NOTICE TO PROPOSERS

August 21, 2015

NOTICE TO PROPOSERS - Enclosed is Addendum #1 to the Request for Proposals (RFP) package for the I-77 Widening and Rehabilitation from MM 15 to 27, a Design Build Project. The information provided in this notice and the addendum shall be made part of the contract documents.

The yellow highlights identify the changes from the Industry Review RFP to the Final RFP. The green highlights identify the changes associated with Addendum #1.

This addendum is being issued in order to provide clarification and additional information for the project and includes the following documents:

- NOTICE TO PROPOSERS
- NOTICE OF RECEIPT
- Pages to be inserted into Request for Proposals

The following pages should be inserted into previously provided copies of the RFP and the old page of the same number removed and disregarded. A summary of the pages included follows:

Request for Proposals

- Pages 16, 22, & 23

Exhibit 3– Scope of Work

- Pages 1 through 3

Exhibit 4a – Roadway Design Criteria

- Pages 1 through 8

Exhibit 4b – Structures Design Criteria

- Pages 4 through 6

Exhibit 4c – Pavement Design Criteria

- Pages 1 through 4

Exhibit 4e– Hydraulic Design Criteria

- Page 8

Exhibit 5 – Special Provisions

- Pages 1, 2, 46, 63, 76 through 91, & 109 through 121

NOTICE OF RECEIPT
ADDENDUM #1

The information in this addendum shall be made part of the contract documents. PROPOSERS are instructed to incorporate the information into the previously provided RFP documents.

PROPOSERS are required to sign this document and enclose it with their Technical Proposal and/or Statement of Intent. Signed receipt of this document by The South Carolina Department of Transportation serves as confirmation that the PROPOSER has received and incorporated Addendum #1 into the contract documents.

Confirmation Statement:

I, the PROPOSER confirm that I have received this addendum package and have incorporated the information provided in the addendum into the contract documents.

_____ _____

PROPOSER's Signature Date

_____

Printed Name

For:_____

Design Build Team Name

include proposed locations of median and sideline barriers as well as the proposed barrier types (i.e. cable, guardrail, concrete, etc.) at those locations.

c. Conceptual Plans showing the development and reduction/merging of the new lanes at each end of the widened section of I-77. Conceptual Plans showing the new lanes interacting with the SC 277 Interchange and the termination of the northbound SC 277 onramps. Conceptual Plans showing improvements to I-77 acceleration/deceleration lanes at onramps and off-ramps within the widening sections. At a minimum, the plans should include proposed taper lengths and pavement markings.

5. Provide Conceptual Maintenance of Traffic Plans depicting the number of construction stages and a staging narrative within those plans to include duration of each stage. The plan scale and detail should be appropriate for demonstrating transitions, directional flow, and all items below.

a. the Team's plan for access to the median work zone (ingress and egress) including access spacing
b. the Team's plan for maintaining ramp traffic
c. the Team's plan for notifying the traveling public of upcoming stages
d. the Team's plan for maintaining I-77 and US 21 mainline and ramp traffic while replacing the ~~approach~~ transitional slabs on the southbound I-77 bridge

6. Conceptual bridge plans for the mainline I-77 bridges which shall consist of:

a. Plan and profile of each bridge showing horizontal and vertical clearances (not required for US 21 overpass)
b. Superstructure cross sections and substructure elevations showing pertinent structural elements and dimensions (not required for US 21 overpass)
c. Construction staging plan for bridge and approach slab work including dimensions of temporary roadway widths both on the bridges and, where applicable, on the roadway beneath the bridges
~~d. Horizontal and vertical plan for formwork/falsework~~
e. Bridge construction access plan showing areas used to access the bridge work and showing proposed equipment and material handling locations and staging

Note: Drawings and plans requested as part of the Technical Proposal or included by the Proposer to help explain commitments shall not count against the specified page limit and can be included in the Appendix.

B. Cost Proposal

PROPOSERS shall complete the Cost Proposal Bid Form provided at the end of this document. The Cost Proposal Bid Form shall be sealed in a separate envelope and delivered as part of the Cost Proposal per the Milestone Schedule.

C. Confidentiality of Proposals

Failure to request a debriefing within the three (3) business day period waives the opportunity for a debriefing.

IX. All PROPOSERs must visibly mark as "CONFIDENTIAL" each part of their submission that they consider to contain proprietary information the release of which would constitute an unreasonable invasion of privacy. All unmarked pages will be subject to release in accordance with law. **In the Technical Proposal appendix, PROPOSER shall include a list of page numbers that contain confidential and/or proprietary information. Failure to include this list in the Technical Proposal appendix waives the confidentiality protection and subjects the information to disclosure in accordance with the law.** PROPOSER should be prepared, upon request, to provide justification of why such materials should not be disclosed under the South Carolina Freedom of Information Act, S.C. Code Section 30-4-10, et seq.

X. PROPOSER shall be held responsible for the validity of all information supplied in its proposal, including that provided by potential subcontractors. Should subsequent investigation disclose that the facts and conditions were not as stated, the proposal may be rejected or contract terminated for default if after award, in addition to any other remedy available under the contract or by law.

XI. PROPOSER, by submitting a proposal, represents that it has read and understands the RFP, its exhibits, attachments and addendums, and that its proposal is made in compliance with the criteria of the RFP. PROPOSERS are expected to examine the RFP, its exhibits, attachments and addendums thoroughly and should request an explanation of any ambiguities, discrepancies, errors, omissions, or conflicting statements therein. Failure to do so will be at the PROPOSER's risk. PROPOSER assumes responsibility for any patent ambiguity in the RFP, its exhibits, attachments and addendums that PROPOSER does not bring to SCDOT's attention.

XII. No proposal guaranty in the form of a Bid Bond is required for this procurement.

XIII. Proposal Acceptance Period - By submitting a proposal, PROPOSER agrees to hold the proposal offer available for acceptance a minimum of ninety (90) calendar days after the Bid Opening date.

XIV. A **business day** is hereby defined as a day in which SCDOT Headquarters is open for business.

XV. Iran Divestment Act - By submission of this bid/proposal, the bidder/proposer as the prime contractor/consultant/vendor does hereby certify his compliance to the following:

CERTIFICATION: (a) The Iran Divestment Act List is a list published pursuant to Section 11-57-310 that identifies persons engaged in investment activities in Iran. Currently, the list is available at the following URL: http://procurement.sc.gov/PS/PS-iran-divestment.phtm (.) Section 11-57-310 requires the government to provide a person ninety days (90) written notice before he is included on the list. The following representation, which is required by Section 11-57-330(A), is a material inducement for the SCDOT to award a contract to you. (b)

By signing your Offer, you certify that, as of the date you sign, you are not on the then-current version of the Iran Divestment Act List. (c) You must notify the SCDOT immediately if, at any time before posting of a final statement of award, you are added to the Iran Divestment Act List.

ONGOING OBLIGATIONS: (a) You must notify SCDOT immediately if, at any time during the contract term, you are added to the Iran Divestment Act List. (b) Consistent with Section 11-57-330(B), you shall not contract with any person to perform a part of the Work, if, at the time you enter into the subcontract, that person is on the then-current version of the Iran Divestment Act List.

OPTION TO RENEW RESTRICTION: Contractor acknowledges that, unless excused by Section 11-57-320, if the contractor is on the then-current Iran Divestment Act List as of the date of any contract renewal, the renewal will be void ab initio.

VIII. MILESTONES

Provide RFP for Industry Review to Selected Short-list PROPOSERS	Wednesday, May 27, 2015
Deadline Clarifications/Comments to be submitted by PROPOSERS	Wednesday, June 10, 2015
First Confidential One-on-One meetings with PROPOSERS for RFP for Industry Review Clarifications/Comments	Tuesday, June 23, 2015
Issue Final RFP	Thursday, July 23, 2015
Preliminary ATC Submittals (Start)	Thursday, July 23, 2015
Confidential RFP Questions and Preliminary ATC (finish) to be submitted by PROPOSERS	Wednesday, August 5, 2015
Second Confidential RFP and ATC One-on-One meetings with PROPOSERS	Wednesday, August 12, 2015
Begin Formal ATC Process	Wednesday, August 12, 2015
All Formal ATC's SHALL be submitted prior to	4:00 PM EDT on Thursday, August 27, 2015
Submittal of Proposals prior to	4:00 PM EDT on Wednesday, September 30, 2015
Bid Opening(with team representatives present)	Thursday, October 29, 2015 at 2:00 PM EDT at SCDOT HQ Room 306
Notification of Selection	November 2015
Award/Contract Execution	SCDOT Commission Meeting January 2016

1. Project Summary

This Project consists of widening northbound and southbound I-77 in Richland County with one (1) additional lane in each direction beginning between SC 12 (Percival Road) and I-20 and terminating near the S-52 (Killian Road) interchange. The project also includes interstate rehabilitation along southbound I-77 from Percival Road to S-59 (Blythewood Road) and interstate rehabilitation along northbound I-77 from Percival Road to Killian Road. The pavement for the Project consists of both concrete and asphalt. The CONTRACTOR shall complete the work in accordance with the Agreement and all subsequent exhibits. ~~At the specified locations referenced to the existing I-77 plans provided in **Attachment B**, the Project includes, but is not limited to, the following general items that are further detailed in subsequent exhibits:~~ The following is a list of major construction items involved in the Project. This list is not intended to comprise all components of the Project nor is it intended to be a complete description of the criteria for each item required. For a full understanding of the scope of the Project and the criteria of the construction items needed for this Project, please review Exhibit 4.

I-77 Mainline Southbound from Station 1160+00 (approx. MM 14.9) to 1170+00 (approx. MM 15):

- extend/install new guardrail at locations that do not meet current standards
- Pave under guardrail adjacent to paved shoulders

I-77 Mainline Northbound & Southbound from Station 1170+00 (approx. MM 15.0) to 1302+50 (approx. MM 17.5):

- Remove existing paved shoulders in median and add one (1) travel lane with paved shoulder toward the median in each direction
- Mill existing lanes and overlay with HMA and OGFC
- Overlay existing ramps with HMA
- Adjust existing ramp tapers, gores, and storage lanes
- Adjust ~~and/~~or improve shoulders, side slopes, ditch banks and paved ditches and rehabilitate or reconstruct paved ditches within present right-of-way to ensure positive drainage
- Replace damaged and/or substandard guardrail and extend/install new guardrail and concrete bridge pier protection at locations that do not meet current standards
- Pave under guardrail adjacent to paved shoulders
- Install new median cable barrier
- Widen and repair existing I-77 mainline bridges
- Install milled-in rumble strips
- Install new and/or upgrade signing and pavement markings

- Repair, ~~and/or~~ replace, or increase capacity of stormwater drainage systems ~~appurtenances~~
- Provide or improve clear zone, sight distance, and roadside safety ~~Clearing and improving I-77 clear zone~~
- Re-install signal loop detectors that are damaged by construction ~~along ramps~~
- Retain the existing vegetated buffer along the west side of southbound I-77 from approximate STA 1178+00 to 1183+00

I-77 Mainline Northbound & Southbound from Station 1302+50 (approx. MM 17.5) to 1510+00 (approx. MM 21.5):

- Remove existing paved shoulders in median and add one (1) travel lane with paved shoulder towards the median in each direction
- Patch existing concrete lanes and/or paved shoulders in various locations
- Overlay existing concrete pavement with HMA and OGFC
- Overlay existing ramps with HMA
- Cross Slope Verification/Correction
- Adjust existing ramp tapers, gores, and storage lanes
- Adjust ~~and/~~or improve shoulders, side slopes, ditch banks and paved ditches and rehabilitate or reconstruct paved ditches within present right-of-way to ensure positive drainage
- Replace damaged and/or substandard guardrail and extend/install new guardrail and concrete bridge pier protection at locations that do not meet current standards ~~Install new guardrail~~
- Pave under guardrail adjacent to paved shoulders
- Install new median cable barrier
- Widen and repair existing I-77 mainline bridges
- Repair ~~and/or replace~~ control of access fencing
- Install new and/or reset existing signing and install new pavement markings
- Repair, ~~and/or~~ replace, or increase capacity of stormwater drainage systems ~~appurtenances~~
- Provide or improve clear zone, sight distance, and roadside safety ~~Clearing and improving I-77 clear zone~~
- Re-install signal loop detectors that are damaged by construction ~~along ramps~~
- Install milled-in rumble strips

I-77 Mainline Southbound from Station 1510+00 (approx. MM 21.5) to 1801+15 (approx. MM 27.0):

- Patch existing concrete lanes and/or shoulders in various locations

- Overlay existing lanes with HMA and OGFC
- Overlay existing ramps with HMA
- Cross Slope Verification/Correction
- Adjust ~~and/~~or improve shoulders~~,~~ and side slopes~~, ditch banks and paved ditches and rehabilitate or reconstruct paved ditches~~
- Replace damaged and/or substandard guardrail and extend/install new guardrail and concrete bridge pier protection at locations that do not meet current standards ~~Install new guardrail~~
- Pave under guardrail adjacent to paved shoulders
- ~~Install new median cable barrier~~
- Repair existing I-77 mainline bridge deck
- Repair ~~and/or replace~~ control of access fencing
- Install new pavement markings
- ~~Where the work requires existing pipes to be extended, repair and/or replace storm drainage appurtenances~~
- Provide or improve clear zone, sight distance, and roadside safety ~~Clearing and improving I-77 clear zone~~
- Re-install signal loop detectors that are damaged by construction ~~along ramps~~
- Install milled-in rumble strips

The Project includes widening and rehabilitation of the following ten (10) bridges and approach/transitional slabs:

- I-77 Northbound and Southbound Overpasses over I-20 & I-20 Ramp (two (2) bridges)
- I-77 Northbound and Southbound Overpasses over I-77 Ramp E (File 40.835.6 in existing plans) (two (2) bridges)
- I-77 Northbound and Southbound Overpasses over Windsor Lake Boulevard (S-1196) (two (2) bridges)
- I-77 Northbound and Southbound Bridges over Windsor Lake (two (2) bridges) and replacement of one (1) approach slab
- I-77 Northbound and Southbound Overpasses over Little Jackson Creek/Edgewater Drive (S-1722) (two (2) bridges) and replacement of all transitional slabs

The Project includes repair/rehabilitation of the following bridge deck and replacement of transitional slabs:

- I-77 Southbound Overpass over US 21 (one (1) bridge)

1.0 GENERAL

The Contractor shall prepare the roadway geometric design for the project using the design standards and criteria that are most appropriate based on design speed, functional classification, design traffic volumes, right-of-way, and aesthetics. The design elements shall include, but not be limited to, the horizontal and vertical alignments, lane widths, shoulder widths, median widths, sight distance, clear zone, cross slopes, and side slopes. ~~The geometric design developed by the Contractor shall be an engineering solution that is not merely an adherence to the minimum SCDOT and/or AASHTO standards.~~

2.0 CRITERIA

2.1 Design Speed & Functional Classification

Interstate 77 shall be designed as a principal arterial freeway with rolling terrain classification. A WB-62 design vehicle shall be utilized for all geometric design.

Interstate 77

Begin (Station 1160+00 ~~1170+00~~) to Station ~~1188+64~~ 1240+00 60 mph (Meet or Exceed)

Station ~~1188+64~~1240+00 to End (Station 1801+15) 70 mph (Meet or Exceed)

Interchange Ramps

I-77 SB to I-20 WB ramp	30 mph (Meet or Exceed)
All other ramps	45 mph (Meet or Exceed)
US 1 SB to I-77 SB loop ramp	20 mph (Meet or Exceed)
All other loop ramps	25 mph (Meet or Exceed)

2.2 Pavement, Shoulder & Median Width

Pavement, shoulder, and median widths shall be developed in compliance with SCDOT Highway Design Manual Chapters 9, 13, 16, and 19.

Add 3.5 ft. to shoulder width when guardrail is required. Pave entire shoulder width when adjacent to guardrail/concrete barrier.

I-77 Mainline Northbound & Southbound from Station 1170+00 (approx. MM 15.0) to 1510+00 (approx. MM 21.5):

- Through Lanes 12 ft.
- Shoulder (outside) 10 ft. paved/12 ft. total width
- Shoulder (inside) 10 ft. paved/12 ft. total width

I-77 Mainline Southbound from Station 1286+55 to Station 1299+00, retain the existing paved shoulder width, concrete curb & gutter, retaining wall, and closed

drainage system.

I-77 Mainline Southbound from Station 1510+00 (approx. MM 21.5) to 1801+15 (approx. MM 27.0):

- Through Lanes 12 ft.
- Shoulder (outside) 10 ft. paved/12 ft. total width
- Shoulder (inside)
  - Wilson Blvd. to Blythewood Rd: 4 ft. paved/10 ft. total width (approx. MM 24.15 to MM 27.0)
  - Killian Rd to Wilson Blvd: 10 ft. paved/12 ft. total width (approx. MM 21.5 to MM 24.15)

2.3 Horizontal Curves

Horizontal curves and superelevation shall be developed in compliance with SCDOT Highway Design Manual Chapter 11 and the SCDOT Standard Drawing No. 150-205-00.

2.4 Vertical Curves, Grades, and Clearances

Vertical curves, grades, and clearances shall be developed in compliance with SCDOT Highway Design Manual Chapters 12, 16, and 19 through 22. Grade adjusted K values shall be considered where the grades are 3 percent or greater.

Spline grade shall not be used.

2.5 Side Slopes

Side slopes shall be developed in compliance with SCDOT Highway Design Manual Chapters 13, 14, 16, and 19.

2.6 Cross Slopes

Cross slopes shall be developed in compliance with SCDOT Highway Design Manual Chapters 11, 13, 16, and 19.

- Shoulder (paved) 2’ or less Match travelway pavement slope
- Shoulder (paved) greater than 2’ 24:1
- Shoulder (unpaved) 12:1

Paved shoulder on high side of superelevation will continue the travelway cross slope.

Paved shoulder on low side of superelevation will maintain a 24:1 slope until the superelevation slope exceeds a 24:1 slope. The shoulder then will be sloped at the

superelevation rate.

2.7 Clear Zones

~~A crash analysis has been performed for this section of I-77. The clear zone for I-77 mainline shall be 46' for the entire length of project.~~

Mainline Interstate, Collector / Distributor Road, and Ramps

The SCDOT HDM (2003 with updates) Chapter 14 and the *Roadside Design Guide* (AASHTO) edition 2006 with Chapter 6 Update, 3rd Edition shall be used based on traffic volumes, design speed, and slopes. Clear Zones provided in Figure 14.3A in the SCDOT HDM (2003 with updates) shall not be limited to 30 feet as indicated as a possibility in the footnote for this figure. When a range of values is shown; the higher value shall be selected. Also, SCDOT does not typically use a 3H:1V fill slope. See the Roadside Design Guide (AASHTO) edition 2006 with Chapter 6 Update, 3rd Edition for clear zone calculations where a 3H:1V fill slope is used. Use 3H:1V fill slope only where fill heights are required to match existing conditions and clear zone can be obtained within the Project limits.

For those areas where no guardrail currently exists, the Contractor shall design fill and cut slopes to obtain clear zones and to avoid the need for protection. In areas where new right-of-way, wetland impacts, or impacts to frontage roads or immovable obstructions would be a result of achieving the clear zone requirement, substandard areas may be protected.

Where existing fill and cut slopes are presently protected by guardrail, the Contractor shall replace damaged and/or substandard guardrail and extend/install new guardrail at locations that do not meet current standard. Also, Contractor shall clear and grind in accordance with EDM 29.

Any Other Roads

The SCDOT HDM (2003 with updates) Chapter 14 and the *Roadside Design Guide* (AASHTO) edition 2006 with Chapter 6 Update, 3rd Edition shall be used based on traffic volumes, design speed, and slopes.

Clear zone for any facilities using curbs on this project shall comply with SCDOT HDM (2003 with updates) Chapter 14.

2.7.1 Safety Clearing

Clear and grind all trees and shrubs down and ground to a depth of 6" (0.5 feet) below grade or remove including stumps. Remove all debris (trash, limbs, dead logs, etc.). Once clearing and grinding operations are complete, the area shall be properly graded and seeded in accordance with Section 810 of SCDOT Standard Specifications (2007) and any applicable Supplemental Specifications.

Where existing fill slopes are protected by guardrail, clear and grind in accordance

with EDM 29.

Safety Clearing shall apply to the following areas:

- The area between the NB SC-277 ramp and I-77
- The area between the SB SC-277 ramp and I-77
- The area bordered by I-77 and the two forks of the WB I-20/Alpine Rd on ramp
- The area between NB I-77 and the on ramp from US-1
- The area between SB I-77 and the on ramp from US-21 NB

~~Clear and grind all trees and shrubs 6" below grade or remove within the 46' clear zone with the following exceptions:~~

- ~~Where backslopes are steeper than 3:1, clear and grind a distance of 10' beyond the ditch line.~~
- ~~Where backslopes are equal to or flatter than 3:1, clear and grind to the 46' zone.~~
- ~~Where existing fill slopes are protected by guardrail, clear and grind in accordance with EDM 29.~~
- ~~In areas where new right-of-way or wetland impacts would be a result of achieving the clear zone requirement, substandard areas may be corrected or protected. If the shoulder can be graded to acceptable slopes without impacting wetlands, right-of-way, or immovable obstructions, then existing guardrail shall be removed and the shoulder graded to meet design standards.~~

~~All trees within the 46' zone shall be cut down and ground to a depth of 6" (0.5 feet) below grade or removed (including stumps). Remove all debris (trash, limbs, dead logs, etc.) within the 46' zone. Once clearing and grinding operations are complete, this area shall be properly graded and seeded in accordance with Section 810 of SCDOT Standard Specifications (2007) and any applicable Supplemental Specifications.~~

~~Clear zone for all other areas shall be developed in compliance with SCDOT Highway Design Manual Chapter 14 and the AASHTO Roadside Design Guide, with 2006 Chapter 6 update, 3rd Edition.~~

2.8 Sight Distance

Sight distance shall be developed in compliance with SCDOT Highway Design Manual Chapter 10.

~~The upper range value established in the current edition of AASHTO's "A Policy on Geometric Design of Highways and Streets," 2001, for the appropriate design speed shall be used.~~

2.9 Ramps

Ramps shall be developed in compliance with SCDOT Highway Design Manual Chapter 16.

Ramps shall be analyzed and corrected if there are deficiencies in acceleration and deceleration lane lengths.

~~Widen and reconstruct, where applicable, portion of the outside shoulder to provide a continuous auxiliary lane from Percival Road to I-20 along I-77 NB.~~

From Percival Road to I-20 along I-77 NB, widen and reconstruct as necessary to provide a continuous auxiliary lane between the two ramps.

From I-20 to Percival Road along I-77 SB, widen and reconstruct as necessary to provide a continuous auxiliary lane between the two ramps.

Provide a two lane bifurcated exit from I-77 NB to I-20 as indicated in the "I-77 Signing Plan" provided in Attachment B.

Eliminate the existing condition (middle lane shared merge) on I-77 NB at SC 277. Provide a two lane parallel entrance ramp for SC 277 plus three thru lanes on I-77 NB. ~~Properly~~ Drop the outside acceleration lane from SC 277 before the SC 555 entrance ramp. Continue four lanes northbound to Killian Road. The fourth lane may be dropped at Killian Road.

Reconstruct and widen, where applicable, portion of the existing ramp to provide a continuous two lanes entrance ramp from Killian Road to I-77 SB. Once two lanes are developed parallel to I-77 SB, the outside lane shall be dropped. Four SB lanes shall continue to SC 277, at which time the lanes shall be bifurcated in accordance with the signing plan provided.

The existing I-77 southbound to I-20 westbound ramp divergence angle may be retained.

2.10 Roadside Barriers

Roadside barriers shall be developed in compliance with SCDOT Highway Design Manual Chapter 14. The following items shall be included in the work:

Guardrail: The Contractor shall be responsible for determining the existing guardrail or end treatments that do not meet current design standards. All existing ~~mainline~~ guardrail~~, ramp guardrail,~~ and end treatments within the project limits that is damaged or does not meet current design standards shall be replaced, reset or reused as a part of the project. All new, reset or reused guardrail and end treatments must be listed on the Qualified Products Policies & Listings. New guardrail shall be added where necessary in order to meet current design standards. Pavement under guardrail adjacent to paved shoulders shall be provided utilizing HMA Surface Type

B at a rate of ~~200~~ 300 psy. Paving under guardrail shall be provided in accordance with the ~~guardrail posts in mow strips~~ guidance found in the ~~2011 AASHTO Roadside Design Guide.~~ Exhibit 5, Special Provisions, Section 403.

Additional length guardrail posts with compressed guardrail shoulder break shall be used only where right of way or environmental impacts dictate that standard guardrail shoulder break cannot be built.

Thrie-beam guardrail with critical offset posts shall not be use at the bridge piers.

Cable Median Barrier: The Contractor shall provide a single run of cable median barrier in all medians less than or equal to 72 feet and greater than or equal to 36 feet. Cable median barrier shall be in installed in accordance with SCDOT standard drawings and specifications. All existing mainline cable median barrier within the project limits that is damaged or does not meet current design standards shall be replaced as a part of the project. This work shall include all necessary median grading, drainage adjustments, and any other work necessary to meet current design standards.

Reset or reused cable median barrier must meet current design standards and subject to RCE approval.

The Contractor shall not use Double Run Cable Median Barrier. ~~Concrete median barrier shall be used in the areas where median slopes cannot accommodate for a single run of cable barrier. Pave entire area between travelway and concrete median barrier.~~

Concrete Median Barrier: The Contractor shall provide concrete median barrier in all medians less than or equal to 36 feet in the widened section only. When concrete median barrier is constructed, the inside shoulder shall be paved to barrier. All new concrete median barriers shall be painted in accordance to SCDOT Standard Specifications. All new concrete median barriers on I-77 shall be single slope shaped.

NBL & SBL Overpasses over I-20 & I-20 Ramp: Remove and dispose of existing concrete median barrier and glare shield barrier extension on I-20 as necessary to construct the new substructures for the widened bridges. After substructure construction has been completed, replace the removed barrier and extension with new concrete median barrier (match existing) and glare shield barrier extension constructed in accordance with SCDOT Standard Drawings 805-806-00 and 805-895-00.

2.11 Right-Of-Way and Control Of Access

If right-of-way is required, it shall be the Contractor's responsibility to secure right-of-way in accordance with Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646), as amended and revise environmental document, if needed.

Maintain fully controlled access along interstate, all interchanges, and ramp intersections. SCDOT and FHWA guidelines for Control of Access at interstate interchanges shall be followed.

3.0 DELIVERABLES

All submittals to SCDOT shall be subjected to a thorough QC review by the Contractor prior to submittal. All RFC Plans submittals 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.

3.1 Preliminary Plans

The Contractor shall submit to the SCDOT:

- Four (4) half-size sets of preliminary plans shall include, at a minimum: title sheet, roadway typical section, roadway plan and profile, cross sections, clearing limits on plan view and cross sections, drainage features, proposed right-of-way, and preliminary geotechnical reports.
- Contractor shall provide one electronic copy of the plans and reports.
- Contractor shall also provide any design calculations requested in writing by SCDOT.
- If the Contractor does not anticipate the need for Right-of-Way Plans, the conceptual work zone traffic control plans shall be submitted with the Preliminary Plans.

3.2 Right-of-Way Plans

The Contractor shall submit to the SCDOT:

- Four (4) half-size sets of 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, conceptual work zone traffic control plans, existing right-of-way, and proposed new right-of-way requirements.
- If the Contractor elects to submit right-of-way plans, one electronic copy is also required.

3.3 Final Plans

The Contractor shall submit to the SCDOT:

- Four (4) half-size sets of final plans shall include, at a minimum: title sheet, roadway typical section, roadway plan and profile, cross sections, drainage design, sediment and erosion control design, existing right-of-way, proposed right-of-way, proposed barrier locations, and final geotechnical and hydraulic reports. The following traffic elements shall also be included: work zone traffic control plans, signing plans, and pavement markings plans.
- Contractor shall provide one electronic copy of the plans and calculations.
- Contractor shall also provide any design calculations requested in writing by SCDOT.

3.4 Release for Construction (RFC) Plans

For roadway plans, Contractor shall provide two full size sets, four half size sets, and one electronic copy of RFC Plans to SCDOT. RFC Plans shall be inserted into plan folders as detailed in the SCDOT plan and preparation guide.

for Test Level 5, as specified in Section 13 of the AASHTO LRFD Bridge Design Specifications. It is acceptable to use a bridge rail design that is similar to a crash tested design based on an analytic comparison using the methodology outlined in Section 13 of the AASHTO LRFD Bridge Specifications. The width of the barrier at the base shall be a minimum of 18 inches, the traffic face shall be vertical and the height shall transition at a 10:1 maximum rate to 32 inches at ends where thrie beam guardrail is attached. At ends where thrie beam is required, the barrier shall be detailed using the standard thrie beam attachment details (the End Wall segment that is 4 feet in length and 32-inch high) shown on Bridge Drawings and Details Drawing 702-30b.

2.1.11 Transition Curbs

For the interstate mainline bridges, construct a transition curb at the ends of barrier parapets that will be retained and that meet both of the following conditions:

- Thrie beam guardrail is attached to the end of the barrier; and
- There is not an existing curb or drainage feature located at the end of the barrier.

For transition curb details and requirements, see SCDOT Standard Drawing No. 403-205-02.

2.1.12 Barrier End Treatment

At the north end of the SBL Overpass over US 21, new reinforced concrete barrier transitions shall be constructed at the ends of the existing barrier parapets and metal railing. The new barriers shall have a height of 40 inches at the end adjacent to the existing rail and the height shall transition at a 10:1 maximum rate to 32 inches at the ends where thrie beam guardrail is attached. At these ends, the barrier shall be detailed using the standard thrie beam attachment details (the End Wall segment that is 4 feet in length and 32-inch high) shown on Bridge Drawings and Details Drawing 702-30b. The barrier transition shall be supported by a moment slab or the transitional slab may be widened as necessary to support the barrier transition. Any existing drainage features that are impacted by the new barrier transitions shall be reconstructed.

2.1.13 Concrete Barrier for Pier Protection

Concrete barrier for pier ~~Pier~~ protection shall be provided for ~~Bent 3 of the Underpass under EBL of SC 277.~~ new and existing bents located within a distance of 30 feet to the edge of a through lane of I-77 ~~roadway~~. Concrete barrier for pier ~~Pier~~ protection shall consist of either a structurally independent, crashworthy ground mounted 54-inch high barrier, located within 10 feet from the column or a 42-inch high barrier

located at more than 10 feet from the column. Such barrier shall be structurally and geometrically capable of surviving the crash test for Test Level 5, as specified in Section 13 of the AASHTO LRFD Bridge Design Specifications. Maintain a minimum of 6 inches from the edge of the column to the nearest edge of the pier protection. The pier protection shall be designed and detailed in a manner that will not obstruct drainage and will allow for easy maintenance of the area around/between barriers.

All new and existing bents ~~Bents~~ within the project limits that are not required to be protected by concrete barrier for pier protection ~~located a distance of 30 feet or greater from the edge of roadway~~, but are within the clear zone, shall be protected in accordance with the requirements of Exhibit 4a.

2.1.14 Approach and Transitional Slabs

With the exception of the Overpasses over Little Jackson Creek/Edgewater Drive and the north end of the NBL Bridge over Windsor Lake, the approach slabs of the widened bridges shall also be widened to accommodate an additional 12-ft. inside lane, 12-ft. inside shoulder, and new barrier parapet. The approach roadway ends of the new approach slabs shall align with the approach roadway ends of the existing approach slabs. The widened approach slabs shall be constructed at grade (without an asphalt overlay). The new slabs shall be connected to the existing slabs by removing the existing approach slab concrete to a width sufficient to splice to existing steel or by connecting with adhesive anchors.

The Overpasses over Little Jackson Creek/Edgewater Drive and the SBL Overpass over US 21 do not contain traditional approach slabs. Instead, they have two transitional reinforced concrete slabs at each end of each bridge. The transitional slabs connect the bridges to the continuously reinforced concrete approach pavement. These existing transitional slabs shall be completely removed and replaced with new slabs. The width of the new slabs shall match the total width of the ~~travel lanes~~ existing and new portland cement concrete approach pavement. For reinforcing steel size and slab thickness requirements, see the existing plans (File 40.973 & 40.973.3). Class 4000 concrete and ASTM A 706 Grade 60 reinforcing steel shall be used. The joints shall be sealed with a cold applied elastic filler. Fill under the slabs shall be thoroughly compacted in accordance with Section 208 of the Standard Specifications. Where required by staged construction, transverse reinforcing steel shall be lap spliced (Class B minimum) or mechanically connected.

At the north end of the NBL Bridge over Windsor Lake, the existing approach slab shall be removed in accordance with Section 202 of the Standard Specifications for Highway Construction and replaced with a new approach slab. The new approach slab shall be the same length as the

existing slab (30 feet plus/minus), shall be 12 inches thick, and shall be constructed at grade. Fill under the new slab shall be thoroughly compacted in accordance with Section 208 of the Standard Specifications. Where required by staged construction, transverse reinforcing steel shall be lap spliced (Class B minimum) or mechanically connected.

A transverse Grooved Surface Finish shall be applied to all widened approach slabs and to all new approach and transitional slabs in accordance with Subsection 702.4.16 of the Standard Specifications for Highway Construction.

2.1.15 Deck Drainage

The bridge deck drainage shall be designed to ensure that minimum requirements of the SCDOT Bridge Design Manual are met and that erosion of the end fill slopes is prevented due to excessive run off at the bridge ends. For decks where the existing drainage will remain in place, the Contractor shall make modifications if capacity needs to be increased to handle the additional runoff from the widened decks. Because there are low points on the Bridges over Windsor Lake and the Overpasses over Little Jackson Creek/Edgewater Drive, a 50-year Design Flood Frequency shall be used in the deck drainage design for those bridges.

Bridge deck drainage systems of existing overpass bridges shall be modified if necessary to prevent free-falling discharge from spilling onto the new inside shoulder and new inside lane or onto concrete barrier walls. Modifications of existing bridge drainage systems shall comply with the requirements of Chapter 18 of the SCDOT Bridge Design Manual.

2.1.16 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 equal to ½”)
Solid Prestressed Concrete Piles	18” Square
Prestressed Concrete Pile Points	W8x58

2.1.17 Steel Pipe Pile 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 end bent cap or footing

1.0 GENERAL

The pavement shown in the Typical Section included in the SCDOT Conceptual Plans provided in Attachment B is for information only. The design for pavement shall conform to the criteria listed in Section 2.0.

Milled-in rumble strips shall be used on all mainline shoulders, both inside and outside, in accordance with SCDOT Standard Drawings and specifications for the entire project.

Transition areas not requiring pavement reconstruction or rehabilitation but requiring revised pavement markings shall be milled 2-inches and resurfaced utilizing 200 lbs/sy hot mix asphalt HMA Surface Type B and 110 lbs/sy Open Graded Friction Course (OGFC). These areas include, but are not limited to, existing I-20 pavement sections.

Include 2000 SY of ~~10"~~ 9" full depth concrete patching and 1000 SY of full depth asphalt patching in accordance with the Special Provision in Exhibit 5.

2.0 CRITERIA

2.1 Mainline Pavement New Lane

Construct a composite pavement for the mainline travel lane. Construct a plain jointed portland cement concrete (PCC) pavement overlaid with a HMA pavement having the following characteristics:

2.1.1 HMA Overlay

Place two (2) 200 psy lifts of Surface Type B with PG76-22 and one (1) 110 psy lift of OGFC. Extend OGFC four (4) feet beyond pavement edge line.

2.1.2 PCC Pavement

Thickness:	10"
Transverse Joint Spacing:	15'
Transverse Load Transfer:	1.5" dowels, 18" long, spaced 12" c-c, mainline only
Surface Texture:	Mainline – Heavy Broom
Joint Sealant:	NA (saw cut joints only)
Nominal Compressive Strength:	5500 psi
Base:	6" GABC overlaid with 200 lbs Surface C

PCC pavement elevation shall match existing concrete pavement. When placing PCC pavement ~~adjacent to existing asphalt section (approximate mile marker 15 to 17.5)~~ saw cut existing pavement structure at the joint to create a clean vertical surface throughout the depth of PCC pavement and base. The new mainline PCC shall meet the requirements of SC-M-502

Section 5.1.6 Profilograph Measurement prior to placement of overlay. Final Rideability will be measured after overlay and be in accordance with SC-M-403.

For all new PCC pavements construct an expansion joint of a design acceptable to the Department when abutting bridges or other structures. At bridge ends and other rigid obstructions, provide three (3) expansion joints one (1) inch in width located at the obstruction and 75 feet and 150 feet away from the obstruction. Obtain approval of expansion joint assembly and detail from the RCE prior to construction.

In Section 5.6.1 of SC-M-501(0308), the compressive strength of 4000 psi is removed and replaced with 5500 psi.

Section 6.3.3.1 of SC-M-501(0308) is removed and replaced with the following:

6.3.3.1 Furnish a suitable concrete compression testing machine meeting the requirements of ASTM C39. Have the machine professionally calibrated after installation in the field laboratory and prior to commencement of work. Maintain proper calibration of the equipment for the duration of the project.

Section 7.4.2 and 7.4.3 of SC-M-501(0308) shall be adjusted for compressive strength of 5500 psi such that the same percentages are applied.

No ATC's will be considered for the above defined pavement types of PCC overlaid with HMA.

2.2 New and Existing Shoulders (Station 1302+50 to 1801+15)

The shoulders shall be surfaced with HMA pavement having a minimum thickness equal to the mainline overlay. ~~Existing shoulders have a Structural Number equal to 3.30~~. Attachment B provides a limited number of asphalt thickness cores and Falling Weight Deflectometer testing of the existing shoulders. This information should be used at the design build teams risk. Plans from previous projects indicate the existing shoulder sections vary. For new shoulders the base materials can be selected from the following list by the design build team. New and existing shoulders shall not have a structural number less than 5.36 calculated in accordance with SCDOT Pavement Design Guide. Allowable base materials include: Cement Stabilized Aggregate Base, Graded Aggregate Base, Asphalt Aggregate Base, Cement Modified Subbase, PCC pavement, Roller Compacted Concrete. Submit all pavement design calculations for review on or before the Formal ATC submittal due date. ~~Submittal schedule for pavement design on shoulders shall follow the ATC milestones.~~

If PCC pavement is selected, tie to new PCC mainline with #5 tie bar, 30" long, 30" c-c. Match adjacent concrete pavement thickness. Do not tie to continually reinforced concrete pavement section. ~~Nominal compressive strength of concrete shall not exceed mainline mixture design.~~

2.3 Existing PCC Pavement

Milling of the existing PCC pavement is not allowed other than for transverse tie-ins. Perform full-depth patching as required in the Exhibit 5 Special Provisions. Tack at a rate of 0.08 to 0.10 gal/yd^2. Correct the cross slope with Asphalt Surface Type E with PG76-22 for correction up to 1.5 inches and Asphalt Surface Type B (with PG76-22) for greater correction. Overlay with 200 psy Surface Type B (with PG-76-22), 200 psy Surface Type B (with PG-76-22) and 110 psy OGFC matching new mainline composite pavement.

To meet the existing pavement grade, perform two variable milling operations up to 2.5 inches in depth to smoothly tie in the ~~intermediate course for the first operation and the surface and OGFC courses in the second~~ asphalt pavement. This variable milling shall extend a minimum of 75 feet for each lift to ensure smooth transitions.

2.4 Existing HMA Pavement (Station 1170+00 to 1302+50)

Mill 2 inches. Overlay with 200 psy Surface Type B (with PG-76-22) and 110 psy OGFC.

2.5 Ramp Pavement

Existing concrete ramps are to be full depth patched and overlaid with HMA matching mainline without OGFC. Carry the OGFC along the ramp to the gore, then variably mill 0 to 1 inch over a minimum of 75 feet and terminate the OGFC in a neat, smooth transverse joint. ~~The overlay shall extend from the mainline to the edge of travel way of the existing crossing route.~~ To meet the existing pavement grade, perform two variable milling operations up to 2.5 inches in depth to smoothly tie in the asphalt pavement. This variable milling shall extend a minimum of 75 feet for each lift to ensure smooth transitions. The final 75 feet of transition will only have one lift of asphalt. In this final transition, the asphalt overlay shall be sawed and sealed at the existing concrete joint locations.

Existing asphalt ramps are to be milled 2 inches and replaced with 200 lbs Surface Type B (with PG 76-22). One exception to this is Killian Road on and off ramps South Bound which will be milled 4 inches or to the underlying PCC pavement and replaced with two lifts of 200 lbs Surface Type B (PG 76-22). ~~The overlay shall extend from the mainline to the edge of travel way of the existing crossing~~

~~route.~~ Concrete patching may be necessary to rehabilitate the underlying concrete pavement in this location prior to overlay.

Existing six-inch curbs/gutters may be filled a maximum of two (2) inches when overlaying with new asphalt, leaving a minimum of four (4) inches of the face of the vertical curb exposed.

The pavement design for the new outside auxiliary lanes along I-77 ~~northbound~~ that connects Percival Road ~~onramp~~ and I-20 ~~off~~ ramps will match the new mainline pavement identified in Section 2.1.

2.5.1 Ramp Rehabilitation Limits

The rehabilitation shall extend from the mainline to the edge of travel way of the existing crossing route with the following exceptions:

- I-77 / I-20 Interchange north of I-20 – from mainline I-77 to gores
- I-77 / I-20 Interchange south of I-20 – from mainline I-77 to joint at gore of collector/distributer road or to approach slab of I-20 flyover bridge
- I-77 / SC 277 Interchange – from mainline I-77 to SC 277 bridge transitional slabs

2.6 Temporary Pavement

Design of temporary pavement, including using the existing shoulder to carry the mainline traffic, is at the discretion of the Contractor. However, temporary pavement must provide a satisfactory rideability to the public prior to opening to traffic and during construction. Satisfactory rideability is defined as any 0.1 mile segment having roughness not to exceed 170 inches per mile when tested in accordance with SC-T-125. In addition to rideability, rutting shall not exceed ¼" when the wheel paths are measured with a 4' straightedge.

Should potholes appear in the temporary pavement the Contractor shall take action within one calendar day to temporarily fill the pothole for safety. Once per week all temporarily filled pot holes shall be full depth patched varying in depth as necessary but shall be no less than 4 inches.

If temporary pavement is to be incorporated in the final pavement structure, it must minimally meet the structural requirements given in Section 2.2 of this Exhibit. Additionally, the pavement must be free of cracks and distortion prior to overlay. If the pavement has visible wear or deterioration, then take remedial action to improve or repair the pavement to the Department's satisfaction prior to overlaying.

EP-2301	1500+90	24" RCP	43.5	Pipe in good condition. Clean pipe. Standing water and sediment in pipe from outfall OP-2399 silting in.
EP-2303	1503+95	18" RCP	142.3	8' of existing pipe prior to outlet shall be replaced due to collapse. Slip line existing pipe due to joint separations and deficiencies.
EP-2403	1499+95	24" RCP	21.3	Pipe in good condition. Clean pipe. Standing water in pipe.
EP-2404	1522+40	18" RCP	61.7	Remove and replace last segment of pipe at downstream end to repair major root issues in joint.

2.2.2 For existing pipes not inspected from MM 15.0 to MM 21.5~~within project limits~~ that will be retained, the Contractor shall:

- Provide video inspection reports to verify structural soundness.
- Perform the necessary repairs and/or rehabilitations as required.
- Verify hydraulic capacity of the pipes through hydraulic analyses performed by a SC Registered Professional Engineer to demonstrate compliance with the Requirements and Design Criteria. When analyses do not demonstrate compliance, the pipes shall be replaced or improvements made to the system.
- Obtain necessary permits to perform the replacement or repairs.

2.2.3 ~~For existing pipes that will be lengthened from MM 21.5 to MM 27.0 Southbound, the Contractor shall verify the structural integrity of the pipes per SCDOT EDM 24.All pipes retained shall be cleaned of all debris and video inspected prior to acceptance of the project.~~

2.2.4 All pipes that are to be abandoned shall be filled with flowable fill.

2.2.5 Traffic control needs to be considered when working on, to include cleaning, the pipes and culverts.

~~2.2.6 The Contractor shall verify structural integrity of the pipe when existing pipe is to be lengthened or retained.~~

2.2.6~~7~~ The Contractor shall implement corrective actions to fix the existing scour holes at inlet EX-1796 of EC-1702 and inlet EX-2196 of EC-2103 and~~.~~ ~~The Contractor~~ shall be responsible for any permitting requirements.

2.3 Hydraulic Modeling, MM 15.0 – MM 21.5

2.3.1 The Contractor shall model natural, existing, and proposed conditions for bridges and/or bridge-sized culverts that are to be replaced, widened,

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~~**(33) SECTION 305: GRADED AGGREGATE BASE COURSE:**~~

~~Only one type of Graded Aggregate Base Course is to be selected. The Contractor is to indicate on the attached form on page **Error! Bookmark not defined.** which type has been selected for use on this project. This form is to be submitted to the Resident Construction Engineer at the Preconstruction Conference.~~

(34) SECTION 305: MAINTENANCE STONE:

Maintenance Stone used on this project shall conform to the gradation requirements of Section 305, or to the gradation specified for Aggregate No. CR-14 in the Standard Specifications.

(35) SECTION 308: CEMENT STABILIZED AGGREGATE BASE:

Reference is made to Supplemental Technical Specification SC-M-308 "Cement Stabilized Aggregate Base." For the purposes of applying this Supplemental Technical Specification when applying pay factor adjustments for thickness tolerances, a unit price of **$15 per square yard** will be used.

(36) SECTION 401: DRESSING OF SHOULDERS:

Prior to the placement of asphalt mixtures on existing roadways, the contractor will be required to remove all vegetation adjacent to the edge of pavement which impedes the placement of the asphalt mixture to the specified width. The contractor shall also remove and dispose of all excess asphalt which is disturbed during minor grading for widening, or during removal of debris or grass from existing surface during preparation of surface for new lift. After the asphalt mixture has been placed, the contractor shall blade the disturbed material to the extent that the shoulder is left in a neat and presentable condition. All excess material shall be removed from the project. No direct payment shall be made for this work, all costs are to be included in the price of other items of work.

(37) SECTION 401: HOT MIX ASPHALT (HMA) QUALITY ASSURANCE:

Reference is made to the Supplemental Technical Specification "Hot Mix Asphalt (HMA) Quality Assurance." For the purposes of applying this Supplemental Technical Specification, there will be no pay factor adjustment greater than 100% for any given lot. When applying pay factor adjustments of less than 100%, a unit price of **$75 per ton** will be used.

(38) SECTION 401: HOT-MIX ASPHALT RIDEABILITY:

Reference is made to the Supplemental Technical Specification "Hot-Mix Asphalt Rideability." For the purposes of applying this Supplemental Technical Specification, there will be no pay factor adjustment greater than 100%. When applying pay factor adjustments of less than 100%, price Adjustments will be calculated based on **$75 per ton**.

(39) SECTION 401: ASPHALT BINDER ADJUSTMENT INDEX:

Reference is made to the Supplemental Specification Dated **March 3, 2009** on SCDOT's Internet Website: http://www.scdot.org/doing/road_SupSpec.aspx#2000 . The SCDOT will establish the Basic Bituminous Index and the unit price for liquid asphalt to be used for bituminous adjustments as the most recent Liquid Asphalt Cement Index shown on the SCDOT website: http://www.scdot.org/doing/constructionLetting_MonthlyIndex.aspx at the time the proposals are due.

The Contractor shall provide the SCDOT with a copy of each Daily Report of Asphalt Plant Inspection within 7 calendar days. These reports will be used to determine the amount of liquid asphalt placed each estimating period.

A price adjustment (negative or positive) will be applied each estimate period to the liquid asphalt binder as appropriate throughout the life of this contract. The following Section of the Supplemental Specification is hereby modified:

Additional Provisions:

7.2 Basis of Payment: The quantity, as measured above, will be paid for at the contract unit price for RCC Pavement, of the thickness specified, which price and payment will be full compensation for furnishing all materials, equipment, tools, labor, and incidentals necessary to satisfactorily complete the work. Pavement that is deficient in thickness, but is permitted to be left in place, will be paid at the reduced unit price as provided in Section 6.13. No compensation will be allowed for the materials or labor involved in the removal of defective material.

Payment includes all direct and indirect costs and expenses required to complete the work. Payment will be made under:

Item Number	Description	Unit
5010100	ROLLER COMPACTED CONCRETE PAVEMENT	SY

(44) SECTION 502: FULL DEPTH CONCRETE PAVEMENT PATCHING:

Description: The Contractor shall patch existing concrete pavement at locations of high severity scaling, cracking and punchouts as directed by SCDOT. This work shall consist of the removal of deteriorated pavement and replacing with a 9 inch full depth Portland Cement Concrete Pavement.

Construction Process: The deteriorated pavement shall be removed to the width and length indicated by the RCE, with the face of the cut being straight and vertical. The pavement shall be removed to a depth of nine (9) inches as directed by the RCE. In the event unstable material is encountered at this point, then such additional material shall be removed as directed by the RCE.

The volume of material removed below the patch shall be backfilled with crushed stone and thoroughly compacted in 4-inch layers with vibratory compactors. Patching shall be performed in accordance with Section 502 of the Standard Specifications and the Concrete Pavement Patching Drawings in Attachment B. The finished patch shall be smooth riding.

The quantity of full depth concrete pavement patching to be paid for will be the actual number of square yards of existing concrete pavement which has been patched and accepted. The Contractor's bid shall include 2000 square yards of 9 inch full depth concrete pavement patching. If more than the estimated square yards of patching are required by SCDOT, the Contractor will be paid a unit price of ~~$105.00~~ $150.00 per square yard. If less than the estimated square yards of patching are required by SCDOT, the Contractor shall reimburse SCDOT for the quantity of full depth patching that was not needed. Reimbursement will be paid to SCDOT at a unit price of ~~$105.00~~ $150.00 per square yard.

(45) DIVISION 600: TRAFFIC SIGNALS

1. **LIST OF TRAFFIC SIGNALS WITHIN PROJECT**

Intersection No.	Intersection Name	Description of Signal
	I-77 SB @ US 1 (Two Notch)	Maintain detection at all times
	I-77 NB @ US 1 (Two Notch)	Maintain detection at all times
	I-77 SB @ SC 555 (Farrow Rd)	Maintain detection at all times
	I-77 NB @ SC 555 (Farrow Rd)	Maintain detection at all times
	I-77 NB @ S-52 (Killian Rd)	Maintain detection at all times
	I-77 SB @ S-52 (Killian Rd)	Maintain detection at all times

Ensure that the surface to receive the patch is clean and dry. Apply an SCDOT approved rust inhibitor to all exposed reinforcing steel in accordance with manufacturer's instructions.

Precondition the epoxy resin and the catalyst before blending to produce a blended liquid that is between 75° F and 90° F. The epoxy components shall be mixed in strict compliance with the manufacturer's mixing instructions before aggregates are added to the mixture. The mixture shall be blended in a suitable mixer (as specified) to produce a homogeneous mass. Only that quantity of material that is usable in one hour shall be mixed at one time. Material that has begun to generate appreciable heat shall be discarded.

Prime the entire clean surface of the repair area with neat blended epoxy immediately before the mixture is placed. Priming shall include overlapping the surface of the area adjacent to the repair. Place and tamp the mixture with sufficient effort to eliminate voids and to thoroughly compact the product. Screed and texture the surface to produce the required finish and grade. For deck applications, allow the repair area to remain undisturbed for at least 3 hours before it is subjected to traffic. Fill saw cut “run-outs” with the mortar of the repair material.

PAYMENT
The quantity of epoxy mortar patch to be paid for will be the actual number of square feet of spalls, popouts, scaling, or other distressed areas in existing concrete which have been patched and accepted. This work includes cleaning, removing, and disposing of debris from the patching work, furnishing patching material, and all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of this item of work.

Pay Item Number	Pay Item	Unit
8990242	Epoxy Mortar Patch	SF

QUANTITY
The Contractor’s bid shall include 135 square feet of epoxy mortar patching within the overall project limits as directed by SCDOT. If more than 135 square feet of patching are required by SCDOT, the Contractor will be paid a unit price of **$225.00 per square foot** for the patching. If less than 135 square feet of epoxy mortar patching are required, the Contractor shall reimburse SCDOT, at a unit price of **$225.00 per square foot**, for the quantity of epoxy mortar patch that was not needed.

(59) SECTION 701: NON-CONFORMING CONCRETE:
For purposes of applying the reduced payment and below strength provisions of Subsection 701.2.12.4 of the Standard Specifications, a unit price of **750 dollars per cubic yard** will be used.

(60) SECTION 703: REINFORCING STEEL:
The Reinforcing Steel Supplemental Specification, dated August 3, 2015, shall apply to this project.

(61) SECTION 711: PILE AND DRIVING EQUIPMENT DATA FORM:
Pile and Driving Equipment Data Form is included in Attachment B.

(62) SECTION 712: DRILLED SHAFT FORMS:
Drilled Shaft Forms are included in Attachment B.

(63) SECTION 712: BI-DIRECTIONAL STATIC LOAD TESTING OF DRILLED SHAFTS:
Bi-Directional Static Load Testing of Drilled Shafts Supplemental Technical Specification dated July 14, 2015, shall apply to this project.
~~July 20, 2015~~ ~~April 14, 2015~~
~~**1.0 GENERAL**~~
~~This work shall consist of furnishing all materials, equipment, labor, and incidentals~~

~~necessary for conducting bi-directional static load testing of 1 drilled shaft. In addition, the structural integrity of the test drilled shaft, the load-deflection and soil-load transfer relationships shall also be determined. Production drilled shaft lengths may be adjusted after results of the test drilled shaft have been analyzed. No materials shall be ordered until drilled shaft lengths are approved by the Department. The test shaft depth, diameter, and location shall be as specified in the plans. The testing specified in the project documents shall be conducted in general accordance with ASTM D1143 – *Standard Test Method for Piles Under Static Axial Load*. The bi-directional static load test shall be performed as shown on the plans.~~

~~The bi-directional static load test cell equipment shall have sufficient capacity to fully mobilize the test drilled shafts' nominal capacity. The applied load shall at least be equivalent to the test drilled shaft load specified in the plans.~~

~~The location of the test drilled shaft (non-production) shall be as indicated in the plans. The test drilled shaft shall maintain a minimum distance of 25 feet from any foundation element of any future bent. The Contractor shall submit the proposed location to the Department for approval.~~

~~Load testing of the test drilled shaft shall not begin until the concrete has attained a compressive strength (f'_c) as indicated in the plans and had a curing time of no less than 7 days. High early strength concrete may be used to obtain the required strength at an earlier time to prevent testing delays, upon the approval of the Department.~~

~~The bi-directional static load testing shall be performed using the number of load cells and at the locations indicated in the plans. The Contractor will be required to furnish and include all costs in the bid item for all materials, personnel, and equipment as described in the plans, this Supplemental Technical Specification, the Special Provisions and as required by the contract to adequately perform Bi-Directional Static Load Testing of Drilled Shafts. The Contractor shall engage the services of an approved bi-directional static load test supplier for instrumenting, performing, and reporting of the bi-driectional static load test. The Contractor may contact the Engineer for names of bi-directional static load test suppliers. The drilled shaft used for the load test program will be instrumented by the bi-directional static load test device supplier. The Contractor shall subcontract with the bi-direction static load test manufacturer to supply the bi-directional static load test cells and other necessary equipment and instrumentation, perform the test, and analyze the results of the bi-directional static load test on 1 test drilled shaft.~~

~~The Contractor shall submit to the Department for approval 3 sets of shop drawings, erection plans, test calculations and details associated with the axial bi-directional static load testing within 21 days following the Notice to Proceed. The submittal shall include details with respect to the reinforcement cage fabrication, instrumentation plans, reference beams and movement measuring systems. All details, drawings, calculations, and procedures shall be submitted to the Department for review a minimum of 21 days prior to beginning the axial bi-directional static load test. Approval of this submittal by the Department shall not relieve the Contractor from making subsequent changes that may become necessary to carry out the test.~~

~~The Contractor, in cooperation with the selected bi-directional static load test supplier, shall supply and supervise the mobilization, assembly, and operation of the bi-directional static load test equipment. The of bi-directional static load test supplier shall provide and install the required instrumentation for the test drilled shaft, acquire the test data during testing, and reduce the data into a report. This report shall be presented to the Contractor and the Department for evaluation. Interpretation of the test data with regard to foundation recommendations will be performed by the Department.~~

~~2.0 MATERIALS & EQUIPMENT~~

~~The Contractor shall supply all materials required to install the bi-directional static load test~~

device, conduct the load test, and remove the load test apparatus as required. The Contractor shall furnish the number of bi-directional static load test assemblies as required in the plans for the test drilled shaft. The bi-directional static load test assemblies to be provided shall have a capacity that fully mobilizes the test drilled shafts' nominal capacity and shall be equipped with all necessary hydraulic lines, fittings, pressure source, pressure gage and telltale devices.

Additional materials required include, but are not limited to, the following:

1. Fresh, clean, potable water from an approved source to be used as hydraulic fluid to pressurize the bi-directional static load test devices.

2. Materials sufficient to construct and shade a stable reference beam system for monitoring movements of the drilled shaft during testing. The system shall be supported at a minimum distance of 3 shaft diameters from the center of the test drilled shaft to minimize disturbance of the reference system. A tripod shall be provided to support an automated digital survey level used to monitor movement of the reference system during testing. Alternatively, 2 survey levels located in excess of 3 shaft diameters may be used to monitor the top of drilled shaft displacement in lieu of the beam. In this case, 2 tripods and weather protection (Quikshade or equivalent) shall be provided.

3. Materials sufficient to construct a protected work area (including provisions such as a tent or shed for protection from inclement weather for the load test equipment and personnel) of size and type required by the Engineer and the bi-directional static load test supplier. In the case of cold weather, the protected work area shall be maintained at a temperature above 40° F in order to insure proper operation of the load testing equipment.

4. Stable electric power source, as required for lights, welding, instruments, etc.

5. Materials such as angle or channel iron, steel bearing plates and/or other devices needed to attach the bi-directional static load test assembly to rebar cage or carrying frame, as required.

Materials supplied which do not become a part of the finished structure become the property of the Contractor at the conclusion of the load test and shall be removed from the job site.

The Contractor shall supply equipment required to install the bi-directional static load test devices, conduct the load tests, and remove the load test apparatus as required. Equipment required includes but is not limited to:

1. Welding equipment and certified welding personnel, as required, to assemble the test equipment under the supervision of the bi-directional static load test supplier and to attach hydraulic fittings and telltales to the bi-directional static load test devices, and prepare the work area.

2. Equipment and labor to construct the reinforcing steel cage and/or placement frame required for the test drilled shaft, including steel bearing plates as required.

3. Equipment and operators for handling the bi-directional static load test device and instrumentation and placement frame or reinforcing steel cage during the installation of the bi-directional static load test device and during the conduct of the test, including but not limited to a crane or other lifting device for bi-directional static load test device and instrumentation, manual labor, and hand tools as required by bi-directional static load test supplier.

4. Equipment and labor sufficient to erect the protected work area and monitoring reference beam system, to be constructed to the requirements of the Engineer and bi-directional static load test supplier.

5. Air compressor (minimum 150 cfm) for pump operation during load testing.

6. Strain Gauges – the Contractor shall supply the number of strain gauges as required at each level. The number of strain gauges will be determined as shown in the plans. All cost for supplying strain gauges will be included in the price bid for Bi-Directional Static Load Testing of Drilled Shafts, and no additional payment will be made for this equipment.

3.0 PREPARATION FOR TESTING

The Contractor shall perform site and foundation preparation. Foundation preparation includes the cutting and cleaning of the surface of the test drilled shaft down to test elevation. The top of the test drilled shaft shall be smooth and level. The area around the test drilled shaft, on land, shall be leveled and compacted within a 15-foot radius. The top of the drilled shaft should be approximately 1-1/2 diameters above grade for axial testing. For over water or elevated work areas, the area provided shall be level and at the test elevation. The support falsework platform shall be assembled and installed by the Contractor at the test location.

Prior to performing the load test, the Testing Engineer shall be provided with soil boring logs, test shaft installation records, concrete properties (strength, etc.) and details regarding the anticipated dynamic loading equipment. The Testing Engineer is required to perform wave equation analyses (using GRLWEAP or equivalent) to determine the suitability of the proposed dynamic load testing equipment and an acceptable range of drop weight heights so as not to cause damage in the test shaft during the test. If High Strain Dynamic Load Test becomes necessary after the construction letting, then the Contractor shall provide notice of this requirement to the Department at least 45 days in advance of the test.

For the test drilled shaft, proposed instrumentation location shall be provided to the Department a minimum of 7 days prior to the fabrication of the drilled shaft reinforcement cage. The Department will provide comments for the final instrumentation locations within 3 days after receiving this information.

Strain and pressure gage instrumentation, displacement transducers, CSL access tubes, bi-directional static load testing devices and any other materials and equipment required by bi-directional load test supplier shall be installed on the reinforcing cage.

Immediately prior to placement of the reinforcement cage, the dimensions and verticality of the drilled shaft excavation shall be determined by the bi-directional load test supplier using a method approved by the Engineer.

CSL testing will be performed by the Department personnel or a Department designated representative in accordance with Section 727 of the Standard Specifications.

The axial bi-directional static load testing shall not begin until at least 4 days after CSL testing and until the concrete has attained the compressive strength (f'_c) as indicated in the plans.

The Contractor shall cooperate with the Department's personnel whom shall be granted access to all facilities necessary for observation of the test and the viewing of the test results.

The Contractor shall perform the test drilled shaft excavation in accordance with Section 712 of the Standard Specifications.

The bi-directional static load test cells, hydraulic supply lines and other instruments will be assembled and made ready for installation under the direction of bi-directional static load test supplier and the Department, in a suitable area, adjacent to the test shaft, to be provided by the Contractor. The bi-directional static load test assemblies shall be welded to the rebar cage or carrying frame. The plane of the bottom plate(s) of the bi-driectional load test cell(s) shall be set at right angles to the long axis of the cage. The Contractor shall use the utmost care in handling the test assembly so as not to damage the instrumentation during installation. The Contractor shall limit the deflection of the cage to 2 feet between pick points while lifting the cage from the horizontal position to vertical. The maximum spacing between pick points shall be 25 feet. The Contractor shall provide support bracing, strong backs, etc. to maintain the deflection within the specified tolerance. The bi-directional load test assemblies must remain perpendicular to the long axis of the reinforcing cage throughout the lifting and installation process.

When the test drilled shaft excavation has been completed, inspected, callipered using the approved equipment and accepted by the Department, the bi-directional static load test assembly and the reinforcing steel may be installed. A seating layer of concrete shall be placed in the base of the shaft to provide a level base and reaction for the lower bi-directional static load test assembly. The seating layer shall be placed using a pump line or tremie pipe extending through the bi-directional static load test assemblies to the base of the shaft. After seating the bi-directional static load test device assembly, the remainder of the drilled shaft shall be concreted in a manner similar to that specified for production shafts. At least 4 concrete test cylinders, in addition to those specified elsewhere, shall be made from the concrete used in the test drilled shaft, to be tested at the direction of bi-directional static load test supplier. At least 1 of these test cylinders shall be tested prior to the load test and at least 2 cylinders shall be tested on the day of the load test.

4.0 PROCEDURE FOR LOAD TESTING

The load testing shall be performed by a qualified geotechnical engineer approved in advance by the Department. The geotechnical engineer must have a demonstrated knowledge of load testing procedures, and have performed at least 10 bi-directional static load tests within the past 2 years. The load testing shall be performed in general compliance with ASTM D1143 using the Quick Load Test Method for Individual Piles. Initially the loads shall be applied in increments equaling 5 to 10% of the anticipated nominal capacity of the test shaft. The magnitude of the load increments may be increased or decreased depending on the project requirements but should not be changed during the test.

Loads shall be applied in 3 stages by: 1) pressurizing the lower bi-directional static load test device while the upper assembly remains closed, 2) pressurizing the upper bi-directional static load test device while the lower bi-directional static load test device is allowed to freely drain and 3) pressurizing the upper bi-directional static load test device while the hydraulics are closed on the lower bi-directional static load test device. Loads shall be applied at the prescribed intervals until the ultimate capacity of the shaft is reached in either end bearing or side shear, until the maximum capacity or maximum stroke of an bi-directional static load test device is reached, or unless otherwise directed by the Department. At each load increment, or decrement movement indicators shall be read at 1, 2, 4 and 8-minute intervals while the load is held constant. During unloading cycles the load decrement shall be such that at least 4 data points are acquired for the load versus movement curve. Additional cycles of loading and unloading using similar procedures may be required by the Department following the completion of the initial test cycle.

During the load test, no casings may be vibrated into place in the foundation area, within a 100 ft radius of the load test. Drilling may not continue within a 100-foot radius of the test drilled shaft. If test apparatus shows any interference due to construction activities outside of this perimeter, such activities shall cease immediately.

After the completion of the load test, and at the direction of the Department, the Contractor shall remove any equipment, material, waste, etc. which are not to be a part of the finished

structure.

5.0 INSTRUMENTATION

Direct movement indicator measurements should be made of the following: bi-directional static load test device expansion either directly or with telltales (minimum. of 3 indicators required), upward top-of-shaft displacement (minimum of 2 indicators required) and shaft compression above bi-directional static load test device (minimum. of 2 indicators required). Displacement sensors used to measure bi-directional static load test device expansion and top-of-shaft displacement should have a minimum travel of 4 inches and be capable of being read to the nearest 0.001 inch division. When bi-directional static load test device expansion is measured directly, Linear Vibrating Wire Displacement Transducers (LVWDTs) capable of measuring the full stroke of the bi-directional static load test device will be used (typically 6 inches). Displacement sensors used to measure shaft compression should have a minimum travel of 1 inch and be capable of being read to the nearest 0.001 inch division.

6.0 REPORTING OF RESULTS

Unless otherwise specified by the Department, the Contractor will supply 4 paper copies of a report of each load test, as prepared by bi-directional static load test device and a PDF electronic copy. An initial data report containing the load movement curves and data tables will be provided to the Department within 3 working days of the completion of load testing, to allow evaluation of the test results. A final report on the load testing shall be submitted to the Department within 7 working days after completion of the load testing.

7.0 METHOD OF MEASUREMENT

The Bi-Directional StaticLoad Tests of Drilled Shaft shall be considered to include any material, labor, equipment, load cells, etc. required above the requirements of production drilled shaft installation necessary to install, conduct, and remove the drilled shaft load test at the direction of the Department and bi-directional static load test supplier representative. All costs of the axial load test including subcontracting to bi-directional static load test supplier will also be included in the price bid for this work.

The quantity of the pay item "Bi-Directional Static Load Test of Drilled Shafts" is measured by each (EA) completed and accepted by the Department. A completed Bi-Directional Static Load Test shall be 1 test conducted on a test drilled shaft using Bi-Directional Static Load Testing System. and meeting +/-15 percent of, or exceeding the target test peak load as specified in the plans

All costs associated with the normal production of the drilled shaft are measured and paid for elsewhere in the contract documents.

8.0 DISPOSITION OF TEST SHAFT

After completion of all testing and the submittal of the required reports, the test drilled shaft shall be cut-off at a depth of 2 feet below the ground surface. The cut-off portion of the shaft shall be properly disposed of by the contractor and the resulting hole shall be backfilled with soil in accordance with Section 205 of the Standard Specifications. The test area shall be graded smooth. In addition, the location of this test drilled shaft shall be indicated on the As-Built plans for this project.

9.0 BASIS OF PAYMENT

The complete and accepted "Bi-Directional Static Load Test" shall be paid for at the contract lump sum price for each. This shall constitute full compensation for all costs incurred during the procurement, installation, conducting of the test, subsequent removal of test apparatus and appurtenances and disposing of the test shaft as described in Section 8.0 above.

10.0 PAYMENT

~~Payment shall be made under SCDOT Pay Item No. 7120400, "Bi-Directional Static Load Testing of Drilled Shafts."~~

(64) SECTION 712: RAPID LOAD TESTING OF DRILLED SHAFTS:

Rapid Load Testing of Drilled Shafts Supplemental Technical Specification dated July 14, 2015, shall apply to this project.

~~July 20, 2015~~ ~~April 14, 2015~~

~~**1.0 GENERAL**~~

~~This work shall consist of performing a rapid axial compression load test on a test drilled shaft for the purpose of determining and/or verifying the nominal bearing resistance that may be used in the design of production drilled shafts. In addition, the structural integrity of the test drilled shaft, the load-deflection and soil-load transfer relationships shall also be determined. Production drilled shaft lengths may be adjusted after results of the test drilled shaft have been analyzed. No materials shall be ordered until drilled shaft lengths are approved by the Department. The test drilled shaft depth, diameter, and location shall be as specified in the plans. The testing specified in the project documents shall be conducted in general accordance with ASTM D7383 – *Standard Test Method for Axial Compressive Force Pulse (Rapid) Testing of Deep Foundations* and this Supplemental Technical Specification Special Provision.~~

~~The Rapid Load Testing equipment shall have sufficient capacity to fully mobilize the test shafts' ultimate nominal bearing resistance shown in the plans. The applied load shall at least be equivalent to the test drilled shaft load specified in the plans, if greater than the nominal bearing resistance.~~

~~The location of the test drilled shaft (non-production) shall be as indicated in the plans. The test drilled shaft shall maintain a minimum distance of 25 feet from any foundation element of any future bent. The Contractor shall submit the proposed location to the Department for approval.~~

~~Load testing of the test drilled shaft shall not begin until the concrete has attained a compressive strength (f'_c) as indicated in the plans and had a curing time of no less than 7 days. High early strength concrete may be used to obtain the required strength at an earlier time to prevent testing delays, upon the approval of the Department.~~

~~The Contractor will be required to furnish and include all costs in the bid item for all materials, personnel, and equipment as described in the plans, this and other applicable Special Provisions, and as required by the contract to adequately perform the Rapid Load Test. The Contractor shall engage the services of an approved Rapid Load Test supplier for instrumenting, performing, and reporting of the load test. The Contractor may contact the Engineer for names of Rapid Load Test suppliers.~~

~~The Contractor shall supply the name and qualifications of the selected Rapid Load Test supplier a minimum of 30 days prior to conducting the Rapid Load Test. The Contractor shall submit to the Department for approval 3 sets of shop drawings, erection plans, and test calculations and details. The Contractor should include details with respect to the movement measuring system, the piston support system, and the method for measuring the applied load. The Contractor shall also submit details and shop drawings of the proposed set up for review by the Department 2 weeks prior to beginning construction of the testing arrangements (including the test drilled shaft). All details, drawing calculations, and procedures shall be submitted to the Department for review a minimum of 2 weeks prior to beginning the Rapid Load Test. Approval of these submittals by the Department shall not relieve the Contractor from making subsequent changes that may become necessary to carry out the test.~~

The Contractor, in cooperation with the Rapid Load Test supplier will supply and supervise the mobilization, assembly, and operation of the Rapid Load Test equipment. Rapid Load Test supplier shall provide and install the required instrumentation for the test drilled shaft, acquire the test data during testing, and reduce the data into a report. This report shall be presented to the Contractor and the Department for evaluation. Interpretation of the test data with regard to foundation recommendations will be performed by the Department. Rapid testing is non-destructive and entails no greater danger of shaft damage than static load testing.

2.0 MATERIALS & EQUPMENT

The Contractor will supply all materials, personnel and equipment as described below and as required by the Contractor and the Rapid Load Test supplier to adequately perform the Rapid Load Test. Such materials and equipment are:

1. Rapid Load Testing apparatus, including pressure chamber and cylinder, reaction masses, exhaust silencer, gravel structure, gravel structure base frame, and all items specifically incidental to the Rapid Load Test system.

2. Foundation top plate (and follower assembly, if needed), adequate to distribute the applied rapid test load to the test shaft.

3. Rapid Load Test device, acceleration transducers, and data acquisition system pertaining directly to the Rapid Load Test device. All required electronic equipment for the recording, processing, and storage of the Rapid Load Test will be operated by the Rapid Load Test supplier.

4. Resistance based strain gages and sufficient cabling (as required).

5. One Geotechnical Engineer, licensed Professional Engineer in South Carolina, and one technician experienced in the implementation of the Rapid Load Test methods who will direct the test setup, perform the testing, direct the disassembly of the test apparatus, provide load test submittals, provide assistance as needed with pertinent Rapid Load Test issues, and provide a written report. Both the engineer and the technician shall, individually, have at least 2 years' experience in Rapid Load Testing.

Additional materials required for the Rapid Load Test shall be supplied by the Contractor as specified by the Rapid Load Test supplier and include, but are not limited to, the following:

1. Support piles for falsework platform. A falsework platform is not required for land based testing. However, materials such as crane mats and plywood may be necessary to provide a level and firm surface to assemble the Rapid Load Test device on land based testing.

2. If the nominal resistance provided on the plans is in excess of 2,000 tons then approximately 180 tons of ¾-inch of gravel with less than 5 percent fines shall be provided as required by the Rapid Load Test supplier. If more than 1 Rapid Load Test is to be conducted over land, it is anticipated that the Contractor shall provide the necessary equipment to move the gravel between Rapid Load Test sites. The gravel material must be approved by the Department. (Note that #67 Stone has been used successfully in the past.)

The Contractor shall supply any additional equipment and personnel to assemble, perform, disassemble, and move to next test site (if applicable). This equipment includes, but is not limited to, the following:

1. Unloading and loading of the Rapid Load Test device trucks during mobilization and

demobilization.

2. Any necessary on-site mobilization of test equipment.

3. A level and firm surface surrounding the test drilled shaft to support the Rapid Load Test device.

4. A level and smooth drilled shaft top. The top of the test drilled shaft shall incorporate permanent casing length as indicated in the plans and have a minimum ½ inch wall thickness. There shall be at least 6 inches between the top of the test drilled shaft and the top of casing left in place.

5. A crane, rigging and operator capable of lifting, unloading, assembling, disassembling, and packing all Rapid Load Test device equipment. The crane and rigging should be of sufficient size and strength to handle the required Rapid Load Test device equipment.

6. Power source adequate for electronic equipment.

7. For over water tests only, welding equipment and welder for falsework platform.

3.0 PREPARATION FOR TESTING

The Contractor shall perform site and foundation preparation. Foundation preparation includes the cutting and cleaning of the surface of the test drilled shaft down to design or test elevation. The top of the test drilled shaft shall be smooth and level. The area around the test drilled shaft, on land, shall be leveled and compacted within a 15-foot radius. The top of the drilled shaft should be approximately 2 feet above grade for axial testing. For over water or elevated work areas, the area provided shall be level and at the test elevation. The support falsework platform shall be assembled and installed by the Contractor at the test location.

Prior to performing the load test, the Testing Engineer shall be provided with soil boring logs, test shaft installation records, concrete properties (strength, etc.) and details regarding the anticipated dynamic loading equipment. The Testing Engineer is required to perform wave equation analyses (using GRLWEAP or equivalent) to determine the suitability of the proposed dynamic load testing equipment. If Rapid Load Testing becomes necessary after the construction letting, then the Contractor shall provide notice of this requirement to the Department at least 45 days in advance of the test.

For the test drilled shaft, proposed instrumentation location shall be provided to the Department a minimum of 7 days prior to the fabrication of the drilled shaft reinforcement cage. The Department will provide comments for the final instrumentation locations within 3 days after receiving this information.

Strain and pressure gage instrumentation, displacement transducers, CSL access tubes, Rapid Load Testing devices and any other materials and equipment required by Rapid Load Test supplier shall be installed on the reinforcing cage.

Immediately prior to placement of the reinforcement cage, the dimensions and verticality of the drilled shaft excavation shall be determined by the Contractor using a sonic calibration method approved by the Engineer.

CSL testing will be performed by the Department personnel or a Department designated representative in accordance with Section 727 of the Standard Specifications.

The Contractor shall perform the test drilled shaft excavation in accordance with Section 712 of the Standard Specifications.

The Contractor shall use the utmost care in handling the test assembly so as not to damage the instrumentation during installation. The Contractor shall limit the deflection of the cage to 2 feet between pick points while lifting the cage from the horizontal position to vertical. The maximum spacing between pick points shall be 25 feet. The Contractor shall provide support bracing, strong backs, etc. to maintain the deflection within the specified tolerance.

4.0 PROCEDURE FOR LOAD TESTING

The Contractor shall assist the Rapid Load Test supplier as necessary during all aspects of the Rapid Load Test. The following steps shall be taken in the performance of the Rapid Load Test.

1. Preparation for testing as described in Section 3.0.
2. Place the piston mounting plate on the center of the test shaft, level the plate and secure with anchor bolts or welding.
3. Survey and record the shaft top elevation to a bench mark.
4. Bolt the piston assembly to the piston mounting plate.
5. Set the base frame for the gravel containment structure.
6. Connect load cell cable, ignition cable, and accelerometers to piston.
7. Connect all instrumentation to the data acquisition system.
8. Install the predetermined propellant fuel charge. Check the ignition initiating circuit for the correct resistance.
9. Install vent pin with new seal. Grease piston and cylinder. Place cylinder over piston.
10. Place reaction masses. Secure the masses to the cylinder assembly.
11. Place the gravel containment structure and secure into position (if required).
12. Fill the annular space between the gravel containment structure and the Rapid Load Test apparatus using gravel (if required).
13. Check the assembled device to ensure there is no physical interference of the load or acceleration monitoring systems.
14. Clear the test work area of personnel.
15. Perform final check of instrumentation and recording equipment.
16. Perform the test.
17. Back up test data on hard drive or jump drive.

5.0 INSTRUMENTATION

The intent of the load test instrumentation is to measure the test load and its distribution between side friction and end bearing, load versus deflection, to provide information for design calculations and estimates, and to provide information for final design. The Contractor shall provide assistance when requested by the Rapid Load Test supplier during installation

of any instrumentation supplied through this contract. The Contractor should be aware that lead times are required for ordering instrumentation. The Contractor shall take the lead times into account when planning the work. The instrumentation shall be installed prior to the construction or installation of the test drilled shaft.

The cost of all instrumentation, to be installed as directed by the Rapid Load Test supplier, shall be included in the cost for Rapid Load Testing. Instrumentation pertaining to the Rapid Load Testing, and listed below, shall be provided by the Rapid Load Test supplier.

1. Electronic Resistance Based Strain Gages – See plans for layout and location of electronic resistance based strain gages. Lead wire shall not be unspliced.

2. Accelerometers – A total of 3 accelerometers shall be arranged across the top of the test shaft approximately 120 degrees apart during Rapid Load Testing.

3. Data Acquisition System – The resistance strain gages will require specialized equipment capable of digitizing at very fast rates. The Rapid Load Test supplier shall supply the necessary equipment and record the test data.

6.0 REPORTING OF RESULTS

The final report of Rapid Load Testing is due no later than 14 days after all Rapid Load Testing is completed and accepted by the Department. Field results of the Rapid Load Test will be provided within 72 hours of test completion.

7.0 METHOD OF MEASUREMENT

The quantity of the pay item "Rapid Load Test of Drilled Shafts" is measured by each (EA) completed and accepted by the Department. A completed Rapid Load Test shall be 1 test conducted on a test drilled shaft using the Rapid Load Test method, and meeting +/-15 percent of, or exceeding the target test peak load as specified in the plans and Special Provisions.

The Rapid Load Test shall be considered as any material, labor, equipment, instrumentation, etc. required above and including the requirements of test drilled shaft installation. This item should include everything necessary to assemble, install, perform, collect data, and remove the Rapid Load Test equipment; under the direction of the Rapid Load Test supplier and others.

All costs associated with the normal production of the drilled shaft are measured and paid for elsewhere in the contract documents.

8.0 DISPOSITION OF TEST SHAFT

After all testing and data collection has been completed, the test drilled shaft shall be cut off to a minimum depth of 2 feet below the ground surface. The cut-off portion of the shaft shall be properly disposed of by the contractor and the resulting hole shall be backfilled with soil in accordance with Section 205 of the Standard Specifications. The test area shall be graded smooth. In addition, the location of this test drilled shaft shall be indicated on the As-Built plans for this project.

9.0 BASIS OF PAYMENT

Rapid Load Testing will be paid for at the contract bid price per each accepted test. The price and payment shall be considered full compensation for furnishing all materials, providing all tools, equipment, labor and incidentals, providing assistance to the production of the test shaft, performing the Rapid Load Test, and disposing of the test drilled shaft as described in Section 8.0 above.

10.0 PAYMENT

Payment shall be made under SCDOT Pay Item No. 7120600, "Bi-Directional Static Load Testing of Drilled Shafts."

(65) SECTION 712: HIGH STRAIN DYNAMIC LOAD TESTING OF DRILLED SHAFTS:

High Strain Dynamic Load Testing of Drilled Shafts Supplemental Technical Specification dated July 14, 2015, shall apply to this project.

July 20, 2015 April 14, 2015

1.0 GENERAL

This work shall consist of performing High Strain Dynamic Load Testing using a drop weight loading system on a test drilled shaft for the purpose of determining and/or verifying the nominal bearing resistance that may be used in the design of production drilled shafts. In addition, the structural integrity of the test drilled shaft, the load deflection and soil load transfer relationships shall also be determined. Production drilled shaft lengths may be adjusted after results of the test drilled shaft have been analyzed. No materials shall be ordered until drilled shaft lengths are approved by the Department. The test shaft depth, diameter, and location shall be as specified in the plans. The testing specified in the project documents shall be conducted in general accordance with ASTM D4945 – *Standard Test Method for High-Strain Dynamic Testing of Deep Foundations* and this Supplemental Technical Specification Special Provision.

The drop weight load testing equipment shall have sufficient capacity to fully mobilize the test shafts' nominal bearing resistance shown in the plans. The applied load shall at least be equivalent to the test drilled shaft load specified in the plans, if greater than the nominal bearing resistance.

The location of the test drilled shaft (non-production) shall be as indicated in the plans. The test drilled shaft shall maintain a minimum distance of 25 feet from any foundation element of any future bent. The Contractor shall submit the proposed location to the Department for approval.

Load testing of the test drilled shaft shall not begin until the concrete has attained a compressive strength (f'_c) as indicated in the plans and had a curing time of no less than 7 days. High early strength concrete may be used to obtain the required strength at an earlier time to prevent testing delays, upon the approval of the Department.

The Contractor will be required to furnish and include all costs in the bid item for all materials, personnel, and equipment as described in the plans, this Supplemental Technical Specification, the Special Provisions and as required by the contract to adequately perform High Strain Dynamic Load Testing of Drilled Shafts. The Contractor shall engage the services of an approved High Strain Dynamic Load Test supplier for instrumenting, performing, and reporting of the high strain dynamic load test. The Contractor may contact the Engineer for names of High Strain Dynamic Load Test suppliers.

The Contractor shall supply the name and qualifications of the selected High Strain Dynamic Load Test supplier a minimum of 30 days prior to conducting the High Strain Dynamic Load Test. The Contractor shall submit to the Department for approval 3 sets of shop drawings, erection plans, and test calculations and details. The Contractor should include details with respect to the movement measuring system and the method for measuring the applied load. The Contractor shall also submit details and shop drawings of the proposed set up for review by the Department 2 weeks prior to beginning construction of the testing arrangements (including the test drilled shaft). All details, drawing calculations, and procedures shall be submitted to the Department for review a minimum of 2 weeks prior to beginning the High Strain Dynamic Load Testing. Approval of these submittals by the Department shall not relieve the Contractor from making subsequent changes that may become necessary to carry out the test.

The Contractor, in cooperation with the High Strain Dynamic Load Test supplier, shall supply and supervise the mobilization, assembly, and operation of the High Strain Dynamic Load Test equipment. The High Strain Dynamic Load Test supplier shall provide and install the required instrumentation for the test drilled shaft, acquire the test data during testing, and reduce the data into a report. This report shall be presented to the Contractor and the Department for evaluation. Interpretation of the test data with regard to foundation recommendations will be performed by the Department.

2.0 MATERIALS & EQUIPMENT

The Contractor shall supply all materials, personnel and equipment as described below and as required by the contract to adequately perform the High Strain Dynamic Load Test. Such materials and equipment are:

1. The High Strain Dynamic loading system and all items specifically incidental to the loading system.

2. Means to insure flat, level (axial to test shaft), and solid concrete shaft top.

3. A drop weight in the range of 1 to 2 percent of the anticipated drilled shaft nominal resistance no less than or 20 tons, whichever is lower or as specified in the plans. The impacting surface of the drop weight should have an area between 70 and 130 percent of the test shaft top area. The cross-sectional shape of the drop weight shall be as regular as possible (square, round, hexagonal, etc.).

4. A guiding frame allowing variable drop heights typically between 3 and 7 feet, or as determined by the High Strain Dynamic Load Testing Engineer (described herein as Testing Engineer) in consultation with the Department.

5. A top cushion consisting of new sheets of plywood with a total thickness of 2 to 6 inches, or as determined by the Testing Engineer in consultation with the Department.

6. A surveyor's transit, laser light or equivalent for measurements (precise to the nearest one-tenth inch) of test shaft set under each drop weight impact.

7. Dynamic testing shall be performed and/or supervised by a Licensed Professional Engineer in South Carolina with at least 2 years of dynamic testing experience.

The Contractor shall supply any additional equipment and personnel to assemble, perform, disassemble, and move to next test site (if applicable). This equipment includes, but not limited to, the following:

1. Unloading and loading of the High Strain Dynamic Load Test supplier trucks during mobilization and demobilization.

2. Any necessary on-site mobilization of test equipment.

3. A level and firm surface surrounding the test drilled shaft to support the High Strain Load testing system.

4. A level and smooth drilled shaft top. The top of the test drilled shaft shall incorporate permanent casing length as indicated in the plans and have a minimum ½ inch wall thickness. There shall be at least 6 inches between the top of the test drilled shaft and the top of the casing left in place.

5. A crane, rigging and operator capable of lifting, unloading, assembling, disassembling, and packing all High Stain Dynamic Load Test equipment. The crane and rigging should be of sufficient size and strength to handle the required High Strain Load Test equipment.

6. Power source adequate for electronic equipment.

7. For over water tests only, welding equipment and welder for falsework platform.

3.0 PREPARATION FOR TESTING

The Contractor shall perform site and foundation preparation. Foundation preparation includes the cutting and cleaning of the surface of the test drilled shaft down to test elevation. The top of the test drilled shaft shall be smooth and level. The area around the test drilled shaft, on land, shall be leveled and compacted within a 15-foot radius. The top of the drilled shaft should be approximately 1-1/2 diameters above grade for axial testing. For over water or elevated work areas, the area provided shall be level and at the test elevation. The support falsework platform shall be assembled and installed by the Contractor at the test location.

Prior to performing the load test, the Testing Engineer shall be provided with soil boring logs, test shaft installation records, concrete properties (strength, etc.) and details regarding the anticipated dynamic loading equipment. The Testing Engineer is required to perform wave equation analyses (using GRLWEAP or equivalent) to determine the suitability of the proposed dynamic load testing equipment and an acceptable range of drop weight heights so as not to cause damage in the test shaft during the test. If High Strain Dynamic Load Test becomes necessary after the construction letting, then the Contractor shall provide notice of this requirement to the Department at least 45 days in advance of the test.

For the test drilled shaft, proposed instrumentation location shall be provided to the Department a minimum of 7 days prior to the fabrication of the drilled shaft reinforcement cage. The Department will provide comments for the final instrumentation locations within 3 days after receiving this information.

Strain and pressure gage instrumentation, displacement transducers, CSL access tubes, High Strain Dynamic Load Testing devices and any other materials and equipment required by High Strain Dynamic Load Test supplier shall be installed on the reinforcing cage.

Immediately prior to placement of the reinforcement cage, the dimensions and verticality of the drilled shaft excavation shall be determined by Contractor using a sonic calibration method approved by the Engineer.

CSL testing will be performed by the Department personnel or a Department designated representative in accordance with Section 727 of the Standard Specifications.

The Contractor shall perform the test drilled shaft excavation in accordance with Section 712 of the Standard Specifications.

The Contractor shall use the utmost care in handling the test assembly so as not to damage the instrumentation during installation. The Contractor shall limit the deflection of the cage to 2 feet between pick points while lifting the cage from the horizontal position to vertical. The maximum spacing between pick points shall be 25 feet. The Contractor shall provide support bracing, strong backs, etc. to maintain the deflection within the specified tolerance.

4.0 PROCEDURE FOR LOAD TESTING

The Contractor shall assist the Testing Engineer as necessary during all aspects of the High Strain Dynamic Load Test. The following steps shall be taken in the performance of the High Strain Dynamic Load Test.

1. Preparation for testing as described in Section 3.0.

2. Prior to testing, the Contractor shall make the upper 1-1/2 diameters of the test shaft completely accessible to the Testing Engineer.

3. Four "windows" (approximate size of 6 by 6 inches) diametrically opposite of each other shall be located and removed from the casing, if appropriate, or an entire band of the casing removed to expose a smooth concrete surface for attachment of the sensors. Sensors are typically attached at least 1 diameter below the shaft top. Sensor locations will be determined by the Testing Engineer.

4. In areas where casing is not present, the Testing Engineer, or Contractor under the direction of the Testing Engineer, shall smooth (by grinding) areas around the test shaft circumference such that proper sensor attachment can be accomplished.

5. Sensors shall be attached by the Testing Engineer or under the direction of the Testing Engineer to the exposed concrete in a secure manner as to prevent slippage under impact.

6. Shaft top should be examined to insure having a smooth level surface.

7. Survey and record the shaft top elevation to a bench mark.

8. Apply plywood cushion and striker plate to the shaft top.

9. Two to four hammer impacts with varying drop heights should be applied to the top of the shaft. The first drop height should be minimal to allow the Testing Engineer to assess the testing equipment, the driving system and stresses on the shaft. Subsequent impacts can then be applied by utilizing sequentially higher drop heights until either stresses in the shaft are excessive or the shaft permanent set for the applied impact exceeds 0.1 inch.

5.0 INSTRUMENTATION

The intent of the load test instrumentation is to measure the test load and its distribution between side friction and end bearing, load versus deflection, to provide information for design calculations and estimates, and to provide information for final design. The Contractor shall provide assistance when requested by the Testing Engineer during installation of any instrumentation supplied through this contract.

The cost of all instrumentation, to be installed as directed by the High Strain Dynamic Load Test supplier, shall be included in the cost for High Strain Dynamic Load Testing. Instrumentation pertaining to the High Strain Dynamic Load Testing, and listed below, shall be provided by the High Strain Dynamic Load Test supplier in addition to any instrumentation outlined in ASTM D4945.

1. Pile Driving Analyzer® (PDA) manufactured by Pile Dynamics, Inc., model PAK, PAX or PAL or equivalent.

2. Four calibrated strain transducers.

3. Four calibrated accelerometers.

6.0 REPORTING OF RESULTS

It is the High Strain Dynamic Load Test supplier's responsibility to submit a Final Report of

the High Strain Dynamic Load Testing no later than 14 days after all High Strain Dynamic Load Testing is completed and accepted by the Department. Field results of the High Strain Dynamic Load Test shall be provided within 72 hours of test completion. In addition to the field results, results from a CAPWAP® analysis or equivalent shall be submitted. A CAPWAP® analysis shall be completed for each hammer impact in the field and shall be performed by an Engineer that has achieved Advanced Level or better on the Foundation QC High Strain Dynamic Pile Testing Examination. The report must also provide the following:

1. Wave Equation analysis results obtained prior to testing.

2. CAPWAP® (or equivalent) analysis results.

3. The maximum measured force, maximum calculated tension force, transferred energy to the sensor location, corresponding stresses, and the Case Method bearing capacity for each impact.

4. Assessment of the test results both with respect to shaft capacity (including end bearing and friction resistance) and integrity.

7.0 METHOD OF MEASUREMENT

The quantity of the pay item "High Strain Dynamic Load Testing of Drilled Shafts" is measured by each (EA) completed and accepted by the Department. A completed High Strain Dynamic Load Test shall be 1 test conducted on a test drilled shaft using the High Strain Dynamic Load Testing System and meeting +/-15 percent of, or exceeding the target test peak load as specified in the plans.

The High Strain Dynamic Load Test shall be considered as any material, labor, equipment, instrumentation, etc. required above. This item should include everything necessary to assemble, install, perform, collect data, and remove the High Strain Dynamic Load Test equipment; under the direction of the High Strain Dynamic Load Test supplier and others.

All costs associated with the normal production of the drilled shaft are measured and paid for elsewhere in the contract documents.

8.0 DISPOSITION OF TEST SHAFT

After all testing and data collection has been completed, the test drilled shaft shall be cut off to a minimum depth of 2 feet below the ground surface. The cut-off portion of the shaft shall be properly disposed of by the contractor and the resulting hole shall be backfilled with soil in accordance with Section 205 of the Standard Specifications. The test area shall be graded smooth. In addition, the location of this test drilled shaft shall be indicated on the As-Built plans for this project.

9.0 BASIS OF PAYMENT

High Strain Dynamic Load Testing will be paid for at the contract bid price per each accepted test. The price and payment shall be considered full compensation for furnishing all materials, providing all tools, equipment, labor and incidentals, providing assistance to the production of the test shaft, performing the High Strain Dynamic Load Test, and disposing of the test shaft as described in Section 8.0 above.

10.0 PAYMENT

Payment shall be made under SCDOT Pay Item No. 7120800, "Bi-Directional Static Load Testing of Drilled Shafts."

(66) SECTION 714: SMOOTH WALL PIPE:

manufacturer's recommendations for the specified use conforming to all federal, state and local laws, rules and regulations. The Contractor is responsible for obtaining all required permits.

Emulsion batches shall be mixed following recommendations of a testing laboratory that determines the proper product and rate to meet site requirements.

Additives such as fertilizers, solubility promoters, or inhibitors, etc. to polyacrylamide shall be nontoxic.

Care is to be taken when using polyacrylamide adjacent to natural water bodies.

Method of Measurement:
The application of polyacrylamide for erosion control will be measured by the surface area treated at the recommended rate of application. Quantities are to be computed to the nearest MSY (Thousand Square Yards). Solid form anionic polyacrylamide is to be measured by weight in pounds, in place and accepted. The Contractor is required to provide, to the Engineer, invoices for all polyacrylamide products used on the project.

Basis of Payment:
The accepted quantity of "Anionic Polyacrylamide For Erosion Control" will be paid at the contract unit price, which price and payment shall be full compensation for all materials, labor, tools equipment, and incidentals necessary to complete the work herein described in a workmanlike and acceptable manner. Solid form anionic polyacrylamide is to be paid for by the pound. Bid Item Numbers and Descriptions are as follows:

Bid Item Number	Description	Unit
8152020	Anionic Polyacrylamide for Erosion Control	MSY
8152025	Solid Form Anionic Polyacrylamide	LBS

(83) SECTION 104: SCOPE OF WORK:
Delete Paragraph 2 of Subsection 104.2 of the Standard Specifications and replace it with the following:

"For items of work where the Department has provided estimated quantities and assigned unit prices, the Department reserves the right to increase or decrease the quantities. If a quantity increase is more than 50% of the estimated quantity, the RCE will determine if the assigned unit price may be adjusted because of the increase."

(84) SECTION 107: NORFOLK SOUTHERN RAILWAY COMPANY SPECIAL PROVISIONS FOR PROTECTION OF RAILWAY INTERESTS:

January 4, 2010

SPECIAL PROVISIONS FOR
PROTECTION OF RAILWAY INTERESTS

NORFOLK SOUTHERN RAILWAY COMPANY, hereinafter called the "Railway"; and

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION, hereinafter called the "Department";

1. AUTHORITY OF RAILWAY ENGINEER AND DEPARTMENT ENGINEER:

The authorized representative of the Railway Company, hereinafter referred to as Railway Engineer, shall have final authority in all matters affecting the safe maintenance of railroad traffic of his Company including the adequacy of the foundations and structures supporting the railroad tracks.

The authorized representative of the Department, hereinafter referred to as the Department Engineer, shall have authority over all other matters as prescribed herein and in the Project Specifications.

2. NOTICE OF STARTING WORK:

A. The Department's Prime contractor shall not commence any work on Railway's rights-of-way until he has complied with the following conditions:

1. Given the Railway written notice, with copy to the Department Engineer who has been designated to be in charge of the work, at least ten days in advance of the date he proposes to begin work on Railway's rights-of-way.

Office of Chief Engineer
Bridges & Structures
Norfolk Southern Corporation
1200 Peachtree Street NE
Internal Box #142
Atlanta, Georgia 30309

2. Obtained written approval from the Railway of Railroad Protective Liability Insurance coverage as required by paragraph 14 herein. It should be noted that Railway Company does not accept notation of Railroad Protective insurance on a certificate of liability insurance form or Binders as Railway Company must have the full original countersigned policy. Further, please note that mere receipt of the policy is not the only issue but review for compliance. Due to the number of projects system-wide, it typically takes a minimum of 30-45 days for Railway Company to review.

3. Obtained Railway's Flagging Services as required by paragraph 7 herein.

4. Obtained written authorization from the Railway to begin work on Railway's rights-of-way, such authorization to include an outline of specific conditions with which he must comply.

5. Furnished a schedule for all work within the Railway's rights-of-way as required by paragraph 7,B,1.

B. The Railway's written authorization to proceed with the work shall include the names, addresses, and telephone numbers of the Railway Representatives who are to be notified as hereinafter required. Where more than one representative is designated, the area of responsibility of each representative shall be specified.

3. INTERFERENCE WITH RAILWAY OPERATIONS:

A. The Contractor shall so arrange and conduct his work that there will be no interference with Railway's operations, including train, signal, telephone and telegraphic services, or damage to the property of the Railway Company or to poles, wires, and other facilities of tenants on the rights-of-way of the Railway Company. Whenever work is liable to affect the operations or safety of trains, the method of doing such work shall first be submitted to the Railway Engineer for

approval, but such approval shall not relieve the Contractor from liability. Any work to be performed by the Contractor which requires flagging service or inspection service shall be deferred by the Contractor until the flagging service or inspection service required by the Railway is available at the job site.

B. Whenever work within Railway's rights-of-way is of such a nature that impediment to Railway operations such as use of runaround tracks or necessity for reduced speed is unavoidable, the Contractor shall schedule and conduct his operations so that such impediment is reduced to the absolute minimum.

C. Should conditions arising from, or in connection with the work, require that immediate and unusual provisions be made to protect operations and property of the Railway, the Contractor shall make such provisions. If in the judgment of the Railway Engineer, or in his absence, the Railway's Division Engineer, such provisions are insufficient, either may require or provide such provisions as he deems necessary. In any event, such unusual provisions shall be at the Contractor's expense and without cost to the Railway or the Department.

4. TRACK CLEARANCES:

A. The minimum track clearances to be maintained by the Contractor during construction are shown on the Project Plans. However, before undertaking any work within Railway's rights-of-way, or before placing any obstruction over any track, the Contractor shall:

1. Notify the Railway Representative at least 72 hours in advance of the work.

2. Receive assurance from the Railway Representative that arrangements have been made for flagging service as may be necessary.

3. Receive permission from the Railway Representative to proceed with the work.

4. Ascertain that the Department Engineer has received copies of notice to the Railway and of the Railway's response thereto.

5. CONSTRUCTION PROCEDURES:

A. General:

Construction work and operations by the Contractor on Railway's property shall be:

1. Subject to the inspection and approval of the Railway.

2. In accord with the Railway's written outline of specific conditions.

3. In accord with the Railway's general rules, regulations and requirements including those relating to safety, fall protection and personal protective equipment.

4. In accord with these Special Provisions.

B. Excavation:

The subgrade of an operated track shall be maintained with edge of berm at least 10'-0" from centerline of track and not more than 24- inches below top of rail. Contractor will not be required to make existing section meet this specification if substandard, in which case existing section will be maintained.

Additionally, the Railway Engineer may require installation of orange construction safety fencing for protection of the work area.

C. Excavation for Structures:

The Contractor will be required to take special precaution and care in connection with excavating and shoring pits, and in driving piles or sheeting for footings adjacent to tracks to provide adequate lateral support for the tracks and the loads which they carry, without disturbance of track alignment and surface, and to avoid obstructing track clearances with working equipment, tools or other material. All plans and calculations for shoring shall be prepared and signed by a Registered Professional Engineer. The Registered Professional Engineer will be responsible for the accuracy for all controlling dimensions as well as the selection of soil design values which will accurately reflect the actual field conditions. The procedure for doing such work, including need of and plans and calculations for shoring, shall first be approved by the Department Engineer and the Railway Engineer, but such approval shall not relieve the Contractor from liability.

Additionally, walkway with handrail protection may be required as noted in paragraph 11 herein. .

D. Demolition, Erection, Hoisting

1. Railway's tracks and other Railway property must be protected from damage during the procedure.

2. The Contractor is required to submit a plan showing the location of cranes, horizontally and vertically, operating radii, with delivery or disposal locations shown. The location of all tracks and other railroad facilities as well as all obstructions such as wire lines, poles, adjacent structures, etc. must also be shown.

3. Crane rating sheets showing cranes to be adequate for 150% of the actual weight of the pick. A complete set of crane charts, including crane, counterweight, and boom nomenclature is to be submitted.

4. Plans and computations showing the weight of the pick must be submitted. Calculations shall be made from plans of the existing and/or proposed structure showing complete and sufficient details with supporting data for the demolition or erection of the structure. If plans do not exist, lifting weights must be calculated from field measurements. The field measurements are to be made under the supervision of the Registered Professional Engineer submitting the procedure and calculations.

5. A data sheet must be submitted listing the types, size, and arrangements of all rigging and connection equipment.

6. A complete procedure is to be submitted, including the order of lifts, time required for each lift, and any repositioning or re-hitching of the crane or cranes.

7. All erection or demolition plans, procedures, data sheets, etc. submitted must be prepared, signed and sealed by a Registered Professional Engineer.

8. The Railway Engineer or his designated representative must be present at the site during the entire demolition and erection procedure period.

9. All procedures, plans and calculations shall first be approved by the Department Engineer and the Railway Engineer, but such approval does not relieve the Contractor from liability.

E. Blasting:

1. The Contractor shall obtain advance approval of the Railway Engineer and the Department Engineer for use of explosives on or adjacent to Railway property. The request for permission to use explosives shall include a detailed blasting plan. If permission for use of explosives is granted, the Contractor will be required to comply with the following:

   (a) Blasting shall be done with light charges under the direct supervision of a responsible officer or employee of the Contractor and a licensed blaster.

   (b) Electric detonating fuses shall not be used because of the possibility of premature explosions resulting from operation of two-way radios.

   (c) No blasting shall be done without the presence of the Railway Engineer or his authorized representative. At least 72 hours advance notice to the person designated in the Railway's notice of authorization to proceed (see paragraph 2B) will be required to arrange for the presence of an authorized Railway representative and such flagging as the Railway may require.

   (d) Have at the job site adequate equipment, labor and materials and allow sufficient time to clean up debris resulting from the blasting without delay to trains, as well as correcting at his expense any track misalignment or other damage to Railway property resulting from the blasting as directed by the Railway's authorized representative. If his actions result in delay of trains, the Contractor shall bear the entire cost thereof.

2. The Railway representative will:

   (a) Determine approximate location of trains and advise the Contractor the appropriate amount of time available for the blasting operation and clean up.

   (b) Have the authority to order discontinuance of blasting if, in his opinion, blasting is too hazardous or is not in accord with these special provisions.

F. Maintenance of Railway Facilities:

1. The Contractor will be required to maintain all ditches and drainage structures free of silt or other obstructions which may result from his operations and provide and maintain any erosion control measures as required. The Contractor will promptly repair eroded areas within Railway's rights-of-way and repair any other damage to the property of the Railway or its tenants.

2. All such maintenance and repair of damages due to the Contractor's operations shall be done at the Contractor's expense.

G. Storage of Materials and Equipment:

Materials and equipment shall not be stored where they will interfere with railroad operations, nor on the rights-of-way of the Railway Company without first having obtained permission from the Railway Engineer, and such permission will be with the understanding that the Railway Company will not be liable for damage to such material and equipment from any cause and that the Railway Engineer may move or require the Contractor to move, at the Contractor's expense, such material and equipment.

All grading or construction machinery that is left parked near the track unattended by a watchman shall be effectively immobilized so that it cannot be moved by unauthorized persons. The Contractor shall protect, defend, indemnify and save Railway, and any associated, controlled or affiliated corporation, harmless from and against all losses, costs, expenses, claim or liability for loss or damage to property or the loss of life or personal injury, arising out of or incident to the Contractor's failure to immobilize grading or construction machinery.

H. Cleanup:

Upon completion of the work, the Contractor shall remove from within the limits of the Railway's rights-of-way, all machinery, equipment, surplus materials, falsework, rubbish or temporary buildings of the Contractor, and leave said rights-of-way in a neat condition satisfactory to the Chief Engineer of the Railway or his authorized representative.

6. DAMAGES:

A. The Contractor shall assume all liability for any and all damages to his work, employees, servants, equipment and materials caused by Railway traffic.

B. Any cost incurred by the Railway for repairing damages to its property or to property of its tenants, caused by or resulting from the operations of the Contractor, shall be paid directly to the Railway by the Contractor.

7. FLAGGING SERVICES:

A. Requirements:

Flagging services will not be provided until the contractor's insurance has been reviewed & approved by the Railway.

Under the terms of the agreement between the Department and the Railway, the Railway has sole authority to determine the need for flagging required to protect its operations. In general, the requirements of such services will be whenever the

Contractor's personnel or equipment are or are likely to be, working on the Railway's right-of-way, or across, over, adjacent to, or under a track, or when such work has disturbed or is likely to disturb a railroad structure or the railroad roadbed or surface and alignment of any track to such extent that the movement of trains must be controlled by flagging.

Normally, the Railway will assign one flagman to a project; but in some cases, more than one may be necessary, such as yard limits where three (3) flagmen may be required. However, if the Contractor works within distances that violate instructions given by the Railway's authorized representative or performs work that has not been scheduled with the Railway's authorized representative, a flagman or flagmen may be required full time until the project has been completed.

B. Scheduling and Notification:

1. The Contractor's work requiring railroad flagging should be scheduled to limit the presence of a flagman at the site to a maximum of 50 hours per week. The Contractor shall receive Railway's approval of work schedules requiring a flagman's presence in excess of 40 hours per week.

2. Not later than the time that approval is initially requested to begin work on Railway's rights-of-way, Contractor shall furnish to the Railway and the Department a schedule for all work required to complete the portion of the project within Railway's rights-of-way and arrange for a job site meeting between the Contractor, the Department, and the Railway's authorized representative. Flagman or Flagmen may not be provided until the job site meeting has been conducted and the Contractor's work scheduled.

3. The Contractor will be required to give the Railway representative at least 10 working days of advance written notice of intent to begin work within Railway's rights-of-way in accordance with this special provision. Once begun, when such work is then suspended at any time, or for any reason, the Contractor will be required to give the Railway representative at least 3 working days of advance notice before resuming work on Railway's rights-of-way. Such notices shall include sufficient details of the proposed work to enable the Railway representative to determine if flagging will be required. If such notice is in writing, the Contractor shall furnish the Engineer a copy; if notice is given verbally, it shall be confirmed in writing with copy to the Engineer. If flagging is required, no work shall be undertaken until the flagman, or flagmen are present at the job site. It may take up to 30 days to obtain flagging initially from the Railway. When flagging begins, the flagman is usually assigned by the Railway to work at the project site on a continual basis until no longer needed and cannot be called for on a spot basis. If flagging becomes unnecessary and is suspended, it may take up to 30 days to again obtain from the Railway. Due to Railway labor agreements, it is necessary to give 5 working days notice before flagging service may be discontinued and responsibility for payment stopped.

4. If, after the flagman is assigned to the project site, an emergency arises that requires the flagman's presence elsewhere, then the Contractor shall delay work on Railway's rights-of-way until such time as the flagman is again available. Any additional costs resulting from such delay shall be borne by the Contractor and not the Department or Railway.

C. Payment:

1. The Department will be responsible for paying the Railway directly for any and all costs of flagging which may be required to accomplish the construction.

2. The estimated cost of flagging is current rate per day based on a 10-hour work day. This cost includes the base pay for the flagman, overhead, and includes a per diem charge for travel expenses, meals and lodging. The charge to the Department by the Railway will be the actual cost based on the rate of pay for the Railway's employees who are available for flagging service at the time the service is required.

3. Work by a flagman in excess of 8 hours per day or 40 hours per week, but not more than 12 hours a day will result in overtime pay at 1 and 1/2 times the appropriate rate. Work by a flagman in excess of 12 hours per day will result in overtime at 2 times the appropriate rate. If work is performed on a holiday, the flagging rate is 2 and 1/2 times the normal rate.

4. Railway work involved in preparing and handling bills will also be charged to the Department. Charges to the Department by the Railway shall be in accordance with applicable provisions of Subchapter B, Part 140, Subpart I and Subchapter G, Part 646, Subpart B of the Federal-Aid Policy Guide issued by the Federal Highway Administration on December 9, 1991, including all current amendments. Flagging costs are subject to change.

D. Verification:

1. Railway's flagman will electronically enter flagging time via Railway's electronic billing system. Any complaints concerning flagging must be resolved in a timely manner. If need for flagging is questioned, please contact Railway's System Engineer Public Improvements (404) 529-1641. All verbal complaints will be confirmed in writing by the Contractor within 5 working days with a copy to the Highway Engineer. Address all written correspondence to:

Office of Chief Engineer
Bridges & Structures
Norfolk Southern Corporation
1200 Peachtree Street NE,
Internal Box 142
Atlanta, Georgia 30309

Attn:
System Engineer
Public Improvements

2. The Railway flagman assigned to the project will be responsible for notifying the Department Engineer upon arrival at the job site on the first day (or as soon thereafter as possible) that flagging services begin and on the last day that he performs such services for each separate period that services are provided. The Department Engineer will document such notification in the project records. When requested, the Department Engineer will also sign the flagman's diary showing daily time spent and activity at the project site.

8. HAUL ACROSS RAILROAD:

A. Where the plans show or imply that materials of any nature must be hauled across a railroad, unless the plans clearly show that the Department has included arrangements for such haul in its agreement with the Railway, the Contractor will

be required to make all necessary arrangements with the Railway regarding means of transporting such materials across the railroad. The Contractor will be required to bear all costs incidental to such crossings whether services are performed by his own forces or by Railway personnel.

B. No crossing may be established for use of the Contractor for transporting materials or equipment across the tracks of the Railway Company unless specific authority for its installation, maintenance, necessary watching and flagging thereof and removal, until a temporary private crossing agreement has been executed between the Contractor and Railway. The approval process for an agreement normally takes 90-days.

9. WORK FOR THE BENEFIT OF THE CONTRACTOR:

A. All temporary or permanent changes in wire lines or other facilities which are considered necessary to the project are shown on the plans; included in the force account agreement between the Department and the Railway or will be covered by appropriate revisions to same which will be initiated and approved by the Department and/or the Railway.

B. Should the Contractor desire any changes in addition to the above, then he shall make separate arrangements with the Railway for same to be accomplished at the Contractor's expense.

10. COOPERATION AND DELAYS:

A. It shall be the Contractor's responsibility to arrange a schedule with the Railway for accomplishing stage construction involving work by the Railway or tenants of the Railway. In arranging his schedule he shall ascertain, from the Railway, the lead time required for assembling crews and materials and shall make due allowance therefore.

B. No charge or claim of the Contractor against either the Department or the Railway Company will be allowed for hindrance or delay on account of railway traffic; any work done by the Railway Company or other delay incident to or necessary for safe maintenance of railway traffic or for any delays due to compliance with these special provisions.

11. TRAINMAN'S WALKWAYS:

Along the outer side of each exterior track of multiple operated track, and on each side of single operated track, an unobstructed continuous space suitable for trainman's use in walking along trains, extending to a line not less than 10 feet from centerline of track, shall be maintained. Any temporary impediments to walkways and track drainage encroachments or obstructions allowed during work hours while Railway's protective service is provided shall be removed before the close of each work day. If there is any excavation near the walkway, a handrail, with 10'-0" minimum clearance from centerline of track, shall be placed and must conform to AREMA and/or FRA standards.

12. GUIDELINES FOR PERSONNEL ON RAILWAY'S RIGHTS-OF-WAY:

A. All persons shall wear hard hats. Appropriate eye and hearing protection must be used. Working in shorts is prohibited. Shirts must cover shoulders, back and abdomen. Working in tennis or jogging shoes, sandals, boots with high heels, cowboy and other slip-on type boots is prohibited. Hard-sole, lace-up footwear, zippered boots or boots cinched up with straps which fit snugly about the ankle

are adequate. Wearing of safety boots is strongly recommended. In the vicinity of at-grade crossings, it is strongly recommended that reflective vests be worn.

B. No one is allowed within 25' of the centerline of track without specific authorization from the flagman.

C. All persons working near track while train is passing are to lookout for dragging bands, chains and protruding or shifted cargo.

D. No one is allowed to cross tracks without specific authorization from the flagman.

E. All welders and cutting torches working within 25' of track must stop when train is passing.

F. No steel tape or chain will be allowed to cross or touch rails without permission.

13. GUIDELINES EQUIPMENT ON RAILWAY'S RIGHTS-OF-WAY:

A. No crane or boom equipment will be allowed to set up to work or park within boom distance plus 15' of centerline of track without specific permission from Railway official and flagman.

B. No crane or boom equipment will be allowed to foul track or lift a load over the track without flag protection and track time.

C. All employees will stay with their machines when crane or boom equipment is pointed toward track.

D. All cranes and boom equipment under load will stop work while train is passing (including pile driving).

E. Swinging loads must be secured to prevent movement while train is passing.

F. No loads will be suspended above a moving train.

G. No equipment will be allowed within 25' of centerline of track without specific authorization of the flagman.

H. Trucks, tractors or any equipment will not touch ballast line without specific permission from Railway official and flagman.

I. No equipment or load movement within 25' or above a standing train or railroad equipment without specific authorization of the flagman.

J. All operating equipment within 25' of track must halt operations when a train is passing. All other operating equipment may be halted by the flagman if the flagman views the operation to be dangerous to the passing train.

K. All equipment, loads and cables are prohibited from touching rails.

L. While clearing and grubbing, no vegetation will be removed from railroad embankment with heavy equipment without specific permission from the Railway Engineer and flagman.

M. No equipment or materials will be parked or stored on Railway's property unless specific authorization is granted from the Railway Engineer.

N. All unattended equipment that is left parked on Railway property shall be effectively immobilized so that it cannot be moved by unauthorized persons.

O. All cranes and boom equipment will be turned away from track after each work day or whenever unattended by an operator.

14. INSURANCE:

A. In addition to any other forms of insurance or bonds required under the terms of the contract and specifications, the Prime Contractor will be required to carry insurance of the following kinds and amounts:

1. Commercial General Liability Insurance having a combined single limit of not less than $2,000,000 per occurrence for all loss, damage, cost and expense, including attorneys' fees, arising out of bodily injury liability and property damage liability during the policy period. Said policy shall include explosion, collapse, and underground hazard (XCU) coverage, shall be endorsed to name Railway specified in item A.2.c. below both as the certificate holder and as an additional insured, and shall include a severability of interests provision.

2. Railroad Protective Liability Insurance having a combined single limit of not less than $2,000,000 each occurrence and $6,000,000 in the aggregate applying separately to each annual period. If the project involves track over which passenger trains operate, the insurance limits required are not less than a combined single limit of $5,000,000 each occurrence and $10,000,000 in the aggregate applying separately to each annual period. Said policy shall provide coverage for all loss, damage or expense arising from bodily injury and property damage liability, and physical damage to property attributed to acts or omissions at the job site.

The standards for the Railroad Protective Liability Insurance are as follows:

a. The insurer must be rated A- or better by A.M. Best Company, Inc.

b. The policy must be written using one of the following combinations of Insurance Services Office ("ISO") Railroad Protective Liability Insurance Form Numbers:

(1) CG 00 35 01 96 and CG 28 31 10 93; or
(2) CG 00 35 07 98 and CG 28 31 07 98; or
(3) CG 00 35 10 01; or
(4) CG 00 35 12 04.

c. The named insured shall read:

Norfolk Southern Railway Company
Three Commercial Place
Norfolk, Virginia 23510-2191
Attn: Risk Management

d. The description of operations must appear on the Declarations, must match the project description in this agreement, and must include the appropriate Department project and contract identification numbers.

e. The job location must appear on the Declarations and must include the city, state, and appropriate highway name/number. NOTE: Do not include any references to milepost on the insurance policy.

f. The name and address of the prime contractor must appear on the Declarations.

g. The name and address of the Department must be identified on the Declarations as the "Involved Governmental Authority or Other Contracting Party."

h. Other endorsements/forms that will be accepted are:

Broad Form Nuclear Exclusion – Form IL 00 21

(1) 30-day Advance Notice of Non-renewal or cancellation
(2) Required State Cancellation Endorsement
(3) Quick Reference or Index Form CL/IL 240

i. Endorsements/forms that are NOT acceptable are:

(1) Any Pollution Exclusion Endorsement except CG 28 31
(2) Any Punitive or Exemplary Damages Exclusion
(3) Known injury or Damage Exclusion form CG 00 59
(4) Any Common Policy Conditions form
(5) Any other endorsement/form not specifically authorized in item no. 2.h above.

B. If any part of the work is sublet, similar insurance, and evidence thereof as specified in A.1 above, shall be provided by or on behalf of the subcontractor to cover its operations on Railway's right of way.

C. Prior to entry on Railway's rights-of-way, the original Railroad Protective Liability Insurance Policy shall be submitted by the Prime Contractor to the Railway and a copy shall be provided to the Department's Resident Construction Engineer, for information, prior to beginning work. In addition, certificates of insurance evidencing the Prime Contractor's and any subcontractors' Commercial General Liability Insurance shall be issued to the Railway at the addresses below. The certificates of insurance shall state that the insurance coverage will not be suspended, voided, canceled, or reduced in coverage or limits without (30) days advance written notice to Railway and the Department. No work will be permitted by Railway on its rights-of-way until it has reviewed and approved the evidence of insurance required herein.

RAILWAY:

Risk Management
Norfolk Southern Railway Company
Three Commercial Place
Norfolk, Virginia 23510-2191

D. The insurance required herein shall in no way serve to limit the liability of Department or its Contractors under the terms of this agreement.

15. FAILURE TO COMPLY:

In the event the Contractor violates or fails to comply with any of the requirements of these Special Provisions:

A. The Railway Engineer may require that the Contractor vacate Railway property.

B. The Engineer may withhold all monies due the Contractor on monthly statements.

Any such orders shall remain in effect until the Contractor has remedied the situation to the satisfaction of the Railway Engineer and the Engineer.

16. PAYMENT FOR COST OF COMPLIANCE:

No separate payment will be made for any extra cost incurred on account of compliance with these special provisions. All such costs shall be included in prices bid for other items of the work as specified in the payment items.

Office of Chief Engineer
Bridges & Structures
Norfolk Southern Corporation
1200 Peachtree Street, N. E.
Internal Box 142
Atlanta, GA 30309

Date:
File:
Milepost: