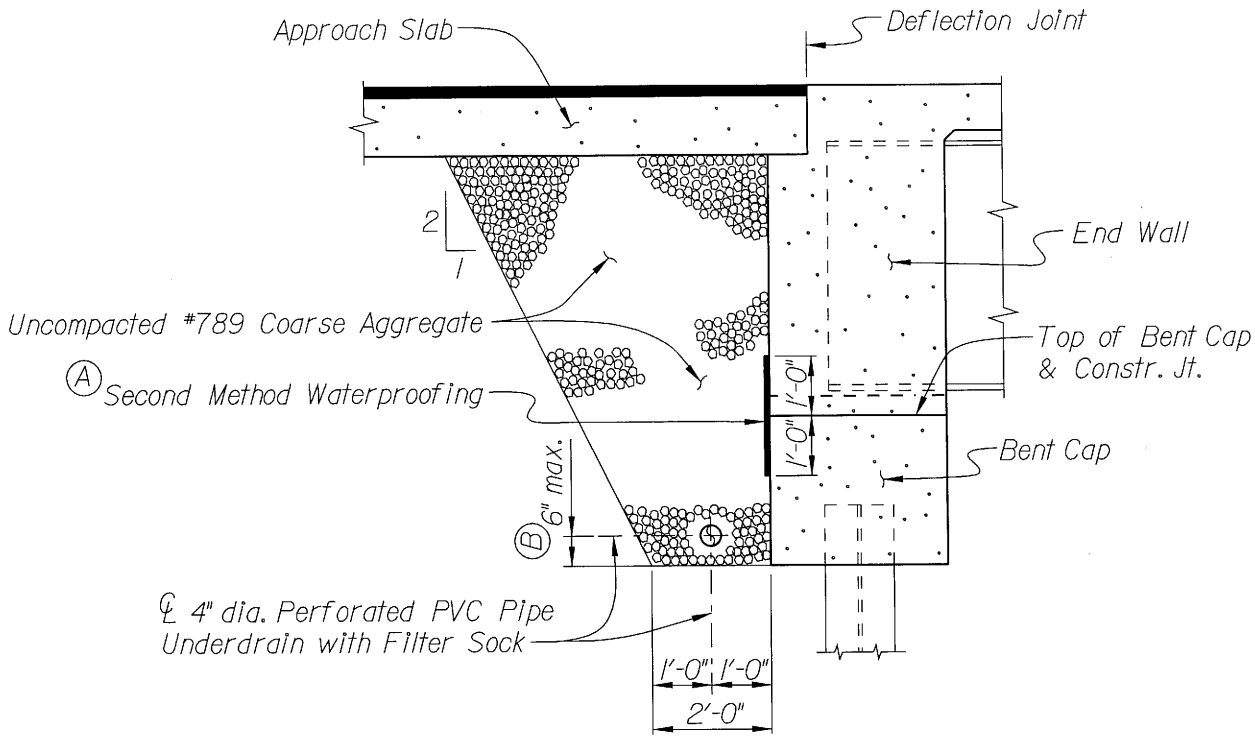
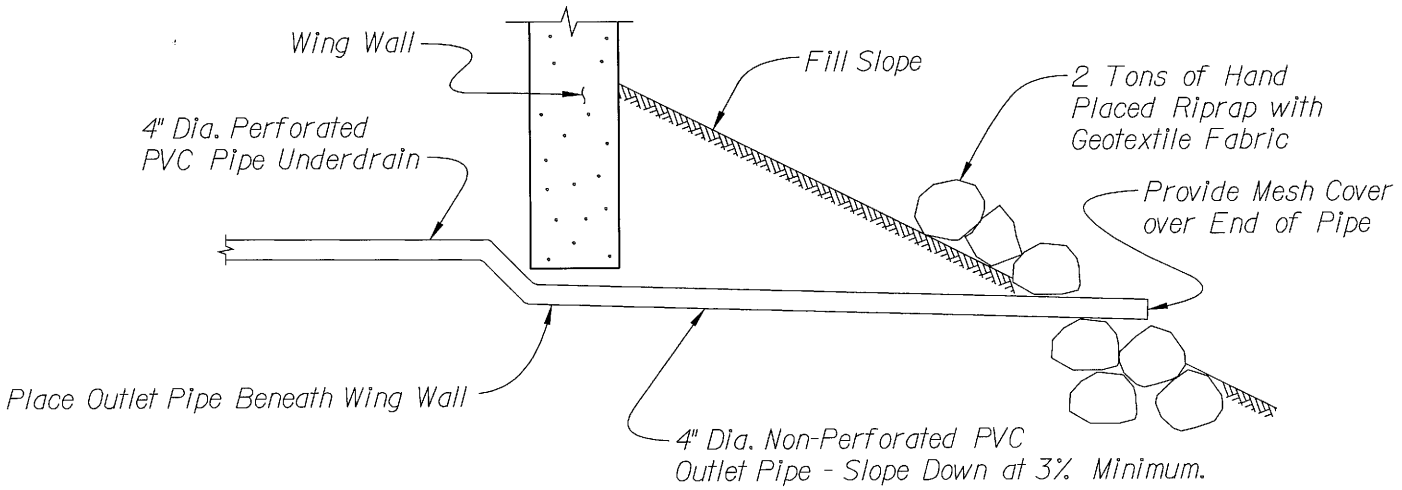



# AGGREGATE UNDERDRAIN DETAIL

Note:
4" Dia. Perforated PVC Pipe Underdrain shall comply with Section 802.07 of the Standard Specifications. Aggregate for underdrain shall be uncompacted #789 Coarse Aggregate and shall comply with Section 701.11 of the Standard Specifications. Filter Sock shall be Geotextile for Drainage Filtration, Class 1 Fabric (Protected) - See Special Provisions. All costs of furnishing and installing the 4" Dia. Perforated PVC Pipe Underdrain, Filter Sock, #789 Coarse Aggregate, 4" Dia. Non-Perforated PVC Outlet Pipe, Riprap, and Geotextile Fabric for Riprap shall be included in the unit price bid for "Aggregate Underdrain #789 With 4" Perforated Pipe for Structures." All costs associated with the construction of the Outlets shall be considered incidental and included in the unit price bid for "Aggregate Underdrain #789 With 4" Perforated Pipe for Structures."

Ⓐ Second Method Waterproofing shall extend the full length of the End Wall. See Section 814 of the Standard Specifications.

Ⓑ Slope Pipe a minimum of 0.5% to drain.




# PIPE OUTLET DETAIL

South Carolina
Department of Transportation

DM0305

April 25, 2005

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Standard Flat Slab Span Lengths

---

On all future projects, flat slab span lengths shall be limited to 22ft, 30ft, and 40ft, with the 30-foot span being the preferred length.

For projects that have been designed and detailed with flat slab span lengths other than those listed above, the Project Manager shall contact the appropriate Assistant Bridge Design Engineer to determine if revisions are needed.

DEM

Douglas E. McClure, P. E.
Bridge Design Engineer

DEM/slb
cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Bridge Maintenance Engineer
Director of CRM Operations
Program Development Engineer - East
Program Development Engineer - West
FHWA
File: PC/YIA

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South Carolina
Department of Transportation

DM0405

June 10, 2005

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Bridge Railing

---

Where accommodations are not required for pedestrians or bicyclists, the following criteria shall be used to determine the type of bridge railing:

- For bridges less than 50 feet in length and having straight wing walls (wing walls that are parallel to the centerline of bent), a reinforced concrete bridge railing with a vertical traffic face shall be used. See attached Detail.
- For bridges 50 feet or greater in length and for all bridges having parallel wing walls (wing walls that are parallel to the centerline of bridge), the Department's standard barrier parapet and the Department's standard barrier parapet transition shall be used.

For previously completed plans that do not conform to the requirements of this memorandum, the Bridge Design Engineer will, on a case-by-case basis, assess the need for revisions.

DEM

Douglas E. McClure, P. E.
State Bridge Design Engineer

Attachment
cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Bridge Maintenance Engineer
FHWA Structural Engineer
File: PC/BWB

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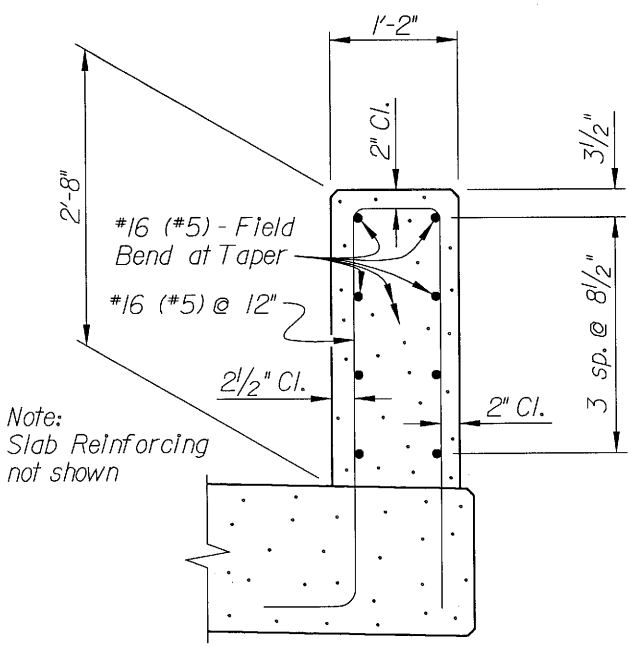
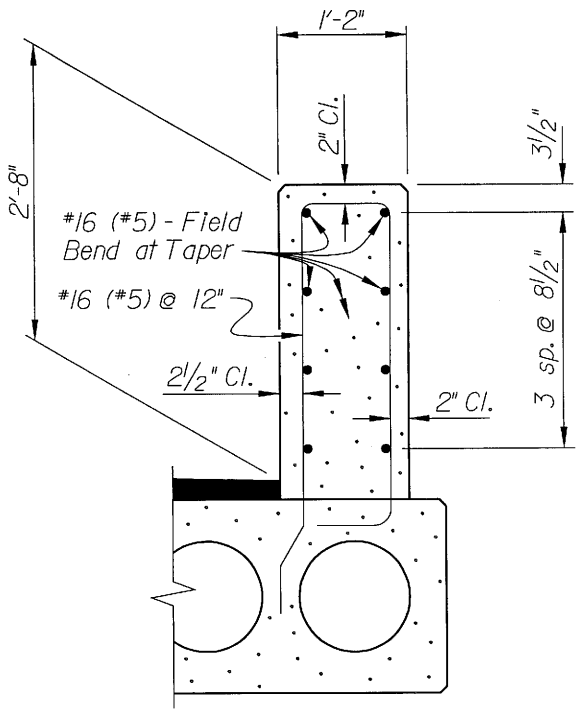
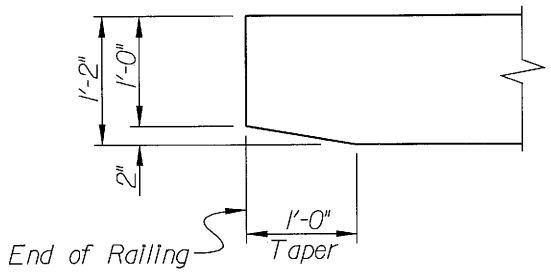



FLAT SLAB




CORED SLAB

## SECTION THRU RAILING




## PLAN VIEW AT END OF RAILING

# REINFORCED CONCRETE BRIDGE RAILING WITH VERTICAL TRAFFIC FACE

South Carolina
Department of Transportation

DM0505

December 12, 2005

# MEMORANDUM TO TEAM LEADERS AND CONSULTANTS

**SUBJECT:** Web Widths for Prestressed Concrete Beams

---

With the exception of the AASHTO Type II beam section, the minimum web width for prestressed concrete beams shall be 7 inches. This minimum web width will provide for standardization, enhance durability, and make fabrication easier.

Projects for which the design has already been substantially completed shall not be revised or redesigned to reflect this requirement.

Rocque L. Kneece, P. E.
Program Development Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Bridge Maintenance Engineer
FHWA Structural Engineer

File: PC/BWB

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South Carolina
Department of Transportation

DM0605

December 12, 2005

**MEMORANDUM TO TEAM LEADERS AND CONSULTANTS**

**SUBJECT:** Conduit in Barrier Parapets and Railing Walls

Effective with the April 2006 Letting, two 2-inch diameter conduits shall be detailed in all concrete bridge barrier parapets and concrete bridge railing walls as shown on the attached Detail. The following requirements shall be included in the bridge plans:

- Schedule 80 PVC rigid nonmetallic conduit shall be specified.
- The conduits shall extend 6 inches beyond each end of barrier parapet or railing wall.
- The ends of the conduits shall be capped with watertight covers.
- Expansion or deflection fittings, capable of accommodating anticipated movements and rotations, shall be specified at each open joint in the barrier parapet or railing wall.
- Pull boxes shall be detailed for any conduit lengths in excess of 300 feet.
- Pull boxes shall be non-metallic or galvanized steel and shall be mounted in the barrier parapet or railing wall, flush with the outside face.

Payment for the conduit shall be made under:

| Item No. | Bid Item | Unit | Quantity |
|---|---|---|---|
| 6060278 | 2.0" SCHEDULE 80 PVC CONDUIT | LF | |

The cost of furnishing and installing pull boxes shall be included in the unit price bid for the conduit.

For previously completed plans that do not conform to the requirements of this memorandum, the Surveys/Utilities Engineer will, on a case-by-case basis, assess the need for revisions.

Rocque L. Kneece, P. E.
Program Development Engineer

Attachment
cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
Bridge Maintenance Engineer
FHWA Structural Engineer
Surveys/Utilities Engineer

File: PC/BWB

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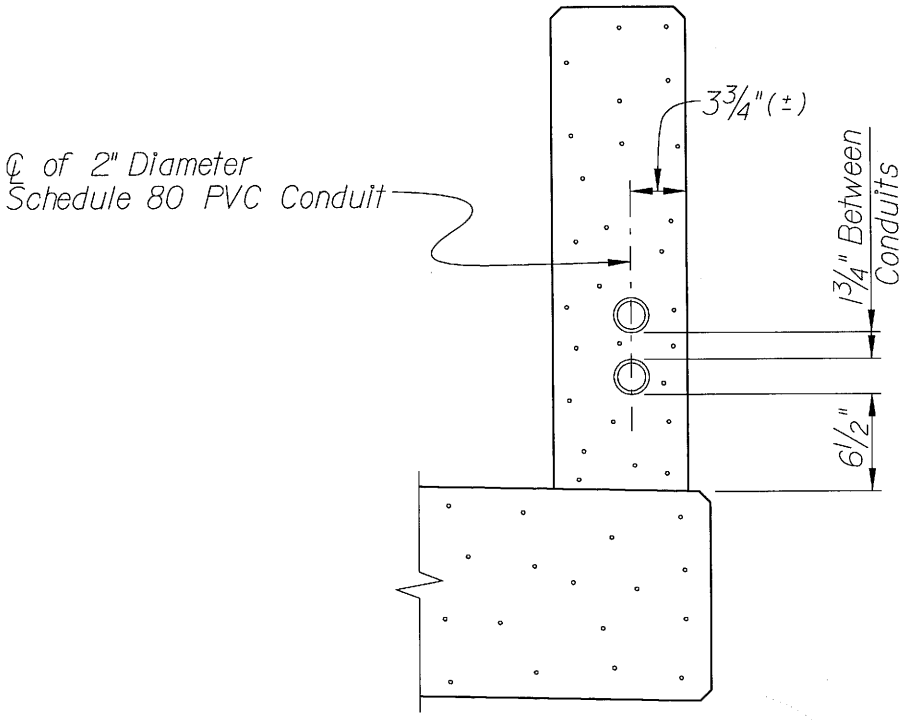


SECTION THROUGH BARRIER PARAPET
TRANSITION OR RAILING WALL

# CONDUIT PLACEMENT DETAIL