

**EXHIBIT 4A - GENERAL DESIGN CRITERIA**

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**EXHIBIT 4A – GENERAL DESIGN CRITERIA**

This document describes the general design considerations and criteria for the proposed roadway approaches, hydraulics, structures, and surveys.

Design standards shall be in accordance with the following design references as supplemented or amended by Sections 1, 2, 3, or 4 of this Exhibit:

- SCDOT Pre-Construction Survey Manual, August 2003
- 2003 SCDOT Highway Design Manual with updates effective as of the Final RFP release date and supplemented with AASHTO A Policy on Geometric Design of Highways and Streets, 2001
- AASHTO Roadside Design Guide, with 2006 Chapter 6 update, 3<sup>rd</sup> Edition
- SCDOT Requirements for Hydraulic Design Studies, May 2009
- SCDOT Standard Drawings, effective as of the Final RFP release date
- SCDOT Engineering Directive Memorandums, effective as of the Final RFP release date
- SCDOT Instructional Bulletins, effective as of the Final RFP release date
- AASHTO Guide for the Development of Bicycle Facilities, 1999
- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2004
- SCDOT Americans with Disabilities Act Transition Plan, January 2009
- SCDOT Roadside Plants to Avoid/Trees with Limitations on R/W, June 2008
- SCDOT Access and Roadside Management Standards, August 2008 with updates
- SCDOT Plan Preparation Guide, 2000
- SCDOT Standard Specifications for Highway Construction, 2007
- SCDOT Supplemental Specifications, effective as of the Final RFP release date
- SCDOT Supplemental Technical Specifications, effective as of the Final RFP release date
- SCDOT Qualified Product Lists, effective as of the Final RFP release date
- FHWA Manual on Uniform Traffic Control Devices, 2009
- The Rule on Work Zone Safety and Mobility
- SCDOT Traffic Signal design Guidelines, 2009 with updates
- Highway Capacity Manual, 2000
- SCDOT Traffic Engineering Guidelines
- SCDOT Preconstruction Advisory Memorandums, effective as of the Final RFP release date
- AASHTO “Highway Drainage Guidelines”
- SCDOT Bridge Design Manual, 2006
- SCDOT Bridge Design Memoranda, effective between July 1, 2006 and the Final RFP release date
- 2012 AASHTO LRFD Bridge Design Specifications, Sixth Edition (with 2013 Interim Revisions)
- SCDOT Geotechnical Design Manual, 2010 Edition (Version 1.1)
- SCDOT Seismic Design Specifications for Highway Bridges, 2008 (Version 2.0)

EXHIBIT 4A – PROJECT CRITERIA

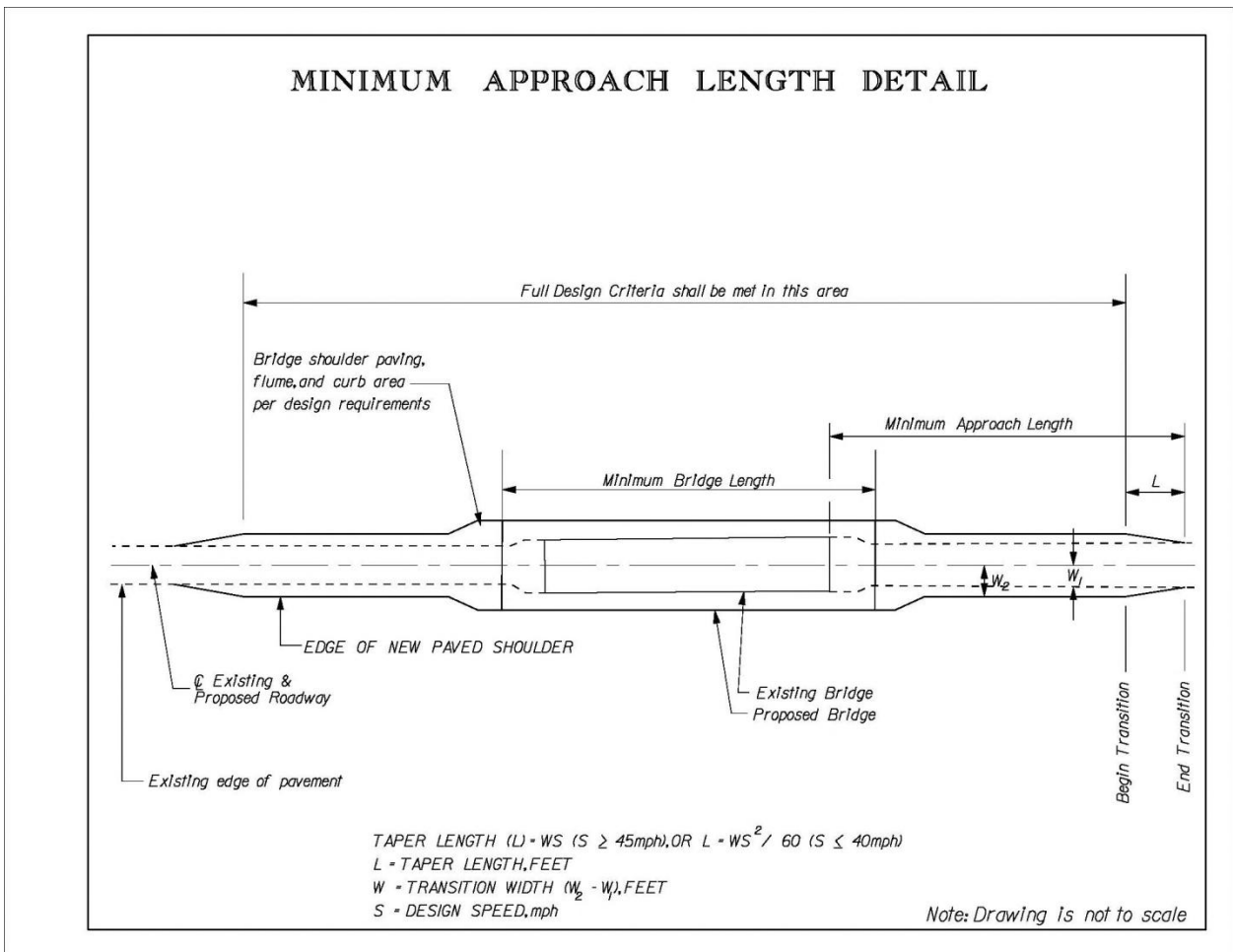
- SCDOT Bridge Design Drawings and Details, effective as of the Final RFP release date
- AASHTO/AWS D1.5M/D1.5:2010 Bridge Welding Code, with 2011 interims

Any variation in design from the included information shall require written approval from SCDOT.

**SECTION 1. ROADWAY**

Approach lengths provided are minimum values and specific designs may increase the length necessary for appropriate tie-in to the existing roadway. All design criteria shall be met along the approach lengths provided in the document with the exception of geometric design criteria within the transition area. Full width geometric design shall be maximized within the approach length limits in accordance with the Highway Design Manual and diagram below. Any work required by design outside of the established approach lengths provided shall not degrade the existing facility.

Paved shoulders shall be provided at full width to the point that the travel lanes are fully transitioned to the existing pavement width.



**a) RIGHT-OF-WAY**

Right of way widths will vary based on construction limits and NPDES requirements, except where noted in the Contract/Special Provisions.

In situations where additional shoulder width for guardrail is not achievable within the existing right-of-way, extra depth post guardrail will be allowed if the utilization of the extra depth post will eliminate the need to acquire new right-of-way.

**b) CLEAR ZONE**

Utilize distances for clear zone as defined in the 2006 AASHTO Roadside Design Guide. 30' is a limit specified by AASHTO for practicality and consistency, but the actual clear zone requirements are greater in some cases, i.e., high speed/high ADT areas and the outside of curves (See pages 3-6 and 3-7 of AASHTO Roadside Design Guide).

Protective barriers, in accordance with SCDOT standards, may be considered by the D/B team if impacts to utilities, impacts to wetlands, and/or acquisition of ROW are a result **solely** due to providing the published clear zone length.

**c) SIDE SLOPES**

**FILL SLOPES** - The SCDOT Highway Design Manual; Chapters 13 and 19-22 will be used.

**Fill Section**

Height of Fill	
≤ 5 ft	6:1
5 ft - 10 ft	4:1
≥10 ft	2:1

**CUT SLOPES**- The SCDOT Highway Design Manual, Chapter 13 & 14 will be used

**Ditch Section**

Shoulder (unpaved)	12:1
Shoulder (paved)	48:1 for shoulders less than or equal to 4' 24:1 for shoulders greater than 4'
Fore Slope	6:1
Back Slope	6:1 to 2:1

**d) SIGHT DISTANCE**

The SCDOT Highway Design Manual, Chapter 10 – Section 10.1 – Sight Distance will be used.

**e) BICYCLE AND PEDESTRIAN ACCOMMODATIONS**

Unless otherwise noted, pedestrian and bicycle accommodations shall be in accordance with the SCDOT Highway Design Manual, and supplemented with SCDOT Engineering Directive Memorandum 22 “Considerations for Bicycles;” AASHTO’s “Guide for the Development of Bicycle Facilities”, 1999 edition; and AASHTO’s Guide for the Planning, Design, and Operation of Pedestrian Facilities,” 2004 edition.

**f) EARTH RETAINING STRUCTURES**

See site specific criteria in Exhibit 4B for locations where MSE walls are not allowed.

**g) PAVEMENT MARKINGS**

The CONTRACTOR shall provide long line pavement markings in accordance with the schedule shown below:

<b>ADT</b>	<b>Approach Marking Material</b>	<b>Bridge Deck Marking Material</b>	<b>Line Width</b>
< 500	Fast Dry Paint	Fast Dry Paint	4"
≥ 500	Thermoplastic	Preformed Tape	4"
<u>Interstate</u>	Thermoplastic	Preformed Tape	6"

**h) TRAFFIC CONTROL**

The existing posted speed limit prior to construction shall be used to design the crossovers for all temporary detour shifts and staging for bridges not closed for construction.

**SECTION 2. HYDRAULICS**

**a) HYDROLOGY AND HYDRAULIC DESIGN**

The CONTRACTOR will develop hydrologic and hydraulic designs for the bridges and follow all guidelines for roadway approach surface drainage and sediment and erosion control with the methods, procedures, and criteria outlined in the “SCDOT Requirements for Hydraulic Design Studies”, May 26, 2009, the AASHTO "Highway Drainage Guidelines", Federal Highway Administration Technical publications, “Model Drainage Manual”,

“Interim Stormwater Control Manual” prepared for use by the Department, September 1993, the South Carolina Department of Health and Environmental Control Regulations 72-405 et. seq. entitled “Standards for Stormwater Management and Sediment Reduction” published in the S.C. State Register Volume 17, Issue 5, Part III, May 28, 1993, and SCDOT Supplemental Specifications.

At a minimum, all bridges shall maintain the existing bridge low chord elevation, exceed the length and opening of the existing bridge, and span the main channel unless otherwise noted in the Location Specific Criteria in Exhibit 4B.

**b) HYDRAULIC MODELING**

The CONTRACTOR will perform a preliminary analysis of the hydrologic/hydraulic characteristics of the existing and proposed bridge using the one dimensional computer program HEC-RAS. The hydraulic analysis will be coordinated with the bridge design such that increases to the design flood elevation will be minimized. The CONTRACTOR will determine the beginning and end stations, finished grade elevations and optimal span configurations for the new bridge based on this analysis. The CONTRACTOR will present a summary of their data collection, findings and proposed design procedure to the DEPARTMENT for review and comment prior to commencing design studies. All hydraulic studies shall be approved by the DEPARTMENT.

When a Federal Emergency Management Agency (FEMA) “No-Impact” Certification or Zone A study is required, the CONTRACTOR will prepare and submit all required data to the local community for approval. Once the local community has approved the hydraulic study, provide a copy of the hydraulic study, FEMA “No-Impact” Certification or Zone A study and the letter of approval from the local community to SCDOT.

When a FEMA Conditional Letter of Map Revision (CLOMR) is required, the CONTRACTOR will prepare and submit to SCDOT three copies of the completed CLOMR package. After the completion of the as-built plans, the CONTRACTOR will submit three copies to SCDOT of all documentation for a Letter of Map Revision (LOMR). All coordination, including obtaining the necessary studies and data, preparation of a NEPA re-evaluation along with correspondence and meetings with the local community and FEMA, etc. shall be the responsibility of the design build engineer.

For a CLOMR and LOMR, SCDOT will be responsible for submitting the completed packages to the local community planning commission and to FEMA. SCDOT will also be responsible for any FEMA review fees.

The bridge configuration must be set based on the triple profile which generally consists of cross sections cut 30’ left and right of the proposed centerline and one at the proposed centerline. However, the location of the offset cross sections shall be adjusted to best reflect stream alignment (i.e. more or less than 30 feet left and/or right) but excludes the existing roadway fill limits. No proposed fill can project into the channel. This means that even if the 2:1 slope intersects with natural ground prior to the channel the slope must be projected

through the ground line to an elevation below the bottom of the channel. This projection must not cross through either the offset or the centerline plot of the channel (triple profile).

The edge of the proposed piles, shafts, columns, or piers should be 5’ or more from the top of creek banks (channel overbanks).

**c) DRAINAGE DESIGN**

All closed storm drainage systems required for roadway drainage will be designed using the Geopak Drainage software. The design storm event will be determined in accordance with the “SCDOT Requirements for Hydraulic Design Studies, and all inlets will be placed and spaced in accordance with the SCDOT Inlet Spacing Charts. Separate pavement spread calculations will not be prepared.

**d) NPDES STUDY AND SCDHEC NOI**

The CONTRACTOR will provide stormwater management study and sediment and erosion control plans in the manner and form prescribed in the “SCDOT Requirements for Hydraulic Design Studies”, all current SCDOT guidelines and references within, including the latest applicable instructional bulletins, supplemental specifications, and supplemental technical specifications. The CONTRACTOR shall provide the Erosion Control Data Sheet. Permanent Water Quality Best Management Practices (BMPs) pertaining to the possible treatment of stormwater from this project, if verified to be a TMDL site, shall be included as part of this scope.

The CONTRACTOR will prepare and submit to the Department a permit package for the land disturbing activities associated with this project. The package will consist of a completed SC Department of Health and Environmental Control (SCDHEC) Notice of Intent (NOI) form along with all applicable documentation required as part of the permit, including a Stormwater Pollution Prevention Plan (SWPPP). The NOI shall be signed, in blue ink, and sealed by a professional engineer licensed in South Carolina.

**e) SCOUR STUDY**

The CONTRACTOR shall perform the scour analysis for these bridges in accordance with FHWA’s HEC-18, HEC-20, USGS SC Envelope Curves, and the Department’s guidelines, if necessary at the Department’s discretion design and prepare plans for remedial measures, which may include structural modification and/or channel stabilization measures per FHWA’s HEC-23. The CONTRACTOR will provide 100-year and 500-year scour profile information for the bridge using data developed by the HEC-RAS model. The 100-year and 500-year scour will be plotted to scale on the Triple Profile.

**f) FINAL DRAINAGE REPORT**

The CONTRACTOR will present a detailed study of the drainage to the Department. All final report, plans, drawings, calculation, etc. shall meet the approval of the Department prior to acceptance of the work. The Consultant will provide a design study report, signed and sealed by a professional engineer licensed in South Carolina, which includes the hydrologic and hydraulic design and scour analyses for the bridge, FEMA Flood Studies, roadway

surface drainage design, NPDES studies, TMDL information, Stormwater Management Study and sediment and erosion control recommendations and designs. All design calculations, field notes, drawing, reports and other material prepared under this agreement will be the property of the Department and will be turned over to the Department upon completion of the work.

**SECTION 3. STRUCTURES**

**a) BARRIER PARAPETS**

For bridges greater than 60 feet in length, the SCDOT Standard Barrier Parapet, 1'-6" in width, shall be used. The SCDOT Standard Barrier Parapet Transition shall be used at all barrier ends where a thrie beam guardrail bridge connector is required. The height of the barrier parapet shall be increased as necessary to maintain the bottom three-inch lip after the placement of any asphalt overlay.

For bridges 60 feet or less in length, a reinforced concrete wall with a vertical face may be used as permitted by Section 17.6.1.2 of the SCDOT Bridge Design Manual. The top of the wall shall be 32" above the top surface of any asphalt overlay.

**b) PRESTRESSED CONCRETE GIRDERS**

If pre stressed concrete girders are selected as the superstructure type, the pre stressed concrete girders shall be either I-beams with a cast-in-place concrete deck or modified bulb-tee beams with a cast-in-place concrete deck.

**c) FINAL FINISH OF EXPOSED CONCRETE SURFACES**

Final surface finish will not be required on this project.

**d) STAY-IN-PLACE BRIDGE DECK FORMS**

Permanent stay-in-place steel bridge deck forms for concrete deck slabs may be used at the CONTRACTOR's option. Fillers shall not be used in the flutes of the stay-in-place forms. Form flutes shall be filled with concrete as the deck slab is placed.

**e) CONCRETE STRENGTH**

In pre stressed concrete beams, concrete strengths up to 10,000 psi maximum may be used. In precast, pre-stressed cored and solid slab sections, concrete strengths up to 8,000 psi maximum may be used. In pre stressed concrete piles, concrete strengths up to 8,000 psi maximum may be used.

All cast-in-place bridge components shall be constructed with concrete having a minimum compressive strength of 4000 psi. All pre-cast concrete bridge components shall be constructed with concrete having a minimum compressive strength of 5000 psi.



**f) GROOVED SURFACE FINISH**

A Grooved Surface Finish shall be applied to all concrete decks in accordance with Subsection 702.4.16 of the Standard Specifications for Highway Construction

**g) PILE SIZES AND TYPES**

Minimum pile sizes and acceptable pile types are listed below. No other pile types will be permitted.

Pile Type	Minimum Size
Steel H-Piles	HP12x53
Steel Pipe Piles	12" Diam. (min. wall thickness= ½ inch)
Pre stressed Concrete Piles	18" Square
Pre stressed Concrete Pile Points	W8x58

**h) LIGHTWEIGHT CONCRETE**

**Lightweight concrete will not be permitted.**

**i) STEEL PIPE CONNECTION DETAILS**

The pile connection detail described in Item 2 of Section 19.2.6.3 of the SCDOT Bridge Design Manual shall not be used for this project. Steel pipe piles shall be terminated at the bottom of the cap or footing and the piles must be connected to the cap or footing using a reinforced concrete infill, with the reinforcing extending into the cap or footing.

**j) BENTS**

Interior pile bents shall consist of a single row of vertical piles. Interior Pile Bents shall not be used to support any span having a length that exceeds 70 feet. Lengths of piles above the final ground line, and therefore exposed to the elements, shall be either prestressed concrete piles or steel piles encased in a protective cover of reinforced concrete. For protection of the pile, concrete portions of piles shall extend a minimum of 2' below final ground line or predicted scour line, whichever is deeper.

Interior Bents supporting spans in excess of 70' shall be constructed of reinforced concrete columns supported on drilled shafts, spread footings, or pile footings.

The tops of footings shall be set at or below ground elevation.

Bent caps may be sloped to account for superelevation, if it is required for the bridge geometry. Bent caps shall not be cast sloped in order to match normal crown in bridge geometry.

**k) BRIDGE DECKS**

Bridge decks supported by girders or beams shall be reinforced cast-in-place concrete with reinforcing steel.

Asphalt overlays will not be allowed on girder or beam supported bridges or flat slab bridges.

**l) PRESTRESSED CONCRETE CORED SLAB AND SOLID SLAB UNITS**

For structures having cored slab and/or solid slab spans, provide an asphalt overlay and a bridge deck waterproofing in conformance with the Standard Specifications. For structures having cored slab and/or solid slab end spans and no approach slabs, provide end walls for the full length of the end bents and seal the joint between each end wall and end span.

Cored slab and/or solid slab bridge spans shall be placed level or in superelevation along the bent caps, as applicable. Normal crown in bridge geometry shall be accommodated by building up the asphalt overlay.

The thickness of the asphalt overlay shall be varied across the lengths of spans and bridge to meet the finished grade requirements across the bridge. However, a minimum asphalt overlay thickness of 2” shall be maintained at all locations on the cored slab and solid slab decks.

**m) CULVERTS**

Culverts will not be permitted as substitutes for bridges.

It is not anticipated that reinforced concrete box culverts will be required as drainage structures in the roadway approaches to the bridges. If the CONTRACTOR determines the need for reinforced concrete box culverts in the roadway approaches, then he shall submit a written request to SCDOT for approval of use and as to what criteria that he is to use in the design and construction of the reinforced concrete box culverts. At a minimum, the contractor shall use AASHTO design guidelines.

**n) POST-TENSIONING**

External post-tensioning will not be permitted.

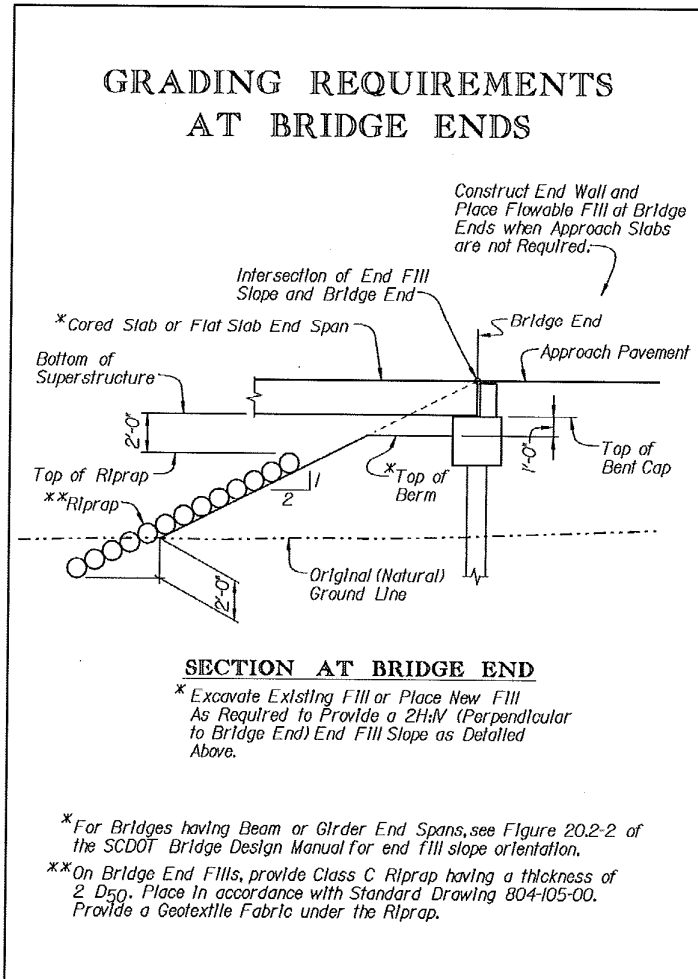
**o) CROSSHOLE SONIC LOGGING (CSL) TESTING**

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CSL testing is required for all drilled shafts. **SCDOT** will be responsible for CSL testing. However, the **CONTRACTOR** will be responsible for placing CSL tubes in all drilled shafts as preparation for CSL testing.

### p) GRADING REQUIREMENTS

Bridge end fills shall be constructed in accordance with the *Grading Requirements at Bridge Ends* as provided below:



### q) APPROACH SLABS

Approach slabs will be required for all permanent bridges.

## SECTION 4. SURVEYS

All field surveys needed for this Project will be performed under the direct supervision of a South Carolina Licensed Professional Land Surveyor. All surveys related to the setting of horizontal control, vertical control, aerial photography and mapping will comply with the Department's Preconstruction Survey Manual.

State Plane coordinates shall be utilized in accordance with the survey manual.

## **SECTION 5. GEOTECHNICAL**

### **a) DYNAMIC LOAD TESTING WITH PILE DRIVING ANALYZER (PDA) AND STATIC LOAD TESTING**

The CONTRACTOR will be responsible for dynamic and static load testing of all foundations, if required by design.

If driven piles are used and if required by the design, PDA testing shall be performed. The CONTRACTOR shall provide a Pile Installation Plan (PIP) that shall include any necessary PDA testing. The testing program shall at a minimum include the Bent and Pile number of each pile to be tested as well as the number of piles to be tested. The number of piles shall conform to the SCDOT Geotechnical Design Manual (GDM).

If drilled shafts are used and if required by the design, a non-production drilled shaft shall be tested prior to the design and construction of any production drilled shafts. The testing shall consist of either a static load test (bi-directional Osterberg Cell), a rapid load test (Statnamic), or a high-strain load test (Apple). The CONTRACTOR shall provide a Drilled Foundation Installation Plan (DFIP) that shall also include which load test procedure will be used (i.e. static, rapid, or high strain). The number of load tests shall conform to the requirements of the latest version of the GDM.

All testing reports whether for driven piles or drilled shafts shall bear the legible seal, signature and date of the testing firm's engineer, who shall be registered as a Professional Engineering in the State of South Carolina. The CONTRACTOR'S designer shall review and approve, in writing, all load test reports prior to submitting the reports to SCDOT for review and acceptance or comment. In the case of a shaft load test, comments made by SCDOT shall be reviewed and rectified by the CONTRACTOR'S designer prior to the results of the load test be used in design.

### **b) GEOTECHNICAL DESIGN**

The following Geotechnical Subsurface Data Reports (GSDR) have been provided in Attachment B for geotechnical information.

- Geotechnical Data Summary Report for S-12-77 over Fishing Creek April 12, 2011
- Geotechnical Data Summary Report for S-12-141 over Rocky Creek April 12, 2011
- Summary of Geotechnical Investigation for S- 200 over Wateree Creek August 6, 2007
- Geotechnical Data Summary Report for S-200 over Wateree Creek November 15, 2011

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- Geotechnical Data Summary Report for SC-9 over Catawba River April 12, 2011
- Geotechnical Data Summary Report for SC-200 over Cane Creek April, 12, 2011
- Report of Geotechnical Exploration for S-46-22 over Steele Creek June 30, 1994
- Geotechnical Baseline Report for S-46-64 over Allison Creek May 9, 2011
- Geotechnical Baseline Report for S-46-347 over Stony Fork Creek May 9, 2011
- Geotechnical Baseline Report for S-46-732 over Calabash Branch May 9, 2011
- Geotechnical Data Summary Report for I-85 over Norfolk Southern RR March 8, 2011
- Summary of Geotechnical Investigation for S-46-103 over Fishing Creek June 7, 2007
- Results of Soils Investigation for S-11-41 over Peoples Creek July 18, 2012

All geotechnical design and testing shall comply with the requirements of the SCDOT GDM and the Special Provisions listed in Exhibit 5. Any ground modification, if required by the design, used on this project shall comply with the requirements set forth in the Exhibit 5 Special Provision. Geotechnical information provided as part of this RFP is intended for use in the design of this project. The CONTRACTOR shall confirm that provided geotechnical information meets the requirements for a geotechnical investigation for this specific project as contained in the GDM. If the requirements are not met, then the CONTRACTOR shall provide additional geotechnical investigation to meet the geotechnical requirements for this specific project.

### c) SEISMIC DESIGN

Final ADRS curves for each bridge have been supplied in Exhibit 4B. The ADRS curves shall be used in the design of the embankments and bridge structure and are hereby incorporated into and made part of the contract documents. It should be noted that the shear wave velocity models and associated Site Classes are defined based on data obtained at the existing ground surface and depth to motion has not been considered.

## **SECTION 6. DESIGN DELIVERABLES**

The CONTRACTOR is solely responsible for the accuracy, completeness, and constructability of the submitted deliverables before and after review. The CONTRACTOR is reminded that the SCDOT reviews the working drawings and design calculations only to insure that the specifications have been addressed.

All submittals to SCDOT shall be subjected to a thorough QA/QC review by the CONTRACTOR prior to submittal and shall be signed and sealed by the Engineer of Record who shall be licensed and registered as a Professional Engineer in the State of South Carolina

### a) ROADWAY DESIGN DELIVERABLES

#### **Preliminary Plans**

Preliminary plans shall include, at a minimum: roadway typical section, roadway plan and profile, cross sections, drainage features, proposed right-of-way, construction staging details, and preliminary geotechnical reports.

CONTRACTOR shall also provide any design calculations requested in writing by SCDOT.

**Right of Way Plans**

Right of Way plans are not a required submittal. However, if right of way is required and the CONTRACTOR wishes to pursue right of way acquisition prior to Final Plan submittal, CONTRACTOR has the option to submit Right of Way Plans.

Right of Way plans shall include, at a minimum: Right of Way data, roadway typical section, roadway plan and profile, cross sections, drainage features, existing Right of Way, and proposed new Right of Way requirements.

**Final Plans**

Final plans shall include, at a minimum: roadway typical section, roadway plan and profile, cross sections, drainage features, sediment and erosion control features, existing right-of-way, proposed right-of-way, construction staging details, proposed barrier locations, and final geotechnical reports. CONTRACTOR shall also provide any design calculations requested in writing by SCDOT.

As – Built Construction Plans shall adhere to Road Design Reference Material for Consultant Prepared Plans, latest edition for Construction Plans.

**b) HYDRAULIC DESIGN DELIVERABLES**

**Preliminary Hydraulic Design Submittal**

The CONTRACTOR shall provide the Hydraulic Design Calculations to SCDOT with the Preliminary Plans. Hydraulic Design Calculation submittal shall include calculations for drainage structures, calculations for sediment and erosion control, and bridge hydraulic models.

**Final Hydraulic Design Submittal**

The CONTRACTOR shall provide the following to the Department with the Final Plan submittal:

- Eight (8) signed, completed copy of the SCDHEC Notice of Intent (NOI),
- Eight (8) copies of the Final Drainage Report and Stormwater Management Report,
- Eight (8) complete “No-Rise” Certification, if applicable, and

- Eight (8) complete CLOMR and LOMR FEMA Packages, if applicable.

c) **STRUCTURAL DESIGN DELIVERABLES**

**Preliminary Structural Design Plans**

Preliminary structural plans shall include, at a minimum, all documents and calculations described in Chapter 3 of the SCDOT Bridge Design Manual. Partial submittal of the required contents of the Preliminary set of plans will not be allowed. A Preliminary Geotechnical Report shall be submitted with the preliminary structural design plans. No final design shall begin until all comments are resolved and SCDOT acceptance is given.

**Final Structural Design Plans**

Final Structural Design Plans shall include, at a minimum, all documents, reports, and calculations described in Chapter 3 of the SCDOT Bridge Design Manual. Three copies of the final geotechnical report shall be included with the final plans submittal.

Final plan submittals to SCDOT shall be signed and sealed by the State of South Carolina licensed Professional Engineer of record. CONTRACTOR shall provide any design calculations requested in writing by SCDOT. No construction shall begin until all comments are resolved and SCDOT acceptance is given.

**Release for Construction (RFC) Plans**

For roadway and structural plans, CONTRACTOR shall provide two full size sets of RFC Plans to SCDOT. RFC Plans shall be inserted into plan folders as detailed in the SCDOT bridge design manual and the SCDOT plan and preparation guide.

**Foundation Installation Plans**

The CONTRACTOR shall prepare Drilled Foundation Installation Plans (DFIP) and/or Pile Installation Plans (PIP) in accordance with the Standard Specifications for Highway Construction. The CONTRACTOR's designer shall review and approve all DFIP and PIP (including pile driving criteria) prior to submitting the foundation installation plans to SCDOT for review and acceptance. SCDOT will review the foundation installation plans and provide either acceptance or comments. Comments must be resolved by the CONTRACTOR's designer prior to re-submittal to SCDOT. The CONTRACTOR is reminded that the SCDOT reviews the DFIP and/or the PIP only to insure that the specifications have been addressed.

**Shop Plans**

Shop plans, as defined by the Standard Specifications for Highway Construction, shall be submitted to the CONTRACTOR's designer for review and approval. All approved shop plans shall be routed to SCDOT for review and distribution. Shop plan submittals shall meet the criteria of Subsection 725.1.1 of the Standard Specifications for Highway Construction.

After reviewing the plans, SCDOT will either distribute the plans or provide comments. Comments shall be reviewed and approved by the CONTRACTOR’s designer prior to the plans being resubmitted to the SCDOT for further review. Shop plans shall be stamped “approved” by the CONTRACTOR’s designer prior to submittal to SCDOT and shall be stamped and distributed by the SCDOT prior to commencing fabrication and/or construction/erection. All design calculations and shop plans shall bear the legible seal, date, and signature of the responsible engineer registered as a Professional Engineer in the State of South Carolina.

**Working Drawings**

Working drawings and design calculations, as defined by the Standard Specifications for Highway Construction, shall be submitted to the CONTRACTOR’s designer for review and approval. All approved working drawings and design calculations shall be routed to the SCDOT for review and distribution. Working drawings and design calculation submittals shall meet the criteria of Subsection 725.1.2 of the Standard Specifications for Highway Construction. SCDOT will review the drawings and calculations and either provide acceptance of the drawings as prepared or provide written comments to the drawings. Comments shall be reviewed by the CONTRACTOR’s designer prior to re-submittal to the SCDOT for further review. Working drawings and design calculations shall be stamped “approved” by the CONTRACTOR’s designer prior to submittal to SCDOT and shall be stamped and distributed by the SCDOT prior to commencing construction/erection. All design calculations and working drawings shall bear the legible seal, date, and signature of the responsible engineer registered as a Professional Engineer in the State of South Carolina.

**d) GEOTECHNICAL DESIGN DELIVERABLES**

The CONTRACTOR shall prepare a preliminary and final geotechnical engineering report for all bridges, retaining walls, roadway embankments, culverts and any other structures constructed for this Project. The reports shall, as a minimum, contain all that is described in Chapter 21 of the *SCDOT Geotechnical Design Manual*. Also, the reports shall have design details and plan notes along with data that are consistent with that shown in the preliminary and final bridge and road plans. In addition, the CONTRACTOR’s designer shall prepare the required geotechnical roadway plan sheets that clearly detail any geotechnical requirements outlined in the reports. The reports and plans shall bear the legible seal, date, and signature of the responsible engineer registered as a Professional Engineer in the State of South Carolina. Each report shall be submitted to SCDOT along with the preliminary or final bridge or road plan submittal. The review of the reports and plans will be performed in accordance with the submittal plan review process. Three copies of each report shall be provided to SCDOT. In addition, the Contractor shall provide a complete copy of the final report in PDF format to SCDOT. The CONTRACTOR shall also submit three copies of each dynamic and/or static foundation load test report to SCDOT. After construction of the foundations is complete, the CONTRACTOR shall provide a supplement to the report containing the actual field conditions encountered and as-built foundation data and information.