09/08/06

**TIP PROJECT: R-4758**

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | R-4758 | S-1 | |

| STATE PROJ. NO. | F. A. PROJ. NO. | DESCRIPTION |
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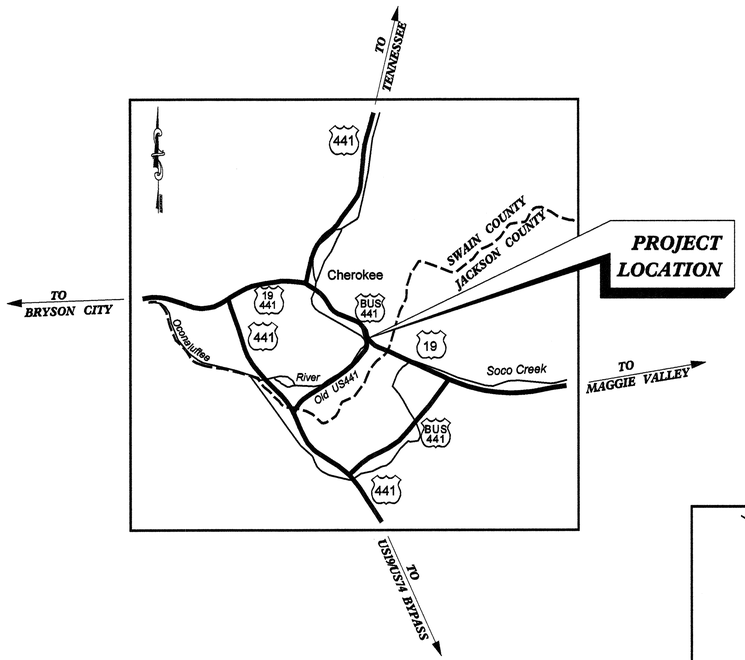
# STATE OF NORTH CAROLINA
# DIVISION OF HIGHWAYS

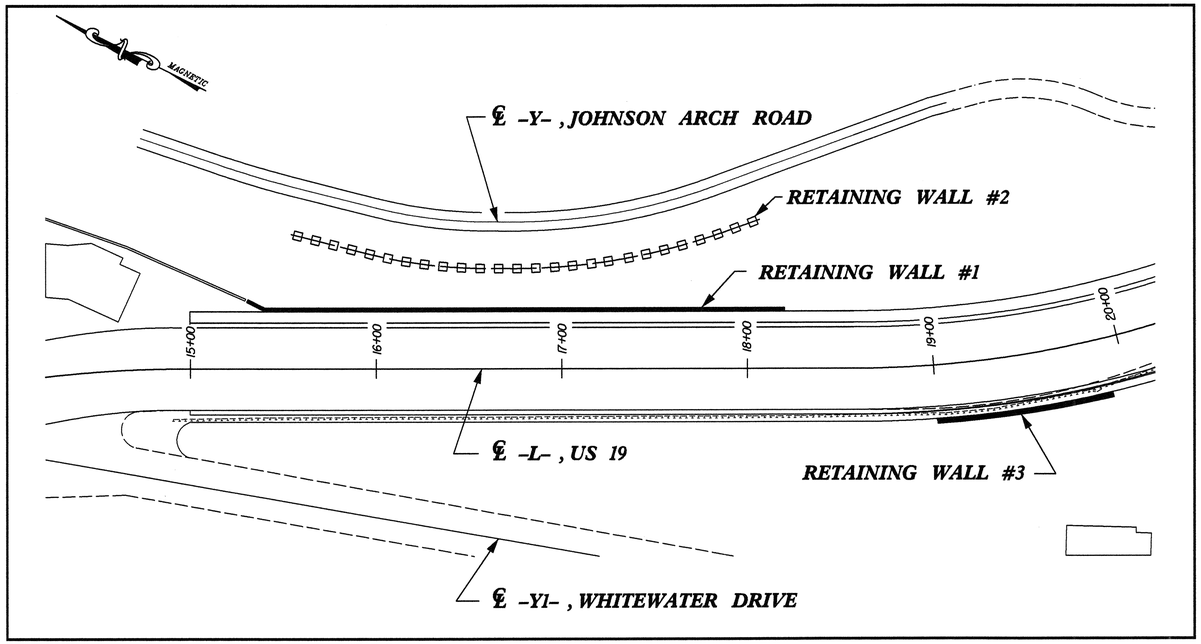
# *SWAIN AND JACKSON COUNTIES*

***LOCATION:*** *U.S. 19 in Downtown Cherokee, from 0.000 Mile East of Intersection of Whitewater Drive (Old US 441) to 0.133 Mile East of Whitewater Drive*

***TYPE OF WORK:*** *Structures (Retaining Walls)*




**VICINITY MAP**




# *STRUCTURES*

***CONTRACT:***

***GRAPHIC SCALE***

VARIES PER DRAWING

***DESIGN DATA***

***PROJECT LENGTH***

LENGTH OF ROADWAY =

TOTAL LENGTH PROJECT =

*Prepared For:*

***NCDOT – DIVISION 14***

*2006 STANDARD SPECIFICATIONS*

***RIGHT OF WAY DATE:*** N/A

***LETTING DATE:*** N/A

*PROJECT ENGINEER*

*PROJECT DESIGN ENGINEER*

PLANS PREPARED BY:

Vaughn & Melton Consulting Engineers

Middlesboro, Kentucky 606-248-6600
Greeneville, Tennessee 423-639-0271
Asheville, North Carolina 828-253-2795



***STRUCTURE DESIGN***

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 32717 HARDY L. WILLIS

01/24/07

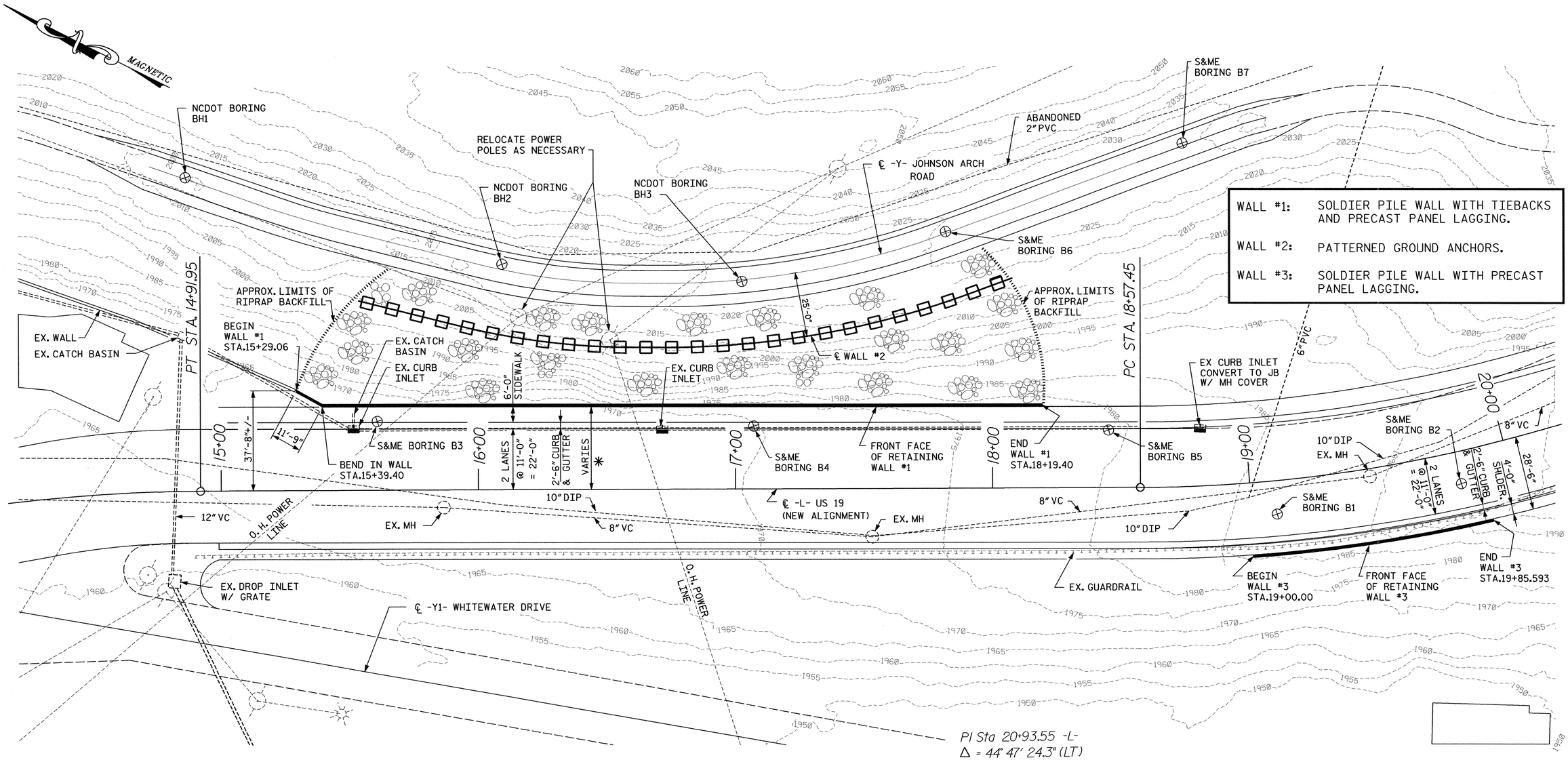
*SIGNATURE:* *P.E.*

***DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA***

*P.E.*
*STATE DESIGN ENGINEER*

***DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION***

*APPROVED*
*DIVISION ADMINISTRATOR* *DATE*




PI Sta 20+93.55 -L-
Δ = 44° 47' 24.3" (LT)
D = 10° 00' 00.0"
L = 447.90'
T = 236.10'
R = 572.96'

US 19 HORIZONTAL CURVE DATA

* OFFSET FROM ℄ US19 TO FRONT FACE OF WALL VARIES FROM 32'-2 1/2 "+/- AT STA.15+39.40 (BEND IN WALL) TO 31'-4"+/- AT STA.18+19.40 (END WALL)

## SITE PLAN - RETAINING WALLS

SCALE: 1"= 20'

## TOTAL BILL OF MATERIAL

| | PILE EXCAVATION NOT IN SOIL | PILE EXCAVATION IN SOIL | CLASS "A" CONCRETE | CLASS "AA" CONCRETE | REINFORCING STEEL | HP 12 X 53 GALVANIZED STEEL PILES | | RIPRAP CLASS II | NO. 57 STONE BACKFILL | DRILLED PIER CONCRETE (ENCASEMENT) | STRUCTURAL STEEL | GROUND ANCHORS | TIEBACKS | TREATED STRUCTURAL TIMBER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LINEAR FEET | LINEAR FEET | CU. YARDS | CU. YARDS | LBS. | NO. | LINEAR FEET | TONS | TONS | CU. YARDS | LBS. | LINEAR FEET | LINEAR FEET | CU. YARDS |
| WALL #1 | | 425 | | 182.5 | 20,810 | 30 | 1,049 | 7,650 | 105 | 39.0 | 110,600 | | 1710 | 170.7 |
| WALL #2 | | | 29.3 | | 4,264 | | | | | | | 1035 | | |
| WALL #3 | 13 | 97 | | 13.6 | 2,065 | 10 | 155 | | 45 | 9.3 | | | | |
| TOTAL | 13 | 522 | 29.3 | 196.1 | 27,139 | 40 | 1,204 | 7,650 | 150 | 48.3 | 110,600 | 1035 | 1710 | 170.7 |

PROJECT NO. R-4758
SWAIN COUNTY
STATION: 17+65.00 -L- POT

S&ME ENGINEERING TESTING ENVIRONMENTAL SERVICES
DRAWN BY: SF DATE: OCT. 2006
CHECKED BY: JRJ DATE: OCT. 2006

Vaughn & Melton Consulting Engineers
Middlesboro, Kentucky 606-248-6500
Greeneville, Tennessee 865-639-0071
Asheville, North Carolina 828 253 3796

DRAWN BY: SF DATE: OCT. 2006
CHECKED BY: HLW DATE: OCT. 2006

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SITE PLAN

AUG. 2007

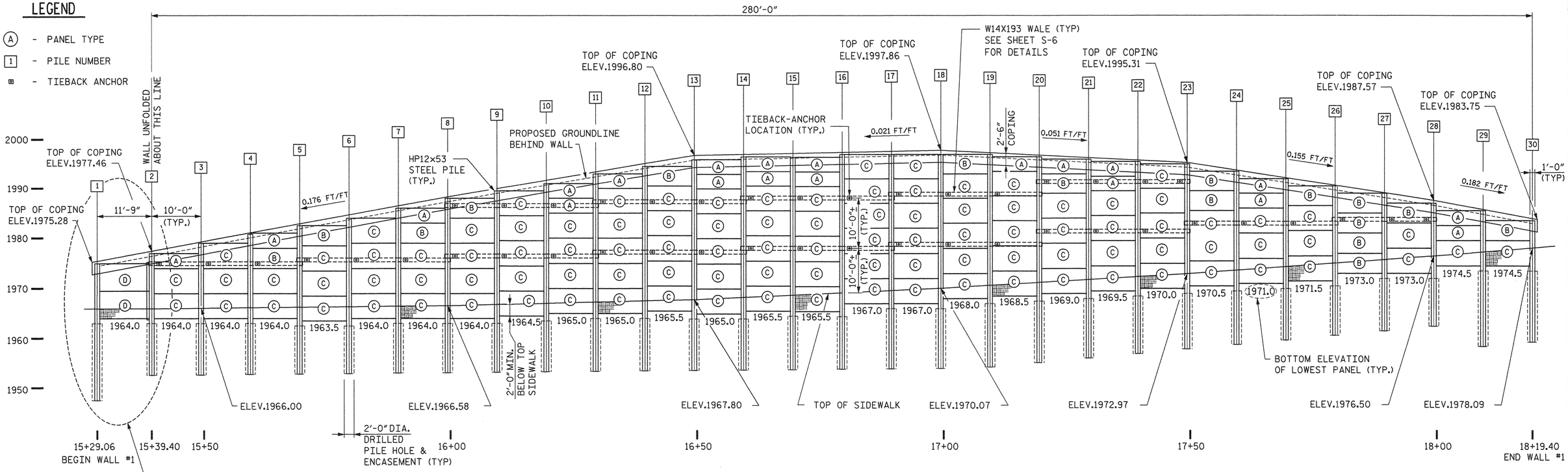
| REVISIONS | | | | | | SHEET NO. |
|---|---|---|---|---|---|---|
| NO. | BY | DATE | NO. | BY | DATE | S-2 |
| ~~1~~ | ~~HLW~~ | ~~8-10-07~~ | | | | |

## LEGEND

(A) - PANEL TYPE

1 - PILE NUMBER

⊠ - TIEBACK ANCHOR

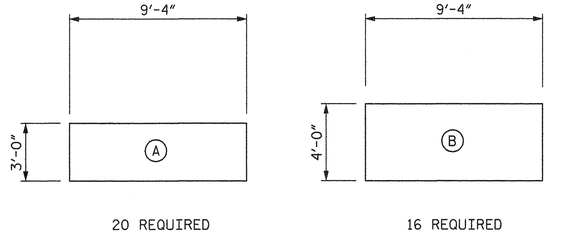



NOTE: THE "PARTIALLY WEATHERED ROCK" AS CALLED OUT HERE IS A LAYER OF VERY STIFF SOIL. IT IS NOT CLASSIFIED AS "SOLID ROCK" FOR THE PURPOSE OF PILE PRE-DRILLING.

## RETAINING WALL #1 ELEVATION

SCALE: 1" = 10'

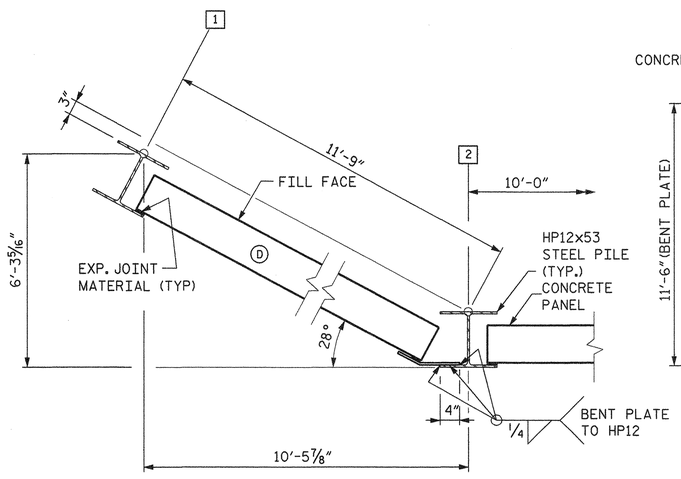
PILE EMBEDMENT INTO PARTIALLY WEATHERED ROCK SHALL BE 5'-0" AT PILES WITH TIEBACKS (#2 THRU #28), AND 10'-0" AT PILES WITHOUT TIEBACKS (#1, #29 AND #30).



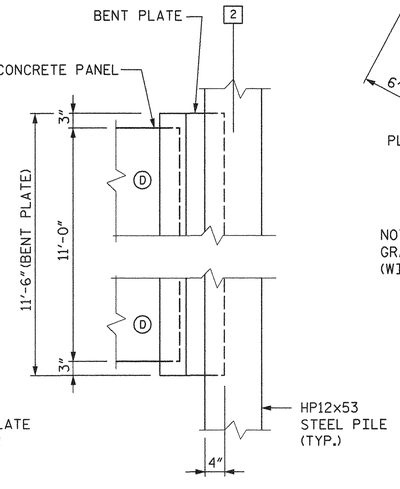

## PANEL TYPES

SCALE: 1/4" = 1'-0"

NOTE: SEE SHEET S-7 FOR PANEL DETAILS.




PLAN




ELEVATION

## DETAIL "A"

SCALE: 3/4" = 1'-0"

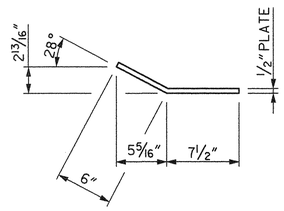



PLATE 1/2" x 1'-1 1/2" x 11'-6"

## BENT PLATE

SCALE: 1 1/2" = 1'-0"

NOTE: BENT PLATE SHALL BE GRADE 50 STEEL, GALVANIZED (WITH PILE 2 AFTER WELDING)

NORTH CAROLINA PROFESSIONAL SEAL 20277 ENGINEER HARDY L WILLIS 01/04/07

NORTH CAROLINA PROFESSIONAL SEAL 030948 ENGINEER R. JACOBSON 01/04/07

PROJECT NO. R-4758

SWAIN COUNTY

STATION: 17+65.00 -L- POT

S&ME ENGINEERING, TESTING ENVIRONMENTAL SERVICES

DRAWN BY: SF DATE: OCT. 2006

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WALL #1 ELEVATION

OCT. 2006

| REVISIONS | | | | | | SHEET NO. |
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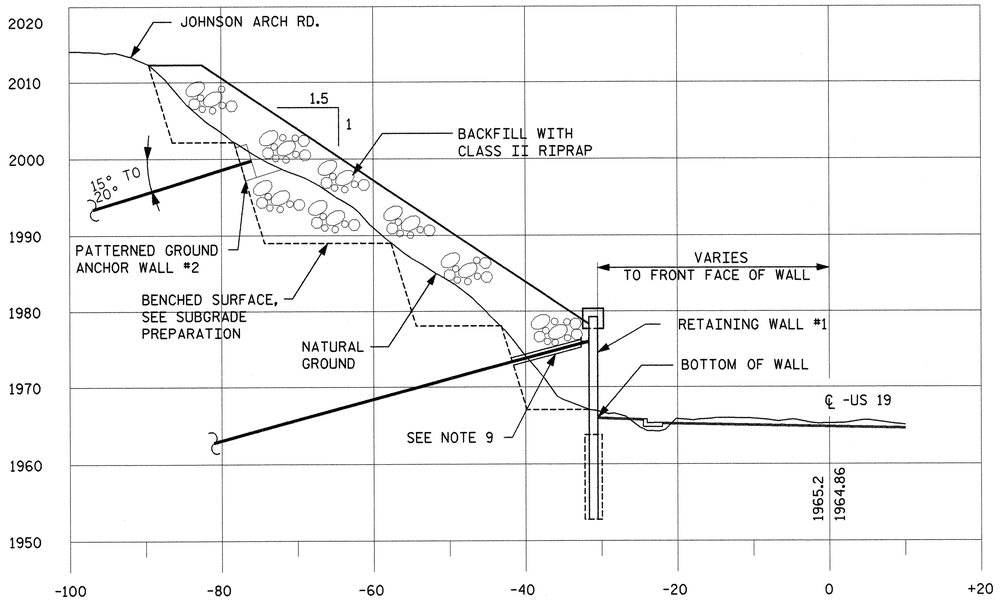
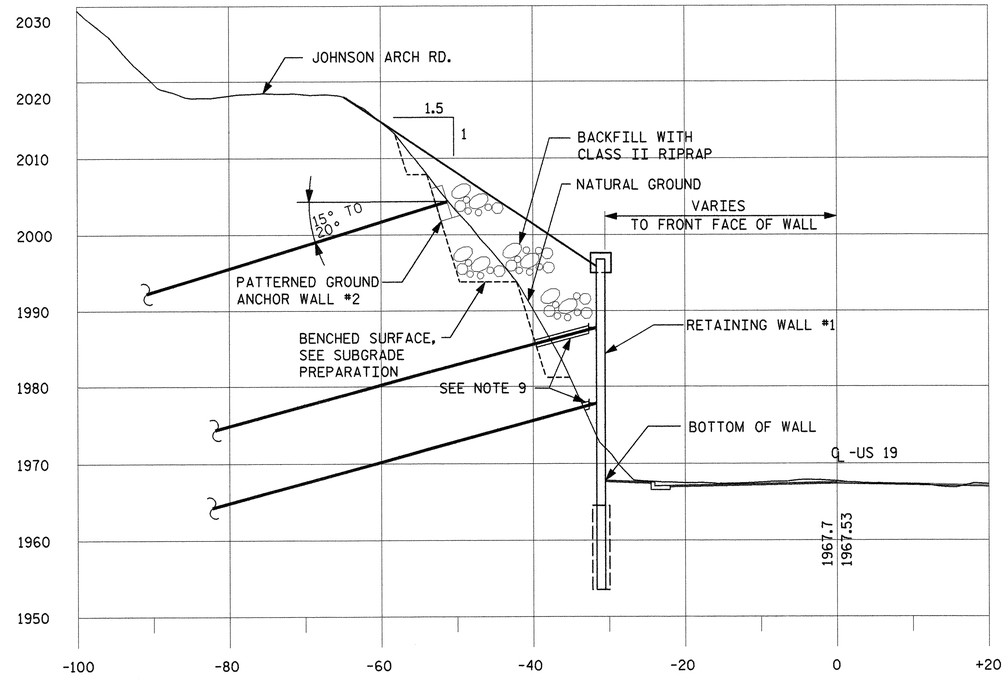
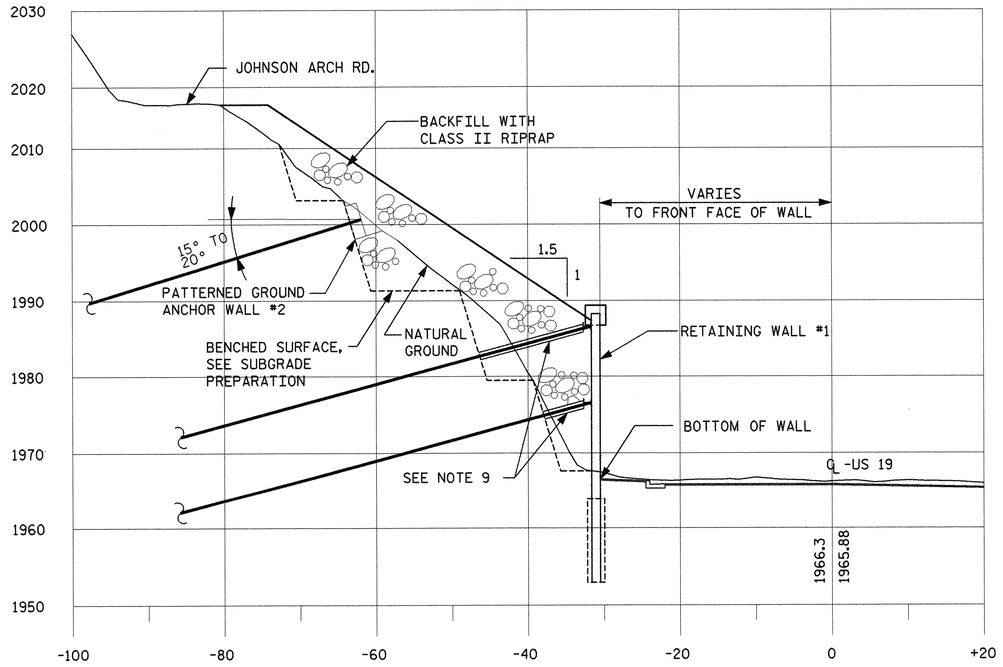



15+50




16+50




16+00

## SUBGRADE PREPARATION

1) THE SLOPE WITHIN THE APPROXIMATE LIMITS OF RIPRAP BACKFILL SHOULD BE STRIPPED OF ALL SURFACE VEGETATION, TOPSOIL, ALL EXISTING TREES, AND ANY OTHER DELETERIOUS SURFACE MATERIALS IN PREPARATION OF THE RIPRAP PLACEMENT.

2) UNDERCUTTING SHOULD ALSO INCLUDE REMOVAL OF THE DISPLACED LANDSLIDE MATERIAL (COLLUVIUM) AND ANY EXISTING FILL, WHICH INCLUDES ALL FAILED, LOOSE, SOFT, OR OTHERWISE UNSUITABLE MATERIALS AS DIRECTED BY THE GEOTECHNICAL ENGINEER DURING GRADING.

3) THE CONTRACTOR SHALL BEGIN CONSTRUCTION ON ONE SIDE OF THE SLIDE AREA AND PROGRESS TO THE OTHER SIDE, AND IN SUCH A WAY AS TO PREVENT LOCAL INSTABILITY THAT WOULD RESULT IN ADDITIONAL SLOPE DISPLACEMENT.

4) AFTER STRIPPING THE SITE, THE EXISTING NATURAL GROUND SHOULD BE BENCHED SO THAT ALL RIPRAP PLACEMENT BEGINS ON A RELATIVELY LEVEL PLANE. THE CONTACT BETWEEN SUITABLE SUBGRADE AND ROCK BUTTRESS MATERIALS SHALL BE BENCHED AS DIRECTED BY THE GEOTECHNICAL ENGINEER.

5) IF SEEPAGE FROM THE EMBANKMENT OR GROUNDWATER CONDITIONS ARE ENCOUNTERED DURING GRADING, THE CONTRACTOR SHALL NOTIFY THE GEOTECHNICAL ENGINEER.

6) A SITE SPECIFIC TOPOGRAPHIC SURVEY SHOULD BE PERFORMED AFTER COMPLETION OF THE SUBGRADE PREPARATION.

7) RIPRAP SHALL BE PLACED IN A MANNER THAT WILL MINIMIZE VOIDS, POCKETS, AND BRIDGING.

8) ALL GRADING ACTIVITIES SHOULD CONFORM TO THE NORTH CAROLINA STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES, (CURRENT EDITION) SECTION 200.

9) IF TENDONS ARE CONSTRUCTED IN SUCH A MANNER THAT REQUIRES PLACING OF RIPRAP AROUND TENDONS, A PROTECTIVE SLEEVE SHALL BE INSTALLED TO SURROUND THE TENDON SUCH THAT NO DAMAGE OCCURS DURING FILLING OPERATIONS

NORTH CAROLINA PROFESSIONAL SEAL 20177 ENGINEER HARDY L WILLIS 11/9/06

NORTH CAROLINA PROFESSIONAL SEAL 020948 ENGINEER JEFFREY R. JACOBSON 11/9/06

PROJECT NO. R-4758
SWAIN COUNTY
STATION: 17+65.00 -L- POT

SHEET 1 OF 2

S&ME ENGINEERING · TESTING ENVIRONMENTAL SERVICES

DRAWN BY: SF DATE: OCT. 2006
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Middlesboro, Kentucky 606-248-6600
Greeneville, Tennessee 865-639-1871
Asheville, North Carolina 828 253 3796


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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WALLS #1 & #2 SECTIONS

OCT. 2006

| REVISIONS | | | | | | SHEET NO. |
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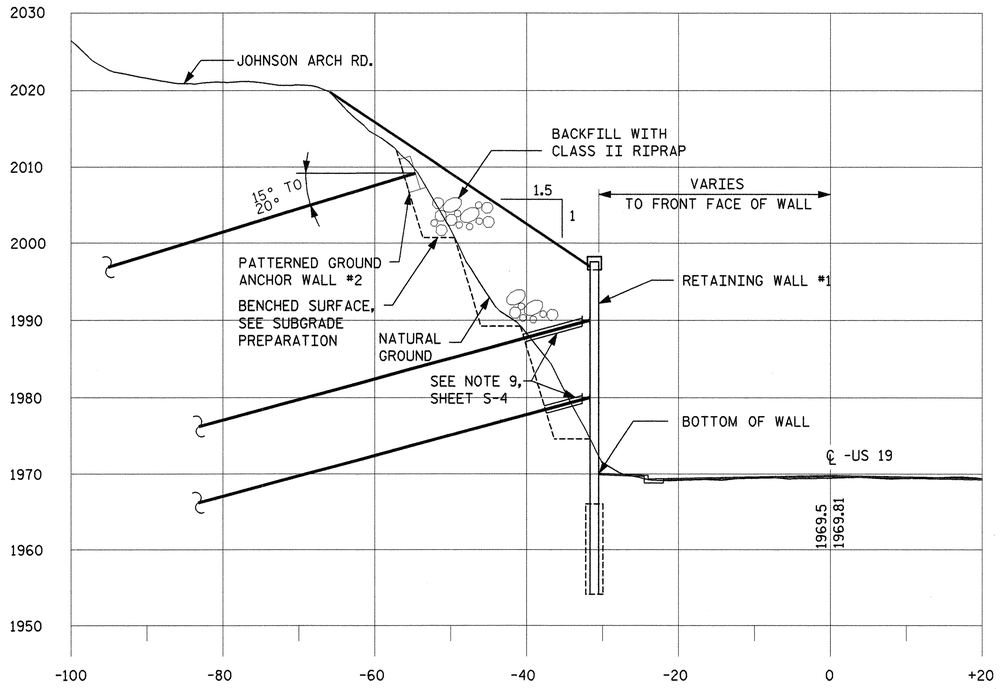
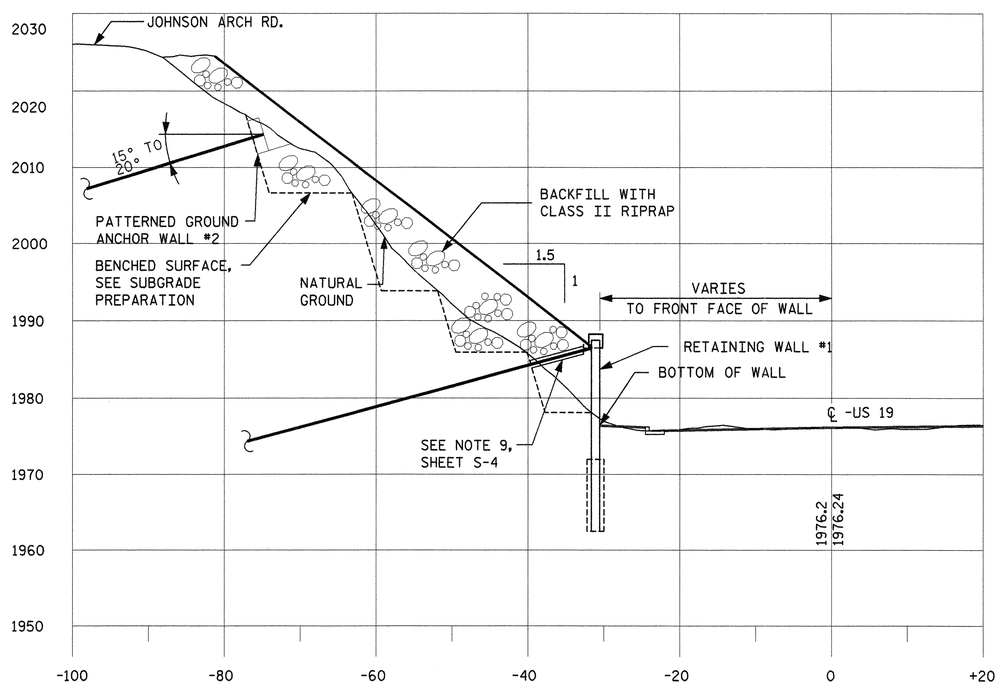
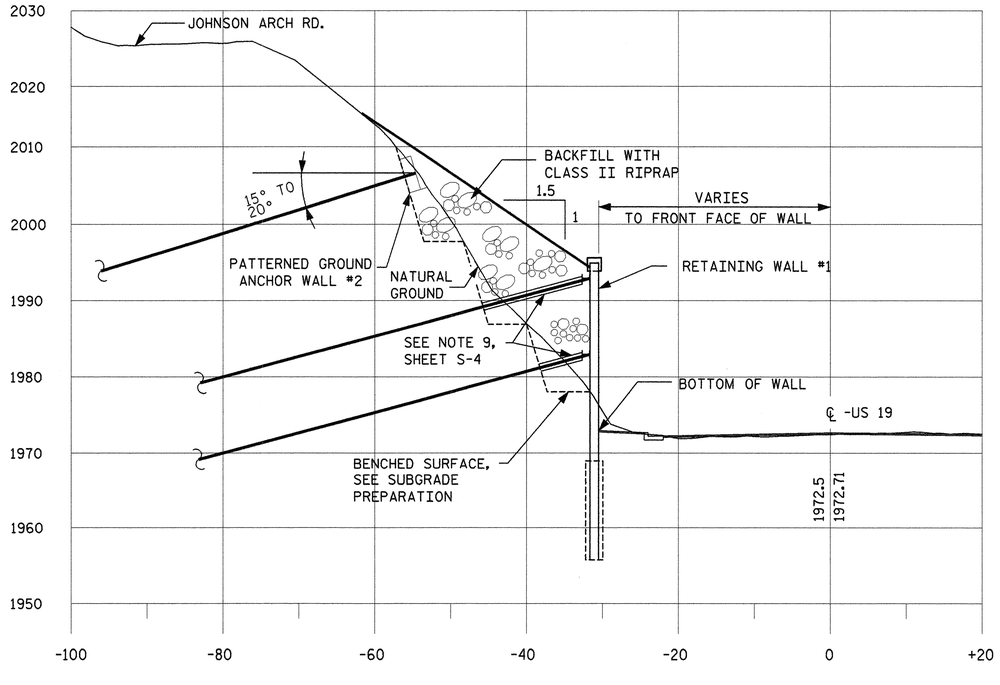



17+00




18+00




17+50

FOR SUBGRADE PREPARATION, SEE SHEET S-4.

NORTH CAROLINA PROFESSIONAL SEAL 20717 ENGINEER HARDY L. WILLIS 11/9/06

NORTH CAROLINA PROFESSIONAL SEAL 030148 ENGINEER JESSIE R. JACOBSON 11/9/06

PROJECT NO. R-4758
SWAIN COUNTY
STATION: 17+65.00 -L- POT

SHEET 2 OF 2

S&ME ENGINEERING TESTING ENVIRONMENTAL SERVICES

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WALLS #1 & #2 SECTIONS

OCT. 2006

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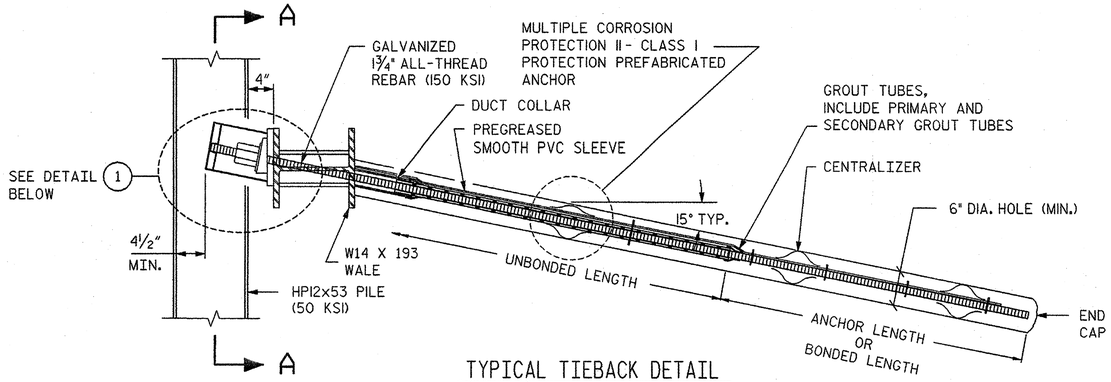
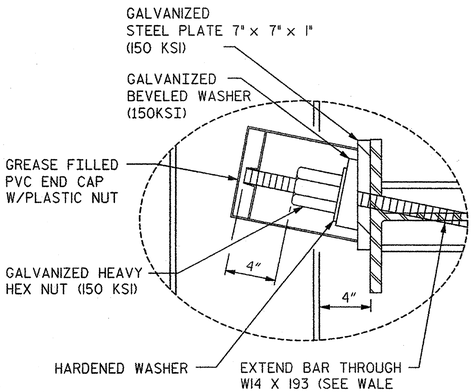



## TYPICAL TIEBACK DETAIL

SCALE: NOT TO SCALE




1 DETAIL

SCALE: NOT TO SCALE

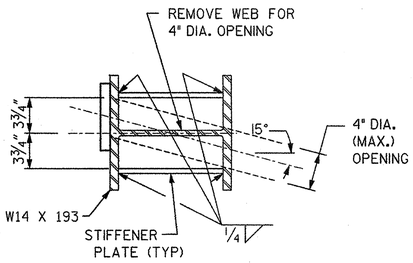
## TIEBACK NOTES

1. STEEL SHAPES SHALL CONFORM TO APPLICABLE ASTM REQUIREMENTS.
2. GROUT - 4000 psi 28-DAY STRENGTH (MINIMUM).
3. THE BONDED LENGTH FOR EACH ANCHOR SHALL BE 12 FEET MINIMUM IN SUITABLE MATERIAL, BUT THE ACTUAL LENGTH WILL BE BASED ON REQUIRED STRENGTH.
4. PRIOR TO MASS PRODUCTION OF ANCHORS, THREE VERIFICATION TESTS SHALL BE PERFORMED IN ACCORDANCE WITH FHWA-IF-99-015 AT LOCATIONS SPECIFIED BY THE GEOTECHNICAL ENGINEER.
5. EACH ANCHOR SHALL BE PROOF-TESTED ACCORDING TO FHWA-IF-99-015 (CURRENT EDITION). THE DESIGN LOAD, UNBONDED LENGTH AND ELEVATION AT WALL FOR EACH TIEBACK IS LISTED IN THE TABLE BELOW.
6. PILES AND WALES SHALL BE ASTM A709, GRADE 50 STRUCTURAL STEEL. BOLTS SHALL BE 1" A490 HIGH STRENGTH BOLTS WITH SLIP-CRITICAL CONNECTION. WELDS SHALL BE SAW, E70XX ELECTRODES.
7. ALL SOLDIER PILES, STEEL PLATES, BEVELED WASHERS, AND ALL STEEL MATERIALS REQUIRED FOR COMPLETE INSTALLATION OF THE WALL SHALL BE GALVANIZED BY APPROVED METHODS AND ACCORDING TO ALL ASTM REQUIREMENTS.

**WALL #1 TIE-BACK RECORD**

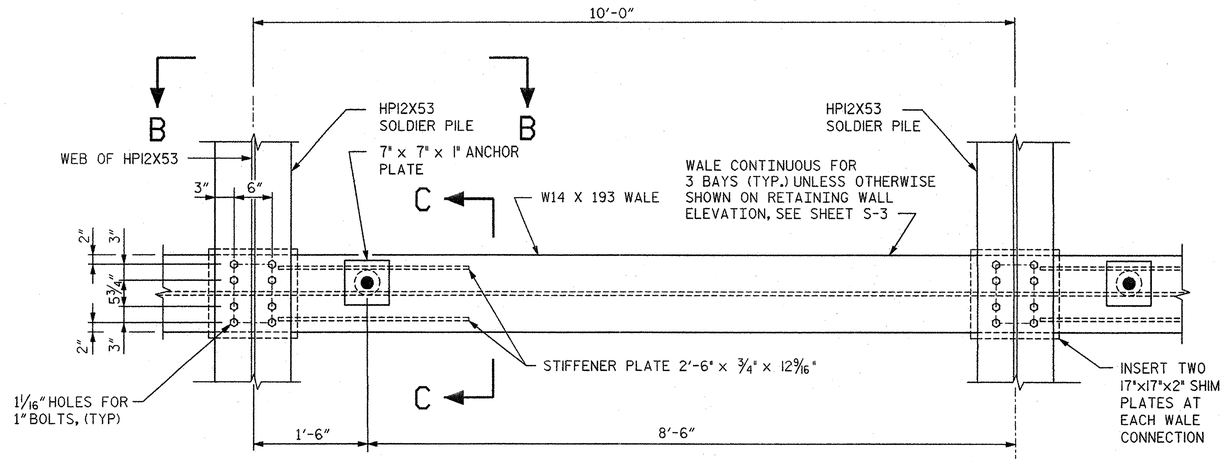
| PILE NO. | TIE-BACK #1 ELEVATION | TIE-BACK #1 DESIGN LOAD (KIPS) | TIE-BACK #1 UNBONDED LENGTH (FT) | TIE-BACK #2 ELEVATION | TIE-BACK #2 DESIGN LOAD (KIPS) | TIE-BACK #2 UNBONDED LENGTH (FT) |
|---|---|---|---|---|---|---|
| 1 | — | — | — | — | — | — |
| 2 | 1975.0 | 50 | 20 | — | — | — |
| 3 | 1975.0 | 65 | 20 | — | — | — |
| 4 | 1975.0 | 80 | 20 | — | — | — |
| 5 | 1976.0 | 100 | 20 | — | — | — |
| 6 | 1976.0 | 130 | 20 | — | — | — |
| 7 | 1976.0 | 165 | 20 | — | — | — |
| 8 | 1977.0 | 80 | 25 | 1986.5 | 130 | 35 |
| 9 | 1977.0 | 100 | 25 | 1986.5 | 140 | 35 |
| 10 | 1977.0 | 100 | 25 | 1986.5 | 155 | 35 |
| 11 | 1978.0 | 120 | 25 | 1988.0 | 165 | 35 |
| 12 | 1978.0 | 140 | 25 | 1988.0 | 175 | 35 |
| 13 | 1978.0 | 170 | 25 | 1988.0 | 190 | 35 |
| 14 | 1979.0 | 170 | 25 | 1989.0 | 200 | 35 |
| 15 | 1979.0 | 170 | 25 | 1989.0 | 200 | 35 |
| 16 | 1979.0 | 165 | 25 | 1989.0 | 200 | 35 |
| 17 | 1980.0 | 160 | 25 | 1990.0 | 190 | 35 |
| 18 | 1980.0 | 155 | 25 | 1990.0 | 185 | 35 |
| 19 | 1980.0 | 135 | 25 | 1990.0 | 170 | 35 |
| 20 | 1982.0 | 115 | 25 | 1992.0 | 165 | 35 |
| 21 | 1982.0 | 105 | 25 | 1992.0 | 155 | 35 |
| 22 | 1982.0 | 85 | 25 | 1992.0 | 150 | 35 |
| 23 | 1984.0 | 80 | 25 | 1992.0 | 140 | 35 |
| 24 | 1984.0 | 175 | 20 | — | — | — |
| 25 | 1984.0 | 130 | 20 | — | — | — |
| 26 | 1986.0 | 105 | 20 | — | — | — |
| 27 | 1986.0 | 70 | 20 | — | — | — |
| 28 | 1986.0 | 60 | 20 | — | — | — |
| 29 | — | — | — | — | — | — |
| 30 | — | — | — | — | — | — |

NOTES:
1. TIEBACK ANCHORS ARE CONNECTED TO THE WALES BETWEEN PILES. EACH ANCHOR ABOVE REFERENCES THE PILE NUMBER NEAREST TO IT.
2. UNBONDED LENGTH IS MEASURED FROM THE BACK OF THE H-PILE.
3. DESIGN LOADS SHALL NOT EXCEED PTI'S RECOMMENDED MAXIMUM ALLOWABLE LOAD FOR THE TENDON.




C-C 5 SECTION C-C

SCALE: NOT TO SCALE



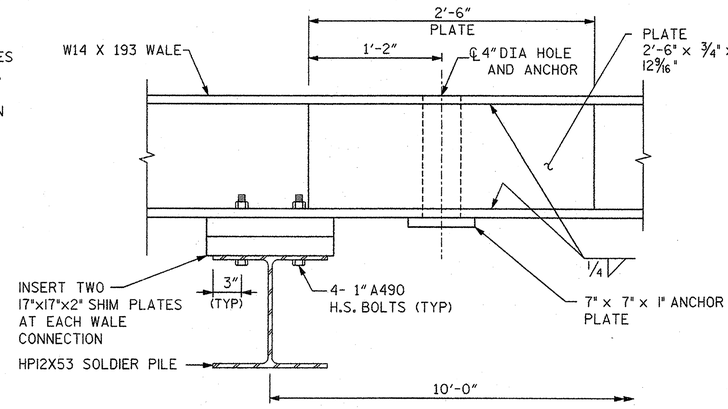

A-A 5 SECTION A-A

SCALE: NOT TO SCALE

NOTE: WHERE TWO ANCHORS ARE REQUIRED IN A SINGLE BAY, LOCATE SYMMETRICALLY AND ADD STIFFENER PLATES.

## WALL GENERAL NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBSERVING ALL APPLICABLE SAFETY LAWS AND REGULATIONS, INCLUDING ANY APPLICABLE EXCAVATION AND RIGGING REGULATIONS.
2. THE CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS, GRADES AND DIMENSIONS AT THE SITE PRIOR TO WALL CONSTRUCTION. IF THE CONTRACTOR DISCOVERS ANY ERRORS, OMISSIONS OR DISCREPANCIES, THE CONTRACTOR SHALL CONTACT THE DESIGN ENGINEER PRIOR TO CONTINUING WALL CONSTRUCTION.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING AND PROTECTING ALL UNDERGROUND UTILITIES AND OTHER STRUCTURES IN THE AREA OF WALL CONSTRUCTION.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACQUIRING PERMISSION AND ALL PERMITS FOR CONSTRUCTION IN THE WALL AREA.
5. WALL HEIGHTS SHOWN ON THE PLANS ARE BASED ON INFORMATION AVAILABLE AT THE TIME OF DESIGN. IF THE ACTUAL WALL HEIGHT IS MORE THAN ONE FOOT GREATER THEN THE WALL HEIGHT SHOWN ON THE DRAWINGS, THEN THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE DESIGN ENGINEER.
6. ALL TIEBACK DRILLING, INSTALLATION, TESTING AND LOADING SHALL BE OBSERVED AND DOCUMENTED BY EXPERIENCED PERSONNEL TO CONFIRM THAT CONSTRUCTION IS IN ACCORDANCE WITH THE DESIGN PLANS.
7. MEASURES SHALL BE IMPLEMENTED TO MEET LOCAL, STATE AND FEDERAL REQUIREMENTS FOR FALL PROTECTION, TRAFFIC BARRIERS, AND ALL OTHER SAFETY CONDITIONS BOTH DURING AND AFTER CONSTRUCTION. SAFETY MEASURES AND CONDITIONS DURING CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SAFETY MEASURES AND CONDITIONS AFTER CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE OWNER. UNDER NO CIRCUMSTANCES SHALL VAUGHN & MELTON OR S&ME BE RESPONSIBLE FOR PERFORMANCE OR IMPLEMENTATION OF THE SAFETY MEASURES OR ANY OTHER SAFETY CONDITIONS AT THE SITE BOTH DURING AND AFTER CONSTRUCTION.
8. EQUIPMENT OPERATIONS BEHIND AND IN FRONT OF THE CONSTRUCTED PORTIONS OF THE TIEBACK WALL SHALL BE RESTRICTED TO PREVENT DAMAGE TO CONSTRUCTED PORTIONS OF THE TIEBACK WALL. ONLY LIGHT EQUIPMENT SHALL BE USED WITHIN 15 FEET BEHIND THE WALL TO PREVENT EXCESSIVE LATERAL STRESS ON CONSTRUCTED PORTIONS OF THE WALL.
9. SURFACE WATER IS EXPECTED TO ENTER THE RIP RAP BACKFILL AND EXIT AT THE BOTTOM OF THE WALL. THIS DESIGN EXCLUDES THE COLLECTION AND CONTROL OF WATER BEYOND THE WALL CONSTRUCTION LIMITS.




B-B 5 SECTION B-B

SCALE: NOT TO SCALE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL HARDY L. WILLIS 5/20/07

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL L-030944 JOSE R. JACOBSON

PROJECT NO. R-4758
SWAIN COUNTY
STATION: 17+65.00 -L- POT

S&ME ENGINEERING - TESTING ENVIRONMENTAL SERVICES

DRAWN BY: SF DATE: OCT. 2006
CHECKED BY: JRJ DATE: OCT. 2006

Vaughn & Melton Consulting Engineers — Middlesboro, Kentucky 606-248-6606; Greenville, Tennessee 865-639-0251; Asheville, North Carolina 828 253 3796



DRAWN BY: SF DATE: OCT. 2006
CHECKED BY: HLW DATE: OCT. 2006

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WALL #1 PILE
TIEBACK DETAILS

OCT. 2006

| REVISIONS | | | | | | SHEET NO. |
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| NO. | BY | DATE | NO. | BY | DATE | S-6 |
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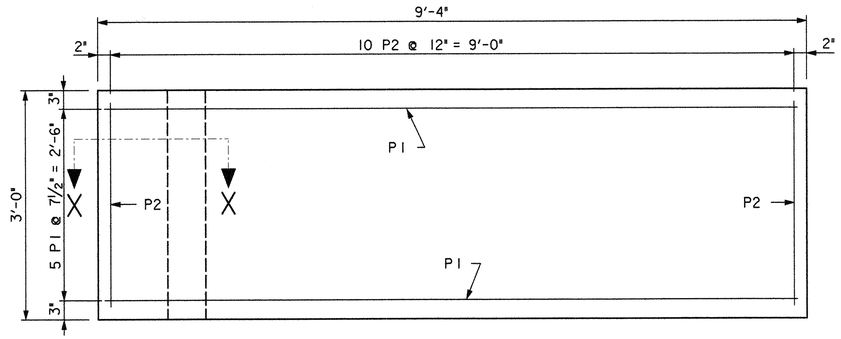


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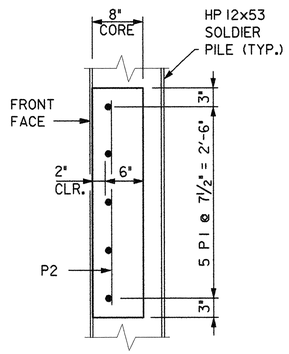


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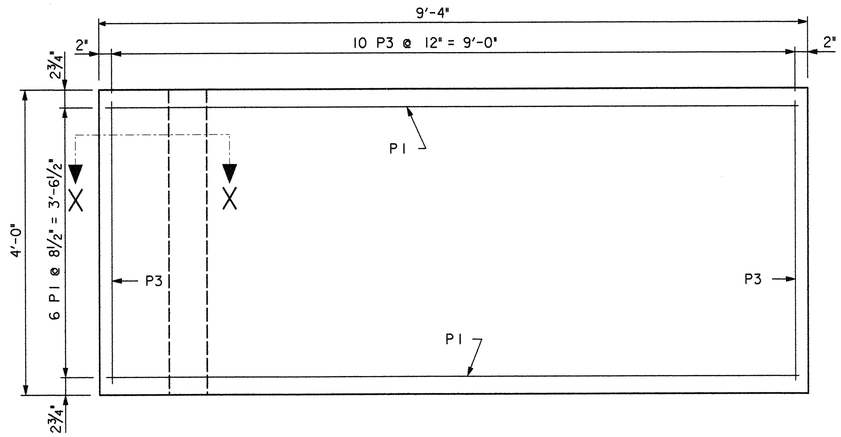


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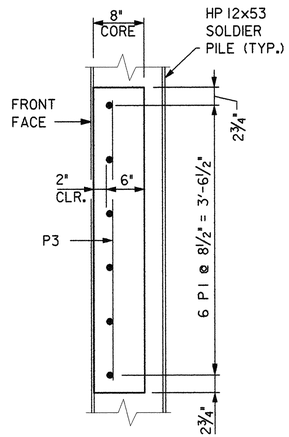


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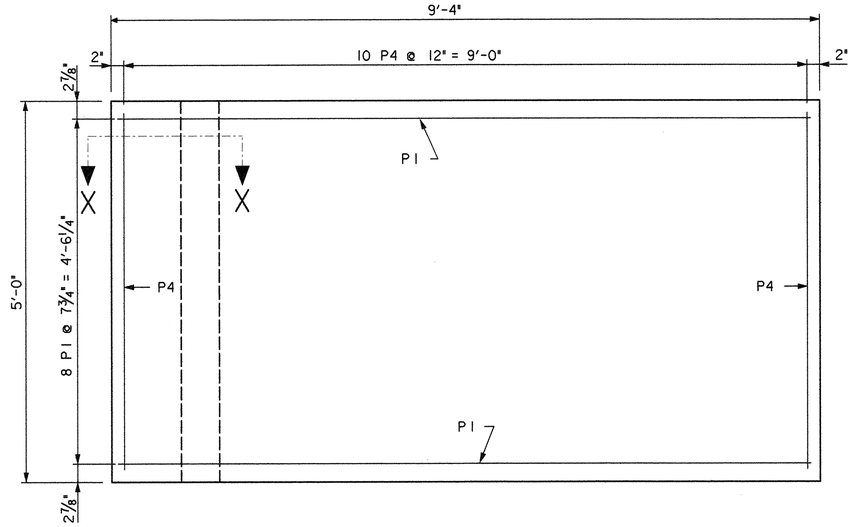


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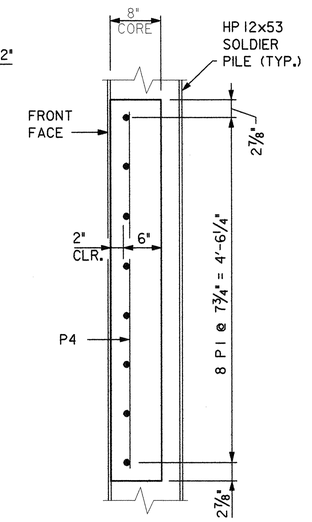


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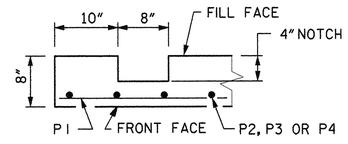
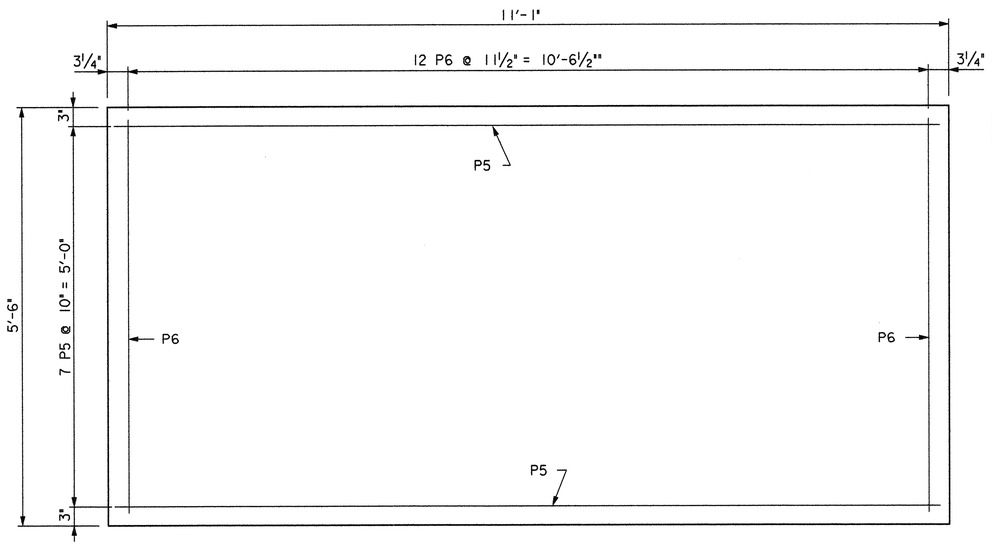



SECTION X

NOTE: THIS NOTCH IS REQUIRED ON BOTH SIDES FOR THE FIVE PANELS BETWEEN PILES 22 & 23 AND THE THREE PANELS BETWEEN PILES 27 & 28. OTHERWISE FORM NOTCH ON LEFT SIDE ONLY (AS SHOWN).

## TABLE OF QUANTITIES

| PANEL | NO. | REINFORCING STEEL MARK | SIZE | NO. | LENGTH FT. | LENGTH IN. | CONCRETE PER PANEL (CU. YDS.) | TOTAL CONCRETE (CU. YDS.) | REINF. STEEL (LBS.) | REINF. STEEL PER PANEL (LBS.) | REINF. STEEL, TOTAL (LBS.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 20 | P1 | #6 | 5 | 9 | 0 | .66 | 13.2 | 68 | 86 | 1720 |
| | | P2 | #4 | 10 | 2 | 8 | | | 18 | | |
| B | 16 | P1 | #6 | 6 | 9 | 0 | .88 | 14.1 | 81 | 105 | 1680 |
| | | P3 | #4 | 10 | 3 | 8 | | | 24 | | |
| C | 103 | P1 | #6 | 8 | 9 | 0 | 1.10 | 113.3 | 108 | 139 | 14,317 |
| | | P4 | #4 | 10 | 4 | 8 | | | 31 | | |
| D | 2 | P5 | #6 | 7 | 10 | 9 | 1.51 | 3.0 | 113 | 154 | 308 |
| | | P6 | #4 | 12 | 5 | 2 | | | 41 | | |
| TOTAL | 141 | | | | | | | 143.6 | | | 18,025 |

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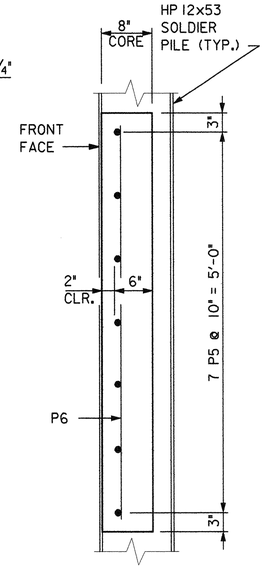


PANEL "D"

## PRECAST PANELS

PRECAST PANELS SHALL BE POURED WITH THE FRONT FACE DOWN. PANELS MUST NOT BE REMOVED FROM THE FORMS UNTIL THE CONCRETE HAS ATTAINED SUFFICIENT STRENGTH TO PREVENT DAMAGE. CRACKED, SPALLED OR DAMAGED PANELS WILL BE REJECTED.

PANELS SHALL NOT BE PLACED UNTIL A MINIMUM OF 85% OF 28-DAY STRENGTH (3400 PSI) HAS BEEN ACHIEVED.

PANELS MUST BE PLUMB AND HAVE A MINIMUM BEARING WIDTH OF 2" ON EACH PILE FLANGE. A ½" THICK EXPANSION JOINT MATERIAL MUST BE PLACED BETWEEN THE PANELS AND PILE FLANGES FOR THE WIDTH OF THE BEARING SURFACE. THE PANEL MUST BE SEATED FIRMLY ON THE CUSHIONING MATERIAL AND MUST BE HELD SECURELY AGAINST THE PILE FLANGE.

EXPANSION JOINTS IN THE COPING ARE NOT PERMITTED, BUT CONSTRUCTION JOINTS MAY BE USED WHERE THE COPING CHANGES SLOPES AND AT 90-FOOT CENTERS.

FILTER FABRIC DRAINAGE MATS, USED IN CONJUNCTION WITH A GRANULAR MATERIAL OR WITH A MOLDED, POLYMERIC CORE, AND DRAIN PIPES AT MINIMUM 6-FOOT CENTERS ARE REQUIRED. POSITION DRAIN PIPES (NOT SHOWN) ALONG THE CENTERLINE OF EACH PANEL. THESE PIPES SHALL PROTRUDE THROUGH THE TIMBER LAGGING ALSO.

EXTREME CAUTION SHALL BE TAKEN WHEN INSTALLING PANELS TO AVOID CONTACTING THE TIEBACK EXTENSION ASSEMBLY (DETAILED ON SHEET 5). THE CONTRACTOR SHALL ENSURE THAT THE TIEBACK ASSEMBLY IS NOT DAMAGED BY SUCH PLACEMENT. THE PANELS MUST ALSO BE ALIGNED SUCH THAT THE FRONT FACE OF EACH PANEL IS FLUSH WITH THE FRONT FACE OF BOTH THE PANEL ABOVE AND THE PANEL BELOW IT.

DRAIN PIPE OR HOLE INSERT SHALL BE CAST INTO PANELS. CONCRETE PANELS SHALL BE EMBEDDED A MINIMUM OF 2'-0" BELOW THE PROPOSED FINISHED GRADE.

TIMBER LAGGING SHALL NOT BE INSTALLED BEFORE THE DRILLED PIER CONCRETE HAS CURED FOR A MINIMUM OF THREE DAYS.


PROJECT NO. R-4758
SWAIN COUNTY
STATION: 17+65.00 -L- POT

STATE OF NORTH CAROLINA
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RALEIGH

WALL #1 PRECAST PANELS

OCT. 2006

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|---|---|---|---|---|---|
| | | | | | |

SHEET NO. S-7

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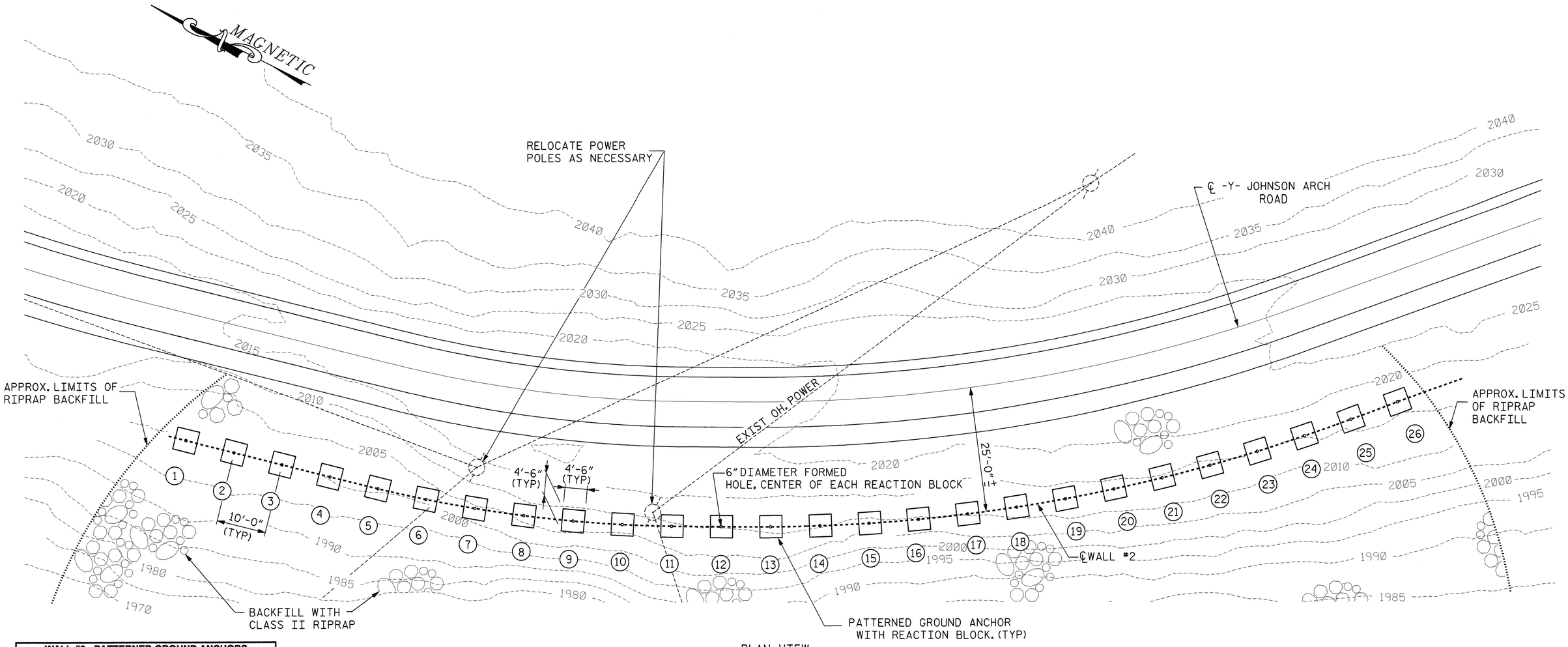


PLAN VIEW
SCALE: 1" = 10'

| WALL #2 - PATTERNED GROUND ANCHORS LOCATIONS & QUANTITIES | | |
|---|---|---|
| GROUND ANCHOR NO. | ANCHOR STATION | OFFSET FROM ℄ U.S. 19 |
| 1 | 15+57.67 | 70.9 FT. LEFT |
| 2 | 15+67.37 | 68.5 FT. LEFT |
| 3 | 15+77.07 | 66.0 FT. LEFT |
| 4 | 15+86.77 | 63.6 FT. LEFT |
| 5 | 15+96.48 | 61.2 FT. LEFT |
| 6 | 16+06.24 | 59.0 FT. LEFT |
| 7 | 16+16.07 | 57.2 FT. LEFT |
| 8 | 16+25.96 | 55.7 FT. LEFT |
| 9 | 16+35.90 | 54.7 FT. LEFT |
| 10 | 16+45.88 | 53.9 FT. LEFT |
| 11 | 16+55.87 | 53.6 FT. LEFT |
| 12 | 16+65.87 | 53.5 FT. LEFT |
| 13 | 16+75.87 | 53.4 FT. LEFT |
| 14 | 16+85.87 | 53.7 FT. LEFT |
| 15 | 16+95.84 | 54.2 FT. LEFT |
| 16 | 17+05.82 | 54.9 FT. LEFT |
| 17 | 17+15.76 | 56.0 FT. LEFT |
| 18 | 17+25.67 | 57.4 FT. LEFT |
| 19 | 17+35.53 | 59.1 FT. LEFT |
| 20 | 17+45.34 | 61.0 FT. LEFT |
| 21 | 17+55.09 | 63.2 FT. LEFT |
| 22 | 17+64.76 | 65.7 FT. LEFT |
| 23 | 17+74.37 | 68.5 FT. LEFT |
| 24 | 17+83.88 | 71.6 FT. LEFT |
| 25 | 17+93.31 | 75.0 FT. LEFT |
| 26 | 18+02.71 | 78.4 FT. LEFT |

NOTES:

GROUNDS ANCHORS SHALL BE CONSTRUCTED (WITHIN THE OVERALL SEQUENCE GIVEN ON SHEET S-15) IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. GENERAL GROUND ANCHOR PROCEDURE, NOTES AND DETAILS ARE GIVEN ON SHEET S-9.

REACTION BLOCKS MAY BE PRECAST AND SET IN PLACE OR FORMED AND CAST IN PLACE.

CONCRETE IN REACTION BLOCKS SHALL BE CLASS A CONCRETE. REINFORCEMENT SHALL BE GRADE 60.

REACTION BLOCKS ARE DESIGNED TO A MAXIMUM ALLOWABLE BEARING CAPACITY OF 5000 PSF AND A MAXIMUM ANCHORAGE LOAD OF 100,000 LBS

REACTION BLOCKS SHALL BE ALIGNED GENERALLY WITH THE SLOPE. EXCAVATE MINIMALLY AT EACH BLOCK LOCATION, AND APPLY SHOTCRETE TO THE BEARING AREA IN ORDER TO PROVIDE AN EVEN SURFACE AT EACH BLOCK BEFORE SETTING AND ANCHORAGE. BLOCKS SHALL BE SET PERPENDICULAR TO THE GROUND ANCHORS, WHICH SHALL BE 15° TO 20° TO HORIZONTAL. IF FORMED IN PLACE, CONTRACTOR SHALL TAKE PRECAUTION TO DESIGN FORMWORK FOR THIS ABNORMAL ANGLE (SEE SECTIONS, SHEETS S-4 & S-5).

NORTH CAROLINA PROFESSIONAL SEAL 20777 ENGINEER HARDY L. WILLIS 11/9/06

NORTH CAROLINA PROFESSIONAL SEAL 020949 ENGINEER JESSE R. JACOBSON 11/9/06

PROJECT NO. R-4758
SWAIN COUNTY
STATION: 17+65.00 -L- POT

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WALL #2
PLAN & DETAILS

OCT. 2006

| REVISIONS | | | | | | SHEET NO. |
|---|---|---|---|---|---|---|
| NO. | BY | DATE | NO. | BY | DATE | S-8 |
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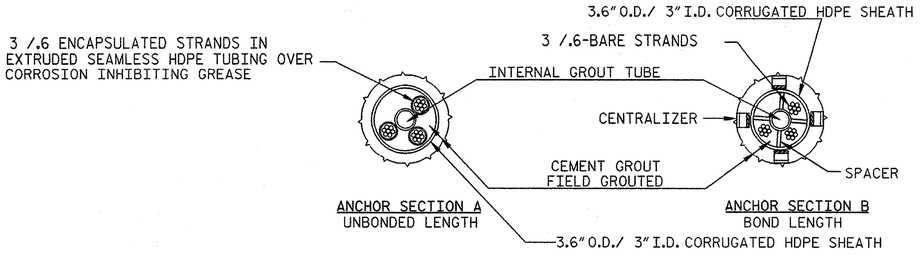
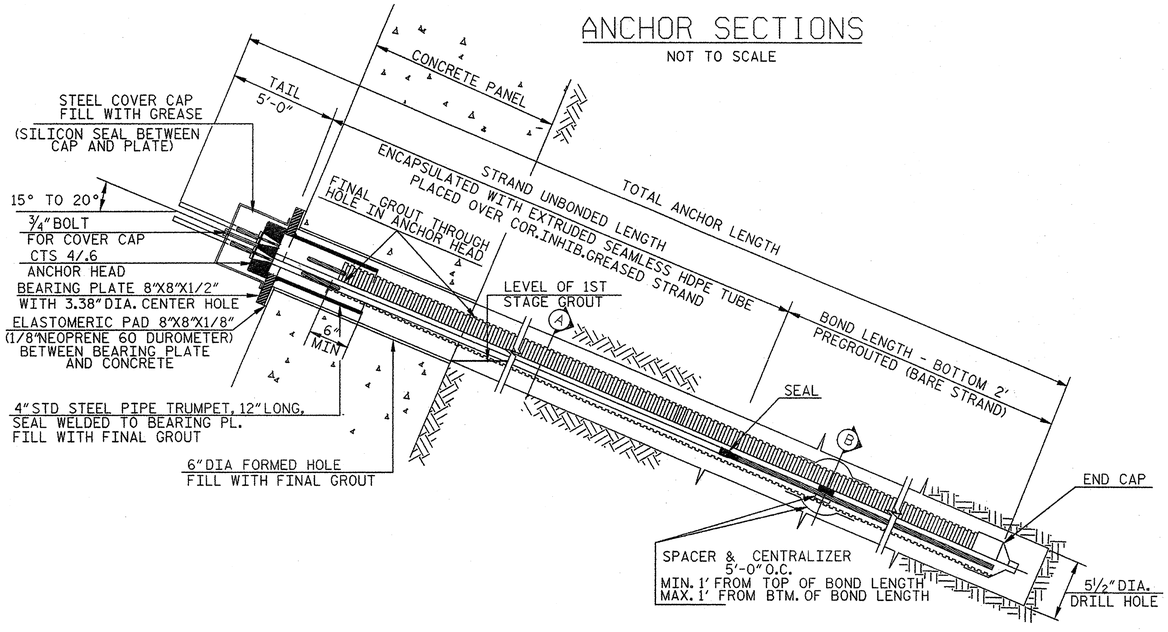



## ANCHOR SECTIONS

NOT TO SCALE




## ANCHORAGE DETAIL

NOT TO SCALE

NOTES:

ELONGATION CALCULATION: $EL = \frac{TL}{AE}$

T = LOAD (PRESTRESSING FORCE = 75 KIP, TEST LOAD=1.33 DESIGN LOAD)

MAX L = FREE (UNBONDED) LENGTH + HEIGHT OF JACKING EQUIPMENT + 50 % OF BOND LENGTH.

MIN L = 80% OF FREE (UNBONDED) LENGTH + HEIGHT OF JACKING EQUIPMENT.

A = AREA OF STEEL SQ.INCH (3/.6 STRANDS=0.65 SQ. INCH.

E = MODULUS OF ELASTICITY = 28,000 KSI (SEE MILL.CERTS.)

ALL TIE BACK ANCHORS ARE AS PER SPECIFICATIONS.

ALL STRANDS TO BE ASTM A-416, 0.6"DIA. 7 WIRE, 270 LOW RELAXATION STRAND. (3 STRANDS PER ANCHOR)

CORRUGATED HDPE SHEATHING CONFORMS TO ASTM D 1248

CORROSION INHIBITING GREASE CONFORMS TO SECTION 3.2.5 POST TENSIONING INSTITUTE.

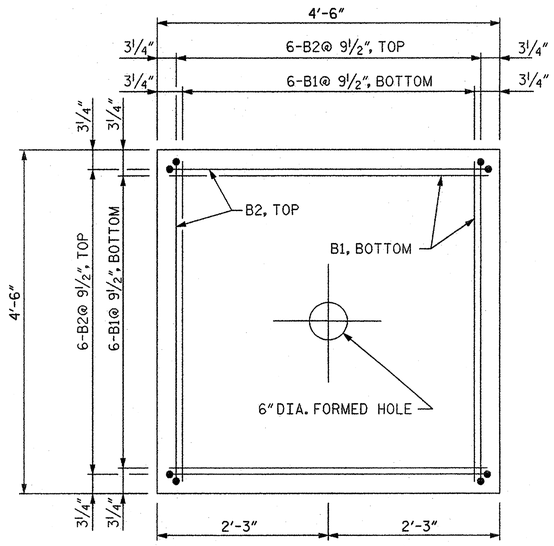
EXTRUDED SEAMLESS TUBING IN UNBONDED LENGTH TO BE HDPE, MIN 1/16" WALL, AS PER ASTM D 1248.

DRILL ANGLE MAY HAVE TO BE STEEPENED TO FACILITATE INSTALLATION OF ANCHORS (TO BE APPROVED BY THE ENGINEER)

BONDED LENGTH SHALL BE 25 FEET MINIMUM. UNBONDED LENGTH SHALL BE 15 FEET MINIMUM. HOWEVER, BOTH OF THESE LENGTHS HAVE BEEN DETERMINED BASED ON THE ENTIRETY OF THE ANCHOR BEING ABOVE THE SOLID ROCK LINE. IN THE EVENT ROCK IS ENCOUNTERED IN THE DRILLING PROCESS, THESE LENGTHS MAY BE REDUCED AT THE INSTRUCTION OF THE ON-SITE GEOTECHNICAL ENGINEER.

GROUND ANCHORS SHALL BE TESTED IN ACCORDANCE WITH "PERFORMANCE OF PERMANENT GROUND ANCHORS FOR LANDSLIDE STABILIZATION" (FHWA-WY-0303F) CURRENT EDITION.

GROUND ANCHOR SHALL BE CON-TECH SYSTEMS OR APPROVED EQUAL

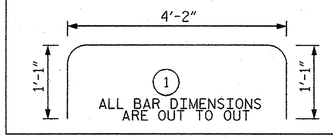



## PLAN

SCALE: 1/2" = 1'-0"

| REINFORCING SCHEDULE | | | | | | |
|---|---|---|---|---|---|---|
| QUANTITIES SHOWN PER BLOCK | | | | | | |
| MARK | TYPE | SIZE | NO. | LENGTH FT. | LENGTH IN. | WEIGHT (LBS) |
| B1 | STR | #7 | 12 | 4 | 2 | 102 |
| B2 | ① | #4 | 12 | 6 | 4 | 51 |
| B3 | STR | #4 | 4 | 4 | 2 | 11 |
| TOTAL REINF. STEEL, ONE BLOCK: | | | | | | 164 LBS |
| TOTAL REINF. STEEL, 26 BLOCKS: | | | | | | 4,264 LBS |
| TOTAL CLASS A CONCRETE, ONE BLOCK: | | | | | | 1.13 C.Y. |
| TOTAL CLASS A CONCRETE, 26 BLOCKS: | | | | | | 29.3 C.Y. |

BAR TYPES







## SECTION

SCALE: 1/2" = 1'-0"

## REACTION BLOCK DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 030249 ENGINEER HARDY L WILLIS 5/20/07

NORTH CAROLINA PROFESSIONAL SEAL 030948 ENGINEER JEREMY R. JACOBSON 5/20/07

PROJECT NO. R-4758

SWAIN COUNTY

STATION: 17+65.00 -L- POT

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WALL #2 DETAILS

OCT. 2006

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|---|---|---|---|---|---|---|
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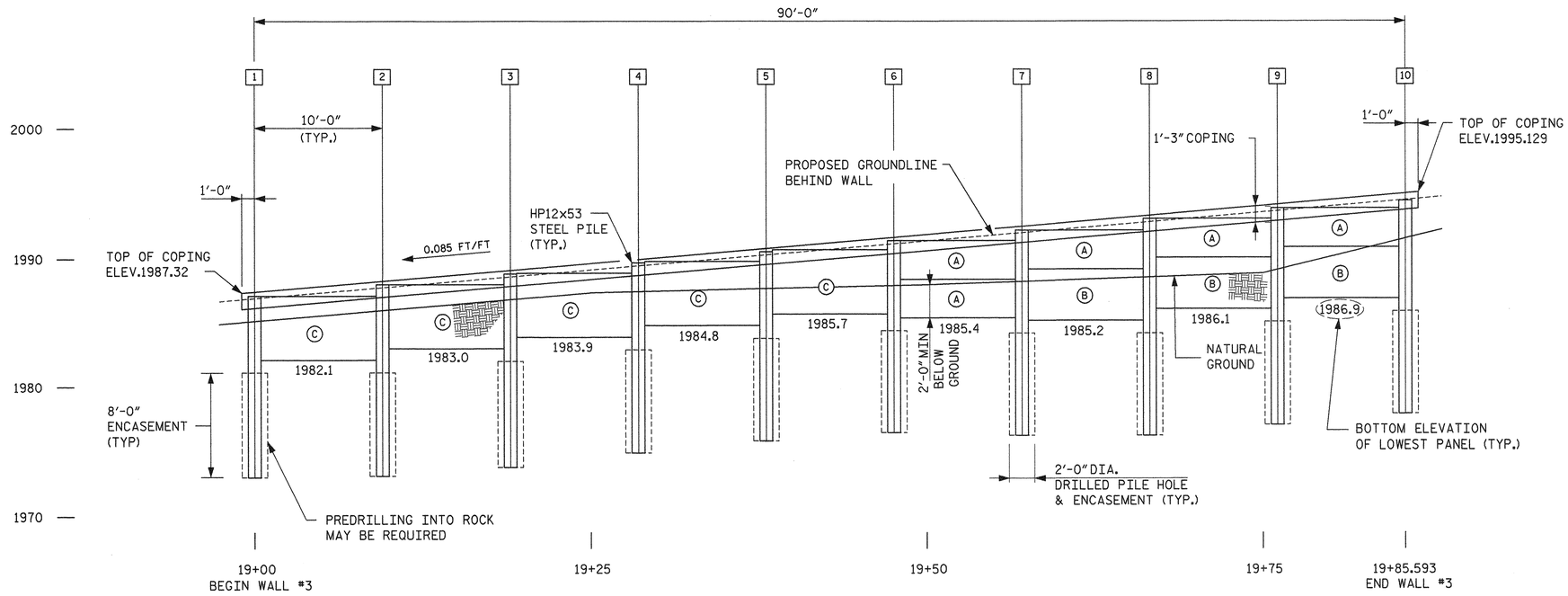


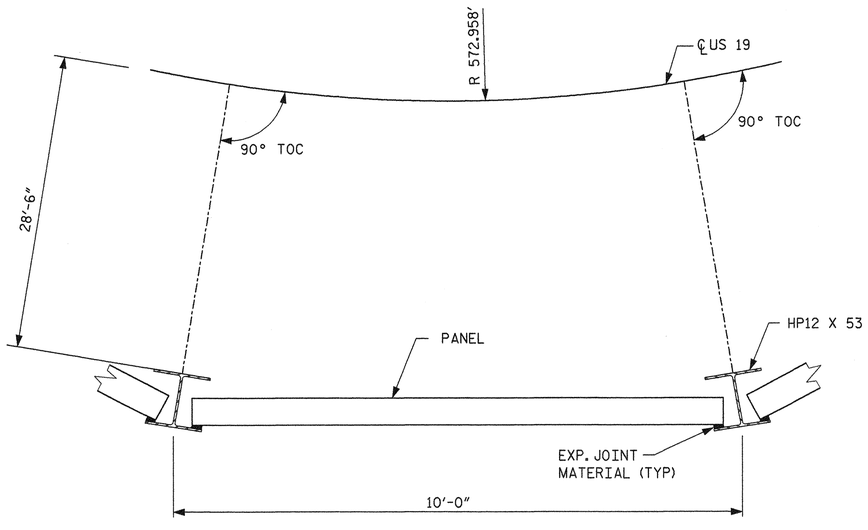

## RETAINING WALL #3 ELEVATION

SCALE: 3/16" = 1'-0"

## LEGEND

(A) - PANEL TYPE

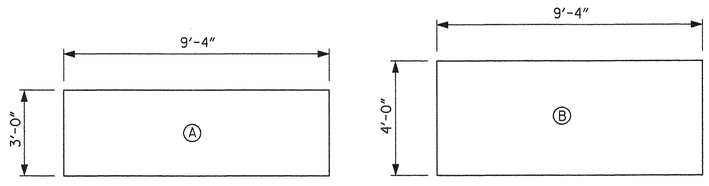
[1] - PILE NUMBER

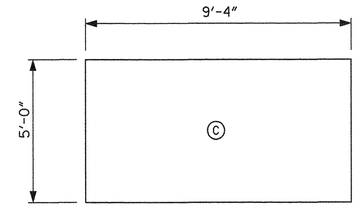



## DETAIL "A"

NTS

NOTE: DUE TO 10° CURVE ALONG ℄ US 19, AND 28'-6" OFFSET TO FILL FACE OF WALL #3, THE WALL WILL FOLLOW CHORDS ALONG THE OFFSET CURVATURE. SET PILES WITH WEBS RADIAL TO THE CURVE AS SHOWN ABOVE.




5 REQUIRED

## PANEL TYPES

SCALE: 3/8" = 1'-0"

NOTE: SEE SHEET S-12 FOR PANEL DETAILS.

NORTH CAROLINA PROFESSIONAL SEAL 20777 ENGINEER HARDY L. WILLIS 01/04/07

NORTH CAROLINA PROFESSIONAL SEAL 030948 ENGINEER JESSE R. JACOBSON 01/04/07

PROJECT NO. R-4758

SWAIN COUNTY

STATION: 17+65.00 -L- POT

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RALEIGH

WALL #3 ELEVATION

OCT. 2006

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| NO. | BY | DATE | NO. | BY | DATE | S-10 |
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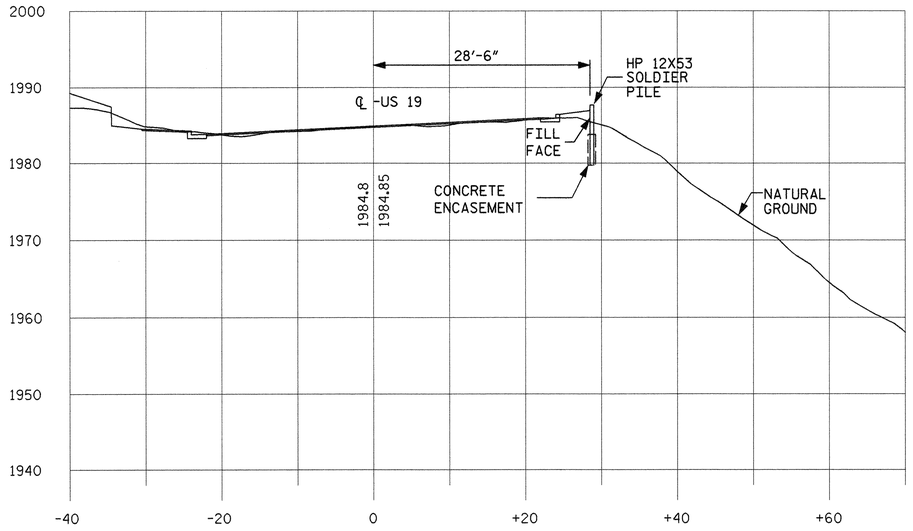
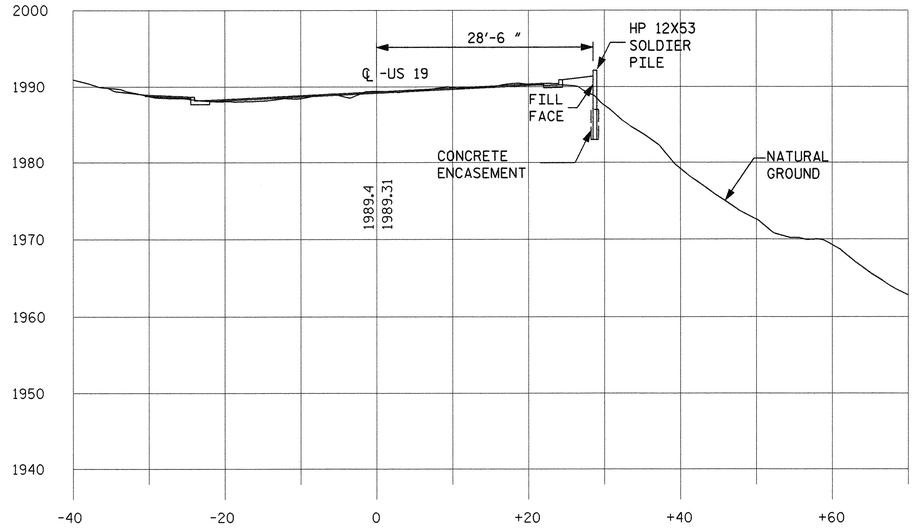
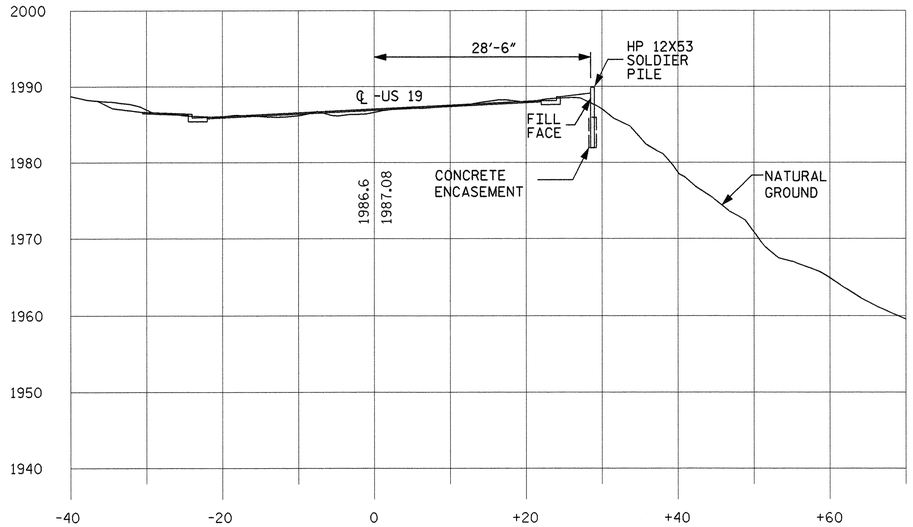


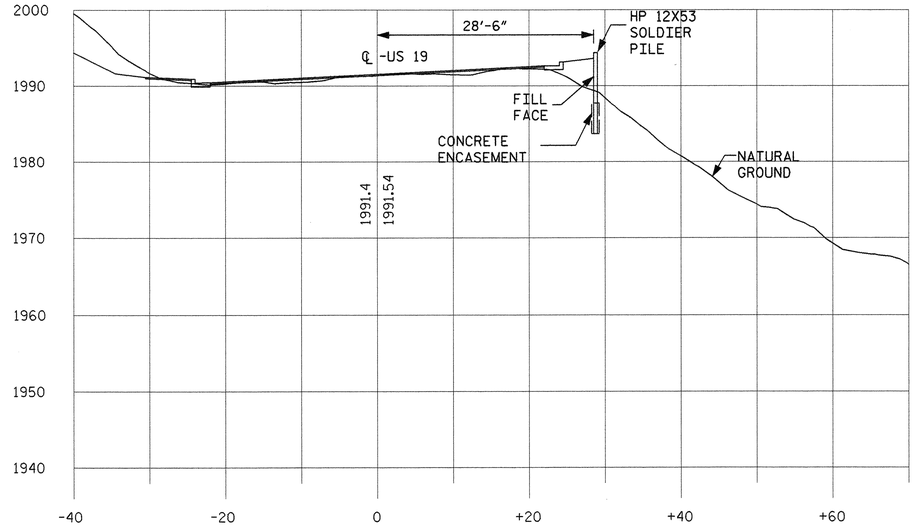

19+00 BEGIN WALL 3




19+50




19+25




19+75

PROJECT NO. R-4758
SWAIN COUNTY
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# WALL # 3 SECTIONS

OCT. 2006

| REVISIONS | | | | | | SHEET NO. |
|---|---|---|---|---|---|---|
| NO. | BY | DATE | NO. | BY | DATE | S-11 |
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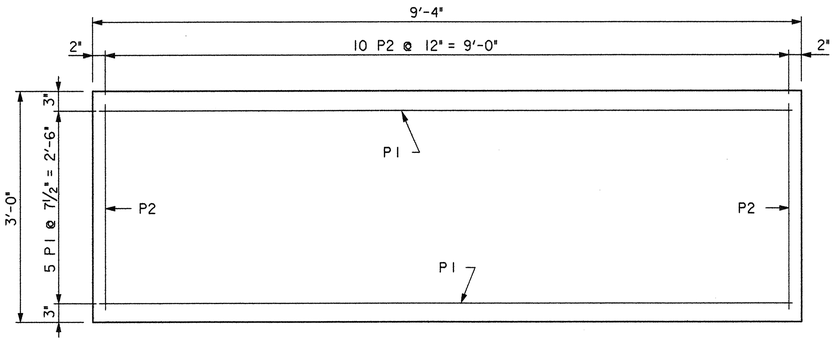


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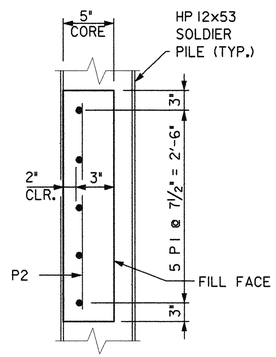


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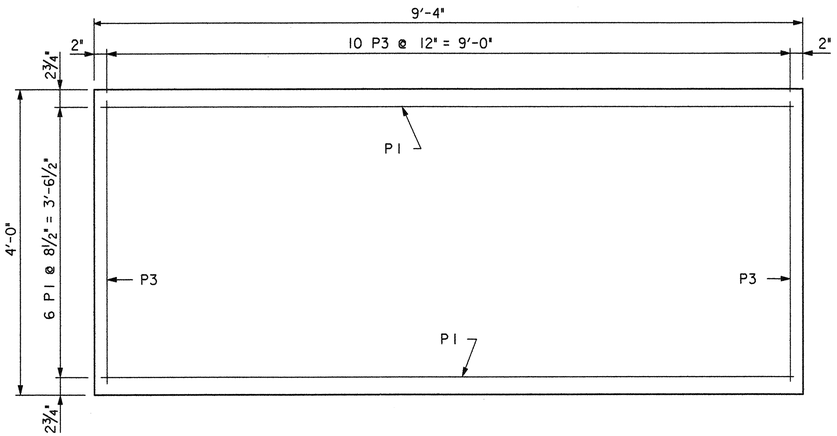


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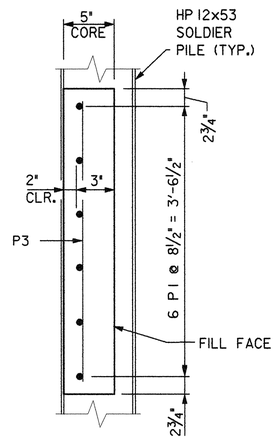


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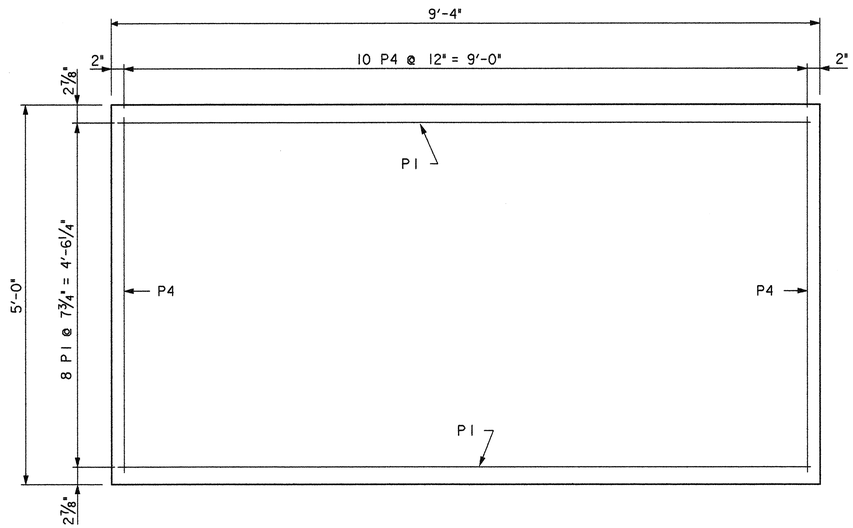


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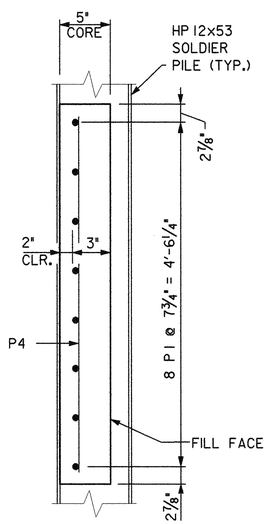


PANEL "C"

## TABLE OF QUANTITIES

| PANEL | NO. | REINFORCING STEEL MARK | SIZE | NO. | LENGTH FT. | LENGTH IN. | CONCRETE PER PANEL (CU. YDS.) | TOTAL CONCRETE (CU. YDS.) | REINF. STEEL (LBS.) | REINF. STEEL PER PANEL (LBS.) | REINF. STEEL, TOTAL (LBS.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 5 | P1 | #6 | 5 | 9 | 0 | .43 | 2.2 | 68 | 86 | 430 |
| | | P2 | #4 | 10 | 2 | 8 | | | 18 | | |
| B | 3 | P1 | #6 | 6 | 9 | 0 | .58 | 1.7 | 81 | 105 | 315 |
| | | P3 | #4 | 10 | 3 | 8 | | | 24 | | |
| C | 5 | P1 | #6 | 8 | 9 | 0 | .72 | 3.6 | 108 | 139 | 695 |
| | | P4 | #4 | 10 | 4 | 8 | | | 31 | | |
| TOTAL | 13 | | | | | | | 7.5 | | | 1440 |

## PRECAST PANELS

PRECAST PANELS SHALL BE POURED WITH THE FILL FACE UP. PANELS MUST NOT BE REMOVED FROM THE FORMS UNTIL THE CONCRETE HAS ATTAINED SUFFICIENT STRENGTH TO PREVENT DAMAGE. CRACKED, SPALLED OR DAMAGED PANELS WILL BE REJECTED.

PANELS SHALL NOT RECEIVE BACKFILL UNTIL A MINIMUM OF 85% OF 28-DAY STRENGTH (3400 PSI) HAS BEEN ACHIEVED.

PANELS MUST BE PLUMB AND HAVE A MINIMUM BEARING WIDTH OF 2" ON EACH PILE FLANGE. A ½" THICK EXPANSION JOINT MATERIAL MUST BE PLACED BETWEEN THE PANELS AND PILE FLANGES FOR THE WIDTH OF THE BEARING SURFACE. THE PANEL MUST BE SEATED FIRMLY ON THE CUSHIONING MATERIAL AND MUST BE HELD SECURELY AGAINST THE PILE FLANGE UNTIL THE BACKFILL IS PLACED SUFFICIENTLY TO HOLD IT IN PLACE.

EXPANSION JOINTS IN THE COPING ARE NOT PERMITTED, BUT CONSTRUCTION JOINTS MAY BE USED WHERE THE COPING CHANGES SLOPES AND AT 90-FOOT CENTERS.

FILTER FABRIC DRAINAGE MATS, USED IN CONJUNCTION WITH A GRANULAR MATERIAL OR WITH A MOLDED, POLYMERIC CORE, AND DRAIN PIPES AT MINIMUM 6-FOOT CENTERS ARE REQUIRED. POSITION DRAIN PIPES (NOT SHOWN) ALONG THE CENTERLINE OF EACH PANEL. PIPE OR HOLE INSERT SHALL BE CAST INTO PANELS.

CONCRETE PANELS SHALL BE EMBEDDED A MINIMUM OF 2'-0" BELOW THE PROPOSED FINISHED GRADE.

THE PRECAST PANELS SHALL NOT BE INSTALLED BEFORE THE DRILLED PIER CONCRETE HAS CURED FOR A MINIMUM OF THREE DAYS.

PROJECT NO. R-4758
SWAIN COUNTY
STATION: 17+65.00 -L- POT



Vaughn & Melton
Consulting Engineers
Middlesboro, Kentucky 606-248-5600
Greeneville, Tennessee 865-639-3570
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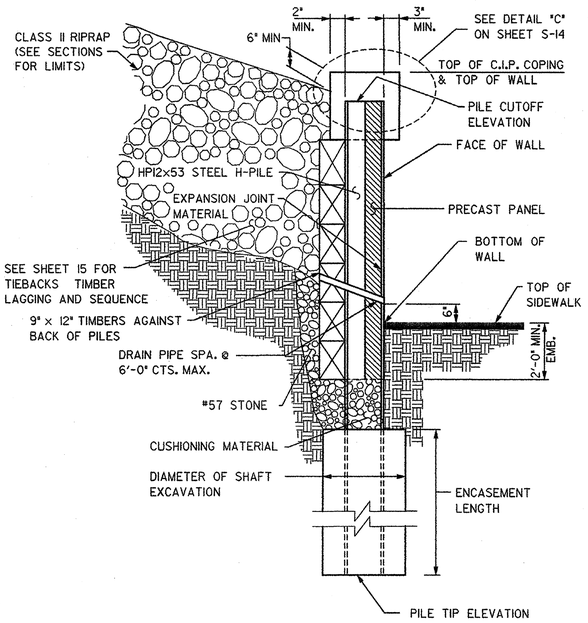
DRAWN BY: SF DATE: OCT. 2006
CHECKED BY: HLW DATE: OCT. 2006

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WALL #3 PRECAST PANELS

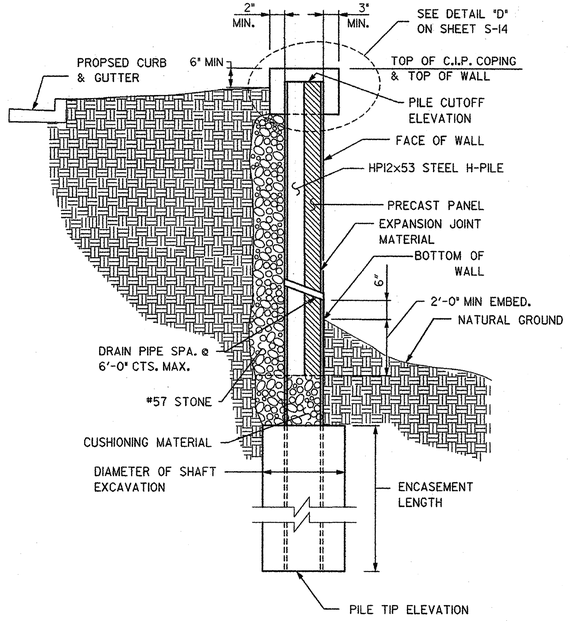
OCT. 2006

| REVISIONS NO. | BY | DATE | NO. | BY | DATE | SHEET NO. |
|---|---|---|---|---|---|---|
| | | | | | | S-12 |

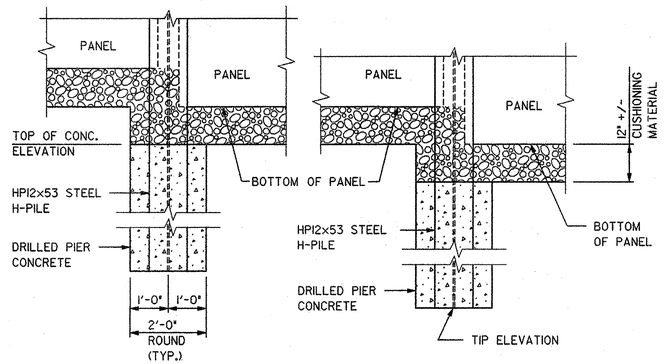



TYPICAL SECTION -WALL #1

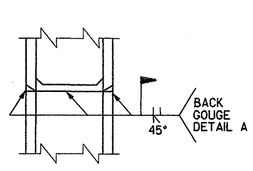
TIEBACKS NOT SHOWN



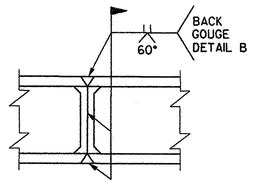

TYPICAL SECTION- WALL #3



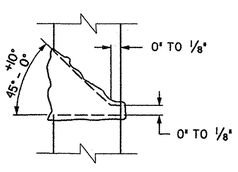

TYPICAL PILE EMBED INTO CONCRETE DETAIL



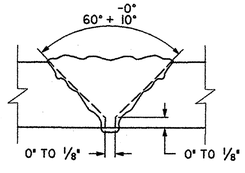

* PILE VERTICAL




* PILE HORIZONTAL




DETAIL A




DETAIL B

* POSITION OF PILE DURING WELDING

PILE SPLICE DETAILS

**WALL #1 - PILES/CONCRETE ENCASEMENT ELEVATIONS AND QUANTITIES**

| PILE NO. | PILE STATION | CUTOFF ELEVATION | TOP OF CONCRETE | TIP ELEVATION | PILE LENGTH (LF) | ENCASEMENT LENGTH (LF) | ENCASEMENT CONCRETE QUANTITY (CY) |
|---|---|---|---|---|---|---|---|
| 1 | 15+29.060 | 1975.0 | 1963.0 | 1947.4 | 27.6 | 15.6 | 1.82 |
| 2 | 15+39.400 | 1977.0 | 1963.0 | 1952.5 | 24.5 | 10.5 | 1.22 |
| 3 | 15+49.400 | 1979.0 | 1963.0 | 1952.6 | 26.4 | 10.4 | 1.21 |
| 4 | 15+59.400 | 1980.8 | 1963.0 | 1952.7 | 28.1 | 10.3 | 1.20 |
| 5 | 15+69.400 | 1982.5 | 1962.5 | 1952.8 | 29.7 | 9.7 | 1.13 |
| 6 | 15+79.400 | 1984.0 | 1962.5 | 1952.9 | 31.1 | 9.6 | 1.12 |
| 7 | 15+89.400 | 1986.0 | 1963.0 | 1953.0 | 33.0 | 10.0 | 1.16 |
| 8 | 15+99.400 | 1988.0 | 1963.0 | 1953.0 | 35.0 | 10.0 | 1.16 |
| 9 | 16+09.400 | 1989.5 | 1963.0 | 1953.1 | 36.4 | 9.9 | 1.15 |
| 10 | 16+19.400 | 1991.0 | 1963.5 | 1953.2 | 37.8 | 10.3 | 1.20 |
| 11 | 16+29.400 | 1993.0 | 1964.0 | 1953.3 | 39.7 | 10.7 | 1.25 |
| 12 | 16+39.400 | 1994.5 | 1964.0 | 1953.4 | 41.1 | 10.6 | 1.23 |
| 13 | 16+49.400 | 1996.0 | 1964.0 | 1953.5 | 42.5 | 10.5 | 1.22 |
| 14 | 16+59.400 | 1996.5 | 1964.0 | 1953.6 | 42.9 | 10.4 | 1.21 |
| 15 | 16+69.400 | 1996.5 | 1964.5 | 1953.7 | 42.8 | 10.8 | 1.26 |
| 16 | 16+79.400 | 1997.0 | 1964.5 | 1953.7 | 43.3 | 10.8 | 1.26 |
| 17 | 16+89.400 | 1997.0 | 1966.0 | 1953.8 | 43.2 | 12.2 | 1.42 |
| 18 | 16+99.400 | 1997.0 | 1966.0 | 1953.9 | 43.1 | 12.1 | 1.41 |
| 19 | 17+09.400 | 1997.0 | 1967.0 | 1954.2 | 42.8 | 12.8 | 1.49 |
| 20 | 17+19.400 | 1996.5 | 1967.5 | 1955.1 | 41.4 | 12.4 | 1.44 |
| 21 | 17+29.400 | 1996.0 | 1968.0 | 1956.0 | 40.0 | 12.0 | 1.40 |
| 22 | 17+39.400 | 1995.5 | 1968.5 | 1956.9 | 38.6 | 11.6 | 1.35 |
| 23 | 17+49.400 | 1995.0 | 1969.0 | 1957.8 | 37.2 | 11.2 | 1.30 |
| 24 | 17+59.400 | 1993.5 | 1969.5 | 1958.8 | 34.7 | 10.7 | 1.25 |
| 25 | 17+69.400 | 1992.0 | 1970.0 | 1959.7 | 32.3 | 10.3 | 1.20 |
| 26 | 17+79.400 | 1990.5 | 1970.5 | 1960.6 | 29.9 | 9.9 | 1.15 |
| 27 | 17+89.400 | 1989.0 | 1972.0 | 1961.5 | 27.5 | 10.5 | 1.22 |
| 28 | 17+99.400 | 1987.0 | 1972.0 | 1962.4 | 24.6 | 9.6 | 1.12 |
| 29 | 18+09.400 | 1985.5 | 1973.5 | 1958.3 | 27.2 | 15.2 | 1.77 |
| 30 | 18+19.400 | 1983.5 | 1973.5 | 1959.2 | 24.3 | 14.3 | 1.66 |
| | | | | TOTALS: | 1048.7 LF | 334.9 LF | 39 CY |

**WALL #3 - PILES/CONCRETE ENCASEMENT ELEVATIONS AND QUANTITIES**

| PILE NO. | PILE STATION | CUTOFF ELEVATION | TOP OF CONCRETE | TIP ELEVATION | PILE LENGTH (LF) | ENCASEMENT LENGTH (LF) | ENCASEMENT CONCRETE QUANTITY (CY) |
|---|---|---|---|---|---|---|---|
| 1 | 19+00.000 | 1987.1 | 1981.1 | 1973.1 | 14.0 | 8.0 | 0.93 |
| 2 | 19+09.510 | 1988.0 | 1981.1 | 1973.1 | 14.9 | 8.0 | 0.93 |
| 3 | 19+19.021 | 1988.9 | 1982.0 | 1974.0 | 14.9 | 8.0 | 0.93 |
| 4 | 19+28.531 | 1989.8 | 1982.9 | 1974.9 | 14.9 | 8.0 | 0.93 |
| 5 | 19+38.041 | 1990.5 | 1983.8 | 1975.8 | 14.7 | 8.0 | 0.93 |
| 6 | 19+47.552 | 1991.4 | 1984.4 | 1976.4 | 15.0 | 8.0 | 0.93 |
| 7 | 19+57.062 | 1992.2 | 1984.2 | 1976.2 | 16.0 | 8.0 | 0.93 |
| 8 | 19+66.572 | 1993.1 | 1984.2 | 1976.2 | 16.9 | 8.0 | 0.93 |
| 9 | 19+76.082 | 1993.9 | 1985.1 | 1977.1 | 16.8 | 8.0 | 0.93 |
| 10 | 19+85.593 | 1994.5 | 1985.9 | 1977.9 | 16.6 | 8.0 | 0.93 |
| | | | | TOTALS: | 154.7 LF | 80. LF | 9.3 CY |

## INSTALLATION & EXCAVATION

THE CONTRACTOR SHALL VERIFY THE LOCATION OF DRAINAGE STRUCTURES AND UTILITIES PRIOR TO INSTALLING PILES.

PILES MUST BE INSTALLED TO CUT OFF ELEVATIONS SHOWN BY PRE-AUGERING OR DRILLING A 2'-0" MINIMUM DIAMETER HOLE. REGARDLESS OF THE MATERIAL ENCOUNTERED, THE SHAFT MUST BE EXCAVATED TO A DEPTH SUFFICIENT TO SET THE FULL LENGTH OF THE STEEL PILE TO GRADE, AND MUST BE CONSTRUCTED IN ACCORDANCE WITH SECTION 825 OF THE STANDARD SPECIFICATIONS.

ALL PILES SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.

SPLICING OF PILES IS SUBJECT TO THE ENGINEER'S APPROVAL. WELDING MUST CONFORM TO THE REQUIREMENTS OF ARTICLE 1072-20 OF THE STANDARD SPECIFICATIONS AND SHALL TAKE PLACE BEFORE GALVANIZING.

THE TOP OF THE INSTALLED PILES SHALL BE WITHIN 2" OF THEIR PLAN LOCATION IN ANY DIRECTION AND THE CENTER TO CENTER DISTANCE BETWEEN INSTALLED PILES MUST NOT DIFFER FROM THE PLANS BY MORE THAN 3". THE PLUMBNESS OF THE PILES MUST NOT VARY FROM THE VERTICAL BY MORE THAN 1" PER 100".

IF NECESSARY, SPECIAL MEASURES MUST BE TAKEN TO INSURE THE STABILITY OF THE SHAFT, SUCH AS INSTALLING TEMPORARY CASINGS PRIOR TO DRILLING, INSTALLING THE PILE AND PLACING CONCRETE IMMEDIATELY AFTER A SHAFT IS EXCAVATED BEFORE CAVING OCCURS, INSTALLING WELL POINTS OR OTHER MEASURES. IF CAVING OCCURS, THE SHAFT EXCAVATION OPERATION MUST BE HALTED UNTIL SPECIAL APPROVED MEASURES ARE IMPLEMENTED.

THE HOLE MUST BE BACKFILLED WITH DRILLED PIER CONCRETE UP TO THE BOTTOM OF THE CUSHIONING MATERIAL (SHOWN AS "TOP OF CONCRETE" ELEVATION IN TABLE). DRILLED PIER CONCRETE MUST BE CAST AGAINST UNDISTURBED GROUND . IF OVER-EXCAVATION OCCURS VERTICALLY, THE CONTRACTOR MUST BACKFILL WITH NO. 57 STONE BEFORE SETTING THE PILE. ALL LOOSE AND SOFT MATERIAL MUST BE REMOVED AND THE EXCAVATION MUST BE DEWATERED IMMEDIATELY BEFORE AND DURING THE CONCRETE CASTING OPERATION. THE TOP OF THE CONCRETE SHAFTS MUST BE GENERALLY LEVEL.

PILE INSTALLATION, INCLUDING SET-UP OF THE DRILLED PIER CONCRETE, MUST BE COMPLETE BEFORE EXCAVATING TO INSTALL LAGGING.

EXCAVATION TO INSTALL LAGGING SHALL BE LIMITED TO 12" BEHIND THE PILES. ALL EXCAVATION BEHIND THE PANELS AND ANY OVER-EXCAVATION SHALL BE BACKFILLED WITH NO. 57 STONE.

EXCAVATION TO INSTALL THE LAGGING SHALL BE VERTICAL AND HAVE A MAXIMUM LIFT HEIGHT OF 4'-0". WHERE CUTS EXCEED 4'-0", MEASURES SHALL BE TAKEN TO MEET OSHA REQUIREMENTS FOR SAFE EXCAVATION HEIGHTS.

TIMBER LAGGING SHALL HAVE A MINIMUM BEARING DISTANCE OF 4" ON EACH PILE FLANGE. LAGGING SHALL BE STRUCTURAL GRADE SOUTHERN PINE TREATED FOR MAXIMUM DESIGN LIFE, AND SHALL CONFORM TO THE APPLICABLE PARTS OF SECTION 1082 OF THE STANDARD SPECIFICATIONS AND THE SPECIAL PROVISIONS. LAGGING SHALL BE 9" THICK AND 12" WIDE (ACTUAL DIMENSIONS), WITH THE 12" FACE BEARING ON THE BACKS OF THE PILES. THEY ARE DESIGNED WITH A NOMINAL ALLOWABLE BENDING STRENGTH OF 1200 psi, SHEAR STRENGTH OF 175 psi, AND E = 1,600,000 psi. MAX DEFLECTION = ½".

PRECAST PANELS SHALL BE HELD SECURELY AGAINST PILES.

BOTH THE CUSHIONING MATERIAL AND BACKFILL MATERIAL BEHIND THE LAGGING UP TO NATURAL GROUNDLINE SHALL BE NO. 57 STONE AND COMPACTED TO THE SATISFACTION OF THE ENGINEER. THE STONE SHALL BE RODDED AND SPREAD IN ORDER TO FILL ALL VOIDS AND ENSURE MAXIMUM DENSITY. LARGER AREAS MUST BE COMPACTED WITH HAND OPERATED EQUIPMENT. HEAVY COMPACTION EQUIPMENT WILL NOT BE ALLOWED BEHIND THE WALL. FLUSHING THE STONE WITH WATER WILL NOT BE ALLOWED. THE CUSHIONING MATERIAL MUST BE COMPACTED WITH AT LEAST (2) TWO PASSES OF LIGHTWEIGHT COMPACTION EQUIPMENT.

THE CONTRACTOR MAY ELECT TO USE AN ALTERNATE METHOD OF PROVIDING A SAFE EXCAVATION. HOWEVER, THE ALTERNATE METHOD MUST BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.

NORTH CAROLINA PROFESSIONAL SEAL 030941 ENGINEER JESSE R. JACOBS 3/20/07

NORTH CAROLINA PROFESSIONAL SEAL 027777 ENGINEER HARDY L. WILLIS 3/20/07

PROJECT NO. R-4758
SWAIN COUNTY
STATION: 17+65.00 -L- POT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WALL DETAILS & GENERAL NOTES

OCT. 2006

| REVISIONS | | | | | | SHEET NO. |
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| NO. | BY | DATE | NO. | BY | DATE | S-13 |

Vaughn & Melton Consulting Engineers
Middlesboro, Kentucky 606-248-4660
Greeneville, Tennessee 615-639-0211
Asheville, North Carolina 828 253 2196
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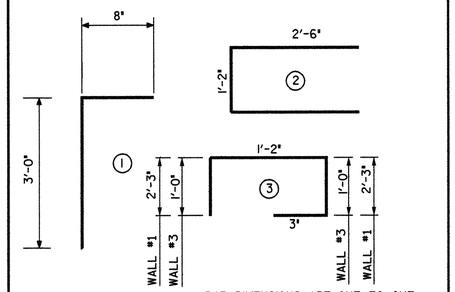
DRAWN BY: SF DATE: OCT. 2006
CHECKED BY: HLW DATE: OCT. 2006

## BAR TYPES



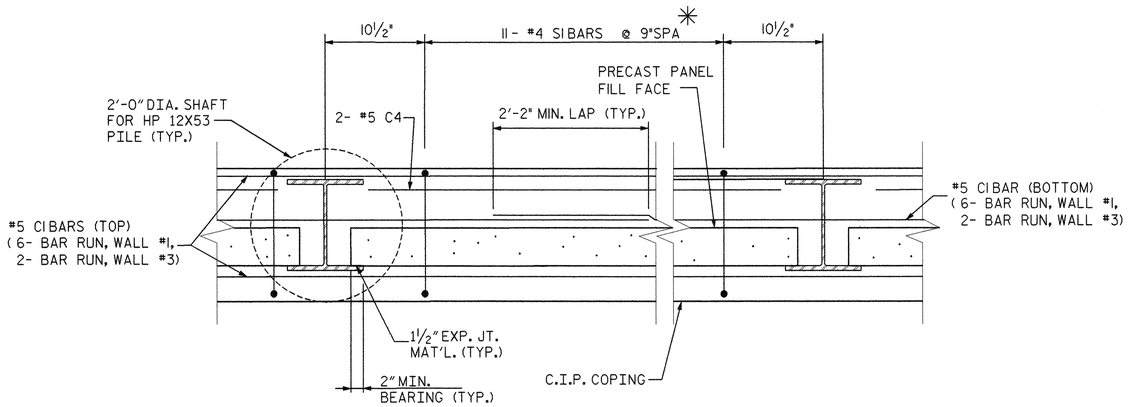

BAR DIMENSIONS ARE OUT TO OUT

### WALL #1 C.I.P. COPING

| BAR | NO. | SIZE | TYPE | LENGTH | WEIGHT |
|---|---|---|---|---|---|
| S1 | 322 | #4 | ③ | 5'-11" | 1273 |
| C1 | 18 | #5 | STR | 51'-3" | 962 |
| C2 | 2 | #5 | ① | 3'-8" | 8 |
| C3 | 2 | #5 | ② | 6'-2" | 13 |
| C4 | 58 | #5 | STR | 8'-9" | 529 |
| | | | | | |
| REINFORCING STEEL (LBS) = | | | | | 2785 |
| CLASS AA CONCRETE (CY) = | | | | | 38.9 |

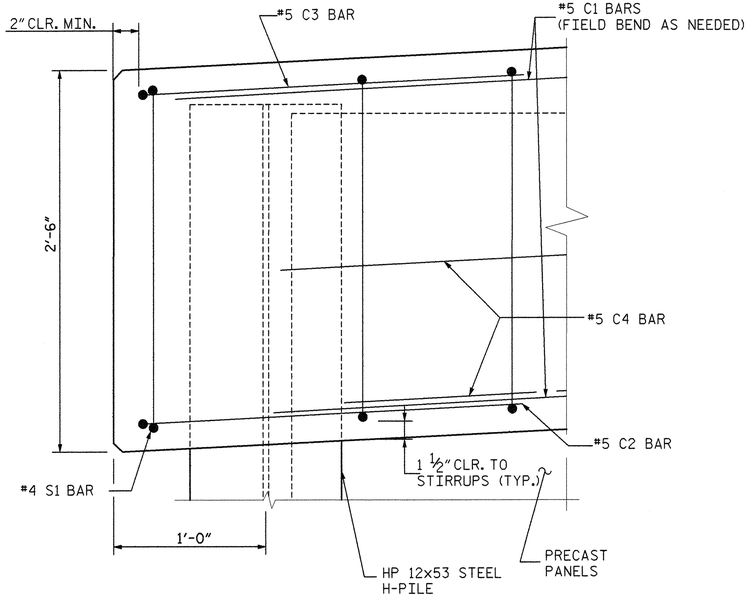
### WALL #3 C.I.P. COPING

| BAR | NO. | SIZE | TYPE | LENGTH | WEIGHT |
|---|---|---|---|---|---|
| S1 | 99 | #4 | ③ | 3'-5" | 226 |
| C1 | 6 | #5 | STR | 47'-3" | 296 |
| C2 | 2 | #5 | ① | 3'-8" | 8 |
| C3 | 2 | #5 | ② | 6'-2" | 13 |
| C4 | 9 | #5 | STR | 8'-9" | 82 |
| | | | | | |
| REINFORCING STEEL (LBS) = | | | | | 625 |
| CLASS AA CONCRETE (CY) = | | | | | 6.1 |

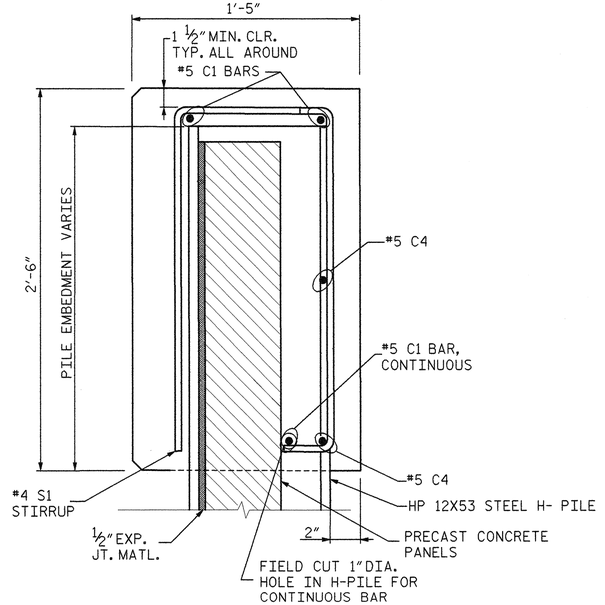



## PLAN VIEW

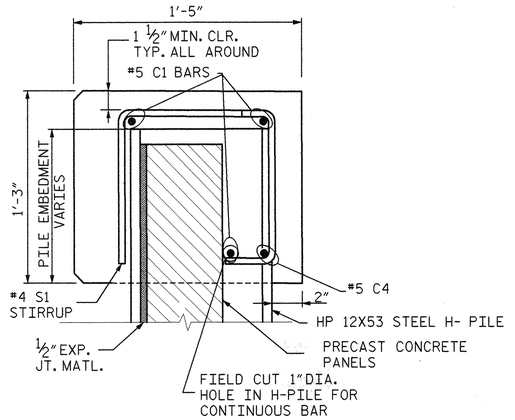
✳14 - #4S1@ 9¼" SPA. AT FIRST PANEL OF WALL #1




## END OF COPING DETAIL
(OTHER END SIMILAR)




## DETAIL C - WALL #1 COPING




## DETAIL D- WALL #3 COPING

## CONCRETE MATERIALS

CONCRETE FOR THE PRECAST PANELS AND COPING SHALL BE CLASS AA.

REINFORCING STEEL SHALL BE GRADE 60.

CONCRETE FOR SHAFT EXCAVATION BELOW THE BOTTOM OF THE WALL SHALL BE DESIGNATED AS DRILLED PIER CONCRETE AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4500 PSI AT 28 DAYS. THE CEMENTITIOUS MATERIAL CONTENT MUST COMPLY WITH ONE OF THE FOLLOWING OPTIONS:

(1) THE MIX MUST HAVE A MINIMUM CEMENT CONTENT OF 640 LBS PER CUBIC YARD AND A CEMENT CONTENT OF 800 LBS PER CUBIC YARD. HOWEVER, IF THE ALKALI CONTENT OF THE CEMENT EXCEEDS 0.4%, THE CEMENT CONTENT MUST BE REDUCED BY 20% AND REPLACED WITH FLY ASH AT THE RATE OF 1.2 LBS OF FLY ASH PER LBS OF CEMENT REMOVED.

(2) IF TYPE IP BLENDED CEMENT IS USED, THE MIX MUST HAVE A MINIMUM OF 665 LBS PER CUBIC YARD TYPE IP BLENDED CEMENT AND A MAXIMUM OF 833 LBS PER CUBIC YARD TYPE IP BLENDED CEMENT IN THE MIX.

THE MAXIMUM WATER-CEMENTITIOUS MATERIAL RATIO IS 0.45. THE CONCRETE MUST BE NON AIR-ENTRAINED. WORKABILITY MUST BE SUCH THAT VIBRATING OR PRODDING WILL NOT BE REQUIRED TO CONSOLIDATE THE CONCRETE. AT THE TIME OF CONCRETE PLACEMENT, THE SLUMP MUST BE WITHIN THE RANGE OF 6 INCHES TO 9 INCHES.

USE TYPE I OR TYPE II CEMENT OR TYPE IP BLENDED CEMENT IN THE MIX. USE EITHER NO. 67 OR NO. 78M COARSE AGGREGATE. AN APPROVED WATER-REDUCER, WATER-REDUCING RETARDER, HIGH-RANGE WATER-REDUCER, OR HIGH-RANGE WATER REDUCING RETARDER MAY BE USED TO FACILITATE PLACEMENT OF THE CONCRETE. ALL ADMIXTURES MUST MEET AASHTO M 194 AND MUST BE ADDED AT THE CONCRETE PLANT WHEN THE MIXING WATER IS INTRODUCED INTO THE CONCRETE. REDOSING OF ADMIXTURES IS NOT PERMITTED.

PLACE CONCRETE WITHIN TWO HOURS AFTER INTRODUCTION OF THE MIXING WATER, AND THE CONCRETE TEMPERATURE AT THE TIME OF PLACEMENT MUST NOT EXCEED 90 DEGREES FAHRENHEIT.

ALL EXPOSED CORNERS ON CONCRETE STRUCTURES SHALL BE CHAMFERED ¾".

PROJECT NO. R-4758
SWAIN COUNTY
STATION: 17+65.00 -L- POT

NORTH CAROLINA PROFESSIONAL SEAL 20770 ENGINEER HARDY L. WILLS
11/9/06


V&M Vaughn & Melton Consulting Engineers
Middlesboro, Kentucky 606 248 6005
Greeneville, Tennessee 865 639 0311
Asheville, North Carolina 828 253 2796



DRAWN BY: SF DATE: OCT. 2006
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

WALLS 1 & 3
DETAILS

OCT. 2006

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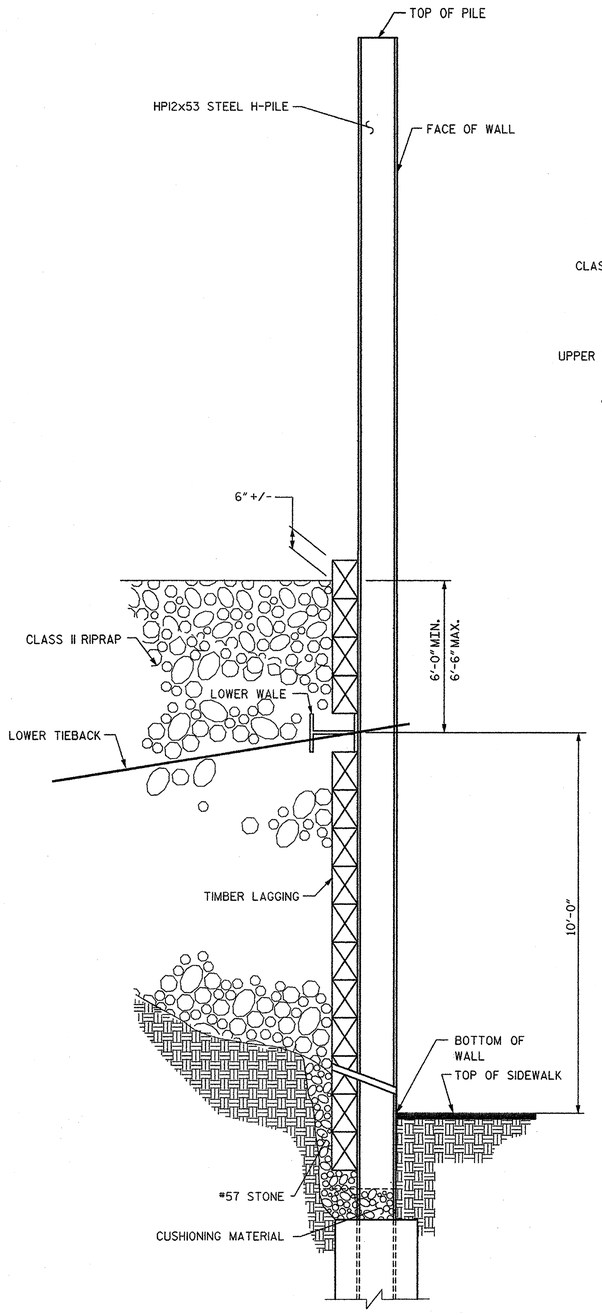
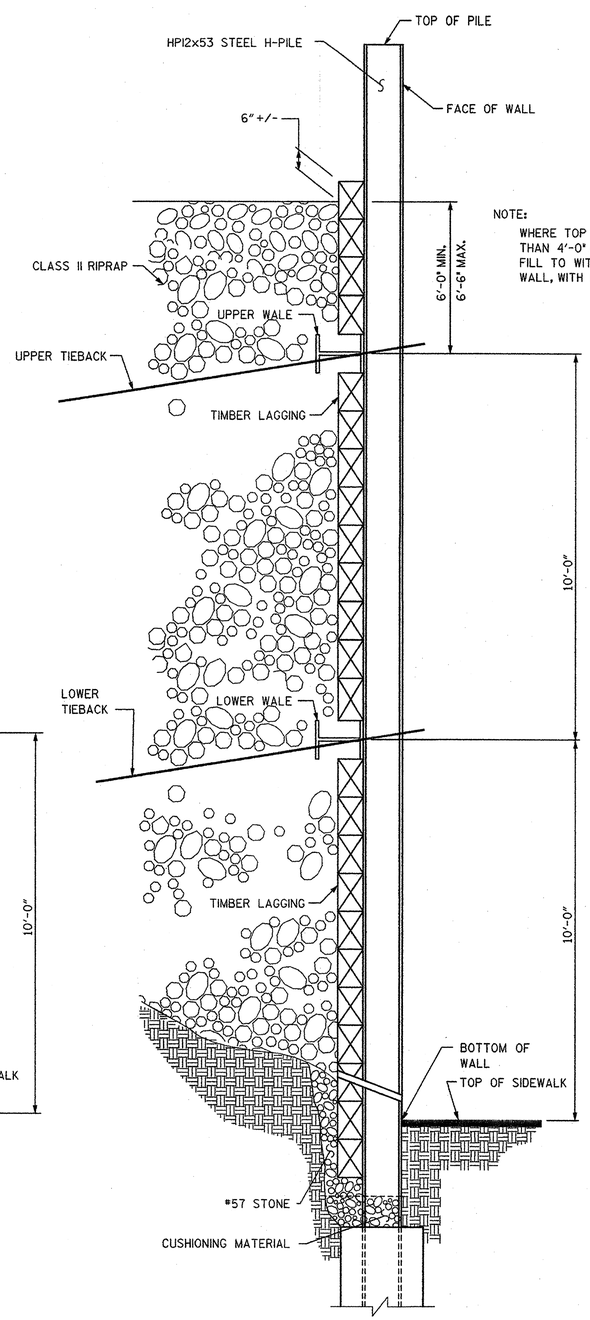
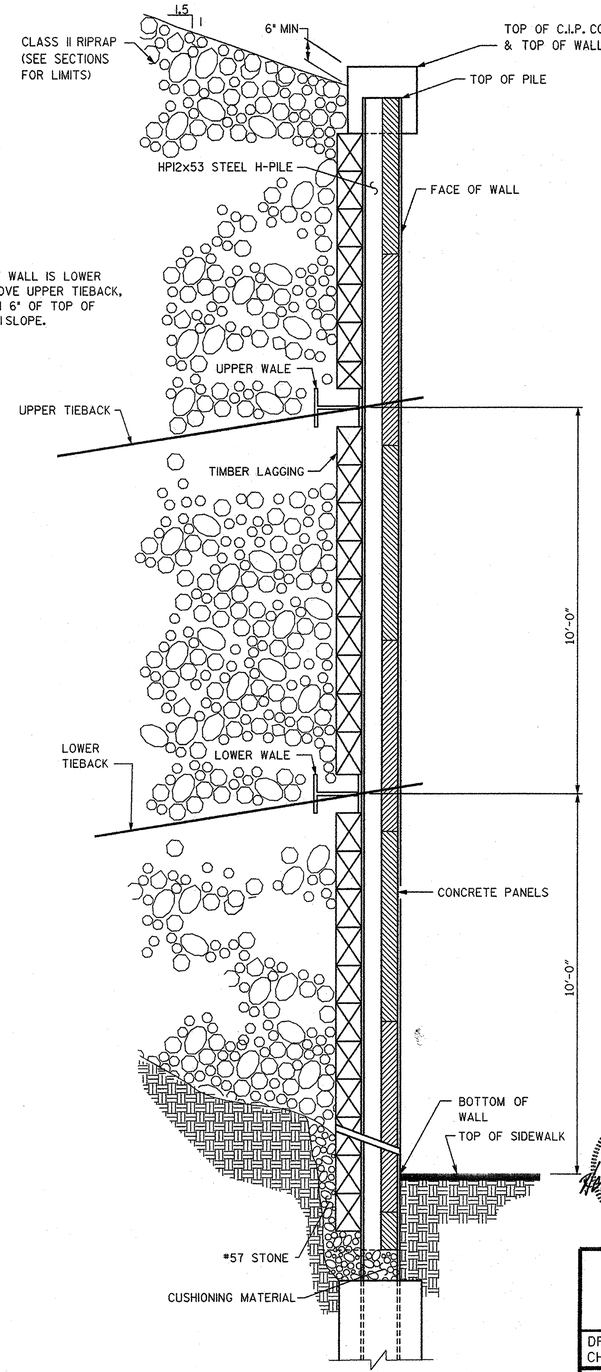



TYPICAL SECTION -STEPS 1 THRU 6




NOTE:
WHERE TOP OF WALL IS LOWER THAN 4'-0" ABOVE UPPER TIEBACK, FILL TO WITHIN 6" OF TOP OF WALL, WITH 1.5:1 SLOPE.

TYPICAL SECTION -STEPS 7 THRU 11




TYPICAL SECTION -STEPS 12 THRU 15

## CONSTRUCTION SEQUENCE

1. PREPARE BACKSLOPE AND SUBGRADE
2. PRE-DRILL AND SET PILES
3. SET TIMBER LAGGING UP TO AN ELEVATION JUST BELOW THE LOWER WALE ELEVATION AS SHOWN.
4. ATTACH LOWER WALE AND EXTEND TIMBER LAGGING ABOVE WALE AS SHOWN.
5. BACKFILL WITH CLASS II RIPRAP AS SHOWN, ENSURING TIEBACK LOCATION IS COVERED BY A MINIMUM OF 6 FEET OF FILL.
6. * DRILL, SET AND PARTIALLY TENSION LOWER TIEBACK.
7. SET ADDITIONAL LAGGING UP TO AN ELEVATION JUST BELOW THE UPPER WALE ELEVATION AS SHOWN.
8. ATTACH UPPER WALE AND EXTEND TIMBER LAGGING ABOVE WALE AS SHOWN.
9. BACKFILL WITH ADDITIONAL CLASS II RIPRAP AS IN STEP 5.
10. * DRILL, SET, AND TENSION UPPER TIEBACK.
11. * ADJUST TENSION OF LOWER TIEBACK TO TABULATED DESIGN LOAD.
12. SET REMAINDER OF TIMBER LAGGING.
13. CONTINUE PLACEMENT OF CLASS II RIPRAP TO FINAL GRADE.
14. ADJUST TENSION OF UPPER TIEBACK TO TABULATED DESIGN LOAD.
15. PLACE CONCRETE PANELS.

NOTE: AT AN APPROPRIATE POINT IN THE SEQUENCE, THE RIPRAP SLOPE MAY BE BENCHED TO PROVIDE A WORKING SPACE FOR THE CONSTRUCTION OF WALL #2.

* DURING THE BACKFILLING PROCESS, ANCHOR LOADS EQUAL TO APPROXIMATELY 60 PERCENT OF THE TABULATED DESIGN LOAD SHOULD BE APPLIED. HOWEVER, IN NO CASE SHALL EXCESSIVE DEFLECTION OF THE PILE OCCUR, NOR SHALL THE ANCHORS BECOME OVERSTRESSED AT ANY TIME DURING THE BACKFILLING PROCESS.

## NOTES

1. TIEBACKS SHALL NOT EXTEND PAST FRONT FACE OF WALL.
2. INSTRUMENTATION: THE CONTRACTOR SHALL INSTALL THREE (3) TILT METERS AND FOUR (4) LOAD CELLS AT LOCATIONS SPECIFIED BY THE GEOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER SHALL MONITOR THESE INSTRUMENTS PERIODICALLY. THE INSTRUMENTATION SHALL BE INSTALLED SUCH THAT DATA ACQUISITION IS POSSIBLE AT ALL TIMES DURING AND AFTER CONSTRUCTION.

NORTH CAROLINA PROFESSIONAL SEAL 027717 ENGINEER HARDY L. WILLIS 5/20/07

NORTH CAROLINA PROFESSIONAL SEAL 030648 ENGINEER JOSE R. JACOBSEN

PROJECT NO. R-4758
SWAIN COUNTY
STATION: 17+65.00 -L- POT

S&ME ENGINEERING . TESTING ENVIRONMENTAL SERVICES

DRAWN BY: SF DATE: OCT. 2006
CHECKED BY: JRJ DATE: OCT. 2006

V&M Vaughn & Melton Consulting Engineers — Middlesboro, Kentucky 606-248-9000; Greeneville, Tennessee 423-639-0071; Asheville, North Carolina 828 253 2795



DRAWN BY: SF DATE: OCT. 2006
CHECKED BY: HLW DATE: OCT. 2006

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

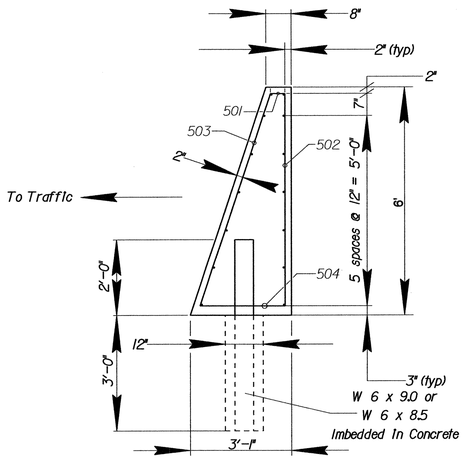
CONSTRUCTION SEQUENCE
WALLS 1 & 2

OCT. 2006

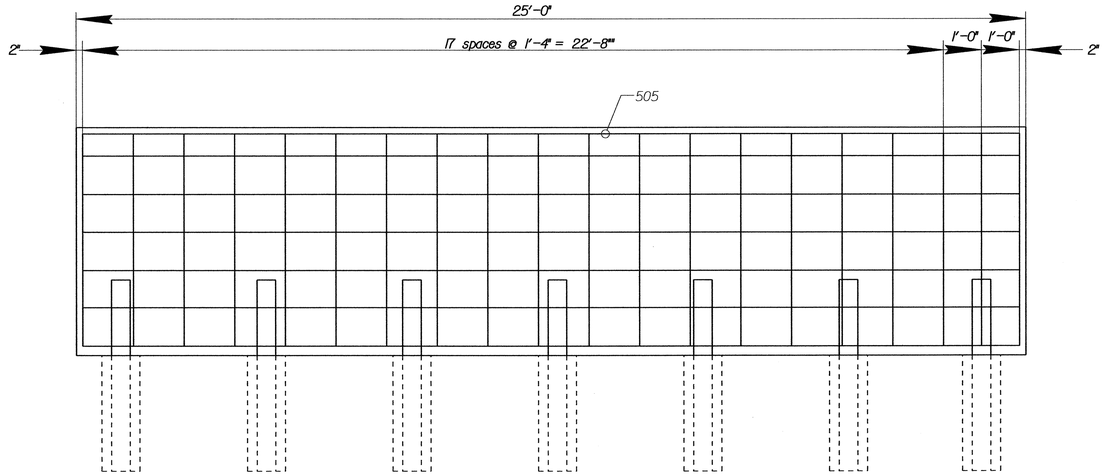
| REVISIONS | | | | | | SHEET NO. |
|---|---|---|---|---|---|---|
| NO. | BY | DATE | NO. | BY | DATE | S-15 |
| | | | | | | |

8/17/99

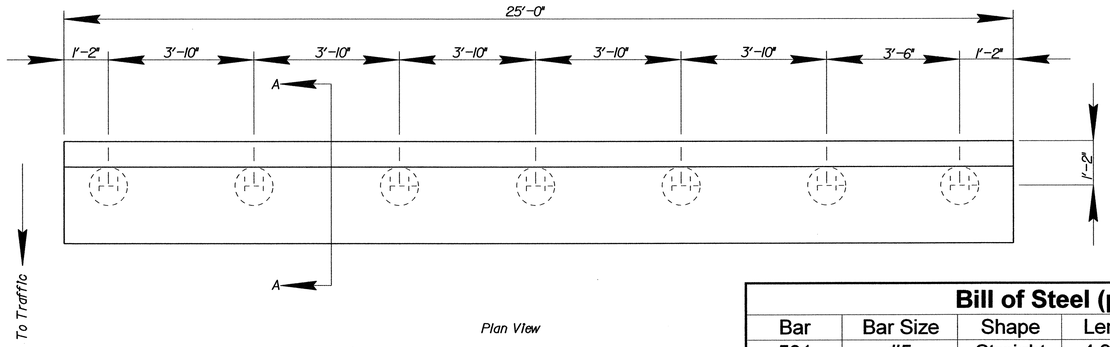
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-4758 | S-16 |



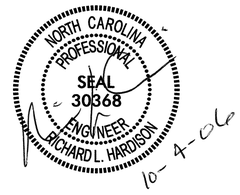

Section A-A




Traffic Side Elevation
W/Reinforcement Diagram




Plan View




MATERIALS SHOWN ON THIS PAGE ARE NOT INCLUDED IN THE TOTAL BILL OF MATERIAL SHOWN ON SHEET S-2.

**Bill of Steel (per Section)**

| Bar | Bar Size | Shape | Length | Number of Bars | Weight (lb) |
|---|---|---|---|---|---|
| 501 | #5 | Straight | 4 9/16" | 19 | 7.53 |
| 502 | #5 | Straight | 5'-7" | 19 | 110.64 |
| 503 | #5 | Straight | 5'-10 5/8" | 19 | 116.63 |
| 504 | #5 | Straight | 2'-2 7/8" | 19 | 44.41 |
| 505 | #5 | Straight | 24'-8" | 14 | 360.18 |
| | | | | Total Steel (lb)= | 639.39 |
| | Class AA Concrete (C.Y.)= | | | 9.26 | |

**Bill of Steel (Complete Wall - 22 25' Sections)**

| Bar | Bar Size | Shape | Length | Number of Bars | Weight (lb) |
|---|---|---|---|---|---|
| 501 | #5 | Straight | 4 9/16" | 418 | 165.63 |
| 502 | #5 | Straight | 5'-7" | 418 | 2434.17 |
| 503 | #5 | Straight | 5'-10 5/8" | 418 | 2565.84 |
| 504 | #5 | Straight | 2'-2 7/8" | 418 | 977.02 |
| 505 | #5 | Straight | 24'-8" | 308 | 7924.02 |
| | | | | Total Steel (lb)= | 14066.67 |
| | Class AA Concrete (C.Y.)= | | | 203.72 | |