SCDOT
South Carolina Department of Transportation

PROPOSED PLANS FOR
GREENVILLE COUNTY
PROJECT ID 0038111 – R02

INTERSTATE 85 / 385 INTERCHANGE

FROM: 0.20 MILES SOUTH OF S-326
TO: ROAD S-492

RELEASE FOR CONSTRUCTION PLANS

CONTRACT ID 5384210	SHEET NO.	TOTAL SHEETS
	1	1918

SEE SHEET 1.1 FOR INDEX OF SHEETS

BRIDGES TO BE CONSTRUCTED

BRIDGE NO.	ROAD NO.	LENGTH	STA. TO STA.	LOCATION
1/2A	I-385 SB	201.85'	374+34.76 TO 376+36.61	GARLINGTON RD. & GE RAILROAD OVERPASS
2B	I-385 NB	201.50'	374+96.79 TO 376+98.29	GARLINGTON RD. & GE RAILROAD OVERPASS
3	I-385 NB CD	201.50'	376+37.60 TO 378+39.10	GARLINGTON RD. & GE RAILROAD OVERPASS
4	RAMP 8	148.17'	57+85.53 TO 59+33.70	I-385 NB CD OVERPASS
5	RAMP 1A	1522.83'	72+79.42 TO 88+02.25	I-385 & I-85 OVERPASS
6	RAMP 4B	1962.83'	390+18.50 TO 409+81.33	I-385 & I-85 OVERPASS
7	RAMP 2B	475.00'	34+16.95 TO 38+91.95	I-85 OVERPASS
8	RAMP 3A	254.85'	297+81.45 TO 300+36.30	I-85 OVERPASS
9	RAMP 2A	368.84'	71+70.81 TO 75+39.65	I-85 OVERPASS
10	RAMP 1B	220.05'	69+11.35 TO 71+31.40	RAMP 4B OVERPASS
12	I-385	497.17'	395+34.84 TO 400+32.01	I-85 OVERPASS

BRIDGE PLANS BOUND UNDER SEPARATE COVER

Hydraulic Design Reference for these plans in the:
2009
Edition of SCDOT'S "Requirements for Hydraulic Design Studies"

Design Reference for these plans is the:
2001
AASHTO "A Policy on Geometric Design of Highways and Streets"
UNLESS OTHERWISE NOTED ON TYPICAL SECTION

⚠ 1/9/18 SHEET TOTAL REVISED B.G.N.
⚠ 5/3/18 SHEET TOTAL REVISED B.G.N.

NPDES PERMIT INFORMATION
Disturbed Area = 160.5 Acre(s)
Permitted Area = 349.7 Acre(s)

Approximate Location of Roadway is
Begin
 Latitude 34° 50' 20" N
 Longitude 82° 17' 26" W
End
 Latitude 34° 50' 02" N
 Longitude 82° 17' 27" W

Hydraulic and NPDES Design provided by:
CECS, Inc.
Designs may be obtained from the SCDOT Regional Production Group

PROJECT ID 0038111–R02
INTERSTATE 385
447+60.00 END

PROJECT ID 0038111–R02
INTERSTATE 85
STA. 435+00.00 END

PROJECT ID 0038111–R02
INTERSTATE 85
203+00.00 BEGIN

PROJECT ID 0038111–R02
INTERSTATE 385
303+89.49 BEGIN

LAYOUT
(NOT TO SCALE)

GREENVILLE COUNTY MAP

	I-85		I-385		RAMPS		CD's		TOTAL	
NET LENGTH OF ROADWAY	4.394	MILES	2.551	MILES	9.035	MILES	2.867	MILES	18.757	MILES
NET LENGTH OF BRIDGES	-	MILES	0.171	MILES	0.938	MILES	0.038	MILES	1.147	MILES
NET LENGTH OF PROJECT	4.394	MILES	2.722	MILES	9.973	MILES	2.905	MILES	19.993	MILES
LENGTH OF EXCEPTIONS	-	MILES	-	MILES	-	MILES	-	MILES	-	MILES
GROSS LENGTH OF PROJECT	4.394	MILES	2.722	MILES	9.973	MILES	2.905	MILES	19.993	MILES

EQUALITIES IN STATIONING
NONE

NOTE: EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIALS AND WORKMANSHIP ON THIS PROJECT SHALL CONFORM TO THE SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (2007 EDITION) AND THE STANDARD DRAWINGS FOR ROAD CONSTRUCTION IN EFFECT AT THE TIME OF LETTING.

ENVIRONMENTAL PERMIT INFORMATION
USACE PERMIT	X YES	___ NO
NEPA DOCUMENT	X YES	___ NO
401 CERTIFICATION	X YES	___ NO
OCRM CAP	___ YES	X NO
NAVIGABLE WATERS	___ SC ___ USCG ___ USACE	X N/A

3 DAYS BEFORE DIGGING IN SOUTH CAROLINA
CALL 811
SOUTH CAROLINA 811 (SC811)
WWW.SC811.COM
ALL UTILITIES MAY NOT BE A MEMBER OF SC811

RAILROAD INVOLVEMENT?
(YES) / NO

TRAFFIC DATA
	I-85	I-385
2015 ADT	118,200	106,500
2035 ADT	174,700	171,400
TRUCKS	18 %	18 %

REVISIONS
NO.	DATE	DESCRIPTION	BY	CHECKED
1	1/27/16	SHEET TOTAL REVISED	D.R.R.	B.G.N.
2	5/02/16	SHEET TOTAL REVISED	D.R.R.	B.G.N.
3	5/12/16	SHEET TOTAL REVISED	D.R.R.	B.G.N.
4	6/17/16	SHEET TOTAL REVISED	D.R.R.	R.L.K
5	7/8/16	SHEET TOTAL REVISED	D.R.R.	R.L.K
6	8/9/16	SHEET TOTAL REVISED	D.R.R.	R.L.K
7	8/18/16	SHEET TOTAL REVISED	D.R.R.	R.L.K

⚠	9/12/16	BRIDGE LENGTHS 1/2A, 2B, 3, SHT. TTL RVSD	D.R.R.	⚠	1/12/17	SHEET TOTAL REVISED	B.G.N.
⚠	9/28/16	SHEET TOTAL REVISED	B.G.N.	⚠	2/2/17	SHEET TOTAL REVISED	B.G.N.
⚠	10/21/16	SHEET TOTAL REVISED	B.G.N.	⚠	3/16/17	SHEET TOTAL REVISED	B.G.N.
⚠	10/28/16	SHEET TOTAL REVISED	B.G.N.	⚠	12/18/17	SHEET TOTAL REVISED	B.G.N.

SCDOT REVIEW
	RIGHT-OF-WAY INITIAL	DATE	CONSTRUCTION INITIAL	DATE
PRECONSTRUCTION SUPPORT - ROAD				
PRECONSTRUCTION SUPPORT - STRUCTURES				
RPG - DESIGN MANAGER				
RPG - PROGRAM MANAGER				

THE INITIALS ABOVE DO NOT RELIEVE THE ENGINEER OF RECORD OF THE RESPONSIBILITY TO DESIGN THIS PROJECT IN ACCORDANCE WITH ALL APPLICABLE CRITERIA.

For Right Of Way Acquisition:
Consultant Engineer of Record _____ Date _____
Regional Production Engineer _____ Date _____

CONSULTING ENGINEERING FIRM
FLATIRON ZACHRY

CECS
CIVIL ENGINEERING CONSULTING SERVICES, INC.
2000 PARK STREET
SUITE 201
COLUMBIA, S.C. 29201

ENGINEER OF RECORD
PAUL HANNA RDT
6/7/2018 12:43:11 PDT

FOR CONSTRUCTION: _____ DATE _____

SCDOT

TYPICAL SECTION OF IMPROVEMENT
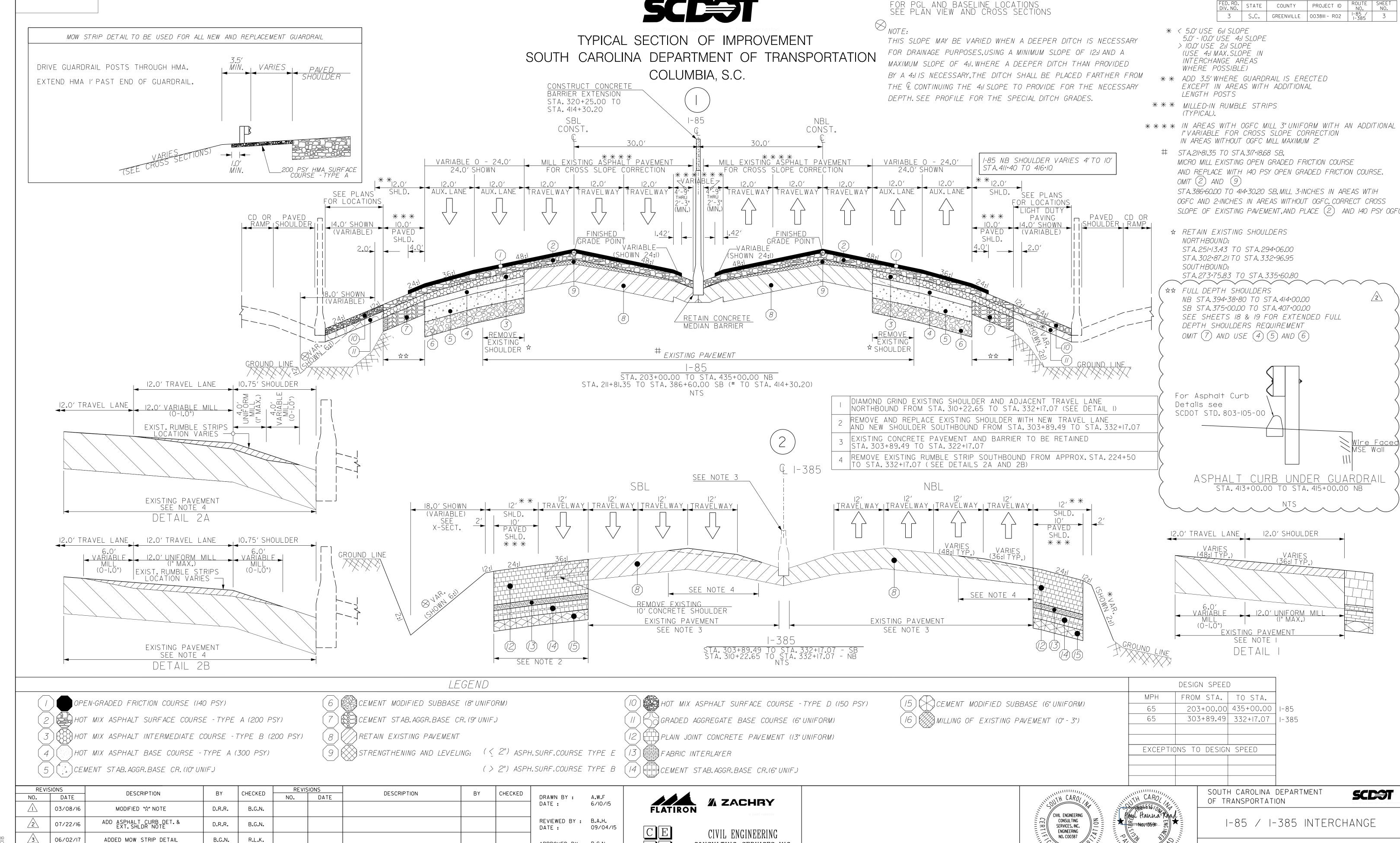**SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION**
COLUMBIA, S.C.

FOR PGL AND BASELINE LOCATIONS
SEE PLAN VIEW AND CROSS SECTIONS

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85, I-385	3

⊗ NOTE:
THIS SLOPE MAY BE VARIED WHEN A DEEPER DITCH IS NECESSARY FOR DRAINAGE PURPOSES, USING A MINIMUM SLOPE OF 12:1 AND A MAXIMUM SLOPE OF 4:1. WHERE A DEEPER DITCH THAN PROVIDED BY A 4:1 IS NECESSARY, THE DITCH SHALL BE PLACED FARTHER FROM THE ℄ CONTINUING THE 4:1 SLOPE TO PROVIDE FOR THE NECESSARY DEPTH. SEE PROFILE FOR THE SPECIAL DITCH GRADES.

* < 5.0' USE 6:1 SLOPE
5.0' - 10.0' USE 4:1 SLOPE
> 10.0' USE 2:1 SLOPE
(USE 4:1 MAX. SLOPE IN INTERCHANGE AREAS WHERE POSSIBLE)

** ADD 3.5' WHERE GUARDRAIL IS ERECTED EXCEPT IN AREAS WITH ADDITIONAL LENGTH POSTS

*** MILLED-IN RUMBLE STRIPS (TYPICAL).

**** IN AREAS WITH OGFC MILL 3" UNIFORM WITH AN ADDITIONAL 1" VARIABLE FOR CROSS SLOPE CORRECTION IN AREAS WITHOUT OGFC MILL MAXIMUM 2'

\# STA.211+81.35 TO STA.317+18.68 SB. MICRO MILL EXISTING OPEN GRADED FRICTION COURSE AND REPLACE WITH 140 PSY OPEN GRADED FRICTION COURSE. OMIT ② AND ⑨
STA.386+60.00 TO 414+30.20 SB, MILL 3-INCHES IN AREAS WITH OGFC AND 2-INCHES IN AREAS WITHOUT OGFC. CORRECT CROSS SLOPE OF EXISTING PAVEMENT, AND PLACE ② AND 140 PSY OGFC.

☆ RETAIN EXISTING SHOULDERS
NORTHBOUND:
STA.251+13.43 TO STA.294+06.00
STA.302+87.21 TO STA.332+96.95
SOUTHBOUND:
STA.273+75.83 TO STA.335+60.80

** FULL DEPTH SHOULDERS
NB STA.394+38.80 TO STA.414+00.00
SB STA.375+00.00 TO STA.407+00.00
SEE SHEETS 18 & 19 FOR EXTENDED FULL DEPTH SHOULDERS REQUIREMENT
OMIT ⑦ AND USE ④ ⑤ AND ⑥

Mow Strip Detail (inset, top left):
MOW STRIP DETAIL TO BE USED FOR ALL NEW AND REPLACEMENT GUARDRAIL
DRIVE GUARDRAIL POSTS THROUGH HMA.
EXTEND HMA 1' PAST END OF GUARDRAIL.
3.5' MIN. / VARIES / PAVED SHOULDER
VARIES (SEE CROSS SECTIONS)
1.0' MIN.
200 PSY HMA SURFACE COURSE - TYPE A

Section ① — I-85
CONSTRUCT CONCRETE BARRIER EXTENSION STA. 320+25.00 TO STA. 414+30.20 (TYPICAL)
SBL CONST. ℄ / I-85 / NBL CONST. ℄ — 30.0' / 30.0'
I-85 NB SHOULDER VARIES 4' TO 10' STA.411+40 TO 416+10
MILL EXISTING ASPHALT PAVEMENT FOR CROSS SLOPE CORRECTION
VARIABLE 0 - 24.0' / 24.0' SHOWN
12.0' SHLD. / 12.0' AUX. LANE / 12.0' AUX. LANE / 12.0' TRAVELWAY / 12.0' TRAVELWAY / 12.0' TRAVELWAY / 12.0' TRAVELWAY / 12.0' TRAVELWAY / 12.0' TRAVELWAY / 12.0' AUX. LANE / 12.0' AUX. LANE / 12.0' SHLD.
FINISHED GRADE POINT
RETAIN CONCRETE MEDIAN BARRIER
REMOVE EXISTING SHOULDER ☆
CD OR PAVED RAMP SHOULDER / 14.0' SHOWN (VARIABLE) / 10.0' PAVED SHLD.
LIGHT DUTY PAVING
SEE PLANS FOR LOCATIONS
GROUND LINE
1.42'

Existing Pavement I-85
STA. 203+00.00 TO STA. 435+00.00 NB
STA. 211+81.35 TO STA. 386+60.00 SB (= TO STA. 414+30.20)
NTS

Detail 2A
12.0' TRAVEL LANE / 12.0' TRAVEL LANE / 10.75' SHOULDER
12.0' VARIABLE MILL (0-1.0')
4.0' UNIFORM MILL (1" MAX.) / 4.0' VARIABLE MILL (0-1.0")
EXIST. RUMBLE STRIPS LOCATION VARIES
EXISTING PAVEMENT SEE NOTE 4

Detail 2B
12.0' TRAVEL LANE / 12.0' TRAVEL LANE / 10.75' SHOULDER
6.0' VARIABLE MILL (0-1.0') / 12.0' UNIFORM MILL (1" MAX.) / 6.0' VARIABLE MILL (0-1.0")
EXIST. RUMBLE STRIPS LOCATION VARIES
GROUND LINE
EXISTING PAVEMENT SEE NOTE 4

Notes box (center):
① DIAMOND GRIND EXISTING SHOULDER AND ADJACENT TRAVEL LANE NORTHBOUND FROM STA. 310+22.65 TO STA. 332+17.07 (SEE DETAIL 1)
② REMOVE AND REPLACE EXISTING SHOULDER WITH NEW TRAVEL LANE AND NEW SHOULDER SOUTHBOUND FROM STA. 303+89.49 TO STA. 332+17.07
③ EXISTING CONCRETE PAVEMENT AND BARRIER TO BE RETAINED STA. 303+89.49 TO STA. 322+17.07
④ REMOVE EXISTING RUMBLE STRIP SOUTHBOUND FROM APPROX. STA. 224+50 TO STA. 332+17.07 (SEE DETAILS 2A AND 2B)

Section ② — I-385
℄ I-385
SBL / SEE NOTE 3 / NBL
12' SHLD. / 10' PAVED SHLD. / 12' TRAVELWAY / 12' TRAVELWAY / 12' TRAVELWAY / 12' TRAVELWAY (SBL)
12' TRAVELWAY / 12' TRAVELWAY / 12' TRAVELWAY / 12' TRAVELWAY / 10' PAVED SHLD. / 12' SHLD. (NBL)
18.0' SHOWN (VARIABLE) SEE X-SECT.
VARIES (48:1 TYP.) / VARIES (36:1 TYP.)
REMOVE EXISTING 10' CONCRETE SHOULDER
EXISTING PAVEMENT SEE NOTE 4 / SEE NOTE 3
GROUND LINE
I-385 STA. 303+89.49 TO STA. 332+17.07 - SB
STA. 310+22.65 TO STA. 332+17.07 - NB
NTS

Detail 1 (right):
12.0' TRAVEL LANE / 12.0' SHOULDER
VARIES (48:1 TYP.) / VARIES (36:1 TYP.)
6.0' VARIABLE MILL (0-1.0') / 12.0' UNIFORM MILL (1" MAX.)
GROUND LINE
EXISTING PAVEMENT SEE NOTE 1

Asphalt Curb detail (right):
For Asphalt Curb Details see SCDOT STD. 803-105-00
Wire Faced MSE Wall
ASPHALT CURB UNDER GUARDRAIL
STA. 413+00.00 TO STA. 415+00.00 NB
NTS

LEGEND
① OPEN-GRADED FRICTION COURSE (140 PSY)
② HOT MIX ASPHALT SURFACE COURSE - TYPE A (200 PSY)
③ HOT MIX ASPHALT INTERMEDIATE COURSE - TYPE B (200 PSY)
④ HOT MIX ASPHALT BASE COURSE - TYPE A (300 PSY)
⑤ CEMENT STAB. AGGR. BASE CR. (10' UNIF.)
⑥ CEMENT MODIFIED SUBBASE (8" UNIFORM)
⑦ CEMENT STAB. AGGR. BASE CR. (9" UNIF.)
⑧ RETAIN EXISTING PAVEMENT
⑨ STRENGTHENING AND LEVELING: (≤ 2") ASPH. SURF. COURSE TYPE E / (> 2") ASPH. SURF. COURSE TYPE B
⑩ HOT MIX ASPHALT SURFACE COURSE - TYPE D (150 PSY)
⑪ GRADED AGGREGATE BASE COURSE (6" UNIFORM)
⑫ PLAIN JOINT CONCRETE PAVEMENT (13' UNIFORM)
⑬ FABRIC INTERLAYER
⑭ CEMENT STAB. AGGR. BASE CR. (6' UNIF.)
⑮ CEMENT MODIFIED SUBBASE (6' UNIFORM)
⑯ MILLING OF EXISTING PAVEMENT (0" - 3")

DESIGN SPEED

MPH	FROM STA.	TO STA.	
65	203+00.00	435+00.00	I-85
65	303+89.49	332+17.07	I-385

EXCEPTIONS TO DESIGN SPEED

Revisions

NO.	DATE	DESCRIPTION	BY	CHECKED
1	03/08/16	MODIFIED ⊗ NOTE	D.R.R.	B.G.N.
2	07/22/16	ADD ASPHALT CURB DET. & EXT. SHLDR NOTE	D.R.R.	B.G.N.
3	06/02/17	ADDED MOW STRIP DETAIL	B.G.N.	R.L.K.
4	5/3/18	REVISED I-85 SB END STA. ADDED I-85 NB REDUCED SHOULDER NOTE	B.G.N.	P.H.R.

DRAWN BY: A.W.F. DATE: 6/10/15
REVIEWED BY: B.A.H. DATE: 09/04/15
APPROVED BY: B.G.N. DATE: 09/20/15

FLATIRON / ZACHRY
CECS CIVIL ENGINEERING CONSULTING SERVICES, INC.

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
I-85 / I-385 INTERCHANGE
TYPICAL SECTION

GEOTECHNICAL NOTES

MAIN INTERCHANGE

The following notes apply to borrow materials:

Provide borrow materials meeting the following minimum requirements:
• A sandy material (35% or less passing 0.075 mm) with a minimum total soil unit weight, γ_m of 110 pcf, with a maximum dry density exceeding 100 pcf.
• Minimum friction angle, φ, of 30° and cohesion, c, of 50 psf for embankment fill.
• No. 57 Stone backfill for Mechanically Stabilized Earth Walls

Walls 32 and 36 will require an embankment fill with a minimum friction angle, φ, of 32° and cohesion, c, of 50 psf. This requirement is between alignment Ramp 4, Stations 50+50 and 52+50.

In addition, determine the moisture-density relationship and classification of the material. Test and submit the classification, moisture-density relationship, and soil strength parameters of the material to the Engineer for acceptance. An AASHTO certified laboratory is required to perform the testing. Contact the RPG Geotechnical Engineer for a list of locally available AASHTO certified laboratories. The Department may perform independent testing to assure quality.

Determine the friction angle and cohesion using either direct shear testing or consolidated-undrained triaxial shear testing with pore pressure measurements. Direct Shear testing shall only be performed on soils with a fines content of less than 25 percent. Classification testing includes grain-size distribution with wash #200 sieve, moisture plasticity testing and natural moisture content. Use the Standard Proctor test to determine the moisture-density relationship. Remold all samples used in shear testing to 95 percent of the Standard Proctor density. Conduct shear strength testing at the initial selection of the borrow pit, any subsequent changes in borrow pits, and for every 10,000 cy of materials placed. Perform classification testing for every 50,000 cy of materials placed, including the material used for the shear strength testing. Additional shear testing may be required if, in the opinion of the RCE, the materials being placed are different from those originally tested.

If these minimum criteria cannot be met, provide the soil parameters for the intended borrow excavation material for the project site to the Engineer for review and acceptance. After acceptable borrow material is obtained, compact the fill to the required finish grade line using the compactive effort indicated in the Standard Specifications for Highway Construction, Section 205 (Embankment Construction).

The following notes apply to muck excavation:

Any areas identified on the plans and any additional areas that are discovered to deflect or settle may require corrective action as directed by the RCE. This may include undercutting, placing No. 57 stone aggregate that is separated from other borrow materials by a geotextile for separation of sub-grade and sub-base, and/or additional compactive effort to the approval of the RCE.

In areas that require mucking or undercutting, borrow material soil may be placed as a bridge lift as long as the grade on which the material is being placed is at least 2 feet above ground water level. In the event that groundwater does not allow backfilling with a borrow material soil, use a No. 57 stone as the bridge lift material. Borrow material bridge lifts may not exceed a 2-foot thickness. The depth at which mucking or undercutting is required is dependent upon encountering a suitable bearing material within the excavation or if a predetermined elevation or depth is required. In most cases, do not undercut more than 3 to 5 feet. The RCE will determine the final mucking or undercutting thickness, unless otherwise specified in the project plans and/or specifications. If a suitable bearing soil is not encountered within this depth range, place a P1 biaxial geogrid with an aperture size of less than or equal to 1 inch and in accordance with the project special previsions beneath a 2-foot thick bridge lift of No. 57 stone. If additional compacted borrow material soil is needed to reach grade, place a geotextile for separation of sub-grade and sub-base between the No. 57 stone and the overlying compacted soil. A bridge lift consisting of borrow material soil may not be placed within 3 feet of the base of the pavement section. Place only compacted borrow material soil or No. 57 stone within this zone. Reference the Standard Specifications for Highway Construction, Earthwork Section, Division 200.

The following notes apply for settlement and displacement monitoring:

The contractor shall establish a monitoring program consisting of settlement instruments. The settlement monitoring program must include establishing settlement monitoring instruments on the subgrade soils prior to fill placement, and at design pavement subgrade elevation. Settlement monitoring instruments are required at a spacing of every 100 feet along MSE Walls and every 500 feet along embankments with new fill thicknesses exceeding 20 feet. Instruments shall be established at the centerline of road and edge of pavement. Settlement monitoring shall continue until three consecutive measurements demonstrate the rate of settlement is less than 0.1 inches per year. No more than one measurement shall be obtained on a single day.

A minimum of 2 measurements shall be obtained on monuments prior to fill placement, and instruments shall be measured weekly during fill placement. Instrumentation measurements shall be provided to the Geotechnical Engineer within 24 hours of measurements for interpretation. Interpreted results shall be provided to the RCE.

The following notes apply to slope construction:

Where the new fill meets the existing slope, the existing slope shall be benched to limit the potential for a preferential failure surface and to allow compaction at the interface. Benches shall have a minimum horizontal length of 8 feet and a vertical rise of no more than 3 feet. Fill slopes of 2H:1V or steeper shall be overbuilt (i.e. fill should temporarily extend beyond the final slope face) to allow compaction at the slope face. After compaction is complete, the slope may be regraded to the final inclination.

Should seeps or thick lenses of highly plastic soils be observed in the planned fill and cut slopes that are steeper than 2H:1V, ECS must be contacted to determine if the steeper slopes may be constructed as planned or if slope flattening or reinforcing is required. Similarly, if soft or wet ground conditions are observed at the base of planned fill embankments, the QA representative must determine the limits of undercutting required or required in-situ treatment.

I-85 STA. 375+00 TO PELHAM RAMP

The following notes apply to borrow materials:

Provide borrow materials meeting the following minimum requirements:
• A sandy material (35% or less passing 0.075 mm) with a minimum total soil unit weight, γ_m of 110 pcf, with a maximum dry density exceeding 100 pcf.
• Minimum friction angle, φ, of 30° and cohesion, c, of 50 psf for embankment fill, alternatively embankment fill may consist of a minimum friction angle (φ) of 34° with zero cohesion.
• No. 57 Stone backfill for Mechanically Stabilized Earth Walls

In addition, determine the moisture-density relationship and classification of the material. Test and submit the classification, moisture-density relationship, and soil strength parameters of the material to the Engineer for acceptance. An AASHTO certified laboratory is required to perform the testing. Contact the RPG Geotechnical Engineer for a list of locally available AASHTO certified laboratories. The Department may perform independent testing to assure quality.

Determine the friction angle and cohesion using either direct shear testing or consolidated-undrained triaxial shear testing with pore pressure measurements. Direct Shear testing shall only be performed on soils with a fines content of less than 25 percent. Classification testing includes grain-size distribution with wash #200 sieve, moisture plasticity testing and natural moisture content. Use the Standard Proctor test to determine the moisture-density relationship. Remold all samples used in shear testing to 95 percent of the Standard Proctor density. Conduct shear strength testing at the initial selection of the borrow pit, any subsequent changes in borrow pits, and for every 10,000 cy of materials placed. Perform classification testing for every 50,000 cy of materials placed, including the material used for the shear strength testing. Additional shear testing may be required if, in the opinion of the RCE, the materials being placed are different from those originally tested.

If these minimum criteria cannot be met, provide the soil parameters for the intended borrow excavation material for the project site to the Engineer for review and acceptance. After acceptable borrow material is obtained, compact the fill to the required finish grade line using the compactive effort indicated in the Standard Specifications for Highway Construction, Section 205 (Embankment Construction).

The following notes apply to muck excavation:

Any areas identified on the plans and any additional areas that are discovered to deflect or settle may require corrective action as directed by the RCE. This may include undercutting; placing No. 57 stone aggregate that is separated from other borrow materials by a geotextile for separation of sub-grade and sub-base, and/or additional compactive effort to the approval of the RCE.

In areas that require mucking or undercutting, borrow material soil may be placed as a bridge lift as long as the grade on which the material is being placed is at least 2 feet above ground water level. In the event that groundwater does not allow backfilling with a borrow material soil, use a No. 57 stone as the bridge lift material. Borrow material bridge lifts may not exceed a 2-foot thickness. The depth at which mucking or undercutting is required is dependent upon encountering a suitable bearing material within the excavation or if a predetermined elevation or depth is required. In most cases, do not undercut more than 3 to 5 feet. The RCE will determine the final mucking or undercutting thickness, unless otherwise specified in the project plans and/or specifications. If a suitable bearing soil is not encountered within this depth range, place a P1 biaxial geogrid with an aperture size of less than or equal to 1 inch and in accordance with the project special provisions beneath a 2-foot thick bridge lift of No. 57 stone. If additional compacted borrow material soil is needed to reach grade, place a geotextile for separation of sub-grade and sub-base between the No. 57 stone and the overlying compacted soil. A bridge lift consisting of borrow material soil may not be placed within 3 feet of the base of the pavement section. Place only compacted borrow material soil or No. 57 stone within this zone. Reference the Standard Specifications for Highway Construction, Earthwork Section, Division 200.

The following notes apply for MSE Wall Subgrades:

Prior to construction of the leveling pad and MSE fill, the RCE shall verify that the retaining wall is founded on subgrade materials possessing the minimum allowable bearing capacity noted on wall plan and elevation sheets. If the RCE determines that the subgrade is unacceptable for placement of MSE fill, the contractor shall undercut the subgrade to the limits directed by the RCE. Unacceptable subgrade materials include, but are not limited to, all high plasticity clays and elastic silts (CH, MH), low plasticity clays and silts (CL, ML) with an unconfined compressive strength less than 2,000 psf, and deleterious debris. Replacement of undercut material will be with Backfill Material, meeting requirements outlined in the SCDOT Standard Specifications for Highway Construction.

The foundation area for the MSE walls might have scattered pockets of soft soils that might be present at the surface or just below the surface for the base of the MSE fill. These soft pockets are only expected to extend a few feet below the base of the MSE fill. The quality assurance representative shall proofroll the subgrade in this area and/or conduct dynamic cone tests at regular intervals to determine that the subgrade meets the requirements of the paragraph above.

There are several locations along the roadway alignment where proposed drainage structures are situated in front of (i.e. parallel) MSE walls. Where new pipes are parallel to the proposed wall, the pipe should be installed prior to the proposed wall or the wall design should account for the temporary reduction in passive resistance. Where pipes pass beneath walls, the pipes should be designed to account for the increased loading associated with the wall backfill. We recommend the top of each pipe be situated a minimum of 1 foot below the bottom of retaining.

The following notes apply for settlement and displacement monitoring:

The contractor shall establish a monitoring program consisting of settlement instruments. The settlement monitoring program must include establishing settlement monitoring instruments on the subgrade soils prior to fill placement, and at design pavement subgrade elevation. Settlement monitoring instruments are required at a spacing of every 100 feet along MSE Walls and every 500 feet along embankments with new fill thicknesses exceeding 20 feet. Instruments shall be established at the centerline of road and edge of pavement. Settlement monitoring shall continue until three consecutive measurements demonstrate the rate of settlement is less than 0.1 inches per year. No more than one measurement shall be obtained on a single day.

A minimum of 2 measurements shall be obtained on monuments prior to fill placement, and instruments shall be measured weekly during fill placement. Instrumentation measurements shall be provided to the Geotechnical Engineer within 24 hours of measurements for interpretation. Interpreted results shall be provided to the RCE.

The following notes apply to slope construction:

Where the new fill meets the existing slope, the existing slope shall be benched to limit the potential for a preferential failure surface and to allow compaction at the interface. Benches shall have a minimum horizontal length of 8 feet and a vertical rise of no more than 3 feet. Fill slopes of 2H:1V or steeper shall be overbuilt (i.e. fill should temporarily extend beyond the final slope face) to allow compaction at the slope face. After compaction is complete, the slope may be regraded to the final inclination.

Should seeps or thick lenses of highly plastic soils be observed in the planned fill and cut slopes that are steeper than 2H:1V, ECS must be contacted to determine if the steeper slopes may be constructed as planned or if slope flattening or reinforcing is required. Similarly, if soft or wet ground conditions are observed at the base of planned fill embankments, the QA representative must determine the limits of undercutting required or required in-situ treatment.

The following Plan Notes apply to Mechanically Stabilized Earth walls:

Reinforced Backfill (Granular Fill or stone.)

Internal Friction Angle (deg) = 36
Total Unit Weight = 120 pcf
Surcharge Dead Load for Pavement Overlay = 140 psf
Active Earth Pressure Coefficient = 0.26

Retained Backfill

Internal Friction Angle (deg) = 30
Total Unit Weight = 117 pcf
Active Earth Pressure Coefficient = 0.33

Wall 17 I-85 Station
Foundation Soils
Total Internal Friction Angle (deg) = 26
Total Cohesion = 0 psf
Effective Internal Friction Angle (deg) = 26
Effective Cohesion = 0 psf

Wall Height	Min. Breq	Factored Bearing (Static)	Factored Bearing (Seismic)
0 < H ≤ 7.5	14.5 ft	2,000	3,100

Wall 18 I-85 Station 413+00 to 415+00
Foundation Soils
Total Internal Friction Angle (deg) = 0
Total Cohesion = 1000 psf
Effective Internal Friction Angle (deg) = 26
Effective Cohesion = 100 psf

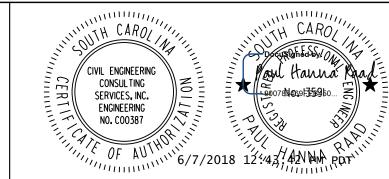| Wall Height	Min. Breq	Factored Bearing (Static)	Factored Bearing (Seismic)
3 < H ≤ 7	12.5 ft	5,400	8,400

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 I-385	18

57
+42.54

59

60

61

56

MUDDY FORD ROAD

SEE SHEET 17 FOR GUARDRAIL NOTE

ERECT 987.5 LF STEEL BEAM GUARDRAIL
CONSTRUCT THRIE BEAM BRIDGE CONNECTOR

END CONSTRUCTION

STA. 386+60.00 I-85 SB WIDENING
REPLACE OGFC AND CORRECT CROSS SLOPE
TO STA. 414+30.20
(SEE SHEET 3)

62

WHISPERING HOLLOW RD.

55

PRESENT 40' R/W
23.412 M.E.A.

PRESENT 40' R/W
23.412 M.E.A.

PRESENT 40' R/W
23.412 M.E.A.

+92.50
PRESENT 150' R/W
23.412 M.E.A.

4 WOVEN WIRE

+60.00
54.00
STA. 386+78 END EXISTING
GUARDRAIL REMOVAL
CONSTRUCT END ANCHOR TYPE B

PRESENT 150' R/W
23.412 M.E.A.

BEGIN WALL 17 w/
MOMENT SLAB BARRIER
STA. +73.80
68.6875' LT.

END WALL 17 W/
MOMENT SLAB BARRIER
STA. +66.59
68.6875' LT.

WALL 17

+00.00
54.00

MOMENT SLAB BARRIER

10' PAVED SHOULDER

12'
INTERSTATE 85 SB
12'
12' C I-85
12'

380 (CUR I85-3)

INTERSTATE 85 NB

385

10' PAVED SHOULDER

MATCH LINE STA. 373+00.00
SEE SHEET 17

10' PAVED SHOULDER
400' TAPER

12'
12'
PAVED SHOULDER
PAVED SHOULDER
375
12'
12'

10' PAVED SHOULDER

PAVED SHOULDER

PAVED SHOULDER
12'
12'
12'
12'
10' PAVED SHOULDER

MATCH LINE STA. 388+00.00
SEE SHEET 19

SEE SHEET 17 FOR GUARDRAIL NOTE

EXIST. CONC.

+98.06

+71.72

EXIS. C/A

53

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 75' R/W
23.412 M.E.A.

PRESENT 75' R/W
23.412 M.E.A.

MUDDY FORD ROAD

58

ERECT 400 LF STEEL BEAM GUARDRAIL
CONSTRUCT END TERMINAL (TYPE T)
CONSTRUCT END ANCHOR (TYPE B)

PRESENT 150' R/W
23.412 M.E.A.

61

CONTRACTOR TO REPLACE EXISTING GUARDRAIL
(WITH ASSOCIATED PAVING UNDER GUARDRAIL)
WITHIN THE PROJECT LIMITS.

CONSTRUCT CONCRETE BARRIER
AT SIGN SUPPORT
SEE STANDARD DRAWINGS 805-801-00
& 805-804-00

LIGHT DUTY PAVING

PAVED SHOULDER

PAVEMENT REMOVAL

ALIGNMENT CONTROL CAN BE FOUND
ON REFERENCE DATA SHEETS 5B TO 5K

REVISIONS					REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED
1	7/22/16	ADDED WALL 55 & REV. WALL 17	D.R.R.	B.G.N.					
2	5/3/18	REVISED STA. 386+60 TO 425+00	B.G.N.	P.H.R.					

DRAWN BY : A.W.F
DATE : 6/10/15

REVIEWED BY : B.A.H.
DATE : 09/04/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON ZACHRY

CECS
CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0 50 100 150 200
SCALE: 1" = 50' HORIZ

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
CERTIFICATE OF AUTHORIZATION
NO. C00387

SOUTH CAROLINA
PROFESSIONAL
No. 1558
ENGINEER
PAUL HANNA RAAD

6/7/2018

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

PLAN SHEET
STA. 373+00.00 TO STA. 388+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	19

TENNIS COURT

65

63

67

69

62

69

N

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

C142   C140'

C113'   C112'

INTERSTATE 85 SB

390 CUR I85-3

395

N 66° 46' 18" E   ℄ I-85   400

EXIST. CONC. MEDIAN BARRIER

EXIST. CONC. MEDIAN BARRIER

INTERSTATE 85 NB

PAVED SHOULDER

PAVED SHOULDER

12'
12'
12'

12'
12'
12'

10' PAVED SHOULDER

10' PAVED SHOULDER

C70'

F84'   F106'   F99'   F94'

NPDES   NPDES   NPDES   NPDES   NPDES

C82'

C139'   C135'   C132'   C122'

C120'   C133'

6' CHAIN LINK

C126'   C141'   C150'   C149'   C148'   C147'   C142'

4 WOVEN WIRE

C89'

C103'

C113'

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

ERECT 637.5 LF STEEL BEAM GUARDRAIL
CONSTRUCT END TERMINAL (TYPE T)
CONSTRUCT END ANCHOR (TYPE B)

64

66

68

61

70   71

CONTRACTOR TO REPLACE EXISTING GUARDRAIL
(WITH ASSOCIATED PAVING UNDER GUARDRAIL)
WITHIN THE PROJECT LIMITS.

MATCH LINE STA. 388+00.00   SEE SHEET 18

MATCH LINE STA. 403+00.00   SEE SHEET 20

☐ LIGHT DUTY PAVING

▨ PAVED SHOULDER

⊠ PAVEMENT REMOVAL

ALIGNMENT CONTROL CAN BE FOUND
ON REFERENCE DATA SHEETS 5B TO 5K

REVISIONS					REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED
⚠	5/3/18	REVISED STA. 386+60 TO 425+00	B.G.N.	P.H.R.					

DRAWN BY : A.W.F
DATE : 6/10/15

REVIEWED BY : B.A.H.
DATE : 09/04/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON   ZACHRY

CECS   CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: I" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

PLAN SHEET
STA. 388+00.00 TO STA. 403+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	20

N

⑦77

⑦79

⑥69

⑦74

BIT. SURF.

BIT. SURF.

PRESENT 150' R/W
23.412 M.E.A.

4' WOVEN WIRE

4' WOVEN WIRE

4 WOVEN WIRE

4' CHAIN LINK

PRESENT 150' R/W
23.412 M.E.A.

MATCH LINE STA. 403+00.00
SEE SHEET 19

MATCH LINE STA. 418+00.00
SEE SHEET 21

405

N 66° 46' 18" E   410

INTERSTATE 85 SB

₵ I-85

415

EXIST. CONC. MEDIAN BARRIER

PAVED SHOULDER

EXIST. CONC. MEDIAN BARRIER

INTERSTATE 85 NB

→ 12'
→ 12'
→ 12'
→ 12'

12' ←
12' ←
12' ←
12' ←

10' PAVED SHOULDER

4' PAVED SHOULDER

10' PAVED SHOULDER

SIGN

+40.00
64.00

F70'

+20.00
58.00

F62'

+30.00
58.00

+10.00
64.00

ERECT 200 LF STEEL BEAM GUARD RAIL
CONSTRUCT END TERMINAL (TYPE T)
CONSTRUCT END ANCHOR (TYPE B)

F82'

F84'

BEGIN WIRE FACED MSE WALL 18
STA. +00.00
62.25' RT.

END WIRE FACED MSE WALL 18
STA. +00.00
63.91' RT.

C102'

C113'

C123'

C130'

C132'

C140'

C128'

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

4' WOVEN WIRE

ERECT 1812.5 LF STEEL BEAM GUARD RAIL
CONSTRUCT END TERMINAL (TYPE T)
CONSTRUCT END ANCHOR (TYPE B)
(USE ADDITIONAL LENGTH POSTS STA.
410+80 TO 426+00)
USE GUARDRAIL MOMENT SLAB FOOTING
(STD 805-510-00) AS NECESSARY TO
AVOID EXISTING BOX CULVERT.

FACE OF GUARDRAIL TO BE CONSTRUCTED
AT EDGE OF PAVED SHOULDER FROM STA.
411+40 TO 420+50.

⑦72

⑦73

⑦76

⑦78

⑦71

TRAILER PARKING AREA

⑧80

CONTRACTOR TO REPLACE EXISTING GUARDRAIL
(WITH ASSOCIATED PAVING UNDER GUARDRAIL)
WITHIN THE PROJECT LIMITS.

☐ LIGHT DUTY PAVING

▨ PAVED SHOULDER

⊠ PAVEMENT REMOVAL

ALIGNMENT CONTROL CAN BE FOUND
ON REFERENCE DATA SHEETS 5B TO 5K

REVISIONS					REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED
⚠	5/3/18	REVISED STA. 386+60 TO 425+00	B.G.N.	P.H.R.					

DRAWN BY : A.W.F
DATE : 6/10/15

REVIEWED BY : B.A.H.
DATE : 09/04/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON   ZACHRY

CECS CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

PLAN SHEET
STA. 403+00.00 TO STA. 418+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85, I-385	21

81
83
84
85
86
87
79
80
82

PRESENT 60' R/W
23.986 M.E.A.
+51.40
+57.00

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

6' CHAIN LINK

6' CHAIN LINK

MATCH LINE STA. 418+00.00
SEE SHEET 20

MATCH LINE STA. 433+00.00
SEE SHEET 22

MATCH LINE STA. 55+00.00
SEE SHEET 22

₵ I-85

INTERSTATE 85 SB

420   N 66° 46' 18" E   425   430

INTERSTATE 85 NB

12'
12'
12'
12'

+00.00
54.00

+00.00
66.00

12'
12'

+08.67
54.00

+10.20
60.88

12'
12'
12'
12'

10' PAVED SHOULDER

300' TAPER

10' PAVED SHOULDER

12'

₵ CUR PELHAM RAMP-1   PELHAM RAMP

10' PAVED SHO.

390' TAPER

R 2'
14'
TAPER
4'

6' PAVED SHOULDER
12'

₵ CUR PELHAM RAMP-2   6' PAVED SHOULDER   12'

+50.00
64.00

NPDES

C81
84

C89'
92

C91'
94

F70'
73

F74'
77

F79'
82

F88'
91

F86'
89

F94'
97

F87'
90

CB2'
85

C34'
37

C46'
49

C45'
48

C47'
51

+86.94
14.00

C48'
51

+88.18
16.00

C48'
51

+51.94
12.00

C36'
39

C34'
37

C29'
32

+19.72

SEE SHEET 20 FOR GUARDRAIL NOTE

PC Sta 50+00.00

50

PCC Sta 51+90.69

PC Sta 51+79.69

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

PRESENT TRANS. R/W
23.986 M.E.A.

TIE EQUALITY:
POT STA.428+20.48 I-85 =
PC STA.50.00.00 PELHAM RAMP
54.00' RIGHT (BEGIN PELHAM RAMP)

CONSTRUCT CONCRETE BARRIER
AT SIGN SUPPORT
SEE STANDARD DRAWINGS 805-801-00
& 805-804-00

CONTRACTOR TO REPLACE EXISTING GUARDRAIL
(WITH ASSOCIATED PAVING UNDER GUARDRAIL)
WITHIN THE PROJECT LIMITS.

LIGHT DUTY PAVING
PAVED SHOULDER
PAVEMENT REMOVAL

ALIGNMENT CONTROL CAN BE FOUND
ON REFERENCE DATA SHEETS 5B TO 5K

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠	5/3/18	REVISED STA. 386+60 TO 425+00	B.G.N.	P.H.R.					

DRAWN BY : A.W.F
DATE : 6/10/15

REVIEWED BY : B.A.H.
DATE : 09/04/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON   ZACHRY

CECS
CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0 50 100 150 200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
CERTIFICATE OF AUTHORIZATION
NO. C00387
ENGINEERING

SOUTH CAROLINA
PROFESSIONAL
PAUL HANNA KAAS
NO. 13598
PAUL HANNA KAAS

6/7/2018 12:45:41 PM EDT

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

PLAN SHEET
STA. 418+00.00 TO STA. 433+00.00

STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
SC	GREENVILLE	0038III - R02	I-385 I-85	47

I-85 NB

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. C00387

SOUTH CAROLINA PAUL HANNA RAU 6/7/2018 12:43:42 PM PDT

VPI (373+35.00) El 900.18

K = 538 195.00' V.C.

K = 2425 200.00' V.C.

VPC (-32+50) 898.08
VPT (-32+50) 898.08
VPT (-27+50) 894.23
VPC (-30.00) 894.18
VPT (-30.00) 890.68
VPC (-05.00) 882.56
VPT (-05.00) 879.64
VPC (-30.00) 878.12

K = 400 200.00' V.C.

K = 222 200.00' V.C.

(-) 2.155%
(-) 1.782%

K = 523 195.00' V.C.

FINISHED GRADE

(-) 1.792%

VPI (375+30.00) El 895.97

VPI (377+30.00) El 892.39

(-) 1.710%

EXISTING GROUND

(-) 1.210%

(-) 0.310%

VPI (384+05.00) El 880.85

VPI (387+30.00) El 876.91

| FINISHED GRADE | 900.76 | 900.28 | 899.79 | 899.28 | 898.77 | 898.24 | 897.70 | 897.18 | 896.66 | 896.16 | 895.67 | 895.19 | 894.73 | 894.27 | 893.82 | 893.38 | 892.94 | 892.50 | 892.06 | 891.63 | 891.19 | 890.76 | 890.34 | 889.91 | 889.48 | 889.05 | 888.63 | 888.20 | 887.77 | 887.34 | 886.92 | 886.49 | 886.06 | 885.63 | 885.21 | 884.78 | 884.35 | 883.92 | 883.50 | 883.07 | 882.64 | 882.22 | 881.81 | 881.42 | 881.05 | 880.68 | 880.34 | 880.01 | 879.70 | 879.39 | 879.09 | 878.79 | 878.49 | 878.18 | 877.89 | 877.63 | 877.39 | 877.18 | 877.00 | 876.84 | 876.72 |

| EXISTING GROUND | 900.59 | 900.09 | 899.56 | 899.06 | 898.51 | 898.02 | 897.56 | 897.10 | 896.64 | 896.19 | 895.75 | 895.29 | 894.86 | 894.41 | 893.92 | 893.45 | 893.28 | 892.50 | 892.01 | 891.52 | 891.08 | 890.66 | 890.22 | 889.78 | 889.31 | 888.89 | 888.48 | 888.06 | 887.66 | 887.25 | 886.85 | 886.41 | 885.94 | 885.49 | 885.03 | 884.60 | 884.17 | 883.72 | 883.31 | 882.86 | 882.40 | 881.97 | 881.54 | 881.14 | 880.79 | 880.46 | 880.12 | 879.76 | 879.43 | 879.13 | 878.89 | 878.59 | 878.32 | 878.04 | 877.72 | 877.46 | 877.19 | 877.00 | 876.77 | 876.66 | 876.54 |

373+00 374+00 375+00 376+00 377+00 378+00 379+00 380+00 381+00 382+00 383+00 384+00 385+00 386+00 387+00 388+00

I-85 SB

VPI (373+50.00) El 901.88

K = 1946 200.00' V.C.

VPI (375+50.00) El 898.47

K = 254 200.00' V.C.

K = 21155 200.00' V.C.

(-) 1.236%
(-) 1.705%

VPC (-00.00) 893.93
VPT (-00.00) 890.41
VPT (-50.00) 900.17
VPC (-50.00) 900.17
VPT (-50.00) 896.65
VPC (-50.00) 889.55
VPT (-50.00) 885.94
VPC (-60.00) 885.94
VPT (-60.00) 882.75
VPC (-60.00) 882.75
VPT (-60.00) 880.54

(-) 1.813%

VPI (381+50.00) El 887.84

VPI (379+00.00) El 892.12

(-) 1.711%

(-) 1.898%

FINISHED GRADE

K = 427 200.00' V.C.

K = 1849 200.00' V.C.

EXISTING GROUND

VPI (383+60.00) El 883.86

(-) 1.109%
(-) 1.100%

K = 1069 200.00' V.C.

END CONSTRUCTION
STA. 386+60.00
I-85 SB WIDENING

| FINISHED GRADE | 902.47 | 902.12 | 901.76 | 901.38 | 900.99 | 900.59 | 900.17 | 899.74 | 899.31 | 898.88 | 898.44 | 898.00 | 897.55 | 897.10 | 896.65 | 896.20 | 895.75 | 895.29 | 894.84 | 894.39 | 893.93 | 893.48 | 893.03 | 892.59 | 892.14 | 891.71 | 891.27 | 890.84 | 890.41 | 889.98 | 889.55 | 889.12 | 888.69 | 888.24 | 887.80 | 887.34 | 886.88 | 886.42 | 885.94 | 885.47 | 885.03 | 884.60 | 884.21 | 883.83 | 883.48 | 883.16 | 882.86 | 882.58 | 882.30 | 882.03 | 881.75 | 881.48 | 881.20 | 880.92 | 880.65 | | | | | |

| EXISTING GROUND | 902.12 | 901.79 | 901.48 | 901.13 | 900.76 | 900.43 | 900.06 | 899.70 | 899.31 | 898.90 | 898.47 | 898.04 | 897.59 | 897.14 | 896.69 | 896.22 | 895.76 | 895.32 | 894.85 | 894.41 | 893.98 | 893.54 | 893.09 | 892.64 | 892.19 | 891.74 | 891.25 | 890.83 | 890.39 | 889.97 | 889.58 | 889.16 | 888.71 | 888.26 | 887.82 | 887.36 | 886.90 | 886.43 | 885.93 | 885.44 | 884.96 | 884.53 | 884.14 | 883.77 | 883.44 | 883.11 | 882.79 | 882.48 | 882.21 | 881.96 | 881.64 | 881.37 | 881.11 | 880.86 | 880.57 | 880.00 | 879.75 | 879.50 | 879.34 | 879.27 |

373+00 374+00 375+00 376+00 377+00 378+00 379+00 380+00 381+00 382+00 383+00 384+00 385+00 386+00 387+00 388+00

50' 10'

STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
SC	GREENVILLE	0038III - R02	I-385 / I-85	48

REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED
⚠	5/3/18	REMOVED SB PROFILE	B.G.N.	P.H.R.

I-85 NB

VPT (-30.00) 876.60

VPI (390-00.00) EI 876.08

VPI (394-70.00) EI 874.40

VPI (398-50.00) EI 872.27

VPI (401-55.00) EI 870.13

(-) 0.310%
(-) 0.358%
(-) 0.560%
(-) 0.700%
(-) 1.080%

FINISHED GRADE

EXISTING GROUND

VPC (-00.00) 876.39
VPT (+00.00) 875.72
K = 4178
200.00' V.C.

VPC (-70.00) 874.75
VPT (+70.00) 873.84
K = 989
200.00' V.C.

VPC (+50.00) 872.83
VPT (-50.00) 871.57
K = 1429
200.00' V.C.

VPC (+55.00) 870.83
VPT (+55.00) 869.05
K = 526
200.00' V.C.

I-85 SB

EXISTING GROUND

STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
SC	GREENVILLE	0038III - R02	I-385 I-85	49

I-85 NB

(-) 1.080%

VPI (406+90.00)
El 864.35

VPC (+90.00) 865.43

FINISHED GRADE

(-) 1.300%

EXISTING GROUND

VPT (+90.00) 863.05

K = 909
200.00' V.C.

VPC (+90.00) 853.95

I-85 SB

EXISTING GROUND

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	DI3

57

59

60

61

56

55

62

PLACE 36 TONS RIP RAP CLASS B AND
53 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 19' W = 25'

PLACE 7 TONS RIP RAP CLASS B AND
11 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 9' W = 11'

PLACE 7 TONS RIP RAP CLASS B AND
11 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 9' W = 11'

GRADE TO DRAIN

CONST. DITCH SEE CROSS-SECTIONS

RETAIN

RETAIN

WHISPERING HOLLOW RD.

MUDDY FORD ROAD

NP-R12

INTERSTATE 85 SB

380

INTERSTATE 85 NB

375

385

I-85

RETAIN

RETAIN AND SLIP LINE

NP-R15

NP-R10

NP-W20401
TIE TO EXIST. DI

CONST. DITCH BERM
ELEV. = 881.43'

CONST. DI-20400

CONST. DITCH BERM
ELEV. = 895.50'

RETAIN

53

58

61

MATCH LINE STA. 373+00.00 SEE SHEET DI2

MATCH LINE STA. 388+00.00 SEE SHEET DI4

MUDDY FORD ROAD

REVISIONS					REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED
1	07/22/16	DESIGN NORTH OF STA.376+00	DKA	BGN					
2	04/25/18	REVISED DRAINAGE, CONST. LIMITS	DKA	BGN					

DRAWN BY : R.A.R.
DATE : 08/28/15

REVIEWED BY : D.K.A.
DATE : 09/18/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON   ZACHRY

CECS
CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. C00387

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

DRAINAGE PLAN SHEET
STA. 373+00.00 TO STA. 388+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	DI4

PLACE 27 TONS RIP RAP CLASS B AND
32 S.Y. GEOTEXTILE CLASS 2, TYPE B
AT DITCH OUTLET
L = 19' W = 15'

65

63

67

62

69

N

E1-1

E1-1

E1-1

E1-1

UTC1-F

C142   C140

C113   C112

MATCH LINE STA. 388+00.00
SEE SHEET DI3

PLACE 20' - 18" CONTECH
SLOTTED DRAIN OR EQUIVALENT.
MAINTAIN MINIMUM 0.3% GRADE.
TIE TO EXIST. CB STA. 419+00.

UTC1-F

MATCH LINE STA. 403+00.00
SEE SHEET DI5

390

395

INTERSTATE 85 SB

RETAIN

₵ I-85

400

RETAIN

RETAIN   RETAIN   RETAIN   RETAIN

INTERSTATE 85 NB

RETAIN

RETAIN AND REPLACE
12' OF EXIST. PIPE
PRIOR TO OUTLET

REMOVE EXIST. DI
CONST. J-R13N

C82   NP-R2

C120   C133   C126   C141   C150   C149   C148   C147   C142   C139   C135   C132   C122   C70   F84   F106   NPDES   NPDES   NPDES   F99   F94   C89   C103   C113

NPDES   NPDES   NPDES

PLACE 7 TONS RIP RAP CLASS B AND
11 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 9' W = 11'

PLACE 9 TONS RIP RAP CLASS B AND
10 S.Y. GEOTEXTILE CLASS 2, TYPE B
AT DITCH OUTLET
L = 9' W = 10'

64

66

68

61

70   71

REVISIONS					REVISIONS							
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED			
⚠	04/25/18	REVISED DRAINAGE, CONST. LIMITS	DKA	BGN								

DRAWN BY : R.A.R.
DATE : 08/28/15

REVIEWED BY : D.K.A.
DATE : 09/18/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON   ZACHRY

CECS   CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

DRAINAGE PLAN SHEET
STA. 388+00.00 TO STA. 403+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	DI5

N

⑦⑦

⑦⑨

⑥⑨

⑦④

SSMH
RIM=853.J
INV.(A)IN=847.9
INV.(B)IN=847.5
INV.(C)IN=847.2
INV.(D)IOUT=847.J

CALL OUT NTS

CALL OUT NTS

MATCH LINE STA. 403+00.00
SEE SHEET DI4

MATCH LINE STA. 418+00.00
SEE SHEET DI6

E1-1   E1-1   E1-1   E1-3,TV1-C/F   E1-3,TV1-C/F   E1-3,E1-1TV1-C/F   E1-3,F1-1TV1-C/F

RETAIN

UTC1-F

RETAIN

RETAIN AND SLIP LINE

405   410   INTERSTATE 85 SB   ℄ I-85   4I5   RETAIN   RETAIN

RETAIN   RETAIN   INTERSTATE 85 NB   RETAIN   RETAIN

NPDES

PLACE 9 TONS RIP RAP CLASS B AND
10 S.Y. GEOTEXTILE CLASS 2. TYPE B
AT DITCH OUTLET
L = 9' W = 10'

F82'   F70'   F62'   F64'   F67'   F68'

C113'   C123'   C130'   C132'   C140'   C128'   C102'   GRADE TO DRAIN

PLACE 6 TONS RIP RAP CLASS B AND
9 S.Y. GEOTEXTILE CLASS 2. TYPE B
L = 8' W = 9'

⑦②

⑦③

⑦⑥

W1-8IP

⑦⑧

⑧⓪

⑦①

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠	04/25/18	REVISED DRAINAGE, CONST. LIMITS	DKA	BGN					

DRAWN BY :   R.A.R.
DATE :   08/28/15

REVIEWED BY :   D.K.A.
DATE :   09/18/15

APPROVED BY :   B.G.N.
DATE :   09/20/15

FLATIRON   ZACHRY

CECS   CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: I" = 50' HORIZ

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. C00387

SOUTH CAROLINA
PROFESSIONAL ENGINEER

Designed by:
9IF2298I80473...
6/6/2018 10:56 AM SHUSJ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

DRAINAGE PLAN SHEET
STA. 403+00.00 TO STA. 418+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	D16

N

87

81

83

84

85

86

79

MATCH LINE STA. 418+00.00
SEE SHEET D15

MATCH LINE STA. 433+00.00
SEE SHEET D17

E1-3.TV1-C/F   E1-3.TV1-C/F   E1-3.TV1-C/F   E1-3.TV1-C/F   E1-3

PLACE 20' - 18" CONTECH VARIABLE-HEIGHT GRATE
SLOTTED DRAIN OR EQUIVALENT. MAINTAIN MINIMUM
0.3% GRADE. TIE TO EXIST. CB STA. 417+97.

RETAIN   RETAIN   RETAIN   RETAIN   RETAIN

RETAIN

UTC1-F

RETAIN

UTC1-F

RETAIN

RETAIN

PLACE 60' - 18" CONTECH VARIABLE-HEIGHT GRATE SLOTTED DRAIN OR EQUIVALENT.
MAINTAIN MINIMUM 0.3% GRADE. TIE TO EXIST. CB STA. 419+00.

RETAIN   425   I-85   INTERSTATE 85 SB   430   RETAIN

420

PLACE 20' - 18" CONTECH SLOTTED DRAIN OR EQUIVALENT.
MAINTAIN MINIMUM 0.3% GRADE. TIE TO EXIST. CB STA. 419+00.

RETAIN

RETAIN   INTERSTATE 85 NB

RETAIN   50   CONVERT EXIST. BOX TO MH
(MH-R29)

PELHAM RAMP

MATCH LINE STA. 55+00.00
SEE SHEET D17

55

F70'   F74'   F79'   F88'   F86'   F94'   F87'   C82'   C34'   C45'   C47'   C48'

GRADE TO DRAIN

C89'   C91'

PLACE 11 TONS RIP RAP CLASS B AND
17 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 11' W = 14'

CLEAN EXIST. OUTFALL TO R/W LIMIT

GRADE TO DRAIN

RETAIN

PLACE 11 TONS RIP RAP CLASS B AND
17 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 11' W = 14'

UT1-C

WP-8IP

PLACE 7 TONS RIP RAP CLASS B AND
11 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 9' W = 11'

PLACE 26 TONS RIP RAP CLASS B AND
22 S.Y. GEOTEXTILE CLASS 2, TYPE C
L = 13' W = 15'

W1-8IP

W1-8IP

80

82

REVISIONS					REVISIONS						
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED		
⚠	04/25/18	REVISED DRAINAGE, CONST. LIMITS	DKA	BGN							
★											

DRAWN BY : R.A.R.
DATE : 08/28/15

REVIEWED BY : D.K.A.
DATE : 09/18/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON   ZACHRY

CECS
CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
CERTIFICATE OF AUTHORIZATION
ENGINEERING
NO. C00387

SOUTH CAROLINA
DONALD
KRISM EN AULD
PROFESSIONAL
NO. 30706

6/6/2018 10:56...

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

DRAINAGE PLAN SHEET
STA. 418+00.00 TO STA. 433+00.00

STORM SEWER DATA SHEET

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	D33

Table 1

GEOMETRY				UPSTREAM						DOWNSTREAM						SPT "N"
PIPE				NODE						NODE						
ID	DIA. AND MATERIAL	NO. OF BARRELS	LENGTH (FT)	ID	DESCRIPTION	ROAD / ROUTE	STATION	OFFSET	PIPE INVERT (FT)	ID	DESCRIPTION	ROAD / ROUTE	STATION	OFFSET	PIPE INVERT (FT)	
NP-R10	18" SM. WALL PIPE	1	8	DN-R30	DUMMY JOINT	I85	381+45.66	82	879.93	DN-R29	DUMMY JOINT	I85	381+45.80	74	879.84	
NP-R12	18" SM. WALL PIPE	1	12	DN-R28	DUMMY JOINT	I85	381+46.00	-79	877.84	OP-R102	OP	I85	381+45.85	-91	877.68	
NP-R15	18" SM. WALL PIPE	1	16	DN-R31	DUMMY JOINT	I85	385+95.86	-79	873.06	OP-R103	OP	I85	385+95.83	-95	872.67	
NP-R2	18" SM. WALL PIPE	1	18	J-R13N	JB	I85	388+45.95	78	869.38	OP-R100	OP	I85	388+45.65	98	869.28	
NP-R29	24" SM. WALL PIPE	1	27	CB-R29	DI TYPE 112	PELHAM_RAMP	55+00.00	-33	868.45	MH-R29	CONVERT EXIST. BOX TO MH	I85	432+94.00	69	868.04	

Table 2 (empty)

GEOMETRY				UPSTREAM						DOWNSTREAM						SPT "N"
PIPE				NODE						NODE						
ID	DIA. AND MATERIAL	NO. OF BARRELS	LENGTH (FT)	ID	DESCRIPTION	ROAD / ROUTE	STATION	OFFSET	PIPE INVERT (FT)	ID	DESCRIPTION	ROAD / ROUTE	STATION	OFFSET	PIPE INVERT (FT)	

Table 3 (empty)

GEOMETRY				UPSTREAM						DOWNSTREAM						SPT "N"
PIPE				NODE						NODE						
ID	DIA. AND MATERIAL	NO. OF BARRELS	LENGTH (FT)	ID	DESCRIPTION	ROAD / ROUTE	STATION	OFFSET	PIPE INVERT (FT)	ID	DESCRIPTION	ROAD / ROUTE	STATION	OFFSET	PIPE INVERT (FT)	

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠	04/20/17	NP-R1,NP-R11,NP-R13,NP-R14,NP-R23,NP-R24, NP-R25,NP-R3,NP-R32,NP-R33,NP-R35, NP-R36,NP-R37 AND ASSOCIATED STRUCTURES DELETED.	D.K.A.	B.G.N.					

I-85

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
Paul Hanna Raa
No. 059
PAUL HANNA RAAD

6/7/2018 12:43:42 PM PDT

⚠ 7/22/16 ADDED NP-R32
⚠2 5/3/18 REMOVED X-LINE STA. 421+61

907.32

0.0208 FT./FT.

906.02

906.24

905.81

905.29

328+60.60

915
910
905
900
895
890
885

5' X 5' BOX CULVERT @ 1.75%

328+60.67
FL 886.75

8' X 8' BOX CULVERT @ 0.39%

328+60.54
FL 890.06

0.0208 FT./FT.

12:1 24:1 0.0208 FT./FT. 48:1 86:1 24:1 0.0208 FT./FT. 24:1 24:1 0.0208 FT./FT. 0.0208 FT./FT. 24:1 86:1 24:1 0.0208 FT./FT. 0.0208 FT./FT. 24:1 12:1 6:1

2:1

10'

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

EROSION CONTROL DATA SHEET

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038111 - R02	I-85, PEL 385	EC8

RECEIVING WATERS

ROAD / ROUTE	OUTFALL DITCH STATION	SIDE	NAME OF RECEIVING WATERS	NAME OF ULTIMATE RECEIVING WATERS	ROAD / ROUTE	OUTFALL DITCH STATION	SIDE	NAME OF RECEIVING WATERS	NAME OF ULTIMATE RECEIVING WATERS
I-85	385+05	LT	ROCKY CREEK	ENOREE RIVER					
I-85	386+53	LT	ROCKY CREEK	ENOREE RIVER					
I-85	387+61	RT	ROCKY CREEK	ENOREE RIVER					
I-85	389+05	LT	ROCKY CREEK	ENOREE RIVER					
I-85	413+26	RT	ROCKY CREEK	ENOREE RIVER					
I-85	418+24	RT	ROCKY CREEK	ENOREE RIVER					
I-85	423+25	RT	ROCKY CREEK	ENOREE RIVER					
I-85	427+99	RT	ROCKY CREEK	ENOREE RIVER					
PEL. RA.*	53+31	RT	ROCKY CREEK	ENOREE RIVER					
PEL. RA.*	54+67	RT	ROCKY CREEK	ENOREE RIVER					
			*PELHAM_RAMP						

SOIL TYPES

ROAD / ROUTE	STATION TO	STATION	SOIL PARTICLE SIZE (COARSE / FINE)	ZONE
I-85	BEG.	413+22	FINE	PIEDMONT
I-85	413+22	426+17	COARSE	PIEDMONT
I-85	426+17	END	FINE	PIEDMONT
PEL. RA. *	BEG.	END	FINE	PIEDMONT

*PELHAM   RAMP

TEMPORARY EROSION CONTROL BLANKET

ROAD / ROUTE	STATION TO STATION	SIDE	DEPTH OF BLANKET (FT)	SLOPES x : 1 FRONT	BACK	DITCH BOTTOM WIDTH (FT)	MSY

SEE SHTS. EC9
FOR TEMPORARY EROSION
CONTROL BLANKET

| | | | | | | | TOTALS |

SEDIMENT DAM

• NOTE BASIN INCISEMENT TO BE CONSTRUCTED WITH VERTICAL SIDE SLOPES TO DEPTH SHOWN IN "DEPTH OF BASIN".

ROAD / ROUTE	NO	STATION	SIDE	DRAINED OR NOT DRAINED	LENGTH OF BASIN	WIDTH OF BASIN	DEPTH OF BASIN	SIDE SLOPE OF BASIN	SPILLWAY WIDTH	SPILLWAY DEPTH	TOTAL HEIGHT TO SPILLWAY	SEDIMENT STORAGE VOLUME	RUNOFF STORAGE VOLUME	OUTFALL CHANNEL WIDTH	OUTFALL CHANNEL DEPTH	OUTFALL CHANNEL LENGTH
I-85	RC1	381+40	RT	UNDRAINED	118	25	1	6:1/2:1	2	1.9	2.9	109	135			
I-85	RC2	386+24	RT	UNDRAINED	112	40	2.5	6:1/2:1	10	2	4.5	414	199			
I-85	RC3	395+00	RT	UNDRAINED	100	10	2	6:1/2:1	3	3.5	5.5	74	156			

SEDIMENT TUBES IN DITCHES

ROAD / ROUTE	STATION TO	STATION	SIDE	AVERAGE LENGTH	SPACING (FT)	TOTAL	COMMENTS
I-85	387+14	388+92	LT	20	150	60	
I-85	376+00	383+50	RT	10	150	60	
I-85	383+50	384+00	RT	10	100	20	
I-85	384+00	385+50	RT	10	150	20	
I-85	385+50	386+50	RT	10	100	20	
I-85	388+50	389+50	RT	10	75	30	
I-85	389+50	391+50	RT	10	150	30	
I-85	391+50	395+00	RT	10	100	50	
I-85	395+00	397+00	RT	10	25	90	
I-85	401+00	409+00	RT	10	150	70	
PELHAM	54+00	55+00	LT	10	150	20	
PELHAM	61+00	61+25	LT	10	25	20	
PELHAM	55+00	61+25	RT	10	50	140	

TURF REINFORCED MATTING (TRM)

ROAD / ROUTE	STATION TO	STATION	SIDE	DEPTH OF MAT (FT)	SLOPES x : 1 FRONT	BACK	DITCH BOTTOM WIDTH (FT)	TYPE	TYPE 1 (MSY)	TYPE 2 (MSY)	TYPE 3 (MSY)
I-85	381+50	387+00	RT	3	6	2	0	1	1.525	0.000	0.000
I-85	415+00	418+00	RT	2	1	0	0	3	0.000	0.000	0.094
I-85	423+00	426+00	RT	5	1.5	0	0	2	0.000	0.300	0.000
PELHAM	55+00	61+25	RT	2	6	2	0	1	1.155	0.000	0.000
								TOTALS	2.681	0.300	0.094

GRAND TOTAL   630

△ 04/25/18 ADJUSTED EROSION CONTROL ITEMS TO REFLECT REVISED CONST. LIMITS

EROSION CONTROL DATA SHEET

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	EC9

TEMPORARY EROSION CONTROL BLANKET

ROAD / ROUTE	STATION TO	STATION	SIDE	DEPTH OF BLANKET (FT)	SLOPES x:1 FRONT	SLOPES x:1 BACK	DITCH BOTTOM WIDTH (FT)	MSY
I-85	375+00	375+50	LT	10	4	0	0	0.229
I-85	375+50	375+25	LT	10	2	0	0	0.062
I-85	377+00	379+50	LT	6	2	0	0	0.373
I-85	381+50	386+00	LT	8	2	0	0	0.894
I-85	386+50	387+00	LT	14	2	0	0	0.174
I-85	387+50	388+50	LT	6	2	2	10	0.409
I-85	376+50	376+50	RT	12	0	2	0	0.000
I-85	377+00	380+50	RT	20	0	2	0	1.739
I-85	381+00	381+50	RT	15	0	2	0	0.186
I-85	381+50	382+00	RT	9	0	2	0	0.112
I-85	384+50	385+50	RT	6	0	2	0	0.149
I-85	388+50	389+00	RT	8	6	2	0	0.370
I-85	389+00	389+50	RT	18	0	2	0	0.224
I-85	389+50	390+00	RT	21	0	2	0	0.261
I-85	390+00	391+50	RT	31	0	2	0	1.155
I-85	391+50	392+50	RT	25	0	2	0	0.621
I-85	392+50	394+00	RT	20	0	2	0	0.745
I-85	393+50	396+00	RT	8	6	0	0	1.352
I-85	394+00	396+00	RT	8	0	2	0	0.398
I-85	397+00	398+00	RT	8	2	0	0	0.199
I-85	398+00	401+00	RT	8	4	0	0	1.099
I-85	402+00	403+00	RT	10	0	2	0	0.248
I-85	403+00	405+00	RT	20	0	2	0	0.994
I-85	405+00	408+00	RT	25	0	2	0	1.863
I-85	408+00	409+00	RT	10	0	2	0	0.248
I-85	424+00	426+00	RT	5	1.5	0	0	0.200
I-85	426+00	427+50	RT	8	4	0	0	0.550

ADJUSTED EROSION CONTROL ITEMS TO REFLECT REVISED CONST. LIMITS

04/25/18

6/6/2018 10:56:07 AM PDT

SCDOT
South Carolina Department of Transportation

PROPOSED PLANS FOR
GREENVILLE COUNTY
PROJECT ID 0038111 – R02

INTERSTATE 85 / 385 INTERCHANGE

FROM: 0.20 MILES SOUTH OF S-326
TO: ROAD S-492

RELEASE FOR
CONSTRUCTION PLANS

CONTRACT ID 5384210

SHEET NO.	TOTAL SHEETS
I	1918

⚠ 1/9/18 SHEET TOTAL REVISED B.G.N.
⚠ 5/3/18 SHEET TOTAL REVISED B.G.N.

SEE SHEET I.I FOR INDEX OF SHEETS

BRIDGES TO BE CONSTRUCTED

BRIDGE NO.	ROAD NO.	LENGTH	STA. TO STA.	LOCATION
1/2A	I-385 SB	201.85'	374+34.76 TO 376+36.61	GARLINGTON RD. & GE RAILROAD OVERPASS
2B	I-385 NB	201.50'	374+96.79 TO 376+98.29	GARLINGTON RD. & GE RAILROAD OVERPASS
3	I-385 NB CD	201.50'	376+37.60 TO 378+39.10	GARLINGTON RD. & GE RAILROAD OVERPASS
4	RAMP 8	148.17'	57+85.53 TO 59+33.70	I-385 NB CD OVERPASS
5	RAMP 1A	1522.83'	72+79.42 TO 88+02.25	I-385 & I-85 OVERPASS
6	RAMP 4B	1962.83'	390+18.50 TO 409+81.33	I-385 & I-85 OVERPASS
7	RAMP 2B	475.00'	34+16.95 TO 38+91.95	I-85 OVERPASS
8	RAMP 3A	254.85'	297+81.45 TO 300+36.30	I-85 OVERPASS
9	RAMP 2A	368.84'	71+70.81 TO 75+39.65	I-85 OVERPASS
10	RAMP 1B	220.05'	69+11.35 TO 71+31.40	RAMP 4B OVERPASS
12	I-385	497.17'	395+34.84 TO 400+32.01	I-85 OVERPASS

BRIDGE PLANS BOUND UNDER SEPARATE COVER

Hydraulic Design Reference for these plans in the:
2009
Edition of SCDOT'S "Requirements for Hydraulic Design Studies"

Design Reference for these plans is the:
2001
AASHTO "A Policy on Geometric Design of Highways and Streets"

UNLESS OTHERWISE NOTED ON TYPICAL SECTION

NPDES PERMIT INFORMATION
Disturbed Area = 160.5 Acre(s)
Permitted Area = 349.7 Acre(s)

Approximate Location of Roadway is

Begin
Latitude   34° 50' 20" N
Longitude 82° 17' 26" W

End
Latitude   34° 50' 02" N
Longitude 82° 17' 27" W

Hydraulic and NPDES Design provided by:
CECS, Inc.
Designs may be obtained from the SCDOT Regional Production Group

ENVIRONMENTAL PERMIT INFORMATION
USACE PERMIT	X YES	__ NO
NEPA DOCUMENT	X YES	__ NO
401 CERTIFICATION	X YES	__ NO
OCRM CAP	__ YES	X NO
NAVIGABLE WATERS	__ SC __ USCG __ USACE	X N/A

SCDOT REVIEW

	RIGHT-OF-WAY INITIAL	DATE	CONSTRUCTION INITIAL	DATE
PRECONSTRUCTION SUPPORT - ROAD				
PRECONSTRUCTION SUPPORT - STRUCTURES				
RPG - DESIGN MANAGER				
RPG - PROGRAM MANAGER				

THE INITIALS ABOVE DO NOT RELIEVE THE ENGINEER OF RECORD OF THE RESPONSIBILITY TO DESIGN THIS PROJECT IN ACCORDANCE WITH ALL APPLICABLE CRITERIA.

LAYOUT
(NOT TO SCALE)

GREENVILLE COUNTY MAP

PROJECT ID 0038111–R02
INTERSTATE 385
447+60.00 END

PROJECT ID 0038111–R02
INTERSTATE 85
STA. 435+00.00 END

PROJECT ID 0038111–R02
INTERSTATE 85
203+00.00 BEGIN

PROJECT ID 0038111–R02
INTERSTATE 385
303+89.49 BEGIN

	I-85	I-385	RAMPS	CD's	TOTAL
NET LENGTH OF ROADWAY	4.394 MILES	2.551 MILES	9.035 MILES	2.867 MILES	18.757 MILES
NET LENGTH OF BRIDGES	- MILES	0.171 MILES	0.938 MILES	0.038 MILES	1.147 MILES
NET LENGTH OF PROJECT	4.394 MILES	2.722 MILES	9.973 MILES	2.905 MILES	19.993 MILES
LENGTH OF EXCEPTIONS	- MILES	- MILES	- MILES	- MILES	- MILES
GROSS LENGTH OF PROJECT	4.394 MILES	2.722 MILES	9.973 MILES	2.905 MILES	19.993 MILES

EQUALITIES IN STATIONING
NONE

NOTE: EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIALS AND WORKMANSHIP ON THIS PROJECT SHALL CONFORM TO THE SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (2007 EDITION) AND THE STANDARD DRAWINGS FOR ROAD CONSTRUCTION IN EFFECT AT THE TIME OF LETTING.

3 DAYS BEFORE DIGGING IN SOUTH CAROLINA
CALL 811
SOUTH CAROLINA 811 (SC811)
WWW.SC811.COM
ALL UTILITIES MAY NOT BE A MEMBER OF SC811

RAILROAD INVOLVEMENT?
(YES) NO

TRAFFIC DATA
	I-85	I-385
2015 ADT	118,200	106,500
2035 ADT	174,700	171,400
TRUCKS	18 %	18 %

REVISIONS
NO.	DATE	DESCRIPTION	BY	CHECKED
⚠1	1/27/16	SHEET TOTAL REVISED	D.R.R.	B.G.N.
⚠2	5/02/16	SHEET TOTAL REVISED	D.R.R.	B.G.N.
⚠3	5/12/16	SHEET TOTAL REVISED	D.R.R.	B.G.N.
⚠4	6/17/16	SHEET TOTAL REVISED	D.R.R.	R.L.K
⚠5	7/8/16	SHEET TOTAL REVISED	D.R.R.	R.L.K
⚠6	8/9/16	SHEET TOTAL REVISED	D.R.R.	R.L.K
⚠7	8/18/16	SHEET TOTAL REVISED	D.R.R.	R.L.K

⚠8	9/12/16	BRIDGE LENGTHS 1/2A, 2B, 3. SHT. TTL RVSD	D.R.R.	⚠12	1/12/17	SHEET TOTAL REVISED	B.G.N.
⚠9	9/28/16	SHEET TOTAL REVISED	B.G.N.	⚠13	2/2/17	SHEET TOTAL REVISED	B.G.N.
⚠10	10/21/16	SHEET TOTAL REVISED	B.G.N.	⚠14	3/16/17	SHEET TOTAL REVISED	B.G.N.
⚠11	10/28/16	SHEET TOTAL REVISED	B.G.N.	⚠15	12/18/17	SHEET TOTAL REVISED	B.G.N.

For Right Of Way Acquisition:
_____ Date
Consultant Engineer of Record

_____ Date
Regional Production Engineer

CONSULTING ENGINEERING FIRM
FLATIRON   ZACHRY

CECS
CIVIL ENGINEERING CONSULTING SERVICES, INC.
2000 PARK STREET
SUITE 201
COLUMBIA, S.C. 29201

ENGINEER OF RECORD
CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. C00387
PAUL HANNA RAD
SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER
6/7/2018 12:43

FOR CONSTRUCTION: _____ DATE

SCDOT

TYPICAL SECTION OF IMPROVEMENT
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

FOR PGL AND BASELINE LOCATIONS
SEE PLAN VIEW AND CROSS SECTIONS

NOTE:
THIS SLOPE MAY BE VARIED WHEN A DEEPER DITCH IS NECESSARY FOR DRAINAGE PURPOSES, USING A MINIMUM SLOPE OF 12:1 AND A MAXIMUM SLOPE OF 4:1. WHERE A DEEPER DITCH THAN PROVIDED BY A 4:1 IS NECESSARY, THE DITCH SHALL BE PLACED FARTHER FROM THE ℄ CONTINUING THE 4:1 SLOPE TO PROVIDE FOR THE NECESSARY DEPTH. SEE PROFILE FOR THE SPECIAL DITCH GRADES.

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85, I-385	3

* < 5.0' USE 6:1 SLOPE
5.0' - 10.0' USE 4:1 SLOPE
> 10.0' USE 2:1 SLOPE
(USE 4:1 MAX. SLOPE IN INTERCHANGE AREAS WHERE POSSIBLE)

** ADD 3.5' WHERE GUARDRAIL IS ERECTED EXCEPT IN AREAS WITH ADDITIONAL LENGTH POSTS

*** MILLED-IN RUMBLE STRIPS (TYPICAL).

**** IN AREAS WITH OGFC MILL 3" UNIFORM WITH AN ADDITIONAL 1" VARIABLE FOR CROSS SLOPE CORRECTION IN AREAS WITHOUT OGFC MILL MAXIMUM 2'

\# STA.211+81.35 TO STA.317+18.68 SB. MICRO MILL EXISTING OPEN GRADED FRICTION COURSE AND REPLACE WITH 140 PSY OPEN GRADED FRICTION COURSE. OMIT ② AND ⑨
STA.386+60.00 TO 414+30.20 SB, MILL 3-INCHES IN AREAS WTIH OGFC AND 2-INCHES IN AREAS WITHOUT OGFC. CORRECT CROSS SLOPE OF EXISTING PAVEMENT, AND PLACE ② AND 140 PSY OGFC.

☆ RETAIN EXISTING SHOULDERS
NORTHBOUND:
STA.25+13.43 TO STA.294+06.00
STA.302+87.21 TO STA.332+96.95
SOUTHBOUND:
STA.273+75.83 TO STA.335+60.80

☆☆ FULL DEPTH SHOULDERS
NB STA.394+38.80 TO STA.414+00.00
SB STA.375+00.00 TO STA.407+00.00
SEE SHEETS 18 & 19 FOR EXTENDED FULL DEPTH SHOULDERS REQUIREMENT
OMIT ⑦ AND USE ④ ⑤ AND ⑥

MOW STRIP DETAIL TO BE USED FOR ALL NEW AND REPLACEMENT GUARDRAIL

DRIVE GUARDRAIL POSTS THROUGH HMA.
EXTEND HMA 1' PAST END OF GUARDRAIL.

3.5' MIN. VARIES | PAVED SHOULDER

VARIES (SEE CROSS SECTIONS)
1.0' MIN.
200 PSY HMA SURFACE COURSE - TYPE A

I-85

CONSTRUCT CONCRETE BARRIER EXTENSION STA. 320+25.00 TO STA. 414+30.20 (TYPICAL)

SBL CONST. ℄ — 30.0' — I-85 ℄ — 30.0' — NBL CONST. ℄

I-85 NB SHOULDER VARIES 4' TO 10' STA.411+40 TO 416+10

VARIABLE 0 - 24.0' 24.0' SHOWN | MILL EXISTING ASPHALT PAVEMENT FOR CROSS SLOPE CORRECTION | MILL EXISTING ASPHALT PAVEMENT FOR CROSS SLOPE CORRECTION | VARIABLE 0 - 24.0' 24.0' SHOWN

12.0' SHLD. | 12.0' AUX. LANE | 12.0' AUX. LANE | 12.0' TRAVELWAY | 12.0' TRAVELWAY | 12.0' TRAVELWAY | VARIABLE 4'-6" THRU 2'-3" (MIN.) | 12.0' TRAVELWAY | 12.0' TRAVELWAY | 12.0' TRAVELWAY | 12.0' AUX. LANE | 12.0' AUX. LANE | 12.0' SHLD.

FINISHED GRADE POINT
VARIABLE (SHOWN 24:1)
1.42'
RETAIN CONCRETE MEDIAN BARRIER
FINISHED GRADE POINT

SEE PLANS FOR LOCATIONS
CD OR PAVED RAMP SHOULDER | 14.0' SHOWN (VARIABLE) | 10.0' PAVED SHLD.
SEE PLANS FOR LOCATIONS
LIGHT DUTY PAVING | 10.0' PAVED SHLD. | 14.0' SHOWN (VARIABLE) | PAVED SHOULDER | CD OR RAMP

REMOVE EXISTING SHOULDER ☆
REMOVE EXISTING SHOULDER ☆

GROUND LINE | GROUND LINE

I-85
EXISTING PAVEMENT
STA. 203+00.00 TO STA. 435+00.00 NB
STA. 211+81.35 TO STA. 386+60.00 SB (≠ TO STA. 414+30.20)
NTS

DETAIL 2A

12.0' TRAVEL LANE | 12.0' TRAVEL LANE | 10.75' SHOULDER
12.0' VARIABLE MILL (0-1.0') | 4.0' UNIFORM MILL (1" MAX.) | 4.0' VARIABLE MILL (0-1.0')
EXIST. RUMBLE STRIPS LOCATION VARIES
EXISTING PAVEMENT SEE NOTE 4

DETAIL 2B

12.0' TRAVEL LANE | 12.0' TRAVEL LANE | 10.75' SHOULDER
6.0' VARIABLE MILL (0-1.0') | 12.0' UNIFORM MILL (1" MAX.) | 6.0' VARIABLE MILL (0-1.0')
EXIST. RUMBLE STRIPS LOCATION VARIES
GROUND LINE
EXISTING PAVEMENT SEE NOTE 4

① ② ③ ④ Notes box

① DIAMOND GRIND EXISTING SHOULDER AND ADJACENT TRAVEL LANE NORTHBOUND FROM STA. 310+22.65 TO STA. 332+17.07 (SEE DETAIL 1)
② REMOVE AND REPLACE EXISTING SHOULDER WITH NEW TRAVEL LANE AND NEW SHOULDER SOUTHBOUND FROM STA. 303+89.49 TO STA. 332+17.07
③ EXISTING CONCRETE PAVEMENT AND BARRIER TO BE RETAINED STA. 303+89.49 TO STA. 322+17.07
④ REMOVE EXISTING RUMBLE STRIP SOUTHBOUND FROM APPROX. STA. 224+50 TO STA. 332+17.07 (SEE DETAILS 2A AND 2B)

② I-385

SBL | ℄ I-385 | NBL

SEE NOTE 3

18.0' SHOWN (VARIABLE) SEE X-SECT. | 2' | 12' SHLD. 10' PAVED SHLD. | 12' TRAVELWAY | 12' TRAVELWAY | 12' TRAVELWAY | 12' TRAVELWAY | 12' TRAVELWAY | 12' TRAVELWAY | 12' TRAVELWAY | 12' TRAVELWAY | SHLD. 10' PAVED SHLD. | 2'

VAR. (SHOWN 6:1)
REMOVE EXISTING 10' CONCRETE SHOULDER
EXISTING PAVEMENT SEE NOTE 4
VARIES (48:1 TYP.) | VARIES (36:1 TYP.)
SEE NOTE 4
EXISTING PAVEMENT SEE NOTE 3

I-385
STA. 303+89.49 TO STA. 332+17.07 - SB
STA. 310+22.65 TO STA. 332+17.07 - NB
NTS

SEE NOTE 2

ASPHALT CURB UNDER GUARDRAIL
STA. 413+00.00 TO STA. 415+00.00 NB
NTS

For Asphalt Curb Details see SCDOT STD. 803-105-00
Wire Faced MSE Wall

DETAIL 1

12.0' TRAVEL LANE | 12.0' SHOULDER
VARIES (48:1 TYP.) | VARIES (36:1 TYP.)
6.0' VARIABLE MILL (0-1.0') | 12.0' UNIFORM MILL (1" MAX.)
GROUND LINE
EXISTING PAVEMENT SEE NOTE 1

LEGEND

①	OPEN-GRADED FRICTION COURSE (140 PSY)
②	HOT MIX ASPHALT SURFACE COURSE - TYPE A (200 PSY)
③	HOT MIX ASPHALT INTERMEDIATE COURSE - TYPE B (200 PSY)
④	HOT MIX ASPHALT BASE COURSE - TYPE A (300 PSY)
⑤	CEMENT STAB. AGGR. BASE CR. (10' UNIF)
⑥	CEMENT MODIFIED SUBBASE (8" UNIFORM)
⑦	CEMENT STAB. AGGR. BASE CR. (9' UNIF)
⑧	RETAIN EXISTING PAVEMENT
⑨	STRENGTHENING AND LEVELING: (≤ 2") ASPH. SURF. COURSE TYPE E / (> 2") ASPH. SURF. COURSE TYPE B
⑩	HOT MIX ASPHALT SURFACE COURSE - TYPE D (150 PSY)
⑪	GRADED AGGREGATE BASE COURSE (6" UNIFORM)
⑫	PLAIN JOINT CONCRETE PAVEMENT (13' UNIFORM)
⑬	FABRIC INTERLAYER
⑭	CEMENT STAB. AGGR. BASE CR. (6' UNIF)
⑮	CEMENT MODIFIED SUBBASE (6' UNIFORM)
⑯	MILLING OF EXISTING PAVEMENT (0" - 3")

DESIGN SPEED

MPH	FROM STA.	TO STA.	
65	203+00.00	435+00.00	I-85
65	303+89.49	332+17.07	I-385

EXCEPTIONS TO DESIGN SPEED

REVISIONS

NO.	DATE	DESCRIPTION	BY	CHECKED
⚠1	03/08/16	MODIFIED ☆ NOTE	D.R.R.	B.G.N.
⚠2	07/22/16	ADD ASPHALT CURB DET. & EXT. SHLDR NOTE	D.R.R.	B.G.N.
⚠3	06/02/17	ADDED MOW STRIP DETAIL	B.G.N.	R.L.K.
⚠4	5/3/18	REVISED I-85 SB END STA. ADDED I-85 NB REDUCED SHOULDER NOTE	B.G.N.	P.H.R.

DRAWN BY: A.W.F. DATE: 6/10/15
REVIEWED BY: B.A.H. DATE: 09/04/15
APPROVED BY: B.G.N. DATE: 09/20/15

FLATIRON | ZACHRY
CECS CIVIL ENGINEERING CONSULTING SERVICES, INC.

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
SCDOT

I-85 / I-385 INTERCHANGE

TYPICAL SECTION

GEOTECHNICAL NOTES

MAIN INTERCHANGE

The following notes apply to borrow materials:

Provide borrow materials meeting the following minimum requirements:
- A sandy material (35% or less passing 0.075 mm) with a minimum total soil unit weight, γ_m of 110 pcf, with a maximum dry density exceeding 100 pcf.
- Minimum friction angle, φ, of 30° and cohesion, c, of 50 psf for embankment fill.
- No. 57 Stone backfill for Mechanically Stabilized Earth Walls

Walls 32 and 36 will require an embankment fill with a minimum friction angle, φ, of 32° and cohesion, c, of 50 psf. This requirement is between alignment Ramp 4, Stations 50+50 and 52+50.

In addition, determine the moisture-density relationship and classification of the material. Test and submit the classification, moisture-density relationship, and soil strength parameters of the material to the Engineer for acceptance. An AASHTO certified laboratory is required to perform the testing. Contact the RPG Geotechnical Engineer for a list of locally available AASHTO certified laboratories. The Department may perform independent testing to assure quality.

Determine the friction angle and cohesion using either direct shear testing or consolidated-undrained triaxial shear testing with pore pressure measurements. Direct Shear testing shall only be performed on soils with a fines content of less than 25 percent. Classification testing includes grain-size distribution with wash #200 sieve, moisture plasticity testing and natural moisture content. Use the Standard Proctor test to determine the moisture-density relationship. Remold all samples used in shear testing to 95 percent of the Standard Proctor density. Conduct shear strength testing at the initial selection of the borrow pit, any subsequent changes in borrow pits, and for every 10,000 cy of materials placed. Perform classification testing for every 50,000 cy of materials placed, including the material used for the shear strength testing. Additional shear testing may be required if, in the opinion of the RCE, the materials being placed are different from those originally tested.

If these minimum criteria cannot be met, provide the soil parameters for the intended borrow excavation material for the project site to the Engineer for review and acceptance. After acceptable borrow material is obtained, compact the fill to the required finish grade line using the compactive effort indicated in the Standard Specifications for Highway Construction, Section 205 (Embankment Construction).

The following notes apply to muck excavation:

Any areas identified on the plans and any additional areas that are discovered to deflect or settle may require corrective action as directed by the RCE. This may include undercutting, placing No. 57 stone aggregate that is separated from other borrow materials by a geotextile for separation of sub-grade and sub-base, and/or additional compactive effort to the approval of the RCE.

In areas that require mucking or undercutting, borrow material soil may be placed as a bridge lift as long as the grade on which the material is being placed is at least 2 feet above ground water level. In the event that groundwater does not allow backfilling with a borrow material soil, use a No. 57 stone as the bridge lift material. Borrow material bridge lifts may not exceed a 2-foot thickness. The depth at which mucking or undercutting is required is dependent upon encountering a suitable bearing material within the excavation or if a predetermined elevation or depth is required. In most cases, do not undercut more than 3 to 5 feet. The RCE will determine the final mucking or undercutting thickness, unless otherwise specified in the project plans and/or specifications. If a suitable bearing soil is not encountered within this depth range, place a P1 biaxial geogrid with an aperture size of less than or equal to 1 inch and in accordance with the project special previsions beneath a 2-foot thick bridge lift of No. 57 stone. If additional compacted borrow material soil is needed to reach grade, place a geotextile for separation of sub-grade and sub-base between the No. 57 stone and the overlying compacted soil. A bridge lift consisting of borrow material soil may not be placed within 3 feet of the base of the pavement section. Place only compacted borrow material soil or No. 57 stone within this zone. Reference the Standard Specifications for Highway Construction, Earthwork Section, Division 200.

The following notes apply for settlement and displacement monitoring:

The contractor shall establish a monitoring program consisting of settlement instruments. The settlement monitoring program must include establishing settlement monitoring instruments on the subgrade soils prior to fill placement, and at design pavement subgrade elevation. Settlement monitoring instruments are required at a spacing of every 100 feet along MSE Walls and every 500 feet along embankments with new fill thicknesses exceeding 20 feet. Instruments shall be established at the centerline of road and edge of pavement. Settlement monitoring shall continue until three consecutive measurements demonstrate the rate of settlement is less than 0.1 inches per year. No more than one measurement shall be obtained on a single day.

A minimum of 2 measurements shall be obtained on monuments prior to fill placement, and instruments shall be measured weekly during fill placement. Instrumentation measurements shall be provided to the Geotechnical Engineer within 24 hours of measurements for interpretation. Interpreted results shall be provided to the RCE.

The following notes apply to slope construction:

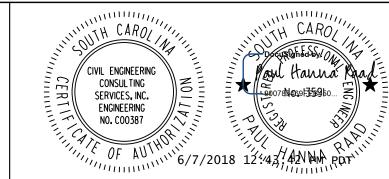Where the new fill meets the existing slope, the existing slope shall be benched to limit the potential for a preferential failure surface and to allow compaction at the interface. Benches shall have a minimum horizontal length of 8 feet and a vertical rise of no more than 3 feet. Fill slopes of 2H:1V or steeper shall be overbuilt (i.e. fill should temporarily extend beyond the final slope face) to allow compaction at the slope face. After compaction is complete, the slope may be regraded to the final inclination.

Should seeps or thick lenses of highly plastic soils be observed in the planned fill and cut slopes that are steeper than 2H:1V, ECS must be contacted to determine if the steeper slopes may be constructed as planned or if slope flattening or reinforcing is required. Similarly, if soft or wet ground conditions are observed at the base of planned fill embankments, the QA representative must determine the limits of undercutting required or required in-situ treatment.

I-85 STA. 375+00 TO PELHAM RAMP

The following notes apply to borrow materials:

Provide borrow materials meeting the following minimum requirements:
- A sandy material (35% or less passing 0.075 mm) with a minimum total soil unit weight, γ_m of 110 pcf, with a maximum dry density exceeding 100 pcf.
- Minimum friction angle, φ, of 30° and cohesion, c, of 50 psf for embankment fill, alternatively embankment fill may consist of a minimum friction angle (φ) of 34° with zero cohesion.
- No. 57 Stone backfill for Mechanically Stabilized Earth Walls

In addition, determine the moisture-density relationship and classification of the material. Test and submit the classification, moisture-density relationship, and soil strength parameters of the material to the Engineer for acceptance. An AASHTO certified laboratory is required to perform the testing. Contact the RPG Geotechnical Engineer for a list of locally available AASHTO certified laboratories. The Department may perform independent testing to assure quality.

Determine the friction angle and cohesion using either direct shear testing or consolidated-undrained triaxial shear testing with pore pressure measurements. Direct Shear testing shall only be performed on soils with a fines content of less than 25 percent. Classification testing includes grain-size distribution with wash #200 sieve, moisture plasticity testing and natural moisture content. Use the Standard Proctor test to determine the moisture-density relationship. Remold all samples used in shear strength testing to 95 percent of the Standard Proctor density. Conduct shear strength testing at the initial selection of the borrow pit, any subsequent changes in borrow pits, and for every 10,000 cy of materials placed. Perform classification testing for every 50,000 cy of materials placed, including the material used for the shear strength testing. Additional shear testing may be required if, in the opinion of the RCE, the materials being placed are different from those originally tested.

If these minimum criteria cannot be met, provide the soil parameters for the intended borrow excavation material for the project site to the Engineer for review and acceptance. After acceptable borrow material is obtained, compact the fill to the required finish grade line using the compactive effort indicated in the Standard Specifications for Highway Construction, Section 205 (Embankment Construction).

The following notes apply to muck excavation:

Any areas identified on the plans and any additional areas that are discovered to deflect or settle may require corrective action as directed by the RCE. This may include undercutting; placing No. 57 stone aggregate that is separated from other borrow materials by a geotextile for separation of sub-grade and sub-base, and/or additional compactive effort to the approval of the RCE.

In areas that require mucking or undercutting, borrow material soil may be placed as a bridge lift as long as the grade on which the material is being placed is at least 2 feet above ground water level. In the event that groundwater does not allow backfilling with a borrow material soil, use a No. 57 stone as the bridge lift material. Borrow material bridge lifts may not exceed a 2-foot thickness. The depth at which mucking or undercutting is required is dependent upon encountering a suitable bearing material within the excavation or if a predetermined elevation or depth is required. In most cases, do not undercut more than 3 to 5 feet. The RCE will determine the final mucking or undercutting thickness, unless otherwise specified in the project plans and/or specifications. If a suitable bearing soil is not encountered within this depth range, place a P1 biaxial geogrid with an aperture size of less than or equal to 1 inch and in accordance with the project special provisions beneath a 2-foot thick bridge lift of No. 57 stone. If additional compacted borrow material soil is needed to reach grade, place a geotextile for separation of sub-grade and sub-base between the No. 57 stone and the overlying compacted soil. A bridge lift consisting of borrow material soil may not be placed within 3 feet of the base of the pavement section. Place only compacted borrow material soil or No. 57 stone within this zone. Reference the Standard Specifications for Highway Construction, Earthwork Section, Division 200.

The following notes apply for MSE Wall Subgrades:

Prior to construction of the leveling pad and MSE fill, the RCE shall verify that the retaining wall is founded on subgrade materials possessing the minimum allowable bearing capacity noted on wall plan and elevation sheets. If the RCE determines that the subgrade is unacceptable for placement of MSE fill, the contractor shall undercut the subgrade to the limits directed by the RCE. Unacceptable subgrade materials include, but are not limited to, all high plasticity clays and elastic silts (CH, MH), low plasticity clays and silts (CL, ML) with an unconfined compressive strength less than 2,000 psf, and deleterious debris. Replacement of undercut material will be with Backfill Material, meeting requirements outlined in the SCDOT Standard Specifications for Highway Construction.

The foundation area for the MSE walls might have scattered pockets of soft soils that might be present at the surface or just below the surface for the base of the MSE fill. These soft pockets are only expected to extend a few feet below the base of the MSE fill. The quality assurance representative shall proofroll the subgrade in this area and/or conduct dynamic cone tests at regular intervals to determine that the subgrade meets the requirements of the paragraph above.

There are several locations along the roadway alignment where proposed drainage structures are situated in front of (i.e. parallel) MSE walls, or where new and existing draining structures pass beneath the MSE walls. Where new pipes are parallel to the proposed wall, the pipe should be installed prior to the proposed wall or the wall design should account for the temporary reduction in passive resistance. Where pipes pass beneath walls, the pipes should be designed to account for the increased loading associated with the wall backfill. We recommend the top of each pipe be situated a minimum of 1 foot below the bottom of retaining.

The following notes apply for settlement and displacement monitoring:

The contractor shall establish a monitoring program consisting of settlement instruments. The settlement monitoring program must include establishing settlement monitoring instruments on the subgrade soils prior to fill placement, and at design pavement subgrade elevation. Settlement monitoring instruments are required at a spacing of every 100 feet along MSE Walls and every 500 feet along embankments with new fill thicknesses exceeding 20 feet. Instruments shall be established at the centerline of road and edge of pavement. Settlement monitoring shall continue until three consecutive measurements demonstrate the rate of settlement is less than 0.1 inches per year. No more than one measurement shall be obtained on a single day.

A minimum of 2 measurements shall be obtained on monuments prior to fill placement, and instruments shall be measured weekly during fill placement. Instrumentation measurements shall be provided to the Geotechnical Engineer within 24 hours of measurements for interpretation. Interpreted results shall be provided to the RCE.

The following notes apply to slope construction:

Where the new fill meets the existing slope, the existing slope shall be benched to limit the potential for a preferential failure surface and to allow compaction at the interface. Benches shall have a minimum horizontal length of 8 feet and a vertical rise of no more than 3 feet. Fill slopes of 2H:1V or steeper shall be overbuilt (i.e. fill should temporarily extend beyond the final slope face) to allow compaction at the slope face. After compaction is complete, the slope may be regraded to the final inclination.

Should seeps or thick lenses of highly plastic soils be observed in the planned fill and cut slopes that are steeper than 2H:1V, ECS must be contacted to determine if the steeper slopes may be constructed as planned or if slope flattening or reinforcing is required. Similarly, if soft or wet ground conditions are observed at the base of planned fill embankments, the QA representative must determine the limits of undercutting required or required in-situ treatment.

The following Plan Notes apply to Mechanically Stabilized Earth walls:

Reinforced Backfill (Granular Fill or stone.)

Internal Friction Angle (deg) = 36
Total Unit Weight = 120 pcf
Surcharge Dead Load for Pavement Overlay = 140 psf
Active Earth Pressure Coefficient = 0.26

Retained Backfill

Internal Friction Angle (deg) = 30
Total Unit Weight = 117 pcf
Active Earth Pressure Coefficient = 0.33

Wall 17 I-85 Station
Foundation Soils
Total Internal Friction Angle (deg) = 26
Total Cohesion = 0 psf
Effective Internal Friction Angle (deg) = 26
Effective Cohesion = 0 psf

Wall Height	Min. Breq	Factored Bearing (Static)	Factored Bearing (Seismic)
0 < H ≤ 7.5	14.5 ft	2,000	3,100

Wall 18 I-85 Station 413+00 to 415+00
Foundation Soils
Total Internal Friction Angle (deg) = 0
Total Cohesion = 1000 psf
Effective Internal Friction Angle (deg) = 26
Effective Cohesion = 100 psf

Wall Height	Min. Breq	Factored Bearing (Static)	Factored Bearing (Seismic)
3 < H ≤ 7	12.5 ft	5,400	8,400

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠1	07/22/16	ADDED I-85 (ROCKY CREEK AREA) GEOTECH. NOTES (ST. 375+00 - PELHAM)	D.R.R.	P.H.R.					
⚠2	5/3/18	REVISED WALL 18, REMOVED WALL 55	B.G.N.	P.H.R.					

DRAWN BY : A.W.F   DATE : 6/10/15
REVIEWED BY : B.A.H.   DATE : 09/04/15
APPROVED BY : B.G.N.   DATE : 09/20/15

FLATIRON   ZACHRY
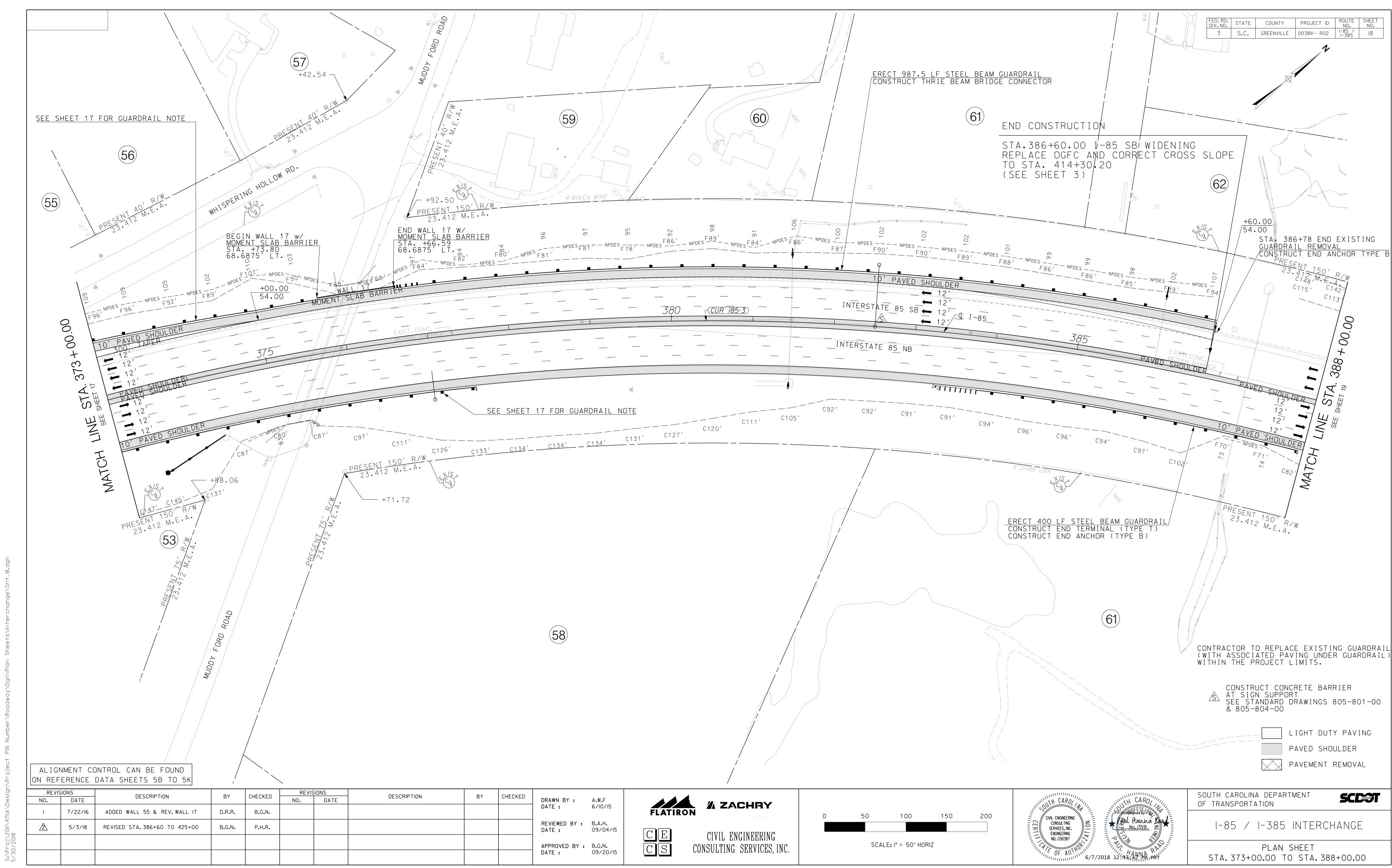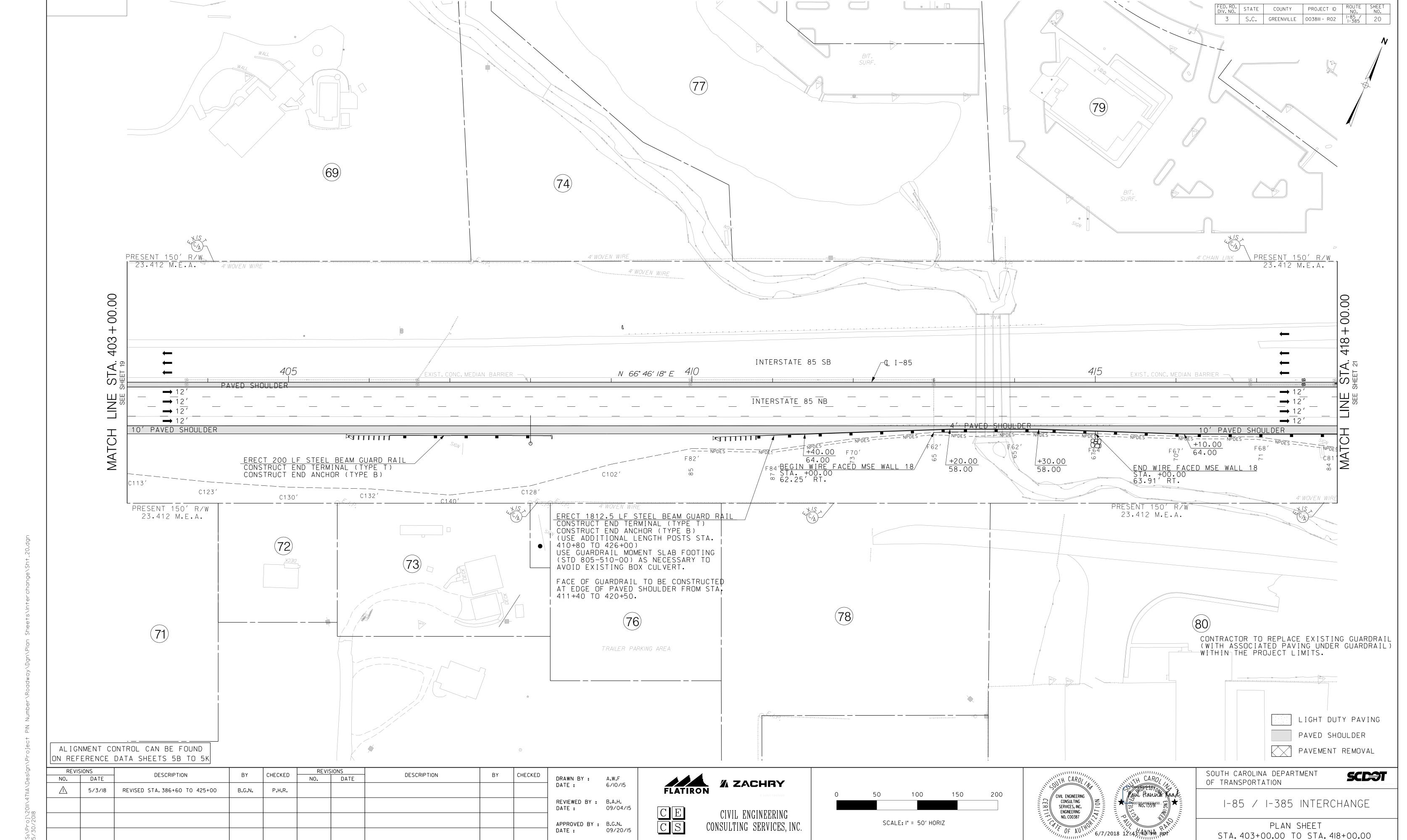
CECS
CIVIL ENGINEERING CONSULTING SERVICES, INC.

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
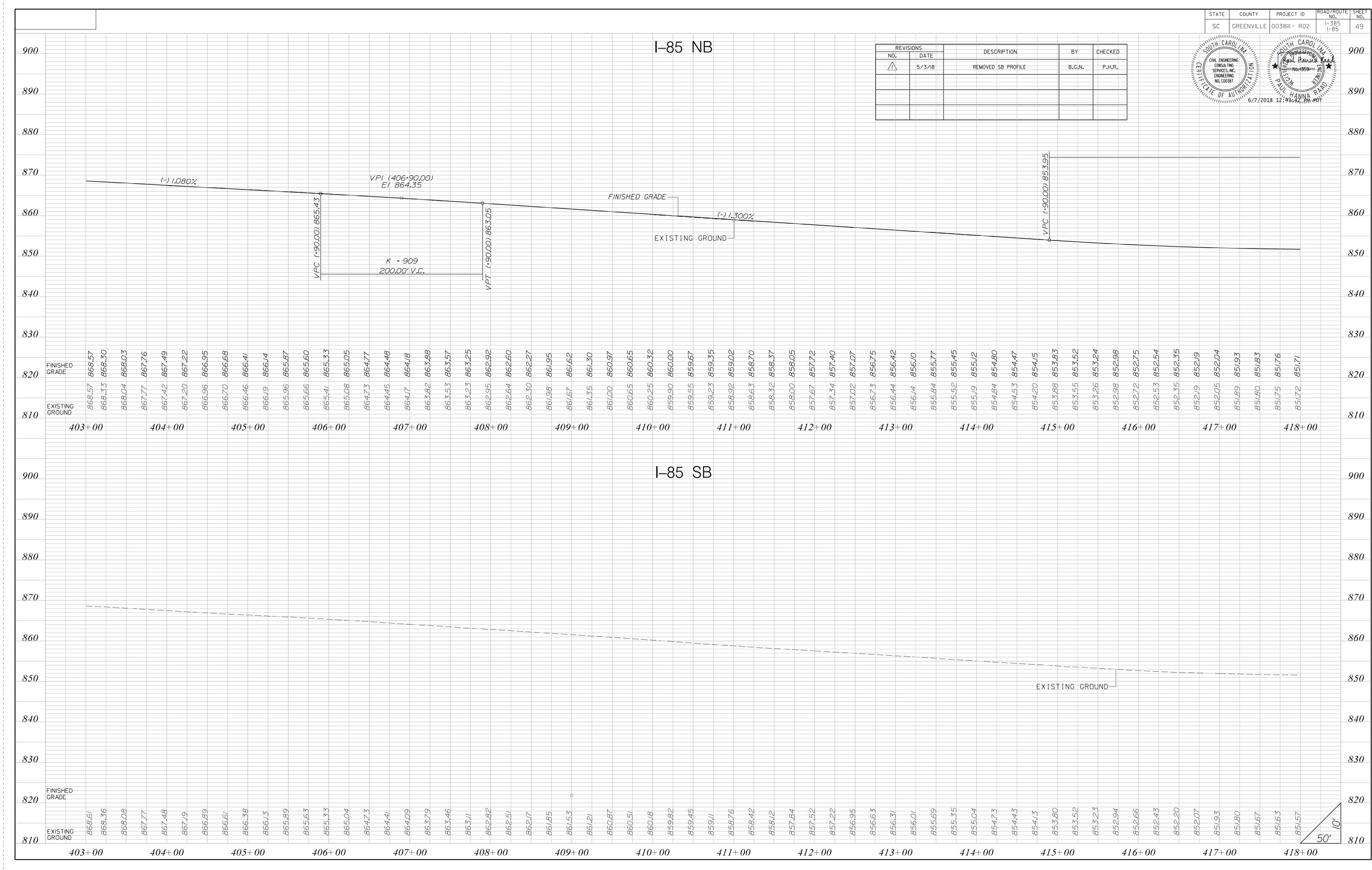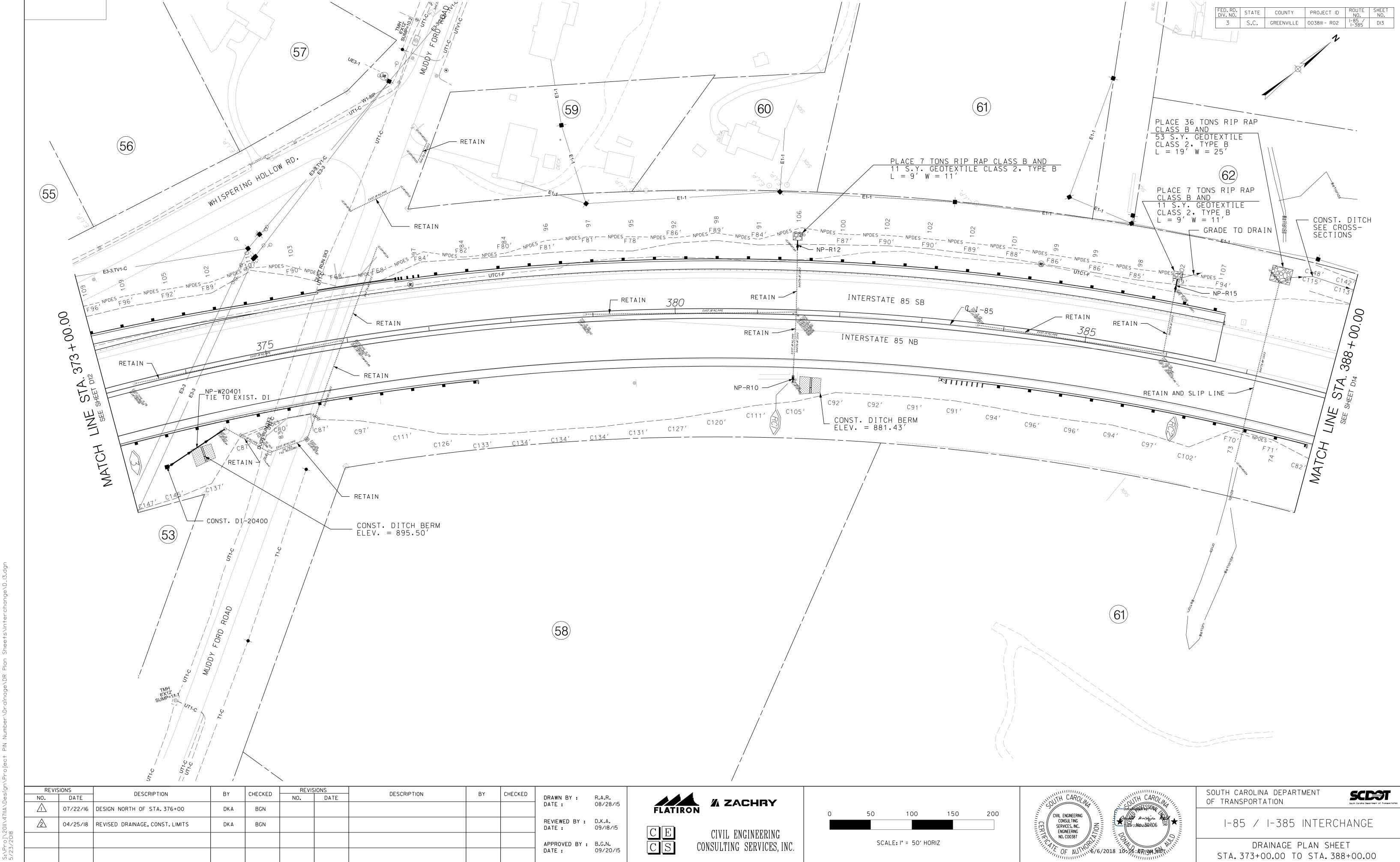
SCDOT

I-85 / I-385 INTERCHANGE

GEOTECHNICAL NOTES

S:\Pro j\200\1471\A\Design\Project PIN Number\Roadway\Dgn\Typicals\Interchange\Sh10E_Geotech_Notes.dgn
5/30/2018

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 I-385	18

ERECT 987.5 LF STEEL BEAM GUARDRAIL
CONSTRUCT THRIE BEAM BRIDGE CONNECTOR

END CONSTRUCTION

STA. 386+60.00 I-85 SB WIDENING
REPLACE OGFC AND CORRECT CROSS SLOPE
TO STA. 414+30.20
(SEE SHEET 3)

SEE SHEET 17 FOR GUARDRAIL NOTE

57 +42.54
59
60
61
62
56
55
53
58
61

+60.00
54.00
STA. 386+78 END EXISTING
GUARDRAIL REMOVAL
CONSTRUCT END ANCHOR TYPE B

MUDDY FORD ROAD
WHISPERING HOLLOW RD.

PRESENT 40' R/W 23.412 M.E.A.
PRESENT 40' R/W 23.412 M.E.A.
PRESENT 150' R/W 23.412 M.E.A.
PRESENT 150' R/W 23.412 M.E.A.
PRESENT 75' R/W 23.412 M.E.A.
PRESENT 150' R/W 23.412 M.E.A.

+92.50

4 WOVEN WIRE
4 CHAIN LINK

BEGIN WALL 17 w/
MOMENT SLAB BARRIER
STA. +73.80
68.6875' LT.

END WALL 17 W/
MOMENT SLAB BARRIER
STA. +66.59
68.6875' LT.

WALL 17
+00.00
54.00

MOMENT SLAB BARRIER

10' PAVED SHOULDER
10' PAVED SHOULDER
10' PAVED SHOULDER
10' PAVED SHOULDER

12'
12'
12'
12'

INTERSTATE 85 SB
INTERSTATE 85 NB
Ç I-85

380 (CUR I85-3)
375
385

400' TAPER

PAVED SHOULDER
PAVED SHOULDER
PAVED SHOULDER

EXIST. CONC.

MATCH LINE STA. 373+00.00
MATCH LINE STA. 388+00.00
SEE SHEET 17
SEE SHEET 19

SEE SHEET 17 FOR GUARDRAIL NOTE

+98.06
+71.72
+42.54

MUDDY FORD ROAD

ERECT 400 LF STEEL BEAM GUARDRAIL
CONSTRUCT END TERMINAL (TYPE T)
CONSTRUCT END ANCHOR (TYPE B)

CONTRACTOR TO REPLACE EXISTING GUARDRAIL
(WITH ASSOCIATED PAVING UNDER GUARDRAIL)
WITHIN THE PROJECT LIMITS.

CONSTRUCT CONCRETE BARRIER
AT SIGN SUPPORT
SEE STANDARD DRAWINGS 805-801-00
& 805-804-00

LIGHT DUTY PAVING
PAVED SHOULDER
PAVEMENT REMOVAL

ALIGNMENT CONTROL CAN BE FOUND
ON REFERENCE DATA SHEETS 5B TO 5K

REVISIONS					REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED
1	7/22/16	ADDED WALL 55 & REV. WALL 17	D.R.R.	B.G.N.					
2	5/3/18	REVISED STA. 386+60 TO 425+00	B.G.N.	P.H.R.					

DRAWN BY : A.W.F
DATE : 6/10/15

REVIEWED BY : B.A.H.
DATE : 09/04/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON ZACHRY
CECS CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0 50 100 150 200
SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION
SCDOT

I-85 / I-385 INTERCHANGE

PLAN SHEET
STA. 373+00.00 TO STA. 388+00.00

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING SERVICES, INC.
CERTIFICATE OF AUTHORIZATION
NO. C00387

SOUTH CAROLINA
PROFESSIONAL
ENGINEER
NO. 11558
PAUL HANNA RAAD

6/7/2018

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III- R02	I-85 / I-385	19

TENNIS COURT

63

65

67

69

62

69

N

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

C142 C140'
C113' C112'

EXIS. C/A

EXIS. C/A

4 WOVEN WIRE

MATCH LINE STA. 388+00.00
SEE SHEET 18

390 CUR I85-3

EXIST. CONC. MEDIAN BARRIER

INTERSTATE 85 SB

395

N 66° 46' 18" E

℄ I-85

400

EXIST. CONC. MEDIAN BARRIER

MATCH LINE STA. 403+00.00
SEE SHEET 20

PAVED SHOULDER
12'
12'
12'
10' PAVED SHOULDER

PT Sta. 394+38.80

INTERSTATE 85 NB

PAVED SHOULDER
12'
12'
12'
10' PAVED SHOULDER

C70'
C82'
C120'
C133'
C126'
C141'
C150'
C149'
C148'
C147'
C142'
C139'
C135'
C132'
C122'

F84'
98'
NPDES
F106'
NPDES
NPDES
NPDES
119'
NPDES
F99'
102'
NPDES
F94'
97'
C89'
C103'
C113'

6' CHAIN LINK
EXIS. C/A

PRESENT 150' R/W
23.412 M.E.A.

4 WOVEN WIRE

EXIS. C/A

PRESENT 150' R/W
23.412 M.E.A.

ERECT 637.5 LF STEEL BEAM GUARDRAIL
CONSTRUCT END TERMINAL (TYPE T)
CONSTRUCT END ANCHOR (TYPE B)

64

66

68

61

70

71

DECK

WALL

CONTRACTOR TO REPLACE EXISTING GUARDRAIL
(WITH ASSOCIATED PAVING UNDER GUARDRAIL)
WITHIN THE PROJECT LIMITS.

	LIGHT DUTY PAVING
	PAVED SHOULDER
	PAVEMENT REMOVAL

ALIGNMENT CONTROL CAN BE FOUND
ON REFERENCE DATA SHEETS 5B TO 5K

REVISIONS					REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED
⚠ ★	5/3/18	REVISED STA. 386+60 TO 425+00	B.G.N.	P.H.R.					

DRAWN BY : A.W.F
DATE : 6/10/15

REVIEWED BY : B.A.H.
DATE : 09/04/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON ZACHRY

CECS CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0 50 100 150 200

SCALE: I" = 50' HORIZ

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. C00387

SOUTH CAROLINA
PROFESSIONAL
Paul Hanna Read
No. 00559
PAUL HANNA READ

6/7/2018 12:43:41 PM PDT

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

PLAN SHEET
STA. 388+00.00 TO STA. 403+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	20

N

77

79

69

74

⑲ (circle sheet markers)

PRESENT 150' R/W
23.412 M.E.A.

4' WOVEN WIRE

4' WOVEN WIRE

4' WOVEN WIRE

EXIST. C/A

4' CHAIN LINK   PRESENT 150' R/W
23.412 M.E.A.

EXIST. C/A

MATCH LINE STA. 403+00.00
SEE SHEET 19

MATCH LINE STA. 418+00.00
SEE SHEET 21

405

410

INTERSTATE 85 SB

₵ I-85

415

EXIST. CONC. MEDIAN BARRIER

N 66° 46' 18" E

EXIST. CONC. MEDIAN BARRIER

PAVED SHOULDER

INTERSTATE 85 NB

→ 12'
→ 12'
→ 12'
→ 12'

← 12'
← 12'
← 12'
← 12'

10' PAVED SHOULDER

4' PAVED SHOULDER

10' PAVED SHOULDER

NPDES

+10.00
64.00

+40.00
64.00

F70'

F82'   85

F84

+20.00
58.00

+30.00
58.00

+10.00
64.00

C102'

C113'

C123'

C130'

C132'

C140'

C128'

ERECT 200 LF STEEL BEAM GUARD RAIL
CONSTRUCT END TERMINAL (TYPE T)
CONSTRUCT END ANCHOR (TYPE B)

BEGIN WIRE FACED MSE WALL 18
STA. +00.00
62.25' RT.

END WIRE FACED MSE WALL 18
STA. +00.00
63.91' RT.

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

EXIST. C/A

EXIST. C/A

ERECT 1812.5 LF STEEL BEAM GUARD RAIL
CONSTRUCT END TERMINAL (TYPE T)
CONSTRUCT END ANCHOR (TYPE B)
(USE ADDITIONAL LENGTH POSTS STA.
410+80 TO 426+00)
USE GUARDRAIL MOMENT SLAB FOOTING
(STD 805-510-00) AS NECESSARY TO
AVOID EXISTING BOX CULVERT.

FACE OF GUARDRAIL TO BE CONSTRUCTED
AT EDGE OF PAVED SHOULDER FROM STA.
411+40 TO 420+50.

72

73

76

78

71

80

CONTRACTOR TO REPLACE EXISTING GUARDRAIL
(WITH ASSOCIATED PAVING UNDER GUARDRAIL)
WITHIN THE PROJECT LIMITS.

TRAILER PARKING AREA

ALIGNMENT CONTROL CAN BE FOUND
ON REFERENCE DATA SHEETS 5B TO 5K

☐ LIGHT DUTY PAVING
▨ PAVED SHOULDER
⊠ PAVEMENT REMOVAL

REVISIONS					REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED
⚠	5/3/18	REVISED STA. 386+60 TO 425+00	B.G.N.	P.H.R.					

DRAWN BY : A.W.F
DATE : 6/10/15

REVIEWED BY : B.A.H.
DATE : 09/04/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON   ZACHRY

CECS
CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0 50 100 150 200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION   SCDOT

I-85 / I-385 INTERCHANGE

PLAN SHEET
STA. 403+00.00 TO STA. 418+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III-R02	I-85 I-385	21

87

81 83 84 85 86

79 80 82

PRESENT 60' R/W
23.986 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

6' CHAIN LINK

PRESENT 150' R/W
23.412 M.E.A.

+51.40
+57.00

MATCH LINE STA. 418+00.00
SEE SHEET 20

MATCH LINE STA. 433+00.00
SEE SHEET 22

I-85
INTERSTATE 85 SB

420   N 66° 46' 18" E   425   430

INTERSTATE 85 NB

12'
12'
12'
12'

10' PAVED SHOULDER
+00.00 54.00
300' TAPER
+00.00 66.00
10' PAVED SHOULDER
12'
12'
12'
50
65'
CUR PELHAM RAMP-1   PELHAM RAMP
R 2'   TAPER
390' TAPER
+08.67 54.00
+10.20 60.88
12'
12'
12'
10' PAVED SHO.
4'

+50.00 64.00
C81 84' C89' 92 C91' 94 F70' 73 F74' 77 F79' 82 F88' 91 F86' 89 F94' 97 F87' 90 CB2 85 C34 37 C46' 49 C45' 48 C47' 51 C48' 51 C48' 51 C36' 39 C34' 37 C29' 32

+86.94 14.00
+51.94 12.00
+88.18 16.00
+19.72

NPDES

SEE SHEET 20 FOR GUARDRAIL NOTE

PC Sta 50+00.00

PRESENT 150' R/W
23.412 M.E.A.

MATCH LINE STA. 55+00.00
SEE SHEET 22

6' PAVED SHOULDER
CUR PELHAM RAMP-2   12'
12'
12'

TIE EQUALITY:
POT STA.428+20.48 I-85 =
PC STA.50.00.00 PELHAM RAMP
54.00' RIGHT (BEGIN PELHAM RAMP)

PRESENT 150' R/W
23.412 M.E.A.

PRESENT TRANS. R/W
23.986 M.E.A.

CONTRACTOR TO REPLACE EXISTING GUARDRAIL
(WITH ASSOCIATED PAVING UNDER GUARDRAIL)
WITHIN THE PROJECT LIMITS.

CONSTRUCT CONCRETE BARRIER
AT SIGN SUPPORT
SEE STANDARD DRAWINGS 805-801-00
& 805-804-00

LIGHT DUTY PAVING
PAVED SHOULDER
PAVEMENT REMOVAL

ALIGNMENT CONTROL CAN BE FOUND
ON REFERENCE DATA SHEETS 5B TO 5K

REVISIONS					REVISIONS			
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED
⚠	5/3/18	REVISED STA. 386+60 TO 425+00	B.G.N.	P.H.R.				

DRAWN BY : A.W.F   DATE : 6/10/15
REVIEWED BY : B.A.H.   DATE : 09/04/15
APPROVED BY : B.G.N.   DATE : 09/20/15

FLATIRON ZACHRY
CIVIL ENGINEERING CONSULTING SERVICES, INC.

0 50 100 150 200
SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION   SCDOT

I-85 / I-385 INTERCHANGE

PLAN SHEET
STA. 418+00.00 TO STA. 433+00.00

STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
SC	GREENVILLE	0038III - R02	I-385 I-85	47

I-85 NB

VPI (373+35.00) EI 900.18

K = 538 195.00' V.C.

K = 2425 200.00' V.C.

VPC (-32.50) 898.08

VPT (-32.50) 898.08

VPC (-27.50) 894.23

VPT (+30.00) 894.18

VPT (+30.00) 890.68

(-) 1.782%

(-) 2.155%

(-) 1.792%

FINISHED GRADE

(-) 1.710%

EXISTING GROUND

K = 400 200.00' V.C.

VPC (+05.00) 882.56

VPT (+05.00) 879.64

K = 222 200.00' V.C.

VPC (+30.00) 878.12

(-) 1.210%

(-) 0.310%

K = 523 195.00' V.C.

VPI (375+30.00) EI 895.97

VPI (377+30.00) EI 892.39

VPI (384+05.00) EI 880.85

VPI (387+30.00) EI 876.91

I-85 SB

VPI (373+50.00) EI 901.88

VPI (375+50.00) EI 898.47

K = 1946 200.00' V.C.

VPC (+00.00) 893.93

VPT (+00.00) 890.41

K = 254 200.00' V.C.

K = 21155 200.00' V.C.

(-) 1.236%

(-) 1.705%

(-) 1.813%

(-) 1.711%

VPI (381+50.00) EI 887.84

VPC (+60.00) 885.75

VPC (+50.00) 885.94

VPT (+60.00) 882.75

VPC (+60.00) 882.75

VPT (+60.00) 880.54

(-) 1.898%

FINISHED GRADE

(-) 1.09%

(-) 1.00%

K = 427 200.00' V.C.

VPT (+50.00) 900.17

VPC (+50.00) 900.17

VPC (+50.00) 896.65

VPT (+50.00) 889.55

K = 1849 200.00' V.C.

VPI (379+00.00) EI 892.12

EXISTING GROUND

VPI (383+60.00) EI 883.86

K = 1069 200.00' V.C.

END CONSTRUCTION STA. 386+60.00 I-85 SB WIDENING

STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
SC	GREENVILLE	0038III - R02	I-385 I-85	48

I-85 NB

REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED
⚠	5/3/18	REMOVED SB PROFILE	B.G.N.	P.H.R.

SOUTH CAROLINA CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. C00387

CERTIFICATE OF AUTHORIZATION

6/7/2018 12:43

VPT (-30.00) 876.60

VPI (390+00.00) El 876.08

VPI (394+70.00) El 874.40

VPI (398+50.00) El 872.27

VPI (401+55.00) El 870.13

(-) 0.310%

(-) 0.358%

(-) 0.560%

(-) 0.700%

(-) 1.080%

FINISHED GRADE

EXISTING GROUND

VPC (+00.00) 876.39

VPT (+00.00) 875.72

K = 4178
200.00' V.C.

VPC (-70.00) 874.75

VPT (+70.00) 873.84

K = 989
200.00' V.C.

VPC (+50.00) 872.83

VPT (+50.00) 871.57

K = 1429
200.00' V.C.

VPC (+55.00) 870.83

VPT (+55.00) 869.05

K = 526
200.00' V.C.

FINISHED GRADE values (NB):
876.72 876.62 876.54 876.46 876.39 876.31 876.23 876.15 876.07 875.98 875.90 875.81 875.72 875.63 875.54 875.45 875.36 875.27 875.18 875.09 875.00 874.91 874.82 874.74 874.64 874.54 874.43 874.32 874.20 874.08 873.95 873.81 873.67 873.53 873.39 873.25 873.11 872.97 872.83 872.69 872.54 872.39 872.23 872.07 871.91 871.74 871.57 871.39 871.22 871.04 870.87 870.69 870.50 870.30 870.08 869.86 869.62 869.37 869.11

EXISTING GROUND values (NB):
876.54 876.50 876.47 876.42 876.33 876.26 876.18 876.08 875.99 875.89 875.78 875.65 875.55 875.43 875.29 875.16 875.05 874.97 874.89 874.82 874.78 874.77 874.70 874.65 874.58 874.50 874.42 874.30 874.21 874.11 873.99 873.85 873.61 873.38 873.25 873.12 872.99 872.91 872.80 872.68 872.56 872.42 872.27 872.11 871.95 871.78 871.62 871.43 871.25 871.10 870.95 870.78 870.58 870.38 870.18 869.95 869.69 869.44 869.19 868.88 868.57

Stations: 388+00 389+00 390+00 391+00 392+00 393+00 394+00 395+00 396+00 397+00 398+00 399+00 400+00 401+00 402+00 403+00

I-85 SB

EXISTING GROUND

FINISHED GRADE

EXISTING GROUND values (SB):
879.27 879.17 879.05 878.97 878.90 878.85 878.83 878.72 878.62 878.49 878.39 878.31 878.22 878.10 877.96 877.76 877.59 877.41 877.25 877.07 876.89 876.70 876.51 876.30 876.09 875.89 875.67 875.46 875.24 874.99 874.77 874.48 874.22 873.96 873.69 873.43 873.23 873.01 872.77 872.59 872.50 872.43 872.28 872.11 871.93 871.75 871.59 871.42 871.26 871.13 870.96 870.76 870.54 870.29 870.06 869.81 869.58 869.34 869.09 868.87 868.61

Stations: 388+00 389+00 390+00 391+00 392+00 393+00 394+00 395+00 396+00 397+00 398+00 399+00 400+00 401+00 402+00 403+00

50' 10'

STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
SC	GREENVILLE	0038III - R02	I-385 I-85	49

I-85 NB

REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED
⚠	5/3/18	REMOVED SB PROFILE	B.G.N.	P.H.R.

CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. C00387

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA PAUL HANNA RAND

6/7/2018 12:43:42 PM PDT

(-) 1.080%

VPI (406+90.00)
El 864.35

VPC (+90.00) 865.43

FINISHED GRADE

(-) 1.300%

EXISTING GROUND

K = 909
200.00' V.C.

VPT (+90.00) 863.05

VPC (+90.00) 853.95

FINISHED GRADE / EXISTING GROUND values (NB):
868.57, 868.30, 868.03, 867.76, 867.49, 867.22, 866.95, 866.68, 866.41, 866.14, 865.87, 865.60, 865.33, 865.05, 864.77, 864.48, 864.18, 863.88, 863.57, 863.25, 862.92, 862.60, 862.27, 861.95, 861.62, 861.30, 860.97, 860.65, 860.32, 860.00, 859.67, 859.35, 859.02, 858.70, 858.37, 858.05, 857.72, 857.40, 857.07, 856.75, 856.42, 856.10, 855.77, 855.45, 855.12, 854.80, 854.47, 854.15, 853.83, 853.52, 853.24, 852.98, 852.75, 852.54, 852.35, 852.19, 852.04, 851.93, 851.83, 851.76, 851.71

868.57, 868.33, 868.04, 867.77, 867.42, 867.20, 866.96, 866.70, 866.46, 866.19, 865.96, 865.66, 865.41, 865.08, 864.73, 864.45, 864.17, 863.82, 863.53, 863.23, 862.95, 862.64, 862.30, 861.98, 861.67, 861.35, 861.00, 860.65, 860.25, 859.90, 859.55, 859.23, 858.92, 858.63, 858.32, 858.00, 857.67, 857.34, 857.02, 856.73, 856.44, 856.14, 855.84, 855.52, 855.19, 854.84, 854.53, 854.20, 853.88, 853.55, 853.26, 852.98, 852.72, 852.53, 852.35, 852.19, 852.05, 851.89, 851.80, 851.75, 851.72

Stations: 403+00, 404+00, 405+00, 406+00, 407+00, 408+00, 409+00, 410+00, 411+00, 412+00, 413+00, 414+00, 415+00, 416+00, 417+00, 418+00

I-85 SB

EXISTING GROUND

EXISTING GROUND values (SB):
868.61, 868.36, 868.08, 867.77, 867.48, 867.19, 866.89, 866.61, 866.38, 866.13, 865.89, 865.63, 865.33, 865.04, 864.73, 864.41, 864.09, 863.79, 863.46, 863.11, 862.82, 862.51, 862.17, 861.85, 861.53, 861.21, 860.87, 860.51, 860.18, 859.82, 859.45, 859.11, 858.76, 858.42, 858.12, 857.84, 857.52, 857.22, 856.95, 856.63, 856.31, 856.01, 855.69, 855.35, 855.04, 854.73, 854.43, 854.13, 853.80, 853.52, 853.23, 852.94, 852.66, 852.43, 852.20, 852.07, 851.93, 851.80, 851.67, 851.63, 851.57

Stations: 403+00, 404+00, 405+00, 406+00, 407+00, 408+00, 409+00, 410+00, 411+00, 412+00, 413+00, 414+00, 415+00, 416+00, 417+00, 418+00

50' 10'

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	DI3

PLACE 36 TONS RIP RAP CLASS B AND
53 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 19' W = 25'

PLACE 7 TONS RIP RAP CLASS B AND
11 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 9' W = 11'

PLACE 7 TONS RIP RAP CLASS B AND
11 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 9' W = 11'

GRADE TO DRAIN

CONST. DITCH
SEE CROSS-
SECTIONS

RETAIN

WHISPERING HOLLOW RD.

MUDDY FORD ROAD

INTERSTATE 85 SB

INTERSTATE 85 NB

RETAIN AND SLIP LINE

CONST. DITCH BERM
ELEV. = 881.43'

CONST. DITCH BERM
ELEV. = 895.50'

CONST. DI-20400

TIE TO EXIST. DI

NP-W20401

NP-R10

NP-R12

NP-R15

MATCH LINE STA. 373+00.00
SEE SHEET DI2

MATCH LINE STA. 388+00.00
SEE SHEET DI4

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠1	07/22/16	DESIGN NORTH OF STA. 376+00	DKA	BGN					
⚠2	04/25/18	REVISED DRAINAGE, CONST. LIMITS	DKA	BGN					

DRAWN BY : R.A.R.
DATE : 08/28/15

REVIEWED BY : D.K.A.
DATE : 09/18/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON / ZACHRY

CECS
CIVIL ENGINEERING
CONSULTING SERVICES, INC.

SCALE: 1" = 50' HORIZ

0   50   100   150   200

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

DRAINAGE PLAN SHEET
STA. 373+00.00 TO STA. 388+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	D14

PLACE 27 TONS RIP RAP CLASS B AND
32 S.Y. GEOTEXTILE CLASS 2, TYPE B
AT DITCH OUTLET
L = 19' W = 15'

65
63
62
67
69

PLACE 20' - 18" CONTECH
SLOTTED DRAIN OR EQUIVALENT.
MAINTAIN MINIMUM 0.3% GRADE.
TIE TO EXIST. CB STA. 419+00.

E1-1
UTC1-F
C142
C140
C112
C113

MATCH LINE STA. 388+00.00
SEE SHEET D13

INTERSTATE 85 SB
RETAIN
℄ I-85
RETAIN

390
395
400

RETAIN
RETAIN
RETAIN
RETAIN
INTERSTATE 85 NB
RETAIN

MATCH LINE STA. 403+00.00
SEE SHEET D15

RETAIN AND REPLACE
12' OF EXIST. PIPE
PRIOR TO OUTLET

REMOVE EXIST. DI
CONST. J-R13N
NP-R2
C82
C120
C133
C126
C141
C150
C149
C148
C147
C142
C139
C135
C132
C122
C70

F84
F106
NPDES
NPDES
NPDES
NPDES
F99
F94
97
102
C89
C103
C113
119
98

PLACE 7 TONS RIP RAP CLASS B AND
11 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 9' W = 11'

PLACE 9 TONS RIP RAP CLASS B AND
10 S.Y. GEOTEXTILE CLASS 2, TYPE B
AT DITCH OUTLET
L = 9' W = 10'

64
66
68
61
70
71

REVISIONS					REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED
⚠	04/25/18	REVISED DRAINAGE, CONST. LIMITS	DKA	BGN					

DRAWN BY : R.A.R.
DATE : 08/28/15

REVIEWED BY : D.K.A.
DATE : 09/18/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON   ZACHRY

CECS   CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

DRAINAGE PLAN SHEET
STA. 388+00.00 TO STA. 403+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	D15

⑥⑨ ⑦④ ⑦⑦ ⑦⑨

MATCH LINE STA. 403+00.00
SEE SHEET D14

MATCH LINE STA. 418+00.00
SEE SHEET D16

RETAIN

RETAIN

RETAIN AND SLIP LINE

E1-1   E1-1   E1-3,TV1-C/F   E1-3,TV1-C/F   E1-3,E1-1,TV1-C/F   E1-3,F1-1,TV1-C/F

UTC1-F

405   410   415

INTERSTATE 85 SB

℄ I-85

RETAIN   INTERSTATE 85 NB   RETAIN   RETAIN

RETAIN

PLACE 9 TONS RIP RAP CLASS B AND
10 S.Y. GEOTEXTILE CLASS 2, TYPE B
AT DITCH OUTLET
L = 9' W = 10'

GRADE TO DRAIN

PLACE 6 TONS RIP RAP CLASS B AND
9 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 8' W = 9'

W1-8IP

⑦② ⑦③ ⑦① ⑦⑥ ⑦⑧ ⑧⑩

CALL OUT NTS

N

	REVISIONS				REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED
⚠	04/25/18	REVISED DRAINAGE, CONST. LIMITS	DKA	BGN					

DRAWN BY : R.A.R.
DATE : 08/28/15

REVIEWED BY : D.K.A.
DATE : 09/18/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON   ZACHRY

CECS   CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

DRAINAGE PLAN SHEET
STA. 403+00.00 TO STA. 418+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 I-385	D16

81

83

84

85

86

87

79

80

82

N

MATCH LINE STA. 418+00.00
SEE SHEET D15

MATCH LINE STA. 433+00.00
SEE SHEET D17

MATCH LINE STA. 55+00.00
SEE SHEET D17

E1-3,TV1-C/F   E1-3,TV1-C/F   E1-3,TV1-C/F   E1-3,TV1-C/F   E1-3

PLACE 20' - 18" CONTECH VARIABLE-HEIGHT GRATE
SLOTTED DRAIN OR EQUIVALENT. MAINTAIN MINIMUM
0.3% GRADE. TIE TO EXIST. CB STA. 417+97.

RETAIN   RETAIN   RETAIN   RETAIN

UTC1-F

RETAIN   RETAIN   RETAIN

UTC1-F

PLACE 60' - 18" CONTECH VARIABLE-HEIGHT GRATE SLOTTED DRAIN OR EQUIVALENT.
MAINTAIN MINIMUM 0.3% GRADE. TIE TO EXIST. CB STA. 419+00.

RETAIN   425   RETAIN

420

$\mathbb{C}$ I-85   INTERSTATE 85 SB   430

PLACE 20' - 18" CONTECH SLOTTED DRAIN OR EQUIVALENT.
MAINTAIN MINIMUM 0.3% GRADE. TIE TO EXIST. CB STA. 419+00.

RETAIN   RETAIN   INTERSTATE 85 NB

RETAIN   50   CONVERT EXIST. BOX TO MH
(MH-R29)

PELHAM RAMP   55

GRADE
TO DRAIN

F70'   F74'   F79'   F88'   F86'   F94'   F87'

C89'   C91'

PLACE 11 TONS RIP RAP CLASS B AND
17 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 11' W = 14'   CLEAN EXIST. OUTFALL TO R/W LIMIT

C82'   C34'   C46'   C45'   C47'   C48'   C48'   C34'   RETAIN

GRADE TO DRAIN   F36'

PLACE 11 TONS RIP RAP CLASS B AND
17 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 11' W = 14'

Wetlands

UT1-C

PLACE 7 TONS RIP RAP CLASS B AND
11 S.Y. GEOTEXTILE CLASS 2, TYPE B
L = 9' W = 11'

WP-6IP   W1-8IP   W1-8IP

PLACE 26 TONS RIP RAP CLASS B AND
22 S.Y. GEOTEXTILE CLASS 2, TYPE C
L = 13' W = 15'

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠	04/25/18	REVISED DRAINAGE, CONST. LIMITS	DKA	BGN					
★									

DRAWN BY : R.A.R.
DATE : 08/28/15

REVIEWED BY : D.K.A.
DATE : 09/18/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON   ZACHRY

CECS
CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. C00387

SOUTH CAROLINA
PROFESSIONAL
No. 30706
6/6/2018 10:56

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

DRAINAGE PLAN SHEET
STA. 418+00.00 TO STA. 433+00.00

STORM SEWER DATA SHEET

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	D33

GEOMETRY				UPSTREAM						DOWNSTREAM						SPT "N"
PIPE				NODE						NODE						
ID	DIA. AND MATERIAL	NO. OF BARRELS	LENGTH (FT)	ID	DESCRIPTION	ROAD / ROUTE	STATION	OFFSET	PIPE INVERT (FT)	ID	DESCRIPTION	ROAD / ROUTE	STATION	OFFSET	PIPE INVERT (FT)	
NP-R10	18" SM. WALL PIPE	1	8	DN-R30	DUMMY JOINT	I85	381+45.66	82	879.93	DN-R29	DUMMY JOINT	I85	381+45.80	74	879.84	
NP-R12	18" SM. WALL PIPE	1	12	DN-R28	DUMMY JOINT	I85	381+46.00	-79	877.84	OP-R102	OP	I85	381+45.85	-91	877.68	
NP-R15	18" SM. WALL PIPE	1	16	DN-R31	DUMMY JOINT	I85	385+95.86	-79	873.06	OP-R103	OP	I85	385+95.83	-95	872.67	
NP-R2	18" SM. WALL PIPE	1	18	J-R13N	JB	I85	388+45.95	78	869.38	OP-R100	OP	I85	388+45.65	98	869.28	
NP-R29	24" SM. WALL PIPE	1	27	CB-R29	DI TYPE 112	PELHAM_RAMP	55+00.00	-33	868.45	MH-R29	CONVERT EXIST. BOX TO MH	I85	432+94.00	69	868.04	

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠	04/20/17	NP-R1,NP-R11,NP-R13,NP-R14,NP-R23,NP-R24, NP-R25,NP-R3,NP-R32,NP-R33,NP-R35, NP-R36,NP-R37 AND ASSOCIATED STRUCTURES DELETED.	D.K.A.	B.G.N.					

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	DRAIN XI

6/7/2018 12:43:42 PM PDT

| ⚠ | 7/22/16 | ADDED NP-R32 |
| ⚠2 | 5/3/18 | REMOVED X-LINE STA. 421+61 |

SOUTH CAROLINA
CIVIL ENGINEERING CONSULTING SERVICES, INC.
ENGINEERING
NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
PAUL HANNA RAAD
No. 059

915 915
910 910
905 905
900 900
895 895
890 890
885 885

0.0208 FT./FT.

5' X 5' BOX CULVERT @ 1.75%

8' X 8' BOX CULVERT @ 0.39%

328+60.60

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

EROSION CONTROL DATA SHEET

RECEIVING WATERS

ROAD / ROUTE	OUTFALL DITCH STATION	SIDE	NAME OF RECEIVING WATERS	NAME OF ULTIMATE RECEIVING WATERS	ROAD / ROUTE	OUTFALL DITCH STATION	SIDE	NAME OF RECEIVING WATERS	NAME OF ULTIMATE RECEIVING WATERS
I-85	385+05	LT	ROCKY CREEK	ENOREE RIVER					
I-85	386+53	LT	ROCKY CREEK	ENOREE RIVER					
I-85	387+61	RT	ROCKY CREEK	ENOREE RIVER					
I-85	389+05	LT	ROCKY CREEK	ENOREE RIVER					
I-85	413+26	RT	ROCKY CREEK	ENOREE RIVER					
I-85	418+24	RT	ROCKY CREEK	ENOREE RIVER					
I-85	423+25	RT	ROCKY CREEK	ENOREE RIVER					
I-85	427+99	RT	ROCKY CREEK	ENOREE RIVER					
PEL. RA.*	53+31	RT	ROCKY CREEK	ENOREE RIVER					
PEL. RA.*	54+67	RT	ROCKY CREEK	ENOREE RIVER					
			*PELHAM_RAMP						

SOIL TYPES

ROAD / ROUTE	STATION	TO STATION	SOIL PARTICLE SIZE (COARSE / FINE)	ZONE
I-85	BEG.	413+22	FINE	PIEDMONT
I-85	413+22	426+17	COARSE	PIEDMONT
I-85	426+17	END	FINE	PIEDMONT
PEL. RA. *	BEG.	END	FINE	PIEDMONT
*PELHAM RAMP				

TEMPORARY EROSION CONTROL BLANKET

ROAD / ROUTE	STATION TO STATION	SIDE	DEPTH OF BLANKET (FT)	SLOPES x : 1 FRONT	BACK	DITCH BOTTOM WIDTH (FT)	MSY

SEE SHTS. EC9 FOR TEMPORARY EROSION CONTROL BLANKET

TOTALS

SEDIMENT DAM

* NOTE: BASIN INCISEMENT TO BE CONSTRUCTED WITH VERTICAL SIDE SLOPES TO DEPTH SHOWN IN "DEPTH OF BASIN".

ROAD / ROUTE	NO	STATION	SIDE	DRAINED OR NOT DRAINED	LENGTH OF BASIN	WIDTH OF BASIN	DEPTH OF BASIN	SIDE SLOPE OF BASIN	SPILLWAY WIDTH	SPILLWAY DEPTH	TOTAL HEIGHT TO SPILLWAY	SEDIMENT STORAGE VOLUME	RUNOFF STORAGE VOLUME	OUTFALL CHANNEL WIDTH	OUTFALL CHANNEL DEPTH	OUTFALL CHANNEL LENGTH
I-85	RC1	381+40	RT	UNDRAINED	118	25	1	6:1/2:1	2	1.9	2.9	109	135			
I-85	RC2	386+24	RT	UNDRAINED	112	40	2.5	6:1/2:1	10	2	4.5	414	199			
I-85	RC3	395+00	RT	UNDRAINED	100	10	2	6:1/2:1	3	3.5	5.5	74	156			

SEDIMENT TUBES IN DITCHES

ROAD / ROUTE	STATION	TO STATION	SIDE	AVERAGE LENGTH	SPACING (FT)	TOTAL	COMMENTS
I-85	387+14	388+92	LT	20	150	60	
I-85	376+00	383+50	RT	10	150	60	
I-85	383+50	384+00	RT	10	100	20	
I-85	384+00	385+50	RT	10	150	20	
I-85	385+50	386+50	RT	10	100	20	
I-85	388+50	389+50	RT	10	75	30	
I-85	389+50	391+50	RT	10	150	30	
I-85	391+50	395+00	RT	10	100	50	
I-85	395+00	397+00	RT	10	25	90	
I-85	401+00	409+00	RT	10	150	70	
PELHAM	54+00	55+00	LT	10	150	20	
PELHAM	61+00	61+25	LT	10	25	20	
PELHAM	55+00	61+25	RT	10	50	140	

GRAND TOTAL: 630

TURF REINFORCED MATTING (TRM)

ROAD / ROUTE	STATION	TO STATION	SIDE	DEPTH OF MAT (FT)	SLOPES x : 1 FRONT	BACK	DITCH BOTTOM WIDTH (FT)	TYPE	TYPE 1 (MSY)	TYPE 2 (MSY)	TYPE 3 (MSY)
I-85	381+50	387+00	RT	3	6	2	0	1	1.525	0.000	0.000
I-85	415+00	418+00	RT	2	1	0	0	3	0.000	0.000	0.094
I-85	423+00	426+00	RT	5	1.5	0	0	2	0.000	0.300	0.000
PELHAM	55+00	61+25	RT	2	6	2	0	1	1.155	0.000	0.000
								TOTALS	2.681	0.300	0.094

⚠ 04/25/18 ADJUSTED EROSION CONTROL ITEMS TO REFLECT REVISED CONST. LIMITS

EROSION CONTROL DATA SHEET

TEMPORARY EROSION CONTROL BLANKET

ROAD / ROUTE	STATION TO STATION		SIDE	DEPTH OF BLANKET (FT)	SLOPES $x:1$		DITCH BOTTOM WIDTH (FT)	MSY
					FRONT	BACK		
I-85	375+00	375+50	LT	10	4	0	0	0.229
I-85	375+50	375+25	LT	10	2	0	0	0.062
I-85	377+00	379+50	LT	6	2	0	0	0.373
I-85	381+50	386+00	LT	8	2	0	0	0.894
I-85	386+50	387+00	LT	14	2	0	0	0.174
I-85	387+50	388+50	LT	6	2	2	10	0.409
I-85	376+50	376+50	RT	12	0	2	0	0.000
I-85	377+00	380+50	RT	20	0	2	0	1.739
I-85	381+00	381+50	RT	15	0	2	0	0.186
I-85	381+50	382+00	RT	9	0	2	0	0.112
I-85	384+50	385+50	RT	6	0	2	0	0.149
I-85	388+50	389+00	RT	8	6	2	0	0.370
I-85	389+00	389+50	RT	18	0	2	0	0.224
I-85	389+50	390+00	RT	21	0	2	0	0.261
I-85	390+00	391+50	RT	31	0	2	0	1.155
I-85	391+50	392+50	RT	25	0	2	0	0.621
I-85	392+50	394+00	RT	20	0	2	0	0.745
I-85	393+50	396+00	RT	8	6	0	0	1.352
I-85	394+00	396+00	RT	8	0	2	0	0.398
I-85	397+00	398+00	RT	8	2	0	0	0.199
I-85	398+00	401+00	RT	8	4	0	0	1.099
I-85	402+00	403+00	RT	10	0	2	0	0.248
I-85	403+00	405+00	RT	20	0	2	0	0.994
I-85	405+00	408+00	RT	25	0	2	0	1.863
I-85	408+00	409+00	RT	10	0	2	0	0.248
I-85	424+00	426+00	RT	5	1.5	0	0	0.200
I-85	426+00	427+50	RT	8	4	0	0	0.550

ROAD / ROUTE	STATION TO STATION	SIDE	DEPTH OF BLANKET (FT)	SLOPES $x:1$		DITCH BOTTOM WIDTH (FT)	MSY
				FRONT	BACK		

ROAD / ROUTE	STATION TO STATION	SIDE	DEPTH OF BLANKET (FT)	SLOPES $x:1$		DITCH BOTTOM WIDTH (FT)	MSY
				FRONT	BACK		

04/25/18   ADJUSTED EROSION CONTROL ITEMS TO REFLECT REVISED CONST. LIMITS

6/6/2018 10:56:07 AM PDT

SCDOT
South Carolina Department of Transportation

RELEASE FOR CONSTRUCTION PLANS

PROPOSED PLANS FOR
GREENVILLE COUNTY
PROJECT ID 0038111 – R02
INTERSTATE 85 / 385 INTERCHANGE

FROM: 0.20 MILES SOUTH OF S-326
TO: ROAD S-492

SEE SHEET 1.1 FOR INDEX OF SHEETS

BRIDGES TO BE CONSTRUCTED

BRIDGE NO.	ROAD NO.	LENGTH	STA. TO STA.	LOCATION
1/2A	I-385 SB	201.85'	374+34.76 TO 376+36.61	GARLINGTON RD. & GE RAILROAD OVERPASS
2B	I-385 NB	201.50'	374+96.79 TO 376+98.29	GARLINGTON RD. & GE RAILROAD OVERPASS
3	I-385 NB CD	201.50'	376+37.60 TO 378+39.10	GARLINGTON RD. & GE RAILROAD OVERPASS
4	RAMP 8	148.17'	57+85.53 TO 59+33.70	I-385 NB CD OVERPASS
5	RAMP 1A	1522.83'	72+79.42 TO 88+02.25	I-385 & I-85 OVERPASS
6	RAMP 4B	1962.83'	390+18.50 TO 409+81.33	I-385 & I-85 OVERPASS
7	RAMP 2B	475.00'	34+16.95 TO 38+91.95	I-85 OVERPASS
8	RAMP 3A	254.85'	297+81.45 TO 300+36.30	I-85 OVERPASS
9	RAMP 2A	368.84'	71+70.81 TO 75+39.65	I-85 OVERPASS
10	RAMP 1B	220.05'	69+11.35 TO 71+31.40	RAMP 4B OVERPASS
12	I-385	497.17'	395+34.84 TO 400+32.01	I-85 OVERPASS

BRIDGE PLANS BOUND UNDER SEPARATE COVER

ENVIRONMENTAL PERMIT INFORMATION

USACE PERMIT	X YES	NO
NEPA DOCUMENT	X YES	NO
401 CERTIFICATION	X YES	NO
OCRM CAP	YES	X NO
NAVIGABLE WATERS	SC USCG USACE	X N/A

3 DAYS BEFORE DIGGING IN SOUTH CAROLINA
CALL 811
SOUTH CAROLINA 811 (SC811)
WWW.SC811.COM
ALL UTILITIES MAY NOT BE A MEMBER OF SC811

RAILROAD INVOLVEMENT?
(YES) NO

TRAFFIC DATA

	I-85	I-385
2015 ADT	118,200	106,500
2035 ADT	174,700	171,400
TRUCKS	18 %	18 %

PROJECT ID 0038111–R02
INTERSTATE 385
447+60.00 END

END

PROJECT ID 0038111–R02
INTERSTATE 85
STA. 435+00.00 END

PROJECT ID 0038111–R02
INTERSTATE 85
203+00.00 BEGIN

PROJECT ID 0038111–R02
INTERSTATE 385
303+89.49 BEGIN

GREENVILLE COUNTY MAP

LAYOUT
(NOT TO SCALE)

	I-85		I-385		RAMPS		CD's		TOTAL	
NET LENGTH OF ROADWAY	4.394	MILES	2.551	MILES	9.035	MILES	2.867	MILES	18.757	MILES
NET LENGTH OF BRIDGES	-	MILES	0.171	MILES	0.938	MILES	0.038	MILES	1.147	MILES
NET LENGTH OF PROJECT	4.394	MILES	2.722	MILES	9.973	MILES	2.905	MILES	19.993	MILES
LENGTH OF EXCEPTIONS	-	MILES	-	MILES	-	MILES	-	MILES	-	MILES
GROSS LENGTH OF PROJECT	4.394	MILES	2.722	MILES	9.973	MILES	2.905	MILES	19.993	MILES

EQUALITIES IN STATIONING
NONE

NOTE: EXCEPT AS MAY OTHERWISE BE SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIALS AND WORKMANSHIP ON THIS PROJECT SHALL CONFORM TO THE SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (2007 EDITION) AND THE STANDARD DRAWINGS FOR ROAD CONSTRUCTION IN EFFECT AT THE TIME OF LETTING.

REVISIONS

NO.	DATE	DESCRIPTION	BY	CHECKED
1	1/27/16	SHEET TOTAL REVISED	D.R.R.	B.G.N.
2	5/02/16	SHEET TOTAL REVISED	D.R.R.	B.G.N.
3	5/12/16	SHEET TOTAL REVISED	D.R.R.	B.G.N.
4	6/17/16	SHEET TOTAL REVISED	D.R.R.	R.L.K
5	7/8/16	SHEET TOTAL REVISED	D.R.R.	R.L.K
6	8/9/16	SHEET TOTAL REVISED	D.R.R.	R.L.K
7	8/18/16	SHEET TOTAL REVISED	D.R.R.	R.L.K

8	9/12/16	BRIDGE LENGTHS 1/2A, 2B, 3. SHT. TTL RVSD	D.R.R.	12	1/12/17	SHEET TOTAL REVISED	B.G.N.
9	9/28/16	SHEET TOTAL REVISED	B.G.N.	13	2/2/17	SHEET TOTAL REVISED	B.G.N.
10	10/21/16	SHEET TOTAL REVISED	B.G.N.	14	3/16/17	SHEET TOTAL REVISED	B.G.N.
11	10/28/16	SHEET TOTAL REVISED	B.G.N.	15	12/18/17	SHEET TOTAL REVISED	B.G.N.

16 1/9/18 SHEET TOTAL REVISED B.G.N.
17 5/3/18 SHEET TOTAL REVISED B.G.N.

Hydraulic Design Reference for these plans in the:
2009
Edition of SCDOT'S "Requirements for Hydraulic Design Studies"

Design Reference for these plans is the:
2001
AASHTO "A Policy on Geometric Design of Highways and Streets"

UNLESS OTHERWISE NOTED ON TYPICAL SECTION

NPDES PERMIT INFORMATION
Disturbed Area = 160.5 Acre(s)
Permitted Area = 349.7 Acre(s)

Approximate Location of Roadway is
Begin
Latitude 34° 50' 20" N
Longitude 82° 17' 26" W
End
Latitude 34° 50' 02" N
Longitude 82° 17' 27" W

Hydraulic and NPDES Design provided by:
CECS, Inc.
Designs may be obtained from the SCDOT Regional Production Group

SCDOT REVIEW	RIGHT-OF-WAY INITIAL	DATE	CONSTRUCTION INITIAL	DATE
PRECONSTRUCTION SUPPORT - ROAD				
PRECONSTRUCTION SUPPORT - STRUCTURES				
RPG - DESIGN MANAGER				
RPG - PROGRAM MANAGER				

THE INITIALS ABOVE DO NOT RELIEVE THE ENGINEER OF RECORD OF THE RESPONSIBILITY TO DESIGN THIS PROJECT IN ACCORDANCE WITH ALL APPLICABLE CRITERIA.

For Right Of Way Acquisition:
_____ Date _____
Consultant Engineer of Record
_____ Date _____
Regional Production Engineer

CONSULTING ENGINEERING FIRM
FLATIRON   ZACHRY
CECS
CIVIL ENGINEERING CONSULTING SERVICES, INC.
CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. C00387
2000 PARK STREET
SUITE 201
COLUMBIA, S.C. 29201

ENGINEER OF RECORD
PAUL HANNA
PAUL HANNA, P.E.
6/7/2018 12:43:43 PDT

FOR CONSTRUCTION: _____ DATE _____

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-R02	I-85/ I-385	I-85 X83

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
Paul Hanna Raad
PAUL HANNA RAAD
NO. 13591
6/7/2018 12:45:42 PM PDT

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

384·00.00

883·50.00

383·00.00

EX. RW

0.0650 FT./FT.

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	0038III-R02	I-85/ I-385	I-85 X84

6/7/2018 12:43:42 PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

386·00.00

885 — 885
880 — 880
875 — 875
870 — 870

883.77 883.41 882.76 15d 15d 2d
EX. RW
874.18
0.0650 FT./FT. 881.20
0.0650 FT./FT. 879.64 879.32 880.34 880.05
15d 15d
879.85
0.0650 FT./FT. 878.49
0.0650 FT./FT. 876.93 876.28 875.82
15d 12d 6d
877.55
872.82 2d

385·50.00

885 — 885
880 — 880
875 — 875
870 — 870

884.32 883.96 883.31 15d 15d 2d
EX. RW
876.46
0.0650 FT./FT. 880.75
0.0650 FT./FT. 880.09 879.87 880.95 880.65
15d 15d
880.40
0.0650 FT./FT. 879.09
0.0650 FT./FT. 877.53 876.88 876.42
15d 12d 6d
878.88
874.01 2d
EX. RW

385·00.00

885 — 885
880 — 880
875 — 875
870 — 870

884.87 884.51 883.86 15d 15d 2d
EX. RW
876.85
0.0650 FT./FT. 882.30
0.0650 FT./FT. 880.74 880.42 881.57 881.26
15d 15d
880.91
0.0650 FT./FT. 879.70
0.0650 FT./FT. 878.14 877.49 877.03
15d 12d 6d
880.62
874.51 2d
EX. RW

384·50.00

885 — 885
880 — 880
875 — 875

885.43 885.07 884.42 15d 15d 2d
EX. RW
877.01
0.0650 FT./FT. 882.86
0.0650 FT./FT. 881.30 881.00 882.22 881.90
15d 15d
881.60
0.0650 FT./FT. 880.34
0.0650 FT./FT. 878.78 878.13 877.67
15d 12d 6d
881.45
875.26 2d
EX. RW

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003811-R02	I-85/I-385	I-85 X85

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. CO0387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
Paul Hanna Raad
No. 0599
PAUL HANNA RAAD
6/7/2018 12:49:42 PM PDT

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

387·00.00

386·50.00

END CONSTRUCTION
I-85 SB STA. 386+60

0.0650 FT./FT.

EX. RW

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	0038III-R02	I-85/ I-385	I-85 X86

5/3/18 REVISED STA. 384+00 TO 425+00

388+00.00

387+50.00

I–85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 X87

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

EX. RW

890
885
880
875
870
865
860
855

886.55

878.25
877.95
0.0650 FT./FT.
876.39
0.0650 FT./FT.
874.83
874.18
874.01
877.56
15:1
15:1
6:1
2:1
869.08

EX. RW

389+00.00

885
880
875
870
865
860
855

878.42
878.10
0.0650 FT./FT.
876.54
0.0650 FT./FT.
874.98
874.33
874.17
877.82
877.22
15:1
15:1
6:1
2:1
868.47

EX. RW
EX. RW

849.01
2:1
2:1

388+50.00

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. COO387
CERTIFICATE OF AUTHORIZATION

PAUL HANNA RAAD
NO. 15531

6/7/2018

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003BIII-R02	I-85/ I-385	I-85 X88

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

389•50.00

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 X89

6/7/2018 12:49:44, PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

900

895

890

885

880

875

870

865

860

855

EX. RW

899.12

EX. RW

877.90
877.63
877.25
15:1

0.0650 FT./FT.

876.07

0.0650 FT./FT.

874.51

873.86
873.69
15:1

870.70

2:1

390·00.00

5'
10'

| 160 | 150 | 140 | 130 | 120 | 110 | 100 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 |

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
PAUL HANNA ROAD

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	0038III-R02	I-85/ I-385	I-85 X90

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
Paul Hanna Road
No. 15551
PAUL HANNA ROAD
6/7/2018 12:43:41 PM PDT

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

EX. RW
905.31
EX. RW
905.31

877.73
877.46
15:1
0.0650 FT./FT.
875.90
0.0650 FT./FT.
874.34
873.69
873.52
15:1
6:1
876.99
870.55

2:1

390+50.00

905
900
895
890
885
880
875
870
865
860
855
850

850

EX. RW

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

10' 5'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003BIII-R02	I-85/ I-385	I-85 X91

6/7/2018 12:43:42 PM PDT

⚠ 5/3/18 REVISED STA.384+00 TO 425+00

905

900

895

890

885

880

875

870

865

860

855

EX. RW

877.56
877.28
15:l
876.68
0.0650 FT./FT.
875.72
0.0650 FT./FT.
874.16
15:l
873.51
873.34
6:l
870.39
2:l
EX. RW
905.00

391+00.00

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'

10'

I–85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003B111-R02	I-85/ I-385	I-85 X92

CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. C00387

CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA

PAUL HANNA ROAD

6/7/2018 12:43:42 PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

900.94 EX. RW

900.94 EX. RW

877.38
877.10
15:1
876.40
0.0650 FT./FT.
875.54
0.0650 FT./FT.
873.58
15:1
873.33
2:1
872.89
6:1
870.24
2:1

EX. RW

391+50.00

5'
10'

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

900
895
890
885
880
875
870
865
860
855

I-85

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	0038III-R02	I-85/ I-385	I-85 X94

6/7/2018 12:43:42 PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

895

890

885

880

875

870

865

860

855

850

845

EX. RW

877.00
876.74
875.74
0.0650 FT./FT.
875.18
0.0650 FT./FT.
873.62
872.97
872.51
15d
12d
6d
868.98
2d
893.83
EX. RW

15d

392·50.00

EX. RW

| 160 | 150 | 140 | 130 | 120 | 110 | 100 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 |

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 X95

SOUTH CAROLINA
CIVIL ENGINEERING CONSULTING SERVICES, INC.
ENGINEERING NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
PAUL HANNA RAAD
No. 23590
PAUL HANNA RAAD

6/7/2018 12:43:42 PM PDT

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

393•00.00

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

890 885 880 875 870 865 860 855 850

0.0650 FT./FT.   875.00   0.0650 FT./FT.

876.81 / 876.56   873.44   872.34
875.34   872.79   868.35
890.51   890.51

EX. RW

10' / 5'

I–85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	0038III-R02	I-85/I-385	I-85 X96

CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. C00387

SOUTH CAROLINA
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
PAUL HANNA
REVISED STA. 384+00 TO 425+00

394+00.00

- 885
- 880
- 875
- 870
- 865
- 860
- 855
- 850

EX. RW

876.0
875.88
874.64
873.41
872.89
872.43
875.25
867.09
881.48

0.0514 FT./FT.
0.0514 FT./FT.

393+50.00

- 890
- 885
- 880
- 875
- 870
- 865
- 860
- 855
- 850

EX. RW

876.55
876.31
874.82
873.34
872.72
872.26
875.19
867.72
885.82

0.0618 FT./FT.
0.0618 FT./FT.

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	0038III-R02	I-85/ I-385	I-85 X97

6/7/2018 12:43:42 PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

875 — 875
870 — 870
865 — 865
860 — 860
855 — 855
850 — 850

873.70
873.90
873.67
873.17
872.75
872.29
872.13
873.71
0.0097 FT./FT.
0.0208 FT./FT.
24:1
24:1
12:1

396+00.00

880 — 880
875 — 875
870 — 870
865 — 865
860 — 860
855 — 855
850 — 850

END S.E. ON RIGHT
STA. 395+46.80

875.09
874.94
874.20
873.47
873.05
872.59
874.68
0.0306 FT./FT.
0.0306 FT./FT.
3.3:1
24:1
12:1
6:1
2:1
871.50
865.83

395+00.00

EX. RW

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003BIII-R02	I-85/ I-385	I-85 X98

SOUTH CAROLINA
CIVIL ENGINEERING CONSULTING SERVICES, INC.
ENGINEERING
NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
PROFESSIONAL
Paul Hanna Road
No. 11556
PAUL HANNA ROAD
ENGINEER
6/7/2018 12:43:40 PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

875 — 875

0.0208 FT./FT.   0.0208 FT./FT.

872.04   872.54   872.04   871.62   871.16
871.84   24:1   24:1   12:1
871.80

870 — 870

4:1

862.08

865 — 865

860 — 860

855 — 855

850 — 850

398+00.00

END S.E. ON LEFT
STA. 397+46.80

872.64   873.11   872.61   872.9   871.73
872.84   24:1   0.0111 FT./FT.   0.0208 FT./FT.   24:1   12:1
872.53

875 — 875

870 — 870

2:1

864.28

865 — 865

860 — 860

855 — 855

850 — 850

397+00.00

EX. RW   EX. RW   EX. RW   EX. RW

| 160 | 150 | 140 | 130 | 120 | 110 | 100 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 |

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003BIII-R02	I-85/ I-385	I-85 X99

CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. C00387

CERTIFICATE OF AUTHORIZATION

6/7/2018 12:43:42 PM

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

Station 401+00.00

870.00
869.80
870.50
870.00
869.58
869.41
24:1
0.0208 FT./FT.
0.0208 FT./FT.
24:1
12:1
868.83
869.56
4:1
2:1
866.41
EX. RW

Station 400+00.00

870.52
870.72
871.22
870.72
870.30
870.13
24:1
0.0208 FT./FT.
0.0208 FT./FT.
24:1
12:1
870.45
4:1
863.23
EX. RW
EX. RW

Station 399+00.00

871.21
871.41
871.91
871.41
870.99
870.65
24:1
0.0208 FT./FT.
0.0208 FT./FT.
24:1
12:1
871.20
4:1
862.88
EX. RW
EX. RW

Elevations: 870, 865, 860, 855, 850, 875

Stations (bottom): 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I–85

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

403+00.00

402+00.00

I—85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 X101

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
Paul Hanna Raad
No. 3993
PAUL HANNA RAAD
6/7/2018 12:43:42 PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

405•00.00

866.70
865.91
24:1
865.60
0.0208 FT./FT.
866.41
0.0208 FT./FT.
865.91
24:1
865.49
865.32
6:1
862.32

EX. RW
890
885
880
875
870
865
860

885.39

EX. RW

404•00.00

866.78
866.99
24:1
866.69
0.0208 FT./FT.
867.49
0.0208 FT./FT.
866.99
24:1
866.57
866.40
6:1
863.40

883.12

EX. RW

EX. RW

890
885
880
875
870
865

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003BIII-R02	I-85/ I-385	I-85 X102

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SOUTH CAROLINA
Paul Hanna Road
Nov. 1358
PAUL HANNA ROAD

6/7/2018 12:43:42 PM PDT

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

407+00.00

EX. RW
890
885
880
875
870
865
863.48 863.68 864.18 863.58 863.26
24' 0.0208 FT./FT. 0.0208 FT./FT. 24' 12' 862.80
863.34
860.10
860
887.12
24'

406+00.00

EX. RW
890
885 884.44
880
875 EX. RW
870
865 864.62 864.83 865.33 864.83 864.41
24' 0.0208 FT./FT. 0.0208 FT./FT. 24' 12' 863.95
864.54
861.24
860
24'

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I–85

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⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

Top section (409+00.00)

EX. RW
EX. RW

875
870
865   866.37
860   860.92 861.12 861.62   861.12 860.71 860.54
855
850   860.88   24:1 0.0208 FT./FT.   0.0208 FT./FT.   24:1   857.54
         2:1
         6:1

409•00.00

Bottom section (408+00.00)

EX. RW
EX. RW

890
885
880   880.0
875
870   2:1
865   862.22 862.42   862.92   862.42 862.01 861.55
860   862.14   24:1 0.0208 FT./FT.   0.0208 FT./FT.   24:1
855   858.84
         6:1

408•00.00

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	0038III-R02	I-85/ I-385	I-85 XI04

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SOUTH CAROLINA
PAUL HAWKINS REED
NO. 13931
REGISTERED PROFESSIONAL ENGINEER

6/7/2018
5/3/18   REVISED STA. 384+00 TO 425+00

412+00.00

411+00.00

410+00.00

0.0208 FT./FT.   0.0208 FT./FT.

EX. RW

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003811-R02	I-85/ I-385	I-85 X105

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⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

855 — 850 — 845 — 840

853.33
853.33
855.83
0.0208 FT./FT.   0.0208 FT./FT.
853.33
855.06
855.27
24:1   24:1   10:1
855.12
855.06
WALL 18

415+00.00

860 — 855 — 850 — 845 — 840

855.43
854.62
855.12
0.0208 FT./FT.   0.0208 FT./FT.
854.62
854.46
854.10
24:1   24:1   10:1
854.42
855.00
WALL 18

414+00.00

860 — 855 — 850 — 845 — 840

855.73
855.92
855.42
0.0208 FT./FT.   0.0208 FT./FT.
855.92
855.73
855.57
24:1   24:1   10:1
855.53
853.61
WALL 18

413+00.00

EX. RW

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I–85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 XIO6

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851.02
851.21
0.0208 FT./FT.
851.71
0.0208 FT./FT.
851.21
850.79
24'
24'
10'
847.86
850.76
50'
847.66
847.66

418+00.00

851.35
851.54
0.0208 FT./FT.
852.04
0.0208 FT./FT.
851.54
851.13
848.93
24'
24'
10'
851.32

417+00.00

852.05
852.25
0.0208 FT./FT.
852.75
0.0208 FT./FT.
852.25
851.85
850.18
24'
24'
10'
852.01

416+00.00

850 | 850
845 | 845
855 | 855
850 | 850
845 | 845
840 | 840
855 | 855
850 | 850
845 | 845
840 | 840

EX. RW

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	0038III-R02	I-85/ I-385	I-85 X107

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BEG. TRANS. TO 36' STA. 421+00
END TRANS. TO 36' STA. 421+20

421+00.00

420+00.00

419+00.00

0.0208 FT./FT.

852.25
852.44
852.94
852.44
852.02
851.49
852.11
24'
24'
12'

851.46
851.66
852.16
851.66
851.24
851.45
847.25
846.89
50'
24'
24'
10'

851.06
851.25
851.75
851.25
850.83
850.80
847.56
847.21
50'
24'
24'
10'

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 XIO8

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⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

423+00.00

422+00.00

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 XIO9

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NO. C00387
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SOUTH CAROLINA
Paul Hanna Raad
PAUL HANNA RAAD
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⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

425+00.00

424+00.00

ECS SOUTHEAST, LLP

"Setting the Standard for Service"

Geotechnical • Construction Materials • Environmental • Facilities

NC Registered Engineering Firm F-1078
NC Registered Geologists Firm C-406
SC Registered Engineering Firm 3241

May 22, 2018

Mr. Maher Almassri
Civil Engineering Consulting Services, Inc.
2000 Park Street – Suite 201
Columbia, SC 29201

Re: Interstate 85/385 Interchange Improvements
          Rocky Mountain Creek Retaining Wall 18
          Greenville County, SC
          ECS Project No. 08-9283-B6

Dear Mr. Almassri:

As you are aware, ECS Southeast provided Mechanically Stabilized Earth (MSE) Wall recommendations as part of the Final Roadway Geotechnical Engineering Report titled Rocky Mountain Creek Roadway and Retaining Walls, dated October 25, 2016. It is our understanding that since the completion of the report, revisions were made to the retaining walls. Walls 18B, 18C, and 55 have been removed from the project, and require no further analysis. Wall 18A has been revised and was renumbered to wall 18. The purpose of this letter is to provide supplementary geotechnical recommendations for wall 18.

Wall 18A previously consisted of a wire faced MSE wall from station 413+00 to 419+40 (640 feet long) ranging in height from 4.33 feet to 10.27 feet tall. We understand that the wall has been shortened to 200 feet long with an alignment from station 413+00 to 415+00. Wall heights have also been decreased to a range of 3.21 feet to 6.75 feet.

An external stability analysis was performed for Wall 18 at station 413+50 with a design height of 7 feet. The results of the analysis are summarized below in Tables 1.0 and 1.1.

Table 1.0 – MSE Wall External Stability Analysis Results					
Wall Number	Design Height, H, ft[1]	Minimum Reinforcement Length, B_{req}, ft (%H)	Calculated Resistance Factor		Max. Factored Bearing Resistance, psf
			Bearing Capacity[2]	Sliding[3]	
18	3 < H ≤ 7	12.5 (1.79H)	0.23	0.47	5,400

Table 1.1 – MSE Wall External Stability Analysis Results (Extreme Event 1)					
Wall Number	Design Height, H, ft[1]	Minimum Reinforcement Length, B_{req}, ft (%H)	Calculated Resistance Factor		Max. Factored Bearing Resistance, psf
			Bearing Capacity[2]	Sliding[3]	
18	3 < H ≤ 7	12.5 (1.79H)	0.17	0.52	8,400

Notes:
1. Height analyzed is measured from PGL to embedment depth.
2. Maximum Resistance factor is 0.65 for Static Bearing Capacity and 1.0 for Seismic Bearing Capacity.
3. Maximum resistance factor is 1.0 for sliding.

Static and extreme limit state global stability was also evaluated for Wall 18 at station 414+00. Extreme limit state (seismic) considers a pseudo-static horizontal acceleration (kh) of 0.20. Results are summarized below in Tables 1.2 and 1.3.

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Rocky Mountain Creek Roadway and Retaining Walls
I-85/385 Interchange Improvements
Greenville County, South Carolina
Page 2

ECS Project No. 08-9283
May 22, 2018

Table 1.2 – Static Global Stability Analysis

Wall Number	Direction	Loading Condition	Demand/ Capacity, D/C			Performance Criteria Met
			Morganstern-Price	Bishop	Spencer	
Wall 18 I-85 Station 413+50	Transverse	ESA	0.61	0.61	0.61	Yes
		TSA	0.41	0.41	0.41	Yes

Table 1.3 – Extreme Limit State Global Stability Analysis

Wall Number	Direction	k_h	Demand/Capacity, D/C			Performance Criteria Met
			Morganstern-Price	Bishop	Spencer	
Wall 18 I-85 Station 413+50	Transverse	0.20	0.61	0.62	0.61	Yes

Revisions to the Geotechnical Notes on Plans have been made to reflect the changes to walls 18 and 55, and are provided in attached Roadway Notes on Plans. As shown in the attached analysis, the proposed wall 18 meets the SCDOT GDM performance requirements.

If you have any questions concerning the MSE Wall recommendations, please do not hesitate to contact us.

Respectfully,

ECS SOUTHEAST, LLP

Jacob E. Erickson, E.I.
Geotechnical Staff Project Manager

Marc F. Plotkin, P.E., D.GE
Principal Engineer
SC Registration No. 30565

Attachments: MSE External Stability Results
MSE Global Stability Results
Geotechnical Notes on Plans

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER

WBS NO.:   TIP NO.:   COUNTY:
SUBJECT: LRFD External Stability Analysis for MSE Walls
I-85 Wall 18
PREPARED BY: JEE   DATE: 05/22/18   STATION: 413+50
CHECKED BY: DATE: STR. NO.:   SHEET: 1 OF 8

ECS

Input Traffic Surcharge, Backslope, Wall Geometry, and Soil Parameters

Traffic and Overlay Surcharge Surcharge

q = 390 psf   *Live Load Traffic Surcharge and Pavement Overlay*
35.9 % Surcharge due to overlay
q_{ol} = 140 psf   *Pavement overlay surcharge*

Backslope

Horizontal Backslope

(d = horizontal distance from back of wall face to top of backslope)

Wall Geometry

H = 7.00 ft   *Wall Height*
L/H = 1.79   *Ratio of Reinforcement Length to Wall Height*
(L/H ≥ 0.7 per NCDOT MSE Wall Standard Provision)
L = 12.50 ft   *Reinforcement Length*
(L ≥ 6 ft per NCDOT MSE Wall Standard Provision)
h = 7.00 ft   *Height of Wall & Slope at the back of Reinforced Zone*

D_w = 10.00 ft   *Distance of Water Table below the Bottom of the Wall*

Soil Parameters for Reinforced Zone

ϕ'_r = 36 deg   *Effective Friction Angle*
γ'_r = 120 pcf   *Effective Unit Weight*
K_{a_r} = 0.260   *Active Earth Pressure Coeficent (AASHTO Eqn 3.11.5.3-2)*

Soil Parameters for Retained Backfill

ϕ'_b = 30 deg   *Effective Friction Angle*
γ'_b = 117 pcf   *Effective Unit Weight*
K_{a_b} = 0.333   *Active Earth Pressure Coeficent (AASHTO Eqn 3.11.5.3-2)*

Soil Parameters for Foundation Soil

ϕ'_f = 26 deg   *Effective Friction Angle*
γ_f = 105 pcf   *Total Unit Weight*
c_f = 100 psf   *Undrained Shear Strength (Cohesion)*
μ = 0.49   *Coefficient of Friction (AASHTO 11.10.5.3)*
The coefficient of friction shall be based on the lesser of ϕ'_r and ϕ'_f.

Input Load and Resistance Factors

Load Factors (See AASHTO Table 3.4.1-1 and 2)

Ψ_{LS} = 1.75   *Lilve Load Surcharge*
$\Psi_{EH(A)}$ = 1.50   *Horizontal (Active) Earth Pressure Load*
Ψ_{EV} = 1.00 min / 1.35 max   Vertical Dead Load Generated from Earth Fill
Ψ_{EQ-p} = 1.00
Ψ_{EQ-LL} = 0.50

Resistance Factors (See AASHTO Table 11.5.6-1)

φ_b = 0.65   *Bearing Resistance for MSE Walls*
φ_τ = 1.00   *Sliding Resistance for MSE Walls*

Seismic Design Acceleration Parameters

k_{max} = 0.20   *Maximum Horizontal Ground Acceration (PGA)*
S_{d1} = 0.14   *Peak spectral acceleration at 1 second*

Typical MSE Wall with Level Backslope and Traffic Surcharge

Typical MSE Wall with Infinite Backslope

Typical MSE Wall with Broken Backslope and Traffic Surcharge

References:

1. *AASHTO LRFD Bridge Design Specifications, 5th Edition, 2010*
2. *FHWA-NHI-10-024 Design and Construction of MSE Walls and Reinforced Soil Slopes - Vol I, 2009*
3. *SCDOT Geotechnical Design Manual version 1.1, 2010*

Calculate Forces acting on Wall

q = 0.390 ksf

External Stability for MSE Walls: Earth Pressure - Level Backslope with Surcharge Case
(Based on FHWA Figure 4-2 and AASHTO Figure 11.10.5.2-1)
All Forces are Calculated per Unit Length of Wall
Figure Not Drawn to Scale

Forces from Vertical Earth Loads

V_1 = Total Vertical Force from the Reinforced Soil Mass = $(\gamma'_r)(H)(L)$
= (0.120 kcf)(7.00 ft)(12.50 ft) = 10.500 kips

Forces from Lateral Earth Pressure

F_1 = Total Force Generated from Lateral Earth Pressure = $0.5(\gamma'_b)(H^2)(K_{ab})$ FHWA Eqn. 4-5
= (0.5)(0.117 kcf)(7.00 ft)^2(0.333) = 0.955 kips

Horizontal Force from Traffic Surcharge

F_2 = Force Generated from Traffic Surcharge = $(q)(H)(K_{ab})$ *FHWA Eqn. 4-6*
= (0.390 ksf)(7.00 ft)(0.333) = 0.909 kips

Sliding Stability - AASHTO 11.10.5.3, AASHTO 10.6.3.4, and FHWA 4.4.6.a

The passive resistance at the toe due to embedment is ignored due to the potential for soil to be removed through natural or manmade processes.
(per FHWA 4.4.6.a)

q = 0.390 ksf

External Stability for MSE Walls: Sliding Stability - Level Backslope with Surcharge Case
(Based on FHWA Figure 4-2 and AASHTO Figure 11.10.5.2-1)
All Forces are Calculated per Unit Length of Wall
Figure Not Drawn to Scale

Calculate Factored Sliding Resistance (R_R)

$R_R = \varphi R_N = \varphi_\tau R_\tau$ *AASHTO Eqn. 10.6.3.4-1*

WBS NO.:	TIP NO.:	COUNTY:
SUBJECT:	LRFD External Stability Analysis for MSE Walls	
	I-85 Wall 18	

PREPARED BY: JEE DATE: 05/22/18 STATION: 413+50

CHECKED BY: DATE: STR. NO.: SHEET: 3 OF 8

Sliding Stability Continued - AASHTO 11.10.5.3, AASHTO 10.6.3.4, and FHWA 4.4.6.a

φ_τ = *Resistance Factor for Sliding* = 1.00   *AASHTO Table 11.5.6-1*

R_τ = *Nominal Sliding Resistance between Reinforced Soil Mass and Foundation Soil*

  = $\Psi_{EV}(V_1)\mu + (c_f)(L)$ *FHWA Eqn. 4-12 and AASHTO 10.6.3.4*

Ψ_{EV} = Load Factor for Dead Load of Earth Fill = 1.00   *AASHTO Table 3.4.1-1*

(Use the Min Value of Ψ_{EV} per FHWA 4.4.6.a, AASHTO C3.4.1, and AASHTO C11.5.5)

V_1 = Total Vertical Force from the Reinforced Soil Mass = 10.500 kips

μ = Coefficent of Friction between Reinforced Soil Mass and Foundation Soil = 0.49   *AASHTO 11.10.5.3*

c_f = Cohesion for Foundation Soil = 0.100 ksf

L = Reinforcement Length = 12.50 ft

R_τ = (1.00)(10.50 kips)(0.49) + (0.100 ksf)(12.50 ft) = 6.40 kips

R_R = (1.00)(6.40 kips) = 6.40 kips

Calculate Factored Horizontal Driving Force (P_d)

$P_d = (\Psi_{EHA})(F_1) + (\Psi_{LS})(F_2)$ *FHWA Eqn. 4-9*

Ψ_{EHA} = Load Factor for Horizontal (Active) Earth Pressure = 1.50   *AASHTO Table 3.4.1-1*

F_1 = Force Generated from Lateral Earth Pressure = 0.955 kips   *FHWA Eqn. 4-5*

Ψ_{LS} = Load Factor for Horizontal (Active) Earth Pressure = 1.75   *AASHTO Table 3.4.1-1*

F_2 = Force Generated from Traffic Surcharge = 0.909 kips   *FHWA Eqn. 4-6*

P_d = (1.50)(0.955 kips) + (1.75)(0.909 kips) = 3.023 kips

Check Sliding   Calculated Resistance Factor

R_R must be greater than or equal to P_d $P_d/(Rr/\varphi_t)$ = **0.47**

6.395 kips ≥ 3.023 kips

OK

Overturning (Limiting Eccentricity) - AASHTO 11.6.3.3, AASHTO 11.10.5.5 and FHWA 4.4.6.b

Eccentricity (e) = the distance between the resultant foundation load (R) and the center of the reinforced zone

q = 0.390 ksf

Reinforced Soil Mass
ϕ'_r = 36 deg
γ'_r = 0.120 kcf
K_{a_r} = 0.260

Retained Fill
ϕ'_b = 30 deg
γ'_b = 0.117 kcf
K_{a_b} = 0.333

h = H = 7 ft

V_1

F_2

H/2 = 3.5 ft

F_1

H/3 = 2.33 ft

R

e

L = 12.5 ft

Foundation Soil
ϕ'_f = 26 deg γ_f = 0.105 kcf c_f = 0.100 ksf

External Stability for MSE Walls: Overturning - Level Backslope with Surcharge Case
(Based on FHWA Figure 4-7 and AASHTO Figure 11.10.5.2-1)
Figure Not Drawn to Scale - All Forces are Calculated per Unit Length of Wall
Figure Not Drawn to Scale

Calculate Eccentricity (e)

$$e = \frac{\Psi_{EHA}F_1(H/3) + \Psi_{LS}F_2(H/2)}{\Psi_{EV}V_1}$$ *FHWA Eqn. 4-15*

Overturning (Limiting Eccentricity) Continued - AASHTO 11.6.3.3, AASHTO 11.10.5.5 and FHWA 4.4.6.b

Ψ_{EHA} = Load Factor for Horizontal (Active) Earth Pressure = 1.50

Ψ_{EV} = Load Factor for Dead Load of Earth Fill = 1.00
(Use the Min Value of Ψ_{EV} per FHWA 4.4.6.a, AASHTO C3.4.1, and AASHTO C11.5.5)

Ψ_{LS} = Load Factor for Surcharge = 1.75

F_1 = Force Generated from Lateral Earth Pressure = 0.955 kips

F_2 = Force Generated from Traffic Surcharge = 0.909 kips

V_1 = Total Vertical Force from the Reinforced Soil Mass = 10.500 kips

H = MSE Wall Height = 7.00 ft

$$e = \frac{(\ 1.50\ )(\ 0.955\ \text{kips})(\ 2.33\ \text{ft}) + (\ 1.75\ )(\ 0.909\ \text{kips})(\ 3.50\ \text{ft})}{(\ 1.00\ )(\ 10.500\ \text{kips})}$$

= 0.85 ft

Check Eccentricity

e must be less than or equal to L/4 per AASHTO 11.6.3.3
0.85 ft ≤ 3.13 ft
OK

Bearing Resistance (General Shear) - AASHTO 11.10.5.4, AASHTO 10.6.3.1, and FHWA 4.4.6.c

External Stability for MSE Walls: Bearing Resistance - Level Backslope with Surcharge Case
(Based on FHWA Figure 4-7 and AASHTO Figure 11.10.5.2-1)
All Forces are Calculated per Unit Length of Wall
Figure Not Drawn to Scale

Calculate Eccentricity for Bearing, (e_B)

$$e_B = \frac{\Psi_{EHA}F_1(H/3) + \Psi_{LS}F_2(H/2)}{\Psi_{EV}V_1 + \Psi_{LS}qL}$$

FHWA Eqn. 4-19

Ψ_{EHA} = Load Factor for Horizontal (Active) Earth Pressure = 1.50 *AASHTO Table 3.4.1-1*

Ψ_{EV} = Load Factor for Dead Load of Earth Fill = 1.35 *AASHTO Table 3.4.1-1 and FHWA 4.4.6.a*
(Use the Max Value of Ψ_{EV} per FHWA 4.4.6.a, AASHTO C3.4.1, and AASHTO C11.5.5)

Ψ_{LS} = Load Factor for Surcharge = 1.75 *AASHTO Table 3.4.1-1*

F_1 = Force Generated from Lateral Earth Pressure = 0.955 kips *FHWA Eqn. 4-5*

F_2 = Force Generated from Traffic Surcharge = 0.909 kips *FHWA Eqn. 4-6*

V_1 = Total Vertical Force from the Reinforced Soil Mass = 10.500 kips

Bearing Resistance Continued (General Shear) - AASHTO 11.10.5.4, AASHTO 10.6.3.1, and FHWA 4.4.6.c

q = Live Load Traffic Surcharge = 0.390 ksf

H = MSE Wall Height = 7.00 ft

L = Reinforcement Length = 12.50 ft

$$e_B = \frac{(\ 1.50\ )(\ 0.955\ \text{kips})(\ 2.33\ \text{ft}\ ) + (\ 1.75\ )(\ 0.909\ \text{kips})(\ 3.50\ \text{ft}\ )}{(\ 1.35\ )(\ 10.5\ \text{kips}) + (\ 1.75\ )(\ 0.390\ \text{ksf})(\ 12.50\ \text{ft})}$$

= 0.39 ft

Calculate Nominal Bearing Resistance, (q_n)   *AASHTO Eqn. 10.6.3.1.2a-1*

$q_n = c_f N_c + 0.5\gamma B' N_\gamma C_{w\gamma}$ *AASHTO Eqn. 10.6.3.1.2a-1*

c_f = Cohesion for Foundation Soil = 0.100 ksf

N_c = Bearing Capacity Factor (based on ϕ'_f) = 22.30   *AASHTO Table 10.6.3.1.2a-1*

γ_f = Total Unit Weight for Foundation Soil = 0.105 kcf

B' = Effective Foundation Width = L - 2e_B *AASHTO C11.10.5.4*

= 12.5 ft - 2(0.39 ft) = 11.72 ft

N_γ = Bearing Capacity Factor (based on ϕ'_f) = 12.50   *AASHTO Table 10.6.3.1.2a-1*

$C_{w\gamma}$ = Correction Factor to Account for Location of Groundwater Table = 0.8   *AASHTO Table 10.6.3.1.2a-2*

q_n = (0.100 ksf)(22.30) + (0.5)(0.105 kcf)(11.72 ft)(12.50)(0.80)

= 8.383 ksf

Calculate Factored Bearing Resistance, (q_r)

$q_r = \varphi_b q_n$ *AASHTO Eqn. 10.6.3.1.1-1*

φ_b = Resistance Factor for Bearing = 0.65   *AASHTO Table 11.5.6-1*

q_n = Nominal Bearing Resistance = 8.383 ksf   *AASHTO Eqn. 10.6.3.1.2a-1*

q_r = (0.65)(8.383 ksf) = 5.449 ksf

Calculate Factored Vertical Bearing Pressure at the base, (q_{V-F})

$$\sigma_{V-F} = \frac{\Psi_{EV} V_1 + \Psi_{LS} qL}{L - 2e_B}$$ *FHWA Eqn. 4-20*

Ψ_{EV} = Load Factor for Dead Load of Earth Fill = 1.35   *AASHTO Table 3.4.1-1 and FHWA 4.4.6.a*

(Use the Max Value of Ψ_{EV} per FHWA 4.4.6.c, AASHTO C3.4.1, and AASHTO C11.5.5)

V_1 = Total Vertical Force from the Reinforced Soil Mass = 10.500 kips

Ψ_{LS} = Load Factor for Surcharge = 1.75   *AASHTO Table 3.4.1-1*

q = Live Load Traffic Surcharge = 0.390 ksf

L = Reinforcement Length = 12.50 ft

e_B = Eccentricity for Bearing = 0.39 ft   *FHWA Eqn. 4-19*

$$\sigma_{V-F} = \frac{(\ 1.35\ )(\ 10.50\ \text{kips ft}\ ) + (\ 1.75\ )(\ 0.390\ \text{ksf})(\ 12.50\ \text{ft}\ )}{12.50\ \text{ft} - 2(\ 0.39\ \text{ft}\ )}$$

= 1.937 ksf

Check Bearing   Calculated Resistance Factor

q_R must be greater than or equal to q_{V-F} σ_{V-F}/q_n =   **0.23**

5.449 ksf ≥ 1.937 ksf

OK

Bearing Resistance (Local/Punching Shear) - AASHTO 11.10.5.4, AASHTO 10.6.3.1.2b, and FHWA 4.4.6.c

Local and Punching shear failure occurs in loose or compressible soils and in weak soils under slow (drained) loading. This mode of failure will only be considered for foundation material that is cohesive.

To prevent Local/Punching Shear on weak cohesive soils

$(\gamma_r)(H) \le 3c_f$ *FHWA Eqn. 4-24*

γ_r = Effective Unit Weight of Reinforced Soil Mass = 0.120 kcf
H = Height of MSE Wall = 7.00 ft
c_f = Undrained Shear Strength (Cohesion) of Foundation Soil = 0.100 ksf

(0.120 kcf)(7.00 ft) ≤ 3 (0.100 ksf)

0.840 ksf > 0.300 ksf   **The foundation is subject to Local/Punching Shear. Check Reduced Bearing Resistance**

Calculate Reduced Nominal Bearing Resistance, (q_n)

$q_n = c^*_f N_c + 0.5\gamma B'N_\gamma C_{w\gamma}$ *AASHTO Eqn. 10.6.3.1.2a-1*

c^*_f = Reduced Cohesion for Foundation Soil = $0.67c_f$
= 0.67 (0.100 ksf) = 0.067 ksf   *AASHTO 10.6.3.1.2b-1*
N_c = Bearing Capacity Factor (based on f^*_f) = 13.10   *AASHTO Table 10.6.3.1.2a-1*
γ = Effective Unit Weight for Foundation Soil = 0.105 ksf
B' = Effective Foundation Width = L - $2e_B$ *AASHTO C11.10.5.4*
= 12.5 ft - 2 (0.39 ft) = 11.72 ft
N_γ = Bearing Capacity Factor (based on ϕ'^*_f) = 4.10   *AASHTO Table 10.6.3.1.2a-1*
$C_{w\gamma}$ = Correction Factor to Account for Location of Groundwater Table = 0.8   *AASHTO Table 10.6.3.1.2a-2*
ϕ'^*_f = Reduced Friction Angle for Foundation Soil = $\tan^{-1}(0.67 \tan \phi'_f)$
= $\tan^{-1}$[0.67 tan (26 deg)] = 18 deg   *AASHTO 10.6.3.1.2b-2*

q_n = (0.067 ksf)(13.10) + (0.5)(0.105 kcf)(12.50 ft)(4.10)(0.8)

= 3.030 ksf

Calculate Reduced Factored Bearing Resistance, (q_r)

$q_r = \varphi_b q_n$ *AASHTO Eqn. 10.6.3.1.1-1*

φ_b = Resistance Factor for Bearing = 0.65   *AASHTO Table 11.5.6-1*
q_n = Nominal Bearing Resistance = 3.030 ksf   *AASHTO Eqn. 10.6.3.1.2a-1*

q_r = (0.65)(3.030 ksf) = 1.970 ksf

Check Bearing

q_R must be greater than or equal to q_{V-F}
1.97 ksf ≥ 1.937 ksf
OK

Seismic Stablity - SCDOT GDM Section 14.12

Calculate Wave Scattering Effects

Wave Scattering Coefficient, α_w =1+0.01H((0.5β)-1<1.0   SCDOT Equation 13-103

α_w =   0.9545

Ground Motion Index, $\beta = k_{max}/S_{d1}$ =   0.70   SCDOT Equation 13-104

Average seismic horizontal coefficient due to wave scattering

$k_h = \alpha_w * k_{max}$ =   0.2   SCDOT Equation 13-102

Calculate Seismic Active Earth Pressure Coefficinet (Mononobe -Kobe Method) SCDOT GDM Section 14.4.1

Seismic Active Earth Pressure Coefficient Reinforced Soils, K_{AEr} =   0.584

Seismic Active Earth Pressure Coefficient Retained, K_{AEb} =   0.678

$$K_{ae} = \frac{\cos^2(\phi - \Psi - \theta)}{\cos(\Psi)\cos^2(\theta)\cos(\delta + \theta + \Psi)\left[1 + \sqrt{\frac{\sin(\phi + \delta)\sin(\phi - \Psi - \beta)}{\cos(\delta + \theta + \Psi)\cos(\beta - \theta)}}\right]^2}$$ Equation 14-2

Where,

γ	=	unit weight of soil
H	=	height of wall or effective height of wall (h_{eff})
ϕ	=	angle of internal friction of soil
Ψ	=	$\tan^{-1}[k_h/(1-k_v)]$
δ	=	angle of friction between soil and wall
k_h	=	horizontal acceleration coefficient
k_v	=	vertical acceleration coefficient, typically set to zero.
β	=	backfill slope angle
θ	=	angle of backface of the wall with the vertical

Reinforced Soil			Retained Soil		
φ =	36.0	deg	φ =	30.0	deg
Ψ =	11.3	deg	Ψ =	11.3	deg
θ =	0	deg	θ =	0	deg
δ =	0	deg	δ =	0.00	deg
β =	0	deg	β =	0	deg

Calculate Inertial Wall Width, $B_{inertial} = \omega H$ 5

coefficient, ω =   0.70

Calculate Active Earth Thrust Force, $P_{AE} = \gamma_p * 0.5 K_{AEr} * \gamma_p * H^2$ =   1.9   kips   GDM Eq. 14-40

Calculate Intertial Reinforced Soil Mass Force, $P_{IR} = \gamma_p * k_{avg} * B_{inertial} * H_{wall} *$ =   0.12   kips   GDM Eq. 14-41

Dead Load Surcharge Force, P_{DC} =   = 0.664 kips   GDM Eq. 14-45

Live Load Surcharge Force, P_{LL} =   = 0.593 kips   GDM Eq. 14-46

Total Seismic Driving Force, F_H =   3.3   kip   Calculated Resistance Factor, $\varphi = F_H/R_t$ = **0.52**

Calculate Eccentricity for Bearing, (e_B)

$$e_B = \frac{\Psi_{EQ-P}F_{1s}(H/2) + \Psi_{EQ-LL}F_{2s}(H/2)}{\Psi_{EV}V_1 + \Psi_{EQ-LL}qL}$$

FHWA Eqn. 4-19

$\Psi_{EHAeq} = \Psi_{EQ-p}$ = Load Factor for Horizontal (Active) Earth Pressure = __1.00__   *AASHTO Table 3.4.1-1*

Ψ_{EV} = Load Factor for Dead Load of Earth Fill = __1.00__   *AASHTO Table 3.4.1-1 and FHWA 4.4.6.a*

(Use the Min Value of Ψ_{EV} per FHWA 4.4.6.a, AASHTO C3.4.1, and AASHTO C11.5.5)

$\Psi_{LSeq} = \Psi_{EQ-p}$ = Load Factor for Surcharge = __1.00__   *AASHTO Table 3.4.1-1*

F_{1s} = Force Generated from Lateral Earth Pressure = __2.725__ kips   *FHWA Eqn. 4-5*

F_{2s} = Force Generated from Traffic Surcharge = __0.593__ kips   *FHWA Eqn. 4-6*

V_1 = Total Vertical Force from the Reinforced Soil Mass = __10.500__ kips

q = Live Load Traffic Surcharge = __0.250__ ksf   *FHWA Eqn. 4-19*

H = MSE Wall Height = __7.00__ ft

L = Reinforcement Length = __12.50__ ft

$$e_B = \frac{(\ 1.00\ )(\ 2.725\ \text{kips})(\ 3.50\ \text{ft}) + (\ 1.00\ )(\ 0.593\ \text{kips})(\ 3.50\ \text{ft})}{(\ 1.00\ )(\ 10.5\ \text{kips}) + (\ 1.00\ )(\ 0.250\ \text{ksf})(\ 12.50\ \text{ft})}$$

= __0.85__ ft

Calculate Factored Vertical Bearing Pressure at the base, (q_{V-F})

$$\sigma_{V-F} = \frac{\Psi_{EQ-P}V_1 + \Psi_{EQ-LS}qL}{L - 2e_B}$$ *FHWA Eqn. 4-20*

Ψ_{EQ-p} = Load Factor for Dead Load of Earth Fill = __1.00__

V_1 = Total Vertical Force from the Reinforced Soil Mass = __10.500__ kips

$\Psi_{LSeq} = \Psi_{EQ-ll}$ = Load Factor for Surcharge = __1.00__

q = Live Load Traffic Surcharge = __0.250__ ksf

L = Reinforcement Length = __12.50__ ft

e_B = Eccentricity for Bearing = __0.85__ ft

$$\sigma_{V-F} = \frac{(\ 1.00\ )(\ 10.50\ \text{kips})(\ \text{ft}) + (\ 1.00\ )(\ 0.250\ \text{ksf})(\ 12.50\ \text{ft})}{12.5\ \text{ft} - 2(\ 0.85\ \text{ft})}$$

= __1.424__ ksf

Calculated Resistance Factor

σ_{V-F}/q_n = __0.17__

Safety Factor

	0.00
	0.25
	0.50
	0.75
	1.00
	1.25
	1.50
	1.75
	2.00
	2.25
	2.50
	2.75
	3.00
	3.25
	3.50
	3.75
	4.00
	4.25
	4.50
	4.75
	5.00
	5.25
	5.50
	5.75
	6.00+

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Wall		120	Mohr-Coulomb	4000	0	None	0
Med. Stiff Sandy Lean Clay		105	Mohr-Coulomb	100	26	None	0
Very Soft Sandy Lean Clay		105	Mohr-Coulomb	50	26	None	0
Loose Silty Sand		105	Mohr-Coulomb	50	28	None	0
Dense Silty Sand		120	Mohr-Coulomb	50	34	None	0
PWR		137	Mohr-Coulomb	400	40	None	0

Method Name	Min FS
Bishop simplified	1.63
Spencer	1.63
GLE / Morgenstern-Price	1.63

390.00 lbs/ft2   390.00 lbs/ft2   390.00 lbs/ft2   390.00 lbs/ft2

1.63

Project	I-85/385 Interchange Improvements - Project ID: 003811; ECS Project No. 9283		
Analysis Description	Rocky Mountain Creek Roadway and Retaining Walls - Wall 18 Sta 414+00		
Drawn By	JEE	Scale	1:200	Company	ECS Southeast LLP
Date	05-22-2018	File Name	STA 414+00 ESA.slim

rocscience

SLIDEINTERPRET 8.010

Safety Factor

	0.00
	0.25
	0.50
	0.75
	1.00
	1.25
	1.50
	1.75
	2.00
	2.25
	2.50
	2.75
	3.00
	3.25
	3.50
	3.75
	4.00
	4.25
	4.50
	4.75
	5.00
	5.25
	5.50
	5.75
	6.00+

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Wall		120	Mohr-Coulomb	4000	0	None	0
Med. Stiff Sandy Lean Clay		105	Mohr-Coulomb	1000	0	None	0
Very Soft Sandy Lean Clay		105	Mohr-Coulomb	500	0	None	0
Loose Silty Sand		105	Mohr-Coulomb	50	28	None	0
Dense Silty Sand		120	Mohr-Coulomb	50	34	None	0
PWR		137	Mohr-Coulomb	400	40	None	0

Method Name	Min FS
Bishop simplified	2.44
Spencer	2.45
GLE / Morgenstern-Price	2.45

2.44

250.00 lbs/ft2   250.00 lbs/ft2   250.00 lbs/ft2   250.00 lbs/ft2

SLIDEINTERPRET 8.010

Project	I-85/385 Interchange Improvements - Project ID: 003811; ECS Project No. 9283
Analysis Description	Rocky Mountain Creek Roadway and Retaining Walls - Wall 18 Sta 414+00

Drawn By	JEE	Scale	1:200	Company	ECS Southeast LLP
Date	05-22-2018			File Name	STA 414+00 TSA.slim

rocscience

Safety Factor

	0.00
	0.25
	0.50
	0.75
	1.00
	1.25
	1.50
	1.75
	2.00
	2.25
	2.50
	2.75
	3.00
	3.25
	3.50
	3.75
	4.00
	4.25
	4.50
	4.75
	5.00
	5.25
	5.50
	5.75
	6.00+

1.62

► 0.2

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Wall		120	Mohr-Coulomb	4000	0	None	0
Med. Stiff Sandy Lean Clay		105	Mohr-Coulomb	1000	0	None	0
Very Soft Sandy Lean Clay		105	Mohr-Coulomb	500	0	None	0
Loose Silty Sand		105	Mohr-Coulomb	50	28	None	0
Dense Silty Sand		120	Mohr-Coulomb	50	34	None	0
PWR		137	Mohr-Coulomb	400	40	None	0

Method Name	Min FS
Bishop simplified	1.62
Spencer	1.63
GLE / Morgenstern-Price	1.63

140.00 lbs/ft2   140.00 lbs/ft2   140.00 lbs/ft2   140.00 lbs/ft2

SLIDEINTERPRET 8.010

Project		I-85/385 Interchange Improvements - Project ID: 003811; ECS Project No. 9283			
Analysis Description		Rocky Mountain Creek Roadway and Retaining Walls - Wall 18 Sta 414+00			
Drawn By	JEE		Scale	1:200	Company	ECS Southeast LLP
Date	05-22-2018			File Name	STA 414+00 TSA -EQ.slim

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I-85/385 Interchange Improvements
Greenville County, South Carolina

ECS Project No. 08-9283

NOTES ON PLANS

The following notes apply to borrow materials:

Provide borrow materials meeting the following minimum requirements:
- **A sandy material (35% or less passing 0.075 mm) with a minimum total soil unit weight, γ_{total} of 110 pcf, with a maximum dry density exceeding 100 pcf.**
- **Minimum friction angle, φ, of 30° and cohesion, c, of 50 psf for embankment fill, alternatively embankment fill may consist of a minimum friction angle (φ) of 34° with zero cohesion.**
- **No. 57 Stone backfill for Mechanically Stabilized Earth Walls**

In addition, determine the moisture-density relationship and classification of the material. Test and submit the classification, moisture-density relationship, and soil strength parameters of the material to the Engineer for acceptance. An AASHTO certified laboratory is required to perform the testing. Contact the RPG Geotechnical Engineer for a list of locally available AASHTO certified laboratories. The Department may perform independent testing to assure quality.

Determine the friction angle and cohesion using either direct shear testing or consolidated-undrained triaxial shear testing with pore pressure measurements. Direct Shear testing shall only be performed on soils with a fines content of less than 25 percent. Classification testing includes grain-size distribution with wash #200 sieve, moisture plasticity testing and natural moisture content. Use the Standard Proctor test to determine the moisture-density relationship. Remold all samples used in shear strength testing to 95 percent of the Standard Proctor density. Conduct shear strength testing at the initial selection of the borrow pit, any subsequent changes in borrow pits, and for every 10,000 cy of materials placed. Perform classification testing for every 50,000 cy of materials placed, including the material used for the shear strength testing. Additional shear testing may be required if, in the opinion of the RCE, the materials being placed are different from those originally tested.

If these minimum criteria cannot be met, provide the soil parameters for the intended borrow excavation material for the project site to the Engineer for review and acceptance. After acceptable borrow material is obtained, compact the fill to the required finish grade line using the compactive effort indicated in the Standard Specifications for Highway Construction, Section 205 (Embankment Construction).

The following notes apply to muck excavation:

Any areas identified on the plans and any additional areas that are discovered to deflect or settle may require corrective action as directed by the RCE. This may include undercutting; placing No. 57 stone aggregate that is separated from other borrow materials by a geotextile for separation of sub-grade and sub-base, and/or additional compactive effort to the approval of the RCE.

In areas that require mucking or undercutting, borrow material soil may be placed as a bridge lift as long as the grade on which the material is being placed is at least 2 feet above ground water level. In the event that groundwater does not allow backfilling with a

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borrow material soil, use a No. 57 stone as the bridge lift material. Borrow material bridge lifts may not exceed a 2-foot thickness. The depth at which mucking or undercutting is required is dependent upon encountering a suitable bearing material within the excavation or if a predetermined elevation or depth is required. In most cases, do not undercut more than 3 to 5 feet. The RCE will determine the final mucking or undercutting thickness, unless otherwise specified in the project plans and/or specifications. If a suitable bearing soil is not encountered within this depth range, place a P1 biaxial geogrid with an aperture size of less than or equal to 1 inch and in accordance with the project special provisions beneath a 2-foot thick bridge lift of No. 57 stone. If additional compacted borrow material soil is needed to reach grade, place a geotextile for separation of sub-grade and sub-base between the No. 57 stone and the overlying compacted soil. A bridge lift consisting of borrow material soil may not be placed within 3 feet of the base of the pavement section. Place only compacted borrow material soil or No. 57 stone within this zone. Reference the Standard Specifications for Highway Construction, Earthwork Section, Division 200.

The following notes apply for MSE Wall Subgrades:

Prior to construction of the leveling pad and MSE fill, the RCE shall verify that the retaining wall is founded on subgrade materials possessing the minimum allowable bearing capacity noted on wall plan and elevation sheets. If the RCE determines that the subgrade is unacceptable for placement of MSE fill, the contractor shall undercut the subgrade to the limits directed by the RCE. Unacceptable subgrade materials include, but are not limited to, all high plasticity clays and elastic silts (CH, MH), low plasticity clays and silts (CL, ML) with an unconfined compressive strength less than 2,000 psf, and deleterious debris. Replacement of undercut material will be with Backfill Material, meeting requirements outlined in the SCDOT Standard Specifications for Highway Construction.

The foundation area for the MSE walls might have scattered pockets of soft soils that might be present at the surface or just below the surface for the base of the MSE fill. These soft pockets are only expected to extend a few feet below the base of the MSE fill. The quality assurance representative shall proofroll the subgrade in this area and/or conduct dynamic cone tests at regular intervals to determine that the subgrade meets the requirements of the paragraph above.

There are several locations along the roadway alignment where proposed drainage structures are situated in front of (i.e. parallel) MSE walls, or where new and existing draining structures pass beneath the MSE walls. Where new pipes are parallel to the proposed wall, the pipe should be installed prior to the proposed wall or the wall design should account for the temporary reduction in passive resistance. Where pipes pass beneath walls, the pipes should be designed to account for the increased loading associated with the wall backfill. We recommend the top of each pipe be situated a minimum of 1 foot below the bottom of retaining.

The following notes apply for settlement and displacement monitoring:

The contractor shall establish a monitoring program consisting of settlement instruments. The settlement monitoring program must include establishing settlement monitoring instruments on the subgrade soils prior to fill placement, and at design

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pavement subgrade elevation. Settlement monitoring instruments are required at a spacing of every 100 feet along MSE Walls and every 500 feet along embankments with new fill thicknesses exceeding 20 feet. Instruments shall be established at the centerline of road and edge of pavement. Settlement monitoring shall continue until three consecutive measurements demonstrate the rate of settlement is less than 0.1 inches per year.   No more than one measurement shall be obtained on a single day.

A minimum of 2 measurements shall be obtained on monuments prior to fill placement, and instruments shall be measured weekly during fill placement. Instrumentation measurements shall be provided to the Geotechnical Engineer within 24 hours of measurements for interpretation. Interpreted results shall be provided to the RCE.

The following notes apply to slope construction:

Where the new fill meets the existing slope, the existing slope shall be benched to limit the potential for a preferential failure surface and to allow compaction at the interface. Benches shall have a minimum horizontal length of 8 feet and a vertical rise of no more than 3 feet.   Fill slopes of 2H:1V or steeper shall be overbuilt (i.e. fill should temporarily extend beyond the final slope face) to allow compaction at the slope face.   After compaction is complete, the slope may be regraded to the final inclination.

Should seeps or thick lenses of highly plastic soils be observed in the planned fill and cut slopes that are steeper than 2H:1V, ECS must be contacted to determine if the steeper slopes may be constructed as planned or if slope flattening or reinforcing is required. Similarly, if soft or wet ground conditions are observed at the base of planned fill embankments, the QA representative must determine the limits of undercutting required or required in-situ treatment.

The following Plan Notes apply to Mechanically Stabilized Earth walls:

Reinforced Backfill (Granular Fill or stone.)

Internal Friction Angle (deg) = 36
Total Unit Weight = 120 pcf
Surcharge Dead Load for Pavement Overlay = 140 psf
Active Earth Pressure Coefficient = 0.26

Retained Backfill

Internal Friction Angle (deg) = 30
Total Unit Weight = 117 pcf
Active Earth Pressure Coefficient = 0.33

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Greenville County, South Carolina

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Wall 17 – I-85 Station
Foundation Soils
Total – Internal Friction Angle (deg) = 26
Total – Cohesion = 0 psf
Effective – Internal Friction Angle (deg) = 26
Effective – Cohesion = 0 psf

Wall Height	Min. Breq	Factored Bearing (Static)	Factored Bearing (Seismic)
0 < H ≤ 7.5	14.5 ft	2,000 psf	3,100 psf

Wall 18 – I-85 Station 413+00 to 415+00
Foundation Soils
Total – Internal Friction Angle (deg) = 0
Total – Cohesion = 1000 psf
Effective – Internal Friction Angle (deg) = 26
Effective – Cohesion = 100 psf

Wall Height	Min. Breq	Factored Bearing (Static)	Factored Bearing (Seismic)
3 < H ≤ 7	12.5 ft	5,400 psf	8,400 psf

Stantec

April 26, 2015
Revised April 26, 2015
Revised March 29, 2018

File: 171001537

Attention: Rocque Kneece
CECS, Inc
2000 Part Street, Suite 201
Columbia SC, 29201

Dear Rocque,

Reference: I-85 / I-385 Interchange – FEMA No-Rise Study – SCDOT Review

Introduction
Stantec performed a FEMA No-Rise analysis for an approximately 5000 foot reach of Rocky Creek at Interstate 85 in Greenville, South Carolina. Per FEMA regulations (44 CFR 60.3(d)(3)), a No-Rise analysis must demonstrate a zero-increase (0.00 feet) in the base flood elevation (BFE), floodway elevations, or floodway widths through hydrologic and hydraulic analysis before land development occurs within a floodway. A No-Rise analysis was performed due to proposed interstate modifications within the effective floodway.

The No-Rise analysis utilized the effective FEMA hydraulic model (HEC-RAS version 4.0) which provided cross sections, surveyed structures, and hydrology (steady-state flow rates). Detailed design of the proposed conditions were provided to Stantec and then incorporated into the hydraulic model using HEC-RAS version 4.1. Water surface profiles were produced for the 2-, 10-, 25-, 50-, 100-, and 500-year storm events.

Effective Model
The Flood Insurance Rate Maps for Greenville County became effective in August 18, 2014, and the project area is located in FEMA Map Number 45045C0407E. The Rocky Creek hydraulic model is comprised of the main channel and 6 additional tributaries. There are 2 areas of interest for this No-Rise study. The first location is at the I-85 culvert bridge crossing, and the second location is approximately 2500 feet upstream of the culvert bridge where Rocky Creek meanders back towards I-85. This location was included into the study because of the close proximity between the 100-year floodplain, floodway, and proposed I-85 modifications.

Duplicate Effective Model
The duplicate effective model is a truncated reproduction of the effective model for the specific project area. The two areas of interest described above are located between cross sections 24541 and 28374. However, the actual project limits for the No-Rise analysis are extended to 3 additional upstream cross sections and 1 additional downstream cross section. The project limits

Design with community in mind

Reference: I-85 / I-385 Interchange – FEMA No-Rise Study – SCDOT Review

for the No-Rise analysis are defined from cross section 24314 to 28944 as seen in the main channel of the hydraulic model. Boundary conditions for each water surface profile are known water surface elevations from the results of the original effective model. Results of the duplicate effective model come within 0.1 feet of the effective model.

Corrected Effective Model
A corrected effective model includes any significant corrections or errors to the effective model. For this study, no corrections or errors were discovered in the effective model.

Existing Conditions Model
The existing conditions model reflects any modifications or updated topography within the project area since the date of the effective model. Because the effective model was dated August 2014, no modifications or topography were incorporated into the model.

Proposed Conditions
Land development activity within the floodway includes I-85 road widening for portions of the north bound and south bound lanes. No modifications to the existing box culverts are proposed. All proposed modifications described in this report are within the 300 foot I-85 right-of-way.

The hydraulic methodologies for the proposed conditions model match the effective model. For instance, no additional cross sections were created, contraction/expansion coefficients were not revised, the jersey barrier was disregarded, and the bridge modeling approach was not adjusted. However, Manning's n values were adjusted as necessary to match proposed conditions.

The proposed conditions were the result of an iterative process to add or reduce modifications to reach zero increase (0.00) in the BFE, floodway elevation, and floodway width. For instance, retaining walls are proposed to limit the embankment impact to the BFE. There is approximately1400 LF of retaining wall proposed in the southbound lane, and approximately 800 LF of retaining wall proposed in the north bound lane. The proposed modifications were represented in the hydraulic model by overlaying the effective model cross sections, proposed road design stationing centerline, and ESRI aerial imagery in ArcGIS software. The proposed roadway design was the foundation to the proposed conditions hydraulic model. However, the No-Rise analysis is iterative in nature and additional revisions to the proposed roadway design were made. The additional revisions were agreed upon during phone conversations and are not reflected in the original roadway design plans. Upon approval of this report, the intent is to update the roadway design plans with the additional revisions. Proposed conditions within the No-Rise project area are more specifically described by the following:

1. I-85 Northbound lane widening between Station 387+00 to Station 422+00
    a. Proposed conditions incorporated from roadway design plans

Design with community in mind

Reference: I-85 / I-385 Interchange – FEMA No-Rise Study – SCDOT Review

      b. ~~Additional revisions include the off-ramp taper beginning at Station 414+00 was shifted north to Station 421+00. Stantec was instructed to maintain 17 feet between existing edge of pavement and outside edge of guardrail from Station 414+00 to Station 421+00, then maintain 21 feet starting at STA422+00~~

      c. Additional revisions include off ramp taper starting at 421+00. Revisions also include a reduction in the earthen shoulder from approximately 410+00 to 426+00 per the revised plans.

2. ~~I-85 Southbound lane widening between Station 387+00 to Station 412+00~~
      a. ~~Proposed conditions incorporated from roadway design plans~~
      b. ~~Additional revisions include:~~
         i. ~~Reduced embankment impact to 10 feet from existing edge-of-pavement at Station 410+00~~
         ii. ~~Southbound lane extended 18 additional feet between Station 386+00 and Station 400+00~~

3. I-85 Northbound retaining wall between Station 414+00 to ~~Station 422+00~~ Station 416+00
      a. ~~A retaining wall was incorporated as an additional revision at Cross Section 24541 and Cross Section 24668 with embankment cuts~~
      b. Additional revisions include embankment cuts at Cross Sections 24541 and 24668 per the proposed plans.

4. ~~I-85 Southbound retaining wall between Station 387+00 to Station 401+00~~
      a. ~~A retaining wall was incorporated as an additional revision at Cross Sections 28374, 28216, 27999, 27809, 27572, and 27339~~

Reference: I-85 / I-385 Interchange – FEMA No-Rise Study – SCDOT Review

Results

Since there was no corrected effective model and no modifications to topography/structures needed, the existing conditions model would be a replica of the duplicate effective model. Therefore, the proposed conditions model results were compared against the duplicate effective model. The difference between the two models resulted in a 0.00 feet (or less) increase in the BFE, floodway elevations, and floodway widths thus satisfying the FEMA No-Rise requirement.

Table 1 – No-Rise Analysis Results (BFE)

Cross Section			100-yr Water Surface Elevations (feet NAVD88)			
		Effective		Existing*	Proposed	Delta
						(Proposed - Existing)
Rocky Creek_24314.4				848.25	848.25	0.00
Rocky Creek_24541.44				849.51	849.5	-0.01
Rocky Creek_24668.16	AQ	849.9		849.94	849.77	-0.17
Rocky Creek_25380.96				851.44	851.23	-0.21
Rocky Creek_25539.36				853.49	853.43	-0.06
Rocky Creek_25687.2	AR	853.6		853.56	853.5	-0.06
Rocky Creek_25893.12				853.58	853.53	-0.05
Rocky Creek_26083.2				853.6	853.54	-0.06
Rocky Creek_26220.48				853.6	853.55	-0.05
Rocky Creek_26400	AS	853.6		853.64	853.58	-0.06
Rocky Creek_26574.24				853.72	853.67	-0.05
Rocky Creek_26806.56				853.74	853.69	-0.05
Rocky Creek_27033.6	AT	853.9		853.85	853.8	-0.05
Rocky Creek_27155.04				853.95	853.94	-0.01
Rocky Creek_27339.84				854.11	854.1	-0.01
Rocky Creek_27572.16	AU	854.2		854.19	854.18	-0.01
Rocky Creek_27809.76				854.49	854.48	-0.01
Rocky Creek_27999.84				854.91	854.91	0.00
Rocky Creek_28216.32	AV	856.5		856.48	856.48	0.00
Rocky Creek_28374.72				857.19	857.19	0.00
Rocky Creek_28570.08				857.42	857.42	0.00
Rocky Creek_28707.36	AW	857.4		857.46	857.45	-0.01
Rocky Creek_28944.96				857.59	857.59	0.00
*Results from duplicate effective model						

Design with community in mind

Reference: I-85 / I-385 Interchange – FEMA No-Rise Study – SCDOT Review

Table 2 – No-Rise Analysis Results (Floodway)

Cross Section		Floodway Elevations (feet NAVD88)				Floodway Widths (feet)			
		Effective	Existing*	Proposed	Delta	Effective	Existing*	Proposed	Delta
					(Proposed - Existing)				(Proposed - Existing)
Rocky Creek_24314.4			848.98	848.98	0.00		160	160	0.00
Rocky Creek_24541.44			849.95	849.95	0.00		160	160	0.00
Rocky Creek_24668.16	AQ	850.3	850.28	850.20	-0.08	160	160	160	0.00
Rocky Creek_25380.96			851.58	851.50	-0.08		382	382	0.00
Rocky Creek_25539.36			854.35	854.32	-0.03		350	350	0.00
Rocky Creek_25687.2	AR	854.5	854.52	854.49	-0.03	350	350	350	0.00
Rocky Creek_25893.12			854.53	854.50	-0.03		300	300	0.00
Rocky Creek_26083.2			854.53	854.50	-0.03		225	225	0.00
Rocky Creek_26220.48			854.53	854.50	-0.03		225	225	0.00
Rocky Creek_26400	AS	854.6	854.59	854.56	-0.03	225	225	225	0.00
Rocky Creek_26574.24			854.68	854.65	-0.03		270	270	0.00
Rocky Creek_26806.56			854.69	854.66	-0.03		270	270	0.00
Rocky Creek_27033.6	AT	854.8	854.81	854.79	-0.02	270	270	270	0.00
Rocky Creek_27155.04			854.92	854.86	-0.06		270	270	0.00
Rocky Creek_27339.84			855.03	854.97	-0.06		230	230	0.00
Rocky Creek_27572.16	AU	855.2	855.22	855.16	-0.06	215	215	215	0.00
Rocky Creek_27809.76			855.43	855.38	-0.05		155	155	0.00
Rocky Creek_27999.84			855.88	855.84	-0.04		155	155	0.00
Rocky Creek_28216.32	AV	856.9	856.87	856.85	-0.02	155	155	155	0.00
Rocky Creek_28374.72			857.93	857.91	-0.02		235	235	0.00
Rocky Creek_28570.08			858.33	858.32	-0.01		250	250	0.00
Rocky Creek_28707.36	AW	858.3	858.39	858.38	-0.01	250	250	250	0.00
Rocky Creek_28944.96			858.58	858.58	0.00		250	250	0.00

*Results from duplicate effective model

Regards,
STANTEC CONSULTING SERVICES INC.

Shaun Cavey, PE
Project Engineering Specialist
Phone: (843) 740-6345
shaun.cavey@stantec.com

Design with community in mind

ROCKY CREEK
NO-RISE STUDY
GREENVILLE, SOUTH CAROLINA

Legend

→ FEMA Cross Section

Tax_Parcel

— Stream Centerline

FEMA Floodplain

Flood Zones

A,

AE,

AE, FLOODWAY

X, 0.2 PCT ANNUAL CHANCE FLOOD HAZARD

DATE:
3/10/2015

PAGE:
1 of 1

PROJECT NO:
-

SCALE:
1 inch = 300 feet

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	IL1

INDEX OF SHEETS

SHEET NO.	DESCRIPTION	TOTAL SHEETS
1	TITLE SHEET	1
1A	RIGHT OF WAY TITLE SHEET	1
IL1	INDEX OF SHEETS	1
IL2 - IL34	PLAN SHEET/REVISION LOGS	33
2	SUMMARY OF ESTIMATED QUANTITIES	OMITTED
3 - 3D	TYPICAL SECTIONS	5
3E	GEOTECHNICAL NOTES	1
3F	DRAINAGE DETAIL SHEET	1
3G	PCCP JOINT DETAILS	1
4 - 4A	RIGHT OF WAY DATA SHEETS	2
4B - 4F	PROPERTY STRIP MAPS	5
5	GENERAL CONSTRUCTION NOTES	OMITTED
5A	PLAN SHEET LAYOUT	1
5B- 5L	REFERENCE DATA SHEETS	11
6 - 34	PLAN SHEETS	31
35 - 120	PROFILE SHEETS	86
121	CURB PROFILES	1
D1 - D33	DRAINAGE SHEETS	35
TC1 - TC18.2	TEMPORARY TRAFFIC CONTROL PLANS	287
TS1 - TS164	TEMPORARY SIGNING PLANS	167
TA - TAX235	TEMPORARY ROADWAY PLANS	290
PM1 - PM29	PAVEMENT MARKING PLANS	29
SN1 - SN 96	SIGNING PLANS	96
SL1 - SL29	SIGN LIGHTING PLANS	29
S01 - SC9	ROADWAY STRUCTURE SHEETS	117
EC1 - EC10	EROSION CONTROL PLANS	10
I-85 X1 - I-85 X113	I-85 CROSS SECTIONS	113
I-85 NBCD X1 - I-85 NBCD X24	I-85 NBCD CROSS SECTIONS	24
PELHAM X1 - PELHAM X6	PELHAM RAMP CROSS SECTIONS	6
I-385 X1 - I-385 X103	I-385 CROSS SECTIONS	105
I-385 NBCD X1 - I-385 NBCD X37	I-385 NBCD CROSS SECTIONS	39
I-385 SBCD X1 - I-385 SBCD X31	I-385 SBCD CROSS SECTIONS	31
RAMP 1 X1 - RAMP 1 X36	RAMP 1 CROSS SECTIONS	36
RAMP 1A X1 - RAMP 1A X34	RAMP 1A CROSS SECTIONS	34
RAMP 1B X1 - RAMP 1B X13	RAMP 1B CROSS SECTIONS	13
RAMP 2 X1 - RAMP 2 X10	RAMP 2 CROSS SECTIONS	10
RAMP 2A X1 - RAMP 2A X50	RAMP 2A CROSS SECTIONS	50
RAMP 2B X1 - RAMP 2B X25	RAMP 2B CROSS SECTIONS	25
RAMP 3 X1 - RAMP 3 X20	RAMP 3 CROSS SECTIONS	20
RAMP 3A X1 - RAMP 3A X17	RAMP 3A CROSS SECTIONS	17
RAMP 4 X1 - RAMP 4 X33	RAMP 4 CROSS SECTIONS	33
RAMP 4B X1 - RAMP 4B X28	RAMP 4B CROSS SECTIONS	28
RAMP 5 X1 - RAMP 5 X14	RAMP 5 CROSS SECTIONS	14
RAMP 7 X1 - RAMP 7 X5	RAMP 7 CROSS SECTIONS	5
RAMP 8 X1 - RAMP 8 X12	RAMP 8 CROSS SECTIONS	12
RAMP 8A X1 - RAMP 8A X10	RAMP 8A CROSS SECTIONS	10
RAMP 9 X1 - RAMP 9 X4	RAMP 9 CROSS SECTIONS	6
RAMP 10 X1 - RAMP 10 X9	RAMP 10 CROSS SECTIONS	9
RAMP 11 X1 - RAMP 11 X12	RAMP 11 CROSS SECTIONS	12
DRAIN X1 - DRAIN X22	DRAINAGE CROSS SECTIONS	22
	TOTAL SHEETS	1917

⚠8 ADDED SHEETS 3G, TA-X63A TO TA-X63E, TA-X145A TO TA-X145D, TA-X151A, TA-X157A, TA-X157B, TA-X182 TO TA-X210, I-385 X52A, I-385 X52B, I-385 NBCD X34A, I-385 NBCD X12A, RAMP 9 X0, RAMP 9 X5.

⚠9 10/21/16 - ADDED SHEETS IL33, TA-24, TA-X211 TO TA-X220.

⚠10 10/28/16 - ADDED SHEETS IL34, D33, TC4.2AA TO TC4.2AC, TC4.2BA TO TC4.2BC, TC4.2CA TO TC4.2CH, TC4.2Q, TA-2C, TA-25, TA-X221 TO TA-X235, S0-40 TO S0-43, S17-1, S18-1 TO S18-4, S55-1 TO S55-5, EC8 TO EC10.

⚠11 1/12/17 - ADDED SHEET S32-7

⚠12 2/2/17 - ADDED SHEETS TA-26, TA-X236 TO TA-X241

⚠13 3/16/17 - ADDED SHEET D32A

⚠14 12/18/17 - ADDED SHEETS TC4.2A.1A AND TC4.2A.1B

⚠15 1/9/18 - ADDED SHEET SC9

⚠16 5/3/18 - REMOVED SHEETS S18-2, S18-3, S18-4, S55-1, S55-2, S55-3, S55-4, S55-5

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
1	1/27/16	ADDED SHEET TC2H TO TC SERIES	D.R.R.	B.G.N.	5	7/8/16	TC/TA SERIES SHTS ADDED,IL32 ADDED	D.R.R.	B.G.N.
2	4/29/16	PLAN SHEET/ REVISION LOGS ADDED	D.P.M.	B.G.N.	6	8/9/16	ADDED SHT TC4.2G.I	D.R.R.	R.L.K.
3	5/12/16	TAX84A-C ADDED	D.R.R.	B.G.N.	7	8/18/16	ADDED SHEET SO-44	D.R.R.	R.L.K.
4	6/17/16	SHEET SO-39 ADDED	D.R.R.	R.L.K.	8	9/28/16	ADDED SHEETS	B.G.N.	R.L.K.

DRAWN BY : A.W.F
DATE : 6/10/15

REVIEWED BY : B.A.H.
DATE : 09/04/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON   ZACHRY

CECS CIVIL ENGINEERING CONSULTING SERVICES, INC.

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION   SCDOT

I-85 / I-385 INTERCHANGE

INDEX OF SHEETS

MUDDY FORD ROAD

APPLY 6" WHITE
PAVEMENT EDGE LINE

APPLY 6" WHITE
BROKEN LANE LINE

APPLY 6" YELLOW
PAVEMENT EDGE LINE

APPLY 6" WHITE
PAVEMENT EDGE LINE

APPLY 6"-2'
WHITE SKIP LINES

APPLY 6"-2'
WHITE SKIP LINES

END CONSTRUCTION
STA.386+60.00 I-85 SB WIDENING

MATCH LINE STA. 373+00.00
SEE SHEET PMI2

MATCH LINE STA. 388+00.00
SEE SHEET PMI4

380

375

385

INTERSTATE 85 SB

INTERSTATE 85 NB

Ç I-85

12'
12'
12'
12'
12'
12'
12'
12'
12'
12'
12'
12'
12'
12'

APPLY 6" WHITE
PAVEMENT EDGE LINE

APPLY 6" WHITE
BROKEN LANE LINE

APPLY 6" YELLOW
PAVEMENT EDGE LINE

APPLY 6" WHITE
PAVEMENT EDGE LINE

MUDDY FORD ROAD

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED			
NO.	DATE				NO.	DATE						
⚠	05/02/18	REMOVED I85 SB PAVEMENT MARKINGS STA. 386+60.00 TO STA. 388+00.00	R.L.D.	B.G.N.								

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.R.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

FLATIRON ZACHRY

CECS CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

PAVEMENT MARKING PLAN SHEET
STA. 373+00.00 TO STA. 388+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	PM14

N

MATCH LINE STA. 388+00.00
SEE SHEET PM13

MATCH LINE STA. 403+00.00
SEE SHEET PM15

INTERSTATE 85 SB

₵ I-85

390   395   400

INTERSTATE 85 NB

12'
12'
12'
12'

12'
12'
12'
12'

APPLY 6" WHITE
PAVEMENT EDGE LINE

APPLY 6" WHITE
BROKEN LANE LINE

APPLY 6" YELLOW
PAVEMENT EDGE LINE

APPLY 6" WHITE
PAVEMENT EDGE LINE

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠ ★	05/02/18	REMOVED I85 SB PAVEMENT MARKINGS STA.388+00.00 TO STA.403+00.00	R.L.D.	B.G.N.					

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.P.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

FLATIRON ZACHRY

CECS CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0 50 100 150 200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

PAVEMENT MARKING PLAN SHEET
STA. 388+00.00 TO STA. 403+00.00

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
CERTIFICATE OF AUTHORIZATION
ENGINEERING
NO. C00387

SOUTH CAROLINA
PROFESSIONAL
ENGINEER
License No. 23889
BRIAN G. NICHOLSON
6/6/2018 11:35:46 AM EDT

S:\Proj\2011\.20IV.47IIA\Design\Project PIN Number\Traffic\Pavement Markings\Interchange\PAVEMARK_SHEETS\PM14.dgn
5/30/2018

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	PM15

N

MATCH LINE STA. 403+00.00
SEE SHEET PM14

MATCH LINE STA. 418+00.00
SEE SHEET PM16

405

INTERSTATE 85 SB

₵ I-85

410

415

12'
12'
12'
12'

12'
12'
12'
12'

INTERSTATE 85 NB

BEGIN RAMP TAPER MOVED
FROM STA. 414+00 TO STA. 421+00

APPLY 6" WHITE
PAVEMENT EDGE LINE

APPLY 6" WHITE
BROKEN LANE LINE

APPLY 6" YELLOW
PAVEMENT EDGE LINE

APPLY 6" WHITE
PAVEMENT EDGE LINE

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠1	05/16/16	ADJUSTED PAVEMENT MARKINGS FOR PELHAM ROAD EXIT	R.L.D.	B.G.N.					
⚠2	05/02/18	REMOVED I85 SB PAVEMENT MARKINGS STA. 403+00.00 TO STA. 414+30.20	R.L.D.	B.G.N.					

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.R.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

FLATIRON ZACHRY

CEC
CS CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: I" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

PAVEMENT MARKING PLAN SHEET
STA. 403+00.00 TO STA. 418+00.00

INTERCHANGE WALL SUMMARY

WALL #	WALL TYPE	FROM STA.	TO STA.	ALIGNMENT
1	MSE	1+00.00	3+63.51	WALL 1
1	MSE	-	-	SEE BRIDGE 10 PLANS
1	MSE	8+31.02	12+09.78	WALL 1
2	MSE	-	-	SEE BRIDGE 10 PLANS
2A	MSE	4+74.09	8+13.33	WALL 2A
2B	BARRIER	8+13.33	61+43.24	WALL 2B
3	MSE	-	-	SEE BRIDGE 7/9 PLANS
4	MSE	-	-	SEE BRIDGE 9 PLANS
5	MSE	-	-	SEE BRIDGE 12 PLANS
6	MSE	-	-	SEE BRIDGE 12 PLANS
7	MSE	-	-	SEE BRIDGE 6 PLANS
8	MSE	-	-	SEE BRIDGE 8 PLANS
9	MSE	-	-	SEE BRIDGE 8 PLANS
10	SOIL NAIL	10+00.00	14+68.53	WALL 10
11	BARRIER	10+00.00	14+83.98	WALL 11
12	PILE AND PANEL	9+98.70	17+50.70	WALL 12
12	MSE/SOIL NAIL	-	-	SEE BRIDGE 11 PLANS
12	PILE AND PANEL	18+57.39	30+81.39	WALL 12
12	MSE	30+81.39	39+04.30	WALL 12
12	MSE			SEE BRIDGE 5 PLANS
13	MSE	10+50.00	18+85.45	WALL 13
14	R. CONCRETE	10+00.00	15+84.09	WALL 14
15	BARRIER	1+00.00	32+38.27	WALL 15
16A	BARRIER	10+00.00	17+70.00	WALL 16A
16B	SOIL NAIL	17+74.84	19+34.84	WALL 16B
16B	PILE AND PANEL	19+34.84	21+58.84	WALL 16B
16B	MSE/SOIL NAIL	-	-	SEE BRIDGE 11 PLANS
16B	SOIL NAIL	22+75.00	26+51.00	WALL 16B
17	MSE	10+30.00	11+25.00	WALL 17
18	WIRE FACED MSE	413+00.00	415+00.00	I85
19	OMITTED			
20	56" RIGID SLOPE BARRIER	327+50.37	329+27.97	I385/I 385 NBCD
21	PILE AND PANEL	10+00.00	19+28.00	WALL 21
22	BARRIER	10+00.00	104+49.65	WALL 22
23	BARRIER	0+33.82	11+53.89	WALL 23
24	BARRIER	1+00.00	38+99.60	WALL 24
25	BARRIER	1+00.00	6+39.83	WALL 25
26	SOIL NAIL	10+00.00	12+70.00	WALL 26
27	SOIL NAIL	10+10.00	12+16.00	WALL 27
27	SOIL NAIL	12+16.00	16+09.30	WALL 27
28	MSE	-	-	SEE BRIDGE 4 PLANS
29	MSE	-	-	SEE BRIDGE 4 PLANS
30	MOMENT SLAB BARRIER	374+25.00	375+42.02	I385 NBCD
31A	BARRIER	10+00.00	18+75.60	WALL 31A
31B	MSE	18+75.60	21+30.57	WALL 31B
32	MSE	-	-	SEE BRIDGE 3 PLANS
32	MSE	10+15.75	24+34.33	WALL 32
33	MSE	-	-	SEE BRIDGE 7 PLANS
33	MSE	11+62.10	21+56.10	WALL 33
34	BARRIER	10+00.00	15+12.17	WALL 34
35	MSE	-	-	SEE BRIDGE 5/7 PLANS
36A	BARRIER	10+00.00	13+48.33	WALL 36A
36B	MSE	13+48.33	17+10.00	WALL 36B
37	MSE	-	-	SEE BRIDGE 6 PLANS
38	SOIL NAIL	10+00.00	33+52.00	WALL 38
39	BARRIER	9+97.93	23+92.04	WALL 39
40A	MOMENT SLAB BARRIER	110+53.13	110+74.86	RAMP 5
40B	MOMENT SLAB BARRIER	258+78.00	258+99.86	I-85
41	56" RIGID SLOPE BARRIER	36+30.00	36+90.00	RAMP 3
42	56" RIGID SLOPE BARRIER	37+47.81	38+15.35	RAMP 3
43	MOMENT SLAB BARRIER	80+70.03	81+28.36	RAMP 2A
44	BARRIER	285+99.60	286+68.15	I85 NBCD
45	56" RIGID SLOPE BARRIER	293+68.75	294+25.95	I85 NBCD
46	56" RIGID SLOPE BARRIER	400+34.77	401+60.00	I385
47	56" RIGID SLOPE BARRIER	113+61.84	114+49.21	RAMP 1
48	56" RIGID SLOPE BARRIER	300+54.58	301+20.00	RAMP 3A
49	BARRIER	283+64.53	291+57.42	I-85
50	BARRIER	296+05.48	298+26.76	I-85
51	BARRIER	289+80.65	291+04.92	RAMP 3A
52	BARRIER	319+15.71	321+32.21	I-85
53	56" RIGID SLOPE BARRIER	78+33.85	79+89.60	RAMP 2A
54	56" RIGID SLOPE BARRIER	293+92.54	294+68.88	RAMP 3A
56	MSE	-	-	SEE BRIDGE 2A,2B,3

(*) PORTION OF WALL BOUND UNDER SEPERATE COVER, SEE BRIDGE PLANS

* FOR BRIDGE WALL LAYOUT, SEE BRIDGE PLANS BOUND UNDER SEPARATE COVER.

** FOR BARRIER WALL AND MOMENT SLAB BARRIER NOT ASSOCIATED WITH MSE OR PILE AND PANEL WALLS SEE SHEETS S0-18 THROUGH S0-25

*** FOR 56" SINGLE SLOPE RIGID BARRIER SEE SCDOT STD. DWG. 805-805-01 & STD. DWG. 805-810-01

**** FOR TYPE 25 BARRIER SEE SCDOT STD. DWG. 805-825-00

REVISIONS NO.	DATE	DESCRIPTION	BY	CHECKED
1	5/16/16	REVISED WALL 27 TYPE AND BEGIN STA.	D.R.R.	B.G.N.
2	7/22/16	REVISED WALLS 17, 18,38, & 55	D.R.R.	B.G.N.
3	11/1/16	REVISED WALL 16B	B.G.N.	R.L.K.
4	1/19/17	REVISED WALL 10	B.G.N.	R.L.K.
5	10/20/17	REVISED WALL 23	B.G.N.	R.L.K.
6	5/3/18	REVISED WALL 18, REMOVED WALL 55	B.G.N.	P.H.R.

DRAWN BY: D.M. DATE: 06/19/15
REVIEWED BY: J.C. DATE: 06/24/15
APPROVED BY: M.A. DATE: 06/26/15

FLATIRON | ZACHRY

CECS CIVIL ENGINEERING CONSULTING SERVICES, INC.

SCALE: 1" = 200' HORIZ

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

WALL LAYOUT SHEET

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	S0-2

WALL 12 /13
WALL 12
WALL 2B**
BRIDGE 11
WALL 52****
WALL 14
WALL 11**
WALL 16 (A** & B)
WALL 15**
CENTERLINE I-85

MATCH LINE STA. 299+00
MATCH LINE STA. 358+00
MATCH LINE STA. 358+00

WALL 17
WALL 18

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠1	7/22/16	REVISED WALLS 17,18, & 55	D.R.R.	B.G.N.					
⚠2	5/3/18	REVISED WALL 18, REMOVED WALL 55	B.G.N.	P.H.R.					

DRAWN BY : D.M.
DATE : 06/19/15

REVIEWED BY : J.C.
DATE : 06/24/15

APPROVED BY : M.A.
DATE : 06/26/15

FLATIRON ZACHRY

CECS CIVIL ENGINEERING CONSULTING SERVICES, INC.

0   200   400   600   800

SCALE: 1" = 200' HORIZ

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

WALL LAYOUT SHEET

6/18/2018 12:05:

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85, I-385	S0-40

SUPPORT STRUT LENGTH
(MEASURE INSIDE HOOK — INSIDE HOOK)

1.5" (TYP.)

0.243" DIA. BLACK WIRE

SUPPORT STRUT

1'- 6"

1'- 6"

SUPPORT STRUTS
24" O.C. (TYP.)
(FIELD ADJUST AS REQUIRED)

SECTION A-A

1'- 6"

24" MAX SPACING BETWEEN STRUTS

2"

SUPPORT STRUT

4" x 4" – W5.0 x W5.0
WELDED WIRE FABRIC

10'- 0"

1'- 6"

NOTES:
1. Facing to consist of fabricated Welded Wire Forms 4" X 4" – W5.0 X W5.0 forms.
2. All forms and struts shall be fabricated with black wire.
3. Overall length of wire forms shall be 10'- 0". Effective constructed width is 9'- 8" with a 4" overlap at ends.

BUTT THE END OF
VERTICAL BARS BETWEEN
FACE PANELS

2"

A

A

9'- 8"

4" OVERLAP

WELDED WIRE FORM FACING UNIT

Soil
Reinforcement

1

Retained Backfill

Temporary Welded
Wire Mesh Facing

Bench

2'- 0"

Geotextile

Reinforced
Backfill

TEMPORARY MSE WALL TYPICAL SECTION

1 Extend top two layers of soil reinforcement 5 feet beyond the end of the lower layers of soil reinforcement.

3.58'

For Asphalt Curb Details see SCDOT STD. 803-105-00

Varies

Extra Length Guardrail Post

Top of Wall Elevation

Face of Wall

WALL FACE AND GUARDRAIL DETAIL

Notes:

Extra Length Guardrail post to be used. Contractor shall take the necessary measures needed to avoid conflict between guardrail post and wire wall soil reinforcements.

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠ 1	5/3/18	REVISED WALL FACE/GUARDRAIL DETAIL REMOVED MOMENT SLAB DETAIL REMOVED MSE WALL INTERACTION DETAIL	D.P.M.	M.S.A.					

DRAWN BY : D.P.M.
DATE : 07/26/16

REVIEWED BY : M.S.A.
DATE : 07/26/16

APPROVED BY : R.R.C
DATE : 07/26/16

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OF TRANSPORTATION

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I-85 / I-385 INTERCHANGE

WALL DETAILS

The following notes apply to borrow materials:

Provide borrow materials meeting the following minimum requirements:
• A sandy material (35% or less passing 0.075 mm) with a minimum total soil unit weight, γ_{max} of 110 pcf, with a maximum dry density exceeding 100 pcf.
• Minimum friction angle, φ, of 30° and cohesion, c, of 50 psf for embankment fill, alternatively embankment fill may consist of a minimum friction angle (φ) of 34° with zero cohesion.
• No. 57 Stone backfill for Mechanically Stabilized Earth Walls

In addition, determine the moisture-density relationship and classification of the material. Test and submit the classification, moisture-density relationship, and soil strength parameters of the material to the Engineer for acceptance. An AASHTO certified laboratory is required to perform the testing. Contact the RPG Geotechnical Engineer for a list of locally available AASHTO certified laboratories. The Department may perform independent testing to assure quality.

Determine the friction angle and cohesion using either direct shear testing or consolidated-undrained triaxial testing with pore pressure measurements. Direct Shear testing shall only be performed on soils with a fines content of less than 25 percent. Classification testing includes grain-size distribution with wash #200 sieve, moisture plasticity testing and natural moisture content. Use the Standard Proctor test to determine the moisture-density relationship. Remold all samples used in shear strength testing to 95 percent of the Standard Proctor density. Conduct shear strength testing at the initial selection of the borrow pit, any subsequent changes in borrow pits, and for every 10,000 cy of materials placed. Perform classification testing for every 50,000 cy of materials placed, including the material used for the shear strength testing. Additional shear testing may be required if, in the opinion of the RCE, the materials being placed are different from those originally tested.

If these minimum criteria cannot be met, provide the soil parameters for the intended borrow excavation material for the project site to the Engineer for review and acceptance. After acceptable borrow material is obtained, compact the fill to the required finish grade line using the compactive effort indicated in the Standard Specifications for Highway Construction, Section 205 (Embankment Construction).

The following notes apply to muck excavation:

Any areas identified on the plans and any additional areas that are discovered to deflect or settle may require corrective action as directed by the RCE. This may include undercutting; placing No. 57 stone aggregate that is separated from other borrow materials by a geotextile for separation of sub-grade and sub-base, and/or additional compactive effort to the approval of the RCE.

In areas that require mucking or undercutting, borrow material soil may be placed as a bridge lift as long as the grade on which the material is being placed is at least 2 feet above ground water level. In the event that groundwater does not allow backfilling with a borrow material soil, use a No. 57 stone as the bridge lift material. Borrow material bridge lifts may not exceed a 2-foot thickness. The depth at which mucking or undercutting is required is dependent upon encountering a suitable bearing material within the excavation or if a predetermined elevation or depth is required. In most cases, do not undercut more than 3 to 5 feet. The RCE will determine the final mucking or undercutting thickness, unless otherwise specified in the project plans and/or specifications. If a suitable bearing soil is not encountered within this depth range, place a P1 biaxial geogrid with an aperture size of less than or equal to 1 inch and in accordance with the project special provisions beneath a 2-foot thick bridge lift of No. 57 stone. If additional compacted borrow material soil is needed to reach grade, place a geotextile for separation of sub-grade and sub-base between the No. 57 stone and the overlying compacted soil. A bridge lift consisting of borrow material soil may not be placed within 3 feet of the base of the pavement section. Place only compacted borrow material soil or No. 57 stone within this zone. Reference the Standard Specifications for Highway Construction, Earthwork Section, Division 200.

Additional Notes:

See S0-16 and S0-17 for additional MSE Wall Design Parameters.

The following notes apply for MSE Wall Subgrades:

Prior to construction of the leveling pad and MSE fill, the RCE shall verify that the retaining wall is founded on subgrade materials possessing the minimum allowable bearing capacity noted on wall plan and elevation sheets. If the RCE determines that the subgrade is unacceptable for placement of MSE fill, the contractor shall undercut the subgrade to the limits directed by the RCE. Unacceptable subgrade materials include, but are not limited to, all high plasticity clays and elastic silts (CH, MH), low plasticity clays and silts (CL, ML) with an unconfined compressive strength less than 2,000 psf, and deleterious debris. Replacement of undercut material will be with Backfill Material, meeting requirements outlined in the SCDOT Standard Specifications for Highway Construction.

The foundation area for the MSE walls might have scattered pockets of soft soils that might be present at the surface or just below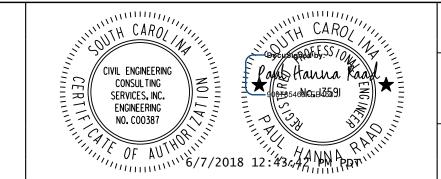 the surface for the base of the MSE fill. These soft pockets are only expected to extend a few feet below the base of the MSE fill. The quality assurance representative shall proofroll the subgrade in this area and/or conduct dynamic cone tests at regular intervals to determine that the subgrade meets the requirements of the paragraph above. There are several locations along the roadway alignment where proposed drainage structures are situated in front of (i.e. parallel) MSE walls, or where new and existing draining structures pass beneath the MSE walls. Where new pipes are parallel to the proposed wall, the pipe should be installed prior to the proposed wall or the wall design should account for the temporary reduction in pas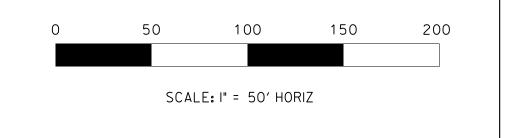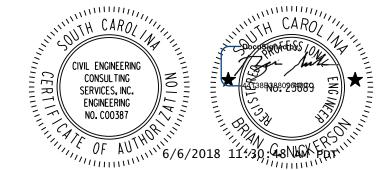sive resistance. Where pipes pass beneath walls, the pipes should be designed to account for the increased loading associated with the wall backfill. We recommend the top of each pipe be situated a minimum of 1 foot below the bottom of retaining.

The following notes apply for settlement and displacement monitoring:

The contractor shall establish a monitoring program consisting of settlement instruments. The settlement monitoring program must include establishing settlement monitoring instruments on the subgrade soils prior to fill placement, and at design pavement subgrade elevation. Settlement monitoring instruments are required at a spacing of every 100 feet along MSE Walls and every 500 feet along embankments with new fill thicknesses exceeding 20 feet. Instruments shall be established at the centerline of road and edge of pavement. Settlement monitoring shall continue until three consecutive measurements demonstrate the rate of settlement is less than 0.1 inches per year. No more than one measurement shall be obtained on a single day.

A minimum of 2 measurements shall be obtained on monuments prior to fill placement, and instruments shall be measured weekly during fill placement. Instrumentation measurements shall be provided to the Geotechnical Engineer within 24 hours of measurements for interpretation. Interpreted results shall be provided to the RCE.

The following notes apply to slope construction:

Where the new fill meets the existing slope, the existing slope shall be benched to limit the potential for a preferential failure surface and to allow compaction at the interface. Benches shall have a minimum horizontal length of 8 feet and a vertical rise of no more than 3 feet. Fill slopes of 2H:1V or steeper shall be overbuilt (i.e. fill should temporarily extend beyond the final slope face) to allow compaction at the slope face. After compaction is complete, the slope may be regraded to the final inclination.

Should seeps or thick lenses of highly plastic soils be observed in the planned fill and cut slopes that are steeper than 2H:1V, ECS must be contacted to determine if the steeper slopes may be constructed as planned or if slope flattening or reinforcing is required. Similarly, if soft or wet ground conditions are observed at the base of planned fill embankments, the QA representative must determine the limits of undercutting required or required in-situ treatment.

The following Plan Notes apply to Mechanically Stabilized Earth walls:

Reinforced Backfill (Granular Fill or stone.)

Internal Friction Angle (deg) = 36
Total Unit Weight = 120 pcf
Surcharge Dead Load for Pavement Overlay = 140 psf
Active Earth Pressure Coefficient = 0.26

Retained Backfill

Internal Friction Angle (deg) = 30
Total Unit Weight = 117 pcf
Active Earth Pressure Coefficient = 0.33

Wall 17 I-85 Station
Foundation Soils
Total Internal Friction Angle (deg) = 26
Total Cohesion = 0 psf
Effective Internal Friction Angle (deg) = 26
Effective Cohesion = 0 psf

Wall Height	Min. Breq	Factored Bearing (Static)	Factored Bearing (Seismic)
0 < H ≤ 7.5	14.5 ft	2,000	3,100

Wall 18 I-85 Station 413+00 to 415+00
Foundation Soils
Total Internal Friction Angle (deg) = 0
Total Cohesion = 1000 psf
Effective Internal Friction Angle (deg) = 26
Effective Cohesion = 100 psf

Wall Height	Min. Breq	Factored Bearing (Static)	Factored Bearing (Seismic)
3 < H ≤ 7	12.5 ft	5,400	8,400

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	S18-1

413+00   414+00   I-85 CENTERLINE   415+00

N

54'

ASPHALT CURB UNDER GUARDRAIL

PAVED SHOULDER

EDGE OF TRAVELWAY (I-85 NB)

3.58' (TYP)

ASPHALT CURB UNDER GUARDRAIL

BEGIN WIRE FACED MSE WALL 18
I-85 STA.413+00.00 - 62.25' RT

END TAPER
+20.04
61.58' RT

BEGIN TAPER
+29.92
61.58' RT

WIRE FACE MSE WALL 18

END WIRE FACED MSE WALL 18
I-85 STA.415+00.00 - 63.91' RT

**CONTRACTOR TO VERIFY

FOR WIRE FACED MSE WALL DETAILS SEE SH. SO-40

CARE SHALL BE TAKEN TO AVOID DRAINAGE BOX WHEN WITHIN LIMITS OF MSE WALL. WALL VENDER TO PROVIDE DETAILS ON SHOP PLANS TO AVOID CONFLICT BETWEEN WALL REINFORCING AND DRAINAGE STRUCTURES.

200'-0' WIRE FACED MSE WALL (WALL 18)

890   880   870   860   850   840

WALL 18 - TEMPORARY MSE WALL

TOP OF SHOULDER BREAK/WALL

EXISTING DRAINAGE

EXISTING CULVERT

I.E. 838.40

BOTTOM OF WALL

PROPOSED & EXISTING GRADE AT TOE OF REINFORCED SLOPE

10'

WALL STATION	413+00	413+25	413+50	413+75	414+00	414+25	414+50	414+75	415+00
I-85 STATION	413+00	413+25	413+50	413+75	414+00	414+25	414+50	414+75	415+00
TOP OF WALL	855.37	855.08	854.75	854.43	854.10	853.78	853.42	853.06	852.71
FINISHED GRADE @ BACK FACE	855.37	855.08	854.75	854.43	854.10	853.78	853.42	853.06	852.71
FINISHED GRADE @ FRONT FACE	853.61	852.25	851.07	851.10	851.00	851.54	851.71	851.50	851.06
BOTTOM OF WALL	851.00	849.50	848.00	848.00	848.00	849.50	849.50	849.50	849.50
WALL HEIGHT	4.37	5.58	6.75	6.43	6.10	4.28	3.92	3.56	3.21

413+00   414+00   415+00

REVISIONS					REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED
⚠	5/3/18	REVISED WALL 18 LOCATION AND TYPE	D.P.M.	R.R.C.					

DRAWN BY : D.P.M.   DATE : 04/24/18
REVIEWED BY : R.R.C.   DATE : 04/26/18
APPROVED BY : R.R.C.   DATE : 04/26/18

FLATIRON   ZACHRY   a joint venture

CECS   CIVIL ENGINEERING CONSULTING SERVICES, INC.

0 10 20 30 40

SCALE: 1" = 10' HORIZ

SOUTH CAROLINA
CIVIL ENGINEERING CONSULTING SERVICES, INC.
ENGINEERING NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
PROFESSIONAL No. 1904
REGISTERED
RANDY SHANE CANNON

6/6/2018 12:45

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION   SCDOT

I-85 / I-385 INTERCHANGE

WALL 18
PLAN & PROFILE

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038111 - R02	I-85, I-385	SLI3

MUDDY FORD ROAD

WHISPERING HOLLOW RD.

55

+42.54

PRESENT 40' R/W
23.412 M.E.A.

PRESENT 40' R/W
23.412 M.E.A.

PRESENT 40' R/W
23.412 M.E.A.

+92.50
PRESENT 150' R/W
23.412 M.E.A.

Ⓐ

Ⓑ

Ⓓ Ⓒ

SIGN LIGHTING SYSTEM NO. 21
SEE SHEET SN41 FOR OVERHEAD STRUCTURE

PRESENT 150' R/W
23.412 M.E.A.

INTERSTATE 85 SB

380

℄ I-85

385

INTERSTATE 85 NB

375

MATCH LINE STA. 373+00.00
SEE SHEET SLI2

MATCH LINE STA. 388+00.00
SEE SHEET SLI4

Ⓓ Ⓒ

Ⓑ

Ⓐ

SIGN LIGHTING SYSTEM NO. 20
SEE SHEET SN40 FOR OVERHEAD STRUCTURE

+88.06

+71.72

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 75' R/W
23.412 M.E.A.

PRESENT 75' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

MUDDY FORD ROAD

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠	05/02/18	MOVED SIGN LIGHTING STRUCTURE NO. 21 TO STA. 382+50	R.L.D.	B.G.N.					

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.R.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

FLATIRON ZACHRY
a joint venture

CEC
CS
CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

SIGN LIGHTING PLAN SHEET
STA. 373+00.00 TO STA. 388+00.00

6/6/2018 1:00:31 PM

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	SLI4

N

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

MATCH LINE STA. 388+00.00
SEE SHEET SLI3

MATCH LINE STA. 403+00.00
SEE SHEET SLI5

INTERSTATE 85 SB

390

395

400

℄ I-85

INTERSTATE 85 NB

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠ 1	05/02/18	REVISED SOUTHBOUND EDGE LINE	R.L.D.	B.G.N.					

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.R.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

FLATIRON
ZACHRY
a joint venture

CECS
CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: I" = 50' HORIZ

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
CERTIFICATE OF AUTHORIZATION
ENGINEERING
NO. C00387

6/6/2018 1:00:31 PM

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

SIGN LIGHTING PLAN SHEET
STA. 388+00.00 TO STA. 403+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	SL15

N

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

MATCH LINE STA. 403+00.00
SEE SHEET SL14

MATCH LINE STA. 418+00.00
SEE SHEET SL16

405

410

415

INTERSTATE 85 SB

℄ I-85

INTERSTATE 85 NB

Ⓓ → ● ← Ⓒ

Ⓑ →

SIGN LIGHTING SYSTEM NO. 22
SEE SHEET SN42 FOR OVERHEAD STRUCTURE

Ⓐ

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠	04/07/16	MOVED SIGN LIGHTING STRUCTURE TO STA. 408+00	R.L.D.	B.G.N.					
⚠	05/02/18	MOVED SIGN LIGHTING STRUCTURE NO. 21 TO STA. 382+50	R.L.D.	B.G.N.					

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.R.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

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CECS
CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

SIGN LIGHTING PLAN SHEET
STA. 403+00.00 TO STA. 418+00.00

6/6/2018 1:00:31 PM HST

MULTIPLE PANEL SIGNS TO BE MOUNTED ON I-BEAM BREAKAWAY POSTS

ITEMIZED LISTING OF ESTIMATED QUANTITIES

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85, I-385	5NI

SIGN NUMBER L=LEFT R=RIGHT	STATION NUMBER	P.E.C. (FEET)	M.H. (FEET)	SOIL TYPE (G, A, P)	REFLECT-ORIZATION	SIGN WIDTH - HEIGHT (FEET)		EXIT PANEL WIDTH (FEET)	EXIT PANEL AREA (SQ FT)	AREA (SQ. FEET)	NO. POSTS	AREA PER POST (SQ FT)	SIGN NUMBER	DISTANCE FROM REFERENCE GRADE (EDGE OF TRAVELWAY) TO GROUND LINE POSTS L1	L2	L3	DESIGN LD= åLS/ # POSTS	dH H/2+MH+LD	POST SIZE	POST LENGTH ABOVE SLIP PLATE (H+MH+L-0.25) P1	P2	P3	STUB LENGTH	TOTAL STUB LENGTH (# POSTS X STUB LGTH) S	TOTAL LENGTH OF POST PER SIGN P1+P2+P3+S	LBS. OF POST STEEL PER SIGN
Q-1-51C	220+00R	30.0	7.0	G	TYPE III	18.0	6.5	9.0	22.5	117.00	2	69.75	Q-1-51C	4.10	6.00	----	5.05	16.30	W8x21	17.35	19.25	---	5.50	11.00	47.60	1000
Q-2-51C	255+00R	20.0	7.0	G	TYPE III	18.0	6.5			117.00	2	58.50	Q-2-51C	4.00	7.10	----	5.55	15.80	W8x18	17.25	20.35	---	4.75	9.50	47.10	848
Q-3-51C	70+00R RP 1	16.0	7.0	G	TYPE III	21.5	9.0	9.0	22.5	193.50	3	72.00	Q-3-51C	3.20	7.00	10.50	6.90	19.40	W10x22	18.95	22.75	26.25	5.75	17.25	85.20	1874
Q-4-51C	62+50R RP 1	16.0	7.0	G	TYPE III	18.0	6.5	9.0	22.5	117.00	2	69.75	Q-4-51C	3.50	9.00	----	6.25	17.50	W8x21	16.75	22.25	---	5.50	11.00	50.00	1050
Q-5-51C	361+00L	16.0	7.0	G	TYPE III	18.0	6.5	9.5	23.8	117.00	2	70.38	Q-5-51C	2.90	4.80	----	3.85	15.10	W8x21	16.15	18.05	---	5.50	11.00	45.20	949
Q-6-51C	378+00L	16.0	7.0	G	TYPE III	21.5	12.0	9.0	22.5	258.00	3	93.50	Q-6-51C	2.86	6.77	5.26	4.96	18.96	W10x26	21.61	25.52	24.01	6.00	18.00	89.14	2318
Q-7	54+50L RP 8	15.0	7.0	G	TYPE III	12.5	9.5			118.75	2	59.38	Q-7	0.50	1.60	----	1.05	12.80	W8x15	16.75	17.85	---	4.50	9.00	43.60	654
Q-8	54+50R RP 8	15.0	7.0	G	TYPE III	14.0	11.5			161.00	2	80.50	Q-8	0.90	5.10	----	3.00	15.75	W10x22	19.15	23.35	---	5.75	11.50	54.00	1188

NOTE (3) — SIGN WIDTH-HEIGHT
NOTE (4) — AREA
NOTE (1) — AREA PER POST
NOTE (2) — DISTANCE FROM REFERENCE GRADE

⚠ 05/02/18 RELOCATED Q-6 AND ADJUSTED POST LENGTHS   R.L.D.   B.G.N.

NOTE: ANY BLANK SPACES UNDER THE BREAKAWAY POST CALCULATIONS, MEANS NO POST REQUIRED.

NOTES:
1) INCLUDES AREA OF EXIT PANEL WHERE APPLICABLE
2) INCLUDES HEIGHT OF EXIT PANEL WHERE APPLICABLE
3) SIZE DENOTES ACTUAL DIMENSIONS OF SIGN TO BE ERECTED
4) AREA DENOTES ACTUAL AREA OF SIGN TO BE ERECTED
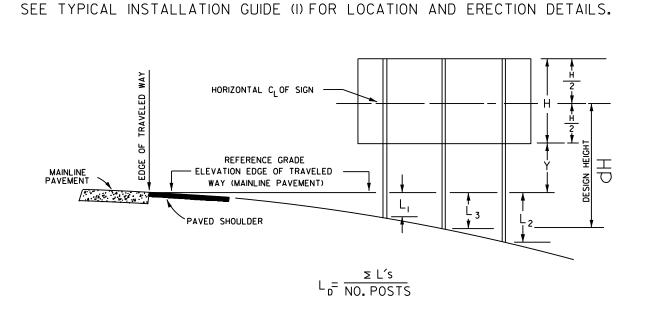
SEE TYPICAL INSTALLATION GUIDE (1) FOR LOCATION AND ERECTION DETAILS.

$$L_D = \frac{\Sigma\ L's}{NO.\ POSTS}$$

NOTE:
USE THREE POSTS TO SUPPORT ALL SIGNS HAVING A WIDTH EQUAL TO OR GREATER THAN 18.5 FEET.

MULTIPLE PANEL SIGNS TO BE MOUNTED ON I–BEAM BREAKAWAY POSTS

ITEMIZED LISTING OF ESTIMATED QUANTITIES

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 I-385	SN3

SIGN NUMBER L=LEFT R=RIGHT	STATION NUMBER	P.E.C. (FEET)	M.H. (FEET)	SOIL TYPE (G, A, P)	REFLECT-ORIZATION	SIGN WIDTH - HEIGHT (FEET)		EXIT PANEL WIDTH (FEET)	EXIT PANEL AREA (SQ FT)	AREA (SQ. FEET)	NO. POSTS	AREA PER POST (SQ FT)	SIGN NUMBER	DISTANCE FROM REFERENCE GRADE (EDGE OF TRAVELWAY) TO GROUND LINE — POSTS L_1	L_2	L_3	DESIGN $L_D = \frac{\Sigma L_S}{\# POSTS}$	dH $H/2+MH+L_D$	POST SIZE	POST LENGTH ABOVE SLIP PLATE (H+MH+L-O.25) P_1	P_2	P_3	STUB LENGTH	TOTAL STUB LENGTH (# POSTS X STUB LGTH) S	TOTAL LENGTH OF POST PER SIGN $P_1 + P_2 + P_3 + S$	LBS. OF POST STEEL PER SIGN
					NOTE (3)			NOTE (4)	NOTE (1)					NOTE (2)												
LODGING 51A	206+00R I85	25.0	7.0	G	TYPE III	15.0	10.0			150.00	2	75.00	LODGING 51A	3.10	2.80	----	2.95	14.95	W8x21	19.85	19.55	---	5.50	11.00	50.40	1058
FOOD 51A	212+50R I85	22.0	7.0	G	TYPE III	15.0	10.0			150.00	2	75.00	FOOD 51A	3.50	2.00	----	2.75	14.75	W8x21	20.25	18.75	---	5.50	11.00	50.00	1050
GAS 51A	223+00R I85	30.0	7.0	G	TYPE III	15.0	10.0			150.00	2	75.00	GAS 51A	5.70	8.10	----	6.90	18.90	W10x22	22.45	24.85	---	5.75	11.50	58.80	1294
LOGO 51A	252+00R I85NBCD	20.0	7.0	G	TYPE III	9.5	7.5			71.25	2	35.63	LOGO 51A	2.80	3.80	----	3.30	14.05	W8x10	17.05	18.05	---	4.00	8.00	43.10	431
LODGING 54	396+00R I85	20.0	7.0	G	TYPE III	15.0	10.0			150.00	2	75.00	LODGING 54	3.50	6.80	----	5.15	17.15	W10x22	20.25	23.55	---	5.75	11.50	55.30	1217
FOOD 54	404+00R I85	30.0	7.0	G	TYPE III	15.0	10.0			150.00	2	75.00	FOOD 54	2.10	-2.20	----	-0.05	11.95	W8x18	18.85	14.55	---	4.75	9.50	42.90	772
GAS 54	412+00R I85	20.0	7.0	G	TYPE III	15.0	10.0			150.00	2	75.00	GAS 54	2.00	3.50	----	2.75	14.75	W8x21	18.75	20.25	---	5.50	11.00	50.00	1050
RAMP LOD 54	56+50R PEL R	22.0	7.0	G	TYPE III	8.5	6.5			55.25	2	27.63	RAMP LOD 54	0.70	0.00	----	0.35	10.60	W6x9	13.95	13.25	---	4.00	8.00	35.20	317
RAMP FD 54	58+50R PEL R	22.0	7.0	G	TYPE III	8.5	6.5			55.25	2	27.63	RAMP FD 54	0.80	-0.30	----	0.25	10.50	W6x9	14.05	12.95	---	4.00	8.00	35.00	315
RAMP GAS 54	60+50R PEL R	22.0	7.0	G	TYPE III	8.5	6.5			55.25	2	27.63	RAMP GAS 54	0.80	-0.60	----	0.10	10.35	W6x9	14.05	12.65	---	4.00	8.00	34.70	312
FOOD 35	317+00R I385	16.0	7.0	G	TYPE III	15.0	10.0			150.00	2	75.00	FOOD 35	1.50	2.80	----	2.15	14.15	W8x21	18.25	19.55	---	5.50	11.00	48.80	1025
GAS 35	325+00R I385	22.0	7.0	G	TYPE III	15.0	10.0			150.00	2	75.00	GAS 35	1.80	-2.70	----	-0.45	11.55	W8x18	18.55	14.05	---	4.75	9.50	42.10	758
RAMP FD 35	57+00R R11	22.0	7.0	G	TYPE III	8.5	6.5			55.25	2	27.63	RAMP FD 35	2.00	0.80	----	1.40	11.65	W6x9	15.25	14.05	---	4.00	8.00	37.30	336
RAMP GAS 35	59+00R R11	22.0	7.0	G	TYPE III	8.5	6.5			55.25	2	27.63	RAMP GAS 35	2.00	0.50	----	1.25	11.50	W6x9	15.25	13.75	---	4.00	8.00	37.00	333
G/F/L 34	320+00L I385	25.0	7.0	G	TYPE III	15.0	10.0			150.00	2	75.00	G/F/L 34	2.50	0.60	----	1.55	13.55	W8x18	19.25	17.35	---	4.75	9.50	46.10	830
G/F/L 35	420+00L I385	25.0	7.0	G	TYPE III	15.0	10.0			150.00	2	75.00	G/F/L 35	0.50	1.30		0.90	12.90	W8x18	17.25	18.05	---	4.75	9.50	44.80	806
R2-4a-48-60/45	388+10R I85	20.0	5.0	G	TYPE III	4.0	8.0			32.00	2	16.00	R2-4a-48-60/45	2.30	2.70	----	2.50	11.50	S4x7.7	15.05	15.45	---	4.00	8.00	38.50	296
R2-4a-48-60/45	198+00L I85	20.0	5.0	G	TYPE III	4.0	8.0			32.00	2	16.00	R2-4a-48-60/45	0.40	0.60	----	0.50	9.50	S3x5.7	13.15	13.35	---	4.00	8.00	34.50	197
R2-4a-48-65/45	313+00L I385	20.0	5.0	G	TYPE III	4.0	8.0			32.00	2	16.00	R2-4a-48-65/45	1.80	2.50	----	2.15	11.15	S3x5.7	14.55	15.25	---	4.00	8.00	37.80	215
R2-4a-48-55/45	313+00R I385	20.0	5.0	G	TYPE III	4.0	8.0			32.00	2	16.00	R2-4a-48-55/45	2.30	2.90	----	2.60	11.60	S4x7.7	15.05	15.65	---	4.00	8.00	38.70	298

6520200 TOTAL

6541005 TOTAL

⚠	05/16/16	ADJUSTED PEC AND POSTS FOR R2-4a-48-60/45 AT STA.395+00L I-85	R.L.D.	B.G.N.
⚠	05/02/18	REMOVED R2-4a-48-60/45 AT STA. 395+00L I85	R.L.D.	B.G.N.

NOTE: ANY BLANK SPACES UNDER THE BREAKAWAY POST CALCULATIONS, MEANS NO POST REQUIRED.

* SIGN TO BE MOUNTED ON WALL, USE PAYITEM NO. 6513000
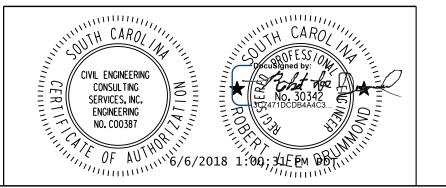
NOTES:

1) INCLUDES AREA OF EXIT PANEL WHERE APPLICABLE
2) INCLUDES HEIGHT OF EXIT PANEL WHERE APPLICABLE
3) SIZE DENOTES ACTUAL DIMENSIONS OF SIGN TO BE ERECTED
4) AREA DENOTES ACTUAL AREA OF SIGN TO BE ERECTED

SEE TYPICAL INSTALLATION GUIDE (1) FOR LOCATION AND ERECTION DETAILS.

$$L_D = \frac{\Sigma L's}{NO. POSTS}$$

NOTE:
USE THREE POSTS TO SUPPORT ALL SIGNS HAVING A WIDTH EQUAL TO OR GREATER THAN 18.5 FEET.

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	SN5

ITEMIZED LISTING OF ESTIMATED QUANTITIES

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

6573100   OVERHEAD   STRUCTURES

OVERHEAD STRUCTURE NUMBER	STATION LOCATION	QUANTITY	TYPE	SPAN LENGTH (FT)	SUPPORTS LENGTH (FT) (GROUND TO LOWEST HORIZONTAL MEMBER) LEFT	RIGHT	FOOTING REQUIRED FOR THIS BID ITEM	SIGNS SUPPORTED
OH-18	360+00	1	CANTILEVER	35.00	-	22.21	1	OH-18
OH-19	371+50	1	SIGN BRIDGE	87.82	16.21	20.62	2	OH-19
OH-20	377+00	1	CANTILEVER	34.78	-	21.25	1	OH-20
OH-21	382+50	1	SIGN BRIDGE	75.91	17.20	19.74	2	OH-21
OH-22	408+00	1	CANTILEVER	35.00	-	20.17	1	OH-22
OH-23	427+35	1	SIGN BRIDGE	87.86	15.41	20.83	2	OH-23A, OH-23B
OH-24	445+00	1	CANTILEVER	34.50	-	17.99	1	OH-24
OH-27	306+00	1	SIGN BRIDGE	83.43	15.59	19.31	2	OH-27
OH-28	315+00	1	CANTILEVER	34.00	-	19.78	1	OH-28
OH-30	327+50	1	SIGN BRIDGE	89.17	14.83	22.02	2	OH-30
OH-31	328+00	1	BRIDGE MOUNT	-	-	-	-	OH-31
OH-32	336+50	1	CANTILEVER	35.00	-	20.57	1	OH-32
OH-33	344+65	1	SIGN BRIDGE	69.42	14.61	11.69	2	OH-33
OH-34	105+75	1	CANTILEVER	45.00	-	19.65	1	OH-34
OH-35	375+00	1	CANTILEVER	36.50	13.74	-	1	OH-35A, OH-35B
OH-36	41+25	1	CANTILEVER	45.00	14.75	-	1	OH-36A, OH-36B
							6573100 TOTAL	16

6573106   REFURBISH OVERHEAD   STRUCTURES

OH-25	278+00	1	SIGN BRIDGE	-	-	-	OH-25A, OH-25B
OH-26	302+00	1	SIGN BRIDGE	-	-	-	OH-26A, OH-26B

6573103   RELOCATION OF OVERHEAD   STRUCTURE

OH-29	337+00	1	BUTTERFLY	-	-	-	OH-29
						6573115 TOTAL	1

PANELS TO BE MOUNTED OVERHEAD

SIGN NUMBER MOUNTED ON CORRESPONDING STRUCTURE NO.	SIGN SURFACE TYPE	SIGN SIZE WIDTH X HEIGHT (FEET)		AREA (SQ. FT.)	QUANTITY	TOTAL AREA (SQ. FT.)
OH-18	TYPE XI	14 X	7.5	105.00	1	105.00
OH-19-51B-C-A	TYPE XI	59 X	20	1180.00	1	1180.00
OH-20-54	TYPE XI	14.5 X	8	116.00	1	116.00
OH-21-51B-C-A	TYPE XI	50.5 X	20	1010.00	1	1010.00
OH-22-54	TYPE XI	15 X	6.5	97.50	1	97.50
OH-23A	TYPE XI	24.5 X	10.5	257.25	1	257.25
OH-23B-54	TYPE XI	16.5 X	6.5	107.25	1	107.25
OH-24-51B-C-A	TYPE XI	23.5 X	13	305.50	1	305.50
OH-25A-35 & 36A-B	TYPE XI	24 X	14	336.00	1	336.00
OH-25B-34	TYPE XI	12 X	6	72.00	1	72.00
OH-26A-33		EXISTING SIGN TO BE RETAINED				
OH-26B-34	TYPE XI	14.5 X	8.5	123.25	1	123.25
OH-27-35 & 36A-B	TYPE XI	50.5 X	20	1010.00	1	1010.00
OH-28-36A	TYPE XI	18 X	12.5	225.00	1	225.00
OH-29		EXISTING SIGN TO BE RETAINED				
OH-30-35 & 36A-B	TYPE XI	59 X	17	1003.00	1	1003.00
OH-31-34	TYPE XI	14.5 X	10.5	152.25	1	152.25
OH-32	TYPE XI	14 X	7.5	105.00	1	105.00
OH-33-35 & 36A-B	TYPE XI	39 X	18.5	721.50	1	721.50
OH-34-35	TYPE XI	32 X	12.5	400.00	1	400.00
OH-35A-36B	TYPE XI	14 X	10	140.00	1	140.00
OH-35B-36A	TYPE XI	21.5 X	13	279.50	1	279.50
OH-36A-36B	TYPE XI	17 X	8	136.00	1	136.00
OH-36B-36A	TYPE XI	21.5 X	13.5	290.25	1	290.25
			6520250	TOTAL		8067.25
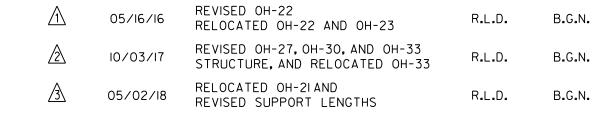
EXIT PANELS FOR OVERHEAD SIGNS

SIGN NUMBER MOUNTED ON CORRESPONDING STRUCTURE NO.	SIGN SURFACE TYPE	SIGN SIZE WIDTH X HEIGHT (FEET)		AREA (SQ. FT.)	QUANTITY	TOTAL AREA (SQ. FT.)
OH-19-51B-C-A	TYPE XI	14.5 X	2.5	36.25	1	36.25
OH-20-54	TYPE XI	7.5 X	2.5	18.75	1	18.75
OH-21-51B-C-A	TYPE XI	14.5 X	2.5	36.25	1	36.25
OH-22-54	TYPE XI	7.5 X	2.5	18.75	1	18.75
OH-23B-54	TYPE XI	7.5 X	2.5	18.75	1	18.75
OH-24-51B-C-A	TYPE XI	14.5 X	2.5	36.25	1	36.25
OH-25A-35 & 36A-B	TYPE XI	17.5 X	2.5	43.75	1	43.75
OH-25B-34	TYPE XI	7.5 X	2.5	18.75	1	18.75
OH-26B-34	TYPE XI	7.5 X	2.5	18.75	1	18.75
OH-27-35 & 36A-B	TYPE XI	17.5 X	2.5	43.75	1	43.75
OH-28-36A	TYPE XI	9.5 X	2.5	23.75	1	23.75
OH-30-35 & 36A-B	TYPE XI	17.5 X	2.5	43.75	1	43.75
OH-31-34	TYPE XI	7.5 X	2.5	18.75	1	18.75
OH-33-35	TYPE XI	7.5 X	2.5	43.75	1	43.75
OH-33-36A-B	TYPE XI	12.5 X	2.5	18.75	1	18.75
OH-34-35	TYPE XI	7.5 X	2.5	18.75	1	18.75
OH-35A-36B	TYPE XI	9.5 X	4.5	42.75	1	42.75
OH-35B-36A	TYPE XI	9.5 X	2.5	23.75	1	23.75
OH-36A-36B	TYPE XI	9.5 X	4.5	42.75	1	42.75
OH-36B-36A	TYPE XI	9.5 X	2.5	23.75	1	23.75
			6520250	TOTAL		590.50

OVERHEAD SPAN WIRE & BRIDGE MOUNTED FLAT SHEET SIGNS

			6510108	TOTAL		0.00
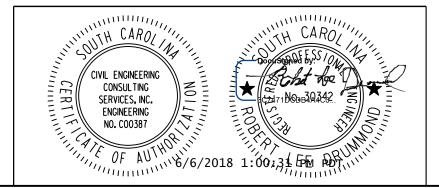
SIGN LIGHTING SYSTEMS

BID ITEM NO.	SYSTEM NO.	SEE PLAN SHEET NO.	QUANTITY
6573200	OH-18	SL12	1
	OH-19	SL12	1
	OH-20	SL13	1
	OH-21	SL15	1
	OH-22	SL15	1
	OH-23	SL16	1
	OH-24	SL17	1
	OH-27	SL18	1
	OH-28	SL19	1
	OH-30	SL20	1
	OH-31	SL20	1
	OH-32	SL20	1
	OH-33	SL21	1
	OH-34	SL23	1
	OH-35	SL23	1
	OH-36	SL23	1
	6573200	TOTAL	16
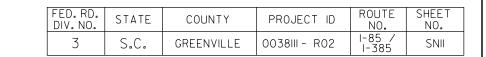
SIGN LIGHTING NOTES:
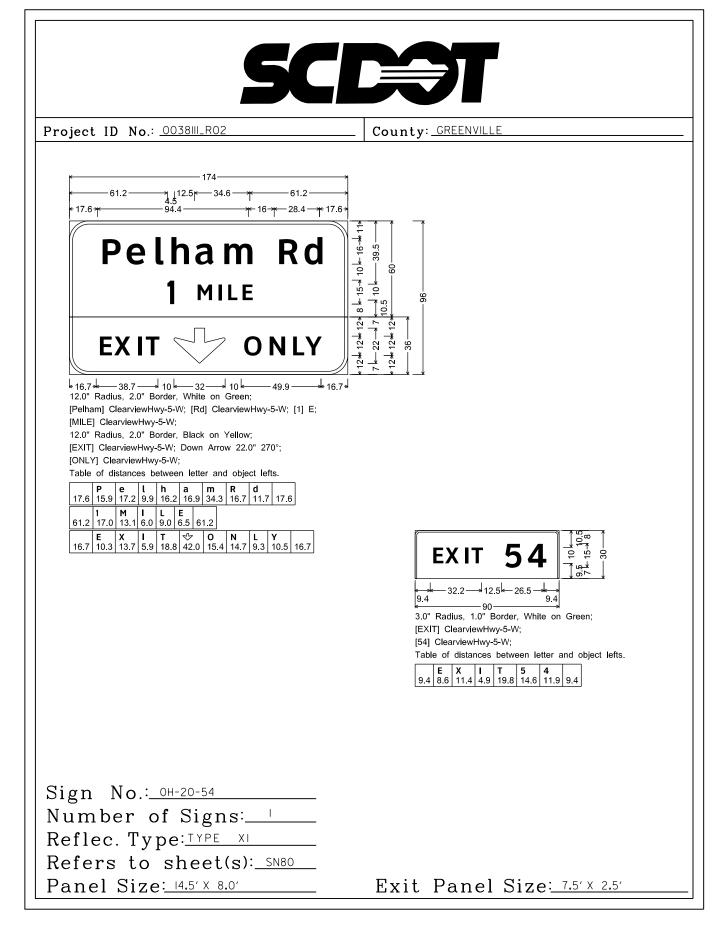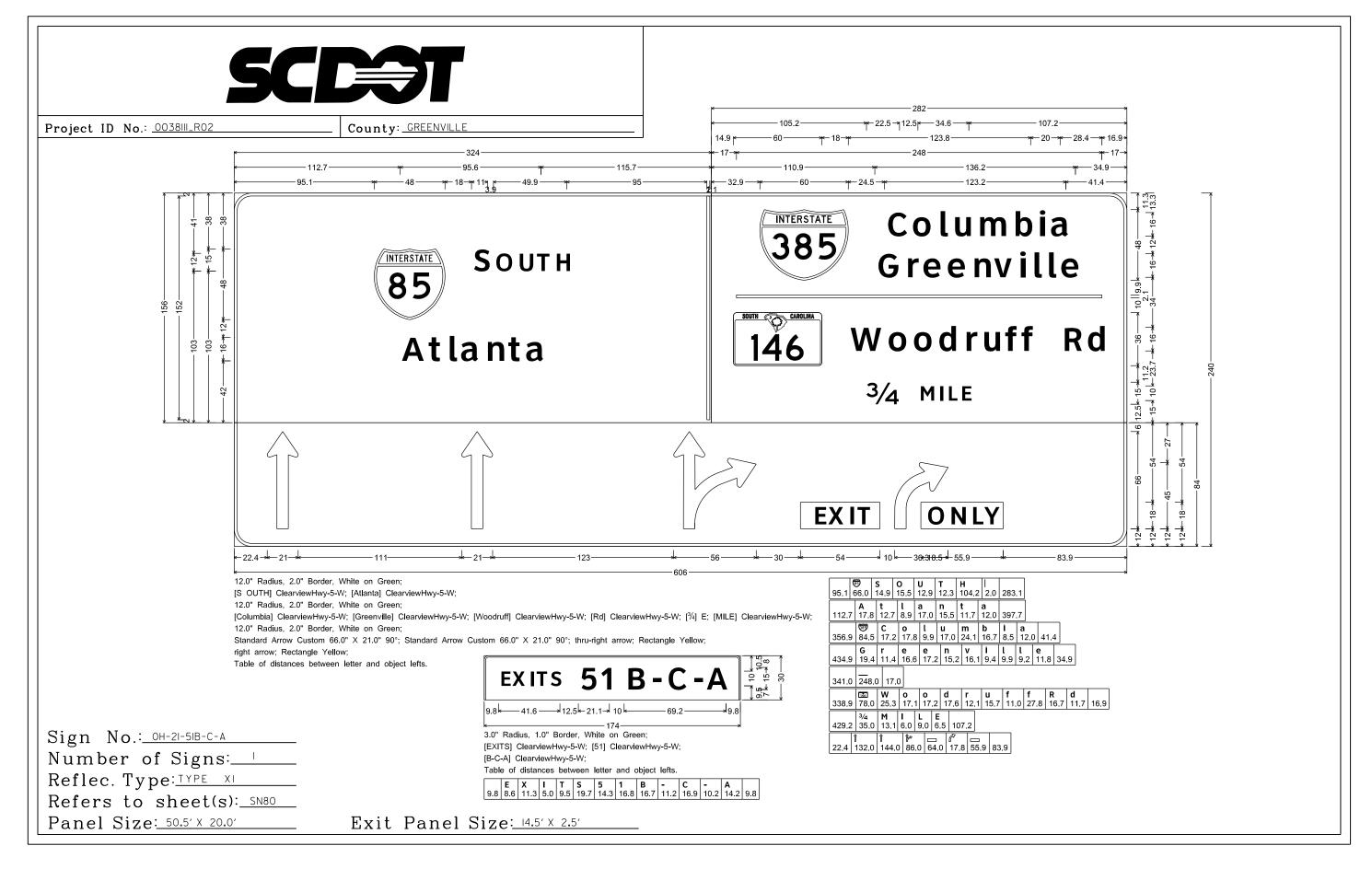
1. SEE SPECIAL PROVISIONS FOR SUPPLEMENTAL SPECIFICATIONS FOR SIGN LIGHTING SYSTEMS AND WORK TO BE DONE
2. SEE SHEETS NUMBERED ADJACENT TO SYSTEM NUMBER FOR GENERAL DETAILS OF REQUIREMENTS FOR EACH SYSTEM. 3. NUMBERING OF EACH SIGN LIGHTING SYSTEM CORRESPONDS TO THE NUMBER ON WHICH THE SYSTEM IS TO BE INSTALLED

	05/16/16	REVISED OH-22 RELOCATED OH-22 AND OH-23	R.L.D.	B.G.N.
	10/03/17	REVISED OH-27, OH-30, AND OH-33 STRUCTURE, AND RELOCATED OH-33	R.L.D.	B.G.N.
	05/02/18	RELOCATED OH-21 AND REVISED SUPPORT LENGTHS	R.L.D.	B.G.N.

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	OO38III - R02	I-85 I-385	SNII

SCDOT

Project ID No.: OO38III_R02   County: GREENVILLE

Pelham Rd
1 MILE
EXIT ⬇ **ONLY**

12.0" Radius, 2.0" Border, White on Green;
[Pelham] ClearviewHwy-5-W; [Rd] ClearviewHwy-5-W; [1] E;
[MILE] ClearviewHwy-5-W;
12.0" Radius, 2.0" Border, Black on Yellow;
[EXIT] ClearviewHwy-5-W; Down Arrow 22.0" 270°;
[ONLY] ClearviewHwy-5-W;
Table of distances between letter and object lefts.

EXIT 54

3.0" Radius, 1.0" Border, White on Green;
[EXIT] ClearviewHwy-5-W;
[54] ClearviewHwy-5-W;
Table of distances between letter and object lefts.

Sign No.: OH-20-54
Number of Signs: I
Reflec. Type: TYPE XI
Refers to sheet(s): SN80
Panel Size: I4.5' X 8.0'   Exit Panel Size: 7.5' X 2.5'

SCDOT

Project ID No.: OO38III_R02   County: GREENVILLE

INTERSTATE 85 **SOUTH**
Atlanta

INTERSTATE 385 **Columbia Greenville**
SOUTH CAROLINA 146 **Woodruff Rd**
¾ MILE

EXIT **ONLY**

12.0" Radius, 2.0" Border, White on Green;
[S OUTH] ClearviewHwy-5-W; [Atlanta] ClearviewHwy-5-W;
12.0" Radius, 2.0" Border, White on Green;
[Columbia] ClearviewHwy-5-W; [Greenville] ClearviewHwy-5-W; [Woodruff] ClearviewHwy-5-W; [Rd] ClearviewHwy-5-W; [¾ E; [MILE] ClearviewHwy-5-W;
12.0" Radius, 2.0" Border, White on Green;
Standard Arrow Custom 66.0" X 21.0" 90°; Standard Arrow Custom 66.0" X 21.0" 90°; thru-right arrow; Rectangle Yellow;
right arrow; Rectangle Yellow;
Table of distances between letter and object lefts.

EXITS 51 B-C-A

3.0" Radius, 1.0" Border, White on Green;
[EXITS] ClearviewHwy-5-W; [51] ClearviewHwy-5-W;
[B-C-A] ClearviewHwy-5-W;
Table of distances between letter and object lefts.

Sign No.: OH-2I-5IB-C-A
Number of Signs: I
Reflec. Type: TYPE XI
Refers to sheet(s): SN80
Panel Size: 50.5' X 20.0'   Exit Panel Size: I4.5' X 2.5'

SCDOT

Project ID No.: OO38III_R02   County: GREENVILLE

INTERSTATE 85 **Spartanburg Atlanta**
SOUTH CAROLINA 146 **Woodruff Rd**
1 MILE

12.0" Radius, 2.0" Border, White on Green;
[Spartanburg] ClearviewHwy-5-W; [Atlanta] ClearviewHwy-5-W; [Woodruff] ClearviewHwy-5-W;
[Rd] ClearviewHwy-5-W; [1] E; [MILE] ClearviewHwy-5-W;
Table of distances between letter and object lefts.

EXITS 35 & 36 A-B

3.0" Radius, 1.0" Border, White on Green;
[EXITS] ClearviewHwy-5-W; [35] E; [&] ClearviewHwy-5-W; [36] E;
[A] ClearviewHwy-5-W; [B] ClearviewHwy-5-W; [36-A-B] ClearviewHwy-5-W;
Table of distances between letter and object lefts.

Sign No.: OH-25A-35 & 36A-B
Number of Signs: I
Reflec. Type: TYPE XI
Refers to sheet(s): SN85
Panel Size: 24.0' X I4.0'   Exit Panel Size: I7.5' X 2.5'

SCDOT

Project ID No.: OO38III_R02   County: GREENVILLE

Pelham Rd
EXIT ⬇ **ONLY**

12.0" Radius, 2.0" Border, White on Green;
[Pelham] ClearviewHwy-5-W; [Rd] ClearviewHwy-5-W;
12.0" Radius, 2.0" Border, Black on Yellow;
[EXIT] ClearviewHwy-5-W; Down Arrow 22.0" 270°;
[ONLY] ClearviewHwy-5-W;
Table of distances between letter and object lefts.

EXIT 54

3.0" Radius, 1.0" Border, White on Green;
[EXIT] ClearviewHwy-5-W;
[54] ClearviewHwy-5-W;
Table of distances between letter and object lefts.

Sign No.: OH-22-54
Number of Signs: I
Reflec. Type: TYPE XI
Refers to sheet(s): SN82
Panel Size: I5.0' X 6.5'   Exit Panel Size: 7.5' X 2.5'

SCDOT

Project ID No.: OO38III_R02   County: GREENVILLE

INTERSTATE 85 **NORTH**
Spartanburg

12.0" Radius, 2.0" Border, White on Green;
[N ORTH] ClearviewHwy-5-W; [Spartanburg] ClearviewHwy-5-W; Down Arrow 22.0" 270°;
Down Arrow 22.0" 270°; Down Arrow 22.0" 270°;
Table of distances between letter and object lefts.

Sign No.: OH-23A
Number of Signs: I
Reflec. Type: TYPE XI
Refers to sheet(s): SN83
Panel Size: 24.5' X I0.5'

SCDOT

Project ID No.: OO38III_R02   County: GREENVILLE

Pelham Rd
↗ EXIT ONLY

12.0" Radius, 2.0" Border, White on Green;
[Pelham] ClearviewHwy-5-W; [Rd] ClearviewHwy-5-W;
12.0" Radius, 2.0" Border, Black on Yellow;
Arrow 160 - 35.0" 45°; [EXIT] ClearviewHwy-5-W;
[ONLY] ClearviewHwy-5-W; Arrow 160 - 35.0" 45°;
Table of distances between letter and object lefts.

EXIT 54

3.0" Radius, 1.0" Border, White on Green;
[EXIT] ClearviewHwy-5-W;
[54] ClearviewHwy-5-W;
Table of distances between letter and object lefts.

Sign No.: OH-23B-54
Number of Signs: I
Reflec. Type: TYPE XI
Refers to sheet(s): SN84
Panel Size: I6.5' X 6.5'   Exit Panel Size: 7.5' X 2.5'

SCDOT

Project ID No.: OO38III_R02   County: GREENVILLE

INTERSTATE 385 **Columbia Greenville**
SOUTH CAROLINA 146 **Woodruff Rd**
2 MILES

12.0" Radius, 2.0" Border, White on Green;
[Columbia] ClearviewHwy-5-W; [Greenville] ClearviewHwy-5-W; [Woodruff] ClearviewHwy-5-W;
[Rd] ClearviewHwy-5-W; [2] E; [MILES] ClearviewHwy-5-W;
Table of distances between letter and object lefts.

EXITS 51 B-C-A

3.0" Radius, 1.0" Border, White on Green;
[EXITS] ClearviewHwy-5-W; [51] ClearviewHwy-5-W;
[B-C-A] ClearviewHwy-5-W;
Table of distances between letter and object lefts.

Sign No.: OH-24-5IB-C-A
Number of Signs: I
Reflec. Type: TYPE XI
Refers to sheet(s): SN85
Panel Size: 23.5' X I3.0'   Exit Panel Size: I4.5' X 2.5'

CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. C00387
CERTIFICATE OF AUTHORIZATION
SOUTH CAROLINA No. 30342 ROBERT G. DRUMMOND
6/6/2018 1:06:31 PM EDT

| ⚠ | 05/16/16 | ADJUSTED OVERHEAD SIGN #22 | R.L.D. | B.G.N. |
| ⚠ | 05/02/18 | REVISED OVERHEAD OH-2I-5IB-C-A | R.L.D. | B.G.N. |

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	SN4I

ERECT NEW OVERHEAD STRUCTURE AND
NEW SIGN OH-21-51B-C-A

LUMINAIRE

OH-21-51B-C-A

75.91'
50.5'
35'
14.5'
1'
10.16'
15.24'

EXITS **51 B-C-A**

| INTERSTATE **85** | SOUTH | INTERSTATE **385** | Columbia Greenville |
| | Atlanta | SOUTH CAROLINA **146** | Woodruff Rd |

2.5'
10'
10'
3/4 MILE

EXIT ONLY

GLARE SCREEN TO BE PROVIDED BETWEEN
TOP OF WALKWAY AND BOTTOM OF SIGN

4' 8' 8' 8' 8' 8' 6.5'

CENTER OF SUPPORT

17.20'

17.5' MINIMUM CLEARANCE

EDGE OF PAVEMENT

CENTER OF SUPPORT

19.74'

6' 6'

12' 12' 12' 12' 10' 12'

10'

*BASED ON 17.5' ROADWAY CLEARANCE
NOTE: DESIGN WIND SPEED = 90 MPH

*FOR DESIGN OF FOOTING USE
2,000 PSI MAX TOE PRESSURE

OVERHEAD STRUCTURE NO. 21
INTERSTATE 85 SOUTHBOUND
STA. 382+50.00
SHEET SN80

REVISIONS NO.	DATE	DESCRIPTION	BY	CHECKED	REVISIONS NO.	DATE	DESCRIPTION	BY	CHECKED
⚠	05/02/18	MOVED OH-21 FROM STA. 404+00 TO STA. 382+50	R.L.D.	B.G.N.					

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.R.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

FLATIRON   ZACHRY

CECS   CIVIL ENGINEERING
CONSULTING SERVICES, INC.

SCALE = NTS

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION   SCDOT

I-85 / I-385 INTERCHANGE

SIGNING PLANS

MUDDY FORD ROAD

WHISPERING HOLLOW RD.

MUDDY FORD ROAD

MATCH LINE STA. 373+00.00
SEE SHEET SN79

MATCH LINE STA. 388+00.00
SEE SHEET SN81

INTERSTATE 85 SB

INTERSTATE 85 NB

℄ I-85

375   380   385

PEC=20

Sign Q-6-51C:
Exit 51C
Downtown Greenville
Bon Secours Wellness
Arena
Fluor Field
NEXT RIGHT
Q-6-51C

ERECT BREAKAWAY POSTS
INSTALL NEW SIGN

Sign OH-21-51B-C-A:
EXITS 51 B-C-A
Columbia
Greenville
385   Woodruff Rd
146   ¾ MILE
EXIT   ONLY
SOUTH
Atlanta
85
OH-21-51B-C-A
STA. 382+50
ERECT OVERHEAD SIGN STRUCTURE NO. 21
AND SIGN NO. OH-21-51B-C-A

Sign OH-20-54:
Exit 54
Pelham Rd
1 MILE
EXIT   ONLY
OH-20-54
STA. 377+00
ERECT OVERHEAD SIGN STRUCTURE NO. 20
AND SIGN NO. OH-20-54

Sign M1-36-85:
NORTH
85
M1-36-85

N

INTERSTATE 85 SB

390

395

400

℄ I-85

INTERSTATE 85 NB

MATCH LINE STA. 388+00.00
SEE SHEET SN80

MATCH LINE STA. 403+00.00
SEE SHEET SN82

PEC=20

PEC=20

ERECT BREAKAWAY POSTS
INSTALL NEW SIGN

R2-4a-48-60/45

SPEED LIMIT **60**
MINIMUM **45**

RETAIN EXISTING SIGN
REMOVE EXISTING I-BEAM POSTS
ERECT BREAKAWAY POSTS
INSTALL EXISTING SIGN

LODGING EXIT 54

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠	05/16/16	CHANGED PEC AT STA. 395+00L	R.L.D.	B.G.N.					
⚠	05/02/18	REMOVED R2-4a-48-60/45 AT STA. 395+00	R.L.D.	B.G.N.					

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.R.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

FLATIRON ZACHRY

CECS CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

SIGNING PLAN SHEET
STA. 388+00.00 TO STA. 403+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	SN82

N

MATCH LINE STA. 403+00.00
SEE SHEET SN81

MATCH LINE STA. 418+00.00
SEE SHEET SN83

INTERSTATE 85 SB

℄ I-85

405   410   415

INTERSTATE 85 NB

PEC=30

PEC=20

RETAIN EXISTING SIGN
REMOVE EXISTING I-BEAM POSTS
ERECT BREAKAWAY POSTS
INSTALL EXISTING SIGN

FOOD–EXIT 54

STA. 403+78
I-2P-12'

D10-2-53

5 EXIT

ERECT OVERHEAD SIGN STRUCTURE NO. 22
AND SIGN NO. OH-22-54
STA. 408+00

OH-22-54

EXIT 54
Pelham Rd
EXIT ⇨ ONLY

RETAIN EXISTING SIGN
REMOVE EXISTING I-BEAM POSTS
ERECT BREAKAWAY POSTS
INSTALL EXISTING SIGN

GAS–EXIT 54

ADJUSTED DELINEATORS FOR
PELHAM ROAD EXIT RAMP

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠	05/16/16	RELOCATED OH-22 REMOVED DELINEATORS	R.L.D.	B.G.N.					
⚠	05/02/18	RELOCATED OH-21, REMOVED SB SIGNS AND SB DELINEATORS	R.L.D.	B.G.N.					

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.R.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

FLATIRON   ZACHRY

CECS   CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
CERTIFICATE OF AUTHORIZATION
ENGINEERING
NO. C00387

SOUTH CAROLINA
PROFESSIONAL
No. 30342
ROGER
ABUMMOND

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

SIGNING PLAN SHEET
STA. 403+00.00 TO STA. 418+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC3

I-85
SERIES 4 SHEETS

STEP 1: **SHEETS TC4.1 – 4.1A**
- PREPARE EX 85NB/SB OUTSIDE SHOULDERS FOR STEP 2 I-85 MEDIAN BENT WORK (85NB STA. 279+00 TO 293+40 & 85SB STA. 280+00 TO 303+50).

STEP 2: **SHEETS TC4.2 – 4.2P**

<u>I-85 WIDENING SOUTH OF INTERCHANGE</u> (TC4.2 – 4.2D)

- SHIFT 85NB/SB TRAFFIC TO THE INSIDE, AND COMPLETE OUTSIDE WIDENING (85NB STA. 203+00 TO 249+13 & 85SB STA. 211+80 TO 268+00).
    CONCURRENT CONSTRUCTION:
    - **R5 STEP 1** (TC14.1)
    - **R5 STEP 2** (TC14.2)

<u>I-85 MEDIAN BENTS</u> (TC4.2E – 4.2G)

- SHIFT 85NB/SB TRAFFIC TO OUTSIDE SHOULDERS.
  WITH 85 TRAFFIC ON OUTSIDE SHOULDERS, COMPLETE MEDIAN BRIDGE BENTS (BR5 BENT 7, BR7 BENT 2, BR8 BENT 2, BR9 BENT 3, BR12 BENT 4).

<u>I-85 WIDENING NORTH OF INTERCHANGE</u> (TC4.2G – 4.2Q)

- SHIFT 85NB/SB TRAFFIC TO THE INSIDE, AND COMPLETE OUTSIDE WIDENING OF 85 TOWARDS PELHAM RD (85NB STA. 304+00 TO 428+25 & 85SB STA. 302+50 TO 386+60).
    CONCURRENT CONSTRUCTION:
    - **R1**
    - **R1A**
    - **R2A**
    - **CHROME DR.**

- CONSTRUCT WALLS ALONG 85 NEAR ROCKY CREEK.

- SHIFT PELHAM EXIT RAMP TRAFFIC TO THE INSIDE AND COMPLETE TEMP. PELHAM AND OUTSIDE WIDENING (PELHAM STA. 54+79 TO 61+25).

STEP 2A: **SHEETS TC4.2AA – 4.2AC**
- COMPLETE 85NB OUTSIDE WIDENING (85NB STA. 415+50 TO 428+20). SHIFT PELHAM EXIT RAMP TRAFFIC TO THE OUTSIDE (TEMP. PELHAM) AND COMPLETE 85NB/PELHAM GORE AREA, TEMP PVMT, AND PELHAM LEFT SIDE.

STEP 2B: **SHEETS TC4.2BA – 4.2BC**
- SHIFT PELHAM EXIT RAMP TRAFFIC TO THE INSIDE/TEMP PVMT AND COMPLETE PELHAM RIGHT SIDE (PELHAM STA. 50+00 TO 54+79).

*UPON SWITCHING TRAFFIC TO THE LEFT SIDE OF PELHAM RAMP, WORK IN A CONTINUOUS AND EXPEDITIOUS MANNER TO BREAK UP AND REMOVE EXISTING RAMP PAVEMENT ON THE RIGHT SIDE SUCH THAT WATER ENTRAPMENT DOES NOT OCCUR.

STEP 2C: **SHEETS TC4.2CA – 4.2CH**
- SHIFT 85NB/SB TRAFFIC TO THE OUTSIDE, AND COMPLETE MEDIAN FOUNDATIONS FOR OVERHEAD SIGN STRUCTURES AND MEDIAN DRAINAGE WORK (85 STA. 350+60 TO 428+50).

- REMOVE TEMP PVMT ALONG LEFT SIDE PELHAM (PELHAM STA. 53+88 TO 57+00).

STEP 3: **SHEETS TC4.3 – 4.3B**
- UPON COMPLETION OF MEDIAN BENT WORK, REMOVE TEMP BARRIER, REVISE PVMT MARKINGS, AND SHIFT 85NB/SB OFF OF OUTSIDE SHOULDERS.

- REVISE 85NBCD MARKINGS AT ENTRANCE RAMP TO 85NB AND COMPLETE 85/85NBCD OUTSIDE WIDENING (STA. 295+00 TO 301+50).
    PREREQUISITE CONSTRUCTION:
    - **85NBCD STEP 3** (TC5.3)
    - **R2A/R4 STEP 3** (TC9.3)

Left margin (revisions block):
DESCRIPTION: 85 STEP 2 NORTH OF INTERCHANGE 85SB END WIDENING STA. REVISED TO 386+60
PHASING UPDATED TO ADD STEP 2A - 2C
DATE: 10-17-16 / 5-4-18
CHECKED: BLW / BLW
BY: CEO / CEO

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2AA

I-85

405

410

415

420

MATCHLINE
I-85 STA. 420+50.00
SEE SHEET TC4.2AB

+50±

25' SP.

Ⓓ   Ⓑ

+00±

300' EXIT RAMP TAPER

+00±

400' DECEL LANE

CHECKED BLW

BY CEO

5-24-18

FLATIRON

ZACHRY

a joint venture

Stantec

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Raleigh, NC 27606

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License No. F-0672

SOUTH CAROLINA
STANTEC
CONSULTING
SERVICES, INC.
No. C02310
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
PROFESSIONAL
No. 27345
Betsy L. Watson
BETSY L. WATSON
6/15/2018

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

I-85
STEP 2A

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2BA

I-85

405

410

415

420

MATCHLINE
I-85- STA. 420+50.00
SEE SHEET TC4.2BB

+00± TIE TO PREV PLACED TCB
OFFSET 2'

+00±   920' DECEL LANE

CHECKED   BLW
BY   CEO
NO.   DATE
5-24-18

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OF TRANSPORTATION

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I-85 / I-385 INTERCHANGE

I-85
STEP 2B

5/30/2018 4:25:02 PM   U:\1710-Transportation Management Plan MOT\DESIGN\AREA 0102 INTERCHANGE TMP\TMP_PLAN_SHEETS\TC04.2BA_I85_STEP 02B.DGN

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2CD

MUDDY FORD RD.

+10±

450' TRANSITION SHIFT

+60±

R 2930'

Ⓐ

Ⓒ

I-85

385

380

385

Ⓑ

Ⓐ

Ⓒ

32'

26'

300

MATCHLINE
I-85- STA. 375+50.00
SEE SHEET TC4.2CC

MATCHLINE
I-85- STA. 390+50.00
SEE SHEET TC4.2CE

I-85- STA. 390+50.00

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I-85 / I-385 INTERCHANGE

I-85
STEP 2C

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2CE

I85
STEP 2C
393+00

I85SB

4' 11' 11' 11' 2'2' 10' 16' 2' 3' 11' 11' 11'

I85NB

CONTRACTOR TO EVALUATE SHOULDER'S ABILITY TO
CARRY TRAFFIC AND PERFORM ANY NECESSARY
IMPROVEMENTS BEFORE PLACING TRAFFIC ON SHOULDER

TYPICAL WORK AREA ALONG I85 MEDIAN FOR DRAINAGE,
OVERHEAD SIGN FOUNDATIONS, AND CONCRETE MEDIAN
BARRIER REPLACEMENT

MATCHLINE
I-85 STA. 390+50.00
SEE SHEET TC4.2CD

MATCHLINE
I-85 STA. 405+50.00
SEE SHEET TC4.2CF

A

A

B

C

C

I-85

395

400

405

26'

26'

I85
393+00

CHECKED

BY

DESCRIPTION

REVISIONS

NO. DATE

CHECKED BLW

BY CEO

DESCRIPTION

REVISIONS

NO. DATE

5-24-18

FLATIRON

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SCDOT

I-85 / I-385 INTERCHANGE

I-85
STEP 2C

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2CF

MATCHLINE
I-85- STA. 405+50.00
SEE SHEET TC4.2CE

MATCHLINE
I-85- STA. 420+50.00
SEE SHEET TC4.2CG

I-85

I85
415+00

W1-4L
48" X 48"
STA. 418+00

I85
STEP 2C
415+00

I85SB   I85NB

| 15' | 11' | 11' | 11' | 2'2' | 10' | 16' | 2' 3' | 11' | 11' | 11' |

WALL I8

TYPICAL WORK AREA ALONG I85 MEDIAN FOR DRAINAGE,
OVERHEAD SIGN FOUNDATIONS, AND CONCRETE MEDIAN
BARRIER REPLACEMENT

REVISED TO REFLECT UPDATED ROCKY CREEK ROADWAY REVISIONS

5-24-18

CHECKED BLW
BY CEO

FLATIRON
ZACHRY
a joint venture

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No. 27345
PROFESSIONAL
BETSY L. WATSON
6/15/2018

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT
South Carolina Department of Transportation

I-85 / I-385 INTERCHANGE

I-85
STEP 2C

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2CG

W5-6B
48" X 48"
STA. 430+00±

LANES
NARROW
AHEAD

+50± 500' SHIFT TAPER +50±

+50±
OFFSET 2'

B

+90±
OFFSET 6'

25' SP.

+20± 320' MERGE TAPER

C E

D

I-85 STA. 420+50.00
SEE SHEET TC4.2CF
MATCHLINE

425

430

435

I-85 STA. 435+50.00
SEE SHEET TC4.2CH
MATCHLINE

27'

26'

I-85

50

+30±
OFFSET 6'

*REMOVE TEMP
PAVEMENT

55 55

+00±
OFFSET 5'

+00±

C

B

D A

I85
425+00

C

+00±
OFFSET 3'

E

+30±
OFFSET 15'

PELHAM RAMP

+73±
OFFSET 5'

C

PC Sta 50+00.00

PCC Sta 547+79.04

+50± 650' SHIFT TAPER +00±

*TEMP LANE CLOSURES ON I85 NB AND PELHAM RAMP MAY
BE USED IN PLACE OF TCB FOR REMOVAL OF TEMPORARY
PAVEMENT, AS ALLOWED BY THE ENGINEER.

I85
STEP 2C
425+00

ENTRANCE RAMP FROM PELHAM	GORE	I85SB	I85NB

19' 11' 11' 11' 2'2' 10' 16' 2' 3' 11' 11' 11' 12' 10'

EXISTING LANES

TYPICAL WORK AREA ALONG I85 MEDIAN FOR DRAINAGE,
OVERHEAD SIGN FOUNDATIONS, AND CONCRETE MEDIAN
BARRIER REPLACEMENT

EXIT LANE
FOR PELHAM

FLATIRON
ZACHRY
a joint venture

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SOUTH CAROLINA
Betsy L. Watson
No. 27345
BETSY L. WATSON
6/15/2018

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

I-85
STEP 2C

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2CH

W1-4R
48" X 48"
STA. 439+00

D

B

320' MERGE TAPER

+40±

12'

ROAD WORK AHEAD
W20-1
48" X 48"

ROAD WORK AHEAD
W20-1
48" X 48"
STA. 443+00

ROAD WORK 1000 FT

LANES NARROW AHEAD
W5-6B
48" X 48"
STA. 448+00±

POT Sta 447-76.64

I-85   440

445

6' 12' 12' 10'

B

A

C

+00±

END ROAD WORK
G20-2
48" X 24"
STA. 439+00

PELHAM RD

I-85 STA. 435+50.00
SEE SHEET TC4.2CG
MATCHLINE

+46±
OFFSET 5'

C

PELHAM RAMP   60

POT Sta 61-97.63

I-85 Sta 461-87

A

B

6' 12' 12' 4'

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2L

MUDDY FORD RD.

+60±

260' TRANSITION SHIFT

+20±

+70±
OFFSET 2'

+10±
OFFSET 6'

R 2920'

A   B   C

I-85

385

380

390

390

MATCHLINE
I-85 STA. 375+50.00
SEE SHEET TC4.2K

MATCHLINE
I-85 STA. 390+50.00
SEE SHEET TC4.2M

B   C

D

LANE ENDS
MERGE
LEFT

W9-2 L
48" X 48"
EXISTING LOCATION

W4-2R
48"X48"
EXISTING LOCATION

CHECKED

BY

DESCRIPTION

REVISIONS NO.   DATE

CHECKED   BLW   BLW

BY   CEO   CEO

DESCRIPTION

REVISED TO INCORPORATE ROCKY CREEK ROADWAY REVISIONS

REVISED TO REFLECT UPDATED ROCKY CREEK ROADWAY REVISIONS

REVISIONS NO.   DATE

10-17-16

5-24-18

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2M

I85
STEP 2
393+00

I85SB
EXISTING LANES

I85NB

1' 5'   11'   11'   11'   8' 3' 2'

RETAIN EXISTING
YELLOW EDGELINE

MATCHLINE
I-85- STA. 390+50.00
SEE SHEET TC4.2L

395

I-85

400

405

MATCHLINE
I-85- STA. 405+50.00
SEE SHEET TC4.2N

I85
393+00

+15±
OFFSET 2'

+35±
OFFSET 3'

+15±

660'± MERGE TAPER

D

TEMPORARY BARRIER
OFFSET OUTWARDS FOR
DRAINAGE SPREAD

+50±
OFFSET 3'

+70±
OFFSET 2'

+75±

A

B

C

FLATIRON
ZACHRY
a joint venture

Stantec

Stantec Consulting Services Inc.
801 Jones Franklin Road-Suite 300
Raleigh, NC 27606

Tel. 919.851.6866
Fax. 919.851.7024
www.stantec.com
License No. F-0672

SOUTH CAROLINA
STANTEC
CONSULTING
SERVICES, INC.
CERTIFICATE OF AUTHORIZATION
No. C02310

SOUTH CAROLINA
Betsy L. Watson
No. 27345
BETSY L. WATSON
6/15/2018

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

I-85
STEP 2

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2N

I-85

410   I-85   415   420

MATCHLINE
-I-85- STA. 405+50.00
SEE SHEET TC4.2M

MATCHLINE
-I-85- STA. 420+50.00
SEE SHEET TC4.2O

A   B   C   D

I85
415+00

+00±
OFFSET 2'

+35±
OFFSET 3'

+30±
OFFSET 3'

+30±   272' EXIT RAMP TAPER

TEMPORARY BARRIER
OFFSET OUTWARDS FOR
DRAINAGE SPREAD

I85
STEP 2
415+00

I85SB
EXISTING LANES

I85NB

5'   11'   11'   11'   2' 2'

Revisions (left margin):

CHECKED	BY	CHECKED	BY	DESCRIPTION	REVISIONS
BLW	CEO	BLW	CEO	REVISED TO INCORPORATE ROCKY CREEK ROADWAY REVISIONS	10-17-16
				REVISED TO REFLECT UPDATED ROCKY CREEK ROADWAY REVISIONS	5-24-18

FLATIRON
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No. C02310
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
PROFESSIONAL
No. 27345
Betsy L. Watson
BETSY L. WATSON
6/15/2018

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

I-85
STEP 2

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC6.7K

FIELD ADJUST OPENING OF R1 LANE AS NECESSARY

+60±   300'± TAPER   +60±

I-85

C   B   D

I-85

380

385

390

I-85 STEP 2

MATCHLINE I-385 STA. 375+50.00 SEE SHEET TC6.7J

CHECKED
BY
DESCRIPTION
REVISIONS
NO. DATE
CHECKED BLW
BY CEO
DESCRIPTION PROPOSED 85SB CONSTRUCTION LIMITS ADJUSTED IN ROCKY CREEK REVISIONS
REVISIONS
NO. DATE
5-24-18

FLATIRON
ZACHRY
a joint venture

Stantec
Stantec Consulting Services Inc.
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No. C02310
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
Betsy L. Watson
No. 27345
PROFESSIONAL
BETSY L. WATSON
6/15/2018

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

I-385
STEP 7

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC6.7L

VOID

© B

MATCHLINE
-I-85- STA. 390+50.00
SEE SHEET TC6.7K

MATCHLINE
-I-85- STA. 405+50.00
SEE SHEET TC6.7M

PT Sta. 394+38.80

395

400

405

I-85 STEP 2

FLATIRON
ZACHRY
a joint venture

Stantec
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801 Jones Franklin Road-Suite 300
Raleigh, NC 27606
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www.stantec.com
License No. F-0672

VOID

12/23/2015

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

I-385
STEP 7

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC6.7M

+00± +45±

45' SHIFT

+50±   380' SHIFT   +30±

B

C

I-85

12' 11'

410   415   420

MATCHLINE
I-85 STA. 405+50.00
SEE SHEET TC6.7L

FLATIRON
ZACHRY
a joint venture

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SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT
South Carolina Department of Transportation

I-85 / I-385 INTERCHANGE

I-385
STEP 7

I—85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003III-R02	I-85/ I-385	I-85 X83

CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. C00387
CERTIFICATE OF AUTHORIZATION

PAUL HANNA RAAD
6/7/2018 12:45:42 PM PDT

5/3/18   REVISED STA. 384+00 TO 425+00

384+00.00

383+50.00

383+00.00

0.0650 FT./FT.

5'
10'

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	0038III-R02	I-85/ I-385	I-85 X84

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. C00387
CERTIFICATE OF AUTHORIZATION
6/7/2018 12:43:42 p.m. PDT

SOUTH CAROLINA
Raul Hanna Road
PAUL HANNA ROAD

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

386·00.00

385·50.00

385·00.00

384·50.00

0.0650 FT./FT.

EX. RW

I-85

SOUTH CAROLINA
CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
Paul Hanna Road
No. 0559
PAUL HANNA ROAD
6/7/2018 12:49:42 PM PDT

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

387·00.00

886.50.00

EX. R/W

883.22
882.86
882.21
2:I
880.65
15:I
15:I

END CONSTRUCTION
I-85 SB STA. 386+60

0.0650 FT./FT.
0.0650 FT./FT.
879.09
878.77
879.75
879.45
15:I
879.20

0.0650 FT./FT.
877.89
876.33
875.68
15:I
12:I
875.22
871.44
871.10
8.549:I

879.24
878.95
878.57
15:I

0.0650 FT./FT.
877.39
0.0650 FT./FT.
875.83
15:I
875.18
12:I
2.874:I
874.65

EX. R/W
EX. R/W

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

885 880 875 870 865 860 855

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 X86

6/7/2018 12:43:42 PM PDT

△ 5/3/18 REVISED STA. 384+00 TO 425+00

Section 388+00.00

0.0650 FT./FT.   0.0650 FT./FT.

878.58 878.28 876.72 875.16 874.51 874.09 872.99

877.92

EX. RW   EX. RW

849.66

388+00.00

Section 387+50.00

0.0650 FT./FT.   0.0650 FT./FT.

878.84 878.56 877.00 875.44 874.79 874.33 874.09

878.03

EX. RW   EX. RW

850.31

387+50.00

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I-85

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

SOUTH CAROLINA CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING CERTIFICATE OF AUTHORIZATION NO. C00387

SOUTH CAROLINA REGISTERED PAUL HANNA PROFESSIONAL ENGINEER NO. 13531

6/7/2018 12:43

389+00.00

890 — 890
885 — 885
880 — 880
875 — 875
870 — 870
865 — 865
860 — 860
855 — 855

878.25
877.95
877.56
15:1
0.0650 FT./FT.
876.39
0.0650 FT./FT.
874.83
874.18
874.01
15:1
6:1
869.08
886.55
2:1
EX. RW
EX. RW

388+50.00

885 — 885
880 — 880
875 — 875
870 — 870
865 — 865
860 — 860
855 — 855

878.42
878.10
877.82
15:1
0.0650 FT./FT.
876.54
0.0650 FT./FT.
874.98
874.33
874.17
15:1
6:1
868.47
877.22
2:1
849.01
2:1
2:1
EX. RW
EX. RW

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003811I-R02	I-85/ I-385	I-85 X88

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

389·50.00

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 X89

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

0.0650 FT./FT.

0.0650 FT./FT.

877.90
877.63
877.25
876.07
874.51
873.86
873.69
870.70
899.12

390+00.00

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003811I-R02	I-85/ I-385	I-85 X90

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

905
900
895
890
885
880
875
870
865
860
855
850

EX. RW
905.31

EX. RW

877.73
877.46
15:1
0.0650 FT./FT.
875.90
0.0650 FT./FT.
874.34
873.69
873.52
15:1
876.99
6:1
870.55
2:1
905.31
EX. RW

390+50.00

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I–85

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
Paul Hanna Raad
PAUL HANNA RAAD
NO. 13591
6/7/2018 12:43:42 PM PDT

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

EX. RW
905.00

EX. RW

905

900

895

890

885

880

875

870

865

860

855

877.56
877.28
15:1
876.68
0.0650 FT./FT.
875.72
0.0650 FT./FT.
874.6
873.51
873.34
15:1
6:1
870.39

2:1

EX. RW
905.00

391+00.00

EX. RW

905

900

895

890

885

880

875

870

865

860

855

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003811-R02	I-85/ I-385	I-85 X92

6/7/2018 12:43:42 PM PDT

△ 5/3/18 REVISED STA. 384+00 TO 425+00

EX. RW

900.94
EX. RW

877.38
877.10
15:1
876.40
0.0650 FT./FT.
875.54
0.0650 FT./FT.
873.58
15:1
873.33
872.89
6:1
870.24

2:1

900.94
EX. RW

EX. RW

391+50.00

900		900
895		895
890		890
885		885
880		880
875		875
870		870
865		865
860		860
855		855

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003BIII-R02	I-85/ I-385	I-85 X93

6/7/2018 12:43:44 PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

392·00.00

	STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
	SC	GREENVILLE	003811-R02	I-85/ I-385	I-85 X94

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003811I-R02	I-85/ I-385	I-85 X95

6/7/2018 12:43:42 PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

890 ... 890
885 ... 885
880 ... 880
875 ... 875
870 ... 870
865 ... 865
860 ... 860
855 ... 855
850 ... 850

EX. RW

890.51
EX. RW

816.81
876.56
15:1
0.0650 FT./FT.
875.00
0.0650 FT./FT.
873.44
875.34
872.79
872.34
15:1
12:1
868.35
6:1
2:1
890.51

393•00.00

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I–85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003811I-R02	I-85/ I-385	I-85 X96

CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. C00387

CERTIFICATE OF AUTHORIZATION

PAUL HANNA ROAD

REVISED STA. 384+00 TO 425+00

Top section (394+00.00):

885
880
875
870
865
860
855
850

EX. RW

876.0
875.88
0.0514 FT./FT.
874.64
0.0514 FT./FT.
873.41
872.89
872.43
875.25
867.09
881.48
EX. RW

394·00.00

Bottom section (393+50.00):

890
885
880
875
870
865
860
855
850

876.55
876.31
0.0618 FT./FT.
874.82
0.0618 FT./FT.
873.34
872.72
872.26
875.19
867.72
885.82
EX. RW
EX. RW

393·50.00

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	0038III-R02	I-85/ I-385	I-85 X97

SOUTH CAROLINA
CIVIL ENGINEERING CONSULTING SERVICES, INC.
CERTIFICATE OF AUTHORIZATION
ENGINEERING
NO. C00387

SOUTH CAROLINA
PROFESSIONAL
Paul Hanna Raad
No. 23516
PAUL HANNA RAAD

6/7/2018 12:43:42 AM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

396+00.00

END S.E. ON RIGHT
STA. 395+46.80

395+00.00

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003BIII-R02	I-85/ I-385	I-85 X98

SOUTH CAROLINA
CIVIL ENGINEERING CONSULTING SERVICES, INC.
ENGINEERING
NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
Paul Hanna Road
Nov. 2558
PAUL HANNA ROAD
6/7/2018 12:43:40 PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

398+00.00

872.54
0.0208 FT./FT.   0.0208 FT./FT.
871.84 872.04   872.04 871.62 871.16
24:1   24:1 12:1
871.80
862.08
4:1
EX. RW
EX. RW

END S.E.ON LEFT
STA.397+46.80

873.11
0.0111 FT./FT.   0.0208 FT./FT.
872.64 872.84   872.61 872.29 871.73
24:1   24:1 12:1
872.53
864.28
3:1
EX. RW
EX. RW

397+00.00

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

875 870 865 860 855 850

I–85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 X99

6/27/2018 12:43:47 PM

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

401+00.00

0.0208 FT./FT.   0.0208 FT./FT.

869.80   870.00   870.50   870.00   869.58   869.41
869.56   24:1   24:1   12:1   868.83
866.41

400+00.00

870.52   870.72   871.22   870.72   870.30   870.13
870.45   24:1   24:1   12:1
863.23

399+00.00

871.21   871.41   871.91   871.41   870.99   870.65
871.20   24:1   24:1   12:1
862.88

EX. R/W

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 XIOO

CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. CO0387

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA PAUL HANNA ROAD
6/7/2018 12:43:40 PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

403+00.00

402+00.00

I–85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 XIOI

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
Paul Hanna Raad
No. 5591
PAUL HANNA RAAD
6/7/2018 12:43:42 PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

405•00.00

865.70
865.91
866.41
865.91
865.49
865.32
865.60
24:1
0.0208 FT./FT.
0.0208 FT./FT.
24:1
6:1
862.32

EX. RW
EX. RW
885.39
2:1

404•00.00

866.78
866.99
867.49
866.99
866.57
866.40
866.69
24:1
0.0208 FT./FT.
0.0208 FT./FT.
24:1
6:1
863.40

EX. RW
EX. RW
883.12
2:1

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003BIII-R02	I-85/ I-385	I-85 XI02

SOUTH CAROLINA
CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
Paul Hanna Road
Nov. 1358
PAUL HANNA ROAD

6/7/2018 12:43:42 PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

407+00.00

EX. RW
863.48 863.68
863.34
24'
0.0208 FT./FT. 864.18 0.0208 FT./FT. 863.58 863.26
24' 12' 862.80
6' 860.10
887.12
24'
EX. RW

406+00.00

EX. RW
884.44
24'
EX. RW
864.62 864.83 865.33 864.83 864.41
864.54 24' 0.0208 FT./FT. 0.0208 FT./FT. 24' 12' 863.95
6' 861.24

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I–85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 XIO3

CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. COO387

PAUL HANNA ROAD

6/7/2018 12:43:42 PM PDT

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

875 — 875
870 — 870
865 — 865
860 — 860
855 — 855
850 — 850

860.92 861.12 861.62 861.12 860.71 860.54
0.0208 FT./FT. 0.0208 FT./FT.
24:1 24:1
860.88 6:1
857.54
866.37
2:1

EX. RW EX. RW

409•00.00

890 — 890
885 — 885
880 — 880
875 — 875
870 — 870
865 — 865
860 — 860
855 — 855

862.22 862.42 862.92 862.42 862.01 861.55
0.0208 FT./FT. 0.0208 FT./FT.
24:1 24:1
862.14 6:1
858.84
880.0
2:1

EX. RW EX. RW

408•00.00

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 X104

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
ENGINEERING
NO. CO0387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
PROFESSIONAL
NO. 13959
PAUL HANNA ROAD

6/7/2018 13:43
REVISED STA. 384+00 TO 425+00.
5/3/18

Station 412+00.00

860 — 860
855 — 855
850 — 850
845 — 845
840 — 840

857.02 857.22 855.72 857.22 856.89 856.54
856.89 24:1 0.0208 FT./FT. 0.0208 FT./FT. 24:1 10:1 854.25
2:1
EX. RW

Station 411+00.00

860 — 860
855 — 855
850 — 850
845 — 845
840 — 840

858.33 858.52 859.02 858.52 858.11 857.62
858.15 24:1 0.0208 FT./FT. 0.0208 FT./FT. 24:1 12:1 854.11
4:1
EX. RW EX. RW

Station 410+00.00

865 — 865
860 — 860
855 — 855
850 — 850
845 — 845

859.62 859.82 860.32 859.82 859.41 859.17
859.34 24:1 0.0208 FT./FT. 0.0208 FT./FT. 24:1 12:1 856.62
6:1
EX. RW EX. RW

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003811I-R02	I-85/ I-385	I-85 XI05

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

415+00.00

853.13
853.33
853.83
853.33
853.06
852.71
855.12
24:I
0.0208 FT./FT.
0.0208 FT./FT.
24:I
10:I
851.06I
WALL 18

414+00.00

854.43
854.62
855.12
854.62
854.46
854.10
854.42
24:I
0.0208 FT./FT.
0.0208 FT./FT.
24:I
10:I
851.00I
WALL 18

413+00.00

855.73
855.92
855.42
855.92
855.73
855.57
855.53
24:I
0.0208 FT./FT.
0.0208 FT./FT.
24:I
10:I
853.61I
WALL 18

EX. RW

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 XIO6

⚠ 5/3/18   REVISED STA. 384+00 TO 425+00

418+00.00

417+00.00

416+00.00

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	0038III-R02	I-85/I-385	I-85 X107

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

BEG. TRANS. TO 36d
STA. 421+00

END TRANS. TO 36d
STA. 421+20

421+00.00

0.0208 FT./FT.   0.0208 FT./FT.

852.25 852.44   852.94   852.44   852.02   851.49
852.11   24d   24d   12d

420+00.00

0.0208 FT./FT.   0.0208 FT./FT.

851.46 851.66   852.16   851.66   851.24
851.45   24d   24d   10d
847.25
50d   846.89

419+00.00

0.0208 FT./FT.   0.0208 FT./FT.

851.06 851.25   851.75   851.25   850.83
850.80   24d   24d   10d
847.56
50d   847.21

EX. RW

865 860 855 850 845
860 855 850 845

5'
10'

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
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NO. C00387
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
Paul Hanna Road
No. 15550
PAUL HANNA ROAD

6/7/2018 12:43:42 PM PDT

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	003811I-R02	I-85/ I-385	I-85 X108

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

423+00.00

422+00.00

0.0208 FT./FT.

0.0278 FT./FT.

854.92
855.11
855.61
855.11
854.78
854.48
852.63
854.80

853.40
853.59
854.09
853.59
853.48
853.06
852.57
853.27

870 870
865 865
860 860
855 855
850 850
845 845

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

I-85

STATE	COUNTY	PROJECT ID	ROAD NO.	SHEET NO.
SC	GREENVILLE	OO38III-RO2	I-85/ I-385	I-85 XIO9

⚠ 5/3/18 REVISED STA. 384+00 TO 425+00

425•00.00

424•00.00

EX. RW

EX. RW

0.0208 FT./FT. 0.0208 FT./FT. 0.0278 FT./FT.

858.77 858.96 859.46 858.96 858.63 858.21
858.78 24:1 24:1 12:1 853.42

856.80 856.99 857.49 856.99 856.66 856.24
856.74 24:1 0.0208 FT./FT. 0.0208 FT./FT. 0.0278 FT./FT. 24:1 12:1 850.68

875 875
870 870
865 865
860 860
855 855
850 850
845 845

870 870
865 865
860 860
855 855
850 850
845 845
840 840

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

5'
10'

May 22, 2018

Mr. Maher Almassri
Civil Engineering Consulting Services, Inc.
2000 Park Street – Suite 201
Columbia, SC 29201

Re: Interstate 85/385 Interchange Improvements
        Rocky Mountain Creek Retaining Wall 18
        Greenville County, SC
        ECS Project No. 08-9283-B6

Dear Mr. Almassri:

As you are aware, ECS Southeast provided Mechanically Stabilized Earth (MSE) Wall recommendations as part of the Final Roadway Geotechnical Engineering Report titled Rocky Mountain Creek Roadway and Retaining Walls, dated October 25, 2016. It is our understanding that since the completion of the report, revisions were made to the retaining walls. Walls 18B, 18C, and 55 have been removed from the project, and require no further analysis. Wall 18A has been revised and was renumbered to wall 18. The purpose of this letter is to provide supplementary geotechnical recommendations for wall 18.

Wall 18A previously consisted of a wire faced MSE wall from station 413+00 to 419+40 (640 feet long) ranging in height from 4.33 feet to 10.27 feet tall. We understand that the wall has been shortened to 200 feet long with an alignment from station 413+00 to 415+00. Wall heights have also been decreased to a range of 3.21 feet to 6.75 feet.

An external stability analysis was performed for Wall 18 at station 413+50 with a design height of 7 feet. The results of the analysis are summarized below in Tables 1.0 and 1.1.

Table 1.0 – MSE Wall External Stability Analysis Results					
Wall Number	**Design Height, H, ft[1]**	**Minimum Reinforcement Length, B_{req}, ft (%H)**	**Calculated Resistance Factor**		**Max. Factored Bearing Resistance, psf**
			Bearing Capacity[2]	**Sliding[3]**	
18	3 < H ≤ 7	12.5 (1.79H)	0.23	0.47	5,400

Table 1.1 – MSE Wall External Stability Analysis Results (Extreme Event 1)					
Wall Number	**Design Height, H, ft[1]**	**Minimum Reinforcement Length, B_{req}, ft (%H)**	**Calculated Resistance Factor**		**Max. Factored Bearing Resistance, psf**
			Bearing Capacity[2]	**Sliding[3]**	
18	3 < H ≤ 7	12.5 (1.79H)	0.17	0.52	8,400

Notes:
1. Height analyzed is measured from PGL to embedment depth.
2. Maximum Resistance factor is 0.65 for Static Bearing Capacity and 1.0 for Seismic Bearing Capacity.
3. Maximum resistance factor is 1.0 for sliding.

Static and extreme limit state global stability was also evaluated for Wall 18 at station 414+00. Extreme limit state (seismic) considers a pseudo-static horizontal acceleration (kh) of 0.20. Results are summarized below in Tables 1.2 and 1.3.

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ECS Capitol Services, PLLC • ECS Florida, LLC • ECS Mid-Atlantic, LLC • ECS Midwest, LLC • ECS Southeast, LLP • ECS Texas, LLP

Rocky Mountain Creek Roadway and Retaining Walls
I-85/385 Interchange Improvements
Greenville County, South Carolina
Page 2

ECS Project No. 08-9283
May 22, 2018

Table 1.2 – Static Global Stability Analysis

Wall Number	Direction	Loading Condition	Demand/ Capacity, D/C			Performance Criteria Met
			Morganstern-Price	Bishop	Spencer	
Wall 18 I-85 Station 413+50	Transverse	ESA	0.61	0.61	0.61	Yes
		TSA	0.41	0.41	0.41	Yes

Table 1.3 – Extreme Limit State Global Stability Analysis

Wall Number	Direction	k_h	Demand/Capacity, D/C			Performance Criteria Met
			Morganstern-Price	Bishop	Spencer	
Wall 18 I-85 Station 413+50	Transverse	0.20	0.61	0.62	0.61	Yes

Revisions to the Geotechnical Notes on Plans have been made to reflect the changes to walls 18 and 55, and are provided in attached Roadway Notes on Plans. As shown in the attached analysis, the proposed wall 18 meets the SCDOT GDM performance requirements.

If you have any questions concerning the MSE Wall recommendations, please do not hesitate to contact us.

Respectfully,

ECS SOUTHEAST, LLP

Jacob E. Erickson, E.I.
Geotechnical Staff Project Manager

Marc F. Plotkin, P.E., D.GE
Principal Engineer
SC Registration No. 30565

Attachments: MSE External Stability Results
MSE Global Stability Results
Geotechnical Notes on Plans

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
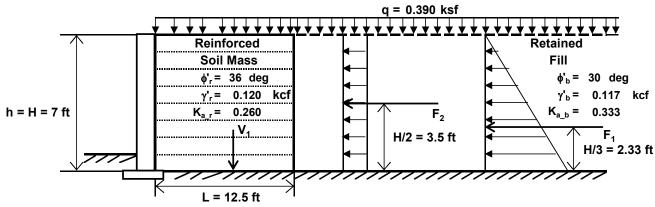GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER

WBS NO.:   TIP NO.:   COUNTY:
SUBJECT: LRFD External Stability Analysis for MSE Walls
I-85 Wall 18
PREPARED BY: **JEE**   DATE: **05/22/18**   STATION: **413+50**
CHECKED BY: DATE: STR. NO.:   SHEET: 1 OF 8

Input Traffic Surcharge, Backslope, Wall Geometry, and Soil Parameters

Traffic and Overlay Surcharge Surcharge

q = **390** psf   *Live Load Traffic Surcharge and Pavement Overlay*

35.9 % Surcharge due to overlay

q_{ol} = 140 psf   *Pavement overlay surcharge*

Backslope

Horizontal Backslope

(d = horizontal distance from back of wall face to top of backslope)

Wall Geometry

H = **7.00** ft   *Wall Height*

L/H = **1.79**   *Ratio of Reinforcement Length to Wall Height*

(L/H ≥ 0.7 *per NCDOT MSE Wall Standard Provision*)

L = 12.50 ft   *Reinforcement Length*

(L ≥ 6 ft *per NCDOT MSE Wall Standard Provision*)

h = 7.00 ft   *Height of Wall & Slope at the back of Reinforced Zone*

D_w = **10.00** ft   *Distance of Water Table below the Bottom of the Wall*

Soil Parameters for Reinforced Zone

ϕ'_r = **36** deg   *Effective Friction Angle*

γ'_r = **120** pcf   *Effective Unit Weight*

K_{a_r} = 0.260   *Active Earth Pressure Coefficent (AASHTO Eqn 3.11.5.3-2)*

Soil Parameters for Retained Backfill

ϕ'_b = **30** deg   *Effective Friction Angle*

γ'_b = **117** pcf   *Effective Unit Weight*

K_{a_b} = 0.333   *Active Earth Pressure Coefficent (AASHTO Eqn 3.11.5.3-2)*

Soil Parameters for Foundation Soil

ϕ'_f = **26** deg   *Effective Friction Angle*

γ_f = **105** pcf   *Total Unit Weight*

c_f = **100** psf   *Undrained Shear Strength (Cohesion)*

μ = 0.49   *Coefficient of Friction (AASHTO 11.10.5.3)*

The coefficient of friction shall be based on the lesser of ϕ'_r and ϕ'_f.

Input Load and Resistance Factors

Load Factors (See AASHTO Table 3.4.1-1 and 2)

Ψ_{LS} = **1.75**   *Lilve Load Surcharge*

$\Psi_{EH(A)}$ = **1.50**   *Horizontal (Active) Earth Pressure Load*

Ψ_{EV} = **1.00** min   Vertical Dead Load Generated from Earth Fill

      1.35 max

Ψ_{EQ-p} = **1.00**

Ψ_{EQ-LL} = **0.50**

Resistance Factors (See AASHTO Table 11.5.6-1)

φ_b = **0.65**   *Bearing Resistance for MSE Walls*

φ_τ = **1.00**   *Sliding Resistance for MSE Walls*

Seismic Design Acceleration Parameters

k_{max} = **0.20**   *Maximum Horizontal Ground Acceration (PGA)*

S_{d1} = **0.14**   *Peak spectral acceleration at 1 second*

References:

1. AASHTO LRFD Bridge Design Specifications, 5th Edition, 2010
2. FHWA-NHI-10-024 Design and Construction of MSE Walls and Reinforced Soil Slopes - Vol I, 2009
3. SCDOT Geotechnical Design Manual version 1.1, 2010

Typical MSE Wall with Level Backslope and Traffic Surcharge

Typical MSE Wall with Infinite Backslope

Typical MSE Wall with Broken Backslope and Traffic Surcharge

Calculate Forces acting on Wall

External Stability for MSE Walls: Earth Pressure - Level Backslope with Surcharge Case
(Based on FHWA Figure 4-2 and AASHTO Figure 11.10.5.2-1)
All Forces are Calculated per Unit Length of Wall
Figure Not Drawn to Scale

Forces from Vertical Earth Loads

V_1 = Total Vertical Force from the Reinforced Soil Mass = $(\gamma'_r)(H)(L)$
= (0.120 kcf)(7.00 ft)(12.50 ft) = __10.500 kips__

Forces from Lateral Earth Pressure

F_1 = Total Force Generated from Lateral Earth Pressure = $0.5(\gamma'_b)(H^2)(K_{ab})$ FHWA Eqn. 4-5
= (0.5)(0.117 kcf)(7.00 ft)^2(0.333) = __0.955 kips__

Horizontal Force from Traffic Surcharge

F_2 = Force Generated from Traffic Surcharge = $(q)(H)(K_{ab})$ *FHWA Eqn. 4-6*
= (0.390 ksf)(7.00 ft)(0.333) = __0.909 kips__

Sliding Stability - AASHTO 11.10.5.3, AASHTO 10.6.3.4, and FHWA 4.4.6.a

The passive resistance at the toe due to embedment is ignored due to the potential for soil to be removed through natural or manmade processes.
(per FHWA 4.4.6.a)

External Stability for MSE Walls: Sliding Stability - Level Backslope with Surcharge Case
(Based on FHWA Figure 4-2 and AASHTO Figure 11.10.5.2-1)
All Forces are Calculated per Unit Length of Wall
Figure Not Drawn to Scale

Calculate Factored Sliding Resistance (R_R)

$R_R = \varphi R_N = \varphi_\tau R_\tau$ *AASHTO Eqn. 10.6.3.4-1*

WBS NO.:	TIP NO.:	COUNTY:
SUBJECT:	LRFD External Stability Analysis for MSE Walls	
	I-85 Wall 18	

PREPARED BY: JEE DATE: 05/22/18 STATION: 413+50

CHECKED BY: DATE: STR. NO.: SHEET: 3 OF 8

Sliding Stability Continued - AASHTO 11.10.5.3, AASHTO 10.6.3.4, and FHWA 4.4.6.a

φ_τ = Resistance Factor for Sliding = 1.00 *(AASHTO Table 11.5.6-1)*

R_τ = Nominal Sliding Resistance between Reinforced Soil Mass and Foundation Soil

= $\Psi_{EV}(V_1)\mu + (c_f)(L)$ *FHWA Eqn. 4-12 and AASHTO 10.6.3.4*

Ψ_{EV} = Load Factor for Dead Load of Earth Fill = 1.00 *AASHTO Table 3.4.1-1*

(Use the Min Value of Ψ_{EV} per FHWA 4.4.6.a, AASHTO C3.4.1, and AASHTO C11.5.5)

V_1 = Total Vertical Force from the Reinforced Soil Mass = 10.500 kips

μ = Coefficent of Friction between Reinforced Soil Mass and Foundation Soil = 0.49 *AASHTO 11.10.5.3*

c_f = Cohesion for Foundation Soil = 0.100 ksf

L = Reinforcement Length = 12.50 ft

R_τ = (1.00)(10.50 kips)(0.49) + (0.100 ksf)(12.50 ft) = 6.40 kips

R_R = (1.00)(6.40 kips) = 6.40 kips

Calculate Factored Horizontal Driving Force (P_d)

$P_d = (\Psi_{EHA})(F_1) + (\Psi_{LS})(F_2)$ *FHWA Eqn. 4-9*

Ψ_{EHA} = Load Factor for Horizontal (Active) Earth Pressure = 1.50 *AASHTO Table 3.4.1-1*

F_1 = Force Generated from Lateral Earth Pressure = 0.955 kips *FHWA Eqn. 4-5*

Ψ_{LS} = Load Factor for Horizontal (Active) Earth Pressure = 1.75 *AASHTO Table 3.4.1-1*

F_2 = Force Generated from Traffic Surcharge = 0.909 kips *FHWA Eqn. 4-6*

P_d = (1.50)(0.955 kips) + (1.75)(0.909 kips) = 3.023 kips

Check Sliding

R_R must be greater than or equal to P_d

6.395 kips ≥ 3.023 kips

OK

Calculated Resistance Factor

$P_d/(Rr/\varphi_t)$ = **0.47**

Overturning (Limiting Eccentricity) - AASHTO 11.6.3.3, AASHTO 11.10.5.5 and FHWA 4.4.6.b

Eccentricity (e) = the distance between the resultant foundation load (R) and the center of the reinforced zone

q = 0.390 ksf

Reinforced Soil Mass
ϕ'_r = 36 deg
γ'_r = 0.120 kcf
K_{a_r} = 0.260
V_1

h = H = 7 ft

F_2

H/2 = 3.5 ft

Retained Fill
ϕ'_b = 30 deg
γ'_b = 0.117 kcf
K_{a_b} = 0.333

F_1
H/3 = 2.33 ft

e

R

L = 12.5 ft

Foundation Soil
ϕ'_f = 26 deg γ_f = 0.105 kcf c_f = 0.100 ksf

External Stability for MSE Walls: Overturning - Level Backslope with Surcharge Case
(Based on FHWA Figure 4-7 and AASHTO Figure 11.10.5.2-1)
Figure Not Drawn to Scale - All Forces are Calculated per Unit Length of Wall
Figure Not Drawn to Scale

Calculate Eccentricity (e)

$$e = \frac{\Psi_{EHA}F_1(H/3) + \Psi_{LS}F_2(H/2)}{\Psi_{EV}V_1}$$

FHWA Eqn. 4-15

Overturning (Limiting Eccentricity) Continued - AASHTO 11.6.3.3, AASHTO 11.10.5.5 and FHWA 4.4.6.b

Ψ_{EHA} = Load Factor for Horizontal (Active) Earth Pressure = 1.50

Ψ_{EV} = Load Factor for Dead Load of Earth Fill = 1.00
(Use the Min Value of Ψ_{EV} per FHWA 4.4.6.a, AASHTO C3.4.1, and AASHTO C11.5.5)

Ψ_{LS} = Load Factor for Surcharge = 1.75

F_1 = Force Generated from Lateral Earth Pressure = 0.955 kips

F_2 = Force Generated from Traffic Surcharge = 0.909 kips

V_1 = Total Vertical Force from the Reinforced Soil Mass = 10.500 kips

H = MSE Wall Height = 7.00 ft

$$e = \frac{(\ 1.50\ )(\ 0.955\ \text{kips}\ )(\ 2.33\ \text{ft}\ ) + (\ 1.75\ )(\ 0.909\ \text{kips}\ )(\ 3.50\ \text{ft}\ )}{(\ 1.00\ )(\ 10.500\ \text{kips}\ )}$$

= 0.85 ft

Check Eccentricity

e must be less than or equal to L/4 per AASHTO 11.6.3.3

0.85 ft ≤ 3.13 ft

OK

Bearing Resistance (General Shear) - AASHTO 11.10.5.4, AASHTO 10.6.3.1, and FHWA 4.4.6.c

External Stability for MSE Walls: Bearing Resistance - Level Backslope with Surcharge Case
(Based on FHWA Figure 4-7 and AASHTO Figure 11.10.5.2-1)
All Forces are Calculated per Unit Length of Wall
Figure Not Drawn to Scale

Calculate Eccentricity for Bearing, (e_B)

$$e_B = \frac{\Psi_{EHA}F_1(H/3) + \Psi_{LS}F_2(H/2)}{\Psi_{EV}V_1 + \Psi_{LS}qL}$$ *FHWA Eqn. 4-19*

Ψ_{EHA} = Load Factor for Horizontal (Active) Earth Pressure = 1.50   *AASHTO Table 3.4.1-1*

Ψ_{EV} = Load Factor for Dead Load of Earth Fill = 1.35   *AASHTO Table 3.4.1-1 and FHWA 4.4.6.a*
(Use the Max Value of Ψ_{EV} per FHWA 4.4.6.a, AASHTO C3.4.1, and AASHTO C11.5.5)

Ψ_{LS} = Load Factor for Surcharge = 1.75   *AASHTO Table 3.4.1-1*

F_1 = Force Generated from Lateral Earth Pressure = 0.955 kips   *FHWA Eqn. 4-5*

F_2 = Force Generated from Traffic Surcharge = 0.909 kips   *FHWA Eqn. 4-6*

V_1 = Total Vertical Force from the Reinforced Soil Mass = 10.500 kips

Bearing Resistance Continued (General Shear) - AASHTO 11.10.5.4, AASHTO 10.6.3.1, and FHWA 4.4.6.c

q = Live Load Traffic Surcharge = 0.390 ksf

H = MSE Wall Height = 7.00 ft

L = Reinforcement Length = 12.50 ft

$$e_B = \frac{(\ 1.50\ )(\ 0.955\ \text{kips})(\ 2.33\ \text{ft}) + (\ 1.75\ )(\ 0.909\ \text{kips})(\ 3.50\ \text{ft})}{(\ 1.35\ )(\ 10.5\ \text{kips}) + (\ 1.75\ )(\ 0.390\ \text{ksf})(\ 12.50\ \text{ft})}$$

= 0.39 ft

<u>Calculate Nominal Bearing Resistance, (q_n)</u>   *AASHTO Eqn. 10.6.3.1.2a-1*

$q_n = c_f N_c + 0.5\gamma B' N_\gamma C_{w\gamma}$ *AASHTO Eqn. 10.6.3.1.2a-1*

c_f = Cohesion for Foundation Soil = 0.100 ksf

N_c = Bearing Capacity Factor (based on ϕ'_f) = 22.30   *AASHTO Table 10.6.3.1.2a-1*

γ_f = Total Unit Weight for Foundation Soil = 0.105 kcf

B' = Effective Foundation Width = L - 2e_B *AASHTO C11.10.5.4*

= 12.5 ft - 2(0.39 ft) = 11.72 ft

N_γ = Bearing Capacity Factor (based on ϕ'_f) = 12.50   *AASHTO Table 10.6.3.1.2a-1*

$C_{w\gamma}$ = Correction Factor to Account for Location of Groundwater Table = 0.8   *AASHTO Table 10.6.3.1.2a-2*

q_n = (0.100 ksf)(22.30) + (0.5)(0.105 kcf)(11.72 ft)(12.50)(0.80)

= 8.383 ksf

<u>Calculate Factored Bearing Resistance, (q_r)</u>

$q_r = \varphi_b q_n$ *AASHTO Eqn. 10.6.3.1.1-1*

φ_b = Resistance Factor for Bearing = 0.65   *AASHTO Table 11.5.6-1*

q_n = Nominal Bearing Resistance = 8.383 ksf   *AASHTO Eqn. 10.6.3.1.2a-1*

q_r = (0.65)(8.383 ksf) = 5.449 ksf

<u>Calculate Factored Vertical Bearing Pressure at the base, ($q_{V\text{-}F}$)</u>

$$\sigma_{V\text{-}F} = \frac{\Psi_{EV}V_1 + \Psi_{LS}qL}{L - 2e_B}$$ *FHWA Eqn. 4-20*

Ψ_{EV} = Load Factor for Dead Load of Earth Fill = 1.35   *AASHTO Table 3.4.1-1 and FHWA 4.4.6.a*

(Use the Max Value of Ψ_{EV} per FHWA 4.4.6.c, AASHTO C3.4.1, and AASHTO C11.5.5)

V_1 = Total Vertical Force from the Reinforced Soil Mass = 10.500 kips

Ψ_{LS} = Load Factor for Surcharge = 1.75   *AASHTO Table 3.4.1-1*

q = Live Load Traffic Surcharge = 0.390 ksf

L = Reinforcement Length = 12.50 ft

e_B = Eccentricity for Bearing = 0.39 ft   *FHWA Eqn. 4-19*

$$\sigma_{V\text{-}F} = \frac{(\ 1.35\ )(\ 10.50\ \text{kips ft}) + (\ 1.75\ )(\ 0.390\ \text{ksf})(\ 12.50\ \text{ft})}{12.50\ \text{ft} - 2(\ 0.39\ \text{ft})}$$

= 1.937 ksf

<u>Check Bearing</u>   <u>Calculated Resistance Factor</u>

q_R must be greater than or equal to $q_{V\text{-}F}$ $\sigma_{V\text{-}F}/q_n$ = **0.23**

5.449 ksf ≥ 1.937 ksf

OK

Bearing Resistance (Local/Punching Shear) - AASHTO 11.10.5.4, AASHTO 10.6.3.1.2b, and FHWA 4.4.6.c

Local and Punching shear failure occurs in loose or compressible soils and in weak soils under slow (drained) loading. This mode of failure will only be considered for foundation material that is cohesive.

To prevent Local/Punching Shear on weak cohesive soils

$(\gamma_r)(H) \le 3c_f$ *FHWA Eqn. 4-24*

γ_r = Effective Unit Weight of Reinforced Soil Mass = 0.120 kcf
H = Height of MSE Wall = 7.00 ft
c_f = Undrained Shear Strength (Cohesion) of Foundation Soil = 0.100 ksf

(0.120 kcf)(7.00 ft) ≤ 3 (0.100 ksf)

0.840 ksf > 0.300 ksf   **The foundation is subject to Local/Punching Shear. Check Reduced Bearing Resistance**

Calculate Reduced Nominal Bearing Resistance, (q_n)

$q_n = c^*_f N_c + 0.5\gamma B' N_\gamma C_{w\gamma}$ *AASHTO Eqn. 10.6.3.1.2a-1*

   c^*_f = Reduced Cohesion for Foundation Soil = $0.67c_f$
     = 0.67 (0.100 ksf) = 0.067 ksf   *AASHTO 10.6.3.1.2b-1*
   N_c = Bearing Capacity Factor (based on f^*_f) = 13.10   *AASHTO Table 10.6.3.1.2a-1*
     γ = Effective Unit Weight for Foundation Soil = 0.105 ksf
   B' = Effective Foundation Width = $L - 2e_B$ *AASHTO C11.10.5.4*
     = 12.5 ft - 2 (0.39 ft) = 11.72 ft
   N_γ = Bearing Capacity Factor (based on ϕ'^*_f) = 4.10   *AASHTO Table 10.6.3.1.2a-1*
   $C_{w\gamma}$ = Correction Factor to Account for Location of Groundwater Table = 0.8   *AASHTO Table 10.6.3.1.2a-2*
   ϕ'^*_f = Reduced Friction Angle for Foundation Soil = $\tan^{-1}(0.67 \tan \phi'_f)$
     = $\tan^{-1}$[0.67 tan (26 deg)] = 18 deg   *AASHTO 10.6.3.1.2b-2*

q_n = (0.067 ksf)(13.10) + (0.5)(0.105 kcf)(12.50 ft)(4.10)(0.8)

   = 3.030 ksf

Calculate Reduced Factored Bearing Resistance, (q_r)

$q_r = \varphi_b q_n$ *AASHTO Eqn. 10.6.3.1.1-1*

   φ_b = Resistance Factor for Bearing = 0.65   *AASHTO Table 11.5.6-1*
   q_n = Nominal Bearing Resistance = 3.030 ksf   *AASHTO Eqn. 10.6.3.1.2a-1*

q_r = (0.65)(3.030 ksf) = 1.970 ksf

Check Bearing

q_R must be greater than or equal to q_{V-F}
1.97 ksf ≥ 1.937 ksf
OK

Seismic Stablity - SCDOT GDM Section 14.12

Calculate Wave Scattering Effects

Wave Scattering Coefficient, α_w $=1+0.01H((0.5\beta)-1<1.0$ SCDOT Equation 13-103

$$\alpha_w = 0.9545$$

Ground Motion Index, $\beta=k_{max}/S_{d1}$ =   0.70   SCDOT Equation 13-104

Average seismic horizontal coefficient due to wave scattering

$$k_h = \alpha_w * k_{max} = \quad 0.2 \qquad\qquad \text{SCDOT Equation 13-102}$$

Calculate Seismic Active Earth Pressure Coefficinet (Mononobe -Kobe Method) SCDOT GDM Section 14.4.1

Seismic Active Earth Pressure Coefficient Reinforced Soils, K_{AEr} =   0.584

Seismic Active Earth Pressure Coefficient Retained, K_{AEb} =   0.678

$$K_{ae} = \frac{\cos^2(\phi - \Psi - \theta)}{\cos(\Psi)\cos^2(\theta)\cos(\delta + \theta + \Psi)\left[1 + \sqrt{\frac{\sin(\phi + \delta)\sin(\phi - \Psi - \beta)}{\cos(\delta + \theta + \Psi)\cos(\beta - \theta)}}\right]^2} \qquad \text{Equation 14-2}$$

Where,

γ	=	unit weight of soil
H	=	height of wall or effective height of wall (h_{eff})
ϕ	=	angle of internal friction of soil
Ψ	=	$\tan^{-1}[k_h/(1-k_v)]$
δ	=	angle of friction between soil and wall
k_h	=	horizontal acceleration coefficient
k_v	=	vertical acceleration coefficient, typically set to zero.
β	=	backfill slope angle
θ	=	angle of backface of the wall with the vertical

Reinforced Soil				Retained Soil		
φ	=	36.0	deg	φ =	30.0	deg
Ψ	=	11.3	deg	Ψ =	11.3	deg
θ	=	0	deg	θ =	0	deg
δ	=	0	deg	δ =	0.00	deg
β	=	0	deg	β =	0	deg

Calculate Inertial Wall Width, $B_{inertial} = \omega H$ 5

         coefficient, ω =   0.70

Calculate Active Earth Thrust Force, $P_{AE} = \gamma_p*0.5K_{AEr}*\gamma_p*H^2$ =   1.9   kips   GDM Eq. 14-40

Calculate Intertial Reinforced Soil Mass Force, $P_{IR} = \gamma_p*k_{avg}*B_{inertial}*H_{wall}*$ =   0.12   kips   GDM Eq. 14-41

Dead Load Surcharge Force, P_{DC} =   = 0.664   kips   GDM Eq. 14-45

Live Load Surcharge Force, P_{LL} =   = 0.593   kips   GDM Eq. 14-46

Total Seismic Driving Force, F_H =   3.3   kip   Calculated Resistance Factor, $\varphi = F_H/R_t$ =   **0.52**

Calculate Eccentricity for Bearing, (e_B)

$$e_B = \frac{\Psi_{EQ-P}F_{1s}(H/2) + \Psi_{EQ-LL}F_{2s}(H/2)}{\Psi_{EV}V_1 + \Psi_{EQ-LL}qL}$$

FHWA Eqn. 4-19

$\Psi_{EHAeq} = \Psi_{EQ-p}$ = Load Factor for Horizontal (Active) Earth Pressure = 1.00   *AASHTO Table 3.4.1-1*

Ψ_{EV} = Load Factor for Dead Load of Earth Fill = 1.00   *AASHTO Table 3.4.1-1 and FHWA 4.4.6.a*

(Use the Min Value of Ψ_{EV} per FHWA 4.4.6.a, AASHTO C3.4.1, and AASHTO C11.5.5)

$\Psi_{LSeq} = \Psi_{EQ-p}$ = Load Factor for Surcharge = 1.00   *AASHTO Table 3.4.1-1*

F_{1s} = Force Generated from Lateral Earth Pressure = 2.725 kips   *FHWA Eqn. 4-5*

F_{2s} = Force Generated from Traffic Surcharge = 0.593 kips   *FHWA Eqn. 4-6*

V_1 = Total Vertical Force from the Reinforced Soil Mass = 10.500 kips

q = Live Load Traffic Surcharge = 0.250 ksf   *FHWA Eqn. 4-19*

H = MSE Wall Height = 7.00 ft

L = Reinforcement Length = 12.50 ft

$$e_B = \frac{(\ 1.00 \ )(\ 2.725 \ kips)(\ 3.50 \ ft) + (\ 1.00 \ )(\ 0.593 \ kips)(\ 3.50 \ ft)}{(\ 1.00 \ )(\ 10.5 \ kips) + (\ 1.00 \ )(\ 0.250 \ ksf)(\ 12.50 \ ft)}$$

= 0.85 ft

Calculate Factored Vertical Bearing Pressure at the base, (q_{V-F})

$$\sigma_{V-F} = \frac{\Psi_{EQ-P}V_1 + \Psi_{EQ-LS}qL}{L - 2e_B}$$

FHWA Eqn. 4-20

Ψ_{EQ-p} = Load Factor for Dead Load of Earth Fill = 1.00

V_1 = Total Vertical Force from the Reinforced Soil Mass = 10.500 kips

$\Psi_{LSeq} = \Psi_{EQ-ll}$ = Load Factor for Surcharge = 1.00

q = Live Load Traffic Surcharge = 0.250 ksf

L = Reinforcement Length = 12.50 ft

e_B = Eccentricity for Bearing = 0.85 ft

$$\sigma_{V-F} = \frac{(\ 1.00 \ )(\ 10.50 \ kips)(\ ft) + (\ 1.00 \ )(\ 0.250 \ ksf)(\ 12.50 \ ft)}{12.5 \ ft - 2(\ 0.85 \ ft)}$$

= 1.424 ksf

Calculated Resistance Factor

σ_{V-F}/q_n = **0.17**

Safety Factor

	0.00
	0.25
	0.50
	0.75
	1.00
	1.25
	1.50
	1.75
	2.00
	2.25
	2.50
	2.75
	3.00
	3.25
	3.50
	3.75
	4.00
	4.25
	4.50
	4.75
	5.00
	5.25
	5.50
	5.75
	6.00+

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Wall		120	Mohr-Coulomb	4000	0	None	0
Med. Stiff Sandy Lean Clay		105	Mohr-Coulomb	100	26	None	0
Very Soft Sandy Lean Clay		105	Mohr-Coulomb	50	26	None	0
Loose Silty Sand		105	Mohr-Coulomb	50	28	None	0
Dense Silty Sand		120	Mohr-Coulomb	50	34	None	0
PWR		137	Mohr-Coulomb	400	40	None	0

Method Name	Min FS
Bishop simplified	1.63
Spencer	1.63
GLE / Morgenstern-Price	1.63

390.00 lbs/ft2   390.00 lbs/ft2   390.00 lbs/ft2   390.00 lbs/ft2

1.63

Project	I-85/385 Interchange Improvements - Project ID: 003811; ECS Project No. 9283				
Analysis Description	Rocky Mountain Creek Roadway and Retaining Walls - Wall 18 Sta 414+00				
Drawn By	JEE	Scale	1:200	Company	ECS Southeast LLP
Date	05-22-2018			File Name	STA 414+00 ESA.slim

rocscience

SLIDEINTERPRET 8.010

Safety Factor

	0.00
	0.25
	0.50
	0.75
	1.00
	1.25
	1.50
	1.75
	2.00
	2.25
	2.50
	2.75
	3.00
	3.25
	3.50
	3.75
	4.00
	4.25
	4.50
	4.75
	5.00
	5.25
	5.50
	5.75
	6.00+

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Wall		120	Mohr-Coulomb	4000	0	None	0
Med. Stiff Sandy Lean Clay		105	Mohr-Coulomb	1000	0	None	0
Very Soft Sandy Lean Clay		105	Mohr-Coulomb	500	0	None	0
Loose Silty Sand		105	Mohr-Coulomb	50	28	None	0
Dense Silty Sand		120	Mohr-Coulomb	50	34	None	0
PWR		137	Mohr-Coulomb	400	40	None	0

Method Name	Min FS
Bishop simplified	2.44
Spencer	2.45
GLE / Morgenstern-Price	2.45

2.44

250.00 lbs/ft2   250.00 lbs/ft2   250.00 lbs/ft2   250.00 lbs/ft2

Project	I-85/385 Interchange Improvements - Project ID: 003811; ECS Project No. 9283
Analysis Description	Rocky Mountain Creek Roadway and Retaining Walls - Wall 18 Sta 414+00
Drawn By	JEE
Scale	1:200
Company	ECS Southeast LLP
Date	05-22-2018
File Name	STA 414+00 TSA.slim

SLIDEINTERPRET 8.010

Safety Factor

	0.00
	0.25
	0.50
	0.75
	1.00
	1.25
	1.50
	1.75
	2.00
	2.25
	2.50
	2.75
	3.00
	3.25
	3.50
	3.75
	4.00
	4.25
	4.50
	4.75
	5.00
	5.25
	5.50
	5.75
	6.00+

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Wall		120	Mohr-Coulomb	4000	0	None	0
Med. Stiff Sandy Lean Clay		105	Mohr-Coulomb	1000	0	None	0
Very Soft Sandy Lean Clay		105	Mohr-Coulomb	500	0	None	0
Loose Silty Sand		105	Mohr-Coulomb	50	28	None	0
Dense Silty Sand		120	Mohr-Coulomb	50	34	None	0
PWR		137	Mohr-Coulomb	400	40	None	0

Method Name	Min FS
Bishop simplified	1.62
Spencer	1.63
GLE / Morgenstern-Price	1.63

1.62

► 0.2

140.00 lbs/ft2   140.00 lbs/ft2   140.00 lbs/ft2   140.00 lbs/ft2

SLIDEINTERPRET 8.010

Project	I-85/385 Interchange Improvements - Project ID: 003811; ECS Project No. 9283			
Analysis Description	Rocky Mountain Creek Roadway and Retaining Walls - Wall 18 Sta 414+00			
Drawn By	JEE	Scale	1:200	Company	ECS Southeast LLP
Date	05-22-2018			File Name	STA 414+00 TSA -EQ.slim

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Greenville County, South Carolina

ECS Project No. 08-9283

NOTES ON PLANS

The following notes apply to borrow materials:

Provide borrow materials meeting the following minimum requirements:
- **A sandy material (35% or less passing 0.075 mm) with a minimum total soil unit weight, γ_{total} of 110 pcf, with a maximum dry density exceeding 100 pcf.**
- **Minimum friction angle, φ, of 30° and cohesion, c, of 50 psf for embankment fill, alternatively embankment fill may consist of a minimum friction angle (φ) of 34° with zero cohesion.**
- **No. 57 Stone backfill for Mechanically Stabilized Earth Walls**

In addition, determine the moisture-density relationship and classification of the material. Test and submit the classification, moisture-density relationship, and soil strength parameters of the material to the Engineer for acceptance. An AASHTO certified laboratory is required to perform the testing. Contact the RPG Geotechnical Engineer for a list of locally available AASHTO certified laboratories. The Department may perform independent testing to assure quality.

Determine the friction angle and cohesion using either direct shear testing or consolidated-undrained triaxial shear testing with pore pressure measurements. Direct Shear testing shall only be performed on soils with a fines content of less than 25 percent. Classification testing includes grain-size distribution with wash #200 sieve, moisture plasticity testing and natural moisture content. Use the Standard Proctor test to determine the moisture-density relationship. Remold all samples used in shear strength testing to 95 percent of the Standard Proctor density. Conduct shear strength testing at the initial selection of the borrow pit, any subsequent changes in borrow pits, and for every 10,000 cy of materials placed. Perform classification testing for every 50,000 cy of materials placed, including the material used for the shear strength testing. Additional shear testing may be required if, in the opinion of the RCE, the materials being placed are different from those originally tested.

If these minimum criteria cannot be met, provide the soil parameters for the intended borrow excavation material for the project site to the Engineer for review and acceptance. After acceptable borrow material is obtained, compact the fill to the required finish grade line using the compactive effort indicated in the Standard Specifications for Highway Construction, Section 205 (Embankment Construction).

The following notes apply to muck excavation:

Any areas identified on the plans and any additional areas that are discovered to deflect or settle may require corrective action as directed by the RCE. This may include undercutting; placing No. 57 stone aggregate that is separated from other borrow materials by a geotextile for separation of sub-grade and sub-base, and/or additional compactive effort to the approval of the RCE.

In areas that require mucking or undercutting, borrow material soil may be placed as a bridge lift as long as the grade on which the material is being placed is at least 2 feet above ground water level. In the event that groundwater does not allow backfilling with a

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borrow material soil, use a No. 57 stone as the bridge lift material. Borrow material bridge lifts may not exceed a 2-foot thickness. The depth at which mucking or undercutting is required is dependent upon encountering a suitable bearing material within the excavation or if a predetermined elevation or depth is required. In most cases, do not undercut more than 3 to 5 feet. The RCE will determine the final mucking or undercutting thickness, unless otherwise specified in the project plans and/or specifications. If a suitable bearing soil is not encountered within this depth range, place a P1 biaxial geogrid with an aperture size of less than or equal to 1 inch and in accordance with the project special provisions beneath a 2-foot thick bridge lift of No. 57 stone. If additional compacted borrow material soil is needed to reach grade, place a geotextile for separation of sub-grade and sub-base between the No. 57 stone and the overlying compacted soil. A bridge lift consisting of borrow material soil may not be placed within 3 feet of the base of the pavement section. Place only compacted borrow material soil or No. 57 stone within this zone. Reference the Standard Specifications for Highway Construction, Earthwork Section, Division 200.

The following notes apply for MSE Wall Subgrades:

Prior to construction of the leveling pad and MSE fill, the RCE shall verify that the retaining wall is founded on subgrade materials possessing the minimum allowable bearing capacity noted on wall plan and elevation sheets. If the RCE determines that the subgrade is unacceptable for placement of MSE fill, the contractor shall undercut the subgrade to the limits directed by the RCE. Unacceptable subgrade materials include, but are not limited to, all high plasticity clays and elastic silts (CH, MH), low plasticity clays and silts (CL, ML) with an unconfined compressive strength less than 2,000 psf, and deleterious debris. Replacement of undercut material will be with Backfill Material, meeting requirements outlined in the SCDOT Standard Specifications for Highway Construction.

The foundation area for the MSE walls might have scattered pockets of soft soils that might be present at the surface or just below the surface for the base of the MSE fill. These soft pockets are only expected to extend a few feet below the base of the MSE fill. The quality assurance representative shall proofroll the subgrade in this area and/or conduct dynamic cone tests at regular intervals to determine that the subgrade meets the requirements of the paragraph above.

There are several locations along the roadway alignment where proposed drainage structures are situated in front of (i.e. parallel) MSE walls, or where new and existing draining structures pass beneath the MSE walls. Where new pipes are parallel to the proposed wall, the pipe should be installed prior to the proposed wall or the wall design should account for the temporary reduction in passive resistance. Where pipes pass beneath walls, the pipes should be designed to account for the increased loading associated with the wall backfill. We recommend the top of each pipe be situated a minimum of 1 foot below the bottom of retaining.

The following notes apply for settlement and displacement monitoring:

The contractor shall establish a monitoring program consisting of settlement instruments. The settlement monitoring program must include establishing settlement monitoring instruments on the subgrade soils prior to fill placement, and at design

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pavement subgrade elevation. Settlement monitoring instruments are required at a spacing of every 100 feet along MSE Walls and every 500 feet along embankments with new fill thicknesses exceeding 20 feet. Instruments shall be established at the centerline of road and edge of pavement. Settlement monitoring shall continue until three consecutive measurements demonstrate the rate of settlement is less than 0.1 inches per year. No more than one measurement shall be obtained on a single day.

A minimum of 2 measurements shall be obtained on monuments prior to fill placement, and instruments shall be measured weekly during fill placement. Instrumentation measurements shall be provided to the Geotechnical Engineer within 24 hours of measurements for interpretation. Interpreted results shall be provided to the RCE.

The following notes apply to slope construction:

Where the new fill meets the existing slope, the existing slope shall be benched to limit the potential for a preferential failure surface and to allow compaction at the interface. Benches shall have a minimum horizontal length of 8 feet and a vertical rise of no more than 3 feet. Fill slopes of 2H:1V or steeper shall be overbuilt (i.e. fill should temporarily extend beyond the final slope face) to allow compaction at the slope face. After compaction is complete, the slope may be regraded to the final inclination.

Should seeps or thick lenses of highly plastic soils be observed in the planned fill and cut slopes that are steeper than 2H:1V, ECS must be contacted to determine if the steeper slopes may be constructed as planned or if slope flattening or reinforcing is required. Similarly, if soft or wet ground conditions are observed at the base of planned fill embankments, the QA representative must determine the limits of undercutting required or required in-situ treatment.

The following Plan Notes apply to Mechanically Stabilized Earth walls:

Reinforced Backfill (Granular Fill or stone.)

Internal Friction Angle (deg) = 36
Total Unit Weight = 120 pcf
Surcharge Dead Load for Pavement Overlay = 140 psf
Active Earth Pressure Coefficient = 0.26

Retained Backfill

Internal Friction Angle (deg) = 30
Total Unit Weight = 117 pcf
Active Earth Pressure Coefficient = 0.33

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Wall 17 – I-85 Station
Foundation Soils
Total – Internal Friction Angle (deg) = 26
Total – Cohesion = 0 psf
Effective – Internal Friction Angle (deg) = 26
Effective – Cohesion = 0 psf

Wall Height	Min. Breq	Factored Bearing (Static)	Factored Bearing (Seismic)
0 < H ≤ 7.5	14.5 ft	2,000 psf	3,100 psf

Wall 18 – I-85 Station 413+00 to 415+00
Foundation Soils
Total – Internal Friction Angle (deg) = 0
Total – Cohesion = 1000 psf
Effective – Internal Friction Angle (deg) = 26
Effective – Cohesion = 100 psf

Wall Height	Min. Breq	Factored Bearing (Static)	Factored Bearing (Seismic)
3 < H ≤ 7	12.5 ft	5,400 psf	8,400 psf

Stantec Consulting Services Inc.
4969 Centre Pointe Drive Suite 200, North Charleston SC 29418-6952

April 26, 2015
Revised April 26, 2015
Revised March 29, 2018

File: 171001537

Attention: Rocque Kneece
CECS, Inc
2000 Part Street, Suite 201
Columbia SC, 29201

Dear Rocque,

Reference: I-85 / I-385 Interchange – FEMA No-Rise Study – SCDOT Review

Introduction
Stantec performed a FEMA No-Rise analysis for an approximately 5000 foot reach of Rocky Creek at Interstate 85 in Greenville, South Carolina. Per FEMA regulations (44 CFR 60.3(d)(3)), a No-Rise analysis must demonstrate a zero-increase (0.00 feet) in the base flood elevation (BFE), floodway elevations, or floodway widths through hydrologic and hydraulic analysis before land development occurs within a floodway. A No-Rise analysis was performed due to proposed interstate modifications within the effective floodway.

The No-Rise analysis utilized the effective FEMA hydraulic model (HEC-RAS version 4.0) which provided cross sections, surveyed structures, and hydrology (steady-state flow rates). Detailed design of the proposed conditions were provided to Stantec and then incorporated into the hydraulic model using HEC-RAS version 4.1. Water surface profiles were produced for the 2-, 10-, 25-, 50-, 100-, and 500-year storm events.

Effective Model
The Flood Insurance Rate Maps for Greenville County became effective in August 18, 2014, and the project area is located in FEMA Map Number 45045C0407E. The Rocky Creek hydraulic model is comprised of the main channel and 6 additional tributaries. There are 2 areas of interest for this No-Rise study. The first location is at the I-85 culvert bridge crossing, and the second location is approximately 2500 feet upstream of the culvert bridge where Rocky Creek meanders back towards I-85. This location was included into the study because of the close proximity between the 100-year floodplain, floodway, and proposed I-85 modifications.

Duplicate Effective Model
The duplicate effective model is a truncated reproduction of the effective model for the specific project area. The two areas of interest described above are located between cross sections 24541 and 28374. However, the actual project limits for the No-Rise analysis are extended to 3 additional upstream cross sections and 1 additional downstream cross section. The project limits

Design with community in mind

Reference: I-85 / I-385 Interchange – FEMA No-Rise Study – SCDOT Review

for the No-Rise analysis are defined from cross section 24314 to 28944 as seen in the main channel of the hydraulic model. Boundary conditions for each water surface profile are known water surface elevations from the results of the original effective model. Results of the duplicate effective model come within 0.1 feet of the effective model.

Corrected Effective Model
A corrected effective model includes any significant corrections or errors to the effective model. For this study, no corrections or errors were discovered in the effective model.

Existing Conditions Model
The existing conditions model reflects any modifications or updated topography within the project area since the date of the effective model. Because the effective model was dated August 2014, no modifications or topography were incorporated into the model.

Proposed Conditions
Land development activity within the floodway includes I-85 road widening for portions of the north bound and south bound lanes. No modifications to the existing box culverts are proposed. All proposed modifications described in this report are within the 300 foot I-85 right-of-way.

The hydraulic methodologies for the proposed conditions model match the effective model. For instance, no additional cross sections were created, contraction/expansion coefficients were not revised, the jersey barrier was disregarded, and the bridge modeling approach was not adjusted. However, Manning's n values were adjusted as necessary to match proposed conditions.

The proposed conditions were the result of an iterative process to add or reduce modifications to reach zero increase (0.00) in the BFE, floodway elevation, and floodway width. For instance, retaining walls are proposed to limit the embankment impact to the BFE. There is approximately1400 LF of retaining wall proposed in the southbound lane, and approximately 800 LF of retaining wall proposed in the north bound lane. The proposed modifications were represented in the hydraulic model by overlaying the effective model cross sections, proposed road design stationing centerline, and ESRI aerial imagery in ArcGIS software. The proposed roadway design was the foundation to the proposed conditions hydraulic model. However, the No-Rise analysis is iterative in nature and additional revisions to the proposed roadway design were made. The additional revisions were agreed upon during phone conversations and are not reflected in the original roadway design plans. Upon approval of this report, the intent is to update the roadway design plans with the additional revisions. Proposed conditions within the No-Rise project area are more specifically described by the following:

1. I-85 Northbound lane widening between Station 387+00 to Station 422+00
    a. Proposed conditions incorporated from roadway design plans

Design with community in mind

Reference: I-85 / I-385 Interchange – FEMA No-Rise Study – SCDOT Review

      b.   ~~Additional revisions include the off-ramp taper beginning at Station 414+00 was shifted north to Station 421+00. Stantec was instructed to maintain 17 feet between existing edge of pavement and outside edge of guardrail from Station 414+00 to Station 421+00, then maintain 21 feet starting at STA422+00~~

      c.   Additional revisions include off ramp taper starting at 421+00. Revisions also include a reduction in the earthen shoulder from approximately 410+00 to 426+00 per the revised plans.

2.   ~~I-85 Southbound lane widening between Station 387+00 to Station 412+00~~
      a.   ~~Proposed conditions incorporated from roadway design plans~~
      b.   ~~Additional revisions include:~~
          i.   ~~Reduced embankment impact to 10 feet from existing edge-of-pavement at Station 410+00~~
          ii.   ~~Southbound lane extended 18 additional feet between Station 386+00 and Station 400+00~~

3.   I-85 Northbound retaining wall between Station 414+00 to ~~Station 422+00~~ Station 416+00
      a.   ~~A retaining wall was incorporated as an additional revision at Cross Section 24541 and Cross Section 24668 with embankment cuts~~
      b.   Additional revisions include embankment cuts at Cross Sections 24541 and 24668 per the proposed plans.

4.   ~~I-85 Southbound retaining wall between Station 387+00 to Station 401+00~~
      a.   ~~A retaining wall was incorporated as an additional revision at Cross Sections 28374, 28216, 27999, 27809, 27572, and 27339~~

Reference: I-85 / I-385 Interchange – FEMA No-Rise Study – SCDOT Review

Results

Since there was no corrected effective model and no modifications to topography/structures needed, the existing conditions model would be a replica of the duplicate effective model. Therefore, the proposed conditions model results were compared against the duplicate effective model. The difference between the two models resulted in a 0.00 feet (or less) increase in the BFE, floodway elevations, and floodway widths thus satisfying the FEMA No-Rise requirement.

Table 1 – No-Rise Analysis Results (BFE)

Cross Section		100-yr Water Surface Elevations (feet NAVD88)			
		Effective	Existing*	Proposed	Delta
					(Proposed - Existing)
Rocky Creek_24314.4			848.25	848.25	0.00
Rocky Creek_24541.44			849.51	849.5	-0.01
Rocky Creek_24668.16	AQ	849.9	849.94	849.77	-0.17
Rocky Creek_25380.96			851.44	851.23	-0.21
Rocky Creek_25539.36			853.49	853.43	-0.06
Rocky Creek_25687.2	AR	853.6	853.56	853.5	-0.06
Rocky Creek_25893.12			853.58	853.53	-0.05
Rocky Creek_26083.2			853.6	853.54	-0.06
Rocky Creek_26220.48			853.6	853.55	-0.05
Rocky Creek_26400	AS	853.6	853.64	853.58	-0.06
Rocky Creek_26574.24			853.72	853.67	-0.05
Rocky Creek_26806.56			853.74	853.69	-0.05
Rocky Creek_27033.6	AT	853.9	853.85	853.8	-0.05
Rocky Creek_27155.04			853.95	853.94	-0.01
Rocky Creek_27339.84			854.11	854.1	-0.01
Rocky Creek_27572.16	AU	854.2	854.19	854.18	-0.01
Rocky Creek_27809.76			854.49	854.48	-0.01
Rocky Creek_27999.84			854.91	854.91	0.00
Rocky Creek_28216.32	AV	856.5	856.48	856.48	0.00
Rocky Creek_28374.72			857.19	857.19	0.00
Rocky Creek_28570.08			857.42	857.42	0.00
Rocky Creek_28707.36	AW	857.4	857.46	857.45	-0.01
Rocky Creek_28944.96			857.59	857.59	0.00
*Results from duplicate effective model					

Design with community in mind

Reference: I-85 / I-385 Interchange – FEMA No-Rise Study – SCDOT Review

Table 2 – No-Rise Analysis Results (Floodway)

Cross Section		Floodway Elevations (feet NAVD88)				Floodway Widths (feet)			
		Effective	Existing*	Proposed	Delta	Effective	Existing*	Proposed	Delta
					(Proposed - Existing)				(Proposed - Existing)
Rocky Creek_24314.4			848.98	848.98	0.00		160	160	0.00
Rocky Creek_24541.44			849.95	849.95	0.00		160	160	0.00
Rocky Creek_24668.16	AQ	850.3	850.28	850.20	-0.08	160	160	160	0.00
Rocky Creek_25380.96			851.58	851.50	-0.08		382	382	0.00
Rocky Creek_25539.36			854.35	854.32	-0.03		350	350	0.00
Rocky Creek_25687.2	AR	854.5	854.52	854.49	-0.03	350	350	350	0.00
Rocky Creek_25893.12			854.53	854.50	-0.03		300	300	0.00
Rocky Creek_26083.2			854.53	854.50	-0.03		225	225	0.00
Rocky Creek_26220.48			854.53	854.50	-0.03		225	225	0.00
Rocky Creek_26400	AS	854.6	854.59	854.56	-0.03	225	225	225	0.00
Rocky Creek_26574.24			854.68	854.65	-0.03		270	270	0.00
Rocky Creek_26806.56			854.69	854.66	-0.03		270	270	0.00
Rocky Creek_27033.6	AT	854.8	854.81	854.79	-0.02	270	270	270	0.00
Rocky Creek_27155.04			854.92	854.86	-0.06		270	270	0.00
Rocky Creek_27339.84			855.03	854.97	-0.06		230	230	0.00
Rocky Creek_27572.16	AU	855.2	855.22	855.16	-0.06	215	215	215	0.00
Rocky Creek_27809.76			855.43	855.38	-0.05		155	155	0.00
Rocky Creek_27999.84			855.88	855.84	-0.04		155	155	0.00
Rocky Creek_28216.32	AV	856.9	856.87	856.85	-0.02	155	155	155	0.00
Rocky Creek_28374.72			857.93	857.91	-0.02		235	235	0.00
Rocky Creek_28570.08			858.33	858.32	-0.01		250	250	0.00
Rocky Creek_28707.36	AW	858.3	858.39	858.38	-0.01	250	250	250	0.00
Rocky Creek_28944.96			858.58	858.58	0.00		250	250	0.00

*Results from duplicate effective model

Regards,
STANTEC CONSULTING SERVICES INC.

Shaun Cavey, PE
Project Engineering Specialist
Phone: (843) 740-6345
shaun.cavey@stantec.com

Design with community in mind

ROCKY CREEK
NO-RISE STUDY
GREENVILLE, SOUTH CAROLINA

Legend

→ FEMA Cross Section

Tax_Parcel

— Stream Centerline

FEMA Floodplain

Flood Zones

A,

AE,

AE, FLOODWAY

X, 0.2 PCT ANNUAL CHANCE FLOOD HAZARD

DATE:
3/10/2015

PAGE:
1 of 1

PROJECT NO:
-

SCALE:
1 inch = 300 feet

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	IL1

INDEX OF SHEETS

SHEET NO.	DESCRIPTION	TOTAL SHEETS
1	TITLE SHEET	1
1A	RIGHT OF WAY TITLE SHEET	1
IL1	INDEX OF SHEETS	1
IL2 - IL34	PLAN SHEET/REVISION LOGS	33
2	SUMMARY OF ESTIMATED QUANTITIES	OMITTED
3 - 3D	TYPICAL SECTIONS	5
3E	GEOTECHNICAL NOTES	1
3F	DRAINAGE DETAIL SHEET	1
3G	PCCP JOINT DETAILS	1
4 - 4A	RIGHT OF WAY DATA SHEETS	2
4B - 4F	PROPERTY STRIP MAPS	5
5	GENERAL CONSTRUCTION NOTES	OMITTED
5A	PLAN SHEET LAYOUT	1
5B- 5L	REFERENCE DATA SHEETS	11
6 - 34	PLAN SHEETS	31
35 - 120	PROFILE SHEETS	86
121	CURB PROFILES	1
D1 - D33	DRAINAGE SHEETS	35
TC1 - TC18.2	TEMPORARY TRAFFIC CONTROL PLANS	287
TS1 - TS164	TEMPORARY SIGNING PLANS	167
TA - TAX235	TEMPORARY ROADWAY PLANS	290
PM1 - PM29	PAVEMENT MARKING PLANS	29
SN1 - SN 96	SIGNING PLANS	96
SL1 - SL29	SIGN LIGHTING PLANS	29
S01 - SC9	ROADWAY STRUCTURE SHEETS	117
EC1 - EC10	EROSION CONTROL PLANS	10
I-85 X1 - I-85 X113	I-85 CROSS SECTIONS	113
I-85 NBCD X1 - I-85 NBCD X24	I-85 NBCD CROSS SECTIONS	24
PELHAM X1 - PELHAM X6	PELHAM RAMP CROSS SECTIONS	6
I-385 X1 - I-385 X103	I-385 CROSS SECTIONS	105
I-385 NBCD X1 - I-385 NBCD X37	I-385 NBCD CROSS SECTIONS	39
I-385 SBCD X1 - I-385 SBCD X31	I-385 SBCD CROSS SECTIONS	31
RAMP 1 X1 - RAMP 1 X36	RAMP 1 CROSS SECTIONS	36
RAMP 1A X1 - RAMP 1A X34	RAMP 1A CROSS SECTIONS	34
RAMP 1B X1 - RAMP 1B X13	RAMP 1B CROSS SECTIONS	13
RAMP 2 X1 - RAMP 2 X10	RAMP 2 CROSS SECTIONS	10
RAMP 2A X1 - RAMP 2A X50	RAMP 2A CROSS SECTIONS	50
RAMP 2B X1 - RAMP 2B X25	RAMP 2B CROSS SECTIONS	25
RAMP 3 X1 - RAMP 3 X20	RAMP 3 CROSS SECTIONS	20
RAMP 3A X1 - RAMP 3A X17	RAMP 3A CROSS SECTIONS	17
RAMP 4 X1 - RAMP 4 X33	RAMP 4 CROSS SECTIONS	33
RAMP 4B X1 - RAMP 4B X28	RAMP 4B CROSS SECTIONS	28
RAMP 5 X1 - RAMP 5 X14	RAMP 5 CROSS SECTIONS	14
RAMP 7 X1 - RAMP 7 X5	RAMP 7 CROSS SECTIONS	5
RAMP 8 X1 - RAMP 8 X12	RAMP 8 CROSS SECTIONS	12
RAMP 8A X1 - RAMP 8A X10	RAMP 8A CROSS SECTIONS	10
RAMP 9 X1 - RAMP 9 X4	RAMP 9 CROSS SECTIONS	6
RAMP 10 X1 - RAMP 10 X9	RAMP 10 CROSS SECTIONS	9
RAMP 11 X1 - RAMP 11 X12	RAMP 11 CROSS SECTIONS	12
DRAIN X1 - DRAIN X22	DRAINAGE CROSS SECTIONS	22
	TOTAL SHEETS	1917

△8 ADDED SHEETS 3G, TA-X63A TO TA-X63E, TA-X145A TO TA-X145D, TA-X151A, TA-X157A, TA-X157B, TA-X182 TO TA-X210, I-385 X52A, I-385 X52B, I-385 NBCD X34A, I-385 NBCD X12A, RAMP 9 X0, RAMP 9 X5.

△9 10/21/16 - ADDED SHEETS IL33, TA-24, TA-X211 TO TA-X220.

△10 10/28/16 - ADDED SHEETS IL34, D33, TC4.2AA TO TC4.2AC, TC4.2BA TO TC4.2BC, TC4.2CA TO TC4.2CH, TC4.2Q, TA-2C, TA-25, TA-X221 TO TA-X235, S0-40 TO S0-43, S17-1, S18-1 TO S18-4, S55-1 TO S55-5, EC8 TO EC10.

△11 1/12/17 - ADDED SHEET S32-7

△12 2/2/17 - ADDED SHEETS TA-26, TA-X236 TO TA-X241

△13 3/16/17 - ADDED SHEET D32A

△14 12/18/17 - ADDED SHEETS TC4.2A.1A AND TC4.2A.1B

△15 1/9/18 - ADDED SHEET SC9

△16 5/3/18 - REMOVED SHEETS S18-2, S18-3, S18-4, S55-1, S55-2, S55-3, S55-4, S55-5

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
1	1/27/16	ADDED SHEET TC2H TO TC SERIES	D.R.R.	B.G.N.	5	7/8/16	TC/TA SERIES SHTS ADDED,IL32 ADDED	D.R.R.	B.G.N.
2	4/29/16	PLAN SHEET/ REVISION LOGS ADDED	D.P.M.	B.G.N.	6	8/9/16	ADDED SHT TC4.2G.I	D.R.R.	R.L.K.
3	5/12/16	TAX84A-C ADDED	D.R.R.	B.G.N.	7	8/18/16	ADDED SHEET SO-44	D.R.R.	R.L.K.
4	6/17/16	SHEET SO-39 ADDED	D.R.R.	R.L.K.	8	9/28/16	ADDED SHEETS	B.G.N.	R.L.K.

DRAWN BY : A.W.F
DATE : 6/10/15

REVIEWED BY : B.A.H.
DATE : 09/04/15

APPROVED BY : B.G.N.
DATE : 09/20/15

FLATIRON   ZACHRY

CE CS   CIVIL ENGINEERING CONSULTING SERVICES, INC.

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION   SCDOT

I-85 / I-385 INTERCHANGE

INDEX OF SHEETS

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	PM13

MUDDY FORD ROAD

APPLY 6" WHITE
PAVEMENT EDGE LINE

APPLY 6" WHITE
BROKEN LANE LINE

APPLY 6" YELLOW
PAVEMENT EDGE LINE

APPLY 6" WHITE
PAVEMENT EDGE LINE

APPLY 6"-2'
WHITE SKIP LINES

APPLY 6"-2'
WHITE SKIP LINES

END CONSTRUCTION
STA.386+60.00 I-85 SB WIDENING

MATCH LINE STA. 373+00.00
SEE SHEET PM12

MATCH LINE STA. 388+00.00
SEE SHEET PM14

380

375

385

INTERSTATE 85 SB

C I-85

INTERSTATE 85 NB

12'
12'
12'

12'

12'
12'
12'

12'
12'
12'
12'

12'
12'
12'

12'
12'
12'

12'
12'
12'

APPLY 6" WHITE
PAVEMENT EDGE LINE

APPLY 6" WHITE
BROKEN LANE LINE

APPLY 6" YELLOW
PAVEMENT EDGE LINE

APPLY 6" WHITE
PAVEMENT EDGE LINE

MUDDY FORD ROAD

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠	05/02/18	REMOVED I85 SB PAVEMENT MARKINGS STA. 386+60.00 TO STA. 388+00.00	R.L.D.	B.G.N.					
★									

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.R.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

FLATIRON ZACHRY

CECS
CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0 50 100 150 200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

PAVEMENT MARKING PLAN SHEET
STA. 373+00.00 TO STA. 388+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	PM14

N

MATCH LINE STA. 388+00.00
SEE SHEET PM13

INTERSTATE 85 SB

390

395

℄ I-85

400

INTERSTATE 85 NB

MATCH LINE STA. 403+00.00
SEE SHEET PM15

12′
12′
12′
12′

12′
12′
12′
12′

APPLY 6" WHITE
PAVEMENT EDGE LINE

APPLY 6" WHITE
BROKEN LANE LINE

APPLY 6" YELLOW
PAVEMENT EDGE LINE

APPLY 6" WHITE
PAVEMENT EDGE LINE

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠ ★	05/02/18	REMOVED I85 SB PAVEMENT MARKINGS STA. 388+00.00 TO STA. 403+00.00	R.L.D.	B.G.N.					

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.R.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE :

FLATIRON ZACHRY

C E
C S
CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA
CIVIL ENGINEERING
CONSULTING
SERVICES, INC.
CERTIFICATE OF AUTHORIZATION
ENGINEERING
NO. C00387

SOUTH CAROLINA
PROFESSIONAL
License No. 23889
ENGINEER
BRYAN GLENN NATION

6/6/2018

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

PAVEMENT MARKING PLAN SHEET
STA. 388+00.00 TO STA. 403+00.00

N

MATCH LINE STA. 403+00.00
SEE SHEET PM14

MATCH LINE STA. 418+00.00
SEE SHEET PM16

405

410

415

INTERSTATE 85 SB

℄ I-85

INTERSTATE 85 NB

12'
12'
12'
12'

12'
12'
12'
12'

BEGIN RAMP TAPER MOVED
FROM STA. 414+00 TO STA. 421+00

APPLY 6" WHITE
PAVEMENT EDGE LINE

APPLY 6" WHITE
BROKEN LANE LINE

APPLY 6" YELLOW
PAVEMENT EDGE LINE

APPLY 6" WHITE
PAVEMENT EDGE LINE

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠ 1	05/16/16	ADJUSTED PAVEMENT MARKINGS FOR PELHAM ROAD EXIT	R.L.D.	B.G.N.					
⚠ 2	05/02/18	REMOVED I85 SB PAVEMENT MARKINGS STA. 403+00.00 TO STA. 414+30.20	R.L.D.	B.G.N.					

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.P.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

FLATIRON ZACHRY

CECS
CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

PAVEMENT MARKING PLAN SHEET
STA. 403+00.00 TO STA. 418+00.00

INTERCHANGE WALL SUMMARY

WALL #	WALL TYPE	FROM STA.	TO STA.	ALIGNMENT
1	MSE	1+00.00	3+63.51	WALL 1
1	MSE	-		SEE BRIDGE 10 PLANS
1	MSE	8+31.02	12+09.78	WALL 1
2	MSE			SEE BRIDGE 10 PLANS
2A	MSE	4+74.09	8+13.33	WALL 2A
2B	BARRIER	8+13.33	61+43.24	WALL 2B
3	MSE	-	-	SEE BRIDGE 7/9 PLANS
4	MSE	-	-	SEE BRIDGE 9 PLANS
5	MSE	-	-	SEE BRIDGE 12 PLANS
6	MSE	-	-	SEE BRIDGE 12 PLANS
7	MSE	-	-	SEE BRIDGE 6 PLANS
8	MSE	-	-	SEE BRIDGE 8 PLANS
9	MSE	-	-	SEE BRIDGE 8 PLANS
10	SOIL NAIL	10+00.00	14+68.53	WALL 10
11	BARRIER	10+00.00	14+83.98	WALL 11
12	PILE AND PANEL	9+98.70	17+50.70	WALL 12
12	MSE/SOIL NAIL	-	-	SEE BRIDGE 11 PLANS
12	PILE AND PANEL	18+57.39	30+81.39	WALL 12
12	MSE	30+81.39	39+04.30	WALL 12
12	MSE			SEE BRIDGE 5 PLANS
13	MSE	10+50.00	18+85.45	WALL 13
14	R. CONCRETE	10+00.00	15+84.09	WALL 14
15	BARRIER	1+00.00	32+38.27	WALL 15
16A	BARRIER	10+00.00	17+70.00	WALL 16A
16B	SOIL NAIL	17+74.84	19+34.84	WALL 16B
16B	PILE AND PANEL	19+34.84	21+58.84	WALL 16B
16B	MSE/SOIL NAIL	-	-	SEE BRIDGE 11 PLANS
16B	SOIL NAIL	22+75.00	26+51.00	WALL 16B
17	MSE	10+30.00	11+25.00	WALL 17
18	WIRE FACED MSE	413+00.00	415+00.00	I85
19	OMITTED			
20	56" RIGID SLOPE BARRIER	327+50.37	329+27.97	I385/I 385 NBCD
21	PILE AND PANEL	10+00.00	19+28.00	WALL 21
22	BARRIER	10+00.00	104+49.65	WALL 22
23	BARRIER	0+33.82	11+53.89	WALL 23
24	BARRIER	1+00.00	38+99.60	WALL 24
25	BARRIER	1+00.00	6+39.83	WALL 25
26	SOIL NAIL	10+00.00	12+70.00	WALL 26
27	SOIL NAIL	10+10.00	12+16.00	WALL 27
27	SOIL NAIL	12+16.00	16+09.30	WALL 27
28	MSE	-	-	SEE BRIDGE 4 PLANS
29	MSE	-	-	SEE BRIDGE 4 PLANS
30	MOMENT SLAB BARRIER	374+25.00	375+42.02	I385 NBCD
31A	BARRIER	10+00.00	18+75.60	WALL 31A
31B	MSE	18+75.60	21+30.57	WALL 31B
32	MSE	-	-	SEE BRIDGE 3 PLANS
32	MSE	10+15.75	24+34.33	WALL 32
33	MSE	-	-	SEE BRIDGE 7 PLANS
33	MSE	11+62.10	21+56.10	WALL 33
34	BARRIER	10+00.00	15+12.17	WALL 34
35	MSE	-	-	SEE BRIDGE 5/7 PLANS
36A	BARRIER	10+00.00	13+48.33	WALL 36A
36B	MSE	13+48.33	17+10.00	WALL 36B
37	MSE	-	-	SEE BRIDGE 6 PLANS
38	SOIL NAIL	10+00.00	33+52.00	WALL 38
39	BARRIER	9+97.93	23+92.04	WALL 39
40A	MOMENT SLAB BARRIER	110+53.13	110+74.86	RAMP 5
40B	MOMENT SLAB BARRIER	258+78.00	258+99.86	I-85
41	56" RIGID SLOPE BARRIER	36+30.00	36+90.00	RAMP 3
42	56" RIGID SLOPE BARRIER	37+47.81	38+15.35	RAMP 3
43	MOMENT SLAB BARRIER	80+70.03	81+28.36	RAMP 2A
44	BARRIER	285+99.60	286+68.15	I85 NBCD
45	56" RIGID SLOPE BARRIER	293+68.75	294+25.95	I85 NBCD
46	56" RIGID SLOPE BARRIER	400+34.77	401+60.00	I385
47	56" RIGID SLOPE BARRIER	113+61.84	114+49.21	RAMP 1
48	56" RIGID SLOPE BARRIER	300+54.58	301+20.00	RAMP 3A
49	BARRIER	283+64.53	291+57.42	I-85
50	BARRIER	296+05.48	298+26.76	I-85
51	BARRIER	289+80.65	291+04.92	RAMP 3A
52	BARRIER	319+15.71	321+32.21	I-85
53	56" RIGID SLOPE BARRIER	78+33.85	79+89.60	RAMP 2A
54	56" RIGID SLOPE BARRIER	293+92.54	294+68.88	RAMP 3A
56	MSE	-	-	SEE BRIDGE 2A,2B,3

(*) PORTION OF WALL BOUND UNDER SEPERATE COVER, SEE BRIDGE PLANS

* FOR BRIDGE WALL LAYOUT, SEE BRIDGE PLANS BOUND UNDER SEPARATE COVER.

** FOR BARRIER WALL AND MOMENT SLAB BARRIER NOT ASSOCIATED WITH MSE OR PILE AND PANEL WALLS SEE SHEETS S0-18 THROUGH S0-25

*** FOR 56" SINGLE SLOPE RIGID BARRIER SEE SCDOT STD. DWG. 805-805-01 & STD. DWG. 805-810-01

**** FOR TYPE 25 BARRIER SEE SCDOT STD. DWG. 805-825-00

MATCH LINE STA. 420+00
MATCH LINE STA. 299+00
MATCH LINE STA. 384+00

CENTERLINE I-85

I-385

WALL 1 (*)
WALL 2*, 2A , & 2B**
WALL 3 *
WALL 4 *
WALL 5*
WALL 5*
WALL 6*
WALL 7 *
WALL 8*
WALL 9*
WALL 10
WALL 11**
WALL 12 (*)
WALL 22**
WALL 24**
WALL 31 (A** & B)
WALL 32
WALL 33(*)
WALL 34**
WALL 35*
WALL 36 (A** & B)
WALL 37*
WALL 39**
WALL 40 (A**& B**)
WALL 41***
WALL 42***
WALL 43**
WALL 44****
WALL 45***
WALL 46***
WALL 47***
WALL 48***
WALL 49****
WALL 50
WALL 51****
WALL 53***
WALL 54***

BRIDGE 5
BRIDGE 6
BRIDGE 7
BRIDGE 8
BRIDGE 9
BRIDGE 10
BRIDGE 12

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	S0-2

MATCH LINE STA. 299+00

WALL 12 /13

WALL 12

WALL 2B**

BRIDGE 11

WALL 52****

WALL 14

WALL 11**

WALL 16 (A** & B)

WALL 15**

CENTERLINE I-85

MATCH LINE STA. 358+00

WALL 17

MATCH LINE STA. 358+00

WALL 18

	REVISIONS	DESCRIPTION	BY	CHECKED		REVISIONS	DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠1	7/22/16	REVISED WALLS 17,18, & 55	D.R.R.	B.G.N.					
⚠2	5/3/18	REVISED WALL 18, REMOVED WALL 55	B.G.N.	P.H.R.					

DRAWN BY : D.M.
DATE : 06/19/15

REVIEWED BY : J.C.
DATE : 06/24/15

APPROVED BY : M.A.
DATE : 06/26/15

FLATIRON ZACHRY

CECS CIVIL ENGINEERING
CONSULTING SERVICES, INC.

0 200 400 600 800

SCALE: 1" = 200' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

WALL LAYOUT SHEET

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 I-385	S0-40

SUPPORT STRUT LENGTH
(MEASURE INSIDE HOOK – INSIDE HOOK)

0.243" DIA. BLACK WIRE

1.5" (TYP.)

1'- 6"

SUPPORT STRUT

1'- 6"

SUPPORT STRUTS 24" O.C. (TYP.)
(FIELD ADJUST AS REQUIRED)

1'- 6"

SECTION A-A

1'- 6"

24" MAX SPACING BETWEEN STRUTS

2"

SUPPORT STRUT

4" x 4" – W5.0 x W5.0 WELDED WIRE FABRIC

10'- 0"

1'- 6"

NOTES:
1. Facing to consist of fabricated Welded Wire Forms 4" X 4" – W5.0 X W5.0 forms.
2. All forms and struts shall be fabricated with black wire.
3. Overall length of wire forms shall be 10'- 0". Effective constructed width is 9'- 8" with a 4" overlap at ends.

BUTT THE END OF VERTICAL BARS BETWEEN FACE PANELS

2"

A

A

9'- 8"

4" OVERLAP

WELDED WIRE FORM FACING UNIT

Soil Reinforcement

①

Retained Backfill

Temporary Welded Wire Mesh Facing

Bench

2'- 0"

Geotextile

Reinforced Backfill

TEMPORARY MSE WALL TYPICAL SECTION

① Extend top two layers of soil reinforcement 5 feet beyond the end of the lower layers of soil reinforcement.

3.58'

For Asphalt Curb Details see SCDOT STD. 803-105-00

Varies

Top of Wall Elevation

Extra Length Guardrail Post

Face of Wall

WALL FACE AND GUARDRAIL DETAIL

Notes:

Extra Length Guardrail post to be used. Contractor shall take the necessary measures needed to avoid conflict between guardrail post and wire wall soil reinforcements.

REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE			
⚠	5/3/18	REVISED WALL FACE/GUARDRAIL DETAIL REMOVED MOMENT SLAB DETAIL REMOVED MSE WALL INTERACTION DETAIL	D.P.M.	M.S.A.

REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE			

DRAWN BY : D.P.M.
DATE : 07/26/16

REVIEWED BY : M.S.A.
DATE : 07/26/16

APPROVED BY : R.R.C
DATE : 07/26/16

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SCDOT
South Carolina Department of Transportation

I-85 / I-385 INTERCHANGE

WALL DETAILS

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	S0-43

The following notes apply to borrow materials:

Provide borrow materials meeting the following minimum requirements:
• A sandy material (35% or less passing 0.075 mm) with a minimum total soil unit weight, γ_{wet} of 110 pcf, with a maximum dry density exceeding 100 pcf.
• Minimum friction angle, φ, of 30° and cohesion, c, of 50 psf for embankment fill, alternatively embankment fill may consist of a minimum friction angle (φ) of 34° with zero cohesion.
• No. 57 Stone backfill for Mechanically Stabilized Earth Walls

In addition, determine the moisture-density relationship and classification of the material. Test and submit the classification, moisture-density relationship, and soil strength parameters of the material to the Engineer for acceptance. An AASHTO certified laboratory is required to perform the testing. Contact the RPG Geotechnical Engineer for a list of locally available AASHTO certified laboratories. The Department may perform independent testing to assure quality.

Determine the friction angle and cohesion using either direct shear testing or consolidated-undrained triaxial shear testing with pore pressure measurements. Direct Shear testing shall only be performed on soils with a fines content of less than 25 percent. Classification testing includes grain-size distribution with wash #200 sieve, moisture plasticity testing and natural moisture content. Use the Standard Proctor test to determine the moisture-density relationship. Remold all samples used in shear strength testing to 95 percent of the Standard Proctor density. Conduct shear strength testing at the initial selection of the borrow pit, any subsequent changes in borrow pits, and for every 10,000 cy of materials placed. Perform classification testing for every 50,000 cy of materials placed, including the material used for the shear strength testing. Additional shear testing may be required if, in the opinion of the RCE, the materials being placed are different from those originally tested.

If these minimum criteria cannot be met, provide the soil parameters for the intended borrow excavation material for the project site to the Engineer for review and acceptance. After acceptable borrow material is obtained, compact the fill to the required finish grade line using the compactive effort indicated in the Standard Specifications for Highway Construction, Section 205 (Embankment Construction).

The following notes apply to muck excavation:

Any areas identified on the plans and any additional areas that are discovered to deflect or settle may require corrective action as directed by the RCE. This may include undercutting; placing No. 57 stone aggregate that is separated from other borrow materials by a geotextile for separation of sub-grade and sub-base, and/or additional compactive effort to the approval of the RCE.

In areas that require mucking or undercutting, borrow material soil may be placed as a bridge lift as long as the grade on which the material is being placed is at least 2 feet above ground water level. In the event that groundwater does not allow backfilling with a borrow material soil, use a No. 57 stone as the bridge lift material. Borrow material bridge lifts may not exceed a 2-foot thickness. The depth at which mucking or undercutting is required is dependent upon encountering a suitable bearing material within the excavation or if a predetermined elevation or depth is required. In most cases, do not undercut more than 3 to 5 feet. The RCE will determine the final mucking or undercutting thickness, unless otherwise specified in the project plans and/or specifications. If a suitable bearing soil is not encountered within this depth range, place a P1 biaxial geogrid with an aperture size of less than or equal to 1 inch and in accordance with the project special provisions beneath a 2-foot thick bridge lift of No. 57 stone. If additional compacted borrow material soil is needed to reach grade, place a geotextile for separation of sub-grade and sub-base between the No. 57 stone and the overlying compacted soil. A bridge lift consisting of borrow material soil may not be placed within 3 feet of the base of the pavement section. Place only compacted borrow material soil or No. 57 stone within this zone. Reference the Standard Specifications for Highway Construction, Earthwork Section, Division 200.

Additional Notes:

See S0-16 and S0-17 for additional MSE Wall Design Parameters.

The following notes apply for MSE Wall Subgrades:

Prior to construction of the leveling pad and MSE fill, the RCE shall verify that the retaining wall is founded on subgrade materials possessing the minimum allowable bearing capacity noted on wall plan and elevation sheets. If the RCE determines that the subgrade is unacceptable for placement of MSE fill, the contractor shall undercut the subgrade to the limits directed by the RCE. Unacceptable subgrade materials include, but are not limited to, all high plasticity clays and elastic silts (CH, MH), low plasticity clays and silts (CL, ML) with an unconfined compressive strength less than 2,000 psf, and deleterious debris. Replacement of undercut material will be with Backfill Material, meeting requirements outlined in the SCDOT Standard Specifications for Highway Construction.

The foundation area for the MSE walls might have scattered pockets of soft soils that might be present at the surface or just below the surface for the base of the MSE fill. These soft pockets are only expected to extend a few feet below the base of the MSE fill. The quality assurance representative shall proofroll the subgrade in this area and/or conduct dynamic cone tests at regular intervals to determine that the subgrade meets the requirements of the paragraph above. There are several locations along the roadway alignment where proposed drainage structures are situated in front of (i.e. parallel) MSE walls, or where new and existing draining structures pass beneath the MSE walls. Where new pipes are parallel to the proposed wall, the pipe should be installed prior to the proposed wall or the wall design should account for the temporary reduction in passive resistance. Where pipes pass beneath walls, the pipes should be designed to account for the increased loading associated with the wall backfill. We recommend the top of each pipe be situated a minimum of 1 foot below the bottom of retaining.

The following notes apply for settlement and displacement monitoring:

The contractor shall establish a monitoring program consisting of settlement instruments. The settlement monitoring program must include establishing settlement monitoring instruments on the subgrade soils prior to fill placement, and at design pavement subgrade elevation. Settlement monitoring instruments are required at a spacing of every 100 feet along MSE Walls and every 500 feet along embankments with new fill thicknesses exceeding 20 feet. Instruments shall be established at the centerline of road and edge of pavement. Settlement monitoring shall continue until three consecutive measurements demonstrate the rate of settlement is less than 0.1 inches per year. No more than one measurement shall be obtained on a single day.

A minimum of 2 measurements shall be obtained on monuments prior to fill placement, and instruments shall be measured weekly during fill placement. Instrumentation measurements shall be provided to the Geotechnical Engineer within 24 hours of measurements for interpretation. Interpreted results shall be provided to the RCE.

The following notes apply to slope construction:

Where the new fill meets the existing slope, the existing slope shall be benched to limit the potential for a preferential failure surface and to allow compaction at the interface. Benches shall have a minimum horizontal length of 8 feet and a vertical rise of no more than 3 feet. Fill slopes of 2H:1V or steeper shall be overbuilt (i.e. fill should temporarily extend beyond the final slope face) to allow compaction at the slope face. After compaction is complete, the slope may be regraded to the final inclination.

Should seeps or thick lenses of highly plastic soils be observed in the planned fill and cut slopes that are steeper than 2H:1V, ECS must be contacted to determine if the steeper slopes may be constructed as planned or if slope flattening or reinforcing is required. Similarly, if soft or wet ground conditions are observed at the base of planned fill embankments, the QA representative must determine the limits of undercutting required or required in-situ treatment.

The following Plan Notes apply to Mechanically Stabilized Earth walls:

Reinforced Backfill (Granular Fill or stone.)

Internal Friction Angle (deg) = 36
Total Unit Weight = 120 pcf
Surcharge Dead Load for Pavement Overlay = 140 psf
Active Earth Pressure Coefficient = 0.26

Retained Backfill

Internal Friction Angle (deg) = 30
Total Unit Weight = 117 pcf
Active Earth Pressure Coefficient = 0.33

Wall 17 I-85 Station
Foundation Soils
Total Internal Friction Angle (deg) = 26
Total Cohesion = 0 psf
Effective Internal Friction Angle (deg) = 26
Effective Cohesion = 0 psf

Wall Height	Min. Breq	Factored Bearing (Static)	Factored Bearing (Seismic)
0 < H ≤ 7.5	14.5 ft	2,000	3,100

Wall 18 I-85 Station 413+00 to 415+00
Foundation Soils
Total Internal Friction Angle (deg) = 0
Total Cohesion = 1000 psf
Effective Internal Friction Angle (deg) = 26
Effective Cohesion = 100 psf

Wall Height	Min. Breq	Factored Bearing (Static)	Factored Bearing (Seismic)
3 < H ≤ 7	12.5 ft	5,400	8,400

REVISIONS					REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED
⚠ 1	5/3/18	REVISED WALL 18. REMOVED WALL 55	D.P.M.	M.S.A.					

DRAWN BY : D.P.M.
DATE : 07/26/16

REVIEWED BY : M.S.A.
DATE : 07/26/16

APPROVED BY : R.R.C.
DATE : 07/26/16

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CIVIL ENGINEERING
CONSULTING SERVICES, INC.

6/6/2018 12:48:34 PM PDT

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION   SCDOT

I-85 / I-385 INTERCHANGE

GEOTECH & MSE WALL NOTES
FOR ROCKY CREEK

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	518-1

413+00

414+00

I-85 CENTERLINE

415+00

N

54'

ASPHALT CURB UNDER GUARDRAIL

PAVED SHOULDER

EDGE OF TRAVELWAY (I-85 NB)

3.58' (TYP)

ASPHALT CURB UNDER GUARDRAIL

BEGIN WIRE FACED MSE WALL 18
I-85 STA. 413+00.00 - 62.25' RT

END TAPER
+20.04
61.58' RT

BEGIN TAPER
+29.92
61.58' RT

WIRE FACE MSE WALL 18

END WIRE FACED MSE WALL 18
I-85 STA. 415+00.00 - 63.91' RT

**CONTRACTOR TO VERIFY

FOR WIRE FACED MSE WALL DETAILS SEE SH. SO-40

CARE SHALL BE TAKEN TO AVOID DRAINAGE BOX WHEN WITHIN LIMITS OF MSE WALL. WALL VENDER TO PROVIDE DETAILS ON SHOP PLANS TO AVOID CONFLICT BETWEEN WALL REINFORCING AND DRAINAGE STRUCTURES.

200'-0" WIRE FACED MSE WALL (WALL 18)

890

880

870

860

850

840

WALL 18 - TEMPORARY MSE WALL

TOP OF SHOULDER BREAK/WALL

BOTTOM OF WALL

PROPOSED & EXISTING GRADE AT TOE OF REINFORCED SLOPE

EXISTING DRAINAGE

EXISTING CULVERT

**I.E. 838.40

10'

WALL STATION	413+00	413+25	413+50	413+75	414+00	414+25	414+50	414+75	415+00
I-85 STATION	413+00	413+25	413+50	413+75	414+00	414+25	414+50	414+75	415+00
TOP OF WALL	855.37	855.08	854.75	854.43	854.10	853.78	853.42	853.06	852.71
FINISHED GRADE @ BACK FACE	855.37	855.08	854.75	854.43	854.10	853.78	853.42	853.06	852.71
FINISHED GRADE @ FRONT FACE	853.61	852.25	851.07	851.10	851.00	851.54	851.71	851.50	851.06
BOTTOM OF WALL	851.00	849.50	848.00	848.00	848.00	849.50	849.50	849.50	849.50
WALL HEIGHT	4.37	5.58	6.75	6.43	6.10	4.28	3.92	3.56	3.21

413+00

414+00

415+00

REVISIONS					REVISIONS				
NO.	DATE	DESCRIPTION	BY	CHECKED	NO.	DATE	DESCRIPTION	BY	CHECKED
⚠	5/3/18	REVISED WALL 18 LOCATION AND TYPE	D.P.M.	R.R.C.					

DRAWN BY : D.P.M.
DATE : 04/24/18

REVIEWED BY : R.R.C.
DATE : 04/26/18

APPROVED BY : R.R.C.
DATE : 04/26/18

FLATIRON

ZACHRY
a joint venture

CECS CIVIL ENGINEERING CONSULTING SERVICES, INC.

0 10 20 30 40

SCALE: 1" = 10' HORIZ

SOUTH CAROLINA

CIVIL ENGINEERING CONSULTING SERVICES, INC. ENGINEERING NO. C00387

CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA

PROFESSIONAL No. 1904

RANDY FRANK CANNON

6/6/2018 12:45

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

SCDOT
South Carolina Department of Transportation

I-85 / I-385 INTERCHANGE

WALL 18
PLAN & PROFILE

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85, I-385	SLI3

MUDDY FORD ROAD

+42.54

PRESENT 40' R/W
23.412 M.E.A.

PRESENT 40' R/W
23.412 M.E.A.

WHISPERING HOLLOW RD.

PRESENT 40' R/W
23.412 M.E.A.

55

+92.50

PRESENT 150' R/W
23.412 M.E.A.

Ⓐ

Ⓑ

SIGN LIGHTING SYSTEM NO. 21
SEE SHEET SN41 FOR OVERHEAD STRUCTURE

Ⓓ   Ⓒ

PRESENT 150' R/W
23.412 M.E.A.

INTERSTATE 85 SB

380   ℄ I-85

385

375   INTERSTATE 85 NB

MATCH LINE STA. 373+00.00
SEE SHEET SLI2

MATCH LINE STA. 388+00.00
SEE SHEET SLI4

Ⓓ   Ⓒ

Ⓑ

Ⓐ

SIGN LIGHTING SYSTEM NO. 20
SEE SHEET SN40 FOR OVERHEAD STRUCTURE

PRESENT 150' R/W
23.412 M.E.A.

+88.06

PRESENT 150' R/W
23.412 M.E.A.

+71.72

PRESENT 75' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 75' R/W
23.412 M.E.A.

MUDDY FORD ROAD

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠	05/02/18	MOVED SIGN LIGHTING STRUCTURE NO. 21 TO STA. 382+50	R.L.D.	B.G.N.					

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.R.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

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0   50   100   150   200

SCALE: 1" = 50' HORIZ

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I-85 / I-385 INTERCHANGE

SIGN LIGHTING PLAN SHEET
STA. 373+00.00 TO STA. 388+00.00

6/6/2018 1:00:31 PM

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	SLI4

N

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

MATCH LINE STA. 388+00.00
SEE SHEET SLI3

MATCH LINE STA. 403+00.00
SEE SHEET SLI5

INTERSTATE 85 SB

390

395

₵ I-85

400

INTERSTATE 85 NB

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠	05/02/18	REVISED SOUTHBOUND EDGE LINE	R.L.D.	B.G.N.					

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.R.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

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CS
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CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: I" = 50' HORIZ

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT

I-85 / I-385 INTERCHANGE

SIGN LIGHTING PLAN SHEET
STA. 388+00.00 TO STA. 403+00.00

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
3	S.C.	GREENVILLE	0038III - R02	I-85 / I-385	SLI5

N

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

MATCH LINE STA. 403+00.00
SEE SHEET SLI4

MATCH LINE STA. 418+00.00
SEE SHEET SLI6

405

410

415

INTERSTATE 85 SB

℄ I-85

INTERSTATE 85 NB

D — C

B

A

SIGN LIGHTING SYSTEM NO. 22
SEE SHEET SN42 FOR OVERHEAD STRUCTURE

PRESENT 150' R/W
23.412 M.E.A.

PRESENT 150' R/W
23.412 M.E.A.

REVISIONS		DESCRIPTION	BY	CHECKED	REVISIONS		DESCRIPTION	BY	CHECKED
NO.	DATE				NO.	DATE			
⚠	04/07/16	MOVED SIGN LIGHTING STRUCTURE TO STA. 408+00	R.L.D.	B.G.N.					
⚠	05/02/18	MOVED SIGN LIGHTING STRUCTURE NO. 21 TO STA. 382+50	R.L.D.	B.G.N.					

DRAWN BY : A.W.F.
DATE : 9/4/15

REVIEWED BY : D.R.R.
DATE : 9/4/15

APPROVED BY : B.G.N.
DATE : 9/4/15

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CONSULTING SERVICES, INC.

0   50   100   150   200

SCALE: 1" = 50' HORIZ

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OF TRANSPORTATION

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South Carolina Department of Transportation

I-85 / I-385 INTERCHANGE

SIGN LIGHTING PLAN SHEET
STA. 403+00.00 TO STA. 418+00.00

6/6/2018 1:00:31 PM EDT

I-85
SERIES 4 SHEETS

STEP 1:   **SHEETS TC4.1 – 4.1A**
- PREPARE EX 85NB/SB OUTSIDE SHOULDERS FOR STEP 2 I-85 MEDIAN BENT WORK (85NB STA. 279+00 TO 293+40 & 85SB STA. 280+00 TO 303+50).

STEP 2:   **SHEETS TC4.2 – 4.2P**

I-85 WIDENING SOUTH OF INTERCHANGE (TC4.2 – 4.2D)

- SHIFT 85NB/SB TRAFFIC TO THE INSIDE, AND COMPLETE OUTSIDE WIDENING (85NB STA. 203+00 TO 249+13 & 85SB STA. 211+80 TO 268+00).
  - *CONCURRENT CONSTRUCTION:*
    - **R5 STEP 1** (TC14.1)
    - **R5 STEP 2** (TC14.2)

I-85 MEDIAN BENTS (TC4.2E – 4.2G)

- SHIFT 85NB/SB TRAFFIC TO OUTSIDE SHOULDERS.
  WITH 85 TRAFFIC ON OUTSIDE SHOULDERS, COMPLETE MEDIAN BRIDGE BENTS (BR5 BENT 7, BR7 BENT 2, BR8 BENT 2, BR9 BENT 3, BR12 BENT 4).

I-85 WIDENING NORTH OF INTERCHANGE (TC4.2G – 4.2Q)

- SHIFT 85NB/SB TRAFFIC TO THE INSIDE, AND COMPLETE OUTSIDE WIDENING OF 85 TOWARDS PELHAM RD (85NB STA. 304+00 TO 428+25 & 85SB STA. 302+50 TO 386+60).
  - *CONCURRENT CONSTRUCTION:*
    - **R1**
    - **R1A**
    - **R2A**
    - **CHROME DR.**

- CONSTRUCT WALLS ALONG 85 NEAR ROCKY CREEK.

- SHIFT PELHAM EXIT RAMP TRAFFIC TO THE INSIDE AND COMPLETE TEMP. PELHAM AND OUTSIDE WIDENING (PELHAM STA. 54+79 TO 61+25).

STEP 2A: **SHEETS TC4.2AA – 4.2AC**
- COMPLETE 85NB OUTSIDE WIDENING (85NB STA. 415+50 TO 428+20). SHIFT PELHAM EXIT RAMP TRAFFIC TO THE OUTSIDE (TEMP. PELHAM) AND COMPLETE 85NB/PELHAM GORE AREA, TEMP PVMT, AND PELHAM LEFT SIDE.

STEP 2B: **SHEETS TC4.2BA – 4.2BC**
- SHIFT PELHAM EXIT RAMP TRAFFIC TO THE INSIDE/TEMP PVMT AND COMPLETE PELHAM RIGHT SIDE (PELHAM STA. 50+00 TO 54+79).

*UPON SWITCHING TRAFFIC TO THE LEFT SIDE OF PELHAM RAMP, WORK IN A CONTINUOUS AND EXPEDITIOUS MANNER TO BREAK UP AND REMOVE EXISTING RAMP PAVEMENT ON THE RIGHT SIDE SUCH THAT WATER ENTRAPMENT DOES NOT OCCUR.

STEP 2C: **SHEETS TC4.2CA – 4.2CH**
- SHIFT 85NB/SB TRAFFIC TO THE OUTSIDE, AND COMPLETE MEDIAN FOUNDATIONS FOR OVERHEAD SIGN STRUCTURES AND MEDIAN DRAINAGE WORK (85 STA. 350+60 TO 428+50).

- REMOVE TEMP PVMT ALONG LEFT SIDE PELHAM (PELHAM STA. 53+88 TO 57+00).

STEP 3:   **SHEETS TC4.3 – 4.3B**
- UPON COMPLETION OF MEDIAN BENT WORK, REMOVE TEMP BARRIER, REVISE PVMT MARKINGS, AND SHIFT 85NB/SB OFF OF OUTSIDE SHOULDERS.

- REVISE 85NBCD MARKINGS AT ENTRANCE RAMP TO 85NB AND COMPLETE 85/85NBCD OUTSIDE WIDENING (STA. 295+00 TO 301+50).
  - *PREREQUISITE CONSTRUCTION:*
    - **85NBCD STEP 3** (TC5.3)
    - **R2A/R4 STEP 3** (TC9.3)

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2AA

I-85

405

410

415

420

MATCHLINE
I-85 STA. 420+50.00
SEE SHEET TC4.2AB

+50±

25' SP.

Ⓓ　　Ⓑ

+00±

300' EXIT RAMP TAPER

+00±

400' DECEL LANE

CHECKED BLW
BY CEO

REVISED TO REFLECT UPDATED ROCKY CREEK ROADWAY; NO WORK ON 85SB

5-24-18

5/30/2018 4:24:22 PM U:\1710-Transportation Management Plan MOT\DESIGN\AREA 0102 INTERCHANGE TMP\TMP_PLAN_SHEETS\TC04.2AA_I85_STEP 02A.DGN

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2BA

I-85

405   410   415   420

MATCHLINE
I-85 STA. 420+50.00
SEE SHEET TC4.2BB

+00± TIE TO PREV PLACED TCB
OFFSET 2'

+00±   920' DECEL LANE

Left margin (rotated):

CHECKED

BY

DESCRIPTION

REVISIONS   DATE

NO.

CHECKED   BLW

BY   CEO

REVISED TO REFLECT UPDATED ROCKY CREEK ROADWAY; NO WORK ON 85SB

DESCRIPTION

REVISIONS   DATE   5-24-18

NO.

Title block (bottom right):

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No. 27345
Betsy L. Watson
BETSY L. WATSON
6/15/2018

SOUTH CAROLINA DEPARTMENT
OF TRANSPORTATION

SCDOT
South Carolina Department of Transportation

I-85 / I-385 INTERCHANGE

I-85
STEP 2B

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2CD

MUDDY FORD RD.

A

+10±

450' TRANSITION SHIFT

+60±

R 2930'

C

I-85

380

385

32'

B

A

26'

C

700

MATCHLINE
I-85 STA. 375+50.00
SEE SHEET TC4.2CC

MATCHLINE
I-85 STA. 390+50.00
SEE SHEET TC4.2CE

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2CE

I85
STEP 2C
393+00

I85SB   I85NB

| 4' | 11' | 11' | 11' | 2' 2' | 10' | 16' | 2' 3' | 11' | 11' | 11' |

CONTRACTOR TO EVALUATE SHOULDER'S ABILITY TO
CARRY TRAFFIC AND PERFORM ANY NECESSARY
IMPROVEMENTS BEFORE PLACING TRAFFIC ON SHOULDER

TYPICAL WORK AREA ALONG I85 MEDIAN FOR DRAINAGE,
OVERHEAD SIGN FOUNDATIONS, AND CONCRETE MEDIAN
BARRIER REPLACEMENT

MATCHLINE
I-85 STA. 390+50.00
SEE SHEET TC4.2CD

I85
393+00

395

I-85

400

405

MATCHLINE
I-85 STA. 405+50.00
SEE SHEET TC4.2CF

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BY   CEO
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I-85 / I-385 INTERCHANGE

I-85
STEP 2C

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2CF

MATCHLINE
I-85- STA. 405+50.00
SEE SHEET TC4.2CE

MATCHLINE
I-85- STA. 420+50.00
SEE SHEET TC4.2CG

I-85

I85
415+00

W1-4L
48" X 48"
STA. 418+00

I85
STEP 2C
415+00

I85SB   I85NB

| 15' | 11' | 11' | 11' | 2'2' | 10' | 16' | 2' 3' | 11' | 11' | 11' |

WALL I8

TYPICAL WORK AREA ALONG I85 MEDIAN FOR DRAINAGE,
OVERHEAD SIGN FOUNDATIONS, AND CONCRETE MEDIAN
BARRIER REPLACEMENT

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I-85
STEP 2C

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BY CEO

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5-24-18

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	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2CG

W5-6B 48" X 48"
STA. 430+00±
LANES NARROW AHEAD

+50± — 500' SHIFT TAPER — +50±

+50±
OFFSET 2'

B

+90±
OFFSET 6'

25' SP.

+20± 320' MERGE TAPER

MATCHLINE
I-85 STA. 420+50.00
SEE SHEET TC4.2CF

C   E

425

430

435

MATCHLINE
I-85 STA. 435+50.00
SEE SHEET TC4.2CH

I-85

+30±
OFFSET 6'

50

+00±
OFFSET 3'

E

+30±
OFFSET 15'

PELHAM RAMP

*REMOVE TEMP
PAVEMENT

55 55

+00±
OFFSET 5'

+73±
OFFSET 5'

C

+00±

I85
425+00

C

B

D

A

PC Sta 50+00.00

PCC Sta 547+79.04

+50± — 650' SHIFT TAPER — +00±

*TEMP LANE CLOSURES ON I85 NB AND PELHAM RAMP MAY
BE USED IN PLACE OF TCB FOR REMOVAL OF TEMPORARY
PAVEMENT, AS ALLOWED BY THE ENGINEER.

I85
STEP 2C
425+00

ENTRANCE RAMP FROM PELHAM	GORE	I85SB					I85NB				
	19'	11'	11'	11'	2'2'	10'	16'	2' 3'	11'	11'	11'	12'	10'

EXISTING LANES

TYPICAL WORK AREA ALONG I85 MEDIAN FOR DRAINAGE,
OVERHEAD SIGN FOUNDATIONS, AND CONCRETE MEDIAN
BARRIER REPLACEMENT

EXIT LANE
FOR PELHAM

REVISIONS
NO.   DATE   DESCRIPTION
1   6-13-18   REVISED TO REFLECT UPDATED ROCKY CREEK ROADWAY REVISIONS

BY   CEO
CHECKED   BLW

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2CH

W1-4R
48" X 48"
STA. 439+00

W20-1
48" X 48"
STA. 443+00

W5-6B
48" X 48"
STA. 448+00±

ROAD WORK AHEAD

ROAD WORK AHEAD

ROAD WORK 1000 FT

LANES NARROW AHEAD

D
B

320' MERGE TAPER   +40±

12'

POT Sta 447+76.64

I-85   *440*

445

6' 12' 12' 12'

PELHAM RD

+00±

B
A
C

END ROAD WORK

G20-2
48" X 24"
STA. 439+00

MATCHLINE
I-85 STA. 435+50.00
SEE SHEET TC4.2CG

+46±
OFFSET 5'

PELHAM RAMP   *60*

C

A

B

I-85 Sta. 467+87

POT Sta 61+97.63

6' 12' 12' 4'

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6/15/2018

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I-85 / I-385 INTERCHANGE

I-85
STEP 2C

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2L

MUDDY FORD RD.

+60± 260' TRANSITION SHIFT +20±

A   B   C

+70±
OFFSET 2'

+10±
OFFSET 6'

R 2920'

I-85

385

380

390

MATCHLINE
I-385 STA. 375+50.00
SEE SHEET TC4.2K

MATCHLINE
I-85 STA. 390+50.00
SEE SHEET TC4.2M

B   C

D

LANE ENDS
MERGE
LEFT

W9-2 L
48" X 48"
EXISTING LOCATION

W4-2R
48"X48"
EXISTING LOCATION

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I-85 / I-385 INTERCHANGE

I-85
STEP 2

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BY
DESCRIPTION
REVISIONS
NO. DATE

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BY CEO CEO
DESCRIPTION
REVISED TO INCORPORATE ROCKY CREEK ROADWAY REVISIONS
REVISED TO REFLECT UPDATED ROCKY CREEK ROADWAY REVISIONS
REVISIONS
NO. DATE
10-17-16
5-24-18

I85
STEP 2
393+00

I85SB
EXISTING LANES

I85NB

1' 5' 11' 11' 11' 8' 3' 2'

RETAIN EXISTING
YELLOW EDGELINE

395

I-85

400

405

MATCHLINE
-I85- STA. 390+50.00
SEE SHEET TC4.2L

MATCHLINE
-I85- STA. 405+50.00
SEE SHEET TC4.2N

I85
393+00

+15±
OFFSET 2'

+35±
OFFSET 3'

TEMPORARY BARRIER
OFFSET OUTWARDS FOR
DRAINAGE SPREAD

+50±
OFFSET 3'

+70±
OFFSET 2'

A

B

C

D

+75±

660'± MERGE TAPER

+15±

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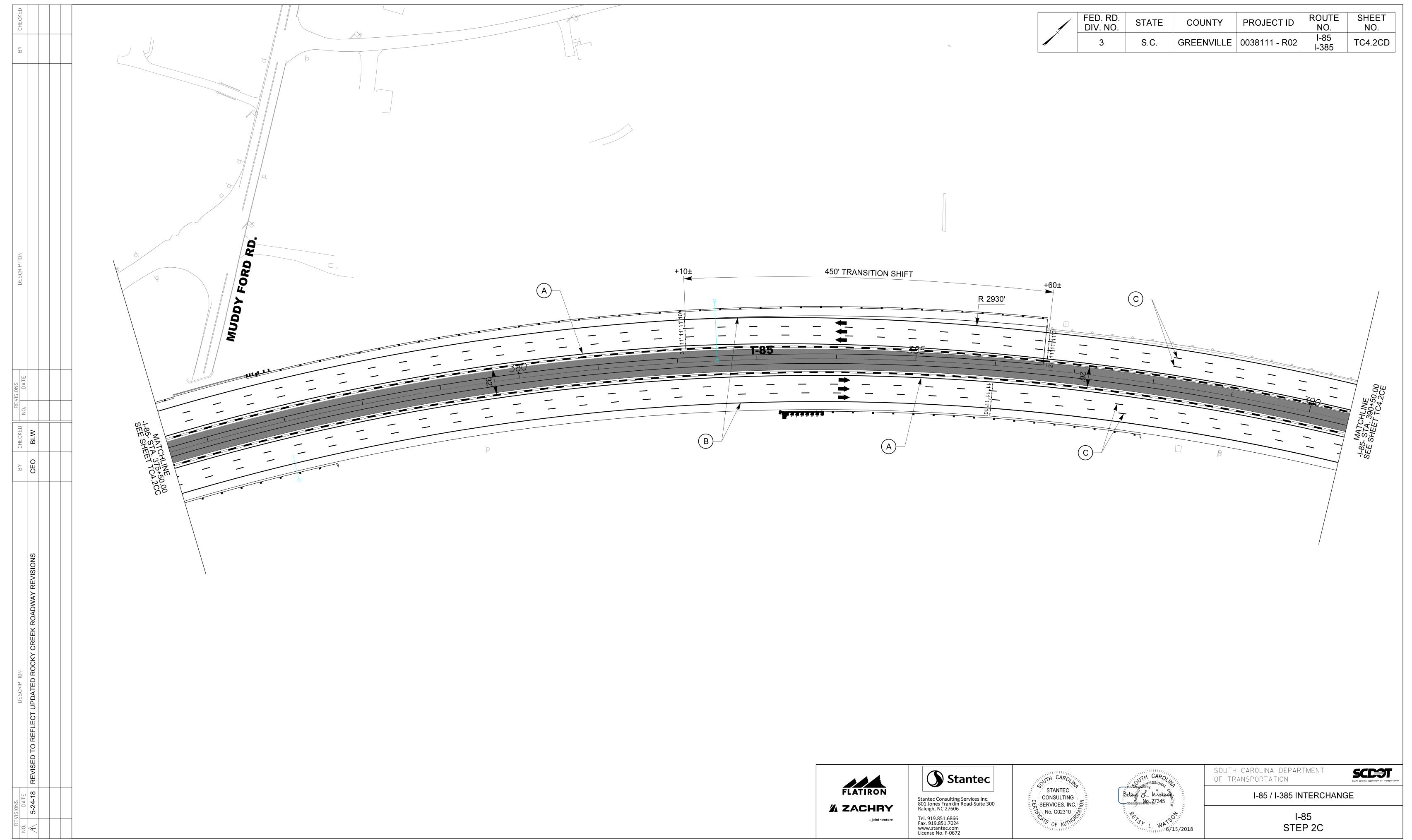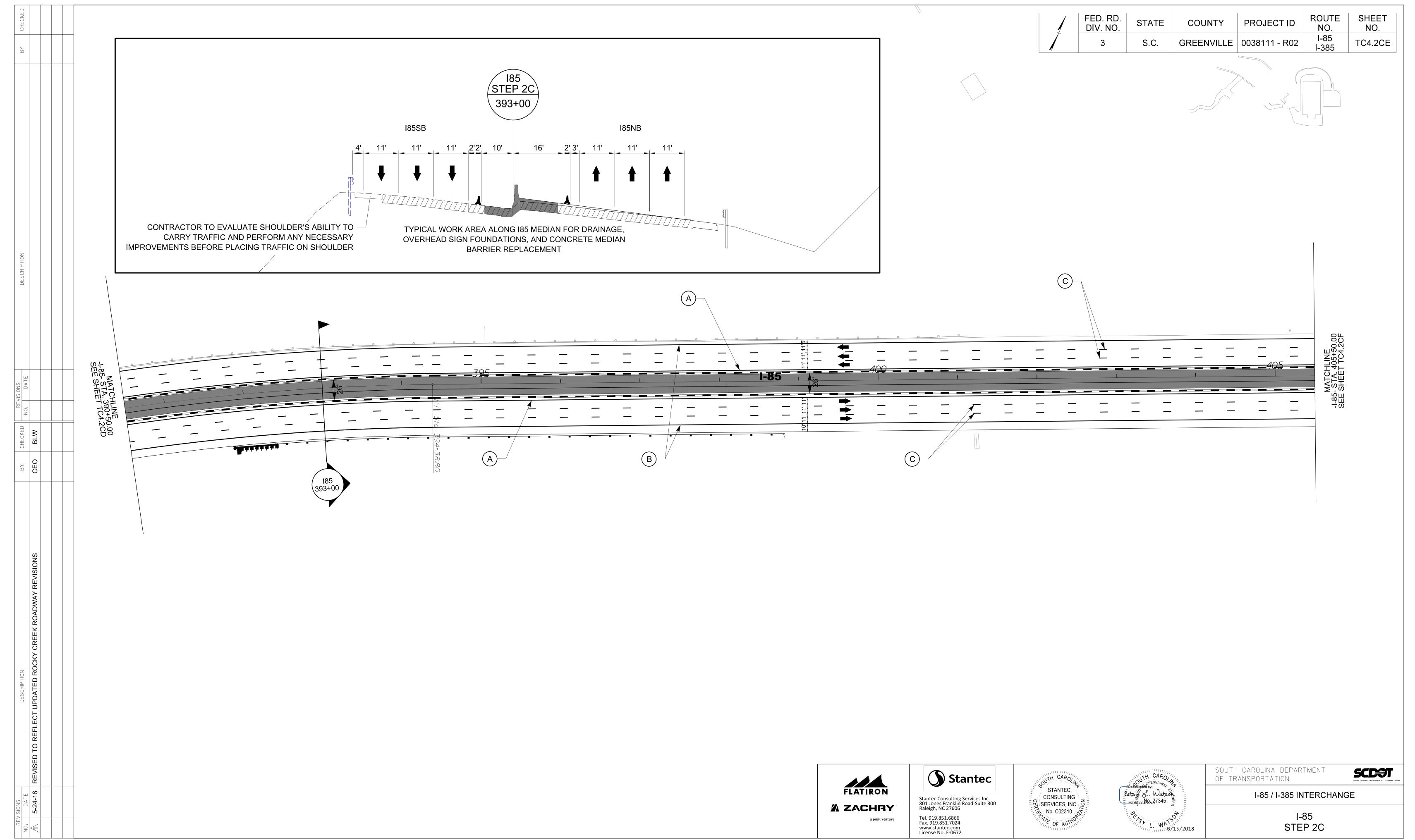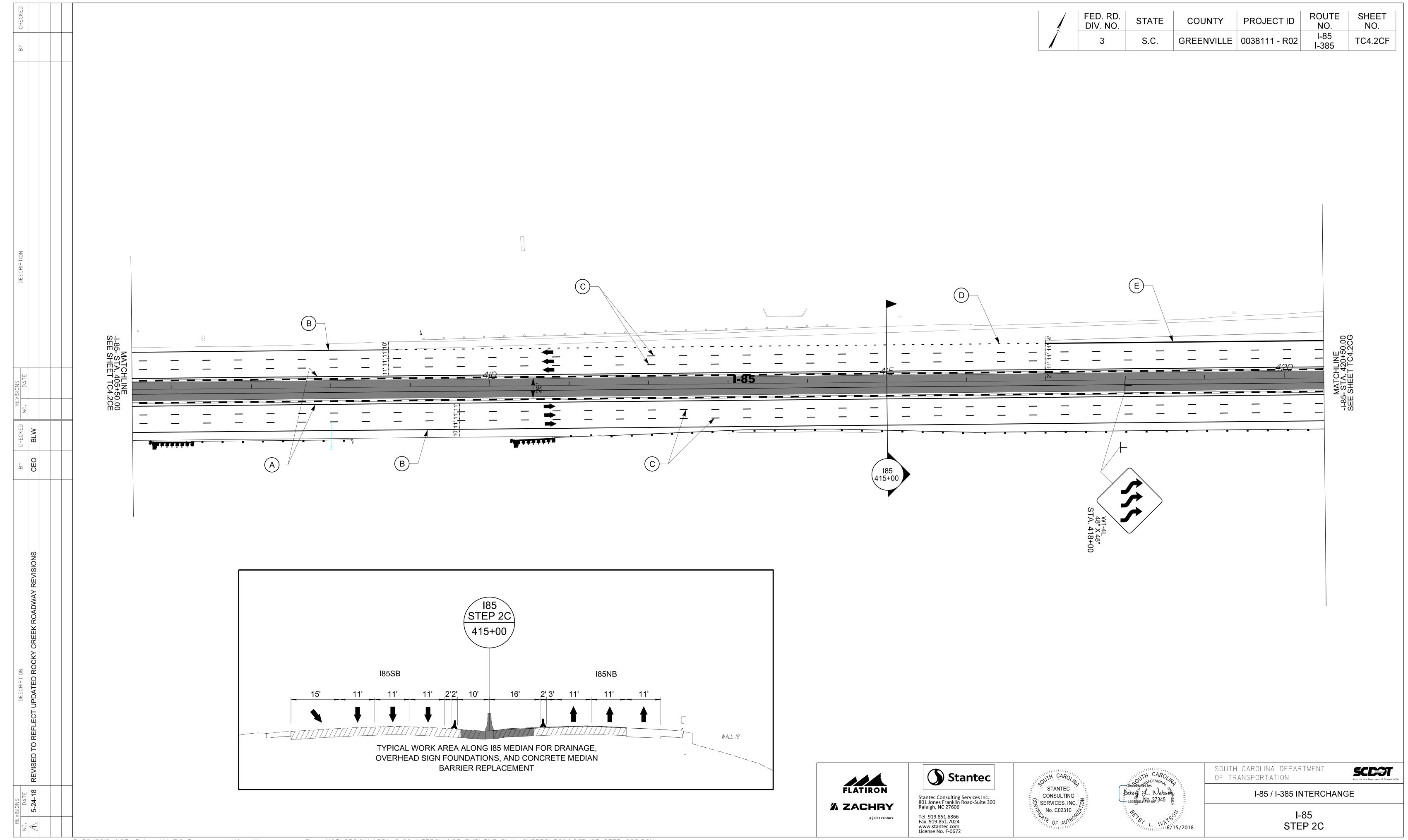
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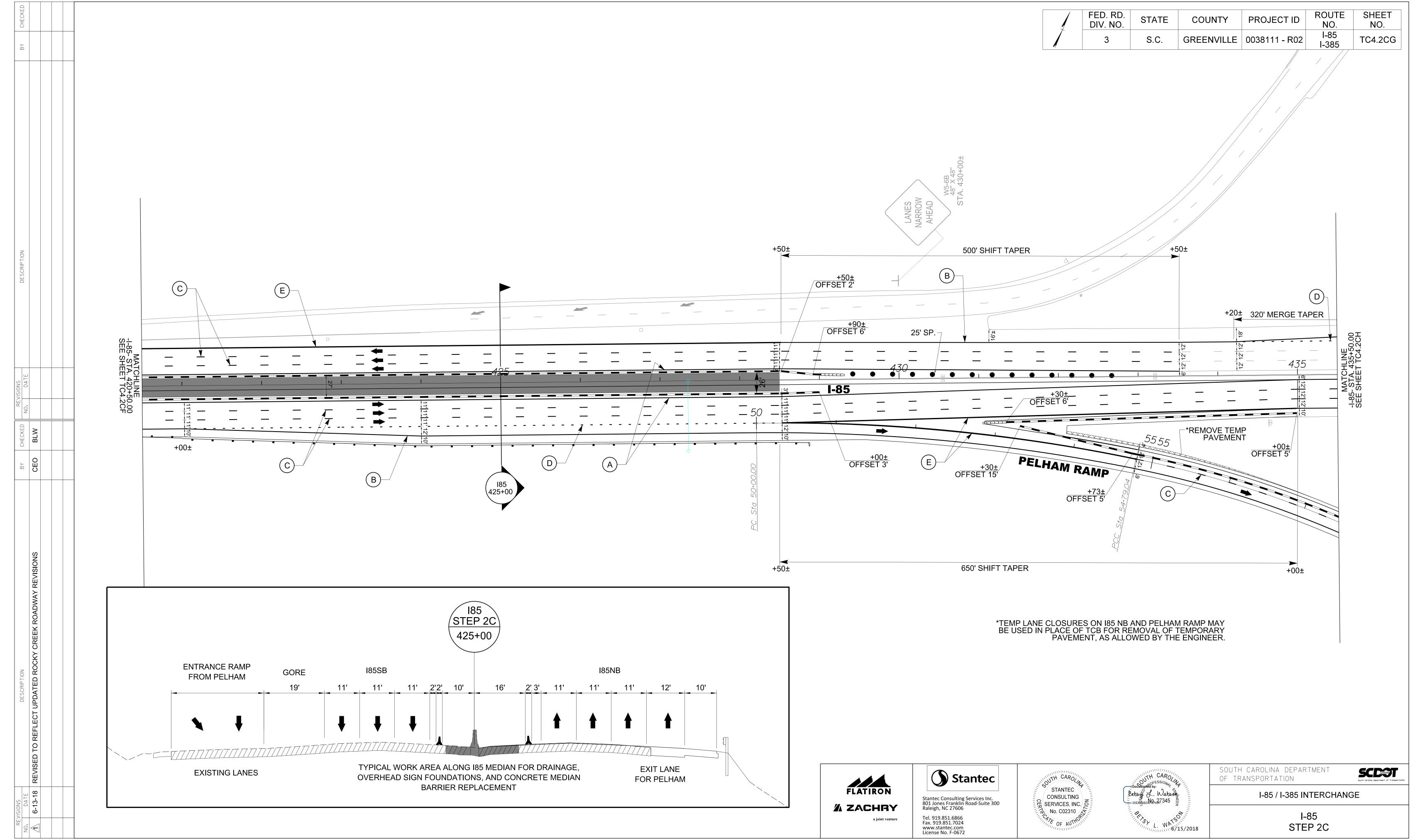I-85 / I-385 INTERCHANGE

I-85
STEP 2

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC4.2N

MATCHLINE
-I-85- STA. 405+50.00
SEE SHEET TC4.2M

MATCHLINE
-I-85- STA. 420+50.00
SEE SHEET TC4.2O

I-85

410

415

420

I-85
415+00

A
B
C
D

+00±
OFFSET 2'

+35±
OFFSET 3'

+30±
OFFSET 3'

+30± 272' EXIT RAMP TAPER

TEMPORARY BARRIER
OFFSET OUTWARDS FOR
DRAINAGE SPREAD

I85
STEP 2
415+00

I85SB
EXISTING LANES

I85NB

5'   11'   11'   11'   2' 2'

CHECKED

BY

DESCRIPTION

REVISIONS   NO.   DATE

CHECKED   BLW   BLW

BY   CEO   CEO

DESCRIPTION   REVISED TO INCORPORATE ROCKY CREEK ROADWAY REVISIONS   REVISED TO REFLECT UPDATED ROCKY CREEK ROADWAY REVISIONS

REVISIONS   NO.   DATE   10-17-16   5-24-18

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC6.7K

FIELD ADJUST OPENING OF
R1 LANE AS NECESSARY

+60±   300'± TAPER   +60±

I-85

C   B   D

I-85

380

385

390

I-85 STEP 2

MATCHLINE
I-385 STA. 315+50.00
SEE SHEET TC6.7J

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I-85 / I-385 INTERCHANGE

I-385
STEP 7

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DESCRIPTION
REVISIONS
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BY CEO
DESCRIPTION PROPOSED 85SB CONSTRUCTION LIMITS ADJUSTED IN ROCKY CREEK REVISIONS
REVISIONS
NO. DATE 5-24-18

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC6.7L

VOID

Ⓒ Ⓑ

400 *405*

395

MATCHLINE -I-85- STA. 390+50.00 SEE SHEET TC6.7K

MATCHLINE -I-85- STA. 405+50.00 SEE SHEET TC6.7M

PT Sta. 394+38.80

I-85 STEP 2

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I-385
STEP 7

	FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROUTE NO.	SHEET NO.
	3	S.C.	GREENVILLE	0038111 - R02	I-85 I-385	TC6.7M

+00± +45±
45' SHIFT

+50± 380' SHIFT +30±

B

C

I-85

410 415 420

VOID

VOID

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I-385
STEP 7