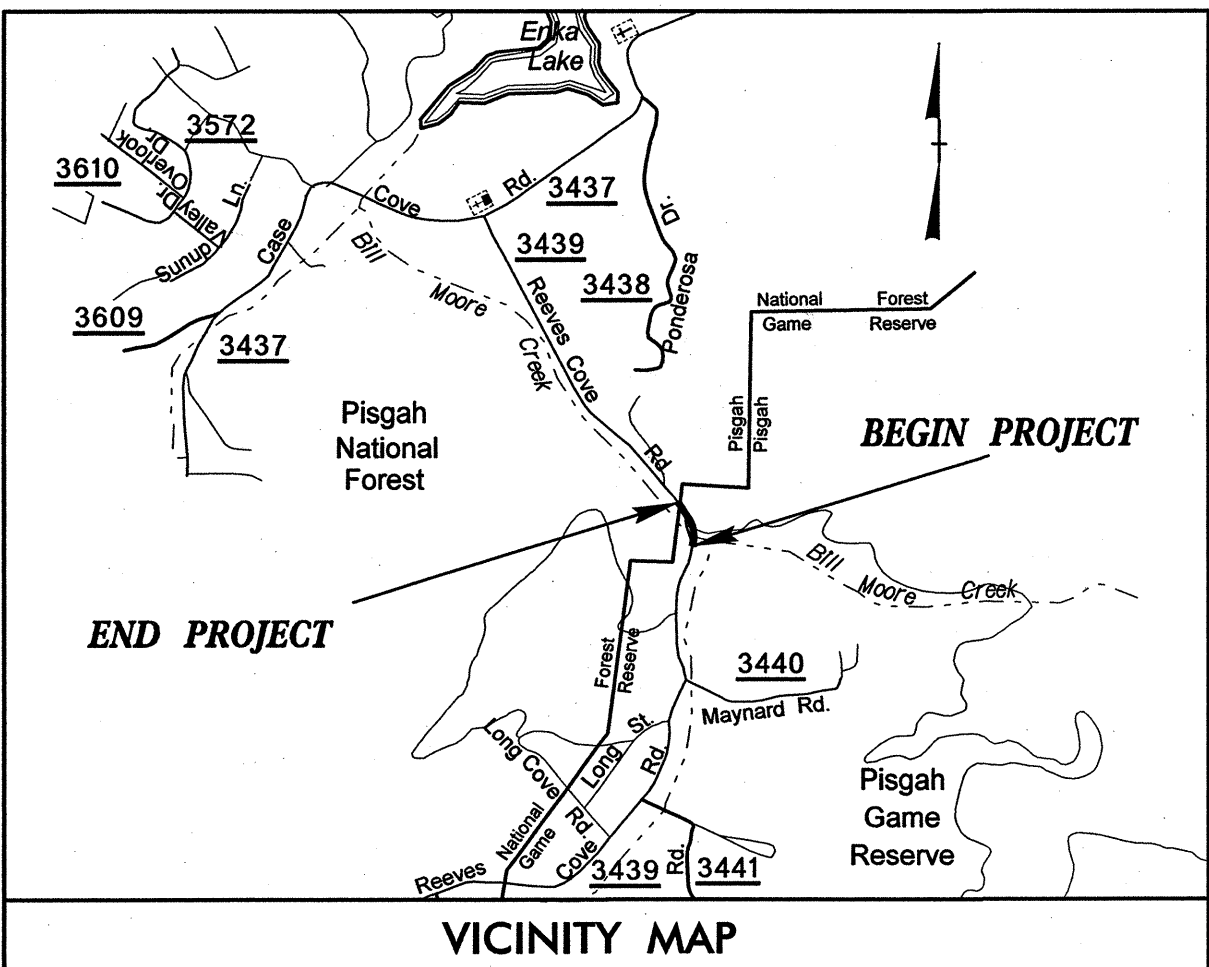


09/08/99

TIP PROJECT: B-3619

CONTRACT: C202649

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



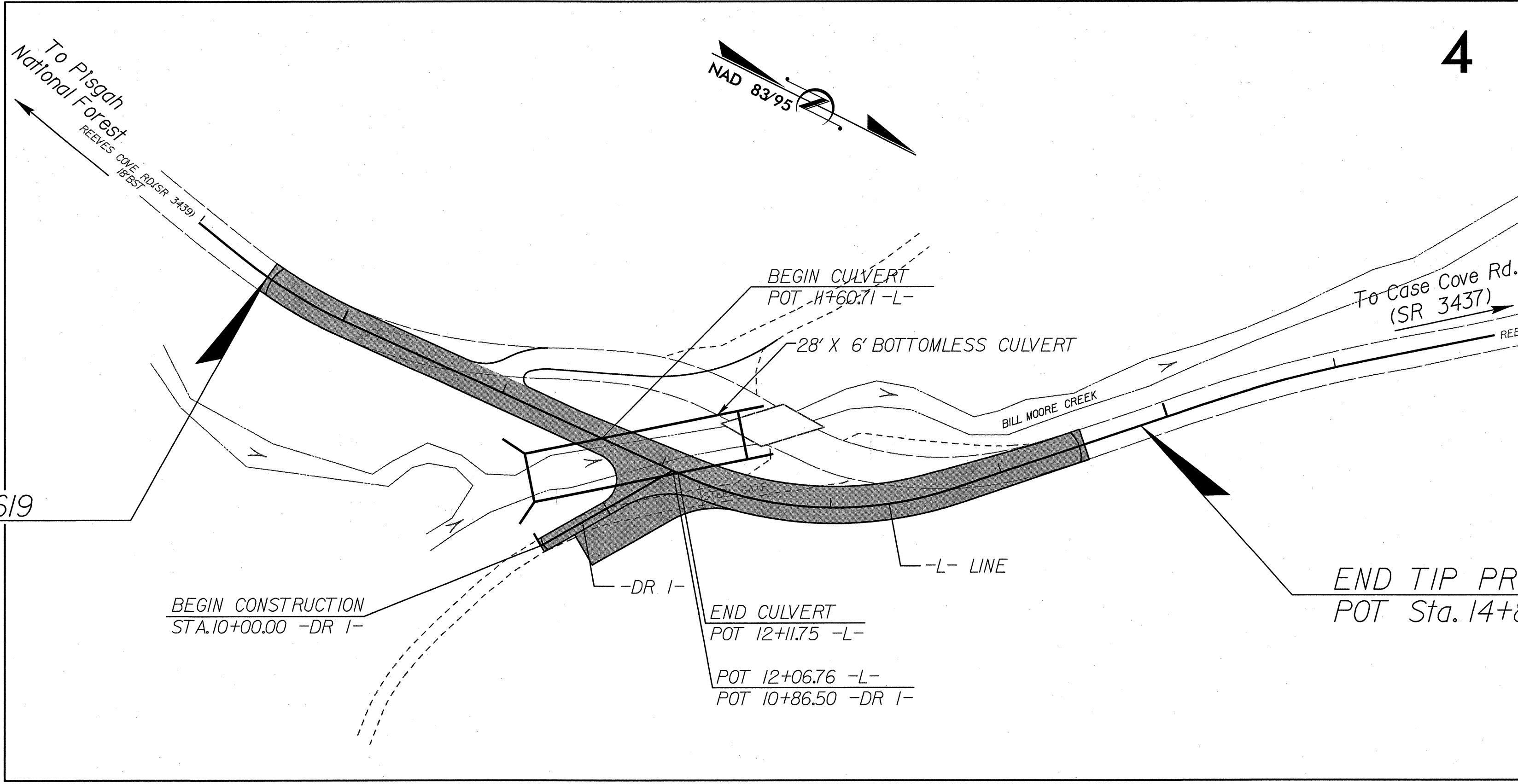
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

BUNCOMBE

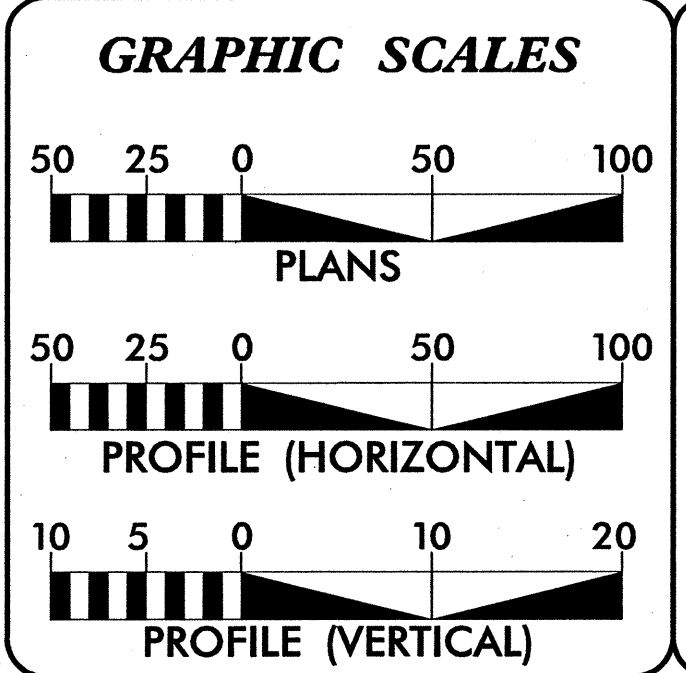
**LOCATION: BRIDGE No. 56 OVER BILL MOORE CREEK
ON SR 3439**

TYPE OF WORK: GRADING, PAVING, DRAINAGE AND CULVERT

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-----------------|-----------------------------|-------------|--------------|
| N.C. | B-3619 | 1 | |
| STATE PROJ. NO. | F.A. PROJ. NO. | DESCRIPTION | |
| 33167.1.1 | BRZ-3439(1) | PE | |
| 33167.2.2 | BRZ-3439(1) | RW & UTILS | |
| 33167.3.1 | BRZ-3439(1) | CONST | |



**DESIGN EXCEPTION FOR DESIGN SPEED, LANE WIDTH AND SHOULDER WIDTH REQUIRED.



DESIGN DATA

| | | |
|-----------------------|---|----------|
| ADT 2011 | = | 1540 |
| ADT 2031 | = | 2340 |
| DHV | = | 60 % |
| T | = | 3 % * |
| V | = | 25 MPH** |
| FUNC. CLASSIFICATION: | | |
| RURAL LOCAL | | |
| * TTST 1% | | DUAL 2% |

PROJECT LENGTH

| | | |
|--------------------------------------|---|-----------|
| LENGTH OF ROADWAY TIP PROJECT B-3619 | = | 0.091 MI. |
| LENGTH OF CULVERT TIP PROJECT B-3619 | = | 0.010 MI. |
| TOTAL LENGTH OF TIP PROJECT B-3619 | = | 0.101 MI. |

Prepared In the Office of:

Stantec Consulting Inc.
Suite 300, 801 Jones Franklin Road
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Tel. 919.851.6866
Fax. 919.851.7024
www.stantec.com

FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
SEPT. 13, 2010

LETTING DATE:
SEPT. 20, 2011

NCDOT CONTACT: RON E. McCOLLUM, PE
PROJECT ENGINEER - ROADWAY DESIGN

ROBERT WILLIAMS, PE
PROJECT ENGINEER

KEITH F. HUDSON
PROJECT DESIGN ENGINEER

HYDRAULIC ENGINEER

ROADWAY DESIGN ENGINEER

James C. [Signature] P.E. 7/19/11

Robert A. Williams [Signature] P.E. 7/19/11

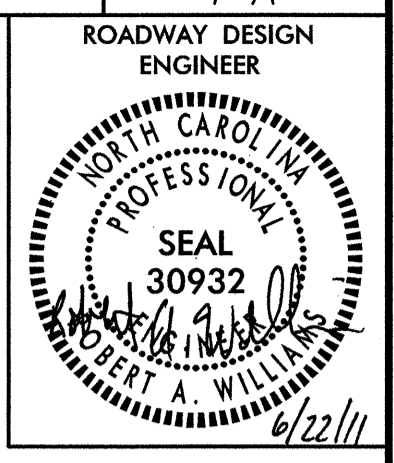
DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

Art McMiller P.E.
STATE HIGHWAY DESIGN ENGINEER

7/18/2011
U:\Roadway\Proj\B3619_rdy_tsh.dgn
RWilliams

8/17/99

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS



INDEX OF SHEETS

| SHEET NUMBER | SHEET |
|------------------|---|
| 1 | TITLE SHEET |
| 1-A | INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARD DRAWINGS |
| 1-B | CONVENTIONAL SYMBOLS |
| 1-C | SURVEY CONTROL SHEET |
| 2 | PAVEMENT SCHEDULE, TYPICAL SECTIONS, AND WEDGING DETAILS |
| 2-A THRU 2-L | TEMPORARY SHORING |
| 2-M THRU 2-N | METHOD OF PIPE INSTALLATION |
| 3 | SUMMARY OF QUANTITIES |
| 3-A | SUMMARY OF GUARDRAIL, EARTHWORK SUMMARY, AND ASPHALT PAVEMENT REMOVAL SUMMARY |
| 3-B | DRAINAGE SUMMARY |
| 4 | PLAN/PROFILE SHEET |
| TMP-1 THRU TMP-6 | TRAFFIC CONTROL PLANS |
| PMP-1 THRU PMP-2 | PAVEMENT MARKING PLANS |
| EC-1 THRU EC-6 | EROSION CONTROL PLANS |
| RF-1 | REFORESTATION PLANS |
| UO-1 THRU UO-2 | UTILITY BY OTHER PLANS |
| X-A | CROSS SECTION SUMMARY SHEET |
| X-1 THRU X-9 | CROSS-SECTIONS |
| C-1 THRU C-5 | CULVERT PLANS |

GENERAL NOTES

GENERAL NOTES: 2006 SPECIFICATIONS
EFFECTIVE: 07-18-06
REVISED: 07-30-08

GRADING AND SURFACING OR RESURFACING AND WIDENING:
THE GRADE LINES SHOWN DENOTE THE FINISHED ELEVATION OF THE PROPOSED SURFACING AT GRADE POINTS SHOWN ON THE TYPICAL SECTIONS. WHERE NO GRADE LINES ARE SHOWN, THE PROFILES SHOWN DENOTE THE TOP ELEVATION OF THE EXISTING PAVEMENT ALONG THE CENTER LINE OF SURVEY ON WHICH THE PROPOSED RESURFACING WILL BE PLACED. GRADE LINES MAY BE ADJUSTED BY THE ENGINEER IN ORDER TO SECURE A PROPER TIE-IN.

CLEARING:
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

SUPERELEVATION:
ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITH STD. NO. 225.04 USING THE RATE OF SUPERELEVATION AND RUNOFF SHOWN ON THE PLANS. SUPERELEVATION IS TO BE REVOLVED ABOUT THE GRADE POINTS SHOWN ON THE TYPICAL SECTIONS.

SHOULDER CONSTRUCTION:
ASPHALT, EARTH, AND CONCRETE SHOULDER CONSTRUCTION ON THE HIGH SIDE OF SUPERELEVATED CURVES SHALL BE IN ACCORDANCE WITH STD. NO. 560.01.

SIDE ROADS:
THE CONTRACTOR WILL BE REQUIRED TO DO ALL NECESSARY WORK TO PROVIDE SUITABLE CONNECTIONS WITH ALL ROADS, STREETS, AND DRIVES ENTERING THIS PROJECT. THIS WORK WILL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR THE PARTICULAR ITEMS INVOLVED.

UNDERDRAINS:
UNDERDRAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 815.03 AT LOCATIONS DIRECTED BY THE ENGINEER.

GUARDRAIL:
THE GUARDRAIL LOCATIONS SHOWN ON THE PLANS MAY BE ADJUSTED DURING CONSTRUCTION AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHOULD CONSULT WITH THE ENGINEER PRIOR TO ORDERING GUARDRAIL MATERIAL.

TEMPORARY SHORING:
SHORING REQUIRED FOR THE MAINTENANCE OF TRAFFIC NOT SHOWN ON THE PLANS WILL BE PAID FOR AT THE CONTRACT PRICE FOR "TEMPORARY SHORING".

UTILITIES:
UTILITY OWNERS ON THIS PROJECT ARE PROGRESS ENERGY, AT&T, and CHARTER COMMUNICATIONS. ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

RIGHT-OF-WAY MARKERS:
ALL RIGHT-OF-WAY MARKERS ON THIS PROJECT SHALL BE PLACED BY CONTRACT.

ROADWAY STANDARD DRAWINGS

2006 ROADWAY ENGLISH STANDARD DRAWINGS
EFF. 07-18-06
REV. 01-02-07

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated July 18, 2006 are applicable to this project and by reference hereby are considered a part of these plans:

| STD. NO. | TITLE |
|--|---|
| DIVISION 2 - EARTHWORK | |
| 200.02 | Method of Clearing - Method II |
| 225.02 | Guide for Grading Subgrade - Secondary and Local |
| 225.04 | Method of Obtaining Superelevation - Two Lane Pavement |
| DIVISION 5 - SUBGRADE, BASES AND SHOULDERS | |
| 560.01 | Method of Shoulder Construction - High Side of Superelevated Curve - Method I |
| DIVISION 6 - ASPHALT BASES AND PAVEMENTS | |
| 654.01 | Pavement Repairs |
| DIVISION 8 - INCIDENTALS | |
| 806.01 | Concrete Right-of-Way Marker |
| 806.02 | Granite Right-of-Way Marker |
| 815.03 | Pipe Underdrain and Blind Drain |
| 862.01 | Guardrail Placement |
| 862.02 | Guardrail Installation |
| 862.03 | Structure Anchor Units |

04/16/11

Note: Not to Scale

*S.U.E. = Subsurface Utility Engineering

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

| | |
|--|------------------|
| State Line | _____ |
| County Line | _____ |
| Township Line | _____ |
| City Line | _____ |
| Reservation Line | _____ |
| Property Line | _____ |
| Existing Iron Pin | ○ _{EP} |
| Property Corner | _____x |
| Property Monument | □ _{ECM} |
| Parcel/Sequence Number | ①②③ |
| Existing Fence Line | -x-x-x- |
| Proposed Woven Wire Fence | -o-o-o- |
| Proposed Chain Link Fence | -□-□-□- |
| Proposed Barbed Wire Fence | -◇-◇-◇- |
| Existing Wetland Boundary | -WLB- |
| Proposed Wetland Boundary | -WLB- |
| Existing Endangered Animal Boundary | -EAB- |
| Existing Endangered Plant Boundary | -EPB- |
| Known Soil Contamination: Boundary or Site | -☠-☠- |
| Potential Soil Contamination: Boundary or Site | -☠-☠- |

BUILDINGS AND OTHER CULTURE:

| | |
|-------------------------------|----------------|
| Gas Pump Vent or U/G Tank Cap | ○ |
| Sign | ○ _S |
| Well | ○ _W |
| Small Mine | ⋈ |
| Foundation | □ |
| Area Outline | □ |
| Cemetery | □ _† |
| Building | □ |
| School | □ _↑ |
| Church | □ ₊ |
| Dam | □ |

HYDROLOGY:

| | |
|------------------------------------|-----------|
| Stream or Body of Water | _____ |
| Hydro, Pool or Reservoir | _____ |
| Jurisdictional Stream | _____JS |
| Buffer Zone 1 | _____BZ 1 |
| Buffer Zone 2 | _____BZ 2 |
| Flow Arrow | → |
| Disappearing Stream | → |
| Spring | ○ |
| Wetland | _____ |
| Proposed Lateral, Tail, Head Ditch | _____FLW |
| False Sump | _____ |

RAILROADS:

| | |
|--------------------|--------------------------|
| Standard Gauge | _____ |
| RR Signal Milepost | ○ _{MILEPOST 35} |
| Switch | □ _{SWITCH} |
| RR Abandoned | _____ |
| RR Dismantled | _____ |

RIGHT OF WAY:

| | |
|--|-----------------|
| Baseline Control Point | ◆ |
| Existing Right of Way Marker | △ |
| Existing Right of Way Line | _____ |
| Proposed Right of Way Line | _____ |
| Proposed Right of Way Line with Iron Pin and Cap Marker | _____ |
| Proposed Right of Way Line with Concrete or Granite Marker | _____ |
| Existing Control of Access | ○ _{CA} |
| Proposed Control of Access | ○ _{CA} |
| Existing Easement Line | _____E |
| Proposed Temporary Construction Easement | _____E |
| Proposed Temporary Drainage Easement | _____TDE |
| Proposed Permanent Drainage Easement | _____PDE |
| Proposed Permanent Drainage / Utility Easement | _____DUE |
| Proposed Permanent Utility Easement | _____PUE |
| Proposed Temporary Utility Easement | _____TUE |
| Proposed Aerial Utility Easement | _____AUE |

Proposed Permanent Easement with Iron Pin and Cap Marker

ROADS AND RELATED FEATURES:

| | |
|----------------------------|-------------------|
| Existing Edge of Pavement | _____ |
| Existing Curb | _____ |
| Proposed Slope Stakes Cut | _____C |
| Proposed Slope Stakes Fill | _____F |
| Proposed Curb Ramp | ○ _{CR} |
| Curb Cut Future Ramp | ○ _{CCFR} |
| Existing Metal Guardrail | _____ |
| Proposed Guardrail | _____ |
| Existing Cable Guiderail | _____ |
| Proposed Cable Guiderail | _____ |
| Equality Symbol | ⊕ |
| Pavement Removal | _____ |

VEGETATION:

| | |
|--------------|-------|
| Single Tree | ○ |
| Single Shrub | ○ |
| Hedge | _____ |
| Woods Line | _____ |

| | |
|----------|-------|
| Orchard | _____ |
| Vineyard | _____ |

EXISTING STRUCTURES:

| | |
|--|-----------------|
| MAJOR: | |
| Bridge, Tunnel or Box Culvert | _____CONC |
| Bridge Wing Wall, Head Wall and End Wall | _____CONC WW |
| MINOR: | |
| Head and End Wall | _____CONC HW |
| Pipe Culvert | _____ |
| Footbridge | _____ |
| Drainage Box: Catch Basin, DI or JB | □ _{CB} |
| Paved Ditch Gutter | _____ |
| Storm Sewer Manhole | ○ _S |
| Storm Sewer | _____S |

UTILITIES:

| | |
|-------------------------------------|----------------|
| POWER: | |
| Existing Power Pole | ● |
| Proposed Power Pole | ○ |
| Existing Joint Use Pole | ● |
| Proposed Joint Use Pole | ○ |
| Power Manhole | ○ _P |
| Power Line Tower | □ _⊗ |
| Power Transformer | □ _⊗ |
| U/G Power Cable Hand Hole | _____ |
| H-Frame Pole | ● |
| Recorded U/G Power Line | _____P |
| Designated U/G Power Line (S.U.E.*) | _____P |

TELEPHONE:

| | |
|---|----------------|
| Existing Telephone Pole | ● |
| Proposed Telephone Pole | ○ |
| Telephone Manhole | ○ _T |
| Telephone Booth | □ _T |
| Telephone Pedestal | □ _T |
| Telephone Cell Tower | ⊕ |
| U/G Telephone Cable Hand Hole | _____PH |
| Recorded U/G Telephone Cable | _____T |
| Designated U/G Telephone Cable (S.U.E.*) | _____T |
| Recorded U/G Telephone Conduit | _____TC |
| Designated U/G Telephone Conduit (S.U.E.*) | _____TC |
| Recorded U/G Fiber Optics Cable | _____T FO |
| Designated U/G Fiber Optics Cable (S.U.E.*) | _____T FO |

WATER:

| | |
|-------------------------------------|----------------|
| Water Manhole | ○ _W |
| Water Meter | ○ |
| Water Valve | ⊗ |
| Water Hydrant | ⊕ |
| Recorded U/G Water Line | _____W |
| Designated U/G Water Line (S.U.E.*) | _____W |
| Above Ground Water Line | _____A/G Water |

TV:

| | |
|--|----------------|
| TV Satellite Dish | _____ |
| TV Pedestal | □ _T |
| TV Tower | ⊗ |
| U/G TV Cable Hand Hole | _____PH |
| Recorded U/G TV Cable | _____TV |
| Designated U/G TV Cable (S.U.E.*) | _____TV |
| Recorded U/G Fiber Optic Cable | _____TV FO |
| Designated U/G Fiber Optic Cable (S.U.E.*) | _____TV FO |

GAS:

| | |
|-----------------------------------|--------------|
| Gas Valve | ◇ |
| Gas Meter | ◇ |
| Recorded U/G Gas Line | _____G |
| Designated U/G Gas Line (S.U.E.*) | _____G |
| Above Ground Gas Line | _____A/G Gas |

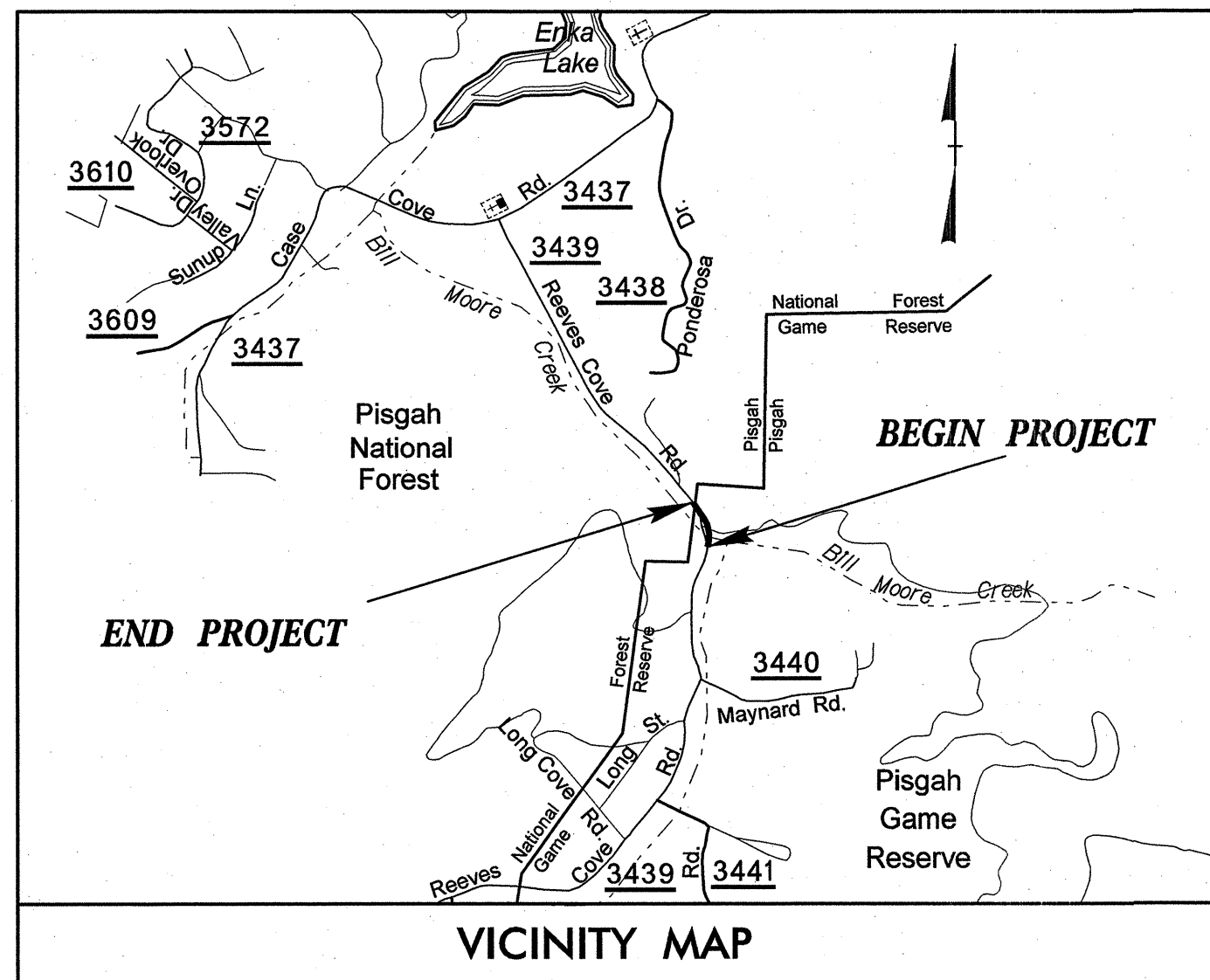
SANITARY SEWER:

| | |
|--|-------------------------|
| Sanitary Sewer Manhole | ○ _{SS} |
| Sanitary Sewer Cleanout | ⊕ |
| U/G Sanitary Sewer Line | _____SS |
| Above Ground Sanitary Sewer | _____A/G Sanitary Sewer |
| Recorded SS Forced Main Line | _____FSS |
| Designated SS Forced Main Line (S.U.E.*) | _____FSS |

MISCELLANEOUS:

| | |
|--|------------------|
| Utility Pole | ● |
| Utility Pole with Base | □ |
| Utility Located Object | ○ |
| Utility Traffic Signal Box | □ _T |
| Utility Unknown U/G Line | _____UTIL |
| U/G Tank; Water, Gas, Oil | _____ |
| Underground Storage Tank, Approx. Loc. | ○ _{UST} |
| A/G Tank; Water, Gas, Oil | _____ |
| Geoenvironmental Boring | ⊕ |
| U/G Test Hole (S.U.E.*) | ⊕ |
| Abandoned According to Utility Records | AATUR |
| End of Information | E.O.I. |

SURVEY CONTROL SHEET B-3619



VICINITY MAP

NOTES:

1. THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:
[HTTP://WWW.NCDOT.ORG/DOH/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/](http://www.ncdot.org/doh/preconstruct/highway/location/project/)

THE FILES TO BE FOUND ARE AS FOLLOWS:
 B3619_LS_CONTROL_090601.TXT

SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

● INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.

PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM NETWORK ESTABLISHED FROM EXISTING HARN MONUMENTATION

| BL | POINT | DESC. | NORTH | EAST | ELEVATION | L STATION | OFFSET |
|----|-------|-------|-------------|-------------|-----------|------------------------|----------|
| 1 | | BL-1 | 662772.0278 | 913309.7327 | 2169.00 | OUTSIDE PROJECT LIMITS | |
| 2 | | BL-2 | 662974.2493 | 913451.8953 | 2167.17 | OUTSIDE PROJECT LIMITS | |
| 3 | | BL-3 | 663217.8198 | 913483.3317 | 2162.95 | 10+50.71 | 6.94 RT |
| 4 | | BL-4 | 663547.7455 | 913362.6431 | 2153.54 | 14+21.99 | 12.98 LT |
| 5 | | BL-5 | 663833.6349 | 913114.7264 | 2153.07 | OUTSIDE PROJECT LIMITS | |

 BM1 ELEVATION = 2176.68
 N 662902 E 913368
 L STATION 9+00
 S 30° 24' 28.4" W DIST 192.39
 NAIL SET IN BASE OF 19 IN. RED OAK

 BM2 ELEVATION = 2172.54
 N 663462 E 913464
 L STATION 12+93 13 RIGHT
 NAIL SET IN BASE OF 12 IN. WHITE OAK

 BM3 ELEVATION = 2160.40
 N 663874 E 913127
 L STATION 15+42
 N 34° 25' 43.2" W DIST 281.60
 NAIL SET IN BASE OF 12 IN. MAPLE

**NCDOT GPS STA. "B3619-2"
 LOCALIZED PROJECT COORDINATES**

**N = 665967.8905
 E = 909636.7437**

**NCDOT GPS STA. "B3619-1"
 LOCALIZED PROJECT COORDINATES**

**N = 666319.4318
 E = 911491.6088**

**-L- STA. 9+00.00 BEGIN STATE PROJECT 33167.1.1
 LOCALIZED PROJECT COORDINATES**

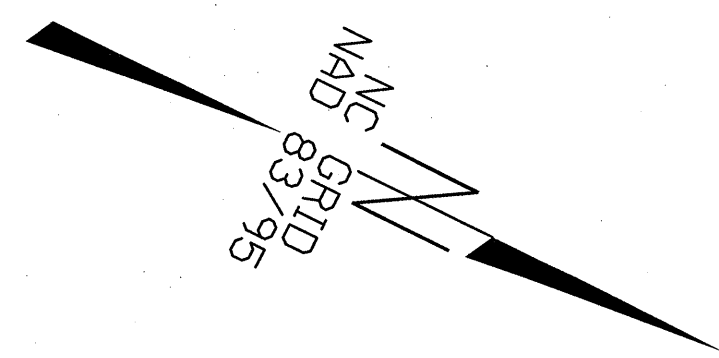
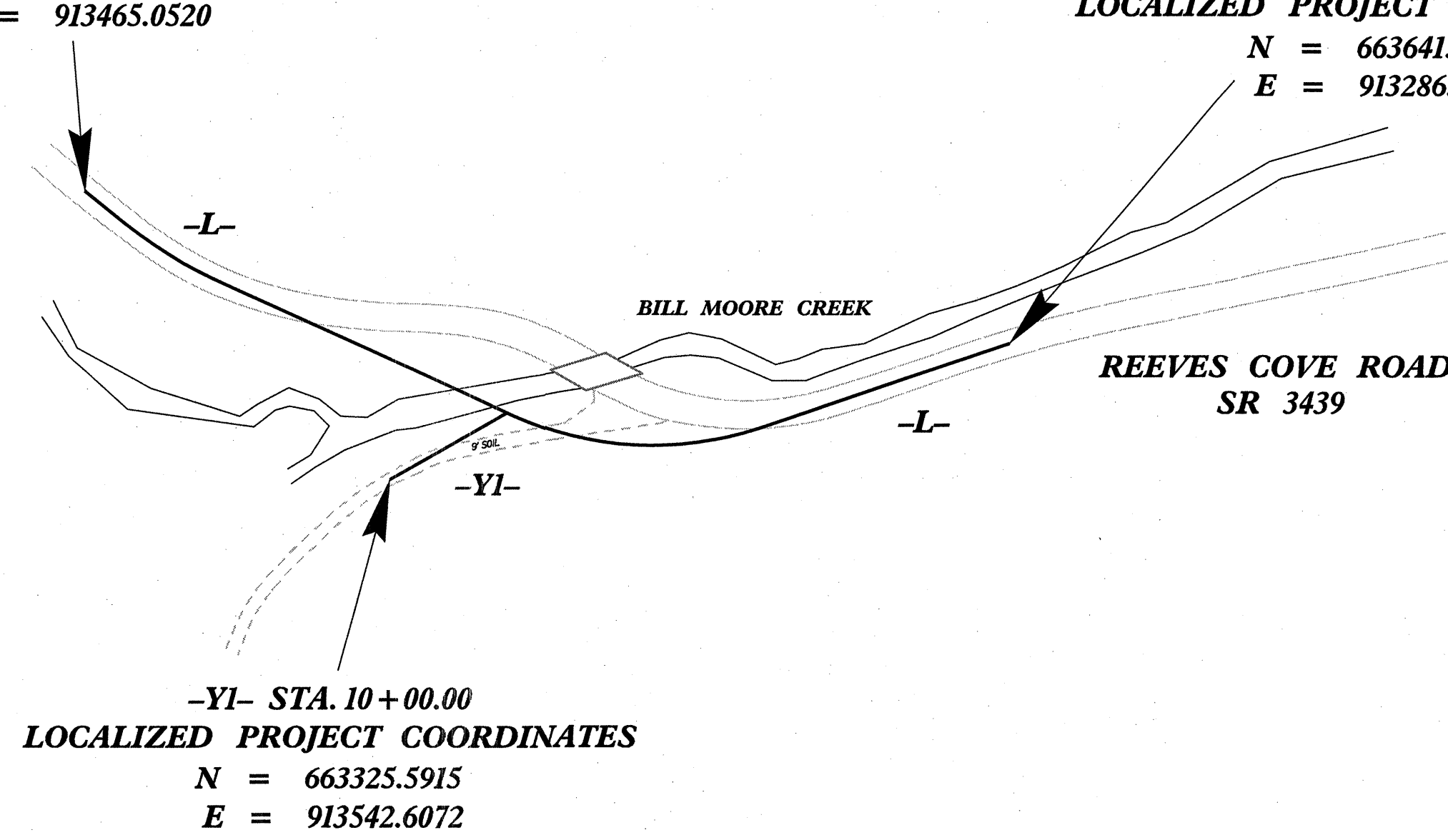
**N = 663068.1281
 E = 913465.0520**

**-L- STA. 15+41.84 END STATE PROJECT 33167.1.1
 LOCALIZED PROJECT COORDINATES**

**N = 663641.3400
 E = 913286.6700**

**-YI- STA. 10+00.00
 LOCALIZED PROJECT COORDINATES**

**N = 663325.5915
 E = 913542.6072**

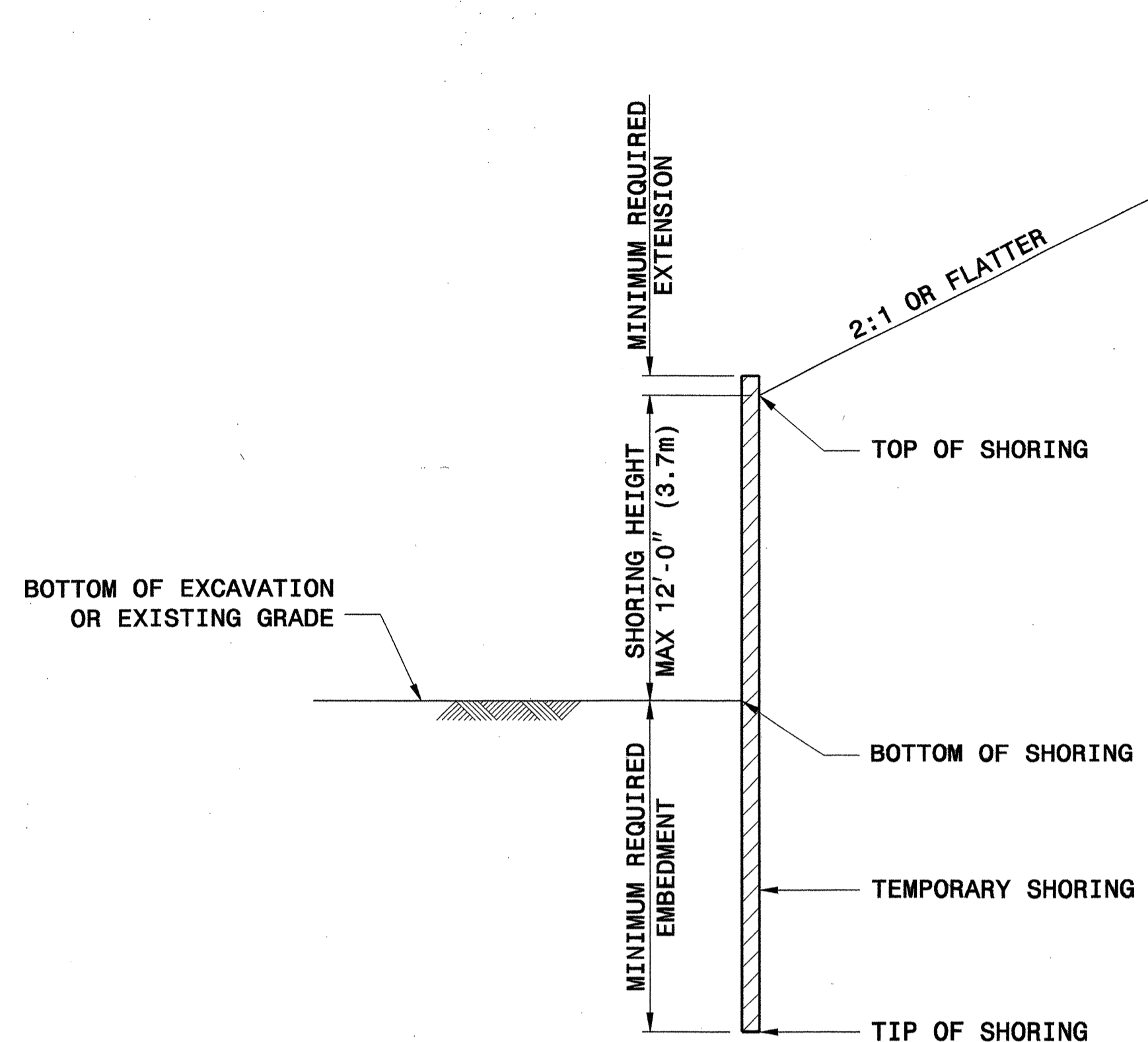


NOTE: DRAWING NOT TO SCALE

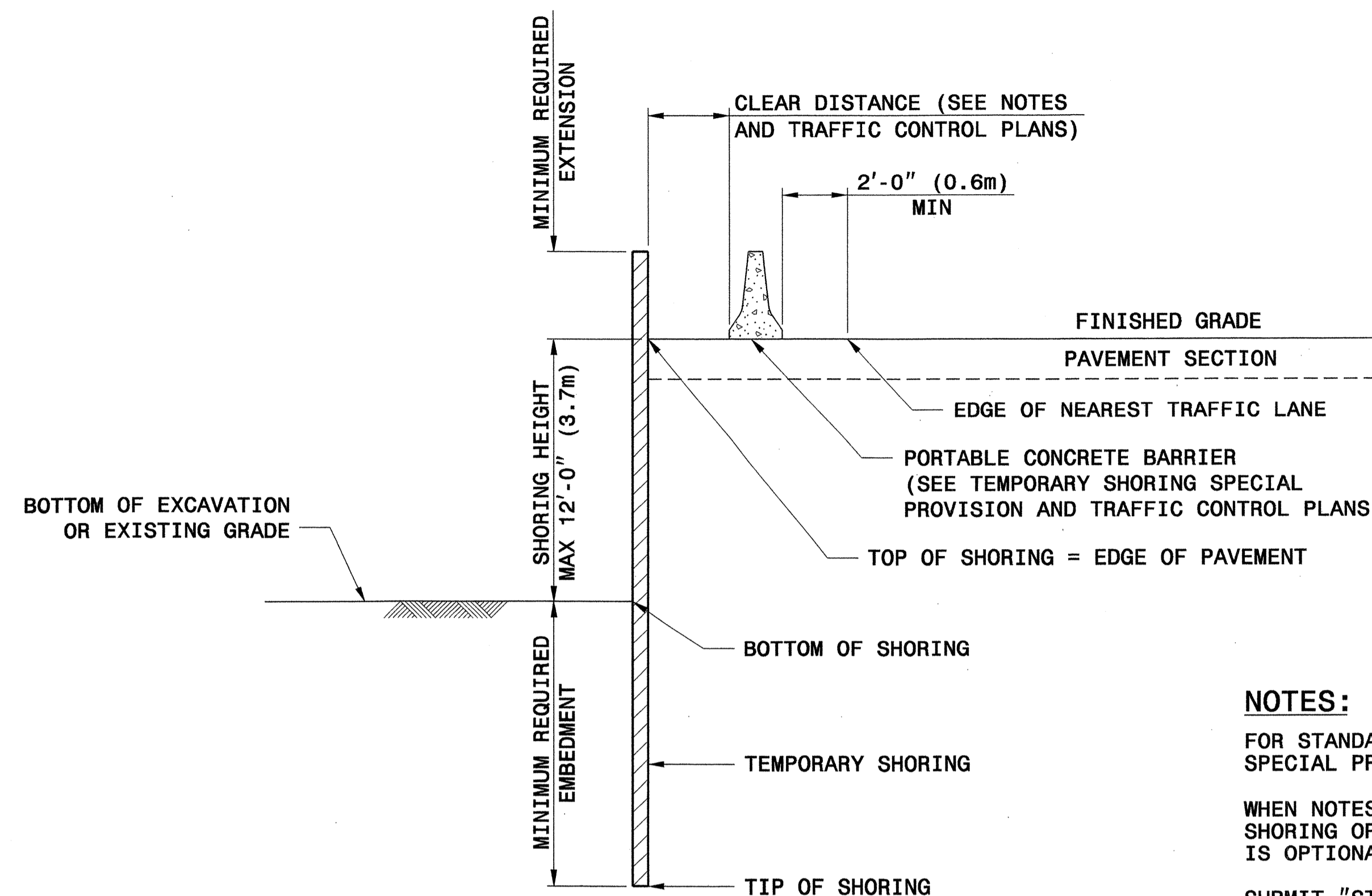
DATUM DESCRIPTION
 THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B3619-1" WITH NAD 83/95 STATE PLANE GRID COORDINATES OF NORTHING: 666319.4318(ft) EASTING: 911491.6088(ft) ELEVATION: 2164.83(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99978606 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B3619-1" TO -L- STATION 9+00.00 IS S 31°15'23" E 3803.35' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NAVD 88



Scott A. Shidden 3/29/07
SIGNATURE DATE



SLOPE CASE



SURCHARGE CASE

NOTES:

FOR STANDARD TEMPORARY SHORING, SEE TEMPORARY SHORING SPECIAL PROVISION.

WHEN NOTES ON PLANS DO NOT PROHIBIT STANDARD TEMPORARY SHORING OR STANDARD SHORING, STANDARD TEMPORARY SHORING IS OPTIONAL.

SUBMIT "STANDARD TEMPORARY SHORING SELECTION FORM" AT LEAST 14 DAYS BEFORE BEGINNING SHORING CONSTRUCTION. UP TO THREE LOCATIONS MAY BE INCLUDED ON EACH SELECTION FORM.

STANDARD TEMPORARY SHORING IS BASED ON THE FOLLOWING CONDITIONS:

- 1) MAXIMUM SHORING HEIGHT IS 12'-0" (3.7m).
- 2) TRAFFIC SURCHARGE IS 240 PSF (11.5 KPA) MAXIMUM OR BACKSLOPE IS 2:1 (H:V) OR FLATTER.
- 3) BOTTOM OF EXCAVATION OR EXISTING GRADE IN FRONT OF SHORING IS 6:1 (H:V) SLOPE OR FLATTER.
- 4) H PILE SPACING IS 6'-0" (1.8m).
- 5) H PILE EMBEDMENT DEPTHS ARE FOR DRIVEN PILES.
- 6) TIMBER LAGGING IS A MINIMUM OF 3" (75mm) THICK.

STANDARD TEMPORARY SHORING IS BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
TOTAL UNIT WEIGHT = 120 PCF (18.8 KN/M³)
FRICTION ANGLE = 30 DEGREES
COHESION = 0 PSF (0 KPA)
GROUNDWATER IS ASSUMED TO BE BELOW BOTTOM OF SHORING.

DO NOT USE STANDARD TEMPORARY SHORING WHEN THE ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE OR GROUNDWATER IS ABOVE THE BOTTOM OF SHORING.

DO NOT USE STANDARD TEMPORARY SHORING WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS PRESENT WITHIN THE EMBEDMENT DEPTH.

VERIFY GROUNDWATER ELEVATION BEFORE BEGINNING SHORING CONSTRUCTION.

IF THE CLEAR DISTANCE AVAILABLE IS LESS THAN THE MINIMUM REQUIRED IN ACCORDANCE WITH THE TRAFFIC CONTROL PLANS, SET THE BARRIER AGAINST THE TRAFFIC SIDE OF THE SHORING AND USE THE "SURCHARGE CASE WITH TRAFFIC IMPACT".

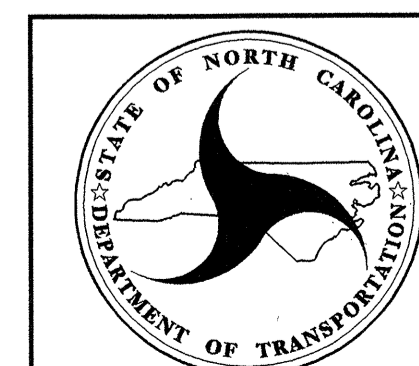
AT THE CONTRACTOR'S OPTION, H PILE EMBEDMENT DEPTHS FOR PILES SET IN DRILLED HOLES MAY BE REDUCED BY 25%. FOR PILE EXCAVATION, SEE TEMPORARY SHORING SPECIAL PROVISION.

CONTROL DRAINAGE DURING CONSTRUCTION IN THE VICINITY OF THE SHORING. COLLECT AND DIRECT RUNOFF AWAY FROM SHORING.

CONTACT THE ENGINEER IF MINIMUM REQUIRED EMBEDMENT IS NOT ACHIEVED.

| GROUNDWATER CONDITION | SHORING HEIGHT FT (m) | SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT | | | | | | SURCHARGE CASE WITH TRAFFIC IMPACT | | | | | | | | | | | | |
|--|-----------------------|--|---|----------------------|----------------------|-----------------------|-----------------------------|------------------------------------|-----------------------|-----------------------------------|---|----------------------|----------------------|-----------------------|-----------------------------|-------------|------------|------------|------------|------------|
| | | MINIMUM REQUIRED EMBEDMENT FT (m) | MINIMUM REQUIRED SECTION MODULUS IN ³ /FT (cm ³ /m) | SHEET PILES | | | H PILES WITH TIMBER LAGGING | | | MINIMUM REQUIRED EMBEDMENT FT (m) | MINIMUM REQUIRED SECTION MODULUS IN ³ /FT (cm ³ /m) | SHEET PILES | | | H PILES WITH TIMBER LAGGING | | | | | |
| | | | | HP 10x42 (HP 250x62) | HP 12x53 (HP 310x79) | HP 14x73 (HP 360x108) | HP 10x42 (HP 250x62) | HP 12x53 (HP 310x79) | HP 14x73 (HP 360x108) | | | HP 10x42 (HP 250x62) | HP 12x53 (HP 310x79) | HP 14x73 (HP 360x108) | | | | | | |
| GROUNDWATER ELEVATION BELOW TIP OF SHORING | < 6 (1.8) | 7.5 (2.3) | 3.0 (161) | 8.0 (2.4) | 8.0 (2.4) | 8.0 (2.4) | 11.0 (3.4) | 10.0 (538) | 9.5 (2.9) | 9.5 (2.9) | 9.5 (2.9) | 11.5 (3.5) | 11.5 (3.5) | 11.5 (3.5) | 16.0 (4.9) | 12.0 (645) | 13.0 (4.0) | 13.0 (4.0) | 13.0 (4.0) | |
| | 7 (2.1) | 8.5 (2.6) | 4.5 (242) | 9.5 (2.9) | 9.5 (2.9) | 9.5 (2.9) | 12.0 (3.7) | 12.0 (645) | 10.5 (3.2) | 10.5 (3.2) | 10.5 (3.2) | 13.5 (4.1) | 13.5 (4.1) | 13.5 (4.1) | 17.0 (5.2) | 14.5 (780) | 14.5 (4.4) | 14.5 (4.4) | 14.5 (4.4) | |
| | 8 (2.4) | 10.0 (3.0) | 6.5 (349) | 10.5 (3.2) | 10.5 (3.2) | 10.5 (3.2) | 12.5 (3.8) | 14.0 (753) | 11.5 (3.5) | 11.5 (3.5) | 11.5 (3.5) | 14.0 (4.3) | 14.0 (4.3) | 14.0 (4.3) | 18.0 (5.5) | 17.0 (914) | 15.5 (4.7) | 15.5 (4.7) | 15.5 (4.7) | |
| | 9 (2.7) | 11.0 (3.4) | 9.5 (511) | -- | 12.0 (3.7) | 12.0 (3.7) | 13.5 (4.1) | 16.5 (887) | -- | 12.5 (3.8) | 12.5 (3.8) | 14.5 (4.4) | 14.5 (4.4) | 14.5 (4.4) | 19.0 (5.8) | 20.0 (1075) | -- | 17.0 (5.2) | 17.0 (5.2) | 17.0 (5.2) |
| | 10 (3.0) | 12.5 (3.8) | 13.0 (699) | -- | -- | 13.5 (4.1) | 14.0 (4.3) | 19.5 (1048) | -- | 13.5 (4.1) | 13.5 (4.1) | 15.5 (4.6) | 15.5 (4.6) | 15.5 (4.6) | 20.0 (6.1) | 23.5 (1263) | -- | -- | 18.5 (5.6) | 18.5 (5.6) |
| | 11 (3.4) | 13.5 (4.1) | 17.0 (914) | -- | -- | 14.5 (4.4) | 15.0 (4.6) | 22.5 (1210) | -- | -- | 14.5 (4.4) | 16.5 (887) | 16.5 (887) | 16.5 (887) | 21.0 (6.4) | 28.0 (1505) | -- | -- | 20.0 (6.1) | 20.0 (6.1) |
| | 12 (3.7) | 15.0 (4.6) | 21.5 (1156) | -- | -- | 16.0 (4.9) | 16.0 (4.9) | 25.5 (1371) | -- | -- | 15.5 (4.7) | 15.5 (4.7) | 17.5 (5.3) | 17.5 (5.3) | 22.0 (6.7) | 33.0 (1774) | -- | -- | 21.5 (6.6) | 21.5 (6.6) |
| GROUNDWATER ELEVATION BETWEEN BOTTOM OF SHORING AND TIP OF SHORING | < 6 (1.8) | 11.5 (3.5) | 4.5 (242) | 11.5 (3.5) | 11.5 (3.5) | 11.5 (3.5) | 16.0 (4.9) | 12.0 (645) | 13.0 (4.0) | 13.0 (4.0) | 13.0 (4.0) | 16.0 (4.9) | 16.0 (4.9) | 16.0 (4.9) | 12.0 (645) | 13.0 (4.0) | 13.0 (4.0) | 13.0 (4.0) | 13.0 (4.0) | |
| | 7 (2.1) | 13.0 (4.0) | 7.0 (376) | 13.0 (4.0) | 13.0 (4.0) | 13.0 (4.0) | 17.0 (5.2) | 14.5 (780) | 14.5 (4.4) | 14.5 (4.4) | 14.5 (4.4) | 17.0 (5.2) | 17.0 (5.2) | 17.0 (5.2) | 14.5 (780) | 14.5 (4.4) | 14.5 (4.4) | 14.5 (4.4) | 14.5 (4.4) | |
| | 8 (2.4) | 15.0 (4.6) | 10.0 (538) | -- | 15.0 (4.6) | 15.0 (4.6) | 18.0 (5.5) | 17.0 (914) | -- | 15.5 (4.7) | 15.5 (4.7) | 18.0 (5.5) | 18.0 (5.5) | 18.0 (5.5) | 17.0 (914) | 14.5 (780) | 14.5 (4.4) | 14.5 (4.4) | 14.5 (4.4) | |
| | 9 (2.7) | 17.0 (5.2) | 14.0 (753) | -- | 17.0 (5.2) | 17.0 (5.2) | 19.0 (5.8) | 20.0 (1075) | -- | 17.0 (5.2) | 17.0 (5.2) | 19.0 (5.8) | 19.0 (5.8) | 19.0 (5.8) | 17.0 (914) | 14.5 (780) | 14.5 (4.4) | 14.5 (4.4) | 14.5 (4.4) | |
| | 10 (3.0) | 18.5 (5.6) | 19.5 (1048) | -- | -- | 18.5 (5.6) | 20.0 (6.1) | 23.5 (1263) | -- | -- | -- | 19.0 (5.8) | 19.0 (5.8) | 19.0 (5.8) | 17.0 (914) | 14.5 (780) | 14.5 (4.4) | 14.5 (4.4) | 14.5 (4.4) | |
| | 11 (3.4) | 20.5 (6.3) | 26.0 (1398) | -- | -- | -- | 21.0 (6.4) | 28.0 (1505) | -- | -- | -- | 20.0 (6.1) | 20.0 (6.1) | 20.0 (6.1) | 17.0 (914) | 14.5 (780) | 14.5 (4.4) | 14.5 (4.4) | 14.5 (4.4) | |
| | 12 (3.7) | 22.5 (6.9) | 33.0 (1774) | -- | -- | -- | 22.0 (6.7) | 33.0 (1774) | -- | -- | -- | 21.5 (6.6) | 21.5 (6.6) | 21.5 (6.6) | 17.0 (914) | 14.5 (780) | 14.5 (4.4) | 14.5 (4.4) | 14.5 (4.4) | |

NOTE: MINIMUM REQUIRED EXTENSION IS 6" (150mm) FOR "SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT" AND 32" (800 mm) FOR "SURCHARGE CASE WITH TRAFFIC IMPACT".




GEOTECHNICAL ENGINEERING UNIT
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD DRAWING NO. 1801.01

STANDARD TEMPORARY SHORING

DATE: 2-20-07

STANDARD TEMPORARY MSE WALL OPTIONS

| | | |
|---|-------------------------------------|--------------|
| PROJECT REFERENCE NO. | | SHEET |
| B-3619 | | 2-B |
| GEOTECHNICAL ENGINEER  SEAL 022246 SCOTT A. SHIDDEN ENGINEER | ENGINEER _____ SIGNATURE DATE | |

| TEMPORARY MSE WALL OPTION | VENDOR | CONTACT INFORMATION | REINFORCEMENT TYPE | SHEETS |
|-------------------------------|--------------------------------|---|-----------------------------------|--------|
| TEMPORARY FABRIC WALL | N/A | N/A | POLYESTER OR POLYPROPYLENE FABRIC | 3 |
| HILFIKER TEMPORARY WALL | HILFIKER RETAINING WALLS | 1902 HILFIKER LANE, EUREKA, CA 95503-5711 707-443-5093 WWW.HILFIKER.COM | WELDED WIRE MAT | 4 |
| SIERRASCAPE TEMPORARY WALL | TENSAR EARTH TECHNOLOGIES, INC | 5883 GLENRIDGE DRIVE, SUITE 200 ATLANTA, GA 30328-5363 404-250-1290 WWW.TENSARCORP.COM | GEOGRID | 5 |
| RETAINED EARTH TEMPORARY WALL | THE REINFORCED EARTH COMPANY | 8614 WESTWOOD CENTER DRIVE, SUITE 1100 VIENNA, VA 22182-2233 703-749-4325 WWW.REINFORCEDEARTH.COM | WELDED WIRE MESH | 6-8 |
| TERRATREL TEMPORARY WALL | THE REINFORCED EARTH COMPANY | 8614 WESTWOOD CENTER DRIVE, SUITE 1100 VIENNA, VA 22182-2233 703-749-4325 WWW.REINFORCEDEARTH.COM | RIBBED STEEL STRIPS | 9-11 |

FOR STANDARD TEMPORARY MSE WALLS, SEE TEMPORARY SHORING SPECIAL PROVISION.

WHEN NOTES ON PLANS DO NOT PROHIBIT TEMPORARY MSE WALLS OR STANDARD SHORING, STANDARD TEMPORARY MSE WALLS ARE OPTIONAL.

WHEN NOTES ON PLANS REQUIRE TEMPORARY MSE WALLS, USE STANDARD TEMPORARY MSE WALLS OR CONTRACTOR DESIGNED TEMPORARY MSE WALLS.

WHEN THE ALIGNMENT OF STANDARD TEMPORARY MSE WALLS RESULTS IN AN INTERIOR ANGLE LESS THAN 90 DEGREES, SUBMIT AN ACUTE CORNER DETAIL FOR THE SPECIFIC SITUATION IN ACCORDANCE WITH THE WALL VENDOR RECOMMENDATIONS. ALSO, SUBMIT A "STANDARD TEMPORARY MSE WALL SELECTION FORM" FOR EACH TEMPORARY MSE WALL LOCATION. SUBMIT THESE ITEMS AT LEAST 14 DAYS BEFORE BEGINNING WALL CONSTRUCTION.

STANDARD TEMPORARY MSE WALLS ARE BASED ON THE FOLLOWING CONDITIONS:

- 1) MAXIMUM WALL HEIGHT IS 28'-0" (8.5m).
- 2) TRAFFIC SURCHARGE IS 240 PSF (11.5 KPA) MAXIMUM OR BACKSLOPE IS 2:1 (H:V) OR FLATTER.
- 3) EXISTING OR FINISHED GRADE IN FRONT OF WALL IS 6:1 (H:V) SLOPE OR FLATTER.
- 4) THE GRADE OF THE TOP OF WALL IS LESS THAN 4% FOR RETAINED EARTH AND TERRATREL TEMPORARY WALLS.
- 5) DESIGN SERVICE LIFE IS 3 YEARS.
- 6) MATERIAL IN REINFORCED ZONE IS SHORING BACKFILL.
- 7) MAXIMUM APPLIED BEARING PRESSURE IS 1 TSF (100 KPA) FOR WALL HEIGHTS UP TO 8'-0" (2.4m), 2 TSF (195 KPA) FOR WALL HEIGHTS BETWEEN 8'-0" AND 18'-0" (2.4m AND 5.5m) AND 3 TSF (290 KPA) FOR WALL HEIGHTS OVER 18'-0" (5.5m).

STANDARD TEMPORARY MSE WALLS ARE BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:

- TOTAL UNIT WEIGHT = 120 PCF (18.8 KN/M³)
- FRICTION ANGLE = 30 DEGREES
- COHESION = 0 PSF (0 KPA)
- GROUNDWATER IS ASSUMED TO BE BELOW BOTTOM OF REINFORCED ZONE.

DO NOT USE STANDARD TEMPORARY MSE WALLS WHEN THE ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE OR VERY LOOSE OR SOFT SOIL OR MUCK IS PRESENT BELOW THE BOTTOM OF REINFORCED ZONE.

CONTROL DRAINAGE DURING CONSTRUCTION IN THE VICINITY OF STANDARD TEMPORARY MSE WALLS. COLLECT AND DIRECT RUNOFF AWAY FROM WALLS AND SHORING BACKFILL.

EXCAVATE AS NECESSARY FOR STANDARD TEMPORARY MSE WALLS IN ACCORDANCE WITH THE FOLLOWING FOR THE WALL OPTION CHOSEN:

- 1) MINIMUM EMBEDMENT OF 18" (450mm) UNLESS WALL BEARS ON ROCK, CONCRETE OR PAVEMENT AS DETERMINED BY THE ENGINEER
- 2) VERTICAL STEPS IN INCREMENTS EQUAL TO THE VERTICAL REINFORCEMENT SPACING
- 3) WITH THE EXCEPTION OF EITHER THE FIRST OR LAST SECTION OF WALL, HORIZONTAL SECTION LENGTHS IN INCREMENTS EQUAL TO THE FOLLOWING:

| STANDARD TEMPORARY MSE WALL OPTION | INCREMENT |
|------------------------------------|----------------------------|
| TEMPORARY FABRIC WALL | 9'-0" (2.7m) MIN (VARIES) |
| HILFIKER TEMPORARY WALL | 10'-0" (3.0m) MIN (VARIES) |
| SIERRASCAPE TEMPORARY WALL | 18'-7 1/4" (5.7m) |
| RETAINED EARTH TEMPORARY WALL | 24'-0" (7.3m) |
| TERRATREL TEMPORARY WALL | 19'-8" (6.0m) |

DO NOT PLACE SHORING BACKFILL OR FIRST REINFORCEMENT LAYER UNTIL OBTAINING APPROVAL OF THE EXCAVATION DEPTH AND FOUNDATION MATERIAL.

IF APPLICABLE, INSTALL FOUNDATIONS LOCATED WITHIN THE REINFORCED ZONE BEFORE BEGINNING WALL CONSTRUCTION UNLESS DIRECTED OTHERWISE BY THE ENGINEER.

ERECT AND MAINTAIN FACINGS AND FORMS AS SHOWN ON THE STANDARD TEMPORARY MSE WALL DETAILS. STAGGER VERTICAL JOINTS OF FACINGS AND FORMS TO CREATE A RUNNING BOND WHEN POSSIBLE UNLESS SHOWN OTHERWISE ON THESE DETAILS.

PLACE FACINGS AND FORMS AS NEAR TO VERTICAL AS POSSIBLE WITH NO NEGATIVE BATTER. CONSTRUCT STANDARD TEMPORARY MSE WALLS WITH A VERTICAL AND HORIZONTAL TOLERANCE OF 3" (75mm) WHEN MEASURED WITH A 10'-0" (3m) STRAIGHT EDGE AND AN OVERALL VERTICAL PLUMBNESS (BATTER) AND HORIZONTAL ALIGNMENT OF LESS THAN 6" (150mm).

PLACE REINFORCEMENT AT LOCATIONS AND ELEVATIONS SHOWN ON THE STANDARD TEMPORARY MSE WALL DETAILS AND IN SLIGHT TENSION FREE OF KINKS, FOLDS, WRINKLES OR CREASES.

DO NOT SPLICE REINFORCEMENT IN THE REINFORCEMENT DIRECTION (RD), i.e., PARALLEL TO THE WALL FACE. SEAMS ARE ALLOWED IN THE CROSS-REINFORCEMENT DIRECTION (CRD).

CONTACT THE ENGINEER WHEN EXISTING OR FUTURE STRUCTURES SUCH AS FOUNDATIONS, PAVEMENTS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH REINFORCEMENT. TO AVOID STRUCTURES, DELFECT, SKEW AND MODIFY REINFORCEMENT.

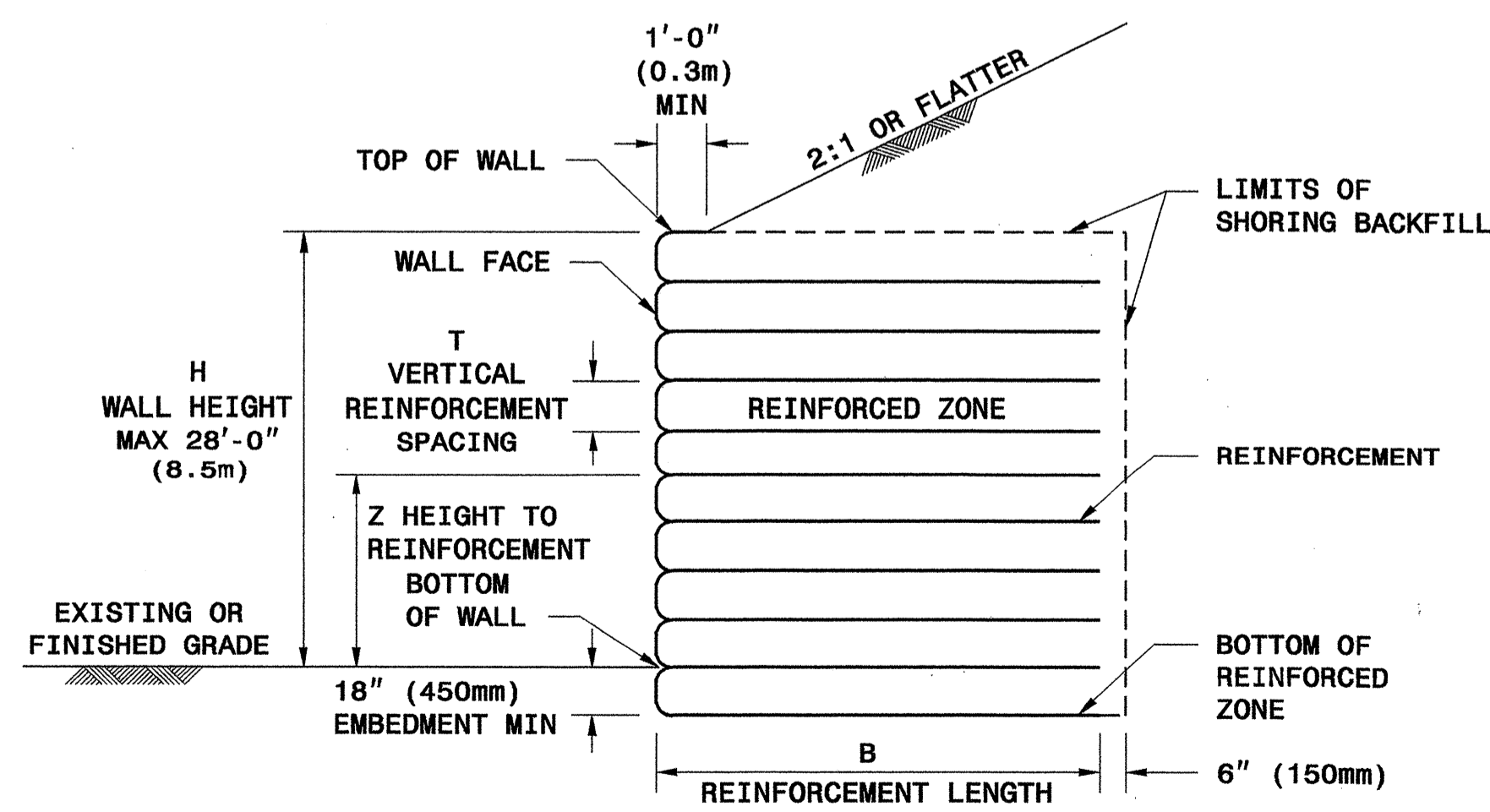
PLACE SHORING BACKFILL IN 8" TO 10" (200mm to 250mm) THICK LIFTS AND COMPACT IN ACCORDANCE WITH SUBARTICLE 235-4(C) OF THE STANDARD SPECIFICATIONS. USE ONLY HAND OPERATED COMPACTION EQUIPMENT WITHIN 3'-0" (1m) OF THE WALL FACE.

DO NOT DAMAGE REINFORCEMENT WHEN PLACING AND COMPACTING SHORING BACKFILL. DO NOT OPERATE HEAVY EQUIPMENT ON REINFORCEMENT UNTIL IT IS COVERED WITH AT LEAST 10" (250mm) OF SHORING BACKFILL. DO NOT USE SHEEPSFOOT, GRID ROLLERS OR OTHER TYPES OF COMPACTION EQUIPMENT WITH FEET.

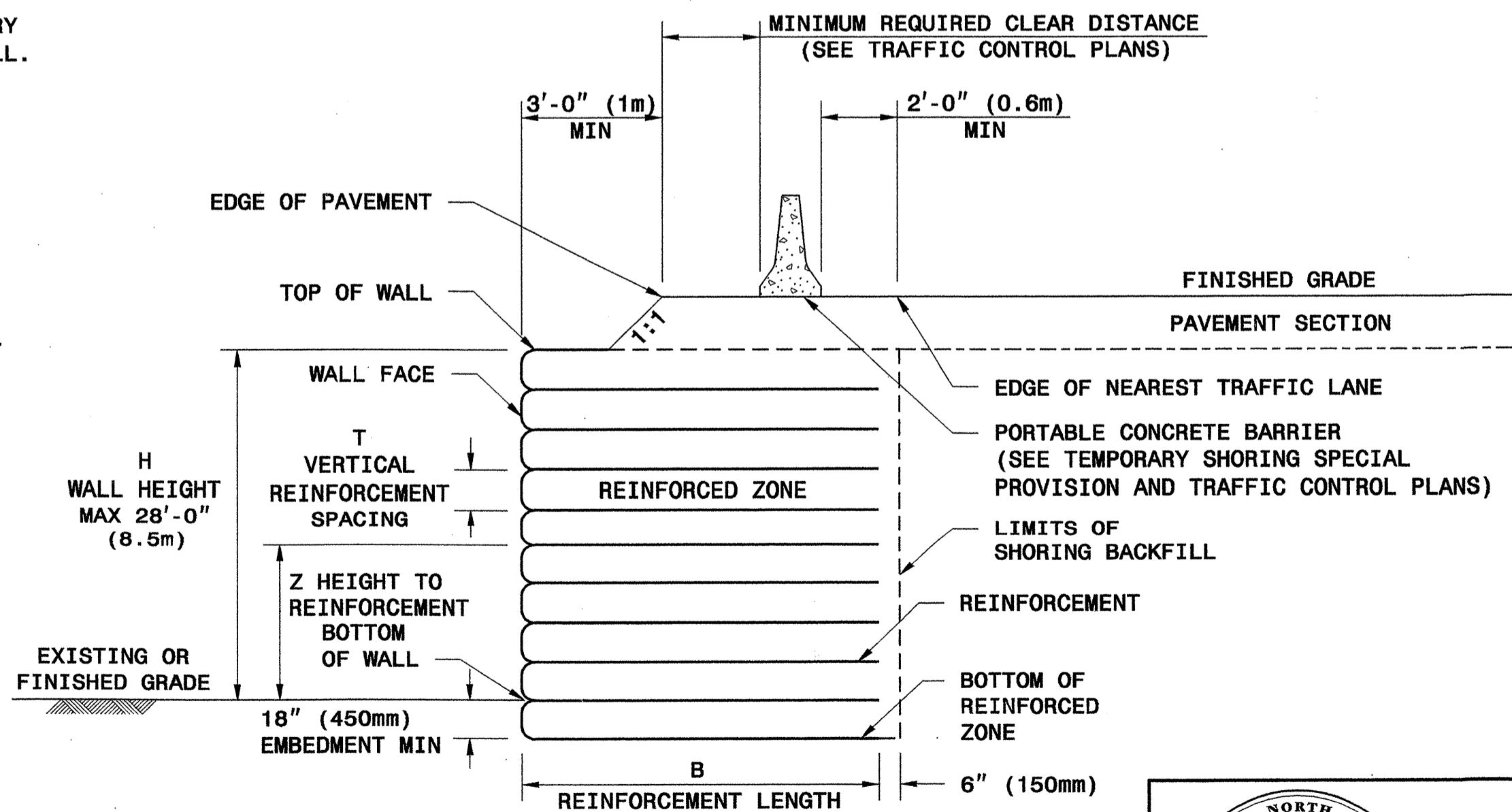
COVER REINFORCING AND RETENTION FABRIC WITH AT LEAST 3" (75mm) OF SHORING BACKFILL. PLACE TOP REINFORCEMENT LAYER BETWEEN 4" AND 24" (100mm and 600mm) BELOW TOP OF WALL DEPENDING ON WALL OPTION.

BENCH STANDARD TEMPORARY MSE WALLS INTO THE SIDES OF EXCAVATIONS WHERE APPLICABLE.

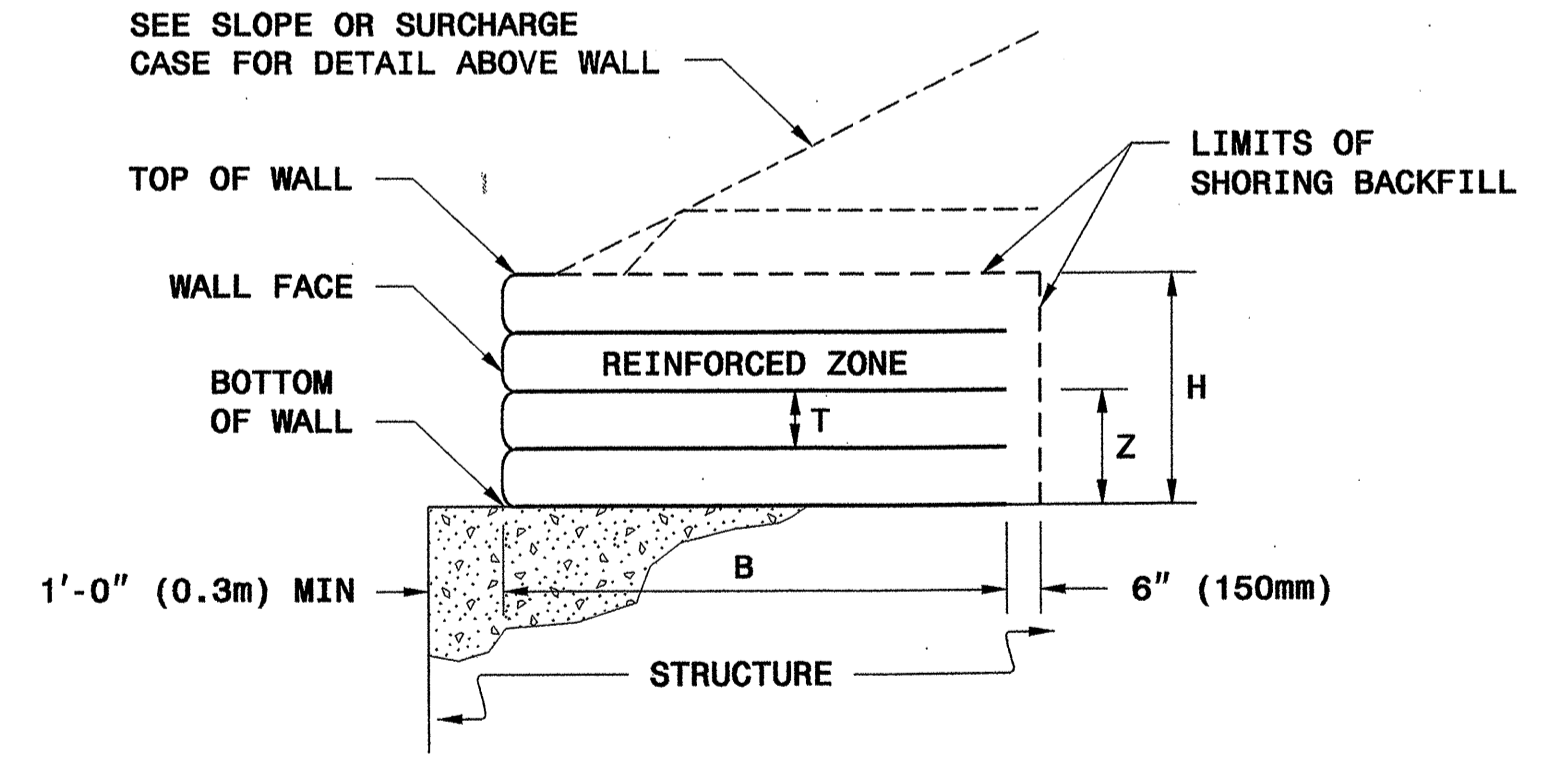
IF THE TOP OF WALL IS WITHIN 5'-0" (1.5m) OF FINISHED GRADE, REMOVE TOP FORM OR FACING AND INCORPORATE THE TOP REINFORCEMENT LAYER INTO THE FILL WHEN PLACING FILL IN FRONT OF THE WALL. STANDARD TEMPORARY MSE WALLS REMAIN IN PLACE PERMANENTLY UNLESS REQUIRED OTHERWISE.



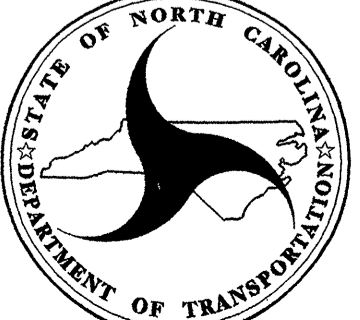
SLOPE CASE



SURCHARGE CASE



TEMPORARY MSE WALL ON STRUCTURE



GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD DRAWING NO. 1801.02

STANDARD TEMPORARY MECHANICALLY STABILIZED EARTH (MSE) WALLS

SHEET 1 OF 11
DATE: 2-20-07

GEOTECHNICAL ENGINEER ENGINEER

Signature: *Scott A. Shidden* 3/29/07

MINIMUM REQUIRED REINFORCEMENT LENGTH B (FT)

(FOR ALL WALL OPTIONS)

| WALL HEIGHT H (FT) | <8 | 8 TO 10 | 10 TO 12 | 12 TO 14 | 14 TO 16 | 16 TO 18 | 18 TO 20 | 20 TO 22 | 22 TO 24 | 24 TO 26 | 26 TO 28 |
|--------------------|----|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| SLOPE CASE | 8 | 11 | 13 | 14 | 16 | 18 | 20 | 22 | 24 | 25 | 27 |
| SURCHARGE CASE | 8 | 9 | 11 | 12 | 14 | 15 | 16 | 18 | 19 | 21 | 22 |

HOW TO USE THIS SHEET:

- FOR ALL WALL OPTIONS, DETERMINE MINIMUM REQUIRED REINFORCEMENT LENGTH (B) FROM TABLE AT RIGHT BASED ON WALL HEIGHT (H) AND SLOPE OR SURCHARGE CASE
- FOR STANDARD TEMPORARY FABRIC WALL, SEE SHEET 3 FOR FABRIC STRENGTH REQUIREMENTS BASED ON WALL HEIGHT (H)
- FOR ALL OTHER WALL OPTIONS, DETERMINE REINFORCEMENT TYPE FROM TABLES BELOW FOR EACH HEIGHT TO REINFORCEMENT (Z) BASED ON WALL HEIGHT (H) AND SLOPE OR SURCHARGE CASE

TERRATREL TEMPORARY WALL (STRIPS PER LEVEL PER PANEL)

| | | H (FT) | | | | | | | | | | | | | | |
|--|--|--------|----|----|----|----|----|----|----|----|----|----|----|---------------|---------|--|
| | | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | | | |
| | | TO | TO | TO | TO | TO | TO | TO | TO | TO | TO | TO | | | | |
| | | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | | | | |
| | | <4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | | |
| | | | | | | | | | | | | | | Z (FT-INCHES) | | |
| | | | | | | | | | | | | | | 3 | 27 - 8 | |
| | | | | | | | | | | | | | | 3 | 26 - 10 | |
| | | | | | | | | | | | | | | 3 | 25 - 2 | |
| | | | | | | | | | | | | | | 3 | 23 - 6 | |
| | | | | | | | | | | | | | | 3 | 21 - 10 | |
| | | | | | | | | | | | | | | 3 | 20 - 2 | |
| | | | | | | | | | | | | | | 3 | 18 - 6 | |
| | | | | | | | | | | | | | | 3 | 16 - 10 | |
| | | | | | | | | | | | | | | 3 | 15 - 2 | |
| | | | | | | | | | | | | | | 3 | 13 - 6 | |
| | | | | | | | | | | | | | | 3 | 11 - 10 | |
| | | | | | | | | | | | | | | 3 | 10 - 2 | |
| | | | | | | | | | | | | | | 3 | 8 - 6 | |
| | | | | | | | | | | | | | | 3 | 6 - 10 | |
| | | | | | | | | | | | | | | 3 | 5 - 2 | |
| | | | | | | | | | | | | | | 3 | 3 - 6 | |
| | | | | | | | | | | | | | | 3 | 1 - 10 | |
| | | | | | | | | | | | | | | 3 | 0 - 2 | |
| | | | | | | | | | | | | | | 3 | -0 - 8 | |

SLOPE AND SURCHARGE CASES Z (FT-INCHES)

SIERRASCAPE TEMPORARY WALL (GEOGRID TYPE)

11 = UX1100MSE 16 = UX1600MSE
14 = UX1400MSE 17 = UX1700MSE
15 = UX1500MSE

| | | H (FT) | | | | | | | | | | | | | | |
|--|--|--------|----|----|----|----|----|----|----|----|----|----|----|--------|------|--|
| | | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | | | |
| | | TO | TO | TO | TO | TO | TO | TO | TO | TO | TO | TO | | | | |
| | | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | | | | |
| | | <4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | | |
| | | | | | | | | | | | | | | Z (FT) | | |
| | | | | | | | | | | | | | | 11 | 26.5 | |
| | | | | | | | | | | | | | | 11 | 25.5 | |
| | | | | | | | | | | | | | | 11 | 24 | |
| | | | | | | | | | | | | | | 11 | 22.5 | |
| | | | | | | | | | | | | | | 11 | 21 | |
| | | | | | | | | | | | | | | 11 | 19.5 | |
| | | | | | | | | | | | | | | 11 | 18 | |
| | | | | | | | | | | | | | | 11 | 16.5 | |
| | | | | | | | | | | | | | | 11 | 15 | |
| | | | | | | | | | | | | | | 11 | 13.5 | |
| | | | | | | | | | | | | | | 11 | 12 | |
| | | | | | | | | | | | | | | 11 | 10.5 | |
| | | | | | | | | | | | | | | 11 | 9 | |
| | | | | | | | | | | | | | | 11 | 7.5 | |
| | | | | | | | | | | | | | | 11 | 6 | |
| | | | | | | | | | | | | | | 11 | 4.5 | |
| | | | | | | | | | | | | | | 11 | 3 | |
| | | | | | | | | | | | | | | 11 | 1.5 | |
| | | | | | | | | | | | | | | 11 | 0 | |
| | | | | | | | | | | | | | | 11 | -1.5 | |

SLOPE CASE Z (FT)

| | | H (FT) | | | | | | | | | | | | | | |
|--|--|--------|----|----|----|----|----|----|----|----|----|----|----|--------|------|--|
| | | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | | | |
| | | TO | TO | TO | TO | TO | TO | TO | TO | TO | TO | TO | | | | |
| | | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | | | | |
| | | <4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | | |
| | | | | | | | | | | | | | | Z (FT) | | |
| | | | | | | | | | | | | | | 11 | 26.5 | |
| | | | | | | | | | | | | | | 11 | 25.5 | |
| | | | | | | | | | | | | | | 11 | 24 | |
| | | | | | | | | | | | | | | 11 | 22.5 | |
| | | | | | | | | | | | | | | 11 | 21 | |
| | | | | | | | | | | | | | | 11 | 19.5 | |
| | | | | | | | | | | | | | | 11 | 18 | |
| | | | | | | | | | | | | | | 11 | 16.5 | |
| | | | | | | | | | | | | | | 11 | 15 | |
| | | | | | | | | | | | | | | 11 | 13.5 | |
| | | | | | | | | | | | | | | 11 | 12 | |
| | | | | | | | | | | | | | | 11 | 10.5 | |
| | | | | | | | | | | | | | | 11 | 9 | |
| | | | | | | | | | | | | | | 11 | 7.5 | |
| | | | | | | | | | | | | | | 11 | 6 | |
| | | | | | | | | | | | | | | 11 | 4.5 | |
| | | | | | | | | | | | | | | 11 | 3 | |
| | | | | | | | | | | | | | | 11 | 1.5 | |
| | | | | | | | | | | | | | | 11 | 0 | |
| | | | | | | | | | | | | | | 11 | -1.5 | |

SURCHARGE CASE Z (FT)

HILFIKER TEMPORARY WALL (WELDED WIRE MAT TYPE)

4.5 = W4.5 x W3.5
7.0 = W7.0 x W3.5
9.5 = W9.5 x W4.0

| | | H (FT) | | | | | | | | | | | | | | |
|--|--|--------|----|----|----|----|----|----|----|----|----|----|----|--------|------|--|
| | | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | | | |
| | | TO | TO | TO | TO | TO | TO | TO | TO | TO | TO | TO | | | | |
| | | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | | | | |
| | | <4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | | |
| | | | | | | | | | | | | | | Z (FT) | | |
| | | | | | | | | | | | | | | 4.5 | 26 | |
| | | | | | | | | | | | | | | 4.5 | 24 | |
| | | | | | | | | | | | | | | 4.5 | 22 | |
| | | | | | | | | | | | | | | 4.5 | 20 | |
| | | | | | | | | | | | | | | 4.5 | 18 | |
| | | | | | | | | | | | | | | 4.5 | 16 | |
| | | | | | | | | | | | | | | 4.5 | 14 | |
| | | | | | | | | | | | | | | 4.5 | 12 | |
| | | | | | | | | | | | | | | 4.5 | 10 | |
| | | | | | | | | | | | | | | 4.5 | 8 | |
| | | | | | | | | | | | | | | 4.5 | 6 | |
| | | | | | | | | | | | | | | 4.5 | 4 | |
| | | | | | | | | | | | | | | 4.5 | 2 | |
| | | | | | | | | | | | | | | 4.5 | 0 | |
| | | | | | | | | | | | | | | 4.5 | -1.5 | |

SLOPE CASE Z (FT)

| | | H (FT) | | | | | | | | | | | | | | |
|--|--|--------|----|----|----|----|----|----|----|----|----|----|----|--------|------|--|
| | | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | | | |
| | | TO | TO | TO | TO | TO | TO | TO | TO | TO | TO | TO | | | | |
| | | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | | | | |
| | | <4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | | |
| | | | | | | | | | | | | | | Z (FT) | | |
| | | | | | | | | | | | | | | 4.5 | 26 | |
| | | | | | | | | | | | | | | 4.5 | 24 | |
| | | | | | | | | | | | | | | 4.5 | 22 | |
| | | | | | | | | | | | | | | 4.5 | 20 | |
| | | | | | | | | | | | | | | 4.5 | 18 | |
| | | | | | | | | | | | | | | 4.5 | 16 | |
| | | | | | | | | | | | | | | 4.5 | 14 | |
| | | | | | | | | | | | | | | 4.5 | 12 | |
| | | | | | | | | | | | | | | 4.5 | 10 | |
| | | | | | | | | | | | | | | 4.5 | 8 | |
| | | | | | | | | | | | | | | 4.5 | 6 | |
| | | | | | | | | | | | | | | 4.5 | 4 | |
| | | | | | | | | | | | | | | 4.5 | 2 | |
| | | | | | | | | | | | | | | 4.5 | 0 | |
| | | | | | | | | | | | | | | 4.5 | -1.5 | |

SURCHARGE CASE Z (FT)

RETAINED EARTH TEMPORARY WALL (WELDED WIRE MESH TYPE)

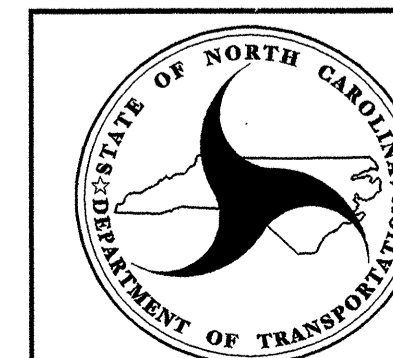
3X1 = 3W8 x W8 x 1.0'
3X2 = 3W8 x W8 x 2.0'

| | | H (FT) | | | | | | | | | | | | | | |
|--|--|--------|----|----|----|----|----|----|----|----|----|----|----|---------------|---------|--|
| | | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | | | |
| | | TO | TO | TO | TO | TO | TO | TO | TO | TO | TO | TO | | | | |
| | | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | | | | |
| | | <4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | | |
| | | | | | | | | | | | | | | Z (FT-INCHES) | | |
| | | | | | | | | | | | | | | 3X1 | 27 - 6 | |
| | | | | | | | | | | | | | | 3X1 | 26 - 10 | |
| | | | | | | | | | | | | | | 3X1 | 25 - 2 | |
| | | | | | | | | | | | | | | 3X1 | 23 - 6 | |
| | | | | | | | | | | | | | | 3X1 | 21 - 10 | |
| | | | | | | | | | | | | | | 3X1 | 20 - 2 | |
| | | | | | | | | | | | | | | 3X1 | 18 - 6 | |
| | | | | | | | | | | | | | | 3X1 | 16 - 10 | |
| | | | | | | | | | | | | | | 3X1 | 15 - 2 | |
| | | | | | | | | | | | | | | 3X1 | 13 - 6 | |
| | | | | | | | | | | | | | | 3X1 | 11 - 10 | |
| | | | | | | | | | | | | | | 3X1 | 10 - 2 | |
| | | | | | | | | | | | | | | 3X1 | 8 - 6 | |
| | | | | | | | | | | | | | | 3X1 | 6 - 10 | |
| | | | | | | | | | | | | | | 3X1 | 5 - 2 | |
| | | | | | | | | | | | | | | 3X1 | 3 - 6 | |
| | | | | | | | | | | | | | | 3X1 | 1 - 10 | |
| | | | | | | | | | | | | | | 3X1 | 0 - 2 | |
| | | | | | | | | | | | | | | 3X1 | -1 - 6 | |

SLOPE AND SURCHARGE CASES Z (FT-INCHES)

NOTES FOR HILFIKER TEMPORARY WALL

- 1) CAP MAT AT TOP OF WALL IS NOT INCLUDED IN TABLES.
- 2) REINFORCEMENT IS NOT REQUIRED AT 1' LEVEL FOR SLOPE CASE UNTIL WALL HEIGHT (H) IS GREATER THAN 24'.
- 3) REINFORCEMENT IS NOT REQUIRED AT 3' LEVEL FOR SLOPE CASE UNTIL WALL HEIGHT (H) IS GREATER THAN 26'.
- 4) REINFORCEMENT IS NOT REQUIRED AT 1' LEVEL FOR SURCHARGE CASE UNTIL WALL HEIGHT (H) IS GREATER THAN 26'.

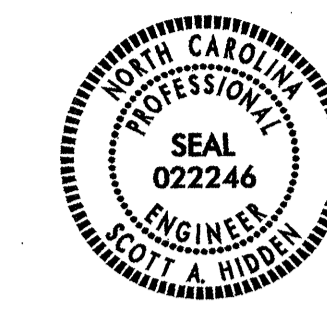


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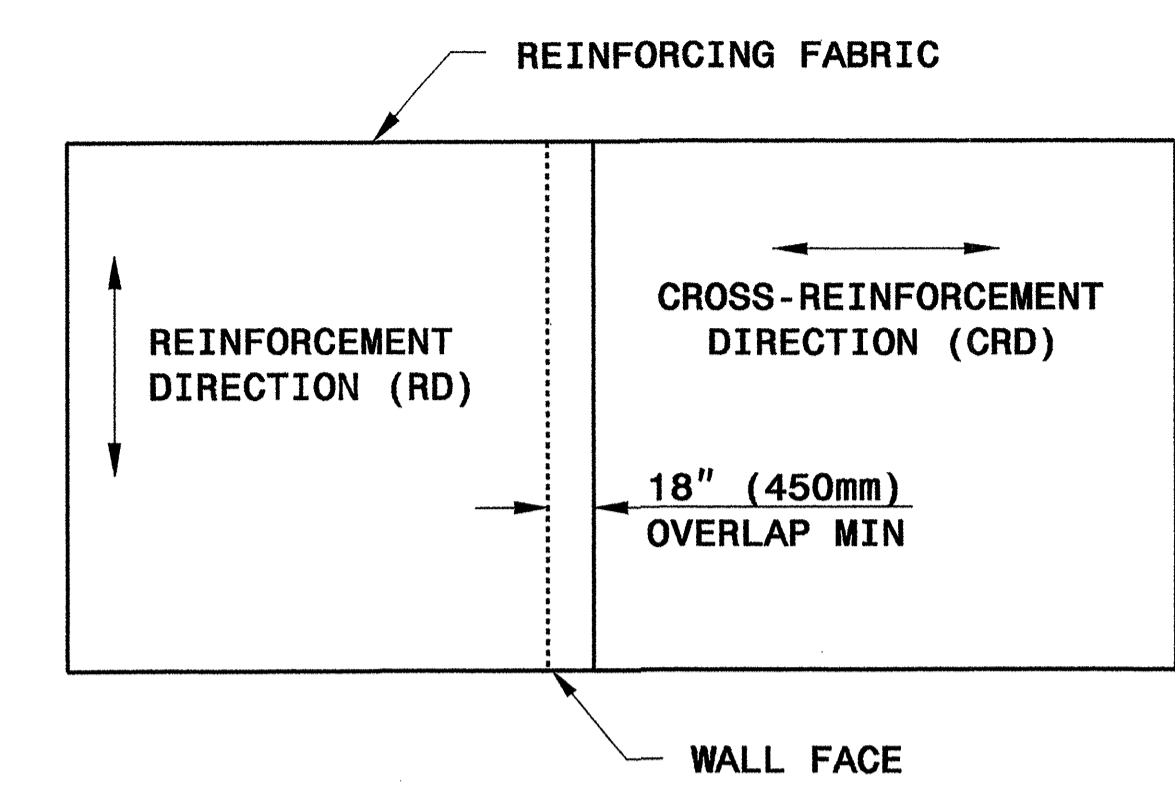
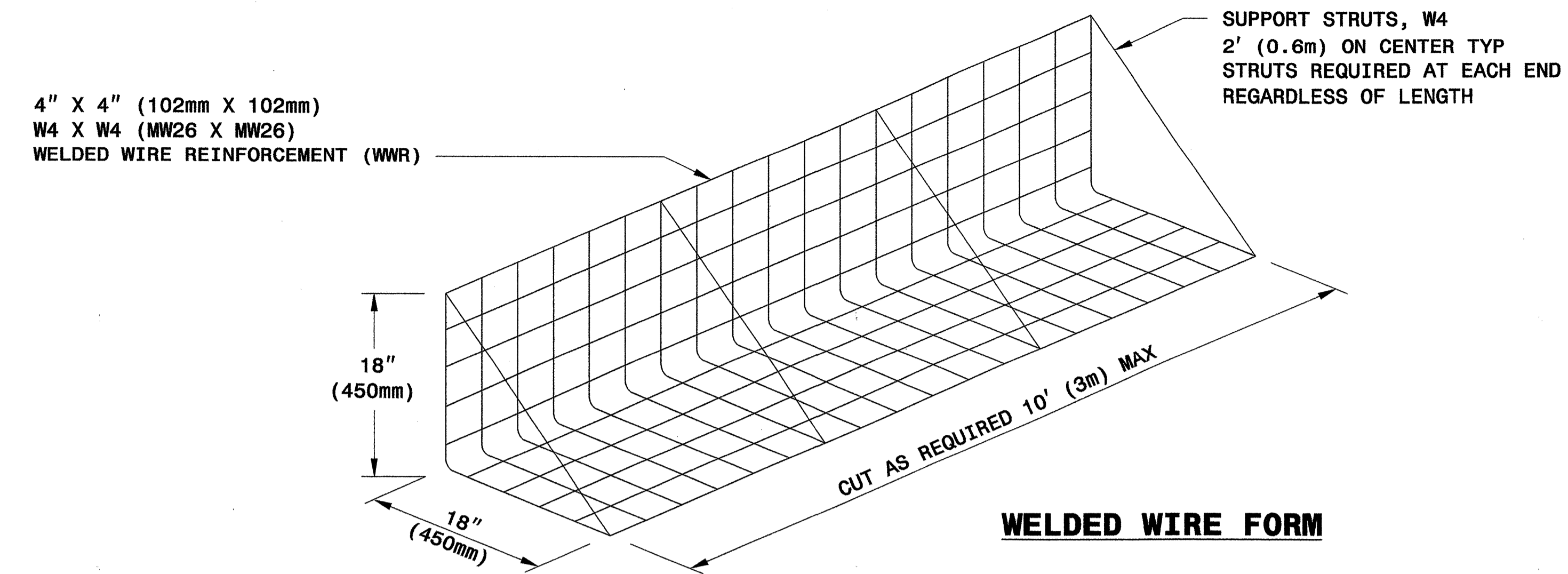
STANDARD TEMPORARY MSE WALL REINFORCEMENT TABLES - ENGLISH UNITS

SHEET 2 OF 11 DATE: 2-20-07

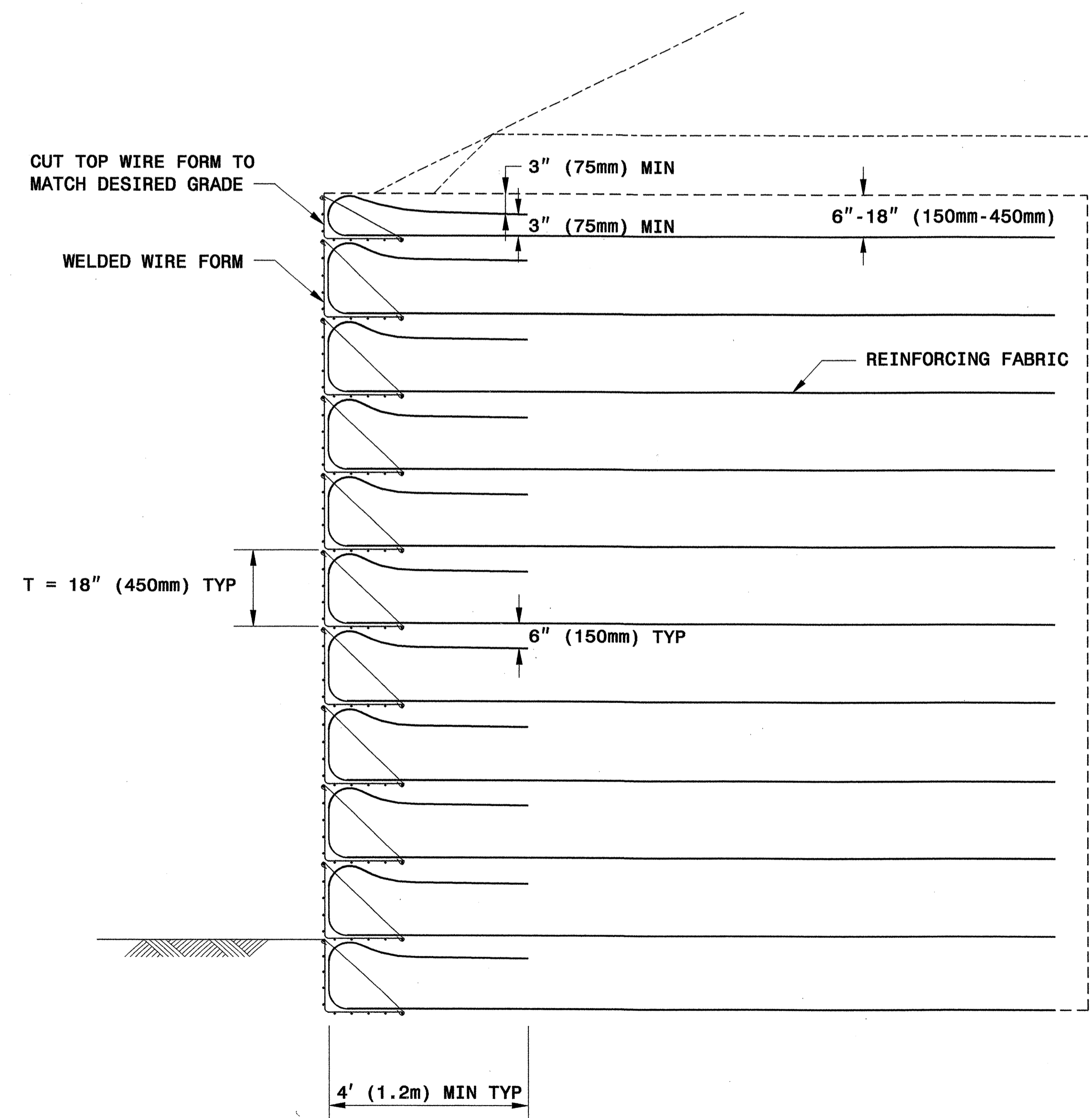


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SIGNATURE DATE



PLAN VIEW OF FABRIC OVERLAP

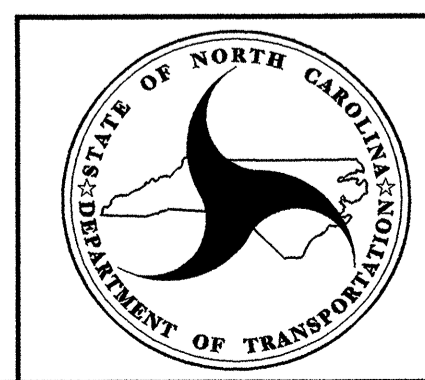


TYPICAL SECTION

MINIMUM REQUIRED REINFORCING FABRIC STRENGTH FOR RD*
(SLOPE AND SURCHARGE CASES)

| WALL HEIGHT H FEET (M) | POLYESTER WIDE WIDTH TENSILE STRENGTH @ ULTIMATE LB/INCH (KN/M) | POLYPROPYLENE WIDE WIDTH TENSILE STRENGTH @ ULTIMATE LB/INCH (KN/M) |
|------------------------------|--|--|
| 4 (1.2) | 200 (35) | 200 (35) |
| 6 (1.8) | 200 (35) | 200 (35) |
| 8 (2.4) | 200 (35) | 200 (35) |
| 10 (3.0) | 200 (35) | 230 (40) |
| 12 (3.7) | 220 (39) | 264 (46) |
| 14 (4.3) | 248 (43) | 297 (52) |
| 16 (4.9) | 276 (48) | 330 (58) |
| 18 (5.5) | 304 (53) | 364 (64) |
| 20 (6.1) | 332 (58) | 397 (70) |
| 22 (6.7) | 359 (63) | 431 (76) |
| 24 (7.3) | 387 (68) | 464 (81) |
| 26 (7.9) | 415 (73) | 497 (87) |
| 28 (8.5) | 443 (78) | 531 (93) |

*RD = REINFORCEMENT DIRECTION



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TEMPORARY
FABRIC WALL

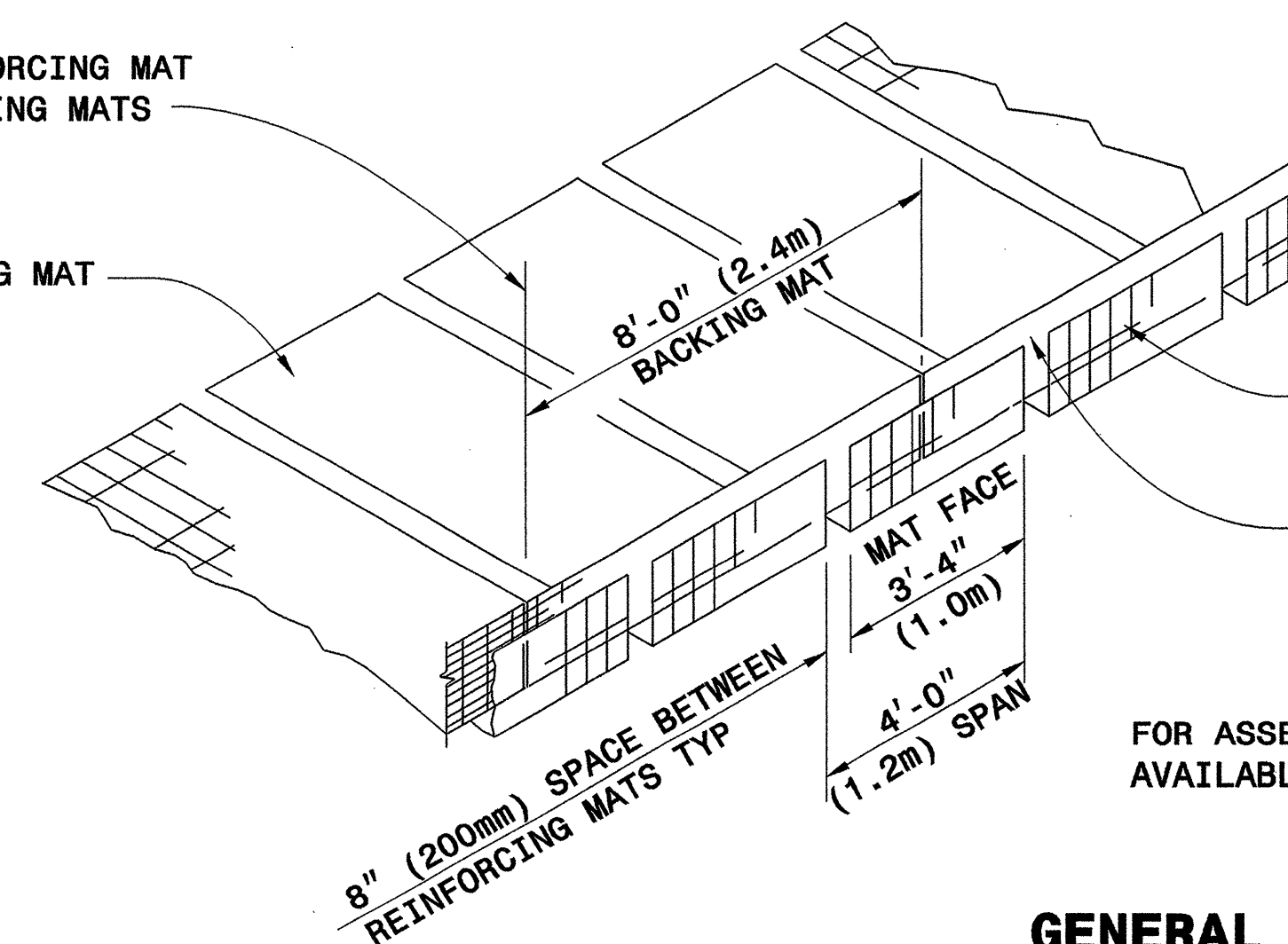


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SIGNATURE DATE

SIGNATURE DATE

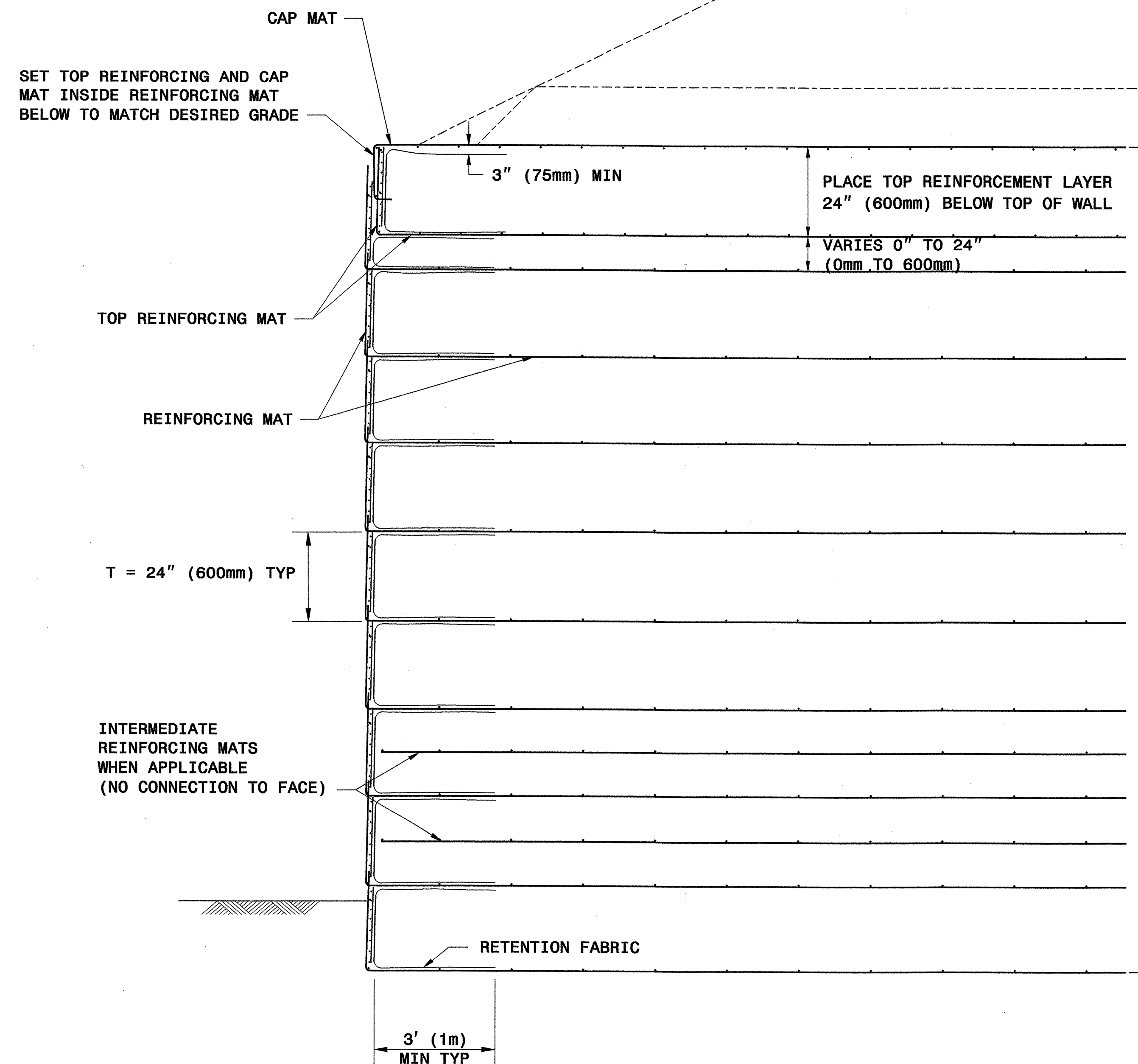
CENTERLINE OF REINFORCING MAT
FACE = EDGE OF BACKING MATS

REINFORCING MAT



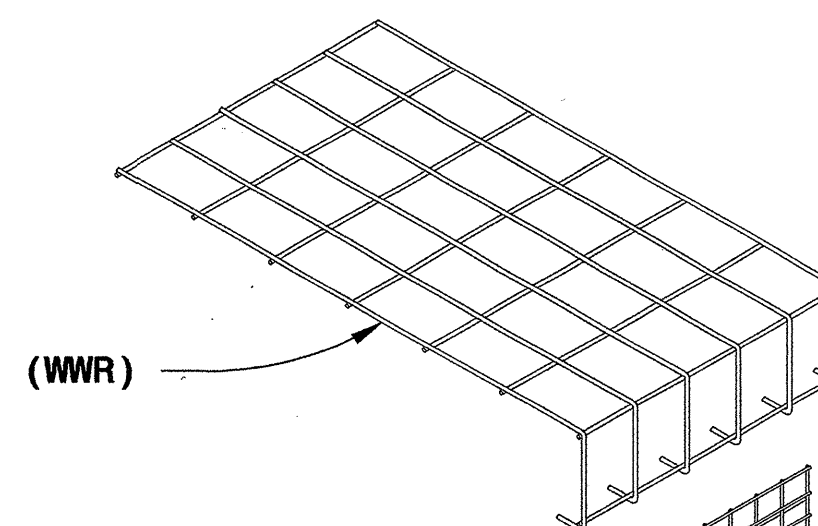
FOR ASSEMBLY INSTRUCTIONS, SEE WELDED WIRE WALL CONSTRUCTION GUIDE AVAILABLE FROM HILFIKER WEBSITE AT WWW.HILFIKER.COM/WWW

GENERAL ASSEMBLY DETAIL

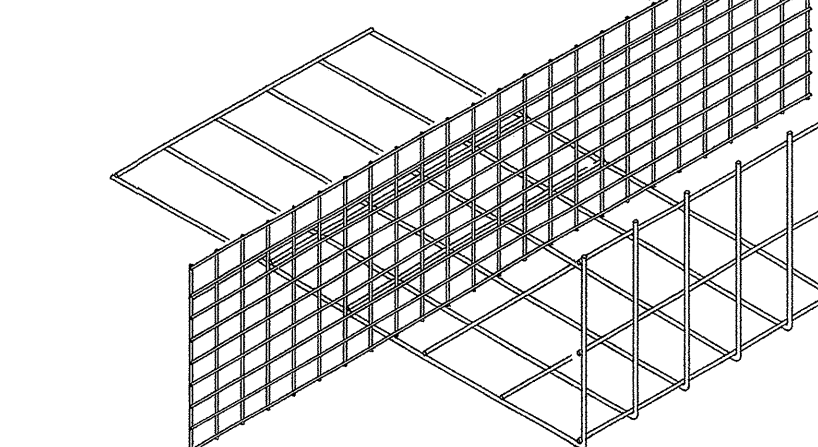


TYPICAL SECTION

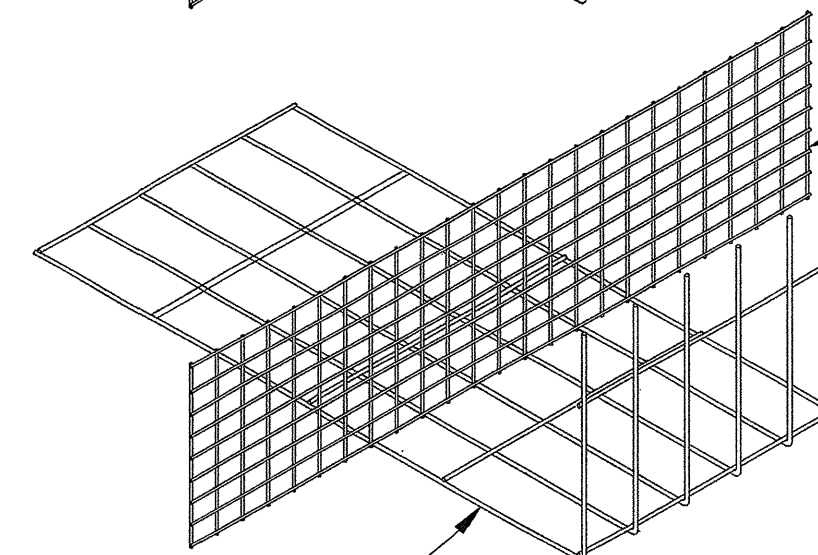
8" X 12" (203mm X 305mm)
W4.5 X W3.5 (MW29 X MW23)
CAP MAT
WELDED WIRE REINFORCEMENT (WWR)



8" X 12" (203mm X 305mm)
W4.5 X W3.5 (MW29 X MW23) WWR
TOP REINFORCING MAT (NO PRONGS)



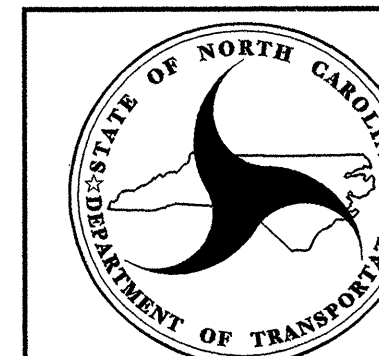
4" X 3" (102mm X 76mm)
W5 X W2.5 (MW32 X MW16) WWR
BACKING MAT
8' (2.4m) WIDE



8" X 21" (203mm X 533mm)
REINFORCING MAT
SEE SHEETS 2 AND 3 FOR GAUGE SIZES

WALL COMPONENTS

HILFIKER RETAINING WALLS



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HILFIKER
TEMPORARY WALL

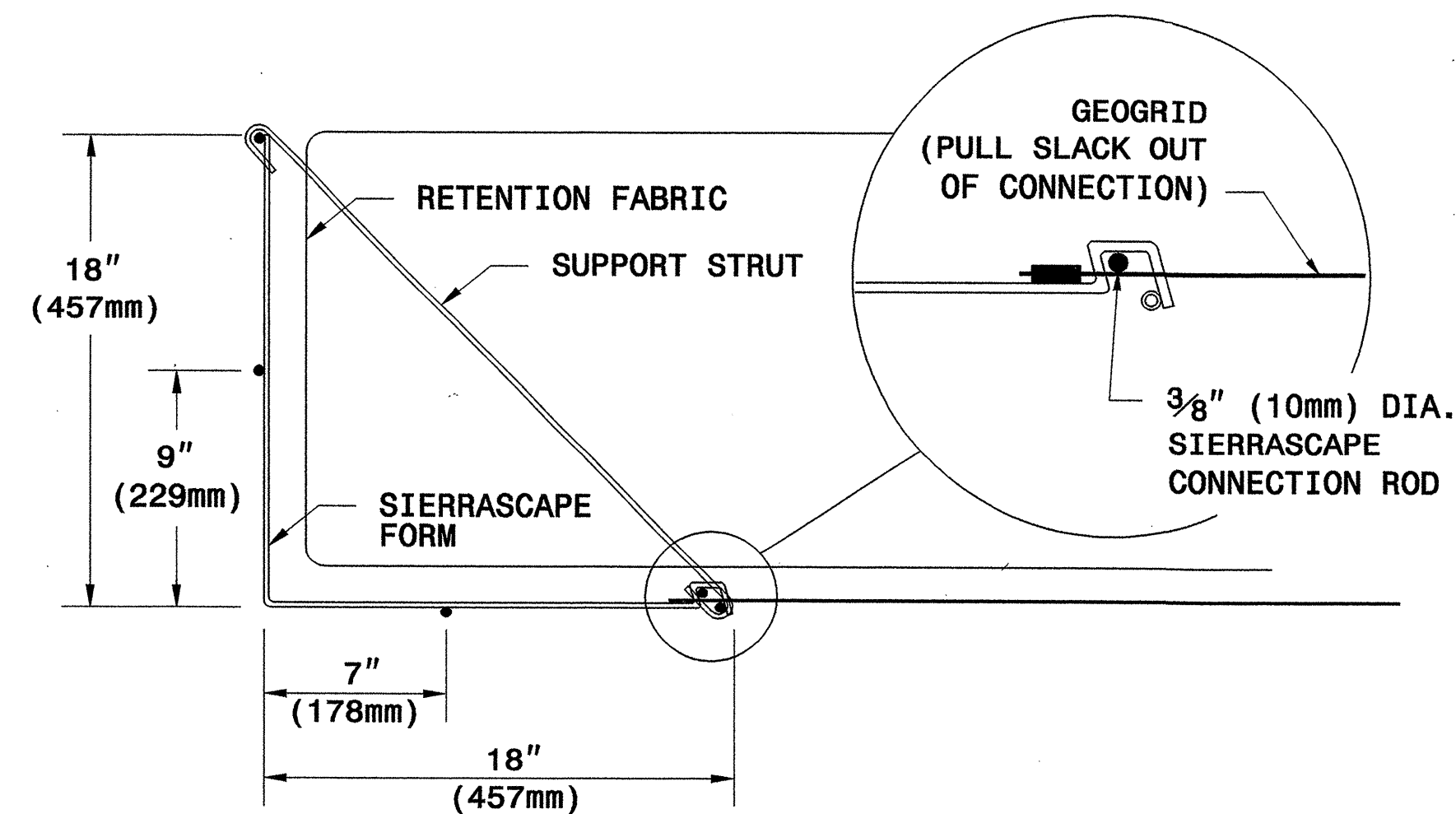
SHEET 4 OF 11

DATE: 12-19-06



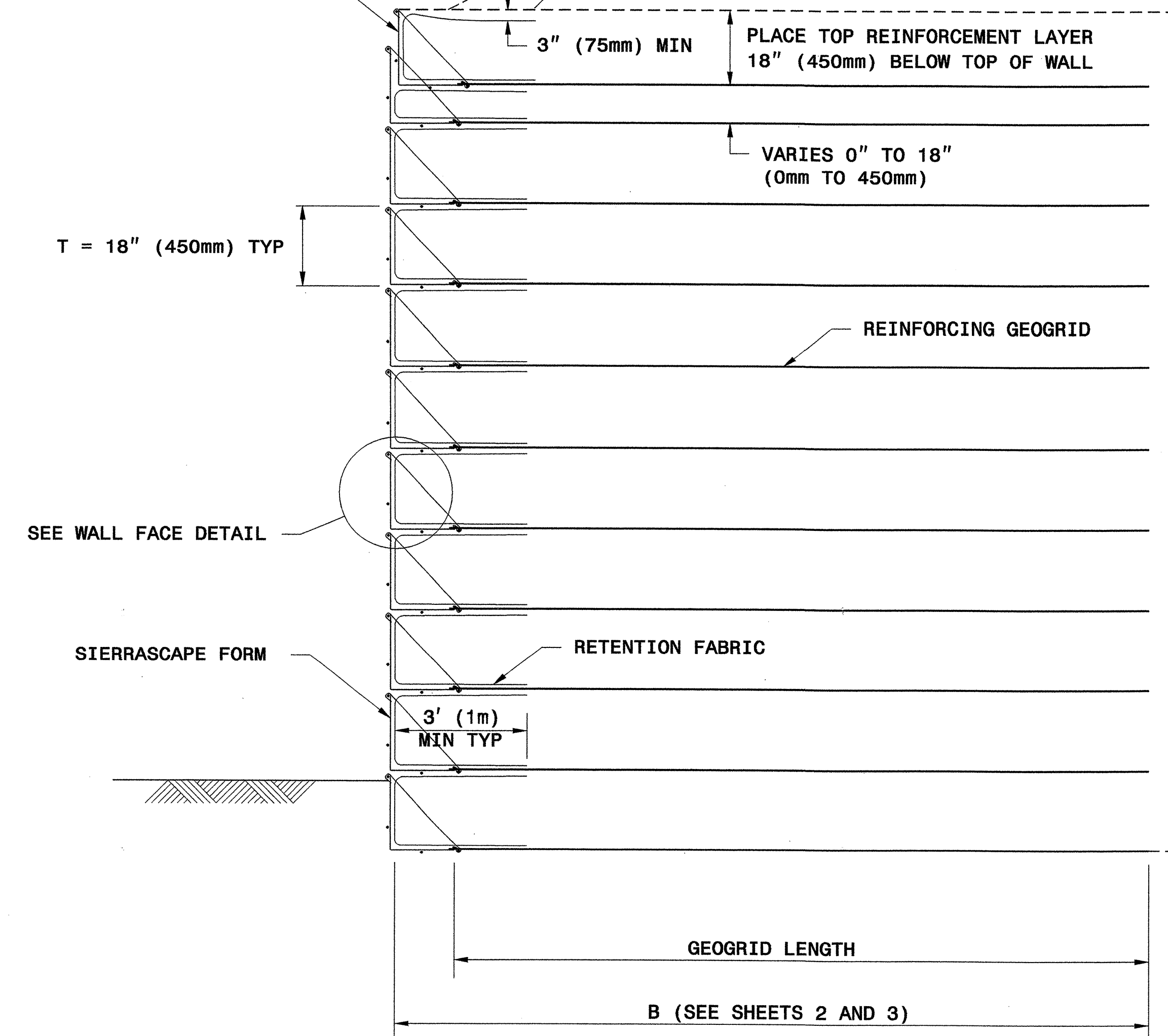
Scott A. Hidden 3/29/07
SIGNATURE DATE

SIGNATURE DATE

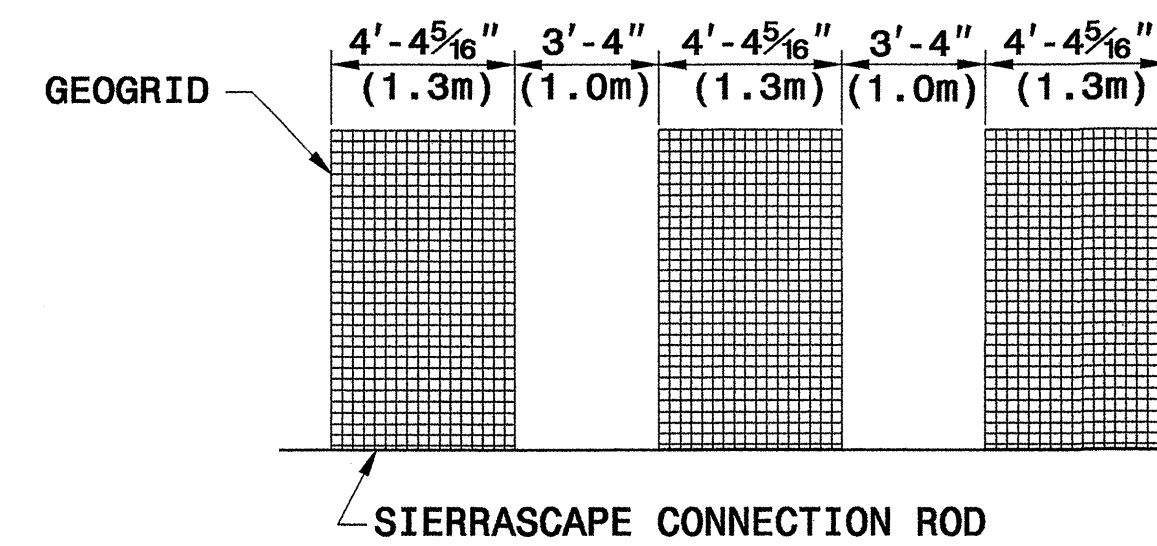


WALL FACE DETAIL

SET TOP WIRE FORM
INSIDE WIRE FORM BELOW
TO MATCH DESIRED GRADE

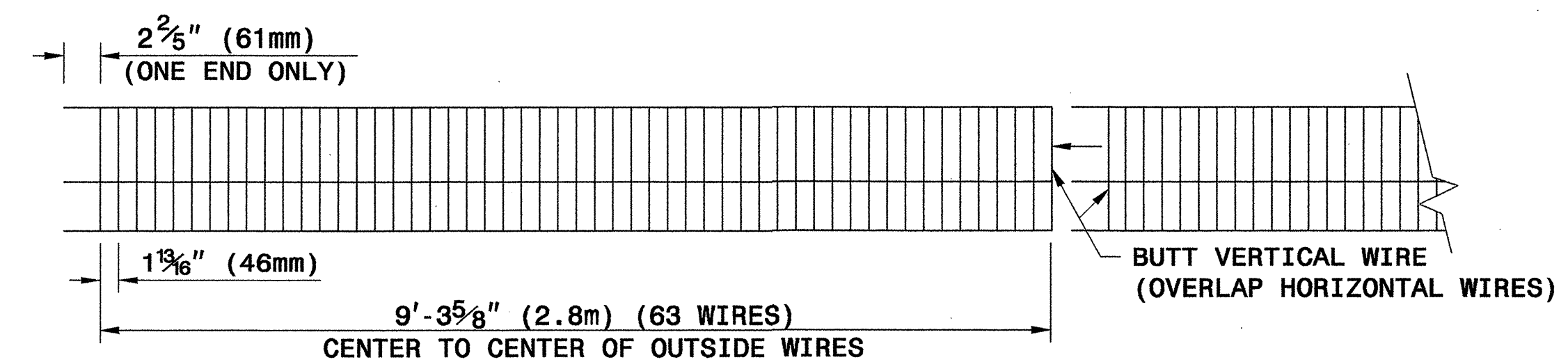


TYPICAL SECTION

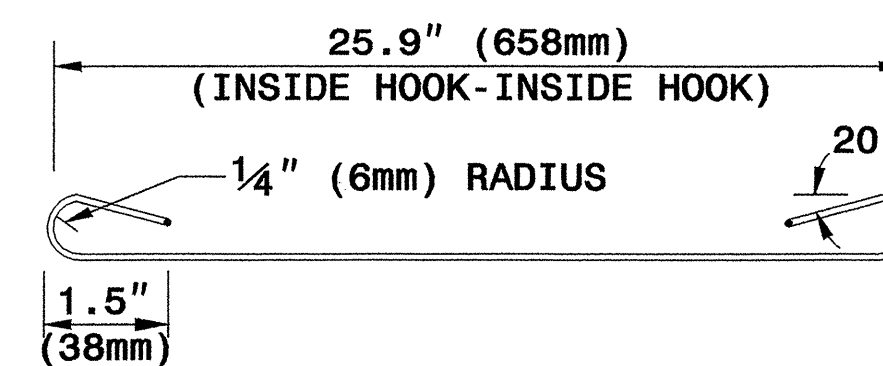


PLACE ALTERNATE LAYERS OF GEOGRID IN STAGGERED PATTERN SUCH THAT THE LAYER ABOVE IS CENTERED OVER SPACE BELOW

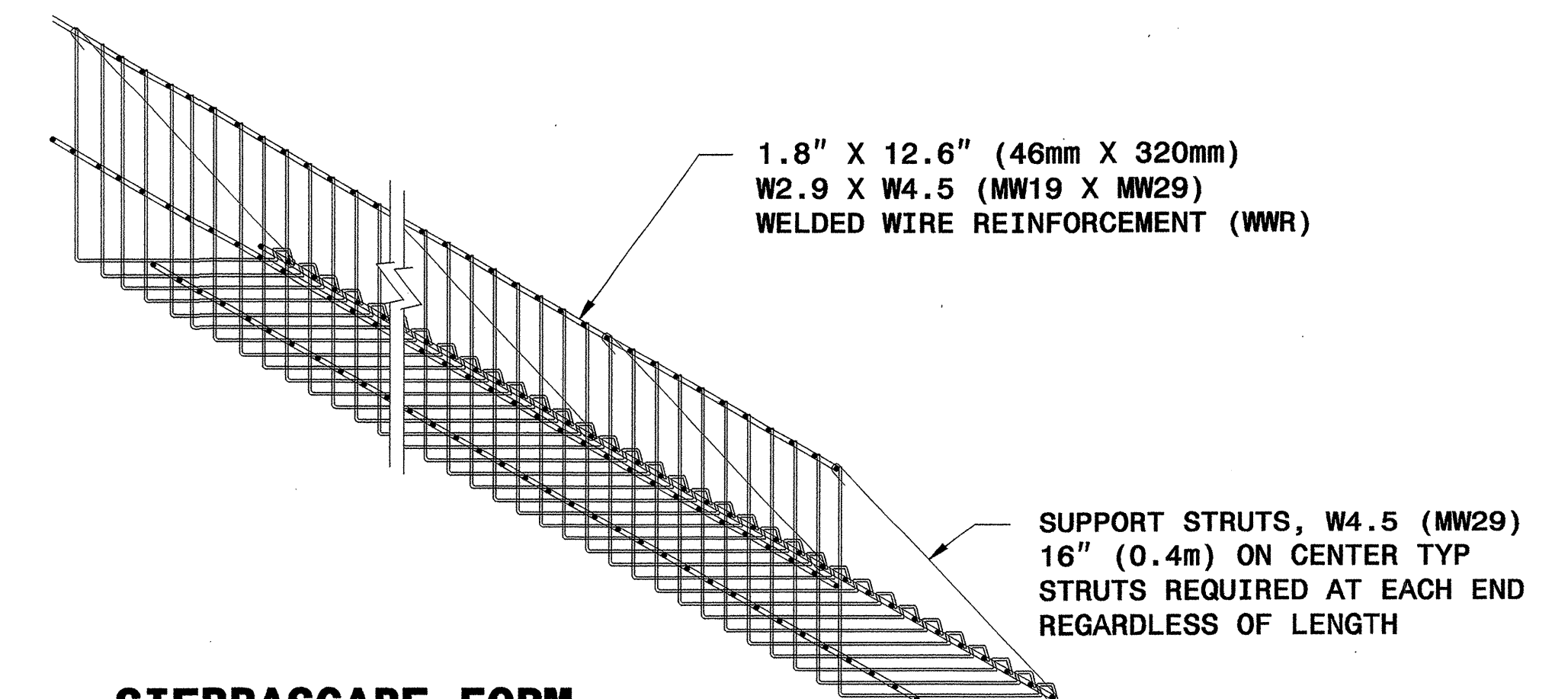
TYPICAL GEOGRID COVERAGE



ELEVATION VIEW

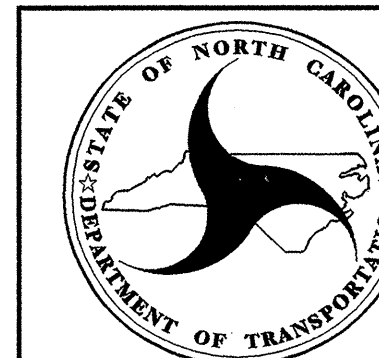
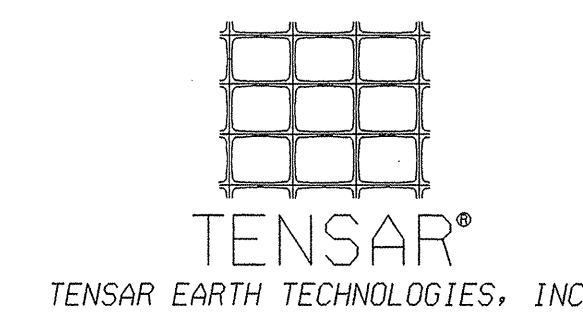


SUPPORT STRUT



SIERRASCAPE FORM

WALL COMPONENTS



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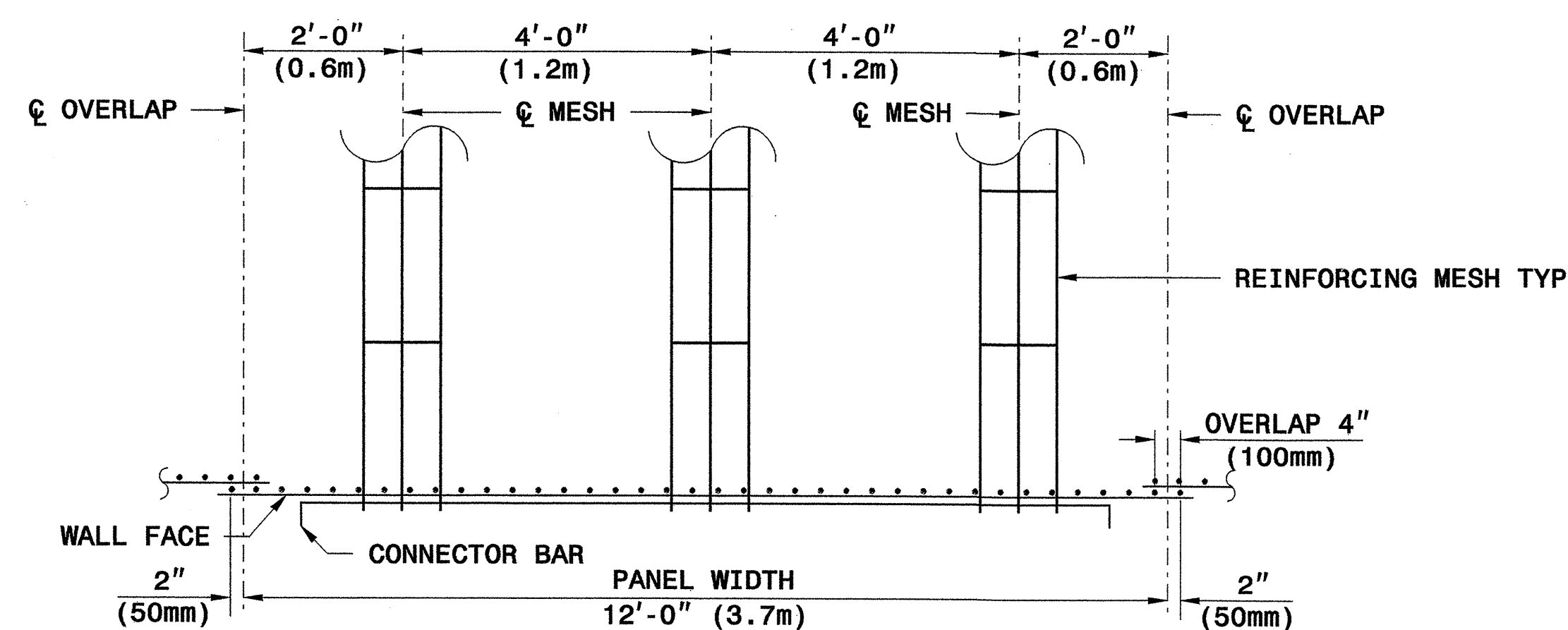
SIERRASCAPE TEMPORARY WALL

SHEET 5 OF 11

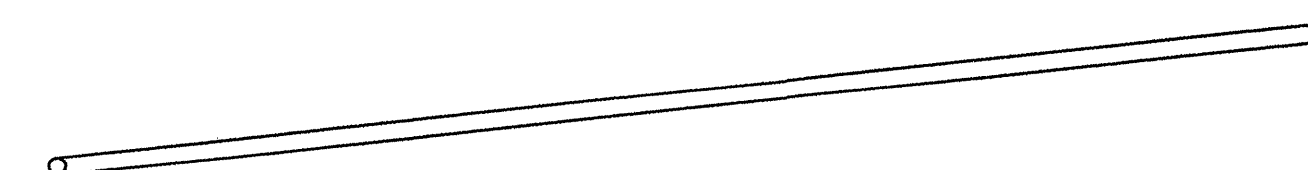
DATE: 12-19-06



Sutra A. Niddler 3/29/07
SIGNATURE DATE

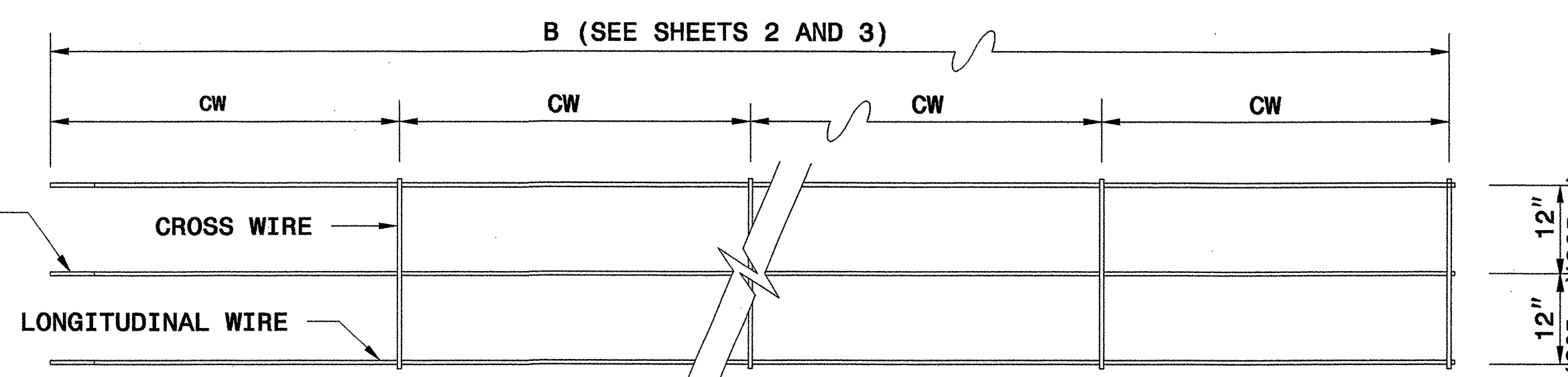


**REINFORCING MESH PLACEMENT DETAIL
(PLAN VIEW)**



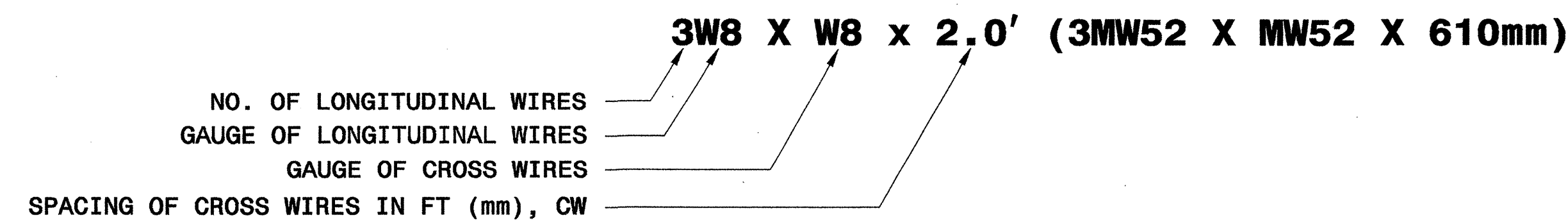
1/2" (13mm) DIA. BAR

CONNECTOR BAR

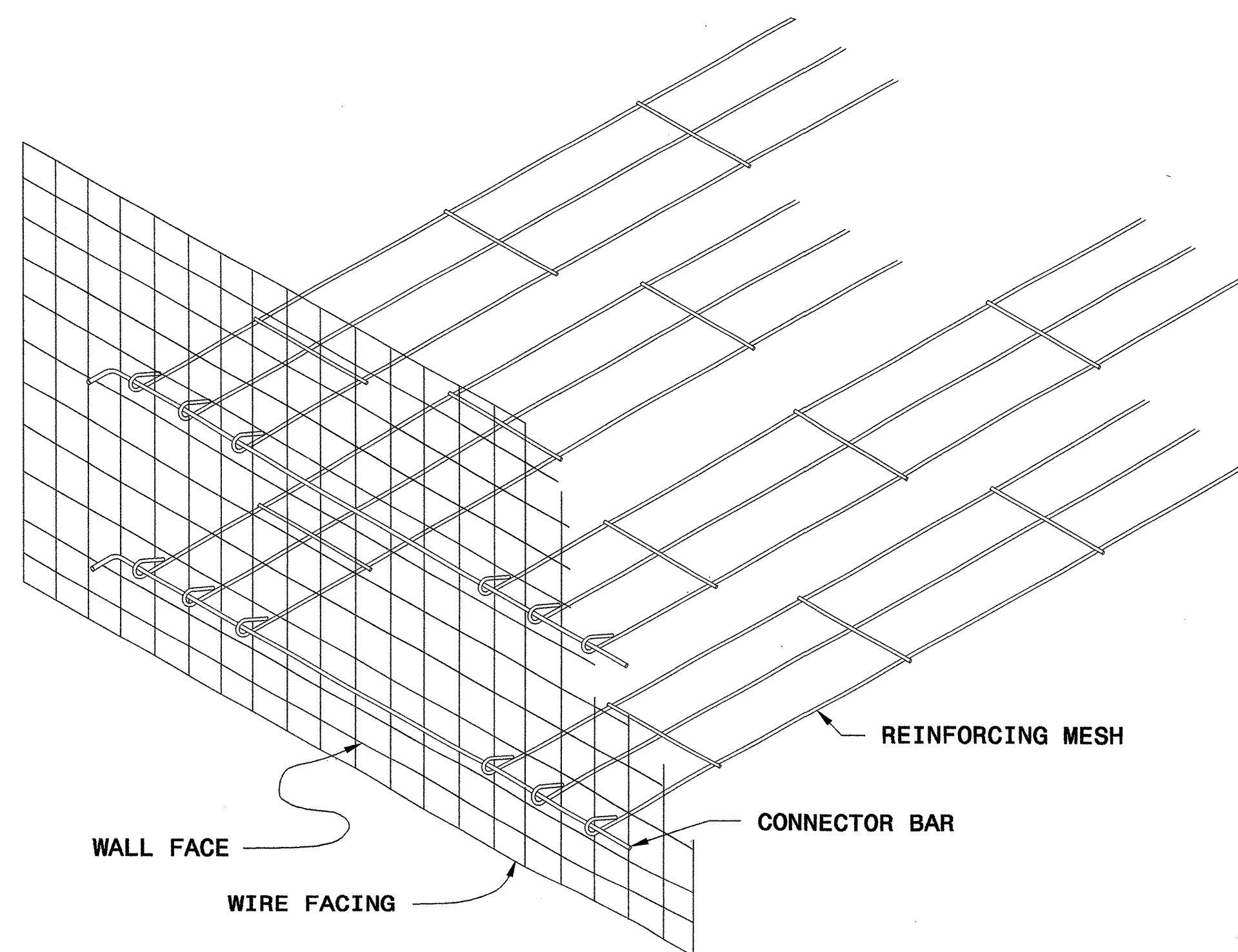


LOOPED END OF MESH
(SEE REINFORCING MESH LOOP DETAIL)

IF REINFORCEMENT LENGTH IS NOT AN INCREMENT OF 2'-0" (610mm) MAKE CW EQUAL TO 12" (305mm) AT THE END OF THE REINFORCING MESH OPPOSITE THE LOOPED END

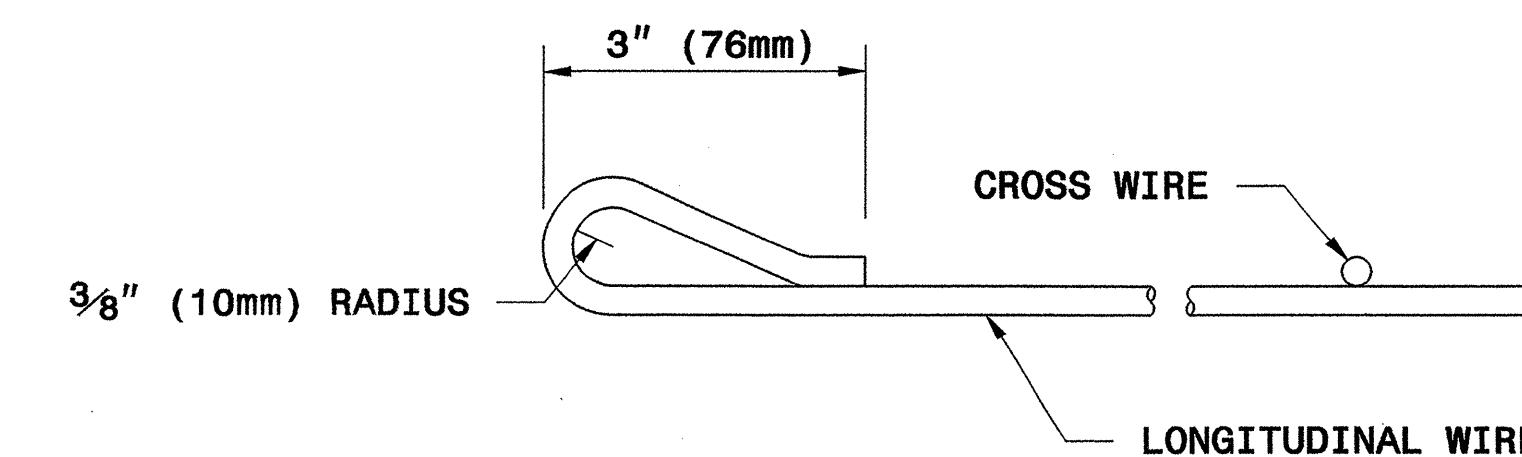


REINFORCING MESH DESIGNATION

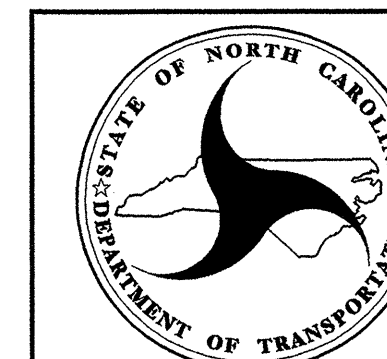


GENERAL ASSEMBLY DETAIL

REINFORCING MESH



REINFORCING MESH LOOP DETAIL



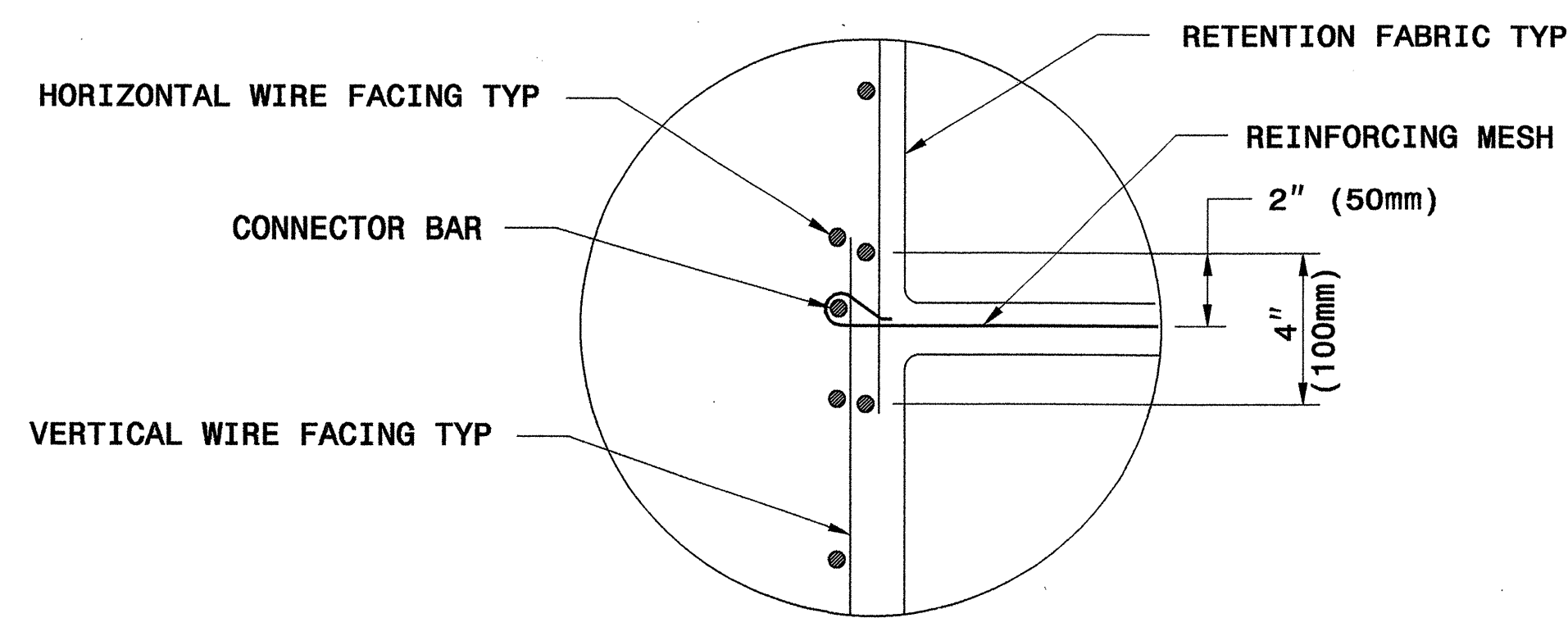
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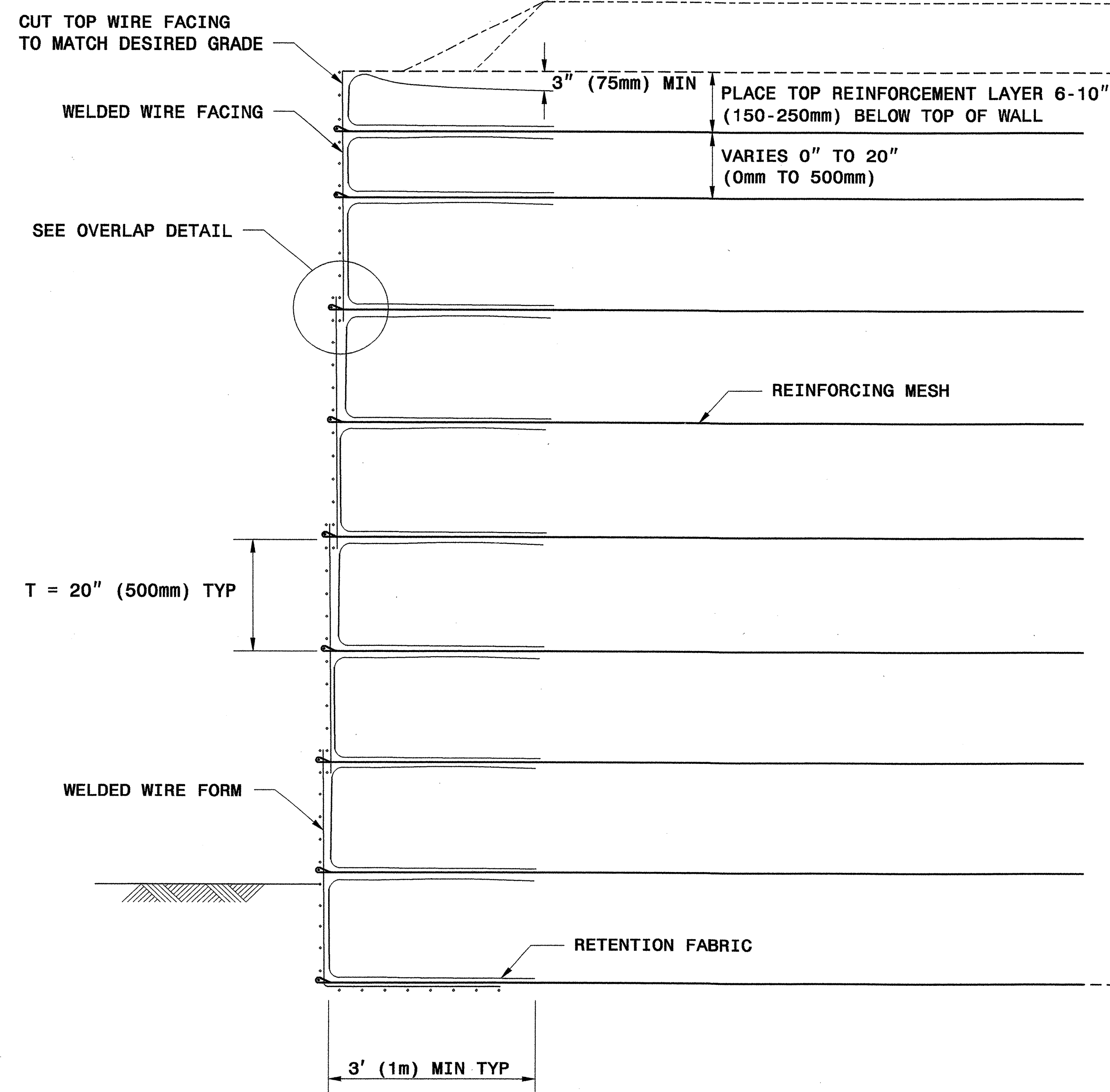
**RETAINED EARTH
TEMPORARY WALL**



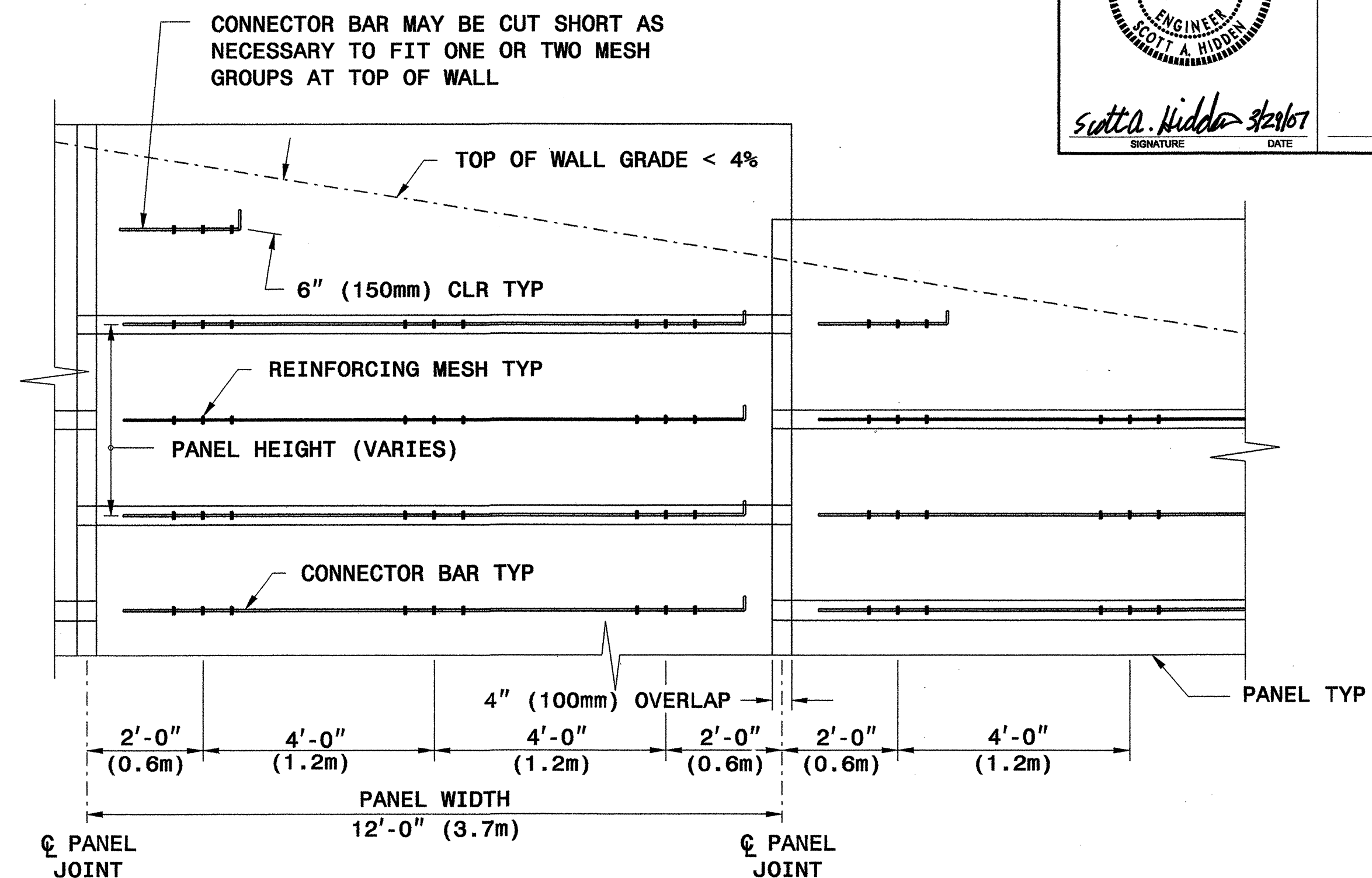
Signature: *Scott A. Hadden* 3/29/07
 DATE: _____



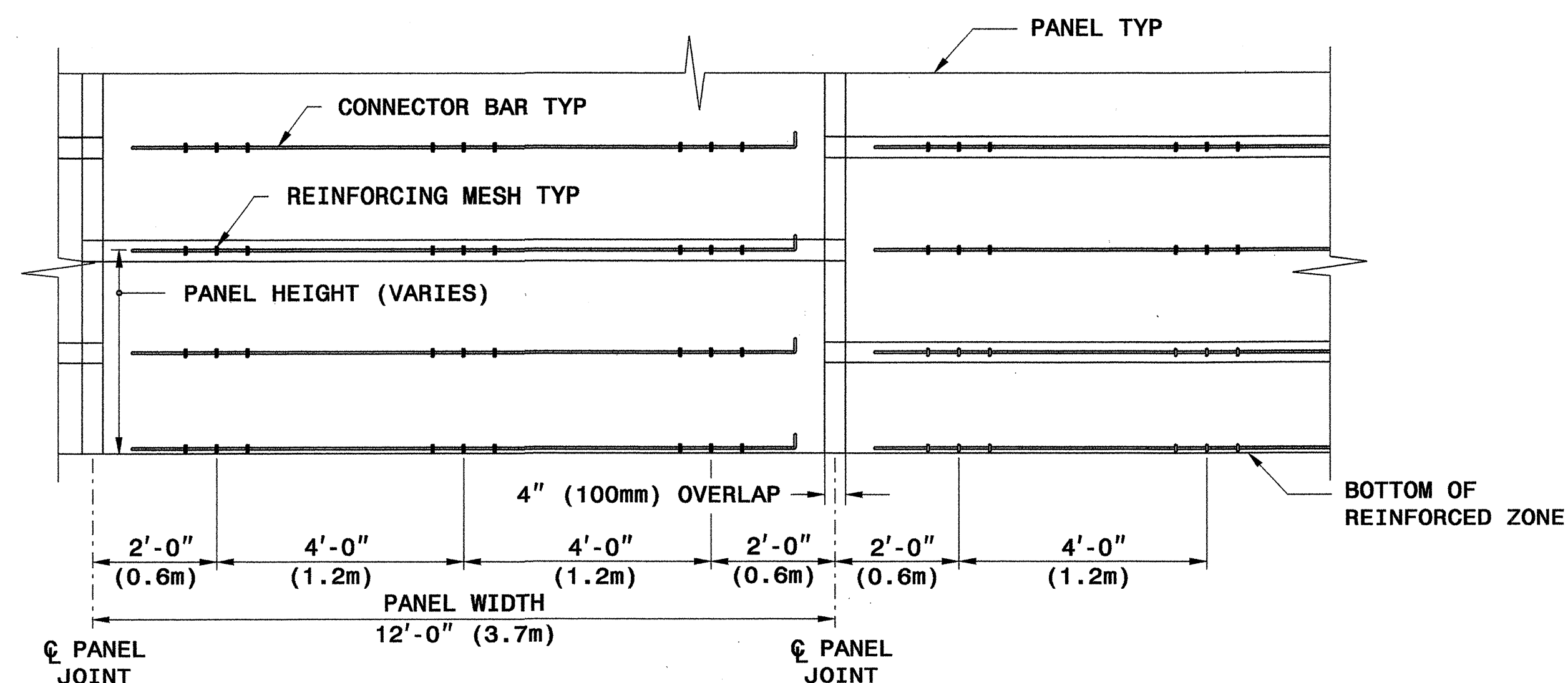
OVERLAP DETAIL



TYPICAL SECTION

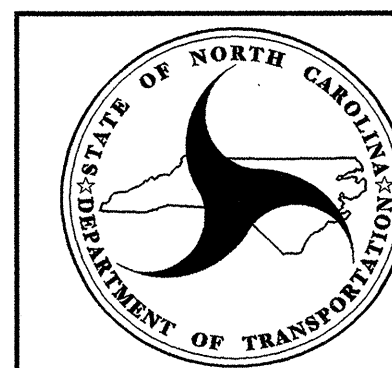


**TYPICAL ELEVATION @ TOP OF WALL
 (WIRES NOT SHOWN FOR CLARITY)**



**TYPICAL ELEVATION @ BOTTOM OF WALL
 (WIRES NOT SHOWN FOR CLARITY)**

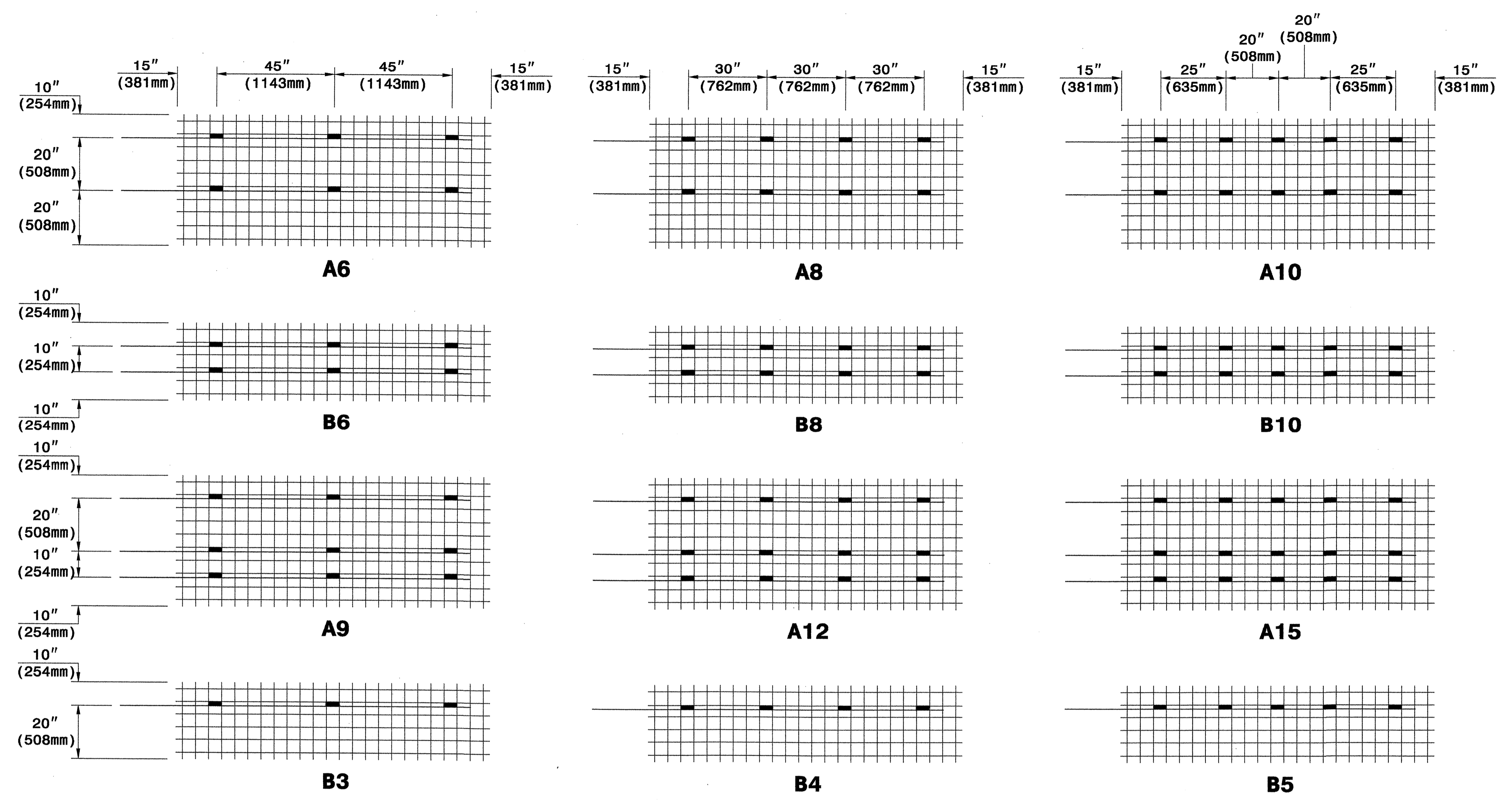
The Reinforced Earth Company



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STANDARD DRAWING NO. 1801.02

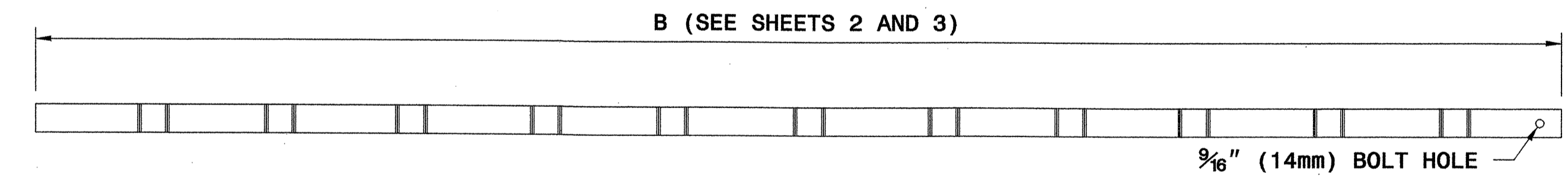
RETAINED EARTH
 TEMPORARY WALL



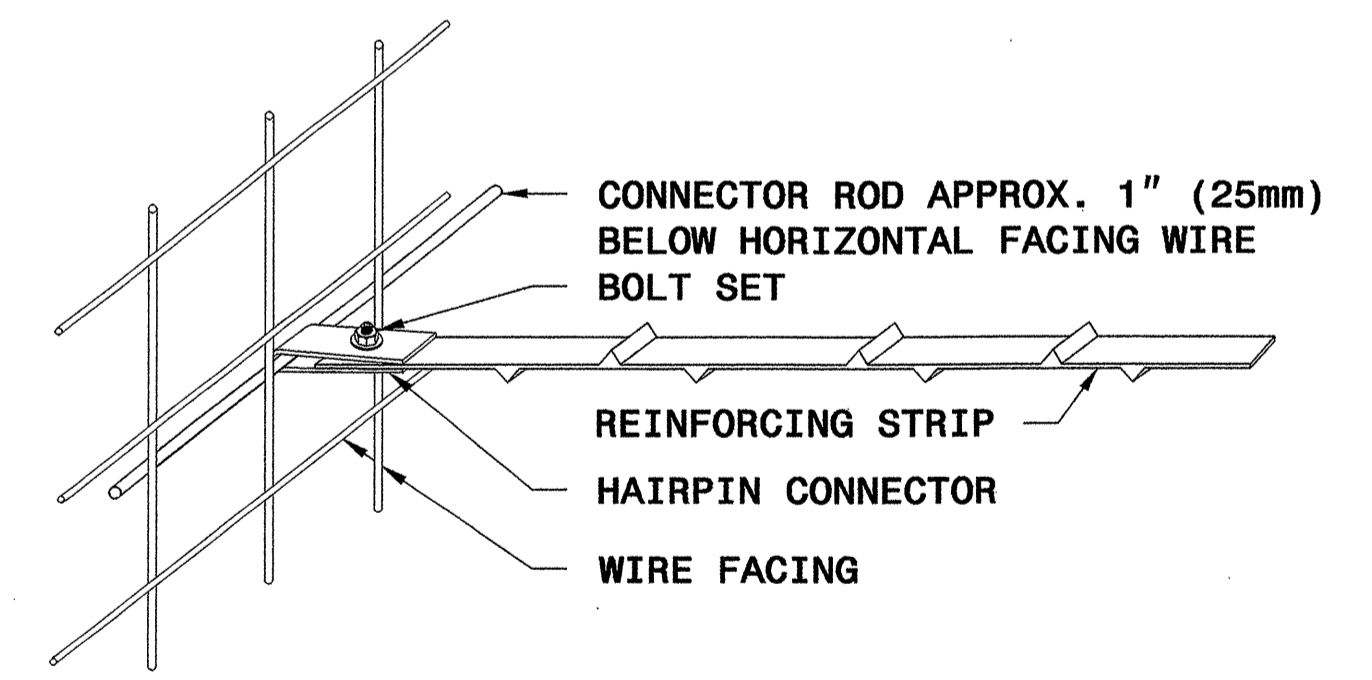
KEY: A8

NUMBER OF REINFORCING STRIPS
PANEL TYPE

CONNECTOR ROD AND REINFORCING STRIP PLACEMENT DIAGRAMS



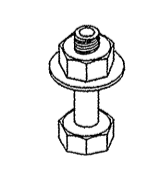
REINFORCING STRIP - 2" X 5/32" (50mm X 4mm)



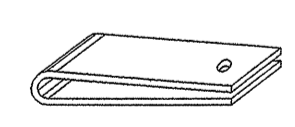
STRIP TO FACING CONNECTION



1/2" (13mm) DIA. ROD
CONNECTOR ROD

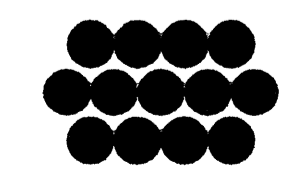


1/2" (13mm) BOLT WITH NUT AND WASHER
BOLT SET

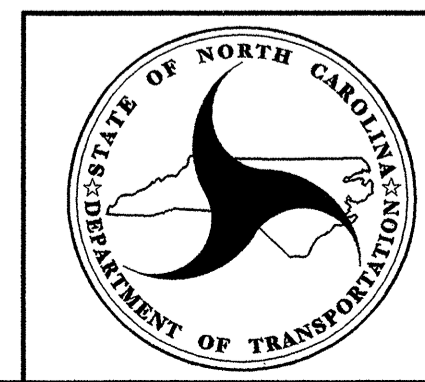


HAIRPIN CONNECTOR

WALL COMPONENTS



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TERRATREL
TEMPORARY WALL

SHEET 10 OF 11 DATE: 12-19-06

GEOTECHNICAL ENGINEER

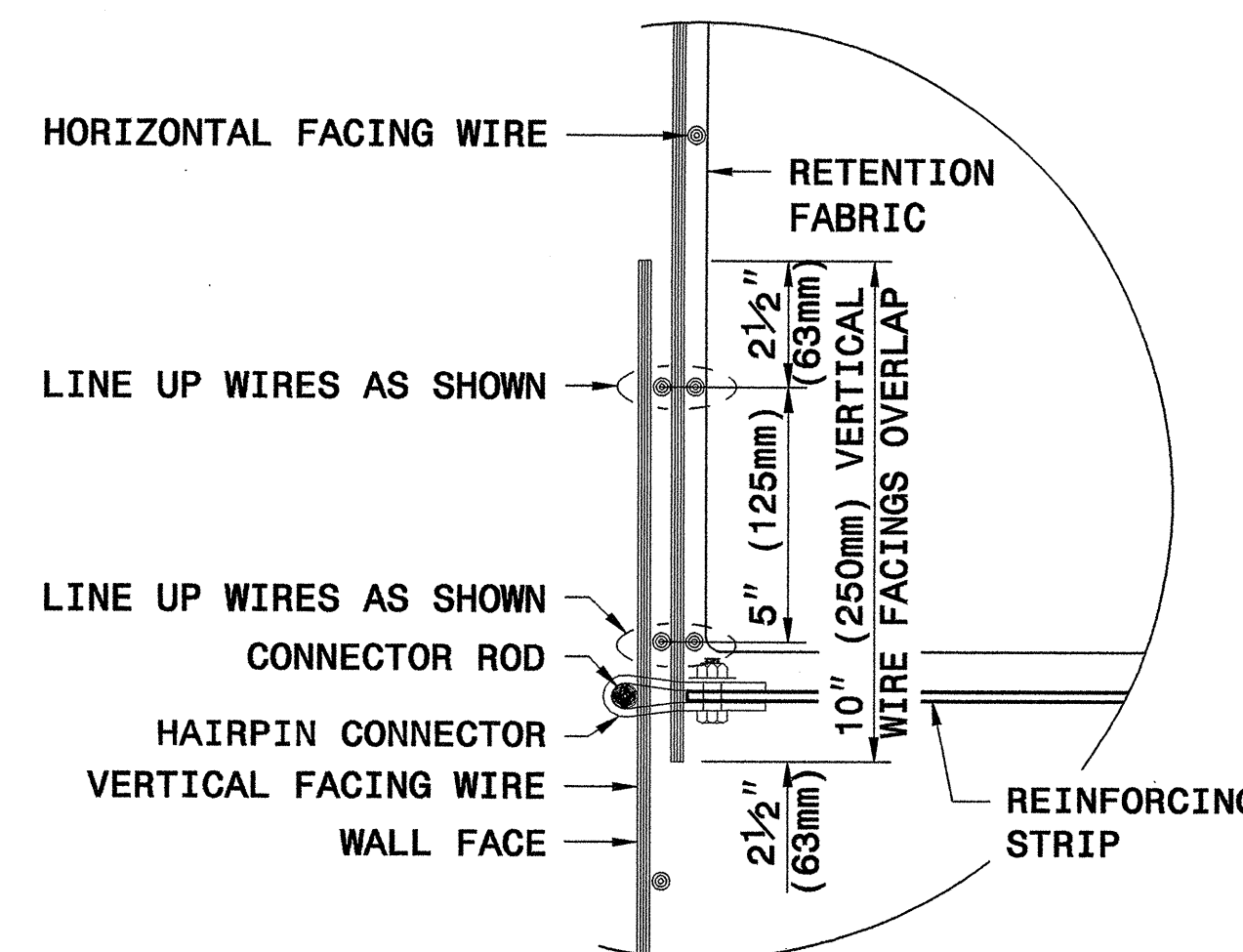
ENGINEER

SEAL 022246

ENGINEER

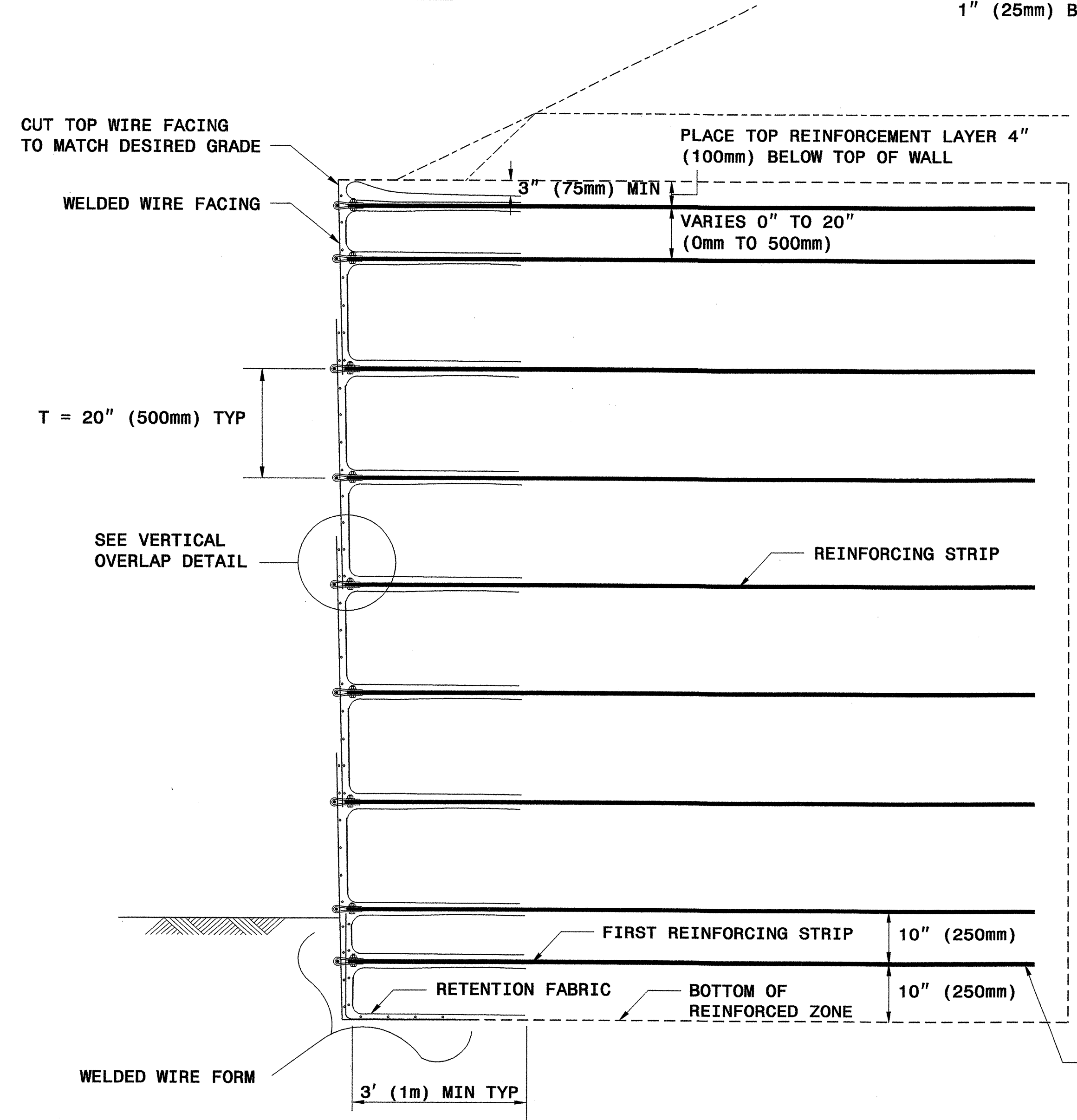
ROTT & HIDDEN

S. A. HIDDEN

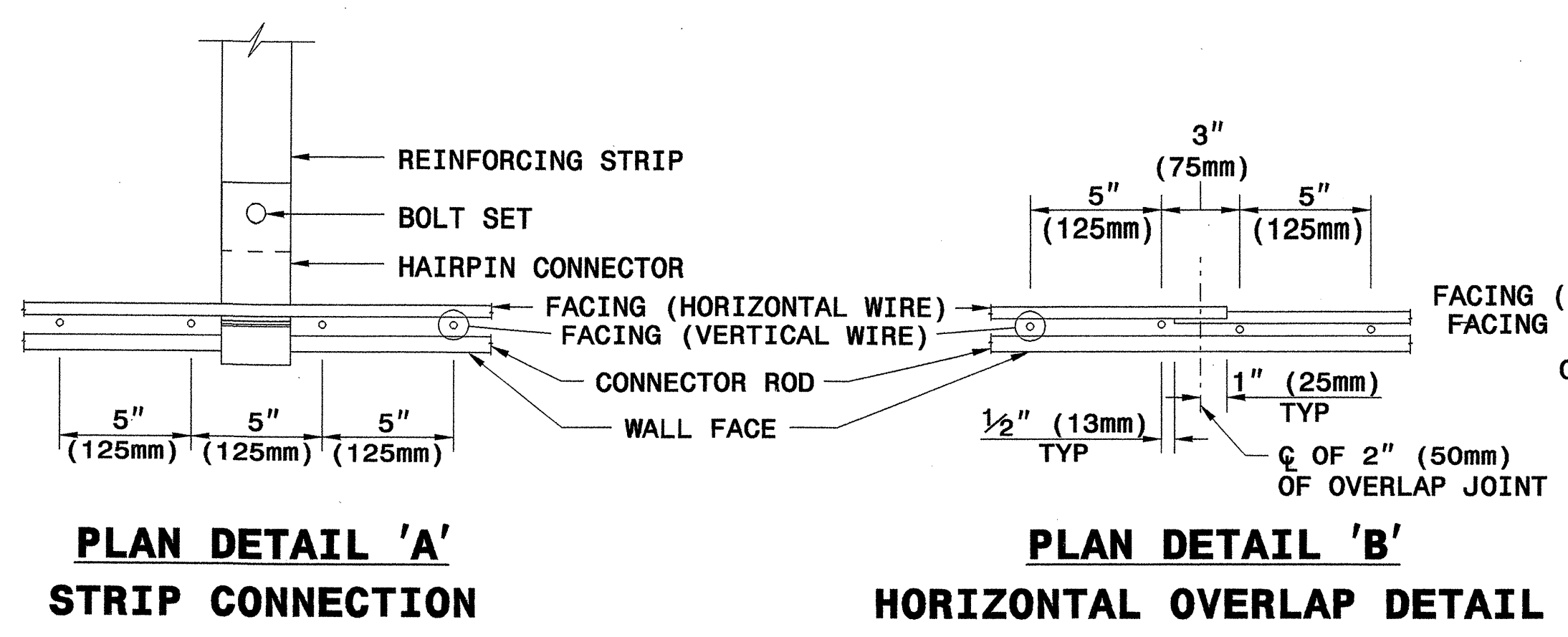


OVERLAP FACINGS VERTICALLY ONE FULL 5" (125mm) WIRE SQUARE DISREGARDING HALF SQUARES AT EDGES

VERTICAL OVERLAP DETAIL

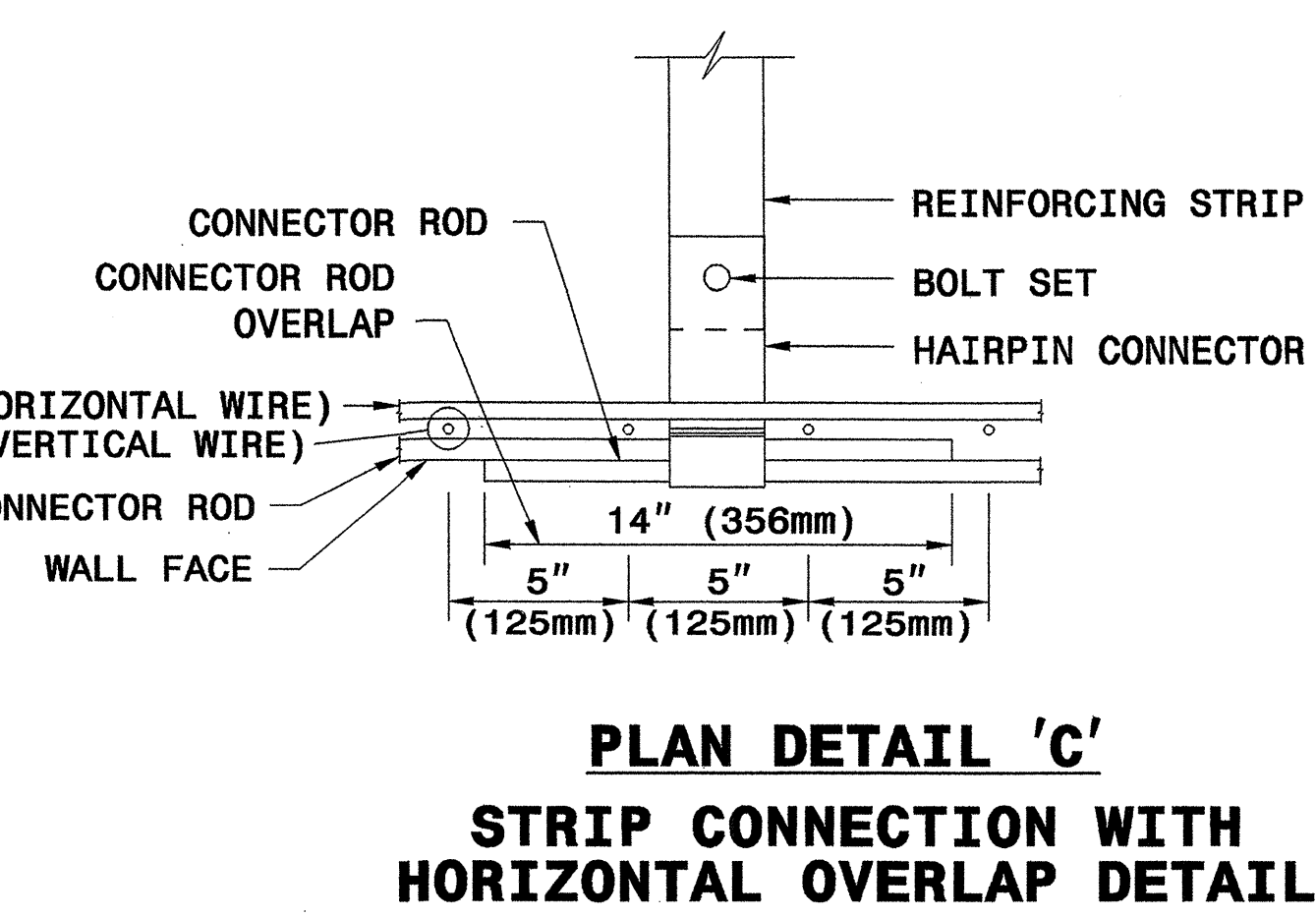


TYPICAL SECTION

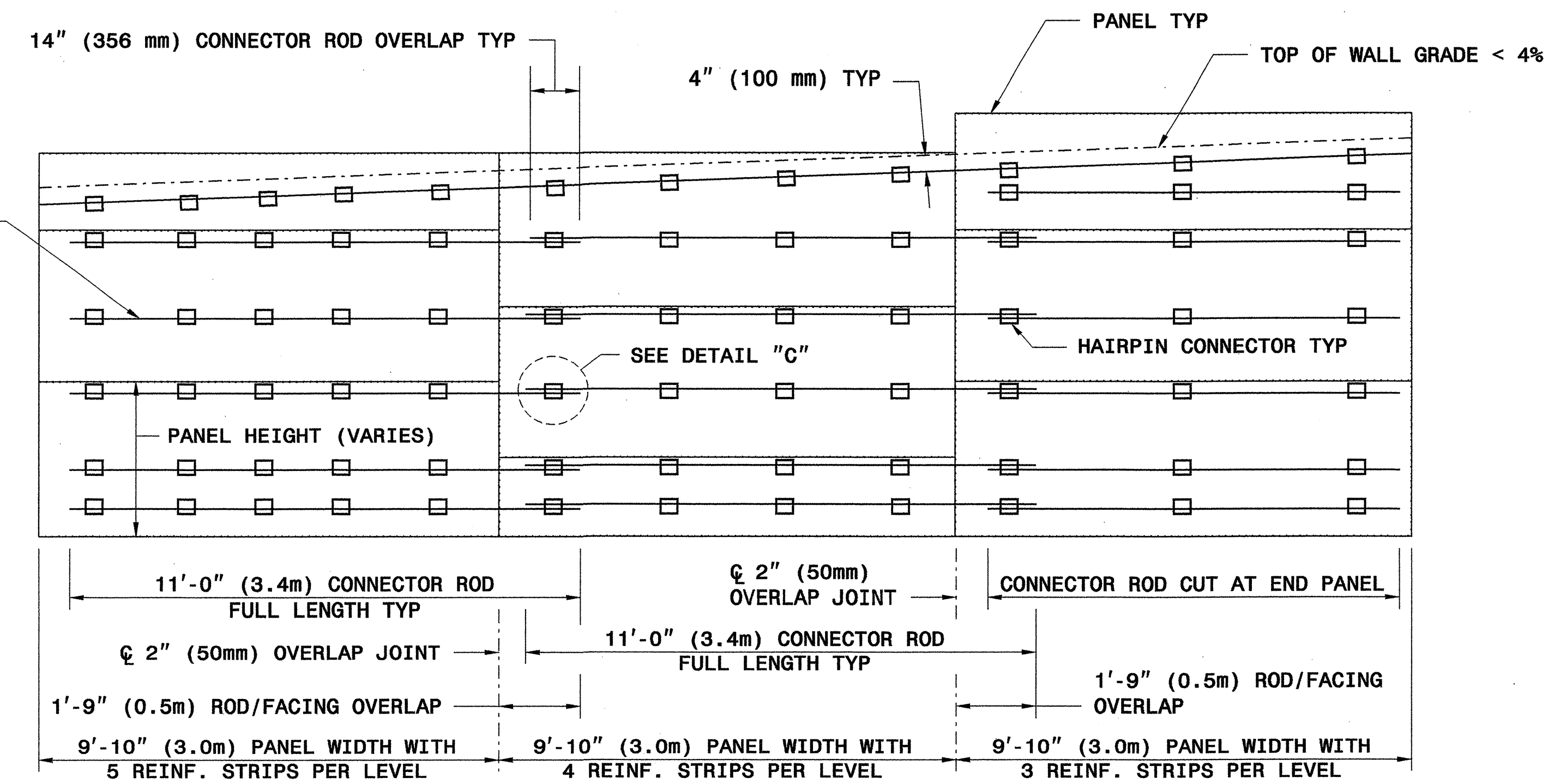


**PLAN DETAIL 'A'
STRIP CONNECTION**

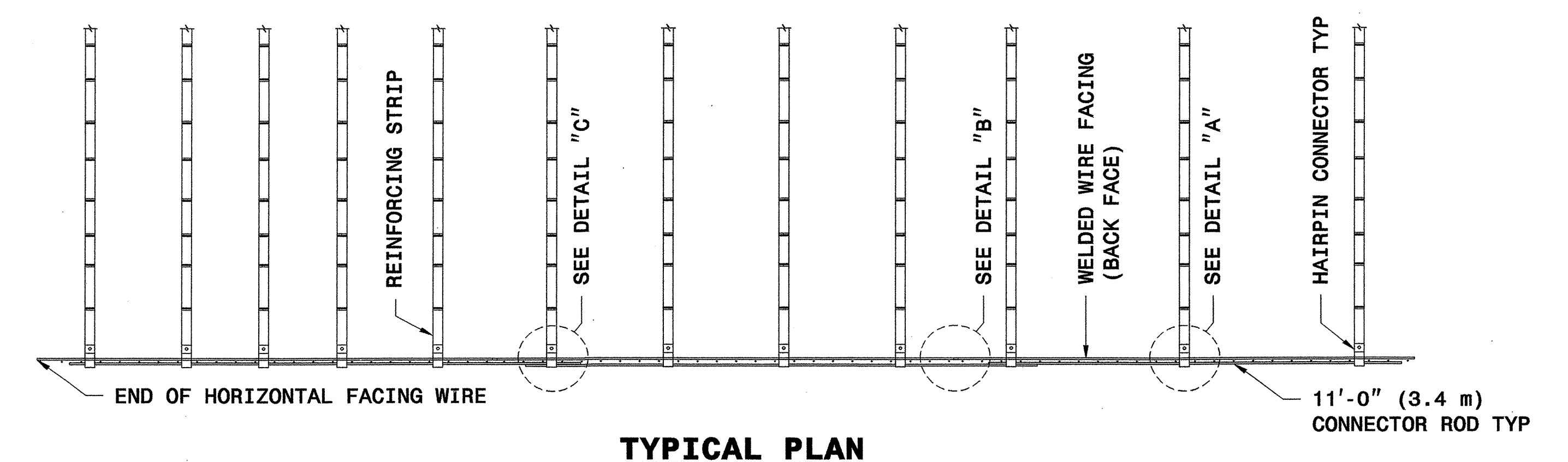
**PLAN DETAIL 'B'
HORIZONTAL OVERLAP DETAIL**



**PLAN DETAIL 'C'
STRIP CONNECTION WITH
HORIZONTAL OVERLAP DETAIL**



**TYPICAL ELEVATION
(WIRES NOT SHOWN FOR CLARITY)**



TYPICAL PLAN

PLACE LOWEST REINFORCING STRIP 10" (250mm) FROM BOTTOM OF REINFORCED ZONE

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

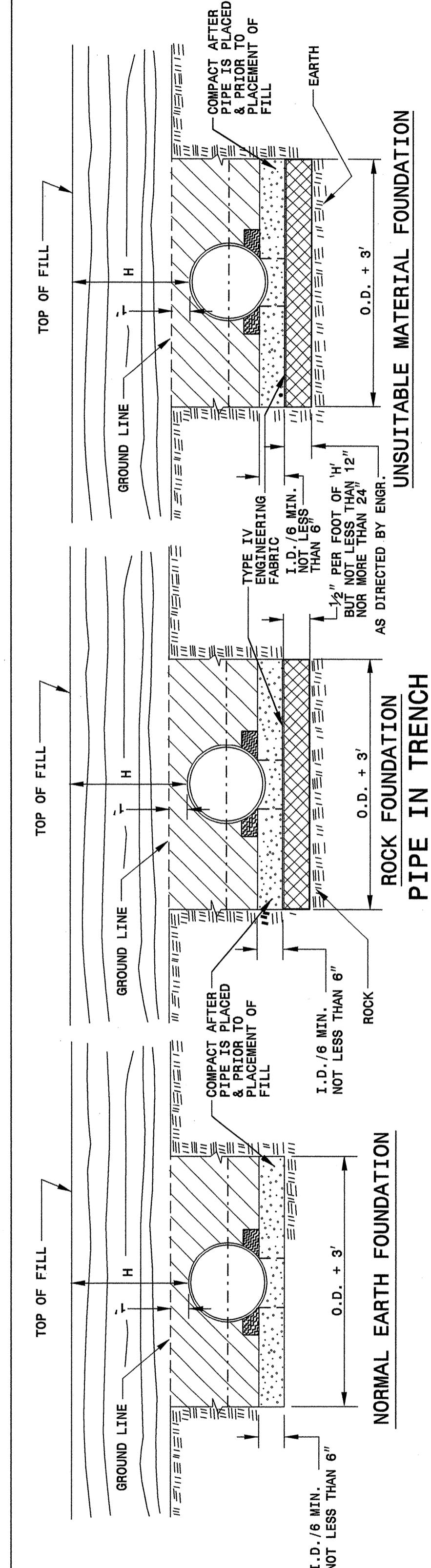
STANDARD DRAWING NO. 1801.02

TERRATREL TEMPORARY WALL

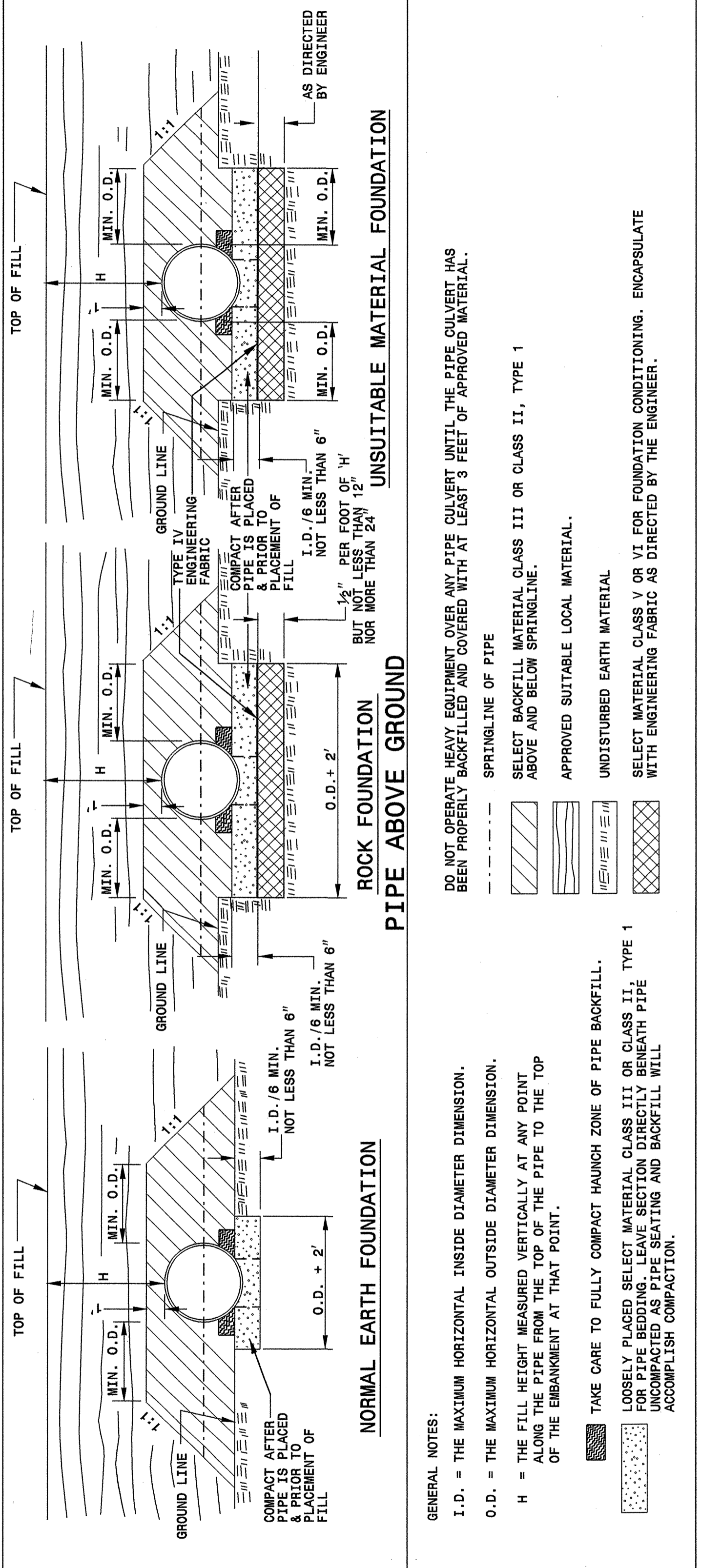
SHEET 11 OF 11 DATE: 12-19-06

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STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.



ENGLISH DETAIL DRAWING FOR METHOD OF PIPE INSTALLATION FLEXIBLE PIPE



STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

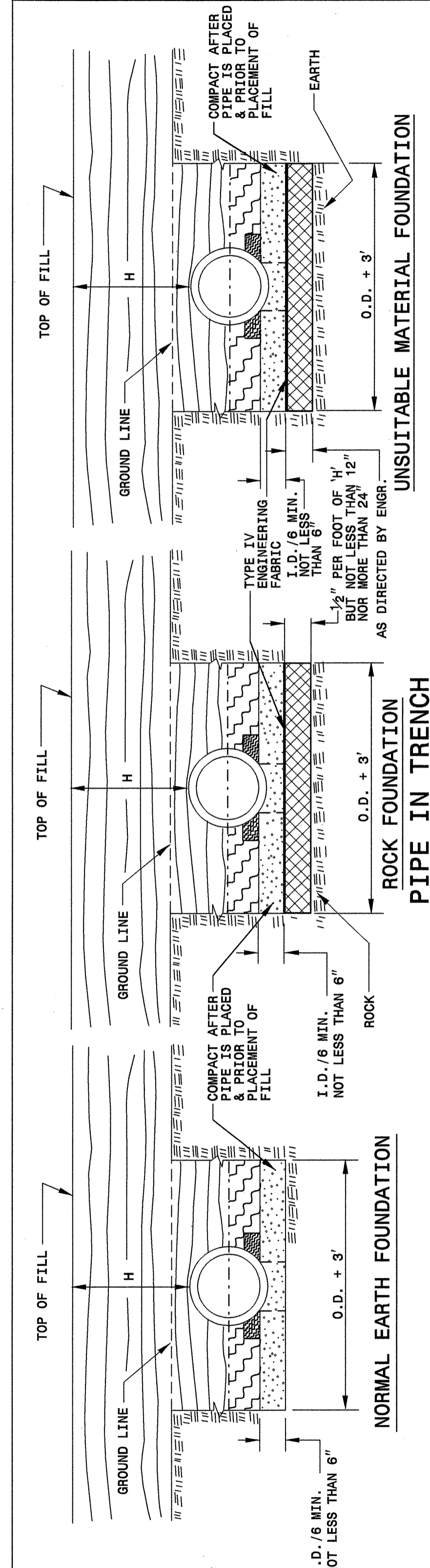
ENGLISH DETAIL DRAWING FOR METHOD OF PIPE INSTALLATION FLEXIBLE PIPE

GENERAL NOTES:
I.D. = THE MAXIMUM HORIZONTAL INSIDE DIAMETER DIMENSION.
O.D. = THE MAXIMUM HORIZONTAL OUTSIDE DIAMETER DIMENSION.
H = THE FILL HEIGHT MEASURED VERTICALLY AT ANY POINT ALONG THE PIPE FROM THE TOP OF THE PIPE TO THE TOP OF THE EMBANKMENT AT THAT POINT.

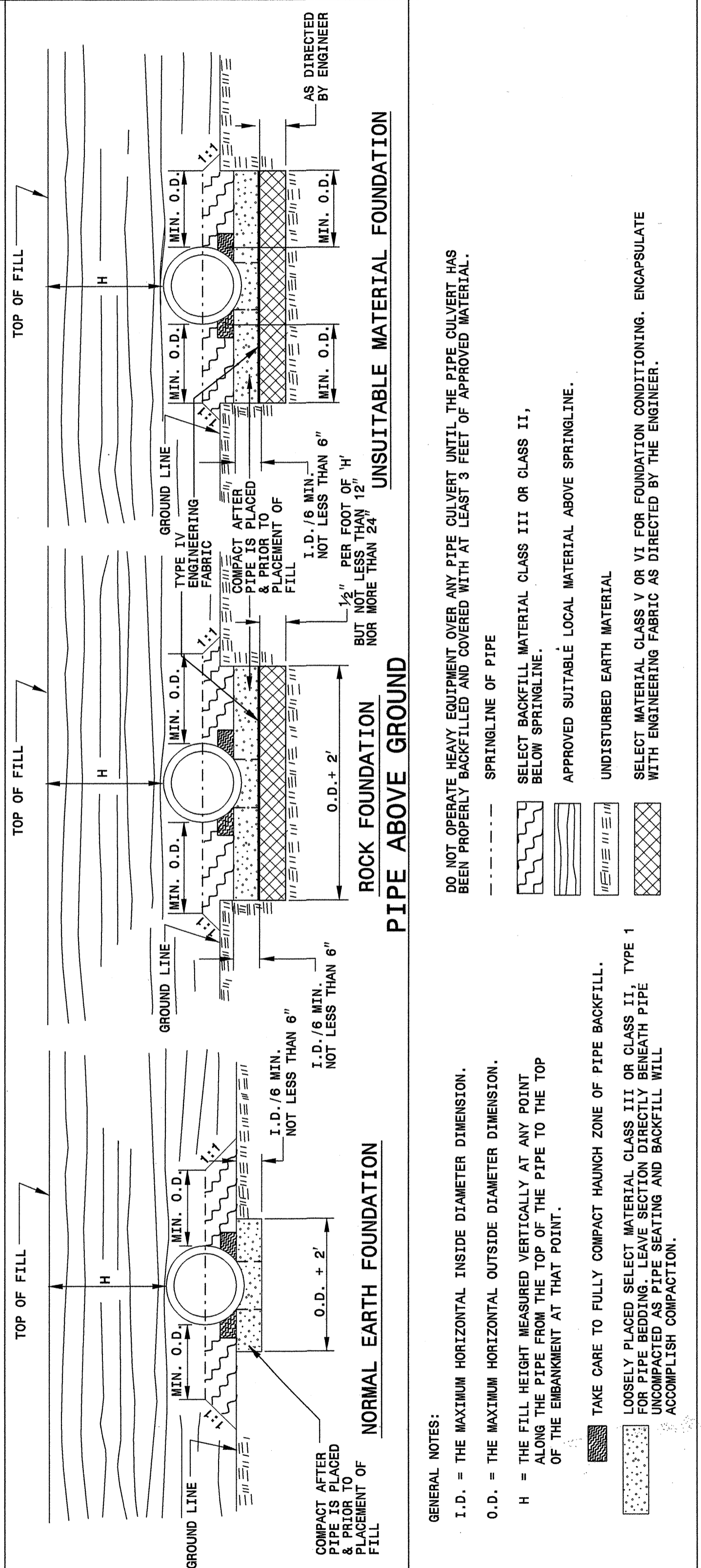
--- SPRINGLINE OF PIPE
--- SELECT BACKFILL MATERIAL CLASS III OR CLASS II, TYPE 1 ABOVE AND BELOW SPRINGLINE.
--- APPROVED SUITABLE LOCAL MATERIAL.
--- UNDISTURBED EARTH MATERIAL
--- SELECT MATERIAL CLASS V OR VI FOR FOUNDATION CONDITIONING. ENCAPSULATE WITH ENGINEERING FABRIC AS DIRECTED BY THE ENGINEER.

--- TAKE CARE TO FULLY COMPACT HAUNCH ZONE OF PIPE BACKFILL.
--- LOOSELY PLACED SELECT MATERIAL CLASS III OR CLASS II, TYPE 1 FOR PIPE BEDDING. LEAVE SECTION DIRECTLY BENEATH PIPE UNCOMPACTED AS PIPE SEATING AND BACKFILL WILL ACCOMPLISH COMPACTION.

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.



ENGLISH DETAIL DRAWING FOR METHOD OF PIPE INSTALLATION RIGID PIPE



GENERAL NOTES:
I.D. = THE MAXIMUM HORIZONTAL INSIDE DIAMETER DIMENSION.
O.D. = THE MAXIMUM HORIZONTAL OUTSIDE DIAMETER DIMENSION.
H = THE FILL HEIGHT MEASURED VERTICALLY AT ANY POINT ALONG THE PIPE FROM THE TOP OF THE PIPE TO THE TOP OF THE EMBANKMENT AT THAT POINT.

--- SPRINGLINE OF PIPE
--- SELECT BACKFILL MATERIAL CLASS III OR CLASS II, TYPE 1 ABOVE AND BELOW SPRINGLINE.
--- APPROVED SUITABLE LOCAL MATERIAL ABOVE SPRINGLINE.
--- UNDISTURBED EARTH MATERIAL
--- SELECT MATERIAL CLASS V OR VI FOR FOUNDATION CONDITIONING. ENCAPSULATE WITH ENGINEERING FABRIC AS DIRECTED BY THE ENGINEER.

--- TAKE CARE TO FULLY COMPACT HAUNCH ZONE OF PIPE BACKFILL.
--- LOOSELY PLACED SELECT MATERIAL CLASS III OR CLASS II, TYPE 1 FOR PIPE BEDDING. LEAVE SECTION DIRECTLY BENEATH PIPE UNCOMPACTED AS PIPE SEATING AND BACKFILL WILL ACCOMPLISH COMPACTION.

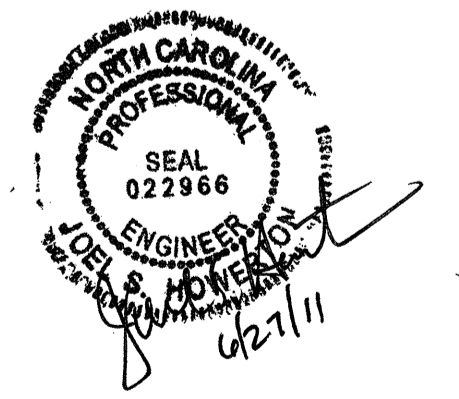
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR METHOD OF PIPE INSTALLATION RIGID PIPE

PROJECT SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

SEE PLATE FOR TITLE

ORIGINAL BY: K Kempf DATE: 5-15-09
MODIFIED BY: DATE:
CHECKED BY: DATE: 7/30/09
FILE SPEC: erickward/stds/stdsdetails/30001/0300d01.dgn



SHEET 1 OF 3 300D01

SHEET 2 OF 3 300D01

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STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
METHOD OF PIPE INSTALLATION
FILL HEIGHT TABLES

SHEET 3 OF 3
300D01

FLEXIBLE PIPE

Round Corrugated Steel Pipe
2 2/3 x 1/2 corrugation **

| Diameter (inches) | Minimum cover (inches) | Maximum Height of Cover (feet) | | | | |
|-------------------|------------------------|--------------------------------|-----|-----|-----|-----|
| | | 16 | 14 | 12 | 10 | 8 |
| 12 | 12 | 204 | 256 | | | |
| 15 | 12 | 162 | 204 | | | |
| 18 | 12 | 135 | 169 | 239 | | |
| 21 | 12 | 115 | 145 | 204 | | |
| 24 | 12 | 100 | 126 | 178 | | |
| 30 | 12 | 79 | 100 | 142 | | |
| 36 | 12 | 65 | 83 | 117 | 152 | |
| 42 | 12 | 55 | 70 | 100 | 130 | 160 |
| 48 | 12 | 48 | 61 | 87 | 113 | 139 |
| 54 | 12 | | 54 | 77 | 100 | 123 |
| 60 | 12 | | | 69 | 90 | 111 |
| 66 | 12 | | | | 81 | 100 |
| 72 | 12 | | | | 74 | 91 |
| 78 | 12 | | | | | 81 |
| 84 | 12 | | | | | 69 |

Round Corrugated Aluminum Pipe
2 2/3 x 1/2 corrugation **

| Diameter (inches) | Minimum cover (inches) | Maximum Height of Cover (feet) | | | | |
|-------------------|------------------------|--------------------------------|-----|-----|-----|-----|
| | | 16 | 14 | 12 | 10 | 8 |
| 12 | 12 | 123 | 155 | 218 | 281 | 344 |
| 15 | 12 | 98 | 123 | 174 | 224 | 275 |
| 18 | 12 | 81 | 102 | 144 | 187 | 228 |
| 21 | 12 | 69 | 87 | 123 | 160 | 195 |
| 24 | 12 | 60 | 76 | 108 | 139 | 171 |
| 27 | 12 | | 67 | 95 | 123 | 151 |
| 30 | 12 | | 60 | 85 | 111 | 136 |
| 36 | 12 | | 50 | 71 | 92 | 113 |
| 42 | 12 | | | 60 | 78 | 96 |
| 48 | 12 | | | 52 | 68 | 84 |
| 54 | 12 | | | 46 | 60 | 74 |
| 60 | 12 | | | | 50 | 62 |
| 66 | 12 | | | | | 51 |
| 72 | 12 | | | | | 41 |

** FOR DIFFERENT CORRUGATIONS AND ARCH PIPES REFER TO ROADWAY DESIGN MANUAL OR MANUFACTURERS SPECIFICATION.

REFER TO THE FOLLOWING FOR PIPE SPECIFICATIONS

- CSP - AASHTO M36
- CAAP - AASHTO M196
- HDPE - AASHTO M294
- PVC - ASTM F949 or AASHTO M304

NOTES: FILL HEIGHTS SHOWN WERE CALCULATED USING AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

1' MINIMUM COVER FOR ALL SIDE DRAIN PIPE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS

RIGID PIPE

- HDPE - * (Minimum fill) 2' for pipe diameters ≥ 12" and ≤ 60"
- * (Maximum fill) 20' for pipe diameters ≤ 24"
- 17' for pipe diameters ≥ 30" and ≤ 60"
- PVC - * (Minimum fill) 2' for pipe diameters ≥ 12" and ≤ 36"
- * (Maximum fill) 30' for pipe diameters ≥ 12" and ≤ 36"

* FILL HEIGHT IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT STRUCTURE

- RCP - * (Minimum fill) 1' for Class IV & Class V
- 2' for Class III & Class II
- * (Maximum fill) 10' - Class II pipe
- 20' - Class III pipe
- 30' - Class IV pipe
- 40' - Class V pipe

(For fills > 40' & < 80' use LRFD Direct Design Method)

* FILL HEIGHT IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT STRUCTURE

REFER TO THE FOLLOWING FOR PIPE SPECIFICATIONS

- RCP - AASHTO M170

NOTES: FILL HEIGHTS SHOWN WERE CALCULATED USING AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

1' MINIMUM COVER FOR ALL SIDE DRAIN PIPE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

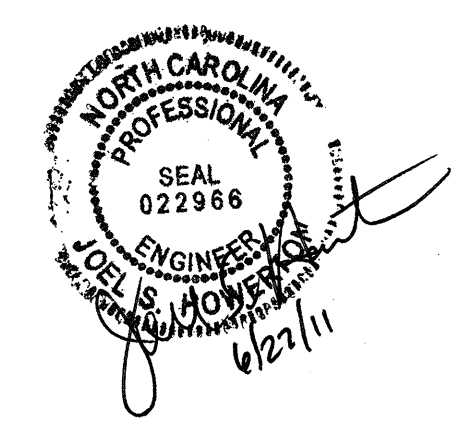
ENGLISH DETAIL DRAWING FOR
METHOD OF PIPE INSTALLATION
FILL HEIGHT TABLES

SHEET 3 OF 3
300D01

PROJECT SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

SEE PLATE FOR TITLE

ORIGINAL BY: K Kempf DATE: 5-15-09
 MODIFIED BY: DATE:
 CHECKED BY: DATE: 7/30/09
 FILE SPEC: /ericward/stds/stdstodetails/30001/0300d01.dgn



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
SUMMARY OF QUANTITIES

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
ROADWAY SUMMARY OF QUANTITIES FOR CONTRACT - C202649

| ItemNumber | Sec # | Quantity | Unit | Description |
|--------------|-------|----------|------|--|
| 0000100000-N | 800 | Lump Sum | | MOBILIZATION |
| 0004000000-N | 801 | Lump Sum | | CONSTRUCTION SURVEYING |
| 0038000000-E | SP | 35 | CY | SHALLOW UNDERCUT |
| 0043000000-N | 226 | Lump Sum | | GRADING |
| 0050000000-E | 226 | 1 | ACR | SUPPLEMENTARY CLEARING & GRUB-BING |
| 0057000000-E | 226 | 10 | CY | UNDERCUT EXCAVATION |
| 0080000000-E | SP | 60 | TON | CLASS IV SUBGRADE STABILIZATION |
| 0195000000-E | SP | 50 | CY | SELECT GRANULAR MATERIAL |
| 0196000000-E | 270 | 100 | SY | FABRIC FOR SOIL STABILIZATION |
| 0199000000-E | SP | 430 | SF | TEMPORARY SHORING |
| 0318000000-E | SP | 5 | TON | FOUNDATION CONDITIONING MATERIAL, MINOR STRS |
| 0320000000-E | SP | 15 | SY | FOUNDATION CONDITIONING FABRIC |
| 0448300000-E | SP | 40 | LF | 18" RC PIPE CULVERTS, CLASS IV |
| 1121000000-E | 520 | 50 | TON | AGGREGATE BASE COURSE |
| 1220000000-E | 545 | 25 | TON | INCIDENTAL STONE BASE |
| 1489000000-E | 610 | 270 | TON | ASPHALT CONC BASE COURSE, TYPE B25.0B |
| 1525000000-E | 610 | 130 | TON | ASPHALT CONC SURFACE COURSE, TYPE SF9.5A |
| 1575000000-E | SP | 21 | TON | ASPHALT BINDER FOR PLANT MIX |
| 1693000000-E | 654 | 25 | TON | ASPHALT PLANT MIX, PAVEMENT REPAIR |
| 2000000000-N | 806 | 21 | EA | RIGHT OF WAY MARKERS |
| 2022000000-E | SP | 22.4 | CY | SUBDRAIN EXCAVATION |
| 2033000000-E | SP | 16.8 | CY | SUBDRAIN FINE AGGREGATE |
| 2044000000-E | SP | 100 | LF | 6" PERFORATED SUBDRAIN PIPE |
| 2070000000-N | SP | 1 | EA | SUBDRAIN PIPE OUTLETS |
| 2077000000-E | SP | 6 | LF | 6" OUTLET PIPE (SUBDRAINS) |
| 3030000000-E | 862 | 300 | LF | STEEL BM GUARDRAIL |

| ItemNumber | Sec # | Quantity | Unit | Description |
|--------------|-------|----------|------|--|
| 3045000000-E | 862 | 25 | LF | STEEL BM GUARDRAIL, SHOP CURVED |
| 3150000000-N | 862 | 5 | EA | ADDITIONAL GUARDRAIL POSTS |
| 3195000000-N | 862 | 1 | EA | GUARDRAIL ANCHOR UNITS, TYPE AT-1 |
| 3270000000-N | SP | 3 | EA | GUARDRAIL ANCHOR UNITS, TYPE 350 |
| 3577000000-N | SP | Lump Sum | | GENERIC FENCING ITEM REMOVE & RESET METAL POLES W/ CABLE |
| 3577000000-N | SP | Lump Sum | | GENERIC FENCING ITEM REMOVE & RESET STEEL GATE |
| 3656000000-E | 876 | 850 | SY | FILTER FABRIC FOR DRAINAGE |
| 4400000000-E | 1110 | 278 | SF | WORK ZONE SIGNS (STATIONARY) |
| 4405000000-E | 1110 | 213 | SF | WORK ZONE SIGNS (PORTABLE) |
| 4410000000-E | 1110 | 30 | SF | WORK ZONE SIGNS (BARRICADE MOUNTED) |
| 4430000000-N | 1130 | 50 | EA | DRUMS |
| 4435000000-N | 1135 | 50 | EA | CONES |
| 4445000000-E | 1145 | 72 | LF | BARRICADES (TYPE III) |
| 4455000000-N | 1150 | 480 | MD | FLAGGER |
| 4465000000-N | 1160 | 2 | EA | TEMPORARY CRASH CUSHIONS |
| 4470000000-N | 1160 | 1 | EA | RESET TEMPORARY CRASH CUSHIONS |
| 4485000000-E | 1170 | 450 | LF | PORTABLE CONCRETE BARRIER |
| 4500000000-E | 1170 | 100 | LF | RESET PORTABLE CONCRETE BARRIER |
| 4609000000-N | SP | 240 | DAY | GENERIC TRAFFIC CONTROL ITEM TEMPORARY TRAFFIC SIGNAL SYSTEM |
| 4650000000-N | 1251 | 50 | EA | TEMPORARY RAISED PAVEMENT MARKERS |
| 4770000000-E | 1205 | 200 | LF | COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (4") |
| 4795000000-E | 1205 | 30 | LF | COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (24") |
| 4810000000-E | 1205 | 8,218 | LF | PAINT PAVEMENT MARKING LINES (4") |

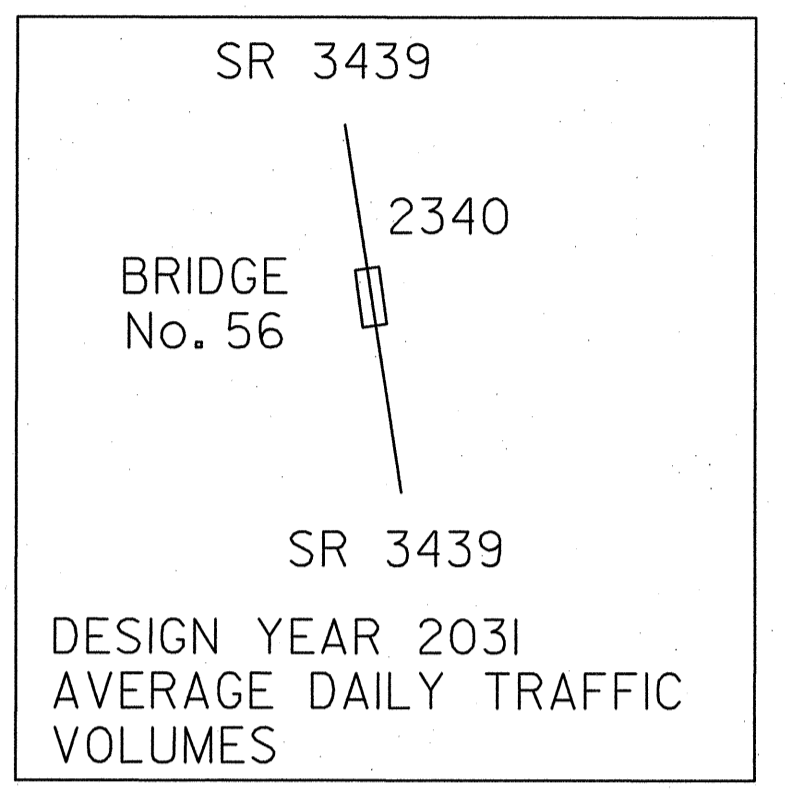
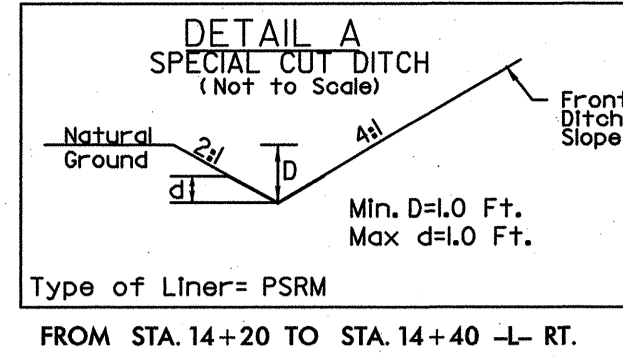
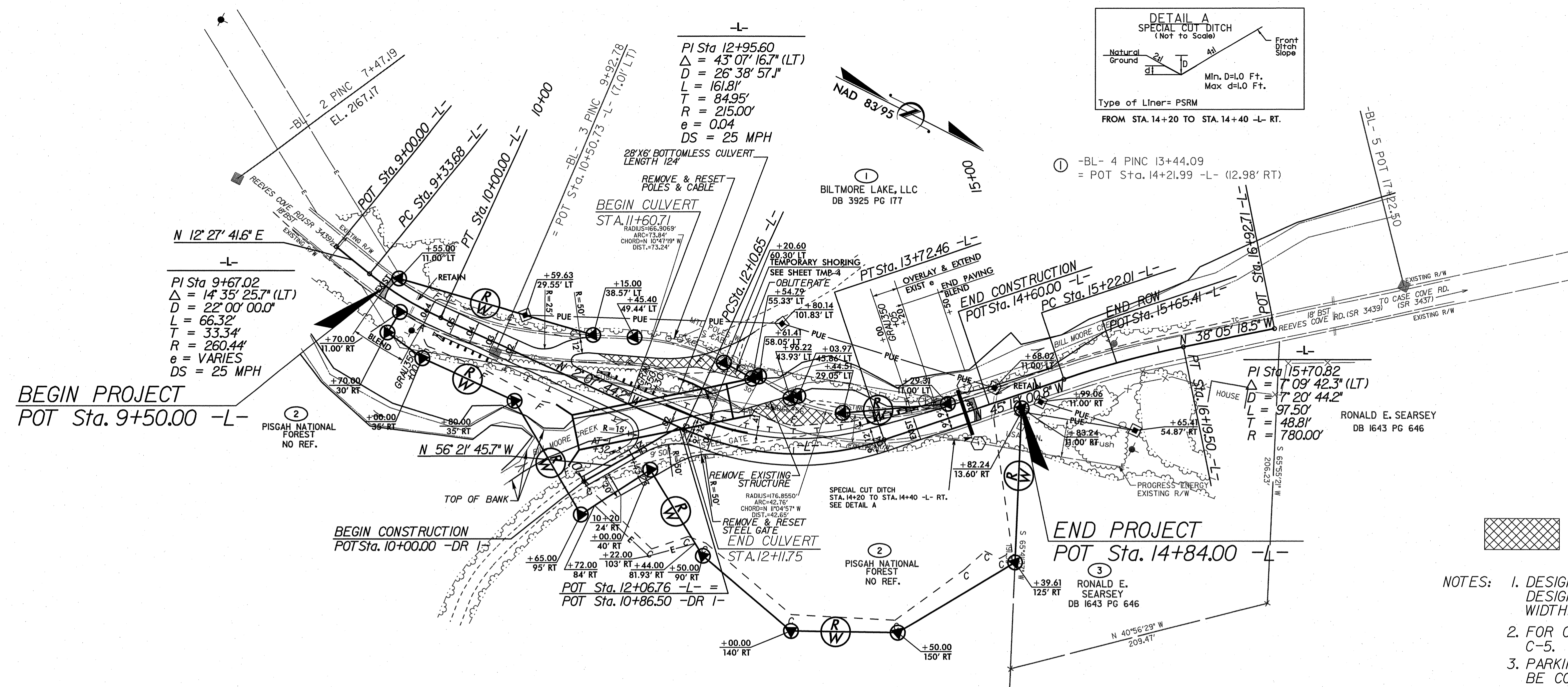
| ItemNumber | Sec # | Quantity | Unit | Description |
|--------------|-------|----------|------|--|
| 4850000000-E | 1205 | 1,000 | LF | REMOVAL OF PAVEMENT MARKING LINES (4") |
| 6000000000-E | 1605 | 750 | LF | TEMPORARY SILT FENCE |
| 6006000000-E | 1610 | 480 | TON | STONE FOR EROSION CONTROL, CLASS A |
| 6009000000-E | 1610 | 420 | TON | STONE FOR EROSION CONTROL, CLASS B |
| 6012000000-E | 1610 | 400 | TON | SEDIMENT CONTROL STONE |
| 6015000000-E | 1615 | 2.5 | ACR | TEMPORARY MULCHING |
| 6018000000-E | 1620 | 100 | LB | SEED FOR TEMPORARY SEEDING |
| 6021000000-E | 1620 | 0.25 | TON | FERTILIZER FOR TEMPORARY SEEDING |
| 6024000000-E | 1622 | 200 | LF | TEMPORARY SLOPE DRAINS |
| 6027000000-N | 1622 | 4 | EA | INLET PROTECTION AT TEMPORARY SLOPE DRAINS |
| 6029000000-E | SP | 1,800 | LF | SAFETY FENCE |
| 6030000000-E | 1630 | 300 | CY | SILT EXCAVATION |
| 6036000000-E | 1631 | 7,000 | SY | MATTING FOR EROSION CONTROL |
| 6037000000-E | SP | 250 | SY | COIR FIBER MAT |
| 6038000000-E | SP | 130 | SY | PERMANENT SOIL REINFORCEMENT MAT |
| 6042000000-E | 1632 | 650 | LF | 1/4" HARDWARE CLOTH |
| 6070000000-N | SP | 5 | EA | SPECIAL STILLING BASINS |
| 6071010000-E | SP | 25 | LF | WATTLE |
| 6071020000-E | SP | 130 | LB | POLYACRYLAMIDE (PAM) |
| 6071030000-E | SP | 130 | LF | COIR FIBER BAFFLE |
| 6084000000-E | 1660 | 2.5 | ACR | SEEDING & MULCHING |
| 6087000000-E | 1660 | 2.5 | ACR | MOWING |
| 6090000000-E | 1661 | 50 | LB | SEED FOR REPAIR SEEDING |
| 6093000000-E | 1661 | 0.25 | TON | FERTILIZER FOR REPAIR SEEDING |
| 6096000000-E | 1662 | 50 | LB | SEED FOR SUPPLEMENTAL SEEDING |
| 6108000000-E | 1665 | 1.5 | TON | FERTILIZER TOPDRESSING |
| 6111000000-E | SP | 380 | LF | IMPERVIOUS DIKE |
| 6114500000-N | SP | 10 | MHR | SPECIALIZED HAND MOWING |
| 6117000000-N | SP | 25 | EA | RESPONSE FOR EROSION CONTROL |
| 6123000000-E | 1670 | 0.25 | ACR | REFORESTATION |

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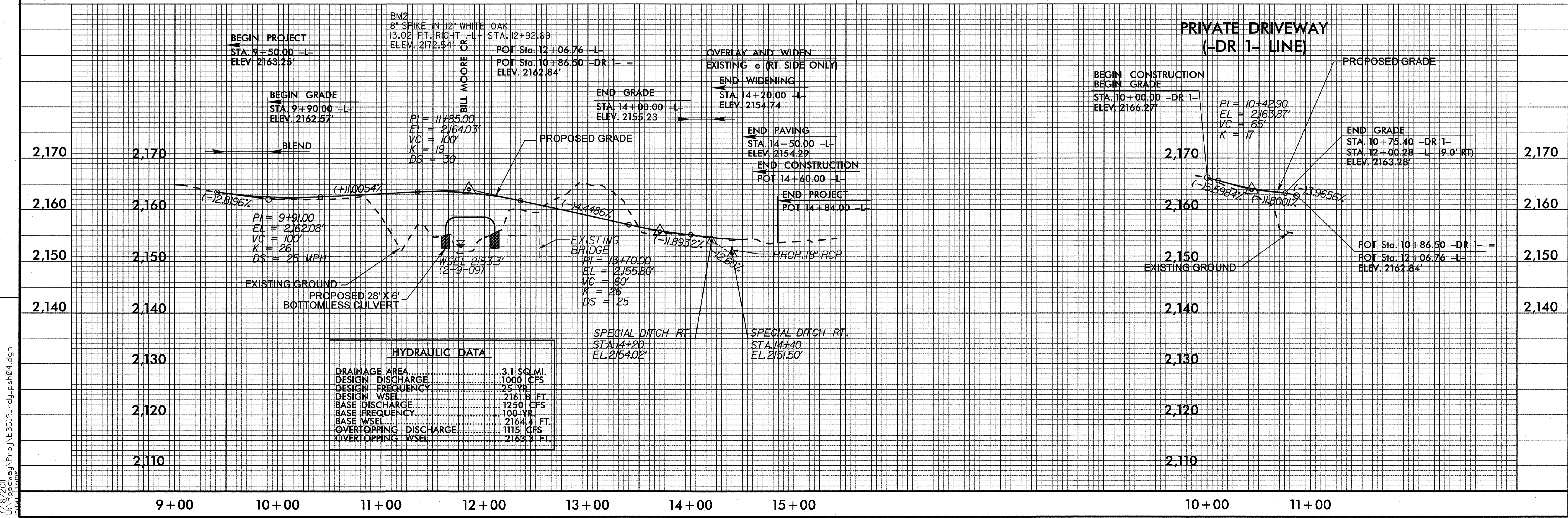
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| | |
|--|---|
| PROJECT REFERENCE NO. B-3619 | SHEET NO. 4 |
| RW SHEET NO. | |
| ROADWAY DESIGN ENGINEER SEAL 30932 ROBERT A. WILLIAMS | HYDRAULICS ENGINEER SEAL 2882 JAMES C. DAVIS |



- NOTES:
- DESIGN EXCEPTION REQUIRED FOR DESIGN SPEED, LANE WIDTH, AND SHOULDER WIDTH.
 - FOR CULVERT PLANS, SEE SHEETS C-1 THRU C-5.
 - PARKING AREA (20' WIDE) OFF OF DR-1 TO BE CONSTRUCTED OF 6" ABC.

REVISIONS



7/18/2011 U:\Roadway\Proj\B3619_rdy_pah04.dgn