

See Sheet 1A For Index of Sheets

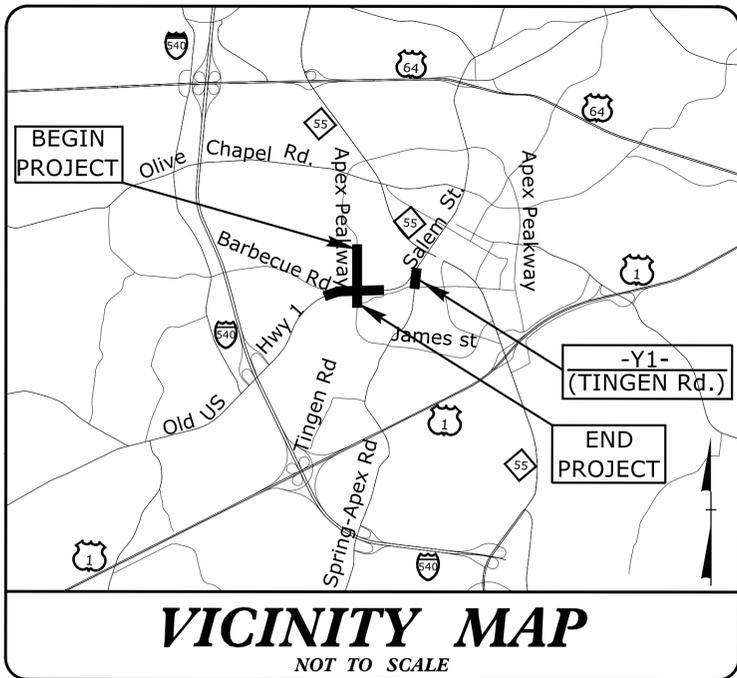
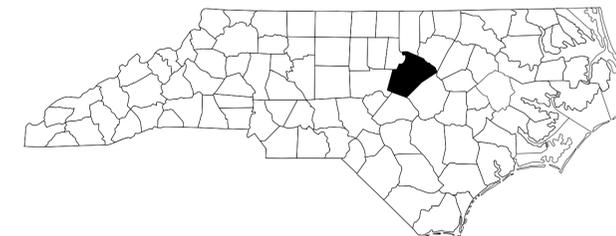
STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

WAKE COUNTY

**LOCATION: JAMES STREET TO TOWHEE DRIVE
CONSTRUCT GRADE SEPARATED INTERCHANGE FOR
APEX PEAKWAY AT SOUTH SALEM STREET AND
CSX RAILROAD**

**TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURE
AND SIGNALS**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5928	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	



TIP PROJECT: U-5928

BUILDING INSPECTIONS & PERMITS TOWN OF APEX CERTIFICATION

This drawing has been reviewed by the Town of Apex Building Inspections & Permits Department, and to the best of my knowledge and belief, conforms to the requirements established within the Town's Code of Ordinances and the North Carolina State Building Code. However, this signature does not constitute a variance from any requirements contained in any federal, state, or local code, law, specification, rule or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements.

By: _____

ELECTRIC TOWN OF APEX CERTIFICATION

This drawing has been reviewed by the Town of Apex Electric Department, and to the best of my knowledge and belief, conforms to the requirements established in the Standard Specifications and Construction Details and the Unified Development Ordinance of the Town of Apex. However, this signature does not constitute a variance from any requirements contained in any federal, state, or local code, law, specification, rule or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements.

By: _____

FIRE DEPARTMENT TOWN OF APEX CERTIFICATION

This drawing has been reviewed by the Town of Apex Fire Department, and to the best of my knowledge and belief, conforms to the requirements established within the Town's Standard Specifications, Fire Protection Ordinances, and the North Carolina International Fire Code. However, this signature does not constitute a variance from any requirements contained in any federal, state, or local code, law, specification, rule or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements.

By: _____

PARKS, RECREATION, AND CULTURAL RESOURCES TOWN OF APEX CERTIFICATION

These plans have been reviewed by the Town of Apex, and to the best of my knowledge and belief, conform to representations made by the developer to myself and the Parks, Recreation, and Cultural Resources Advisory Commission consistent with the projects requirements for public Parks and Recreation, either in total or in part, as outlined in the Town of Apex Unified Development Ordinance and Town of Apex Code of Ordinances. However, this signature does not constitute a variance from any requirements contained in any federal, state, or local code, law, specification, rule or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements.

By: _____

PLANNING/ZONING TOWN OF APEX CERTIFICATION

This construction drawing has been reviewed by the Town of Apex Planning Department, and to the best of my knowledge and belief, conforms to the Subdivision or Site Plan that was approved by the Town of Apex Town Council or Technical Review Committee, as appropriate, and meets the standards of the Town of Apex Unified Development Ordinance. This signature does not constitute a variance from any requirements of the originally approved Subdivision or Site Plan cited above, or any federal, state, or local code, law, specification, rule, guideline, or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements.

By: _____

PUBLIC WORKS & TRANSPORTATION TOWN OF APEX CERTIFICATION

This drawing has been reviewed by the Town of Apex Public Works & Transportation Department, and to the best of my knowledge and belief, provides an acceptable transportation system with consideration for the elements contained within the Transportation Plan conforming to the requirements established in the Standard Specifications and Standard Details and the Unified Development Ordinance of the Town of Apex. However, this signature does not constitute a variance from any requirements contained in any federal, state, or local code, law, specification, rule or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements.

By: _____

WATER RESOURCES SOIL EROSION & SEDIMENTATION CONTROL TOWN OF APEX CERTIFICATION

This drawing has been reviewed by the Town of Apex, and to the best of my knowledge and belief, conforms to the requirements established in the Soil Erosion and Sedimentation Control Ordinance of the Town of Apex. However, this signature does not constitute a variance from any requirements contained in any federal, state, or local code, law, specification, rule or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements. A separate letter of plan approval will be mailed to the financially responsible person at a later date according to the construction sequence.

By: _____

WATER RESOURCES STORMWATER ENGINEERING TOWN OF APEX CERTIFICATION

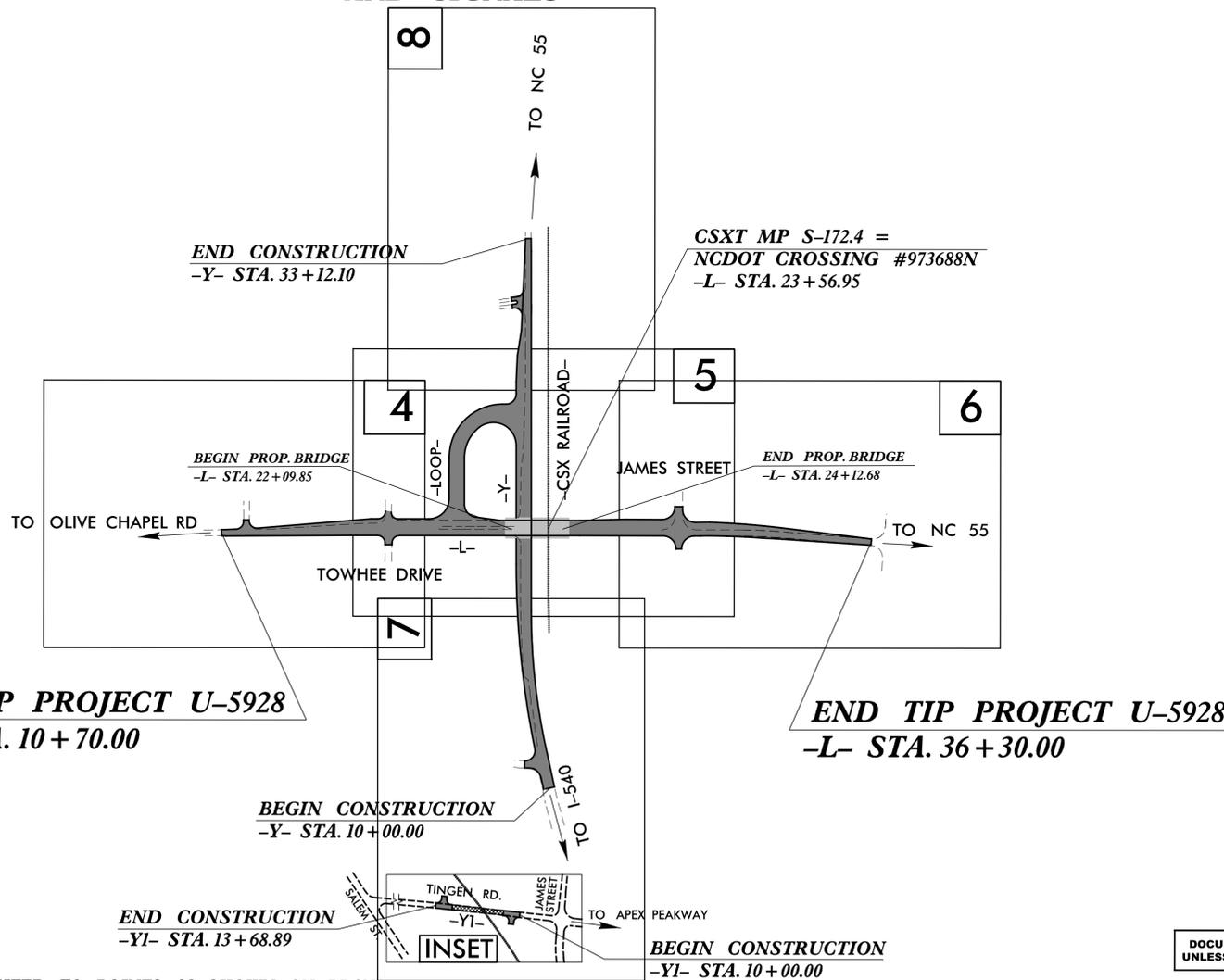
This drawing has been reviewed by the Town of Apex Water Resources Stormwater Ability Engineering Division and to the best of my knowledge and belief, conforms to the requirements established in the Standard Specifications and Standard Details and the Unified Development Ordinance of the Town of Apex. However, this signature does not constitute a variance from any requirements contained in any federal, state, or local code, law, specification, rule or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements. This signature serves as the stormwater permit for this project.

By: _____

WATER RESOURCES UTILITY ENGINEERING TOWN OF APEX CERTIFICATION

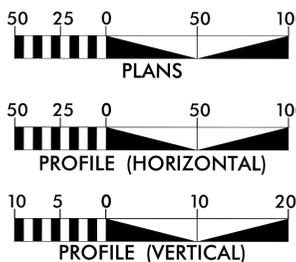
This drawing has been reviewed by the Town of Apex Water Resources Department, and to the best of my knowledge and belief, conforms to the requirements established in the Standard Specifications and Standard Details of the Town of Apex. However, this signature does not constitute a variance from any requirements contained in any federal, state, or local code, law, specification, rule or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements.

By: _____



CONTRACT:

GRAPHIC SCALES



DESIGN DATA

ADT 2016 = 10300
 ADT 2040 = 18200
 DHV = 11 %
 D = 60 %
 T = 3 % *
 V = 40 MPH
 * TTST = 1% DUAL 2%
 FUNC CLASS =
 URBAN COLLECTOR

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-5928 = 0.446 MI.
 LENGTH STRUCTURE TIP PROJECT U-5928 = 0.038 MI.
 TOTAL LENGTH OF TIP PROJECT U-5928 = 0.484 MI.

Prepared for the North Carolina Department of Transportation
In the Office of:



940 Main Campus Drive, Suite 500
Raleigh, NC 27606
NC License No. C-3705

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
NOVEMBER 27, 2018

LETTING DATE:
JULY 25, 2024

TIM D. GOINS, PE
PROJECT ENGINEER

PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

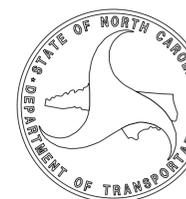


DocuSigned by:
David P. Booker
SIGNATURE: _____ P.E.

ROADWAY DESIGN
ENGINEER



DocuSigned by:
Tim Goins
SIGNATURE: _____ P.E.



DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

8/17/19

INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES, AND STANDARD DRAWINGS
1B	CONVENTIONAL SYMBOLS
1C-1 THRU 1C-5	SURVEY CONTROL SHEETS
2A-1 THRU 2A-5	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
2B-1 THRU 2B-3	ROADWAY INTERSECTION DETAILS
2B-4 THRU 2B-6	DRAINAGE DETAILS
2C-1 THRU 2C-2	SPECIAL DETAILS
3B-1	ROADWAY SUMMARIES
3B-2	RIGHT-OF-WAY AREA DATA
3D-1 THRU 3D-3	DRAINAGE SUMMARIES
3G-1	GEOTECHNICAL SUMMARIES
4 THRU 8	PLAN SHEETS
9 THRU 11	PROFILE SHEETS
TMP-1 THRU TMP-7	TRAFFIC MANAGEMENT PLANS
PMP-1 THRU PMP-3	PAVEMENT MARKING PLANS
E-1 THRU E-5	ELECTRICAL PLANS
EC-1 THRU EC-9	EROSION CONTROL PLANS
SIGN-1 THRU SIGN-5	SIGNING PLANS
SIG-1 THRU SIG-M9	SIGNAL PLANS
SCP-1 THRU SCP-5	SIGNAL COMMUNICATION PLANS
UC-1 THRU UC-6	UTILITIES CONSTRUCTION PLANS
UO-1 THRU UO-6	UTILITIES BY OTHERS PLANS
W-1 THRU W-9	WALL ENVELOPE PLANS
LA-1 THRU LA-3	LANDSCAPING PLANS
X-1A	INDEX OF CROSS-SECTIONS
X-1B	CROSS-SECTIONS SUMMARY SHEETS
X-1 THRU X-34	CROSS-SECTIONS
S-1 THRU S-51	STRUCTURE PLANS

EFF. 01-16-2018
REV.

2024 ROADWAY ENGLISH STANDARD DRAWINGS

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated January, 2024 are applicable to this project and by reference hereby are considered a part of these plans:

STD. NO.	TITLE
DIVISION 2 - EARTHWORK	
200.03	Method of Clearing - Method III
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation
DIVISION 4 - MAJOR STRUCTURES	
423.01	Bridge Approach Fills - Type 1 Approach Fill for Bridge Abutment
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
815.02	Subsurface Drain
838.01	Concrete Endwall for Single and Double Pipe Culverts - 15" thru 48" Pipe 90 Skew
838.11	Brick Endwall for Single and Double Pipe Culverts - 15" thru 48" Pipe 90 Skew
838.80	Precast Concrete Endwall - 12" thru 72" Pipe 90 Skew
840.00	Concrete Base Pad for Drainage Structures
840.01	Brick Catch Basin - 12" thru 54" Pipe
840.02	Concrete Catch Basin - 12" thru 54" Pipe
840.03	Frame, Grates and Hood - for Use on Standard Catch Basin
840.14	Concrete Drop Inlet - 12" thru 30" Pipe
840.15	Brick Drop Inlet - 12" thru 30" Pipe
840.16	Drop Inlet Frame and Grates - for use with Std. Dwg 840.14 and 840.15
840.25	Anchorage for Frames
840.36	Traffic Bearing Grated Drop Inlet - for Steel (840.37) Double Frame and Grates
840.37	Steel Grate and Frames
840.45	Precast Drainage Structure
840.46	Traffic Bearing Precast Drainage Structure
840.66	Drainage Structure Steps
840.72	Pipe Collar
846.01	Concrete Curb, Gutter, and Curb & Gutter
848.01	Concrete Sidewalk
848.02	Driveway Turnout - Radius Type
848.04	Street Turnout
848.05	Curb Ramp (Use Details in Lieu of Standards for Sheets 9 and 10 of 13)
852.01	Concrete Islands
852.06	Method for Placement of Drop Inlets in Concrete Islands
852.10	Median Construction with Curb and Gutter
862.01	Guardrail Placement
862.02	Guardrail Installation
862.03	Structure Anchor Units
866.01	Chain Link Fence - 4', 5' and 6' High Fence
866.06	Chain Link Fence on Retaining Wall
876.02	Guide for Rip Rap at Pipe Outlets



PROJECT REFERENCE NO. U-5928	SHEET NO. 1A
ROADWAY DESIGN ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

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.

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.

SUBSURFACE DRAINS:
SUBSURFACE DRAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 815.02 AT LOCATIONS DIRECTED BY THE ENGINEER.

DRIVEWAYS:
DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. 848.02 USING 3 FOOT RADIUS OR RADIUS AS SHOWN ON THE PLANS. LOCATIONS OF DRIVES WILL BE AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

STREET TURNOUT:
STREET RETURNS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 848.04 USING THE RADIUS NOTED ON PLANS.

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.

END BENTS:
THE ENGINEER SHALL CHECK THE STRUCTURE END BENT PLANS, DETAILS, AND CROSS-SECTION PRIOR TO SETTING OF THE SLOPE STAKES FOR THE EMBANKMENT OR EXCAVATION APPROACHING A BRIDGE.

RIGHT-OF-WAY MARKERS:
RIGHT-OF-WAY MARKERS ON THIS PROJECT SHALL BE PLACED BY OTHERS IN ACCORDANCE WITH DESIGNATED SYMBOLS.

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

SUBSURFACE PLANS:
NO SUBSURFACE PLANS ARE AVAILABLE ON THIS PROJECT. THE CONTRACTOR SHOULD MAKE HIS OWN INVESTIGATION AS TO THE SUBSURFACE CONDITIONS.

UTILITIES:
UTILITY OWNERS ON THIS PROJECT ARE
POWER (DISTRIBUTION) - TOWN OF APEX
GAS (TRANSMISSION) - COLONIAL PIPELINE
GAS (DISTRIBUTION) - PNG
COMMUNICATIONS - AT&T
COMMUNICATIONS - SPECTRUM
COMMUNICATIONS - VERIZON
ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS, EXCEPT AS SHOWN ON THE PLANS.

TEMPORARY SHORING:
SHORING REQUIRED FOR THE MAINTENANCE OF WILL BE PAID FOR AS "EXTRA WORK" IN ACCORDANCE WITH SECTION 104-7.

CURB RAMPS:
CURB RAMPS ARE SHOWN ON THE PLANS AT APPROXIMATE LOCATIONS. CONSTRUCT ALL CURB RAMPS ACCORDANCE WITH STD 848.06.

STD. DRAWINGS:
TOWN OF APEX STD. DRAWINGS SHALL BE UTILIZED IN CONJUNCTION WITH NCDOT 2024 STANDARD DRAWINGS.

- CSXT GENERAL NOTES**
- All work on, over, under, or adjacent to CSXT right-of-way shall be done in accordance with the CSXT Special Provisions, which can be found within the CSXT Public Projects Manual, available at: <https://www.csx.com/index.cfm/about-us/property/>.
 - No work shall take place within 50 feet of the centerline of the CSXT track without a railroad flagman being present. Provide the CSXT field representative with at least thirty (30) business days advance notice of beginning work within this area to allow for the scheduling of the railroad flagman.
 - Construction clearances shall be subject to approval by CSXT. Typically, reduction in clearance for construction is not permitted.
 - Contractor shall maintain all ditches and drainage structures free of silt or other obstructions that may result from their operations. Contractor, upon completion of the Project, shall leave CSXT Property in neat condition, satisfactory to the CSXT Representative.
 - The Contractor shall provide, install and maintain a geotextile fabric ballast protection system to prevent debris and fines from fouling the ballast. The ballast protection system shall extend 25 feet beyond the outer limits of the bridge on both sides.
 - The Contractor may not use CSXT right-of-way for storage of materials or equipment during construction without prior approval from CSXT.
 - CSXT shall be furnished as-built drawings showing actual clearances as constructed prior to project completion and close-out.
 - The Contractor shall reference the CSXT Construction Submission Criteria for construction related submittal requirements while working on, over, under or adjacent to CSXT right-of-way. The Construction Submission Criteria can be found within the Public Project Manual. The Contractor is required to submit a detailed work plan for review and approval by CSXT, including but not limited to the below items:
 - Foundation Installation
 - Girder Erection and Stabilization
 - Protective Fencing
 - Deck Pour/Overhangs
 - The Contractor shall notify and coordinate their work with the on-site CSXT Representative.
 - One Call services do not locate buried railroad signal and communications lines. The contractor shall contact the railroads representative two (2) days in advance of those places where excavation, pile driving, or heavy loads may damage railroad underground lines on railroad property. Upon request from the contractor or agency, railroad signal forces will locate and paint mark or flag railroad underground signal, communication, and power lines in the area to be disturbed for the contractor. The contractor shall avoid excavation or other disturbance of these lines which are critical to the safety of the railroad and the public. If disturbance or excavation is required near a buried railroad signal, communication, or power line, the line shall be potholed manually with careful hand excavation by the contractor and protected by the contractor during the course of the disturbance under the supervision and direction of a railroad signal representative.
 - All soils excavated within CSX railroad right-of-way shall remain on CSX right-of-way. For any excavated soil that requires off-site disposal, the licensee is required to use only CSX approved laboratories, transporters, and disposal facility that are in compliance with all applicable environmental laws and CSX policies and procedures. Soil resulting from excavation outside of CSX railroad right-of-way or railroad owned property shall not be brought onto CSX property and therefore must be stored off CSX property. CSXT shall not incur any costs related to the disposal of soils generated due to construction activity related to this project.
 - The Engineer shall be kept aware of the construction schedule. The Contractor shall provide timely communication to the Engineer when scheduling the work such that the Engineer may be present during the work. The Contractor's schedule shall not dictate the work plan schedule, and fagging shall not be scheduled prior to receipt of an accepted work plan.

GENERAL NOTES: 2024 SPECIFICATIONS
EFFECTIVE: 01-16-2024
REVISED:

GRADE LINE:
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 111.

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

3/11/2024 06:28: P.dj...Index_1A.dgn

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS CONVENTIONAL PLAN SHEET SYMBOLS

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



PROJECT REFERENCE NO. <i>U-5928</i>	SHEET NO. <i>1-B</i>
The information on this sheet was prepared by the person whose name appears below and is not to be used for any other project without the written consent of the person whose name appears below.	
Author: <i>Transportation</i>	Checker: <i>Transportation</i>
Design: <i>Utility Engineering</i>	Plan: <i>Transportation</i>
Drawn: <i>Utility Engineering</i>	Plot: <i>Transportation</i>
Reviewed: <i>Utility Engineering</i>	Checked: <i>Transportation</i>
Approved: <i>Utility Engineering</i>	Checked: <i>Transportation</i>

BOUNDARIES AND PROPERTY:

State Line	_____
County Line	_____
Township Line	_____
City Line	_____
Reservation Line	_____
Property Line	_____
Existing Iron Pin	○ EIP
Computed Property Corner	_____ X
Property Monument	□ ECM
Parcel/Sequence Number	①23
Existing Fence Line	-X-X-X-
Proposed Woven Wire Fence	○
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 ---
Existing Historic Property Boundary	--- HPB ---
Known Contamination Area: Soil	☠ S ☠
Potential Contamination Area: Soil	☠ S ☠
Known Contamination Area: Water	☠ W ☠
Potential Contamination Area: Water	☠ W ☠
Contaminated Site: Known or Potential	☠ ?

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	_____
False Sump	_____

RAILROADS:

Standard Gauge	_____
RR Signal Milepost	○ MILEPOST 35
Switch	□ SWITCH
RR Abandoned	_____
RR Dismantled	_____

RIGHT OF WAY & PROJECT CONTROL:

Secondary Horiz and Vert Control Point	◆
Primary Horiz Control Point	○
Primary Horiz and Vert Control Point	◆
Exist Permanent Easement Pin and Cap	◇
New Permanent Easement Pin and Cap	◆
Vertical Benchmark	⊠
Existing Right of Way Marker	△
Existing Right of Way Line	_____
New Right of Way Line	_____ (R/W)
New Right of Way Line with Pin and Cap	_____ (R/W) ◆
New Right of Way Line with Concrete or Granite R/W Marker	_____ (R/W) ◆
New Control of Access Line with Concrete C/A Marker	_____ (C/A)
Existing Control of Access	_____ (C/A)
New Control of Access	_____ (C/A)
Existing Easement Line	--- E ---
New Temporary Construction Easement	--- E ---
New Temporary Drainage Easement	--- TDE ---
New Permanent Drainage Easement	--- PDE ---
New Permanent Drainage / Utility Easement	--- DUE ---
New Permanent Utility Easement	--- PUE ---
New Temporary Utility Easement	--- TUE ---
New Aerial Utility Easement	--- AUE ---

ROADS AND RELATED FEATURES:

Existing Edge of Pavement	_____
Existing Curb	_____
Proposed Slope Stakes Cut	--- C ---
Proposed Slope Stakes Fill	--- F ---
Proposed Curb Ramp	_____ (CR)
Existing Metal Guardrail	_____
Proposed Guardrail	_____
Existing Cable Guiderail	_____
Proposed Cable Guiderail	_____
Equality Symbol	⊕
Pavement Removal	_____

VEGETATION:

Single Tree	○
Single Shrub	○

Note: Not to Scale

*S.U.E. = Subsurface Utility Engineering

Hedge	_____
Woods Line	_____
Orchard	_____
Vineyard	_____ (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	⊕
Power Line Tower	⊠
Power Transformer	⊠
U/G Power Cable Hand Hole	_____
H-Frame Pole	●
U/G Power Line LOS B (S.U.E.*)	--- P ---
U/G Power Line LOS C (S.U.E.*)	--- P ---
U/G Power Line LOS D (S.U.E.*)	--- P ---

TELEPHONE:

Existing Telephone Pole	●
Proposed Telephone Pole	○
Telephone Manhole	⊕
Telephone Pedestal	⊠
Telephone Cell Tower	⊠
U/G Telephone Cable Hand Hole	_____
U/G Telephone Cable LOS B (S.U.E.*)	--- T ---
U/G Telephone Cable LOS C (S.U.E.*)	--- T ---
U/G Telephone Cable LOS D (S.U.E.*)	--- T ---
U/G Telephone Conduit LOS B (S.U.E.*)	--- TC ---
U/G Telephone Conduit LOS C (S.U.E.*)	--- TC ---
U/G Telephone Conduit LOS D (S.U.E.*)	--- TC ---
U/G Fiber Optics Cable LOS B (S.U.E.*)	--- T FO ---
U/G Fiber Optics Cable LOS C (S.U.E.*)	--- T FO ---
U/G Fiber Optics Cable LOS D (S.U.E.*)	--- T FO ---

WATER:

Water Manhole	⊕
Water Meter	○
Water Valve	⊗
Water Hydrant	⊕
U/G Water Line LOS B (S.U.E.*)	--- W ---
U/G Water Line LOS C (S.U.E.*)	--- W ---
U/G Water Line LOS D (S.U.E.*)	--- W ---
Above Ground Water Line	--- A/G Water ---

TV:

TV Pedestal	⊕
TV Tower	⊗
U/G TV Cable Hand Hole	_____
U/G TV Cable LOS B (S.U.E.*)	--- TV ---
U/G TV Cable LOS C (S.U.E.*)	--- TV ---
U/G TV Cable LOS D (S.U.E.*)	--- TV ---
U/G Fiber Optic Cable LOS B (S.U.E.*)	--- TV FO ---
U/G Fiber Optic Cable LOS C (S.U.E.*)	--- TV FO ---
U/G Fiber Optic Cable LOS D (S.U.E.*)	--- TV FO ---

GAS:

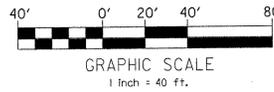
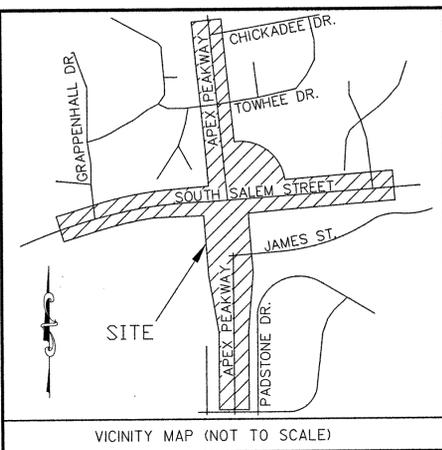
Gas Valve	◇
Gas Meter	⊕
U/G Gas Line LOS B (S.U.E.*)	--- G ---
U/G Gas Line LOS C (S.U.E.*)	--- G ---
U/G Gas Line LOS D (S.U.E.*)	--- G ---
Above Ground Gas Line	--- A/G Gas ---

SANITARY SEWER:

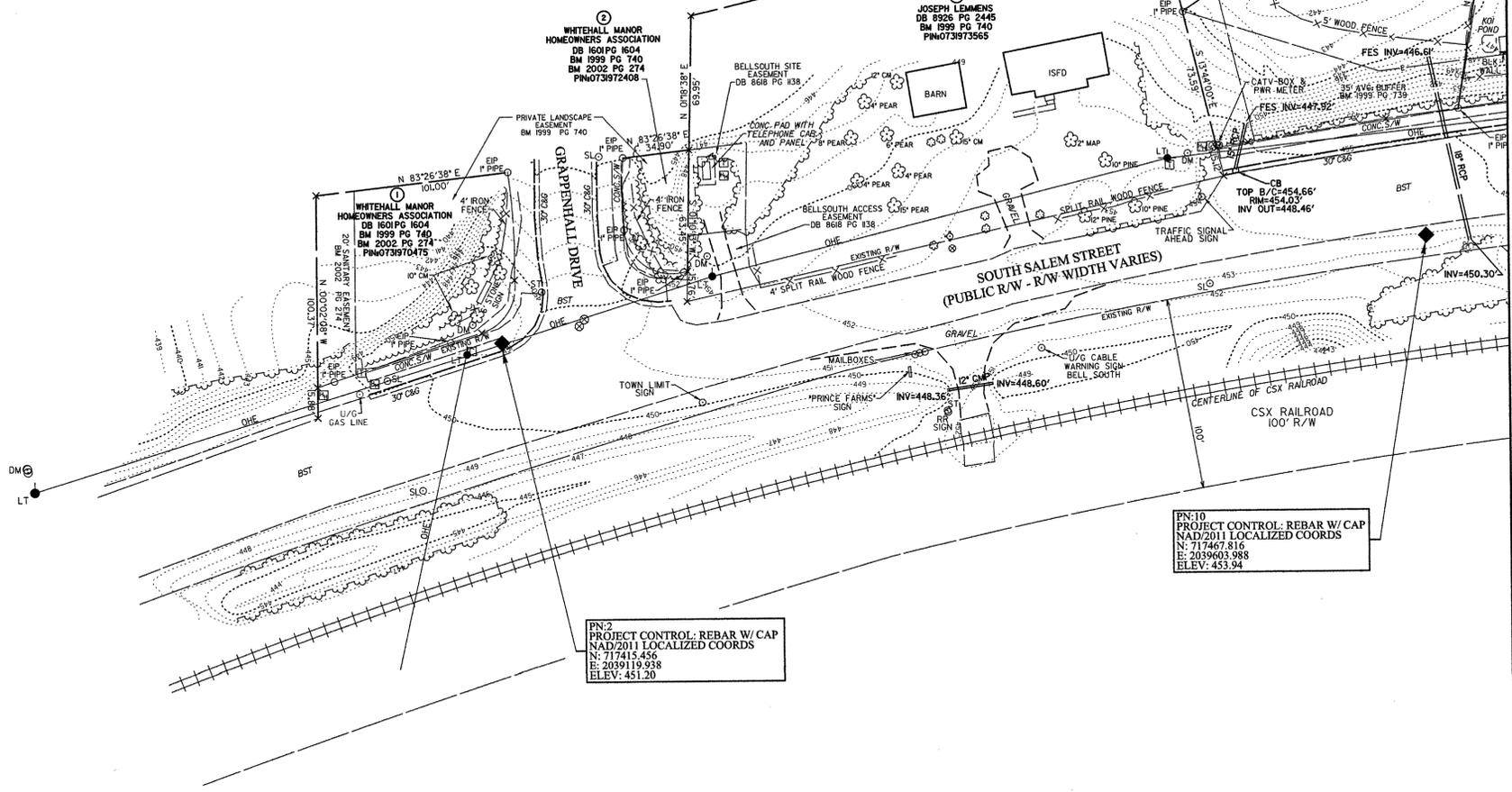
Sanitary Sewer Manhole	⊕
Sanitary Sewer Cleanout	⊕
U/G Sanitary Sewer Line	--- SS ---
Above Ground Sanitary Sewer	--- A/G Sanitary Sewer ---
SS Forced Main Line LOS B (S.U.E.*)	--- FSS ---
SS Forced Main Line LOS C (S.U.E.*)	--- FSS ---
SS Forced Main Line LOS D (S.U.E.*)	--- FSS ---

MISCELLANEOUS:

Utility Pole	●
Utility Pole with Base	□
Utility Located Object	○
Utility Traffic Signal Box	⊠
Utility Unknown U/G Line LOS B (S.U.E.*)	--- 2UTL ---
U/G Tank; Water, Gas, Oil	□
Underground Storage Tank, Approx. Loc.	⊕
A/G Tank; Water, Gas, Oil	□
Geoenvironmental Boring	⊕
U/G Test Hole LOS A (S.U.E.*)	⊕
Abandoned According to Utility Records	AATUR
End of Information	E.O.I.



- LEGEND**
- PROPERTY LINES (NOT SURVEYED)
 - - - EASEMENT LINES
 - - - LANDSCAPE AREA
 - TREE
 - CM-CRAPE MYRTLE
 - MP-CRAPE MYRTLE
 - DM-CRAPE MYRTLE
 - DW-DOGWOOD
 - HDGE/SHRUB LINE
 - TREE LINE
 - GR GRAVEL
 - BST BITUMINOUS SURFACE TREATMENT (ASPHALT)
 - C&G STANDARD CURB AND GUTTER (UNLESS NOTED OTHERWISE)
 - CONC, CONC S/W CONCRETE, CONCRETE SIDEWALK
 - SANITARY SEWER MANHOLE
 - CLEANOUT
 - SANITARY SEWER LINE
 - UNDERGROUND STORM SEWER LINE
 - INVERT
 - FES FLARED END SECTION PIPE
 - RCP REINFORCED CONCRETE PIPE
 - CMP CORRUGATED METAL PIPE
 - DI DROP INLET
 - CB CATCH BASIN
 - HTR HOUSE TRAILER
 - 2SFD 2 STORY FRAMED DWELLING
 - DM GUY WIRE
 - SL SPEED LIMIT SIGN
 - ST STOP SIGN
 - FENCE LINE
 - MISC. LABEL FOR SIGNS/GUY WIRE
 - POSTS/STOP/SPEED/ETC.
 - POWER TRANSFORMER
 - ELECTRIC/POWER PEDESTAL
 - OVERHEAD ELECTRIC
 - POWER DROP
 - TELEPHONE PEDESTAL
 - TV PEDESTAL
 - GAS VALVE
 - GAS VENT
 - POWER POLE (WITH LIGHT IF NOTED)
 - POWER POLE WITH TRANSFORMER
 - POWER HANDHOLE
 - TELEPHONE/FIBER OPTIC HANDHOLE
 - FIRE HYDRANT
 - WATER METER
 - WATER VALVE
 - CALCULATED POINT
 - EXISTING IRON PIPE
 - PROJECT CONTROL



PN-1
PROJECT CONTROL: REBAR W/ CAP (OFF SITE)
NAD2011 LOCALIZED COORDS
N: 71719.580
E: 203851.671
ELEV: 431.24

PN-2
PROJECT CONTROL: REBAR W/ CAP
NAD2011 LOCALIZED COORDS
N: 717415.456
E: 2039119.938
ELEV: 451.20

PN-10
PROJECT CONTROL: REBAR W/ CAP
NAD2011 LOCALIZED COORDS
N: 717467.816
E: 2039403.988
ELEV: 453.94

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

SURVEYOR'S NOTES:

- THE BASIS OF BEARINGS FOR THIS SURVEY IS NAD 83 (2011) SPCS, USING A TRIMBLE R8 GNSS GPS UNIT AND THE REAL TIME NETWORK (RTN).
- ALL ELEVATIONS ARE BASED ON NAVD88 IN FEET.
- AREA COMPUTED BY COORDINATE GEOMETRY METHOD.
- ALL DISTANCES ARE HORIZONTAL GROUND DISTANCES IN FEET.
- SURFACE DTM SET AT 1' CONTOUR INTERVALS.
- THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT AND MAY BE SUBJECT TO ANY MATTERS THAT A FULL TITLE SEARCH WOULD DISCLOSE.
- ALL R/W LINES AND BOUNDARY LINES SHOWN ARE SHOWN AS BROKEN AND DO NOT DEPICT AN ACTUAL BOUNDARY SURVEY.
- NO PORTION OF THE SUBJECT PROPERTY IS IN A SPECIAL FLOOD HAZARD AREA AND RESIDES IN ZONE "X" PER FEMA MAP NUMBER 372007300J & 372007400L, EFFECTIVE DATE MAY 2ND, 2006.
- ZONING FOR THE PROJECT AREA RESIDES IN THE "R1-C2", "MD-C2", "R1A", "MD-C1", "MHP", "MD-M-C1", "MD" & "PUD-C1" ZONES PER THE WAKE COUNTY "MAPS" INTERACTIVE MAP PROGRAM.

I, WENDELL R. BALL, CERTIFY THAT THIS SURVEY WAS COMPLETED UNDER MY DIRECT AND RESPONSIBLE CHARGE FROM AN ACTUAL SURVEY COMPLETED ON AUGUST 27, 2016 PERFORMED TO MEET THE STANDARDS OF PRACTICE FOR LAND SURVEYING IN NORTH CAROLINA (2016) ACCURACY STANDARDS OF HORIZONTAL CLASS AA AND VERTICAL CLASS C, THAT THE HORIZONTAL COORDINATES ARE BASED ON NAD 1983/2011 AND ALL ELEVATIONS ARE BASED ON NAVD88. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 6ND DAY OF SEPTEMBER, 2016.

Wendell R. Ball 26 SEPT 2016
PROFESSIONAL LAND SURVEYOR DATE (SEE REVISIONS)
REGISTRATION NO. L-4371



FIELD SURVEY CONDUCTED: 06/21/2016 THRU 08/27/2016

MATCHLINE (SEE SHEET 2 OF 5)

**APEX PEAKWAY SOUTHWEST CONNECTOR, GRADE
SEPARATION OF SOUTH SALEM STREET & CSX RAILROAD -
PHASE 2, NEPA AND SURVEYS, APEX, NC**

TOWN OF APEX, WHITE OAK TOWNSHIP, WAKE COUNTY, NORTH CAROLINA

CALYX
ENGINEERS + CONSULTANTS
6750 TRON ROAD
CARY, NC 27513-1912
CALYXengineers.com
NC License # F-1335

NO.	DATE	REVISIONS	REMARKS
1			
2			
3			
4			
5			
6			
7			
8			
9			

PROJECT NO: 2016106.00

DRAWN BY: ESS
DWS CHECKED BY: WRB
SCALE: SEE PLAN
DATE: JULY 1ST, 2016

SHEET 1 OF 5

MATCHLINE (SEE SHEET 5 OF 5)

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

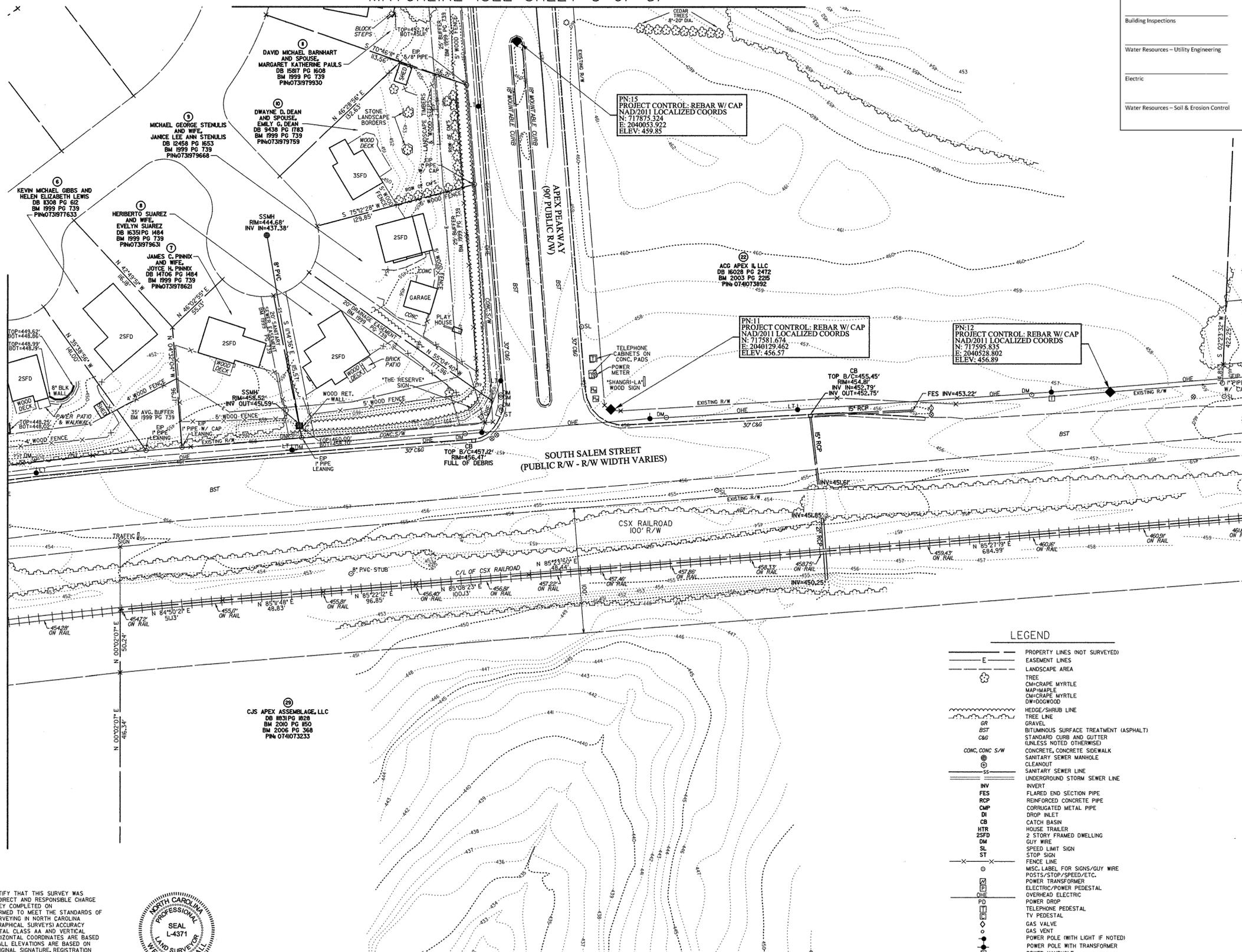


**APEX PEAKWAY SOUTHWEST CONNECTOR, GRADE
SEPARATION OF SOUTH SALEM STREET & CSX RAILROAD -
PHASE 2, NEPA AND SURVEYS, APEX, NC**

TOWN OF APEX, WHITE OAK TOWNSHIP, WAKE COUNTY, NORTH CAROLINA

MATCHLINE (SEE SHEET 1 OF 5)

MATCHLINE (SEE SHEET 3 OF 5)



LEGEND

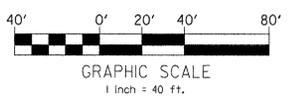
---	PROPERTY LINES (NOT SURVEYED)
- - -	EASEMENT LINES
---	LANDSCAPE AREA
○	TREE
○	ORANGE MYRTLE
○	MAPLE
○	ORANGE MYRTLE
○	DOGWOOD
○	HEDGE/SHRUB LINE
---	TREE LINE
GR	GRAVEL
BST	BITUMINOUS SURFACE TREATMENT (ASPHALT)
C&G	STANDARD CURB AND GUTTER (UNLESS NOTED OTHERWISE)
CONC, CONC S/W	CONCRETE, CONCRETE SIDEWALK
SS	SANITARY SEWER MANHOLE CLEANOUT
---	SANITARY SEWER LINE
---	UNDERGROUND STORM SEWER LINE
INVERT	INVERT
FES	FLARED END SECTION PIPE
RCP	REINFORCED CONCRETE PIPE
CMP	CORRUGATED METAL PIPE
DI	DROP INLET
CB	CATCH BASIN
HTR	HOUSE TRAILER
2SFD	2 STORY FRAMED DWELLING
DM	GUY WIRE
SL	SPEED LIMIT SIGN
ST	STOP SIGN
---	FENCE LINE
○	MISC. LABEL FOR SIGNS/GUY WIRE
○	POSTS/STOP/SPEED/ETC.
○	POWER TRANSFORMER
○	ELECTRIC/POWER PEDESTAL
○	OVERHEAD ELECTRIC
○	POWER DROP
○	TELEPHONE PEDESTAL
○	TV PEDESTAL
○	GAS VALVE
○	GAS VENT
○	POWER POLE (WITH LIGHT IF NOTED)
○	POWER POLE WITH TRANSFORMER
○	POWER HANDHOLE
○	TELEPHONE/FIBER OPTIC HANDHOLE
○	FIRE HYDRANT
○	WATER METER
○	WATER VALVE
○	CALCULATED POINT
○	EXISTING IRON PIPE
○	PROJECT CONTROL

I, WENDELL R. BALL, CERTIFY THAT THIS SURVEY WAS COMPLETED UNDER MY DIRECT AND RESPONSIBLE CHARGE FROM AN ACTUAL SURVEY COMPLETED ON AUGUST 27, 2016 PERFORMED TO MEET THE STANDARDS OF PRACTICE FOR LAND SURVEYING IN NORTH CAROLINA (21NCAC 56.606 TOPOGRAPHICAL SURVEYS) ACCURACY STANDARDS OF HORIZONTAL CLASS AA AND VERTICAL CLASS G THAT THE HORIZONTAL COORDINATES ARE BASED ON NAD 83/2011 AND ALL ELEVATIONS ARE BASED ON NAVD83. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 6ND DAY OF SEPTEMBER, 2016.

Wendell R. Ball 06 SEPT 2016
PROFESSIONAL LAND SURVEYOR
REGISTRATION NO. L-4371
DATE (SEE REVISIONS)



MATCHLINE (SEE SHEET 4 OF 5)



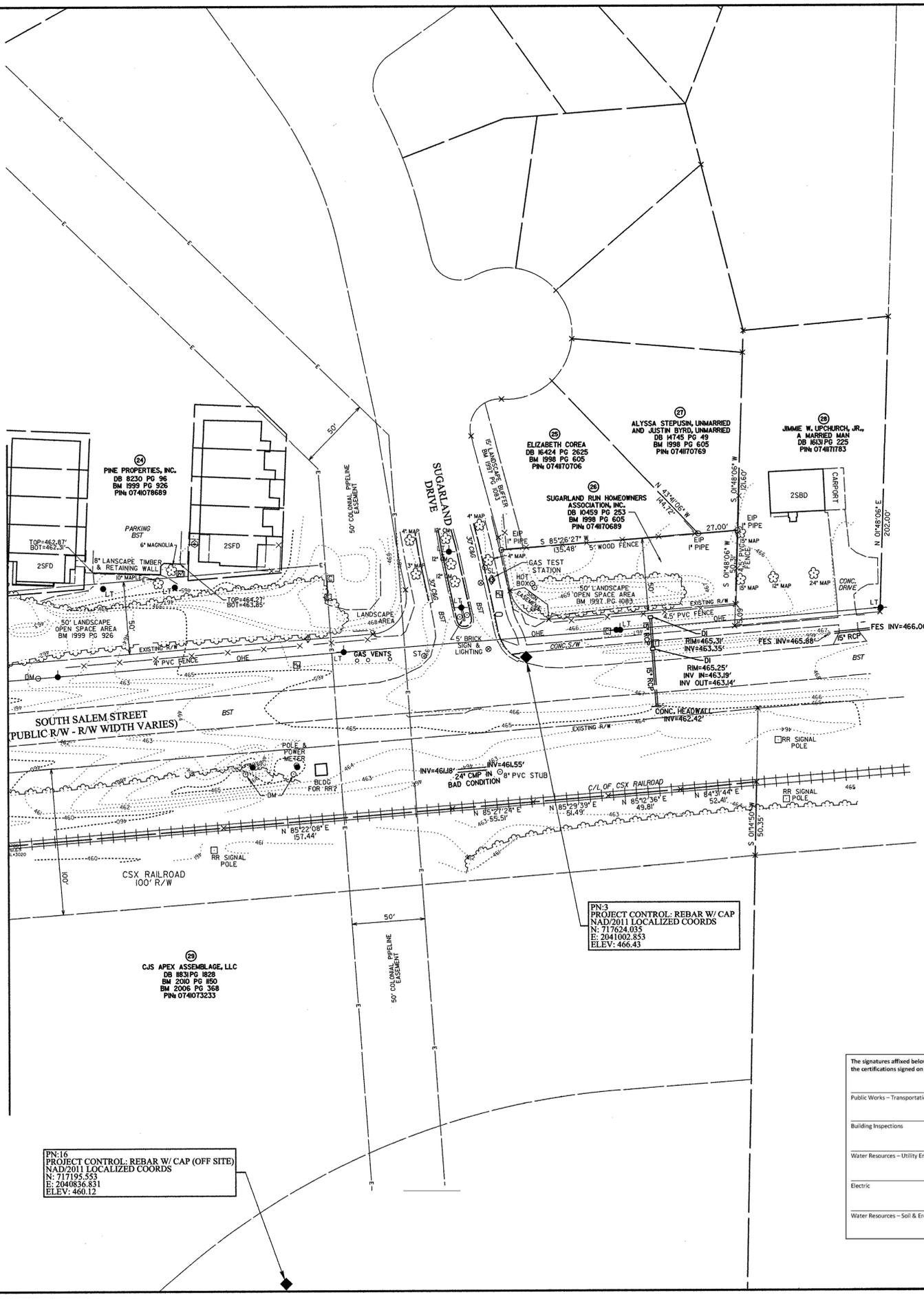
NO.	DATE	REVISIONS	REMARKS
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

PROJECT NO: 2016106.00
DRAWN BY: ESS
DWS, CHECKED BY: WRB
SCALE: SEE PLAN
DATE: JULY 1ST, 2016

**APEX PEAKWAY SOUTHWEST CONNECTOR, GRADE
SEPARATION OF SOUTH SALEM STREET & CSX RAILROAD
PHASE 2, NEPA AND SURVEYS, APEX, NC**

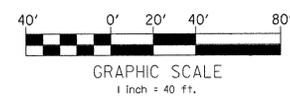
TOWN OF APEX, WHITE OAK TOWNSHIP, WAKE COUNTY, NORTH CAROLINA

MATCHLINE (SEE SHEET 2 OF 5)



I, WENDELL R. BALL, CERTIFY THAT THIS SURVEY WAS COMPLETED UNDER MY DIRECT AND RESPONSIBLE CHARGE FROM AN ACTUAL SURVEY COMPLETED ON AUGUST 27, 2016 PERFORMED TO MEET THE STANDARDS OF PRACTICE FOR LAND SURVEYING IN NORTH CAROLINA (21 NCAC 56.1006 TOPOGRAPHICAL SURVEYS) ACCURACY STANDARDS OF HORIZONTAL CLASS AA AND VERTICAL CLASS C THAT THE HORIZONTAL COORDINATES ARE BASED ON NAD 1983/2011 AND ALL ELEVATIONS ARE BASED ON NAVD83. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 6th DAY OF SEPTEMBER, 2016.

Wendell R. Ball 06 SEPT 2016
PROFESSIONAL LAND SURVEYOR DATE (SEE REVISIONS)
REGISTRATION NO. L-4371



NAD 83/2011

PN-4
PROJECT CONTROL: REBAR W/ CAP (OFF SITE)
NAD/2011 LOCALIZED COORDS
N: 717179.380
E: 204861.671
ELEV: 451.24

PN-3
PROJECT CONTROL: REBAR W/ CAP
NAD/2011 LOCALIZED COORDS
N: 717624.053
E: 2041002.853
ELEV: 466.43

PN-16
PROJECT CONTROL: REBAR W/ CAP (OFF SITE)
NAD/2011 LOCALIZED COORDS
N: 717195.533
E: 2040836.831
ELEV: 460.12

LEGEND

- PROPERTY LINES (NOT SURVEYED)
- E- EASEMENT LINES
- LANDSCAPE AREA
- ☼ TREE
- CM-CRAPE MYRTLE
- MAP-MAPLE
- CM-MAPLE MYRTLE
- DM-DOGWOOD
- HEDGE/SHRUB LINE
- TREE LINE
- GR GRAVEL
- BST BITUMINOUS SURFACE TREATMENT (ASPHALT)
- C&G STANDARD CURB AND GUTTER (UNLESS NOTED OTHERWISE)
- CONC, CONC S/W CONCRETE, CONCRETE SIDEWALK
- ⊙ SANITARY SEWER MANHOLE
- ⊙ CLEANOUT
- SANITARY SEWER LINE
- UNDERGROUND STORM SEWER LINE
- INVERT
- FES FLARED END SECTION PIPE
- ROP REINFORCED CONCRETE PIPE
- CMP CORRUGATED METAL PIPE
- DI DROP INLET
- CB CATCH BASIN
- HTR HOUSE TRAILER
- RSTD 2 STORY FRAMED DWELLING
- DM GUY WIRE
- SL SPEED LIMIT SIGN
- ST STOP SIGN
- X-X- FENCE LINE
- MISC. LABEL FOR SIGNS/GUY WIRE
- POST/STOP/SPEED/ETC.
- POWER TRANSFORMER
- ELECTRIC/POWER PEDESTAL
- OVERHEAD ELECTRIC
- POWER DROP
- TELEPHONE PEDESTAL
- TV PEDESTAL
- GAS VALVE
- GAS VENT
- POWER POLE (WITH LIGHT IF NOTED)
- POWER POLE WITH TRANSFORMER
- POWER HANDHOLE
- TELEPHONE/FIBER OPTIC HANDHOLE
- FIRE HYDRANT
- WATER METER
- WATER VALVE
- CALCULATED POINT
- EXISTING IRON PIPE
- ◆ PROJECT CONTROL

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

NO.	DATE	REVISIONS	REMARKS
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

PROJECT NO: 2016106.00

DRAWN BY: ESS
DWS, CHECKED BY: WRB
SCALE: SEE PLAN
DATE: JULY 1ST, 2016



WILLIAM H. HARRELL, CERTIFY THAT THIS SURVEY WAS COMPLETED BY ME OR UNDER MY DIRECT AND RESPONSIBLE CHARGE FROM AN ACTUAL SURVEY COMPLETED ON THE DATE INDICATED HEREON AND THAT THE STANDARDS OF ACCURACY OF THIS SURVEY MEET THE REQUIREMENTS OF THE NORTH CAROLINA SURVEYING ACT AND THE STANDARDS OF ACCURACY OF THE NATIONAL BOARD OF SURVEYING AND MAPPING (NBSM) (2011) (NAD 83) (2011) LOCALIZED COORDINATES. THIS SURVEY WAS COMPLETED ON THE DATE INDICATED HEREON AND ALL ELEVATIONS ARE BASED ON THE MEAN SEA LEVEL DATUM OF SEPTEMBER 1984. NUMBER AND DATE OF ORIGINAL SURVEY PLAN: NAD 83/2011 LOCALIZED COORDINATES. DATE OF REVISION: 04 SEP 2016. (SEE REVISIONS)

WILLIAM H. HARRELL
 PROFESSIONAL SURVEYOR
 REGISTRATION NO. L-4371

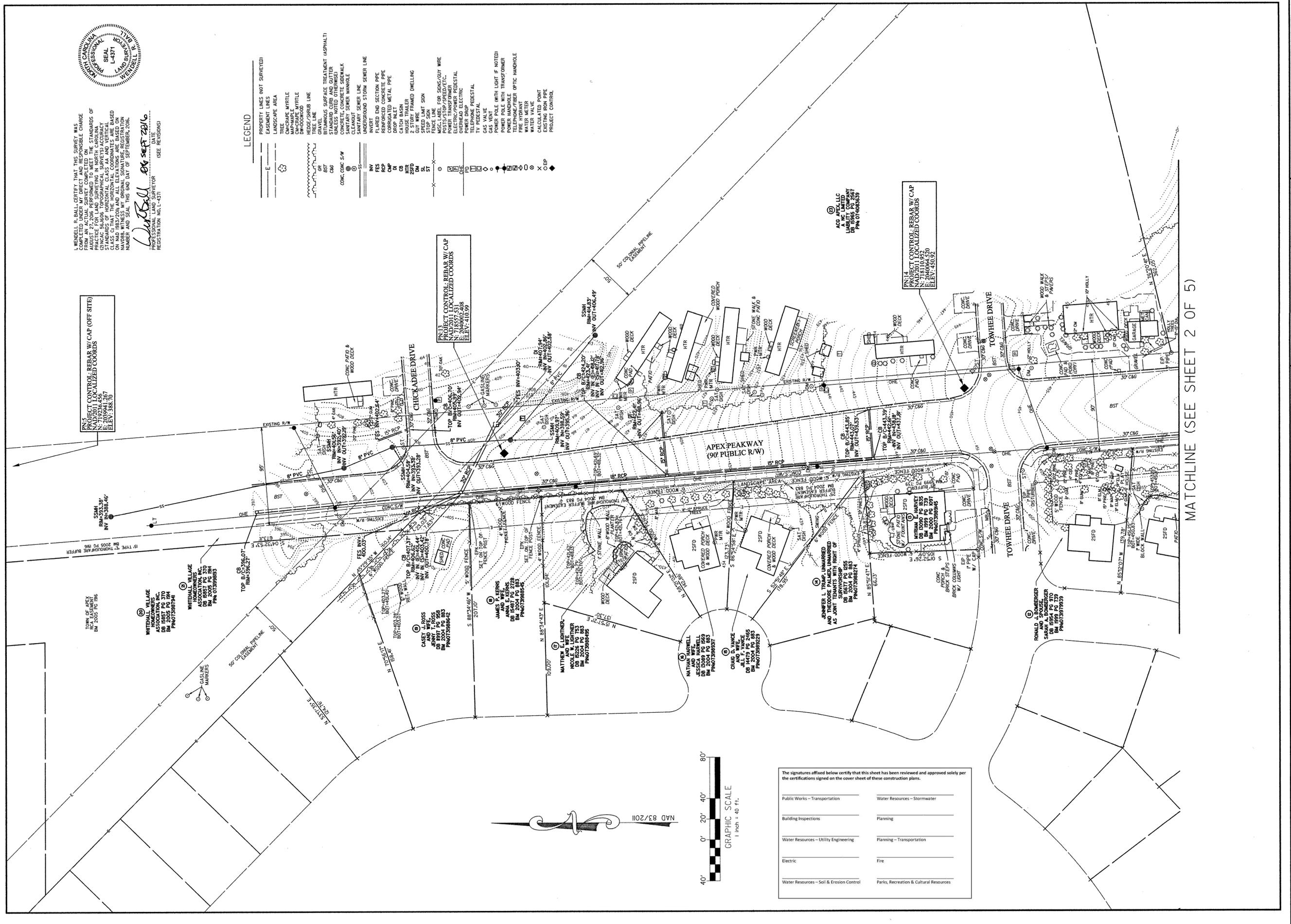
- LEGEND**
- PROPERTY LINES (NOT SURVEYED)
 - EASEMENT LINES
 - LANDSCAPE AREA
 - TREE
 - CADMIUM W/RTILE
 - CHE-CHROME W/RTILE
 - UNDEVELOPED
 - UNDEVELOPED LINE
 - GRAVEL
 - STANDARD 3/8" AG OUTLET
 - STANDARD 1/2" AG OUTLET
 - CONCRETE CONCRETE SIDEWALK
 - CLEANOUT SPOCK MANHOLE
 - UNDERGROUND STORM SEWER LINE
 - FLARED END SECTION PIPE
 - REINFORCED CONCRETE PIPE
 - CORRUGATED METAL PIPE
 - CONCRETE
 - CATCH BASIN
 - HOUSE TRAILER
 - 2 STORY FRAMED DWELLING
 - SPEED LIMIT SIGN
 - STOP SIGN
 - MCG. LABEL FOR SIGNS/STREET LIGHTS
 - POSTS/STOP/SPEED/ETC.
 - OVERHEAD POWER REDESTAL
 - ELECTRIC POWER REDESTAL
 - POWER DROP REDESTAL
 - TV REDESTAL
 - GAS VALVE
 - GAS VENT
 - POWER POLE WITH TRANSFORMER
 - TELEPHONE/FIBER OPTIC HANDHOLE
 - FIRE HYDRANT
 - WATER VALVE
 - CALCULATED POINT
 - EXISTING IRON PIPE
 - PROJECT CONTROL

PROJECT CONTROL-REBAR W/ CAP (OFF SITE)
 NAD 2011 LOCALIZED COORDS
 N: 719236.456
 E: 204006.520
 ELEV: 388.70

PROJECT CONTROL-REBAR W/ CAP
 NAD 2011 LOCALIZED COORDS
 N: 204006.408
 E: 204006.408
 ELEV: 410.99

PROJECT CONTROL-REBAR W/ CAP
 NAD 2011 LOCALIZED COORDS
 N: 718110.953
 E: 204006.520
 ELEV: 450.52

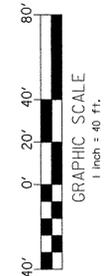
ACG PEAK, LLC
 A NC LIMITED
 LIABILITY COMPANY
 DB 1585 PG 2587
 PIN 074085639



MATCHLINE (SEE SHEET 2 OF 5)

APEX PEAKWAY SOUTHWEST CONNECTOR, GRADE SEPARATION OF SOUTH SALEM STREET & CSX RAILROAD - PHASE 2, NEPA AND SURVEYS, APEX, NC

TOWN OF APEX, WHITE OAK TOWNSHIP, WAKE COUNTY, NORTH CAROLINA



The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

NO.	DATE	REVISIONS	REMARKS
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

PROJECT NO: 2016106.00
 DRAWN BY: ESS
 DWG. CHECKED BY: WRB
 SCALE: SEE PLAN
 DATE: JULY 1ST, 2016

PAVEMENT SCHEDULE <i>PRELIMINARY PAVEMENT DESIGN</i>	
C1	PROP. APPROX. 1.5" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
C2	PROP. APPROX. 2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 224 LBS. PER SQ. YD.
C3	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS
C4	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT TO EXCEED 2" IN DEPTH
D1	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 2-1/2" OR GREATER THAN 4" IN DEPTH
E1	PROP. APPROX. 5" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT GREATER THAN 5-1/2" IN DEPTH OR LESS THAN 4" IN DEPTH.
J1	PROP. 6" AGGREGATE BASE COURSE (WOVEN GEOTEXTILE FABRIC).
J2	PROP. 10" AGGREGATE BASE COURSE.
R1	2'-6" CONCRETE CURB AND GUTTER.
R2	5" MONOLITHIC ISLAND (KEYED-IN)
R3	9" X 12" CONCRETE CURB
R4	1'-6" CONCRETE CURB AND GUTTER.
S	4" CONCRETE SIDEWALK.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
V1	MILLING BITUMINOUS PAVEMENT. 1.5" DEPTH.
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL SHEET No. (2A-3))
X	PROP. GUARDRAIL

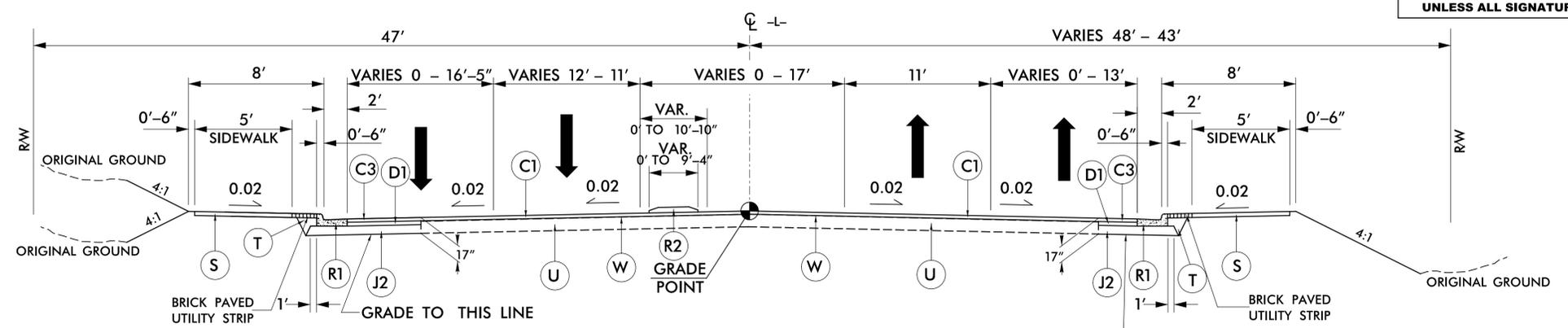
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.	
Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



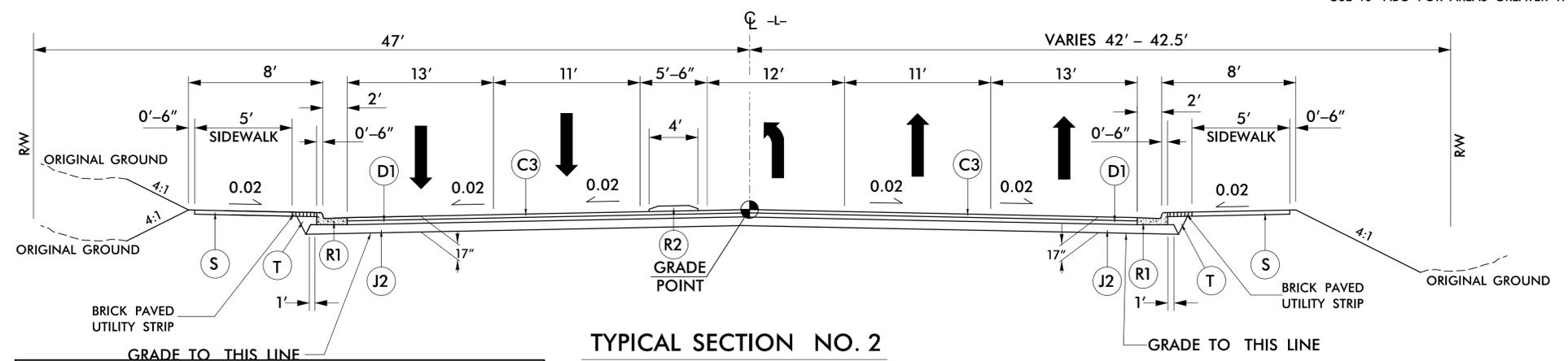
PROJECT REFERENCE NO. <i>U-5928</i>	SHEET NO. <i>2A-1</i>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



**TYPICAL SECTION NO. 1
APEX PEAKWAY**

USE TYPICAL SECTION NO. 1 AS FOLLOWS:
-L- STA. 10+70.00 TO 17+15.00

NOTE: USE 5" B25.0C FOR AREAS LESS THAN 6' WIDE
USE 10" ABC FOR AREAS GREATER THAN 6' WIDE



**TYPICAL SECTION NO. 2
APEX PEAKWAY**

USE TYPICAL SECTION NO. 2 AS FOLLOWS:
-L- (LT) STA. 17+15.00 TO 17+55.00
-L- (RT) STA. 17+15.00 TO 17+65.00

VAR. DEPTH MILLING AT PAVEMENT TIE-INS

NOTES TO CONTRACTOR

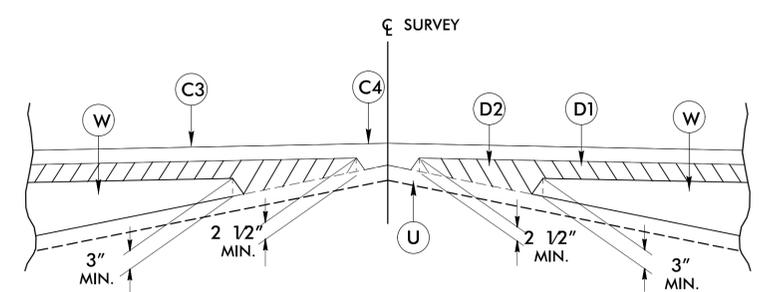
For surface mixes over 1" in thickness, mill the existing pavement in accordance with the following sketch as directed by the Engineer.

Locations shall include ties into existing concrete pavement, at bridge approaches where the bridge will not be resurfaced, and at the beginning and ending point of each resurfacing map.

Perform the work in accordance with Section 607 of the January 2024 North Carolina Department of Transportation Standard Specifications for Roads and Structures. Resurfacing will be accomplished at the same time as the milling operation.

APPROX. 1.5" (THICKNESS OF SURFACE COURSE)

-L- STA. 10+70.00 TO 11+00.00
-L- STA. 36+00.00 TO 36+30.00
-Y- STA. 10+00.00 TO 10+30.00



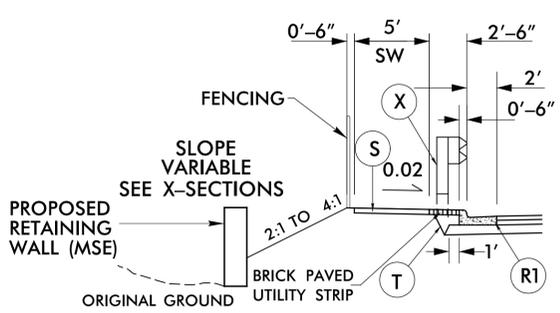
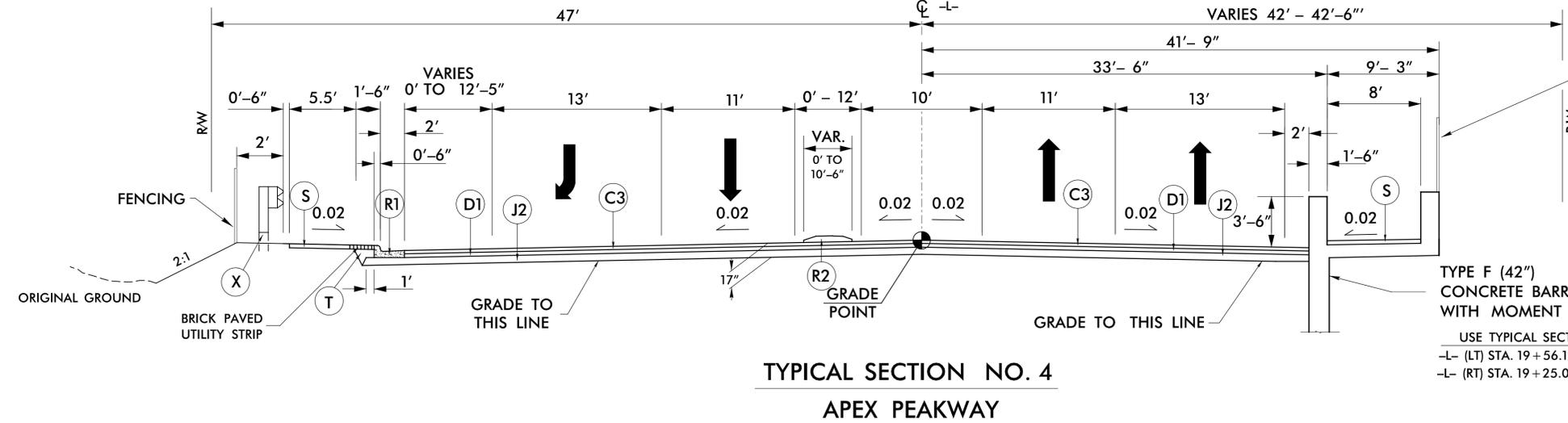
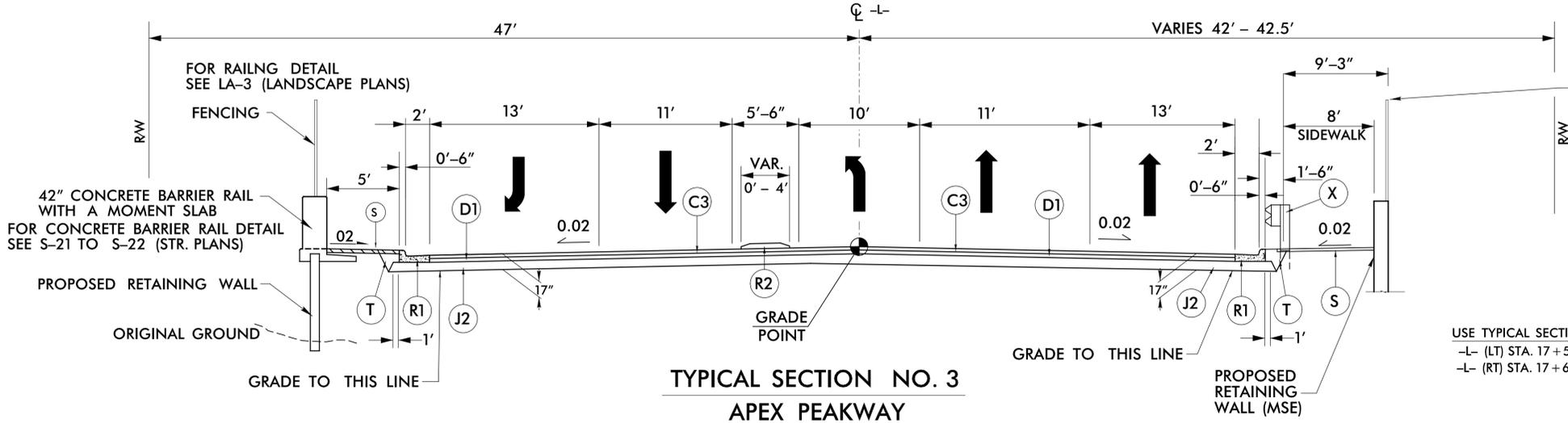
Detail Showing Method of Wedging

PAVEMENT SCHEDULE PRELIMINARY PAVEMENT DESIGN	
C1	1.5" S9.5C
C2	2" S9.5C
C3	3" S9.5C
C4	VAR. DEPTH S9.5C
D1	4" I19.0C
D2	VAR. DEPTH I19.0C,
J1	6" ABC.
J2	10" ABC.
R1	2'-6" CONCRETE CURB AND GUTTER.
R2	5" MONOLITHIC ISLAND
S	4" CONCRETE SIDEWALK.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
V1	MILLING 1.5" DEPTH.
W	WEDGING
X	PROP. GUARDRAIL

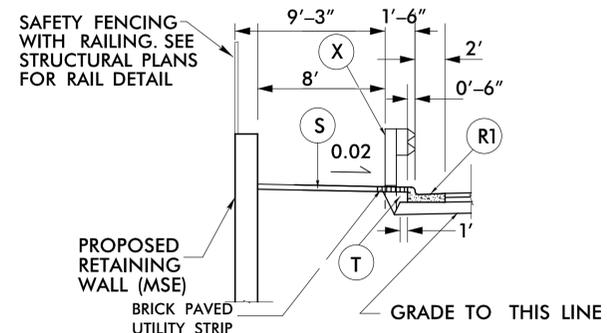
vhb
 VHB Engineering NC, P.C. (C-3705)
 940 Main Campus Drive, Suite 500
 Raleigh, NC 27606



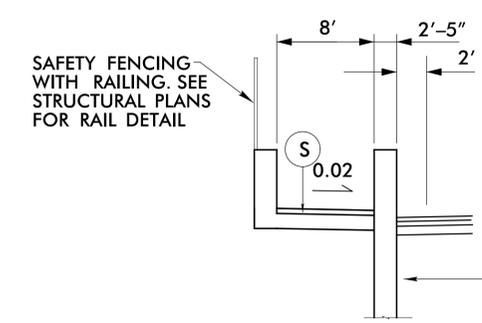
PROJECT REFERENCE NO. U-5928	SHEET NO. 2A-2
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



INSET 4A
 TO BE USED IN CONJUNCTION WITH
 TYPICAL SECTION NO. 7
 -L- (LT) STA. 21+00.00 TO STA. 21+61.18



INSET 4B
 TO BE USED IN CONJUNCTION WITH
 TYPICAL SECTION NO. 4
 -L- (LT) STA. 21+61.18 TO STA. 21+85.68



INSET 4C
 TO BE USED IN CONJUNCTION WITH
 TYPICAL SECTION NO. 4
 -L- (LT & RT) STA. 21+85.68 TO STA. 22+09.85

* NOTE: USE WOOD RUB RAIL IN ALL GUARDRAIL LOCATIONS WHERE GUARDRAIL IS AT FACE OF CURB.

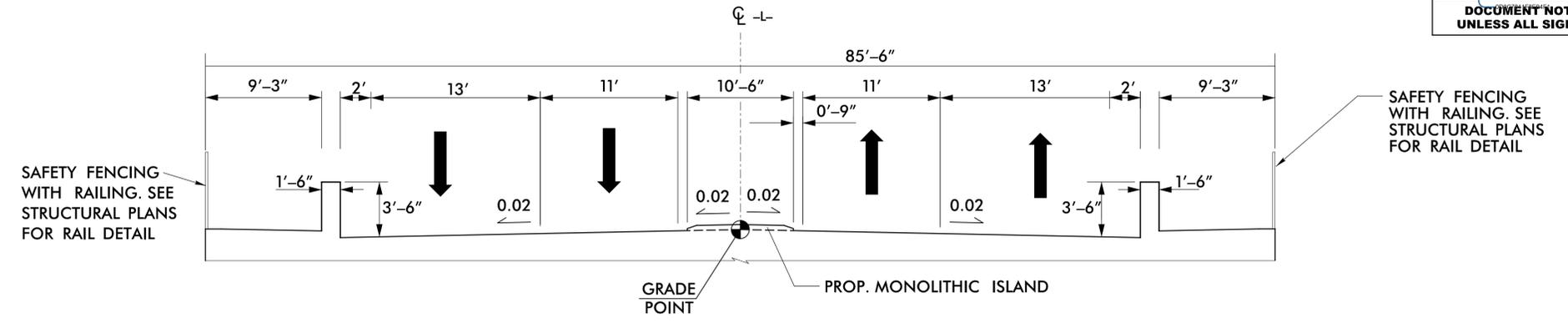


VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



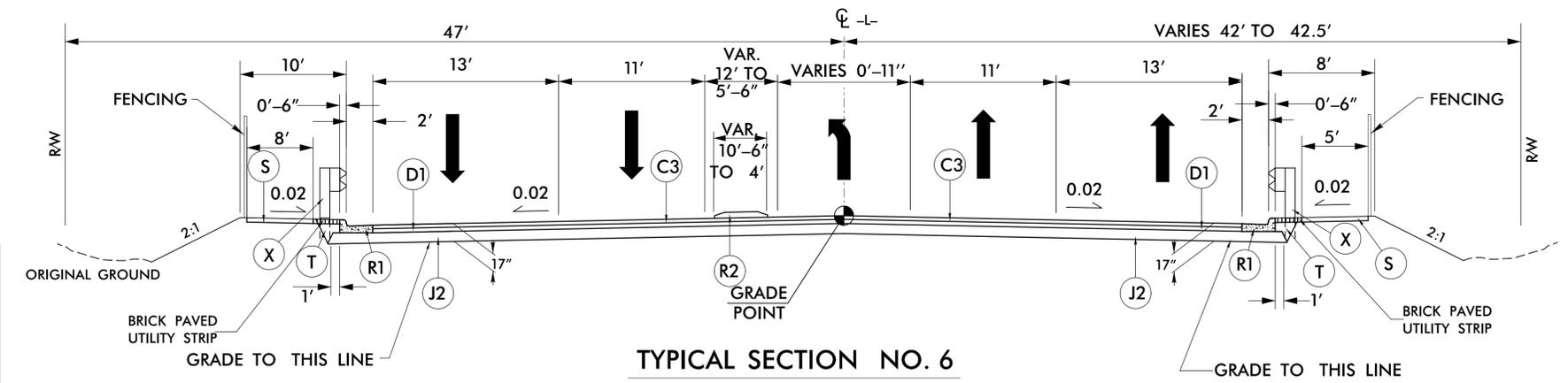
PROJECT REFERENCE NO. <i>U-5928</i>	SHEET NO. <i>2A-3</i>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

PAVEMENT SCHEDULE <small>PRELIMINARY PAVEMENT DESIGN</small>	
C1	1.5" S9.5C
C2	2" S9.5C
C3	3" S9.5C
C4	VAR. DEPTH S9.5C
D1	4" I19.0C
D2	VAR. DEPTH I19.0C,
E1	5" B25.0C
E2	VAR. DEPTH B25.0C,
J1	6" ABC.
J2	10" ABC.
R1	2'-6" CONCRETE CURB AND GUTTER.
R2	5" MONOLITHIC ISLAND
S	4" CONCRETE SIDEWALK.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
V1	MILLING 1.5" DEPTH.
W	WEDGING
X	PROP. GUARDRAIL



TYPICAL SECTION NO. 5
APEX PEAKWAY

USE TYPICAL SECTION NO. 5 AS FOLLOWS:
BEGIN BRIDGE -L- STA. 22+09.85 TO END BRIDGE -L- 24+12.68



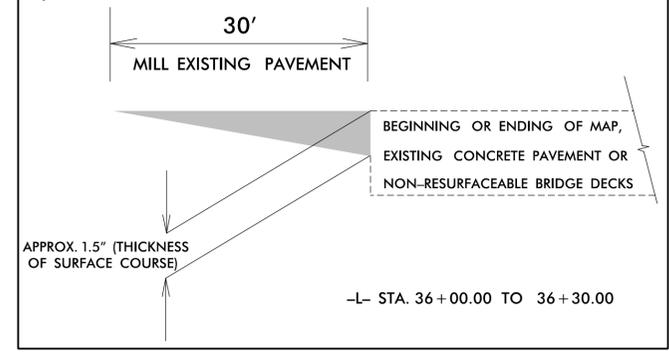
TYPICAL SECTION NO. 6
APEX PEAKWAY

USE TYPICAL SECTION NO. 6 AS FOLLOWS:
-L- STA. 24+12.68 TO 28+65

NOTE: FROM -L- STA. 25+43.10 (LT & RT) TO STA. 28+52.78, TRANSITION FROM 2:1 (BEHIND GUARDRAIL) TO 4:1 (NO GUARDRAIL)

VAR. DEPTH MILLING AT PAVEMENT TIE-INS

NOTES TO CONTRACTOR
For surface mixes over 1" in thickness, mill the existing pavement in accordance with the following sketch as directed by the Engineer.
Locations shall include ties into existing concrete pavement, at bridge approaches where the bridge will not be resurfaced, and at the beginning and ending point of each resurfacing map.
Perform the work in accordance with Section 607 of the January 2024 North Carolina Department of Transportation, Standard Specifications for Roads and Structures. Resurfacing will be accomplished at the same time as the milling operation.



PAVEMENT SCHEDULE PRELIMINARY PAVEMENT DESIGN	
C1	1.5" S9.5C
C2	2" S9.5C
C3	3" S9.5C
C4	VAR. DEPTH S9.5C
D1	4" I19.0C
D2	VAR. DEPTH I19.0C
J1	6" ABC.
J2	10" ABC.
R1	2'-6" CONCRETE CURB AND GUTTER.
R2	5" MONOLITHIC ISLAND
R3	9" X 12" CONCRETE CURB
R4	1'-6" CONCRETE CURB AND GUTTER.
S	4" CONCRETE SIDEWALK.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
W	WEDGING
X	PROP. GUARDRAIL

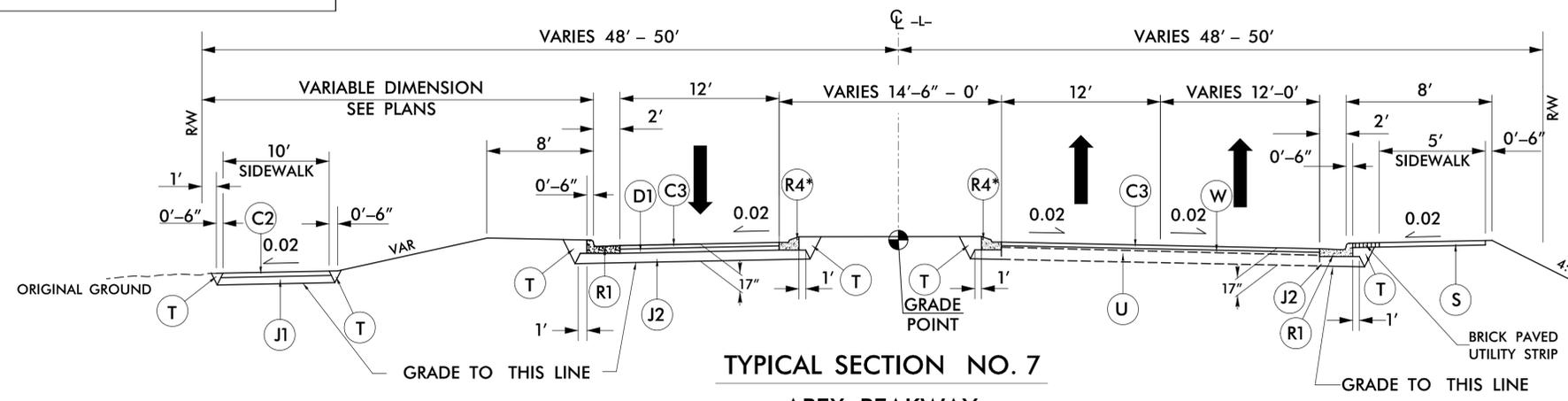
The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

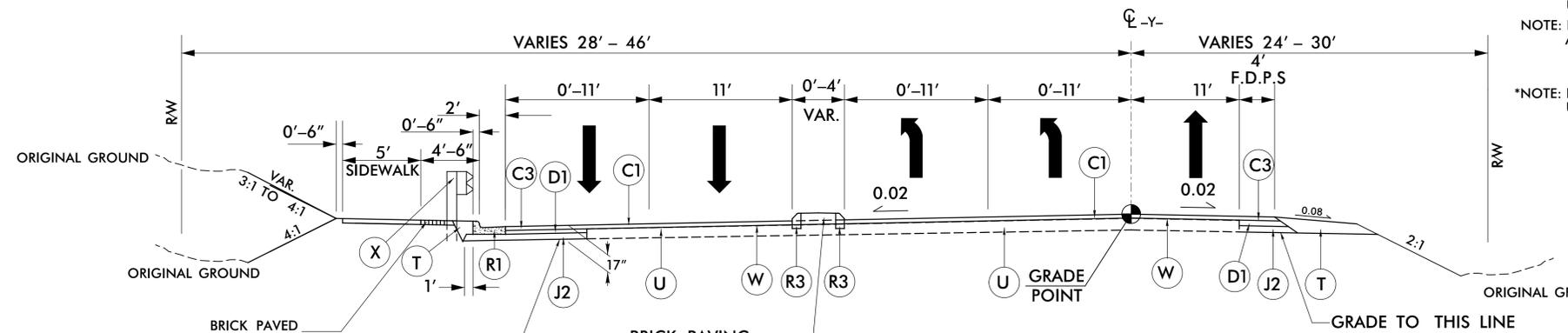


PROJECT REFERENCE NO. U-5928	SHEET NO. 2A-4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



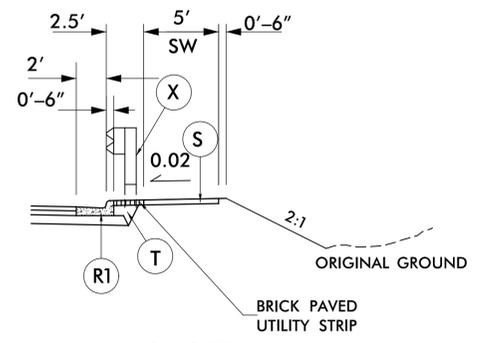
**TYPICAL SECTION NO. 7
APEX PEAKWAY**

USE TYPICAL SECTION NO. 7 AS FOLLOWS:
-L- STA. 28+65 TO 36+30.00
NOTE: USE 5" B25.0C FOR AREAS LESS THAN 6' WIDE
USE 10" ABC FOR AREAS GREATER THAN 6' WIDE
NOTE: FROM -L- STA. 28+65 TO 28+90, MILL 3" AND WEDGE PAVEMENT TO PROPOSED GRADE. (SEE MILLING DETAIL ON PLAN SHEET 6)
*NOTE: IN AREAS WHERE MEDIAN NARROWS TO 5'-6" OR LESS USE R2 IN LIEU OF R4



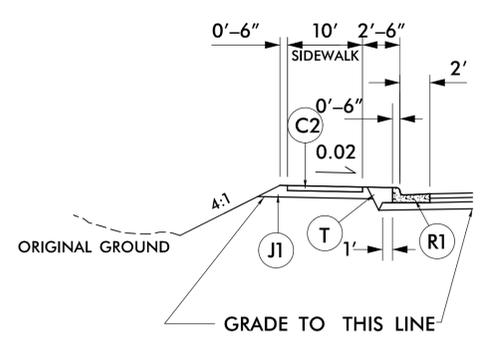
**TYPICAL SECTION NO. 8
SALEM STREET**

USE TYPICAL SECTION NO. 8 AS FOLLOWS:
-Y- STA. 10+00.00 TO -Y- 31+63.42
NOTE: USE 5" B25.0C FOR AREAS LESS THAN 6' WIDE
USE 10" ABC FOR AREAS GREATER THAN 6' WIDE



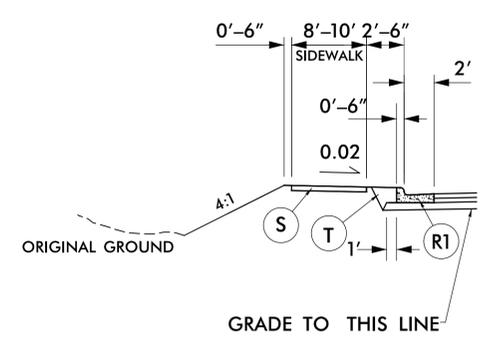
INSET 7A

TO BE USED IN CONJUNCTION WITH
TYPICAL SECTION NO. 7
-L- RT STA. 30+25.00 TO STA. 35+25.00



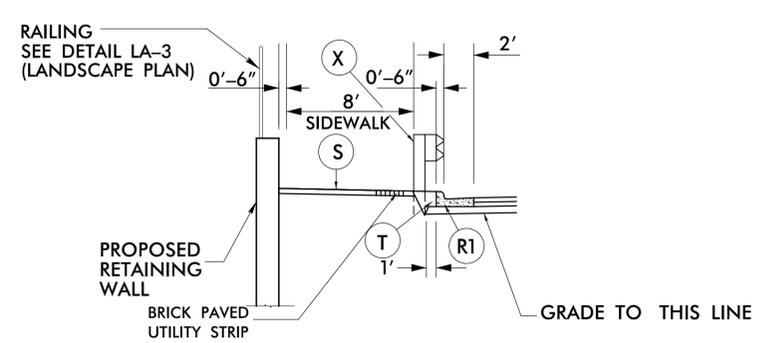
INSET 8A

TO BE USED IN CONJUNCTION WITH
TYPICAL SECTION NO. 8
-Y- LT STA. 10+00.00 TO STA. 10+96.25



INSET 8B

TO BE USED IN CONJUNCTION WITH
TYPICAL SECTION NO. 8
-Y- LT STA. 11+35.75 TO STA. 13+63.75



INSET 8C

TO BE USED IN CONJUNCTION WITH
TYPICAL SECTION NO. 8
-Y- LT STA. 13+63.75 TO STA. 18+20.00

* NOTE: USE WOOD RUB RAIL IN ALL GUARDRAIL LOCATIONS WHERE GUARDRAIL IS AT FACE OF CURB.

PAVEMENT SCHEDULE	
PRELIMINARY PAVEMENT DESIGN	
C1	1.5" S9.5C
C2	2" S9.5C
C3	3" S9.5C
C4	VAR. DEPTH S9.5C
D1	4" I19.0C
D2	VAR. DEPTH I19.0C,
E1	5" B25.0C
E2	VAR. DEPTH B25.0C,
J1	6" ABC.
J2	10" ABC.
R1	2'-6" CONCRETE CURB AND GUTTER.
R2	5" MONOLITHIC ISLAND
R3	9" X 12" CONCRETE CURB
S	4" CONCRETE SIDEWALK.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
V1	MILLING 1.5" DEPTH.
W	WEDGING
X	PROP. GUARDRAIL

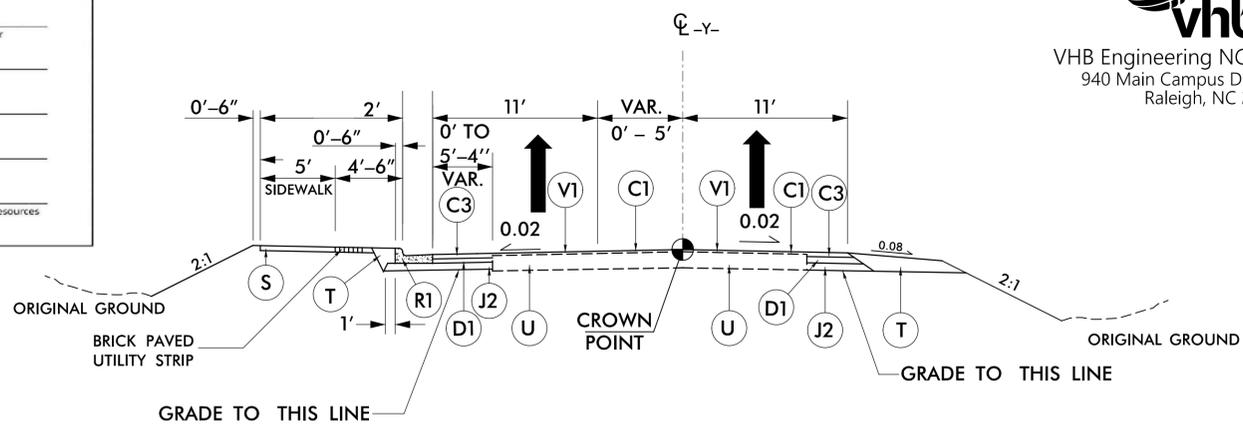
The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

vhb
 VHB Engineering NC, P.C. (C-3705)
 940 Main Campus Drive, Suite 500
 Raleigh, NC 27606

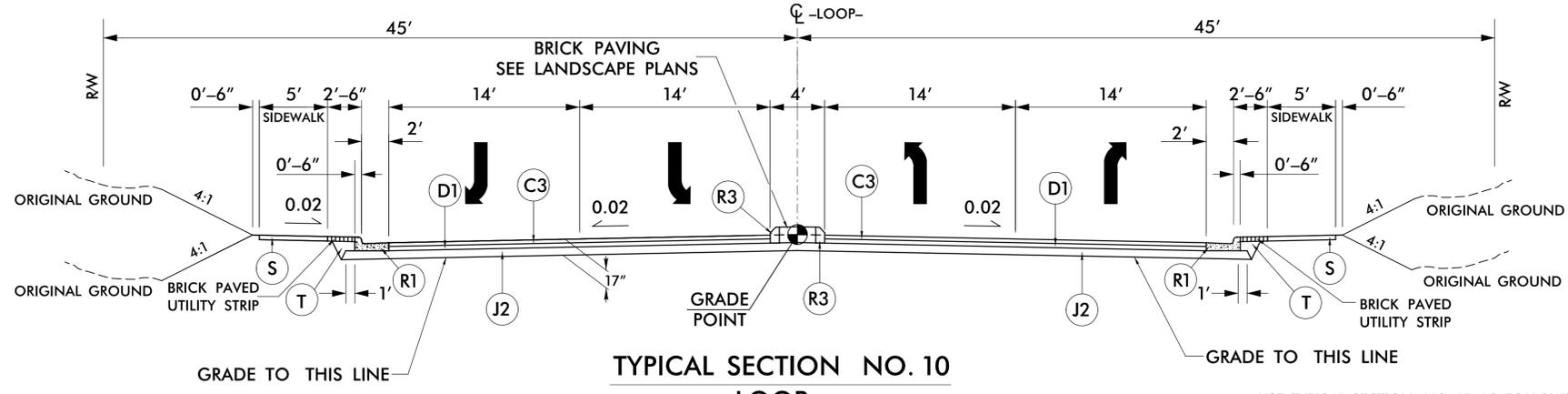


PROJECT REFERENCE NO. U-5928	SHEET NO. 2A-5
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
DOCUMENT IS NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



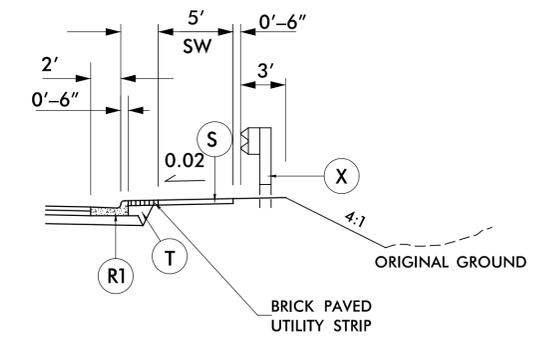
TYPICAL SECTION NO. 9
SALEM STREET

USE TYPICAL SECTION NO. 9 AS FOLLOWS:
 -Y- STA. 31+63.42 TO -Y- 33+12.10
 NOTE: USE 5" B25.0C FOR AREAS LESS THAN 6' WIDE
 USE 10" ABC FOR AREAS GREATER THAN 6' WIDE



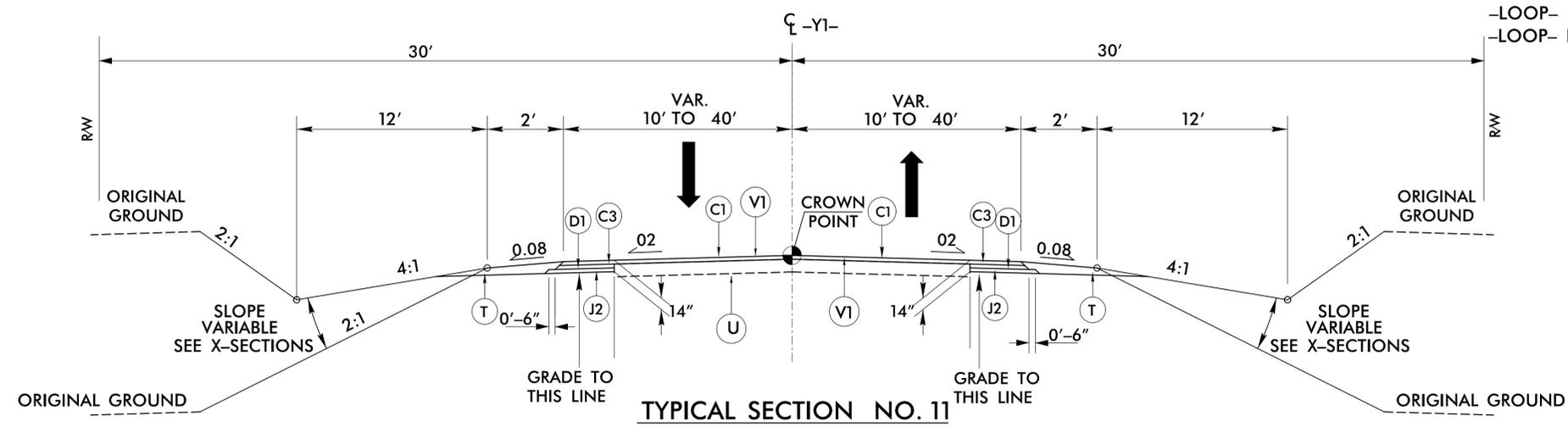
TYPICAL SECTION NO. 10
-LOOP-

USE TYPICAL SECTION NO. 10 AS FOLLOWS:
 -LOOP- STA. 10+32.48 TO 16+12.69



INSET 10A

TO BE USED IN CONJUNCTION WITH
 TYPICAL SECTION NO. 10
 -LOOP- RT STA. 10+57.48 TO STA. 11+05.20
 -LOOP- LT STA. 10+98.04 TO STA. 12+29.29



TYPICAL SECTION NO. 11

USE TYPICAL SECTION NO. 11 AS FOLLOWS:
 -Y1- STA. 10+00.00 TO STA. 11+01.75
 -Y1- STA. 13+03.89 TO STA. 13+68.89

NOTE: USE 5" B25.0C FOR AREAS LESS THAN 6' WIDE
 USE 10" ABC FOR AREAS GREATER THAN 6' WIDE

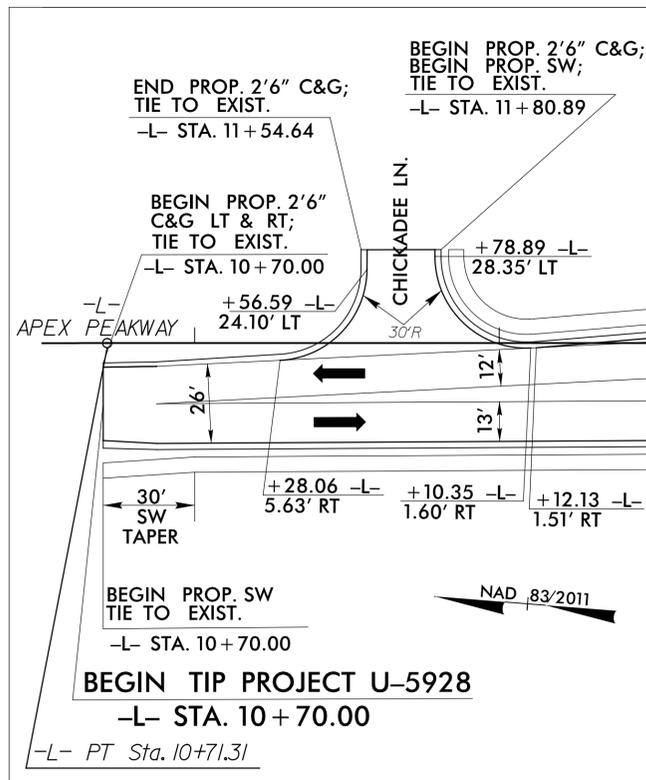
INTERSECTION DETAILS



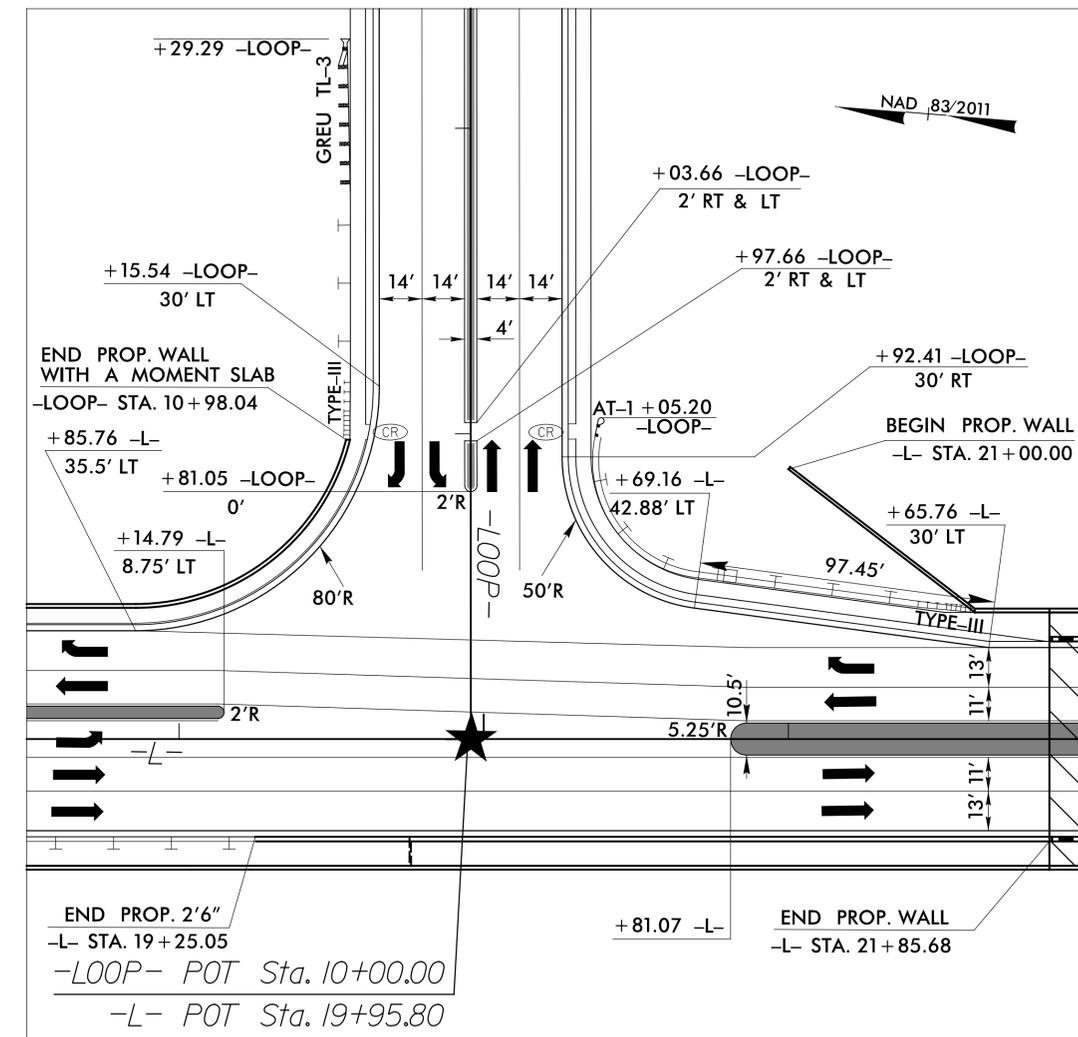
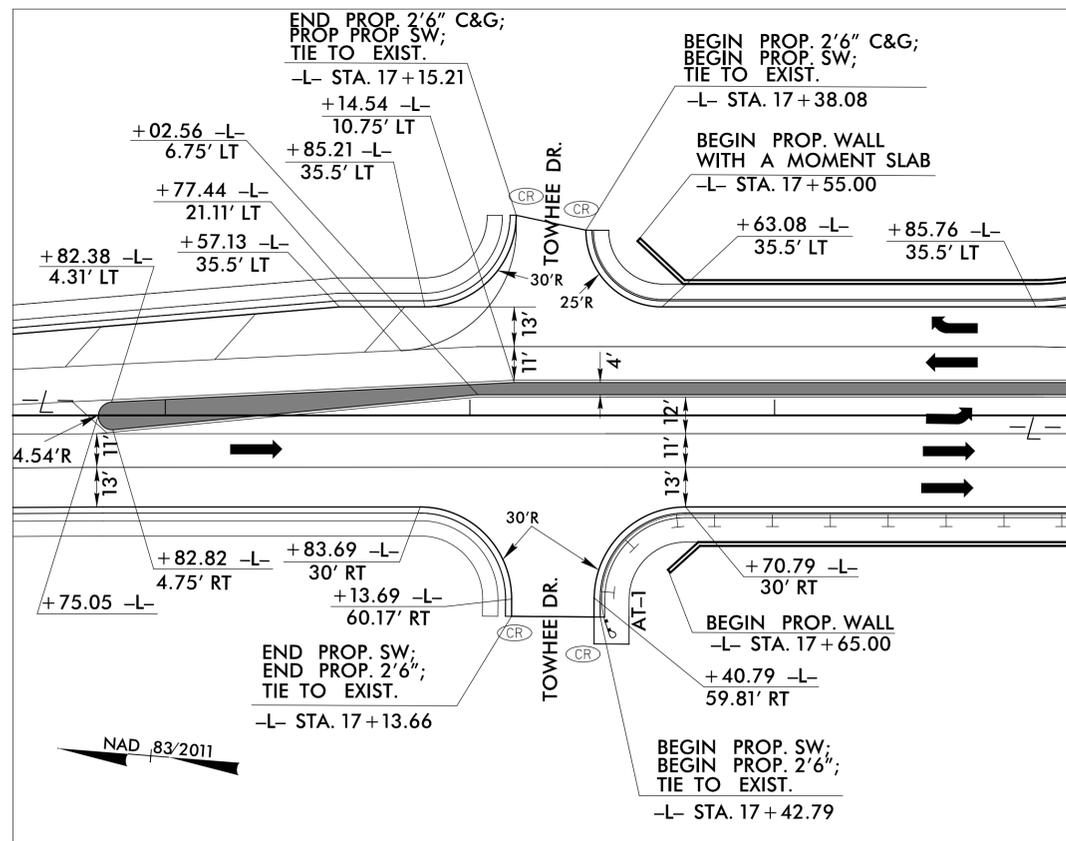
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



PROJECT REFERENCE NO. U-5928	SHEET NO. 2B-1
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	
3/12/2024	
<p>DO NOT CONSIDER THIS FINAL UNLESS ALL SIGNATURES COMPLETED</p>	



DETAIL 1
-L- STA. 10+70.00 TO 12+50.00



DETAIL 3
-L- STA. 18+50.00 TO 22+00.00

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources



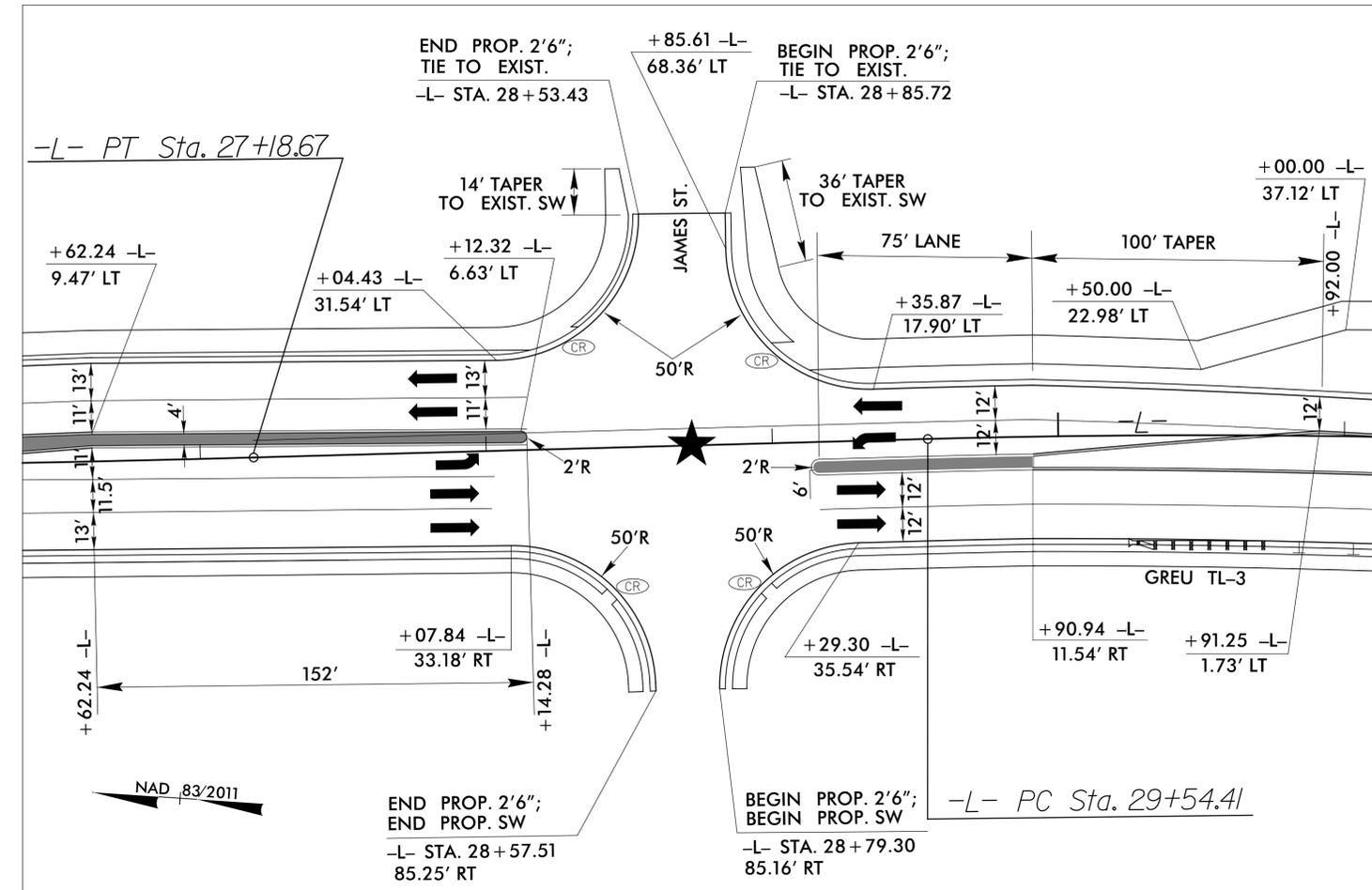
5/14/99



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

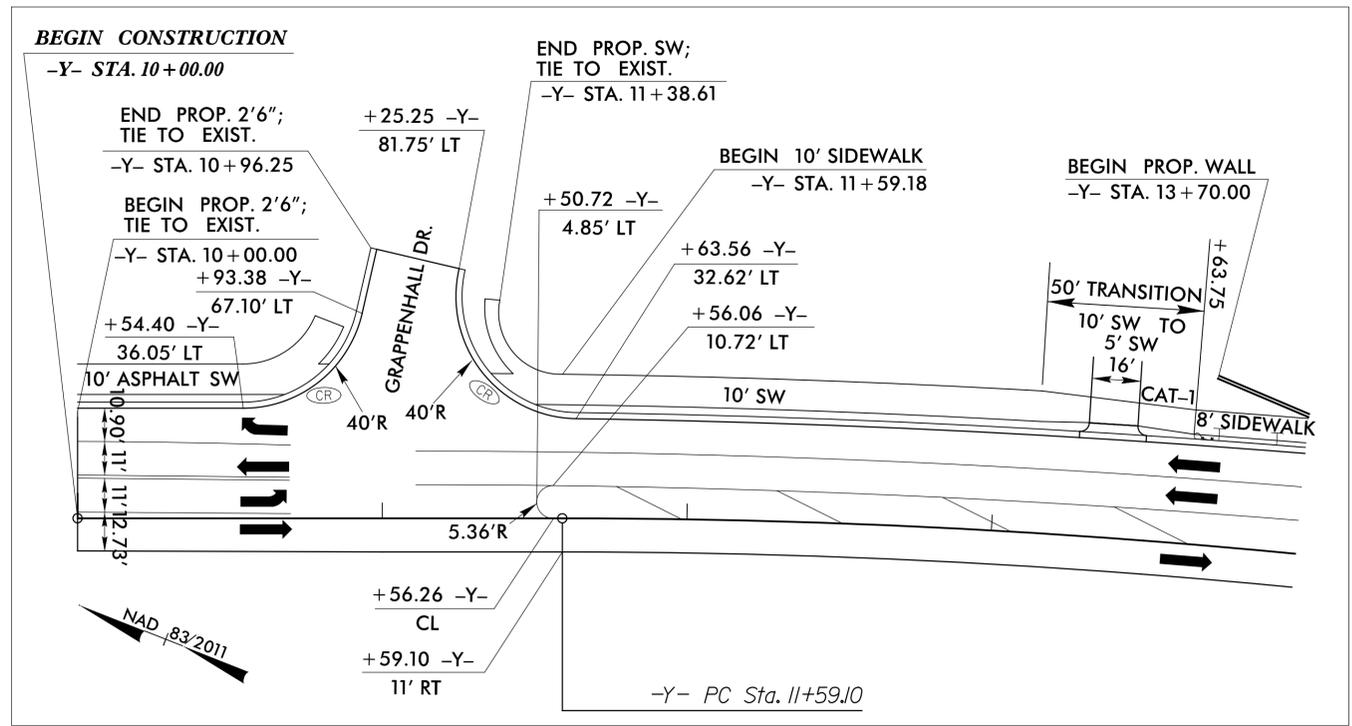


PROJECT REFERENCE NO. U-5928	SHEET NO. 2B-2
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	
<small>DESIGNED BY: Timothy Goins</small> DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



INTERSECTION DETAILS

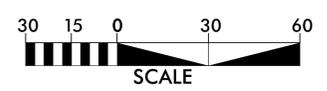
DETAIL 4 -L- STA. 27+50.00 TO 30+50.00



DETAIL 5 -Y- STA. 10+00.00 TO 14+00.00

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources



9/22/2009 10:36:28 a.m. rdy_2B-2.dgn

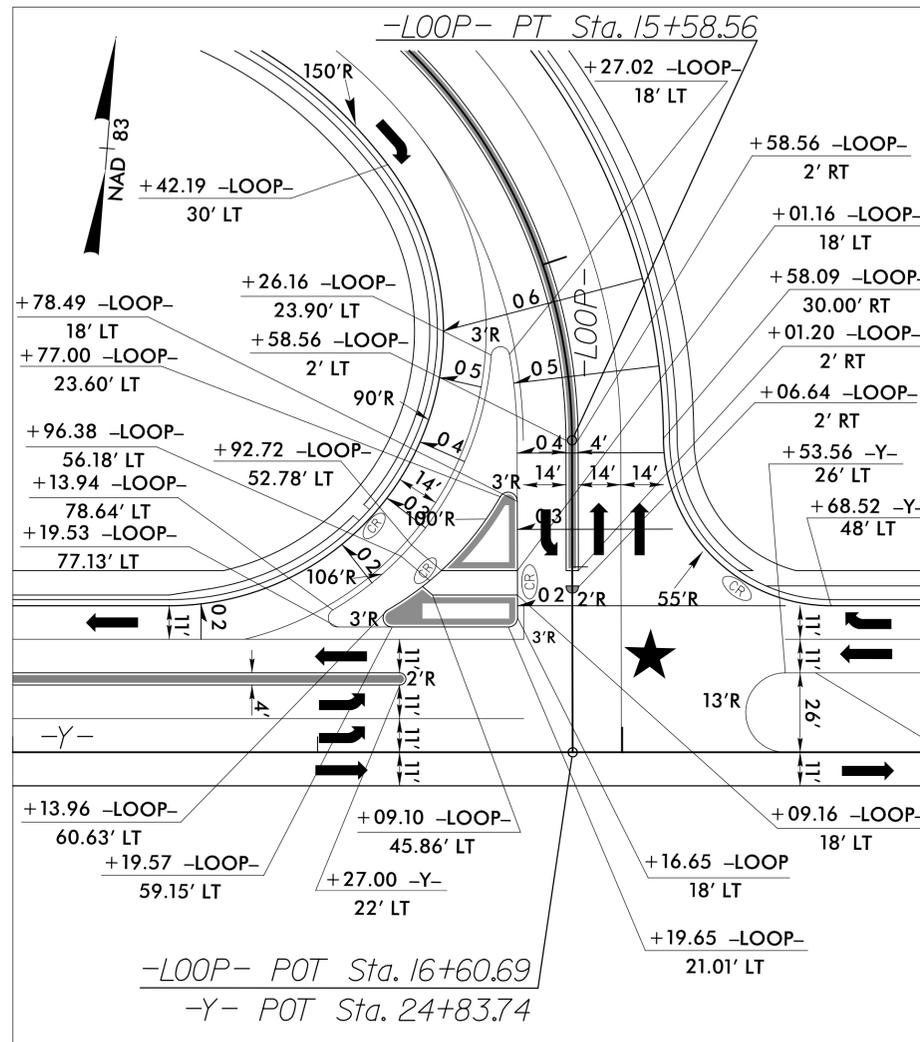
INTERSECTION DETAILS



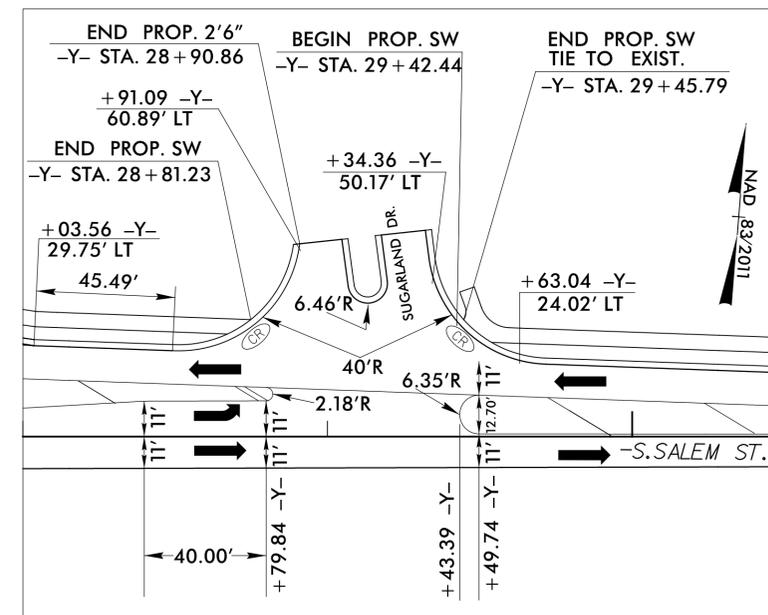
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



PROJECT REFERENCE NO. U-5928	SHEET NO. 2B-3
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



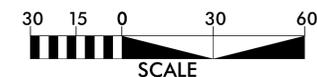
DETAIL 6
-Y- STA. 23+00 TO 26+00



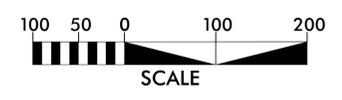
DETAIL 7
-Y- STA. 28+00.00 TO 30+50.00

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources



9/22/2020 10:56:28_rdy_2B-3.dgn



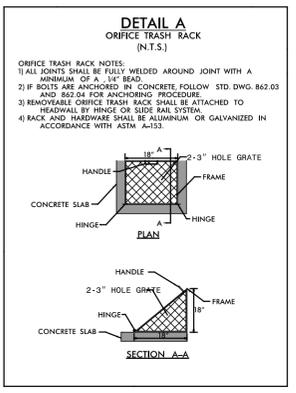
vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

APEX
1873
NORTH CAROLINA

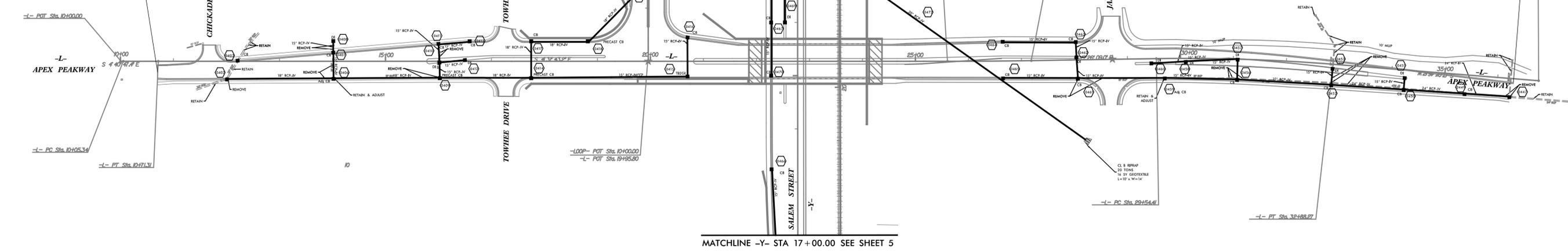
PROJECT REFERENCE NO. **U-5928** SHEET NO. **28-4**
REV. SHEET NO. _____
ROADWAY DESIGN ENGINEER _____
HYDRAULICS ENGINEER _____
DESIGNED BY: **David Becker**
CHECKED BY: **Timothy Coats**
DATE: **12/20/21**
NAD 83 2011
HIDED FINAL
ISS COMPLETED

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources



BEGIN TIP PROJECT U-5928
-L- STA. 10 + 70.00



FOR -L- PROFILE SEE SHEET 6
FOR -Y- PROFILE SEE SHEET 7
FOR -LOOP- PROFILE SEE SHEET 8

U:\17\28\28-4.dwg 12/20/21 10:28:56 AM

8/17/99

REVISIONS

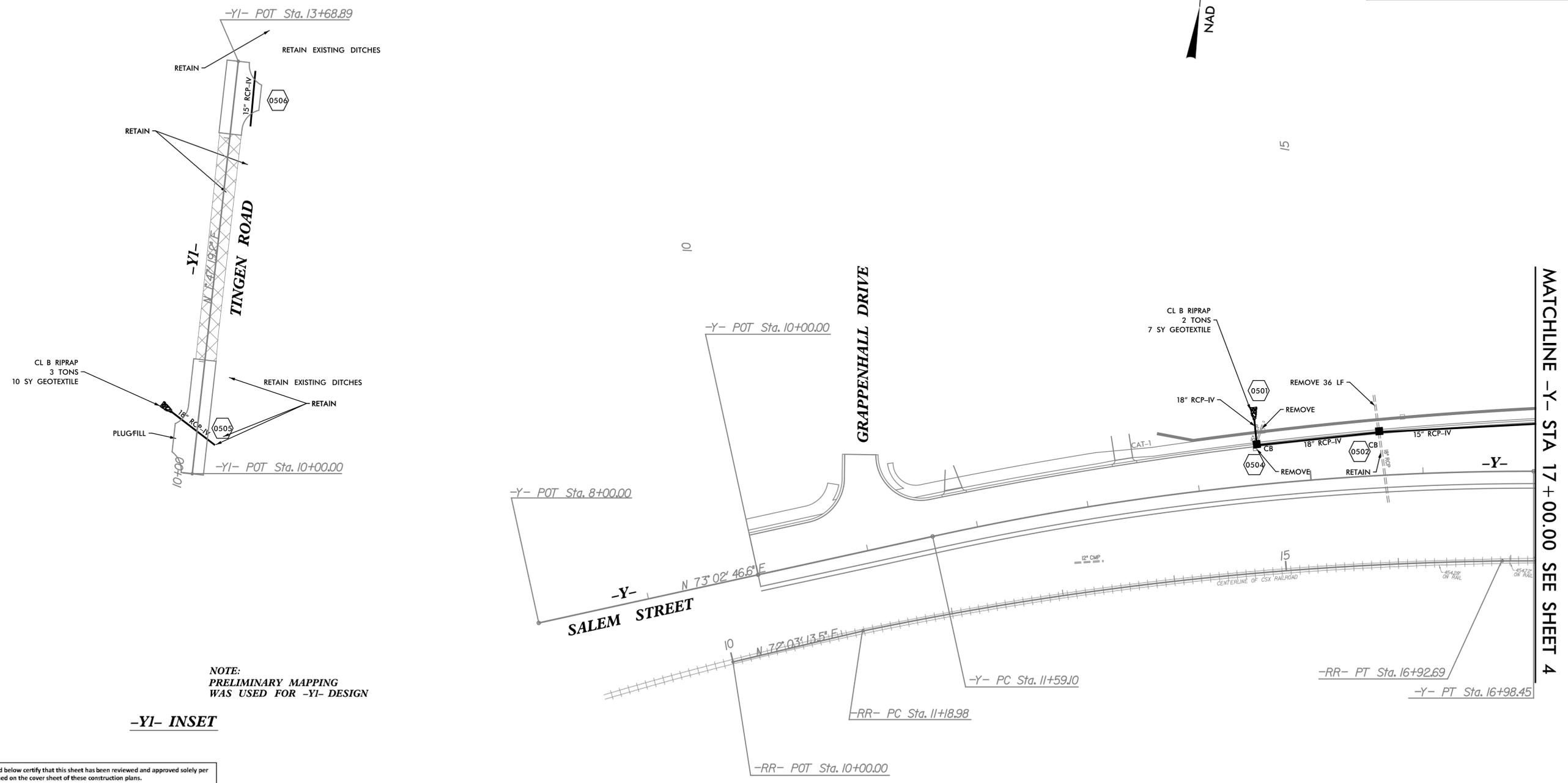
1/13/2021
U65%28-R.dwg-2B-6.dgn
PROJECT



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



PROJECT REFERENCE NO. <i>U-5928</i>	SHEET NO. <i>2B-5</i>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER 	HYDRAULICS ENGINEER
<p>DESIGNED BY: <i>Timothy Coates</i></p> <p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p>	



The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

8/17/99

REVISIONS



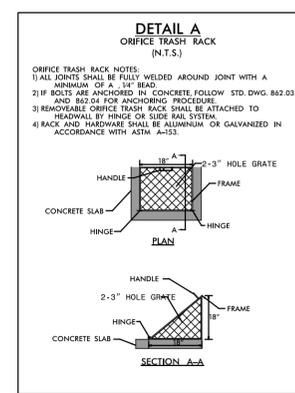
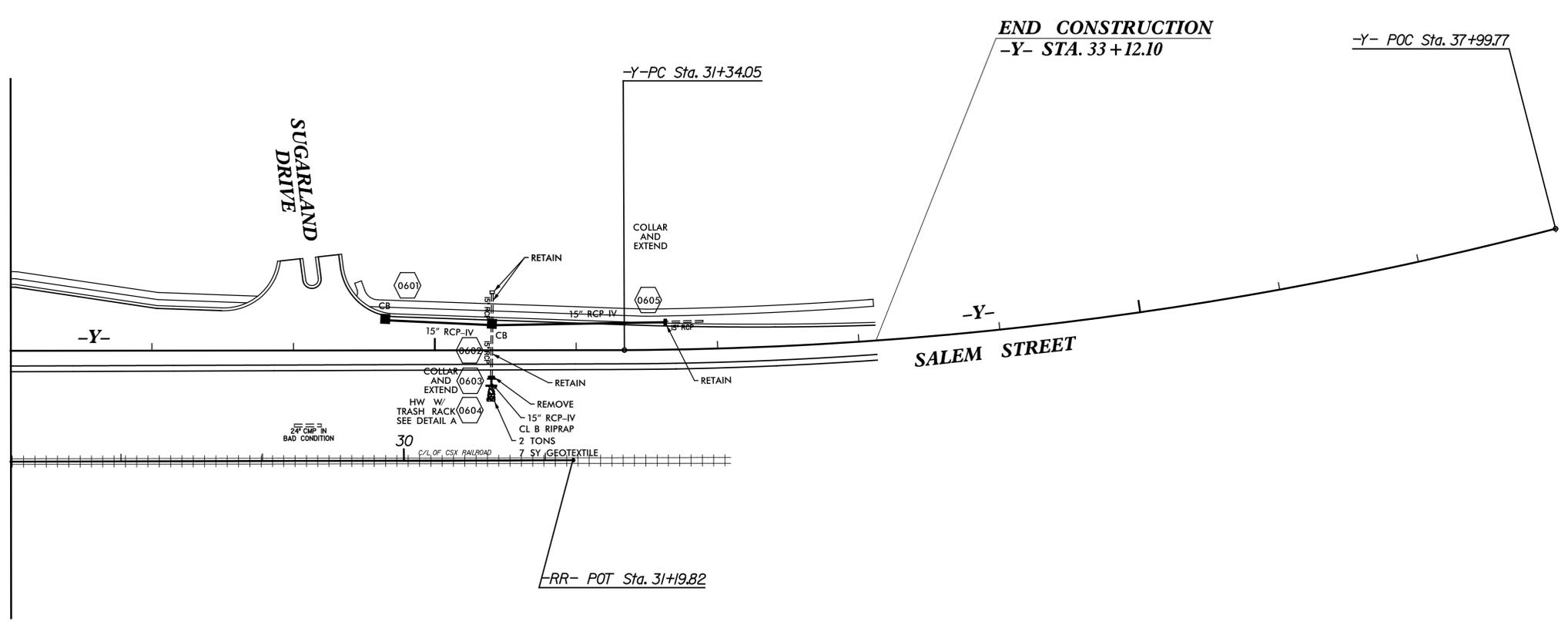
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



PROJECT REFERENCE NO. <i>U-5928</i>	SHEET NO. <i>2B-6</i>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<p>Documented by: <i>Timothy Coons</i></p> <p>4/3/2021</p> <p>NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p>	



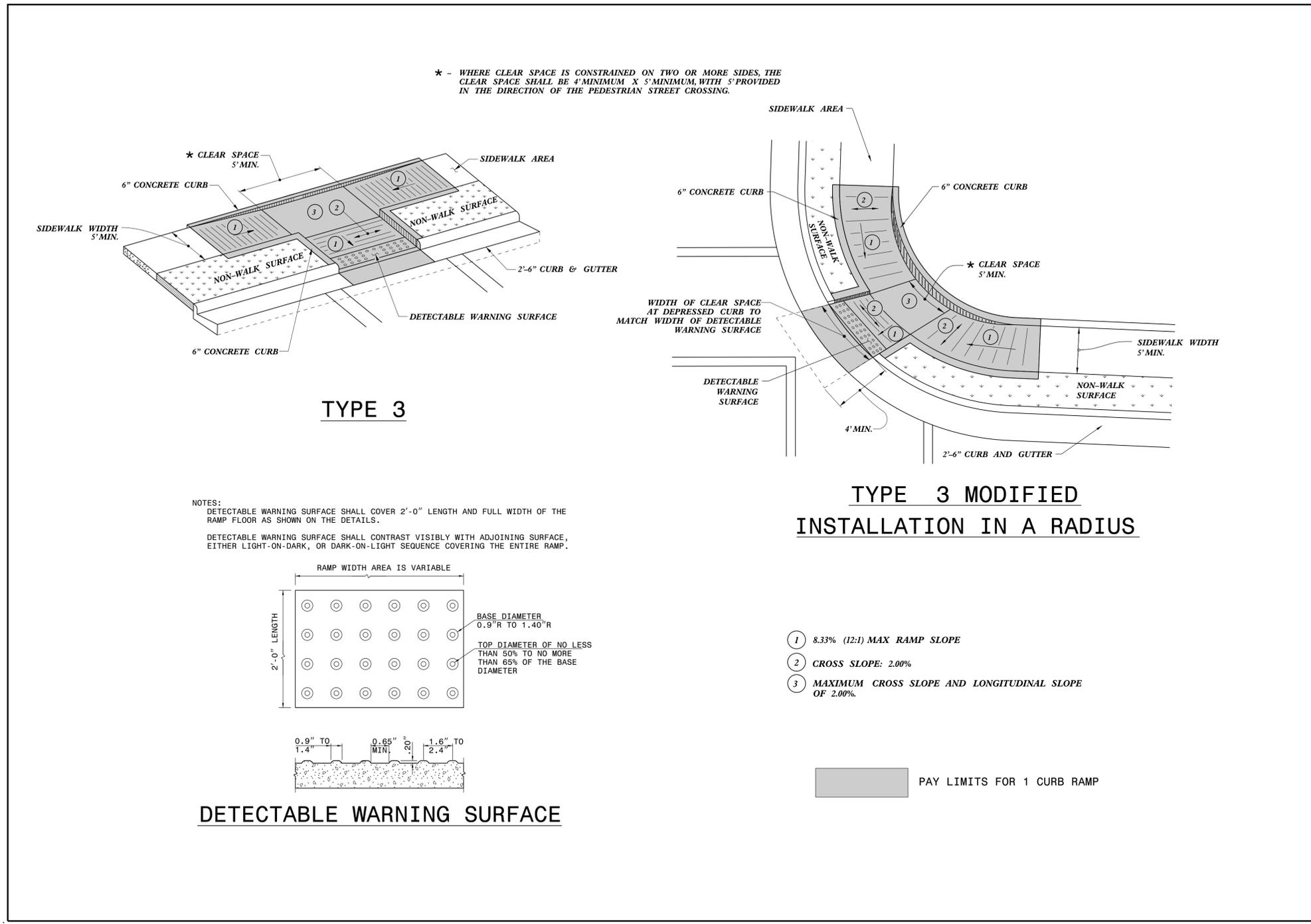
MATCHLINE -Y- STA 27+00.00 SEE SHEET 4



The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

U:\13\2021\16528_rdy_2B-7.dgn
8/17/99



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

ROADWAY DETAIL DRAWING FOR
CURB RAMP
PARALLEL RAMP

SHEET 9 OF 13
848D06



The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

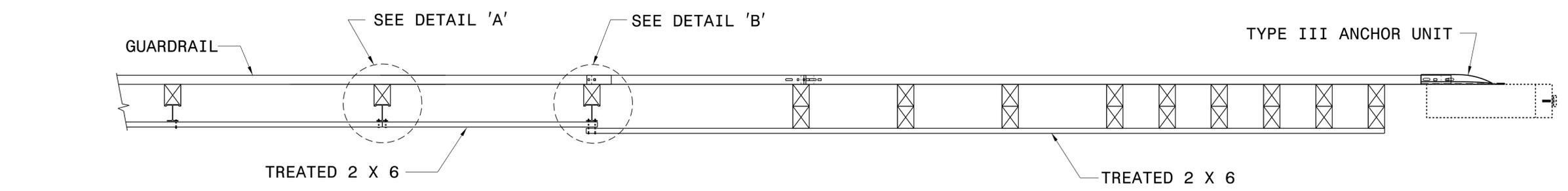
Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

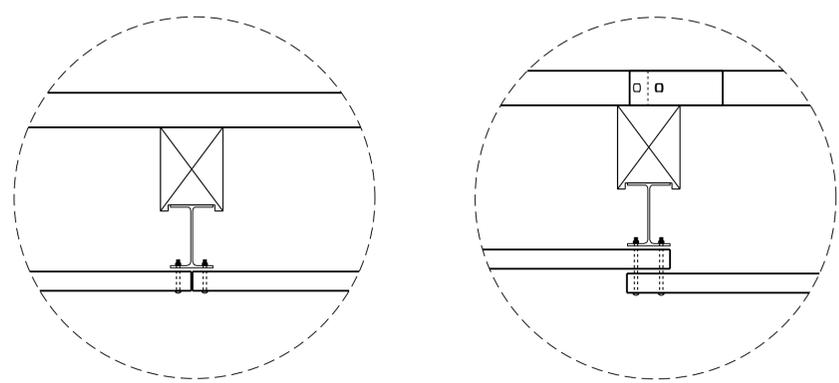
**CONTRACTS STANDARDS
AND DEVELOPMENT UNIT**
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: S. CALHOUN	DATE: 12-22-2023
MODIFIED BY:	DATE:
CHECKED BY:	DATE:
FILE SPEC.: special_details\nmhackler\0609.dgn	



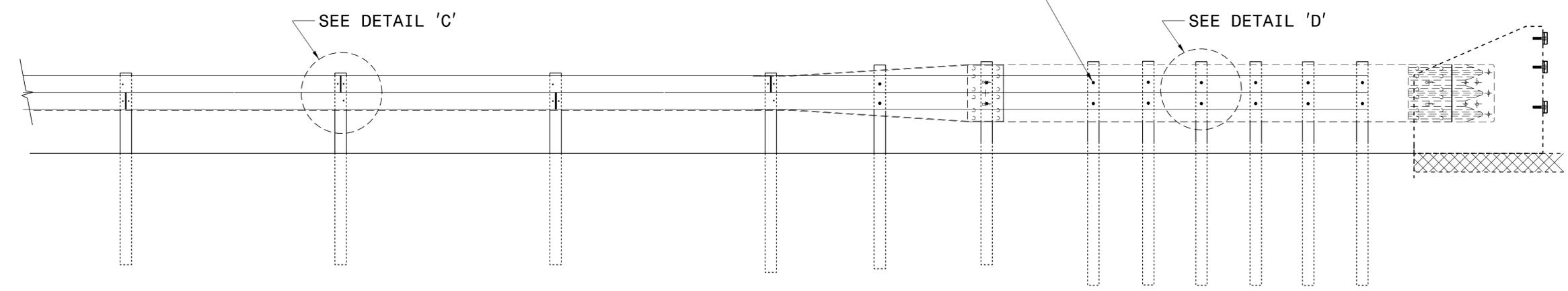
PLAN



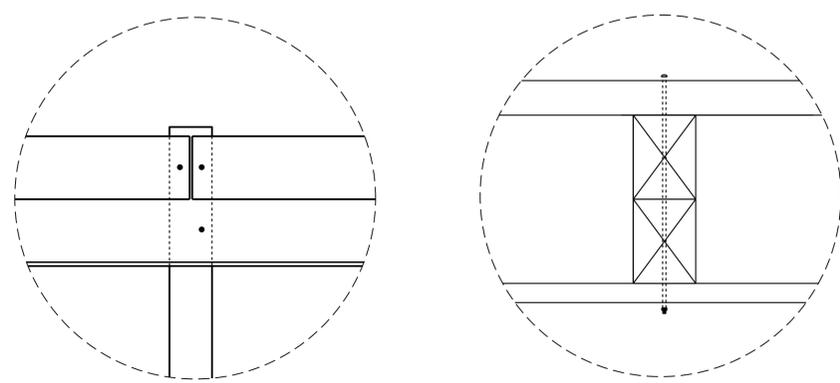
DETAIL 'A'

DETAIL 'B'

USE BOLTS AND NUTS FROM TYPE III ANCHOR UNIT TO FASTEN 2 X 6 WOOD RAILS TO THE WOOD POSTS - BOLTS MAY NEED TO BE LENGTHENED TO ACCOMMODATE FOR THE 2 X 6 WOOD RAILS.



ELEVATION



DETAIL 'C'

DETAIL 'D'

NOTES:

1. USE #2 SYP TREATED 2 X 6 FOR WOOD RAIL.
2. USE GUARDRAIL BOLTS TO FASTEN WOOD RAIL TO GUARDRAIL POSTS. SEE ROADWAY STD.NO.862.02.
3. THE MOUNTING HEIGHT OF THE WOOD RAIL TO BE DETERMINED IN THE FIELD.
4. PLACE THE TREATED 2 X 6 WOOD RAIL AS DIRECTED BY THE ENGINEER.
5. DO NOT PLACE WOOD RAIL WITHIN THE PAY LIMITS OF THE GREU.

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources



DocuSigned by:
Nicole M. Yunker
58843203416AC5...

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

**CONTRACT STANDARDS AND DEVELOPMENT UNIT
PLANS AND STANDARDS SECTION**
Office 919-707-6950 FAX 919-250-4119

**DETAIL OF
WOOD RUB RAIL**

ORIGINAL BY: STD.862 DATE: 1-25-12
 MODIFIED BY: DATE:
 CHECKED BY: DATE:
 FILE SPEC.: jhowerton/Wood Rail on Back of Guardrail

23-AUG-2018 09:52
S:\Contracts\Contractors\Signal Details\jhowerton\Wood Rail on the Back of Guardrail.dgn
jhowerton AI CS0-212955

8/17/99

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

PROJECT REFERENCE NO. U-5928	SHEET NO. 3B-2
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

RIGHT OF WAY AREA DATA

REVISIONS

PARCEL NO.	PROPERTY OWNERS NAMES	R/W AREA	TCE AREA	EU AREA	W AREA	PARCEL NO.	PROPERTY OWNERS NAMES	R/W AREA	PUE AREA	TCE AREA	OEE AREA	PDE AREA	SLE AREA	EU AREA	W AREA	PCE AREA	AE AREA
1, 2	WHITEHALL MANOR HOMEOWNERS ASSOCIATION	0.015 acre	0.017 acre	0.046 acre		16	CARLOS DELANEY AND SANDY LYNETTE ADAMS							0.037 acre			
3	JOSEPH LEMMENS	0.198 acre	0.016 acre	0.068 acre		17	SARAH KATE HICKS							0.031 acre			
4	GREGORY SCOTT JOHNSON	0.045 acre		0.035 acre		18	JAMES P. KERNS AND WIFE, ANNA E. KERNS							0.027 acre			
5	DALE SPAULDING AND WIFE, CANDACE R. SPAULDING	0.045 acre		0.041 acre		19	CASEY J. ROSS AND WIFE, JENNY T. ROSS							0.022 acre			
6	BRETT ALEXANDER JACKSON AND SHANNON LAURA MURPHY	0.011 acre		0.019 acre		20, 21	WHITEHALL VILLAGE HOMEOWNERS ASSOCIATION, INC.							0.035 acre			
7	JOYCE H. PINNIX REVOCABLE LIVING TRUST	0.042 acre		0.039 acre		22	TOWN OF APEX	2.231 acre	0.119 acre	0.035 acre	0.001 acre			0.151 acre	0.086 acre		
8	HERIBERTO SUAREZ AND WIFE, EVELYN SUAREZ	0.055 acre		0.073 acre	0.004 acre	23	CHICKADEE LANE, LLC	0.054 acre		0.011 acre	0.060 acre						
9	KENNETH & DONNA KELLY	0.059 acre		0.001 acre		24	THE TOWNES AT SUGARLAND OWNERS ASSC, INC.	0.110 acre						0.063 acre			
10	DWAYNE D. DEAN AND SPOUSE, EMILY G. DEAN	0.030 acre				28	JIMMIE W. UPCHURCH, JR.,			0.018 acre							
11	DAVID MICHAEL BARNHART AND SPOUSE, MARGARET KATHERINE PAULS	0.038 acre				29	CJS APEX ASSEMBLAGE, LLC (LEFT)	0.557 acre		0.170 acre		0.059 acre	0.623 acre		0.211 acre		
12	GEOFFREY C. FLETCHER AND SPOUSE, AMANDA T. FLETCHER	0.036 acre				29	CJS APEX ASSEMBLAGE, LLC (RIGHT)	0.542 acre		0.166 acre		0.113 acre	1.117 acre				
13	MYRIAM E. HARVEY			0.033 acre		30	SALEM VILLAGE OWNERS ASSOCIATION, INC.			0.008 acre							
14	JENNIFER L TRUMP, UNMARRIED AND THEODORE PALMER, UNMARRIED AS JOINT TENANTS WITH RIGHT OF SURVIVORSHIP			0.002 acre		39	SALEM VILLAGE OWNERS ASSOCIATION, INC.			0.149 acre							
15	JILL F. VANCE			0.041 acre		40	CSX RAILROAD			0.09 acre RT. 0.05 acre LT.						0.018 acre	0.178 acre
						41	LORI MCKINNISH							0.107 acre			

5/11/2021 06:28:17 d:\proj\row\Parcel1a.dgn

MATCHLINE -Y- STA 27+00.00 SEE SHEET 8



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

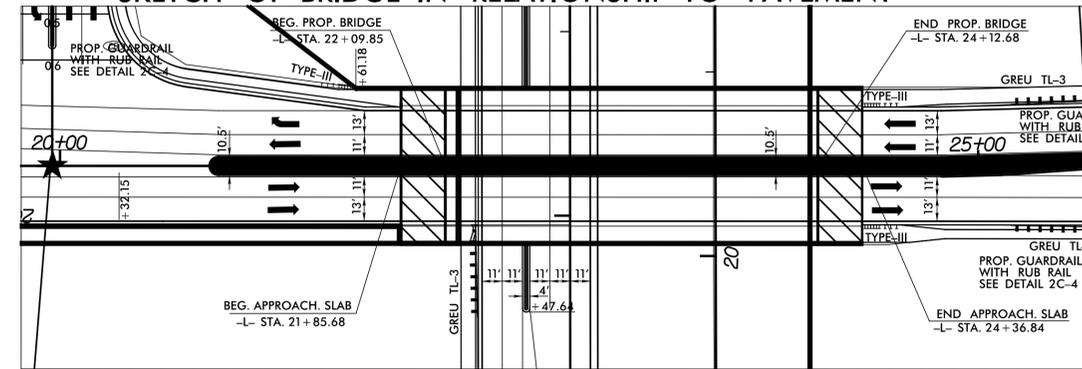


NAD 832011

PROJECT REFERENCE NO. U-5928	SHEET NO. 05
RW SHEET NO.	HYDRAULICS ENGINEER 3/12/2024
ROADWAY DESIGN ENGINEER 3/12/2024	SEAL 037874
SEAL 029984	DAVID P. BOEKER ENGINEER 3/12/2024
DOCUMENT IS NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

NOTE: THE TOWN OF APEX AGREES TO HOLD HARMLESS NCDOT AS A RESULT OF ANY INCREASE OF STORMWATER ENTERING ANY PROPERTY FROM THE INFRASTRUCTURE TYPING TO THE EXISTING 24" PIPE SYSTEM IN THE NE QUADRANT OF YATELEY LN / APEX PEAKWAY INTERSECTION. (SEE PROJECT FILES FOR HOLD HARMLESS AGREEMENT)

SKETCH OF BRIDGE IN RELATIONSHIP TO PAVEMENT



REVISIONS

MATCHLINE -L- STA 16+50.00 SEE SHEET 4

MATCHLINE -L- STA 30+50.00 SEE SHEET 6

MATCHLINE -Y- STA 17+00.00 SEE SHEET 7

MATCHLINE -Y- STA 27+00.00 SEE SHEET 8

MATCHLINE -L- STA 29+54.41

MATCHLINE -L- STA 23+56.95

MATCHLINE -L- STA 24+12.68

MATCHLINE -L- STA 25+60.33

MATCHLINE -L- STA 21+85.68

MATCHLINE -L- STA 19+95.80

MATCHLINE -L- STA 12+76.33

MATCHLINE -L- STA 10+98.05

MATCHLINE -L- STA 11+60.00

MATCHLINE -L- STA 15+58.56

MATCHLINE -L- STA 16+60.69

MATCHLINE -L- STA 24+83.74

MATCHLINE -L- STA 22+09.85

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 20+00.00

MATCHLINE -L- STA 21+12.27

MATCHLINE -L- STA 23+11.27

MATCHLINE -L- STA 24+07.77

MATCHLINE -L- STA 21+49.87

MATCHLINE -L- STA 21+12.68

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 28+53.43

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+44.12

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+65.72

MATCHLINE -L- STA 23+56.95

MATCHLINE -L- STA 24+12.68

MATCHLINE -L- STA 25+60.33

MATCHLINE -L- STA 21+85.68

MATCHLINE -L- STA 19+95.80

MATCHLINE -L- STA 12+76.33

MATCHLINE -L- STA 10+98.05

MATCHLINE -L- STA 11+60.00

MATCHLINE -L- STA 15+58.56

MATCHLINE -L- STA 16+60.69

MATCHLINE -L- STA 24+83.74

MATCHLINE -L- STA 22+09.85

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 20+00.00

MATCHLINE -L- STA 21+12.27

MATCHLINE -L- STA 23+11.27

MATCHLINE -L- STA 24+07.77

MATCHLINE -L- STA 21+49.87

MATCHLINE -L- STA 21+12.68

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 28+53.43

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+44.12

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+65.72

MATCHLINE -L- STA 23+56.95

MATCHLINE -L- STA 24+12.68

MATCHLINE -L- STA 25+60.33

MATCHLINE -L- STA 21+85.68

MATCHLINE -L- STA 19+95.80

MATCHLINE -L- STA 12+76.33

MATCHLINE -L- STA 10+98.05

MATCHLINE -L- STA 11+60.00

MATCHLINE -L- STA 15+58.56

MATCHLINE -L- STA 16+60.69

MATCHLINE -L- STA 24+83.74

MATCHLINE -L- STA 22+09.85

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 20+00.00

MATCHLINE -L- STA 21+12.27

MATCHLINE -L- STA 23+11.27

MATCHLINE -L- STA 24+07.77

MATCHLINE -L- STA 21+49.87

MATCHLINE -L- STA 21+12.68

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 28+53.43

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+44.12

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+65.72

MATCHLINE -L- STA 23+56.95

MATCHLINE -L- STA 24+12.68

MATCHLINE -L- STA 25+60.33

MATCHLINE -L- STA 21+85.68

MATCHLINE -L- STA 19+95.80

MATCHLINE -L- STA 12+76.33

MATCHLINE -L- STA 10+98.05

MATCHLINE -L- STA 11+60.00

MATCHLINE -L- STA 15+58.56

MATCHLINE -L- STA 16+60.69

MATCHLINE -L- STA 24+83.74

MATCHLINE -L- STA 22+09.85

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 20+00.00

MATCHLINE -L- STA 21+12.27

MATCHLINE -L- STA 23+11.27

MATCHLINE -L- STA 24+07.77

MATCHLINE -L- STA 21+49.87

MATCHLINE -L- STA 21+12.68

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 28+53.43

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+44.12

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+65.72

MATCHLINE -L- STA 23+56.95

MATCHLINE -L- STA 24+12.68

MATCHLINE -L- STA 25+60.33

MATCHLINE -L- STA 21+85.68

MATCHLINE -L- STA 19+95.80

MATCHLINE -L- STA 12+76.33

MATCHLINE -L- STA 10+98.05

MATCHLINE -L- STA 11+60.00

MATCHLINE -L- STA 15+58.56

MATCHLINE -L- STA 16+60.69

MATCHLINE -L- STA 24+83.74

MATCHLINE -L- STA 22+09.85

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 20+00.00

MATCHLINE -L- STA 21+12.27

MATCHLINE -L- STA 23+11.27

MATCHLINE -L- STA 24+07.77

MATCHLINE -L- STA 21+49.87

MATCHLINE -L- STA 21+12.68

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 28+53.43

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+44.12

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+65.72

MATCHLINE -L- STA 23+56.95

MATCHLINE -L- STA 24+12.68

MATCHLINE -L- STA 25+60.33

MATCHLINE -L- STA 21+85.68

MATCHLINE -L- STA 19+95.80

MATCHLINE -L- STA 12+76.33

MATCHLINE -L- STA 10+98.05

MATCHLINE -L- STA 11+60.00

MATCHLINE -L- STA 15+58.56

MATCHLINE -L- STA 16+60.69

MATCHLINE -L- STA 24+83.74

MATCHLINE -L- STA 22+09.85

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 20+00.00

MATCHLINE -L- STA 21+12.27

MATCHLINE -L- STA 23+11.27

MATCHLINE -L- STA 24+07.77

MATCHLINE -L- STA 21+49.87

MATCHLINE -L- STA 21+12.68

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 28+53.43

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+44.12

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+65.72

MATCHLINE -L- STA 23+56.95

MATCHLINE -L- STA 24+12.68

MATCHLINE -L- STA 25+60.33

MATCHLINE -L- STA 21+85.68

MATCHLINE -L- STA 19+95.80

MATCHLINE -L- STA 12+76.33

MATCHLINE -L- STA 10+98.05

MATCHLINE -L- STA 11+60.00

MATCHLINE -L- STA 15+58.56

MATCHLINE -L- STA 16+60.69

MATCHLINE -L- STA 24+83.74

MATCHLINE -L- STA 22+09.85

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 20+00.00

MATCHLINE -L- STA 21+12.27

MATCHLINE -L- STA 23+11.27

MATCHLINE -L- STA 24+07.77

MATCHLINE -L- STA 21+49.87

MATCHLINE -L- STA 21+12.68

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 28+53.43

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+44.12

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+65.72

MATCHLINE -L- STA 23+56.95

MATCHLINE -L- STA 24+12.68

MATCHLINE -L- STA 25+60.33

MATCHLINE -L- STA 21+85.68

MATCHLINE -L- STA 19+95.80

MATCHLINE -L- STA 12+76.33

MATCHLINE -L- STA 10+98.05

MATCHLINE -L- STA 11+60.00

MATCHLINE -L- STA 15+58.56

MATCHLINE -L- STA 16+60.69

MATCHLINE -L- STA 24+83.74

MATCHLINE -L- STA 22+09.85

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 20+00.00

MATCHLINE -L- STA 21+12.27

MATCHLINE -L- STA 23+11.27

MATCHLINE -L- STA 24+07.77

MATCHLINE -L- STA 21+49.87

MATCHLINE -L- STA 21+12.68

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 28+53.43

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+44.12

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+65.72

MATCHLINE -L- STA 23+56.95

MATCHLINE -L- STA 24+12.68

MATCHLINE -L- STA 25+60.33

MATCHLINE -L- STA 21+85.68

MATCHLINE -L- STA 19+95.80

MATCHLINE -L- STA 12+76.33

MATCHLINE -L- STA 10+98.05

MATCHLINE -L- STA 11+60.00

MATCHLINE -L- STA 15+58.56

MATCHLINE -L- STA 16+60.69

MATCHLINE -L- STA 24+83.74

MATCHLINE -L- STA 22+09.85

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 20+00.00

MATCHLINE -L- STA 21+12.27

MATCHLINE -L- STA 23+11.27

MATCHLINE -L- STA 24+07.77

MATCHLINE -L- STA 21+49.87

MATCHLINE -L- STA 21+12.68

MATCHLINE -L- STA 27+18.67

MATCHLINE -L- STA 28+53.43

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+44.12

MATCHLINE -L- STA 28+96.49

MATCHLINE -L- STA 28+65.72

MATCHLINE -L- STA 23+56.95

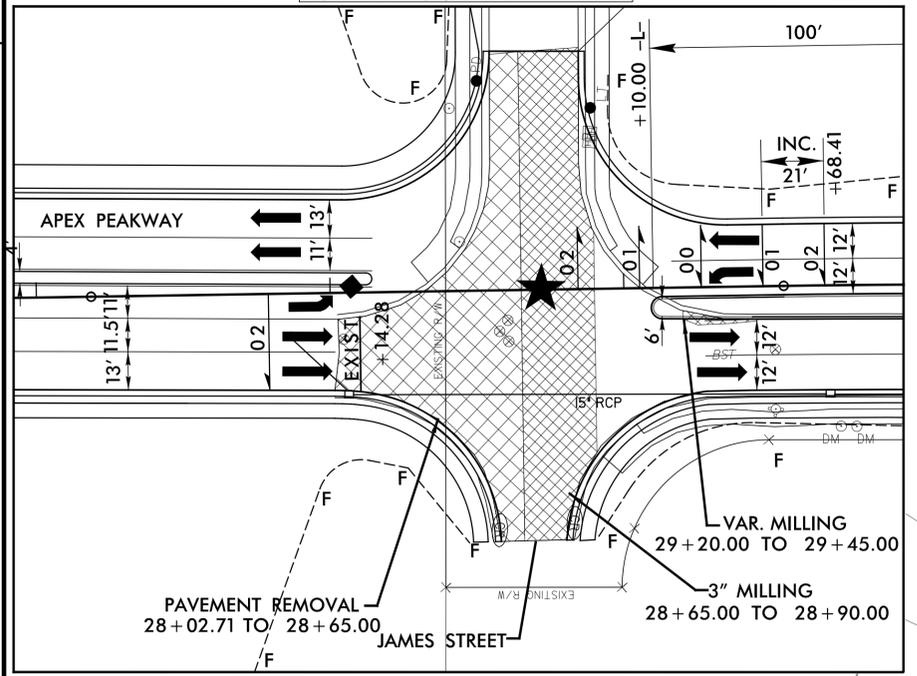
MATCHLINE -L- STA 24+12.68

MATCHLINE -L- STA 25+60.33

MATCHLINE -L- STA 21+85.68

8/17/99

MILLING DETAIL



NOTE: SEE SHEET 5 FOR MILLING LOCATION

REVISIONS



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



PROJECT REFERENCE NO. <i>U-5928</i>	SHEET NO. <i>06</i>
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER 3/12/2024	HYDRAULICS ENGINEER 3/12/2024
SEAL 037874	SEAL 029984
Tim Gohls	David P. Boeker



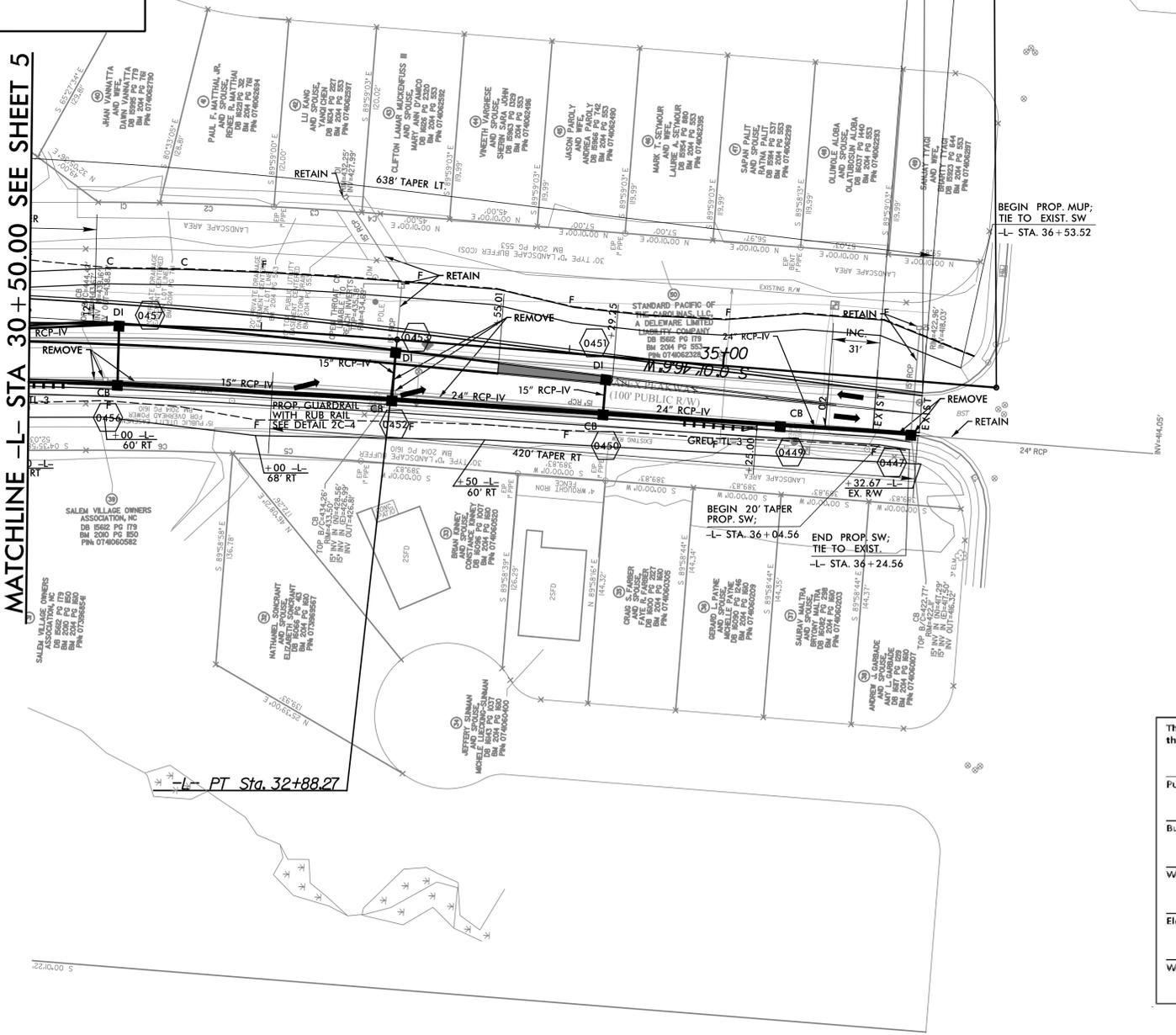
END TIP PROJECT U-5928
-L- STA. 36+30.00
END MILL/RESURFACE

END GRADE
BEGIN MILL/RESURFACE
-L- STA. 36+00.00

END PROP. 2'6"
TIE TO EXIST LT & RT.
-L- STA. 36+30.00

BEGIN PROP. MUP
TIE TO EXIST SW
-L- STA. 36+53.52

MATCHLINE -L- STA 30+50.00 SEE SHEET 5



NOTE: THE TOWN OF APEX AGREES TO HOLD HARMLESS NCDOT AS A RESULT OF ANY INCREASE OF STORMWATER ENTERING ANY PROPERTY FROM THE STORMWATER DESIGN TYING TO THE EXISTING 24\"/>

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

FOR -L- PROFILE SEE SHEET 9

3/17/2024
U6528-F.dwg_pah06.dgn

8/17/99

REVISIONS

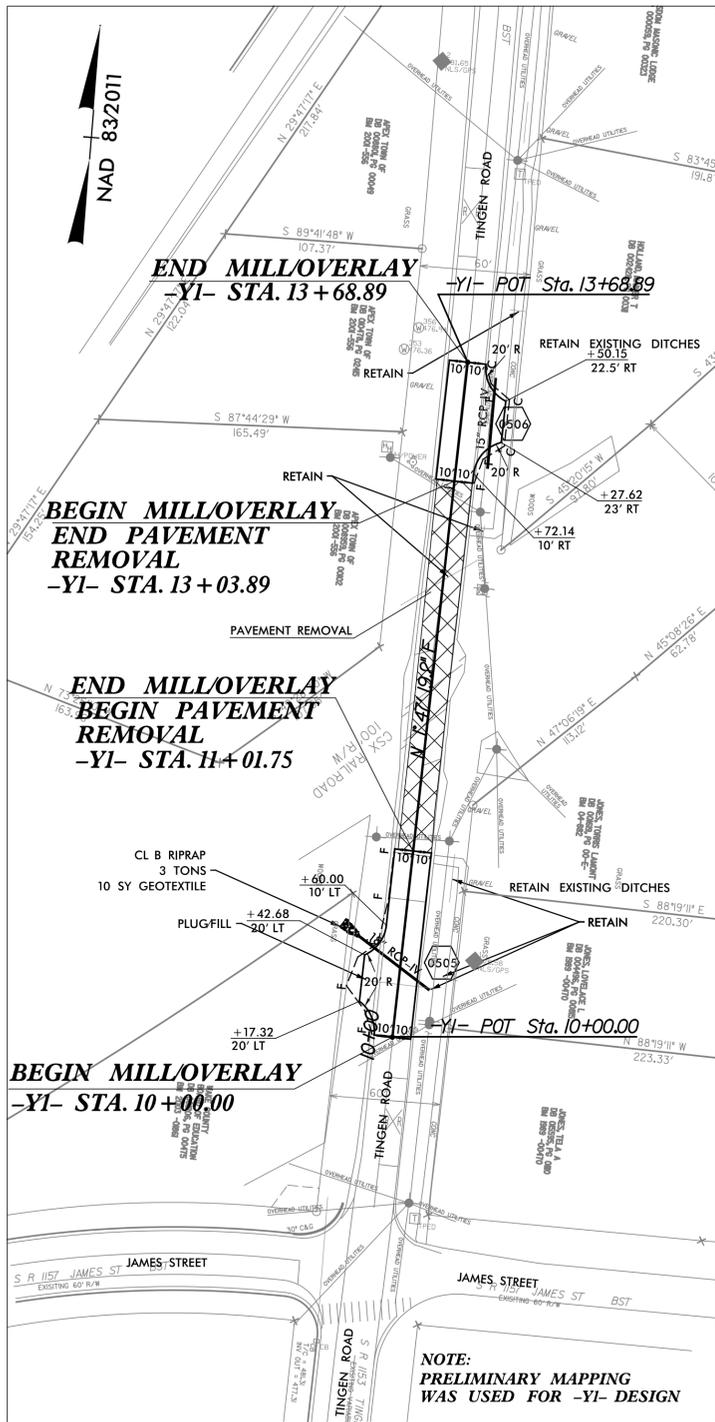
3/6/2024
06528-R.dj_pah07.dgn
-p



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



PROJECT REFERENCE NO. U-5928	SHEET NO. 07
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER 3/12/2024 SEAL 037874 TIM GOINS	HYDRAULICS ENGINEER 3/12/2024 SEAL 029984 DAVID P. BOCKER
DOCUMENT IS NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

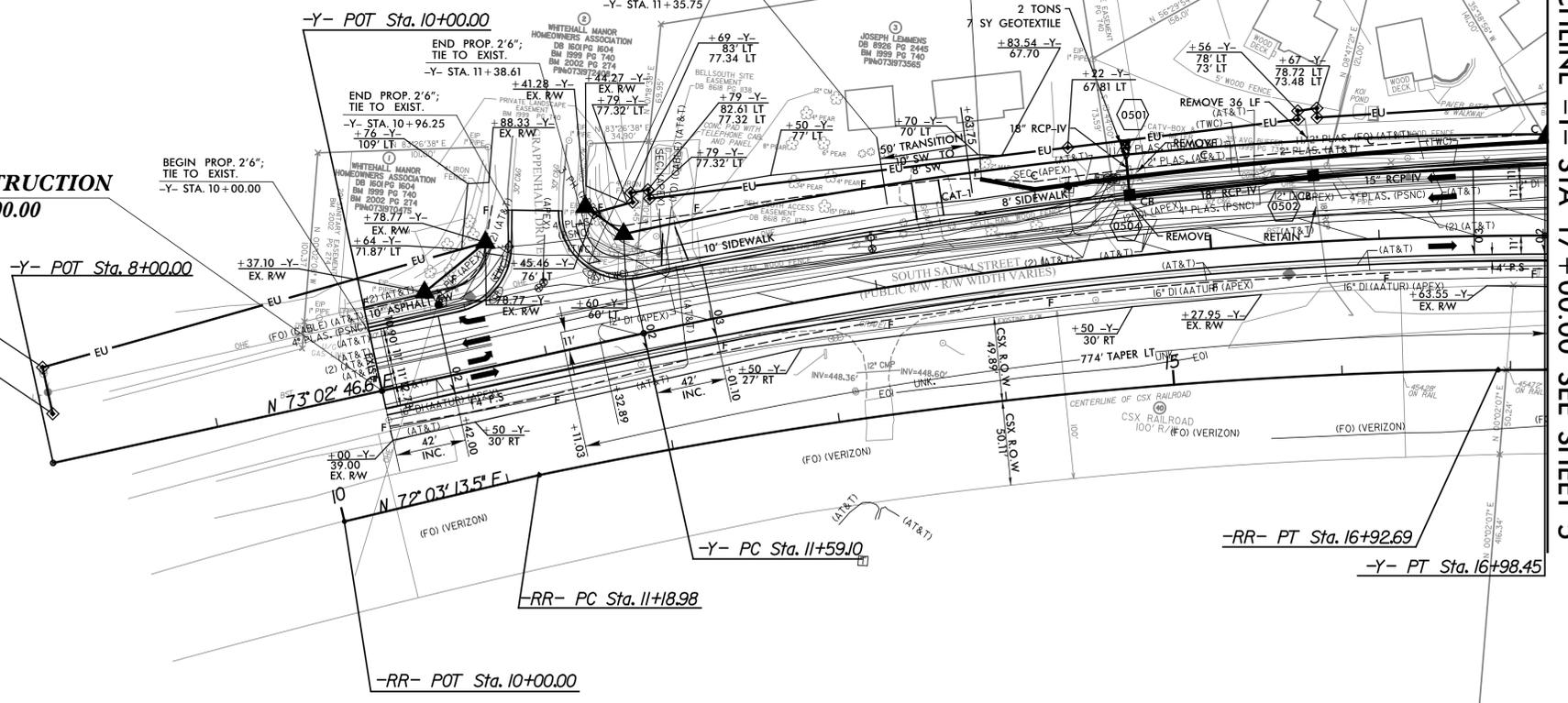


-YI- INSET

NOTE:
PRELIMINARY MAPPING
WAS USED FOR -YI- DESIGN

BEGIN CONSTRUCTION
-Y- STA. 10+00.00

-Y- POT Sta. 8+00.00
-Y- +06.00
56.67 LT
-Y- +06.00
EX. RW LT



MATCHLINE -Y- STA. 17+00.00 SEE SHEET 5

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

FOR -Y- PROFILE SEE SHEET 10

8/17/19

REVISIONS

6/19/2023
065928_rdy_pah08.dgn
ambkrcst



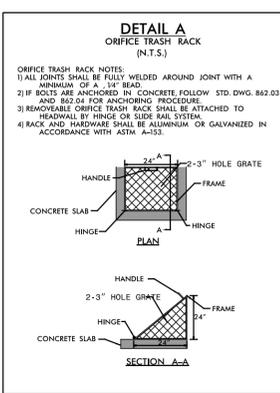
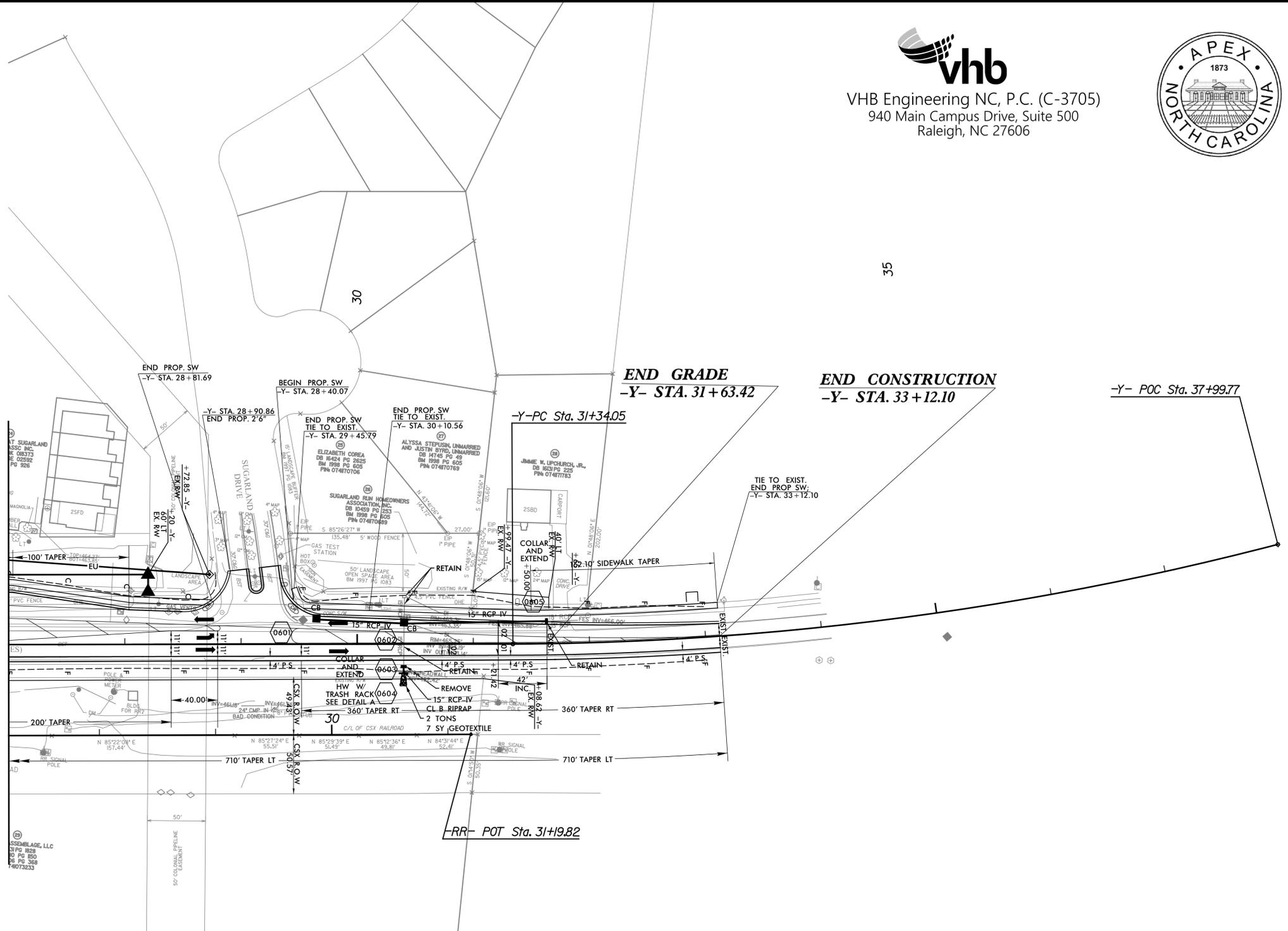
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



PROJECT REFERENCE NO. U-5928	SHEET NO. 08
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER 8/23/2023 SEAL 037874 ENGINEER TIMOTHY D. GONS	HYDRAULICS ENGINEER 8/23/2023 SEAL 029984 ENGINEER DAVID P. BOCKER
DO NOT SCALE DRAWING UNLESS ALL SIGNATURES COMPLETED	



MATCHLINE -Y- STA 27 + 00.00 SEE SHEET 5



The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

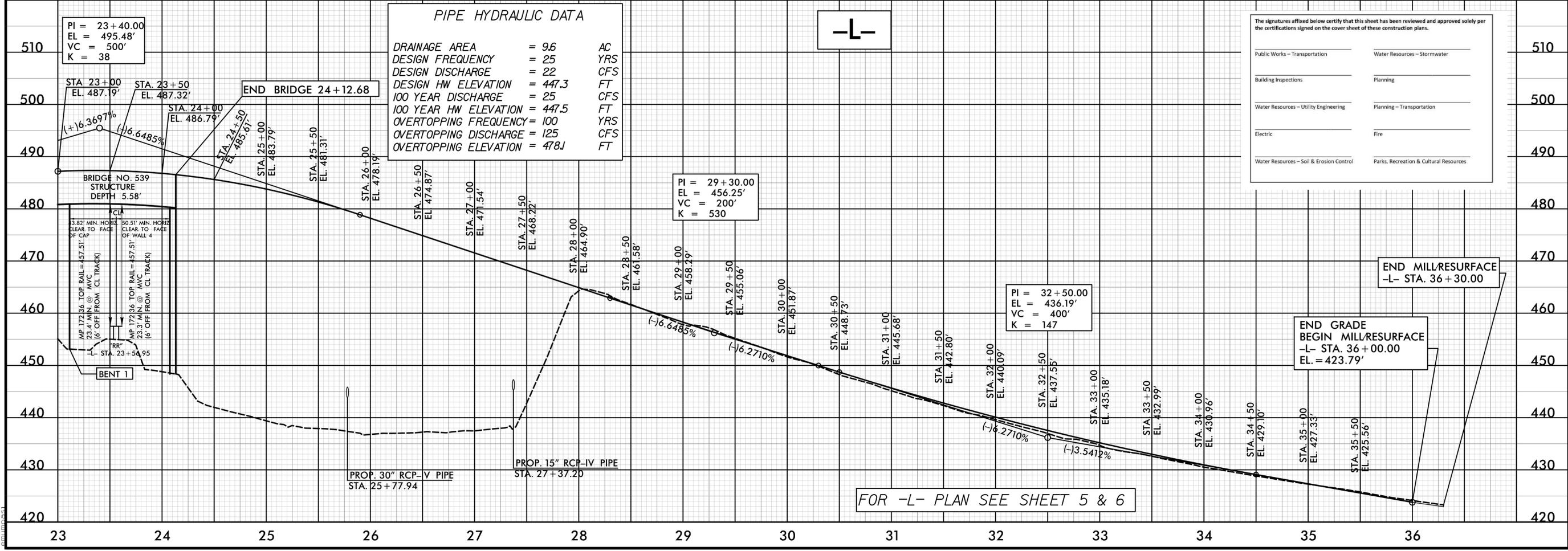
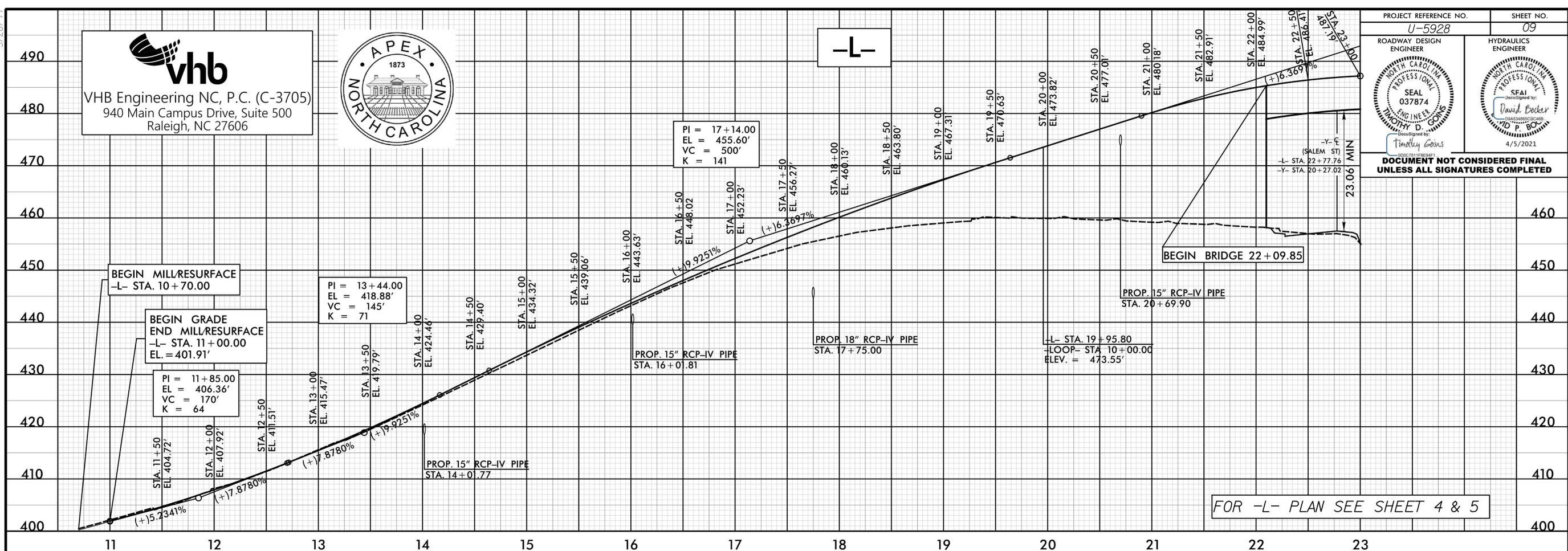
FOR -Y- PROFILE SEE SHEET 10

5/28/20

vhb
 VHB Engineering NC, P.C. (C-3705)
 940 Main Campus Drive, Suite 500
 Raleigh, NC 27606



PROJECT REFERENCE NO. U-5928	SHEET NO. 09
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



PIPE HYDRAULIC DATA

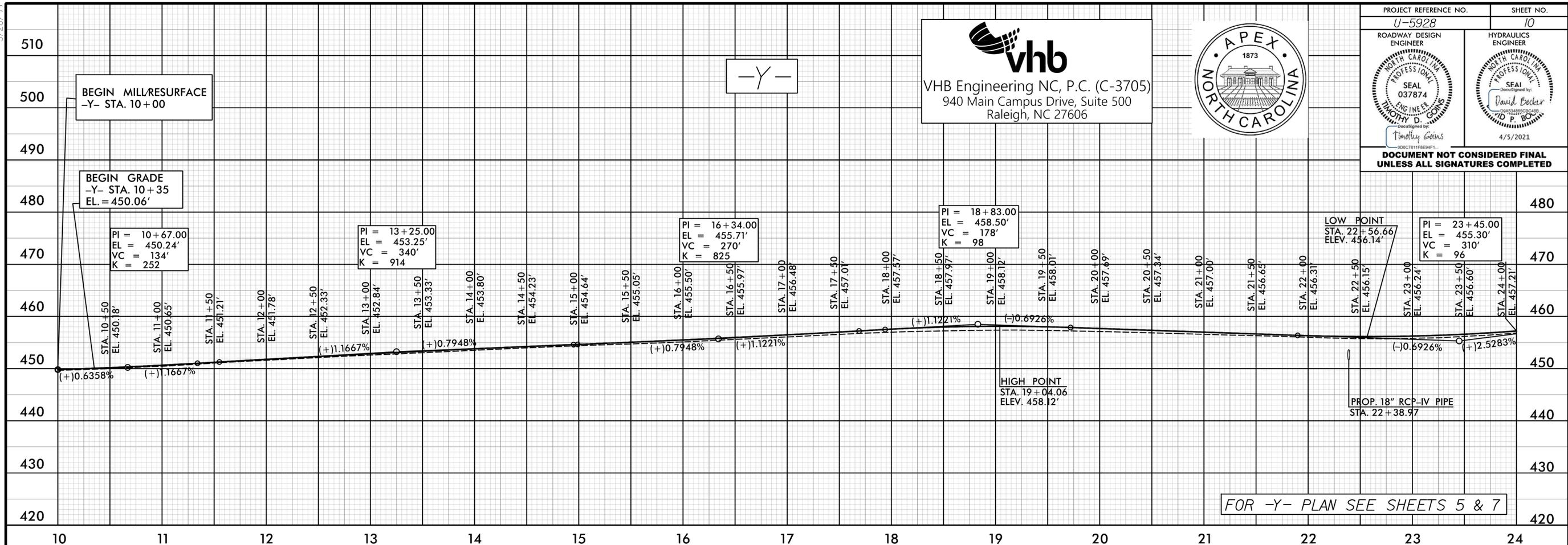
DRAINAGE AREA	= 9.6	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 22	CFS
DESIGN HW ELEVATION	= 447.3	FT
100 YEAR DISCHARGE	= 25	CFS
100 YEAR HW ELEVATION	= 447.5	FT
OVERTOPPING FREQUENCY	= 100	YRS
OVERTOPPING DISCHARGE	= 125	CFS
OVERTOPPING ELEVATION	= 478.1	FT

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

1/6/2020 10:10:09 AM

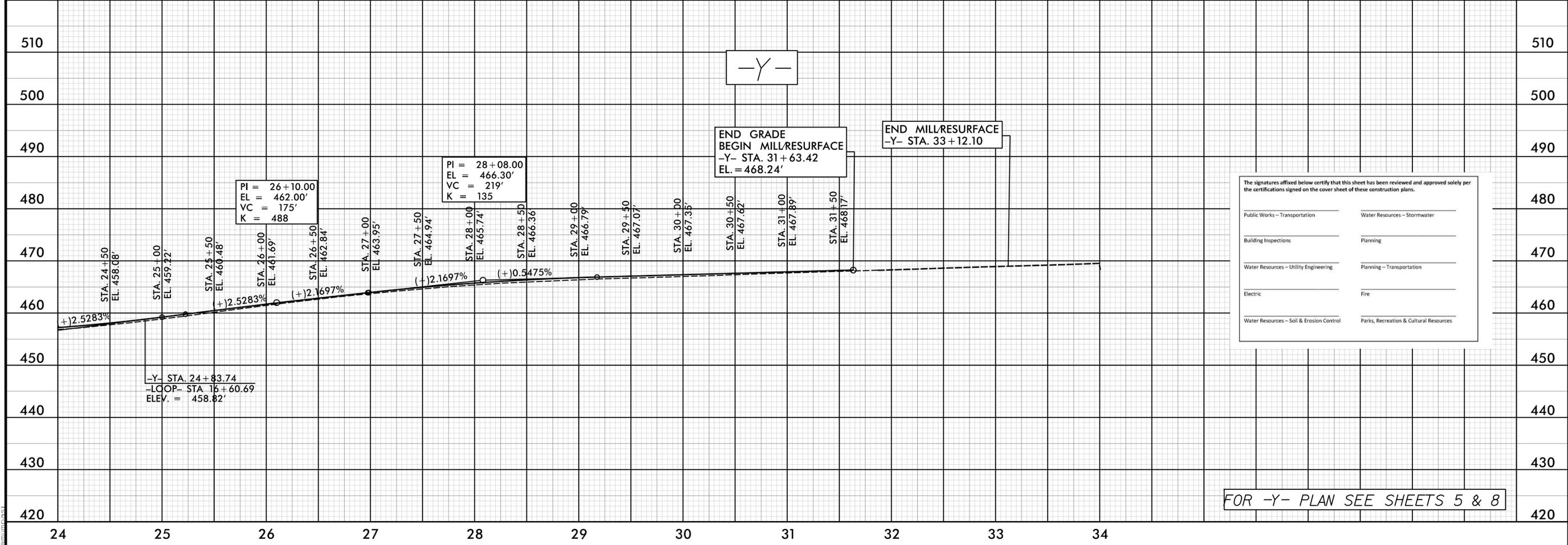
5/28/20




PROJECT REFERENCE NO. U-5928	SHEET NO. 10
ROADWAY DESIGN ENGINEER TIMOTHY D. GOINS	HYDRAULICS ENGINEER DAVID BOEKER
SEAL 037874	SEAL 037874
DATE: 4/5/2021	DATE: 4/5/2021

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

FOR -Y- PLAN SEE SHEETS 5 & 7



The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

FOR -Y- PLAN SEE SHEETS 5 & 8

10/28/2020 10:48:38 am - of 110.dgn

5/28/2020

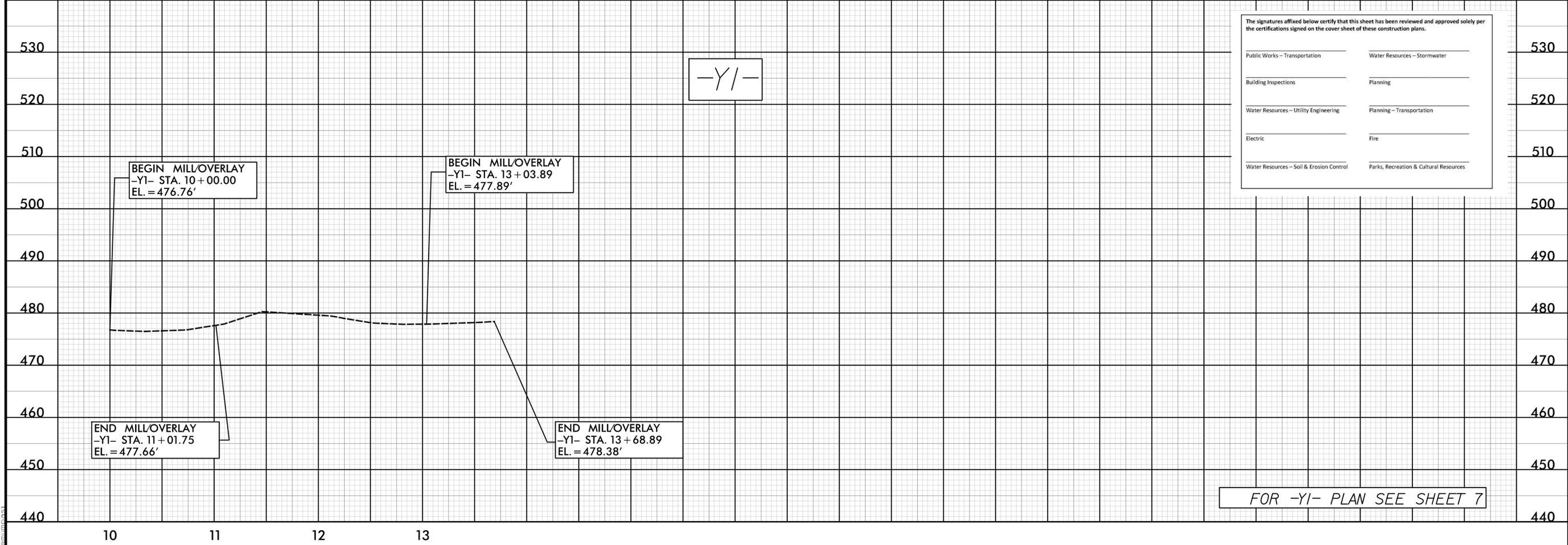
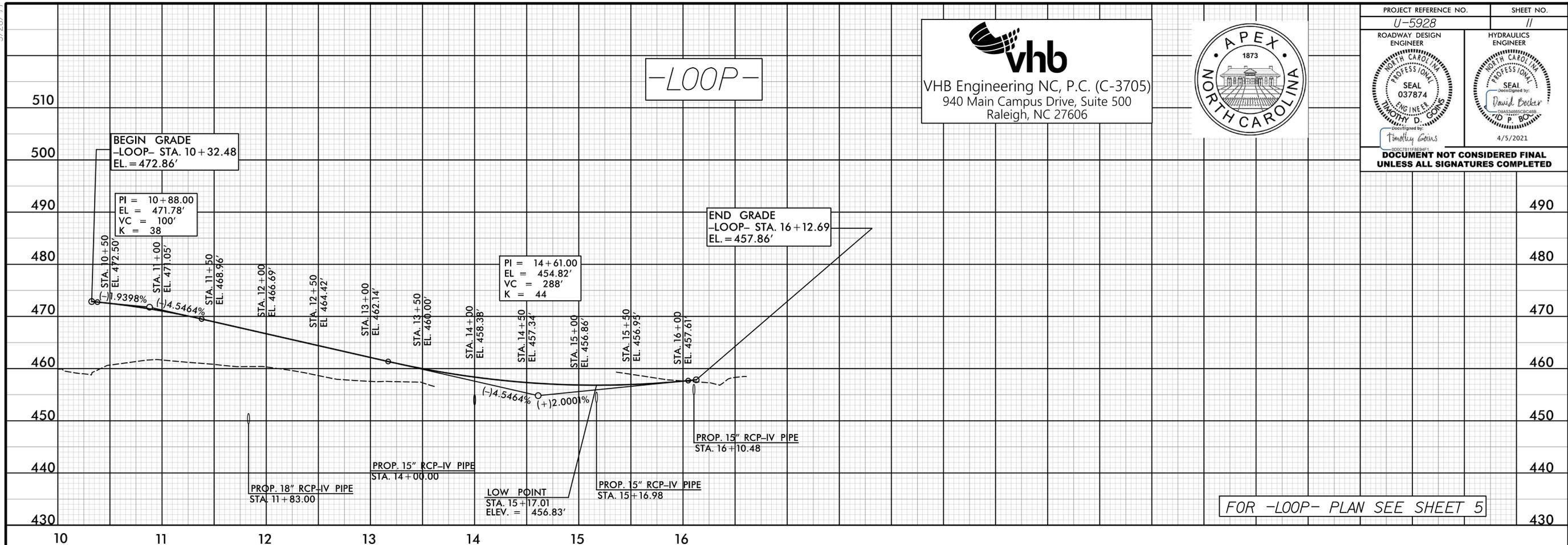


VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



PROJECT REFERENCE NO. U-5928	SHEET NO. 11
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
 SEAL 037874 ENGINEER TIMOTHY D. GOUSS 4/5/2021	 SEAL David Becker 4/5/2021

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**



The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

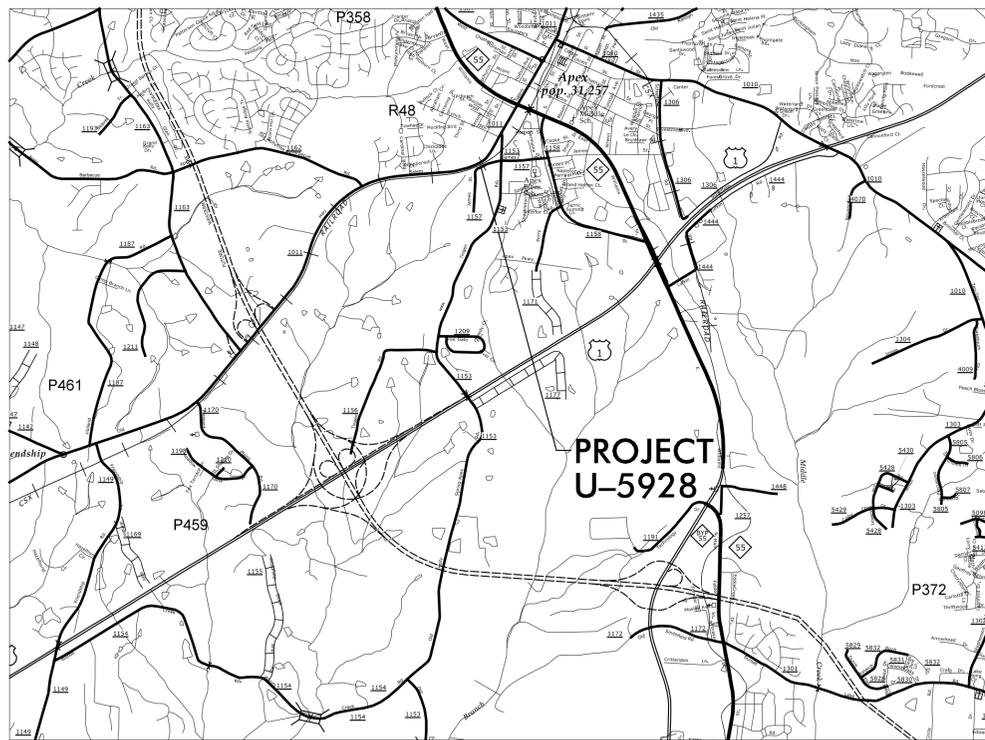
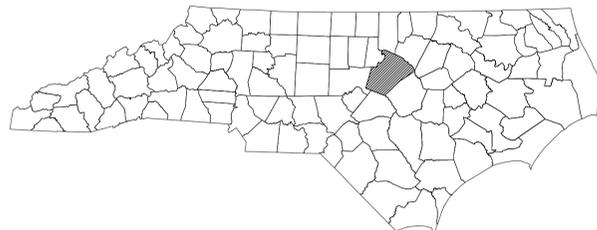
Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

9/22/2020 16:58:20 -cf111.dgn

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

TRANSPORTATION MANAGEMENT PLAN

WAKE COUNTY



VICINITY MAP

LOCATION: JAMES STREET TO TOWHEE DRIVE
CONSTRUCT GRADE SEPARATED INTERCHANGE FOR APEX PEAKWAY
AT SOUTH SALEM STREET AND CSX RAILROAD

INDEX OF SHEETS	
SHEET NO.	TITLE
TMP-1	TITLE SHEET, VICINITY MAP, AND INDEX OF SHEETS
TMP-1A	LIST OF APPLICABLE ROADWAY STANDARD DRAWINGS, AND LEGEND
TMP-1B-1D	TRANSPORTATION OPERATIONS PLAN: (GENERAL NOTES, AND LOCAL NOTES)
TMP-2	OFF-SITE DETOUR
TMP-2A	SPECIAL SIGN DESIGN(S)
TMP-3	TEMPORARY TRAFFIC CONTROL PHASING
TMP-4-5	TEMPORARY TRAFFIC CONTROL PHASE I DETAIL
TMP-6-7	TEMPORARY TRAFFIC CONTROL PHASE II DETAIL

SHEET NO.
TMP-1

U-5928

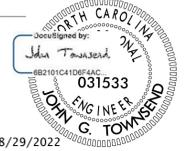
TIP PROJECT:

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

APPROVED: _____

DATE: _____



8/29/2022

8/25/2022 R:\Traffic\TrafficControl\CP\U-5928_TC_TMP01.dgn User:jtownsend



PLANS PREPARED BY:
John Townsend, PE

NCDOT CONTACTS:
Kenneth Thornewell, PE
PROJECT ENGINEER

PROJECT DESIGN ENGINEER



ROADWAY STANDARD DRAWINGS

THE FOLLOWING ROADWAY STANDARDS AS SHOWN IN "ROADWAY STANDARD DRAWINGS" - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2024 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
1101.01	WORK ZONE WARNING SIGNS
1101.02	TEMPORARY LANE CLOSURES
1101.03	TEMPORARY ROAD CLOSURES
1101.04	TEMPORARY SHOULDER CLOSURES
1101.05	WORK ZONE VEHICLE ACCESSES
1101.11	TRAFFIC CONTROL DESIGN TABLES
1110.01	STATIONARY WORK ZONE SIGNS
1110.02	PORTABLE WORK ZONE SIGNS
1115.01	FLASHING ARROW BOARDS
1130.01	DRUMS
1135.01	CONES
1145.01	BARRICADES
1150.01	FLAGGING DEVICES
1160.01	TEMPORARY CRASH CUSHION
1165.01	TRUCK MOUNTED ATTENUATOR
1180.01	SKINNY - DRUMS
1205.01	PAVEMENT MARKINGS - LINE TYPES AND OFFSETS
1205.02	PAVEMENT MARKINGS - TWO LANE AND MULTILANE ROADWAYS
1205.04	PAVEMENT MARKINGS - INTERSECTIONS
1205.05	PAVEMENT MARKINGS - TURN LANES
1205.06	PAVEMENT MARKINGS - LANE DROPS
1205.07	PAVEMENT MARKINGS - PEDESTRIAN CROSSWALKS
1205.08	PAVEMENT MARKINGS - SYMBOLS AND WORD MESSAGES
1205.09	PAVEMENT MARKINGS - PAINTED ISLANDS
1205.12	PAVEMENT MARKINGS - BRIDGES
1250.01	RAISED PAVEMENT MARKERS - INSTALLATION SPACING
1251.01	RAISED PAVEMENT MARKERS - (PERMANENT AND TEMPORARY)
1261.01	GUARDRAIL AND BARRIER DELINEATORS - INSTALLATION SPACING
1261.02	GUARDRAIL AND BARRIER DELINEATORS - TYPES AND MOUNTING
1262.01	GUARDRAIL END DELINEATION
1264.01	OBJECT MARKERS - TYPES
1264.02	OBJECT MARKERS - INSTALLATION

LEGEND

GENERAL

- DIRECTION OF TRAFFIC FLOW
- DIRECTION OF PEDESTRIAN TRAFFIC FLOW
- EXIST. PVMT.
- NORTH ARROW
- PROPOSED PVMT.
- TEMP. SHORING (LOCATION PURPOSES ONLY)
- WORK AREA
- REMOVAL
- USER DEFINED (IF NEEDED)

SIGNALS

- EXISTING
- PROPOSED
- TEMPORARY

PAVEMENT MARKINGS

- EXISTING LINES
- TEMPORARY LINES

TRAFFIC CONTROL DEVICES

- BARRICADE (TYPE III)
- CONE
- DRUM
- SKINNY DRUM
- TUBULAR MARKER
- TEMPORARY CRASH CUSHION
- FLASHING ARROW BOARD
- FLAGGER
- LAW ENFORCEMENT
- TRUCK MOUNTED ATTENUATOR (TMA)
- CHANGEABLE MESSAGE SIGN

TEMPORARY SIGNING

- PORTABLE SIGN
- STATIONARY SIGN
- STATIONARY OR PORTABLE SIGN

PAVEMENT MARKERS

- CRYSTAL/CRYSTAL
- CRYSTAL/RED
- YELLOW/YELLOW

PAVEMENT MARKING SYMBOLS

- PAVEMENT MARKING SYMBOLS

TEMPORARY PAVEMENT MARKING

- P2** WHITE STOPBAR PAINT (24")
- P8** 2FT. - 6FT./SP WHITE MINISKIP PAINT (4")
- P9** 2FT. - 6FT./SP YELLOW MINISKIP PAINT (4")
- PA** WHITE EDGELINE PAINT (4")
- PB** YELLOW EDGELINE PAINT (4")
- PC** 10FT. WHITE SKIP PAINT (4")
- PD** 3FT. - 9FT./SP WHITE MINISKIP PAINT (4")
- PE** WHITE SOLID LANE LINE PAINT (4")
- PI** YELLOW DOUBLE CENTER PAINT (4")
- PN** WHITE GORELINE PAINT (8")
- PO** WHITE DIAGONAL PAINT (8")
- PP** YELLOW DIAGONAL PAINT (8")
- PQ** WHITE CROSSWALK LINE PAINT (8")
- PR** WHITE SOLID LANE LINE PAINT (8")
- QA** LEFT TURN ARROW
- QB** RIGHT TURN ARROW
- QC** STRIAGHT ARROW
- QI** ALPHANUMERIC CHAR.

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Transportation Engineering	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

APPROVED: _____			<h2>ROADWAY STANDARD DRAWINGS & LEGEND</h2>
DATE: _____			
<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p>			

GENERAL NOTES

CHANGES MAY BE REQUIRED WHEN PHYSICAL DIMENSIONS IN THE DETAIL DRAWINGS, STANDARD DETAILS, AND ROADWAY DETAILS ARE NOT ATTAINABLE TO MEET FIELD CONDITIONS OR RESULT IN DUPLICATE OR UNDESIRED OVERLAPPING OF DEVICES. MODIFICATION MAY INCLUDE: MOVING, SUPPLEMENTING, COVERING, OR REMOVAL OF DEVICES AS DIRECTED BY THE ENGINEER.

THE FOLLOWING GENERAL NOTES APPLY AT ALL TIMES FOR THE DURATION OF THE CONSTRUCTION PROJECT EXCEPT WHEN OTHERWISE NOTED IN THE PLAN OR DIRECTED BY THE ENGINEER.

TIME RESTRICTIONS

A) DO NOT CLOSE OR NARROW TRAVEL LANES AS FOLLOWS:

ROAD NAME	DAY AND TIME RESTRICTIONS
APEX PEAKWAY	MONDAY THRU FRIDAY
S. SALEM STREET	6:00 AM TO 9:00 AM AND 4:00 PM TO 7:00 PM

B) DO NOT CLOSE OR NARROW TRAVEL LANES DURING HOLIDAYS AND SPECIAL EVENTS AS FOLLOWS:

ROAD NAME
APEX PEAKWAY
S. SALEM STREET

HOLIDAY

- FOR ANY UNEXPECTED OCCURRENCE THAT CREATES UNUSUALLY HIGH TRAFFIC VOLUMES, AS DIRECTED BY THE ENGINEER.
- FOR NEW YEAR'S, BETWEEN THE HOURS OF 6:00 A.M. DECEMBER 31st TO 7:00 P.M. JANUARY 2ND. IF NEW YEAR'S DAY IS ON A FRIDAY, SATURDAY, SUNDAY, OR MONDAY THEN UNTIL 7:00 P.M. THE FOLLOWING TUESDAY.
- FOR EASTER, BETWEEN THE HOURS OF 6:00 A.M. THURSDAY AND 7:00 P.M. MONDAY.
- FOR MEMORIAL DAY, BETWEEN THE HOURS OF 6:00 A.M. FRIDAY TO 7:00 P.M. TUESDAY.
- FOR INDEPENDENCE DAY, BETWEEN THE HOURS OF 6:00 A.M. THE DAY BEFORE INDEPENDENCE DAY AND 7:00 P.M. THE DAY AFTER INDEPENDENCE DAY.

IF INDEPENDENCE DAY IS ON A FRIDAY, SATURDAY, SUNDAY OR MONDAY THEN BETWEEN THE HOURS OF 6:00 A.M. THE THURSDAY BEFORE INDEPENDENCE DAY AND 7:00 P.M. THE TUESDAY AFTER INDEPENDENCE DAY.
- FOR LABOR DAY, BETWEEN THE HOURS OF 6:00 A.M. FRIDAY TO 7:00 P.M. TUESDAY.
- FOR THANKSGIVING DAY, BETWEEN THE HOURS OF 6:00 A.M. TUESDAY AND 7:00 P.M. MONDAY.
- FOR CHRISTMAS, BETWEEN THE HOURS OF 6:00 A.M. THE FRIDAY BEFORE THE WEEK OF CHRISTMAS DAY AND 7:00 P.M. THE FOLLOWING TUESDAY AFTER THE WEEK OF CHRISTMAS.

C) DO NOT STOP TRAFFIC AS FOLLOWS:

ROAD NAME	DAY AND TIME RESTRICTIONS	DURATION AND OPERATION
S. SALEM STREET	MONDAY THRU SUNDAY 5:00 AM TO 11:00 PM	30 MINS FOR OVERHEAD BRIDGE CONSTRUCTION

LANE AND SHOULDER CLOSURE REQUIREMENTS

- REMOVE LANE CLOSURE DEVICES FROM THE LANE WHEN WORK IS NOT BEING PERFORMED BEHIND THE LANE CLOSURE OR WHEN A LANE CLOSURE IS NO LONGER NEEDED OR AS DIRECTED BY THE ENGINEER.
- WHEN PERSONNEL AND/OR EQUIPMENT ARE WORKING WITHIN 15 FT OF AN OPEN TRAVEL LANE, CLOSE THE NEAREST OPEN SHOULDER USING ROADWAY STANDARD DRAWING NO. 1101.04 UNLESS THE WORK AREA IS PROTECTED BY BARRIER OR GUARDRAIL OR A LANE CLOSURE IS INSTALLED.
- WHEN PERSONNEL AND/OR EQUIPMENT ARE WORKING ON THE SHOULDER ADJACENT TO AN UNDIVIDED FACILITY AND WITHIN 5 FT OF AN OPEN TRAVEL LANE, CLOSE THE NEAREST OPEN TRAVEL LANE USING ROADWAY STANDARD DRAWING NO. 1101.02 UNLESS THE WORK AREA IS PROTECTED BY BARRIER OR GUARDRAIL.
- WHEN PERSONNEL AND/OR EQUIPMENT ARE WORKING WITHIN A LANE OF TRAVEL OF AN UNDIVIDED OR DIVIDED FACILITY, CLOSE THE LANE ACCORDING TO THE TRANSPORTATION MANAGEMENT PLANS, ROADWAY STANDARD DRAWINGS, OR AS DIRECTED BY THE ENGINEER. CONDUCT THE WORK SO THAT ALL PERSONNEL AND/OR EQUIPMENT REMAIN WITHIN THE CLOSED TRAVEL LANE.
- DO NOT WORK SIMULTANEOUSLY WITHIN 15 FT ON BOTH SIDES OF AN OPEN TRAVELWAY, RAMP, OR LOOP WITHIN THE SAME LOCATION UNLESS PROTECTED WITH GUARDRAIL OR BARRIER.
- DO NOT INSTALL MORE THAN ONE LANE CLOSURE IN ANY ONE DIRECTION ON SOUTH SALEM STREET.
- PROVIDE TRAFFIC CONTROL FOR APPROPRIATE LANE CLOSURES FOR SURVEYING.

PAVEMENT EDGE DROP OFF REQUIREMENTS

- BACKFILL AT A 6:1 SLOPE UP TO THE EDGE AND ELEVATION OF EXISTING PAVEMENT IN AREAS ADJACENT TO AN OPENED TRAVEL LANE THAT HAS AN EDGE OF PAVEMENT DROP-OFF AS FOLLOWS:
BACKFILL DROP-OFFS THAT EXCEED 2 INCHES ON ROADWAYS WITH POSTED SPEED LIMITS OF 45 MPH OR GREATER.

BACKFILL DROP-OFFS THAT EXCEED 3 INCHES ON ROADWAYS WITH POSTED SPEED LIMITS LESS THAN 45 MPH.

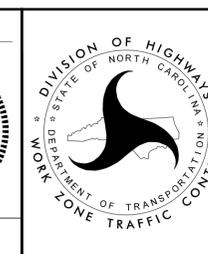
BACKFILL WITH SUITABLE COMPACTED MATERIAL, AS APPROVED BY THE ENGINEER, AT NO EXPENSE TO THE DEPARTMENT.
- DO NOT EXCEED A DIFFERENCE OF 2 INCHES IN ELEVATION BETWEEN OPEN LANES OF TRAFFIC FOR NOMINAL LIFTS OF 1.5 INCHES. INSTALL ADVANCE WARNING "UNEVEN LANES" SIGNS (W8-11) 500 FT IN ADVANCE AND A MINIMUM OF EVERY HALF MILE THROUGHOUT THE UNEVEN AREA.

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

APPROVED: _____
DATE: _____

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**



**TRANSPORTATION OPERATIONS
PLAN: (GENERAL NOTES)**

GENERAL NOTES CONTINUED

TRAFFIC PATTERN ALTERATIONS

M) NOTIFY THE ENGINEER THIRTY (30) CALENDAR DAYS PRIOR TO ANY TRAFFIC PATTERN ALTERATION.

SIGNING

N) INSTALL ADVANCE WORK ZONE WARNING SIGNS WHEN WORK IS WITHIN 40 FT FROM THE EDGE OF TRAVEL LANE AND NO MORE THAN THREE (3) DAYS PRIOR TO THE BEGINNING OF CONSTRUCTION.

O) PROVIDE SIGNING AND DEVICES REQUIRED TO CLOSE THE ROAD ACCORDING TO THE ROADWAY STANDARD DRAWINGS AND TRAFFIC CONTROL PLANS.

AND

PROVIDE SIGNING REQUIRED FOR THE OFF-SITE DETOUR ROUTE AS SHOWN IN THE TRAFFIC CONTROL PLANS.

P) ENSURE ALL NECESSARY SIGNING IS IN PLACE PRIOR TO ALTERING ANY TRAFFIC PATTERN.

Q) INSTALL BLACK ON ORANGE "DIP" SIGNS (W8-2) AND/OR "BUMP" SIGNS (W8-1) 500 FT IN ADVANCE OF THE UNEVEN AREA, OR AS DIRECTED BY THE ENGINEER.

TRAFFIC BARRIER

R) INSTALL TEMPORARY BARRIER ACCORDING TO THE TRANSPORTATION MANAGEMENT PLANS A MAXIMUM OF TWO (2) WEEKS PRIOR TO BEGINNING WORK IN ANY LOCATION. ONCE TEMPORARY BARRIER IS INSTALLED AT ANY LOCATION PROCEED IN A CONTINUOUS MANNER TO COMPLETE THE PROPOSED WORK IN THAT LOCATION UNLESS OTHERWISE STATED IN THE TRANSPORTATION MANAGEMENT PLANS OR AS DIRECTED BY THE ENGINEER.

DO NOT PLACE BARRIER DIRECTLY ON ANY SURFACE OTHER THAN ASPHALT OR CONCRETE.

ONCE TEMPORARY BARRIER IS INSTALLED AT ANY LOCATION AND NO WORK IS PERFORMED BEHIND THE TEMPORARY BARRIER FOR A PERIOD LONGER THAN TWO (2) MONTHS, REMOVE / RESET TEMPORARY BARRIER AT NO COST TO THE DEPARTMENT UNLESS OTHERWISE STATED IN THE TRANSPORTATION MANAGEMENT PLANS, TEMPORARY BARRIER IS PROTECTING A HAZARD, OR AS DIRECTED BY THE ENGINEER.

INSTALL TEMPORARY BARRIER WITH THE TRAFFIC FLOW BEGINNING WITH THE UPSTREAM SIDE OF TRAFFIC. REMOVE TEMPORARY BARRIER AGAINST THE TRAFFIC FLOW BEGINNING WITH THE DOWNSTREAM SIDE OF TRAFFIC.

INSTALL AND SPACE DRUMS NO GREATER THAN TWICE THE POSTED SPEED LIMIT (MPH) TO CLOSE OR KEEP THE SECTION OF THE ROADWAY CLOSED UNTIL THE TEMPORARY BARRIER CAN BE PLACED OR AFTER THE TEMPORARY BARRIER IS REMOVED.

S) PROTECT THE APPROACH END OF MOVABLE/PORTABLE CONCRETE BARRIER AT ALL TIMES DURING THE INSTALLATION AND REMOVAL OF THE BARRIER BY EITHER A MOUNTED ATTENUATOR (MAXIMUM 72 HOURS) OR A TEMPORARY CRASH CUSHION.

PROTECT THE APPROACH END OF MOVABLE/PORTABLE CONCRETE BARRIER FROM ONCOMING TRAFFIC AT ALL TIMES BY A TEMPORARY CRASH CUSHION UNLESS THE APPROACH END OF MOVABLE/PORTABLE CONCRETE BARRIER IS OFFSET FROM ONCOMING TRAFFIC AS FOLLOWS OR AS SHOWN IN THE PLANS: (SEE ALSO 1101.05)

POSTED SPEED LIMIT	MINIMUM OFFSET
40 OR LESS	15 FT
45 - 50	20 FT
55	25 FT
60 MPH or HIGHER	30 FT

TRAFFIC CONTROL DEVICES

T) WHEN LANE CLOSURES ARE NOT IN EFFECT SPACE CHANNELIZING DEVICES IN WORK AREAS NO GREATER IN FEET THAN TWICE THE POSTED SPEED LIMIT (MPH) EXCEPT, 10 FT ON-CENTER IN RADII, AND 3 FT OFF THE EDGE OF AN OPEN TRAVELWAY. REFER TO STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES SECTIONS 1130 (DRUMS), 1135 (CONES) AND 1180 (SKINNY DRUMS) FOR ADDITIONAL REQUIREMENTS.

U) PLACE TYPE III BARRICADES, WITH "ROAD CLOSED" SIGN R11-2 ATTACHED, OF SUFFICIENT LENGTH TO CLOSE ENTIRE ROADWAY.

V) PLACE ADDITIONAL SETS OF THREE CHANNELIZING DEVICES (DRUMS) PERPENDICULAR TO THE EDGE OF TRAVELWAY ON 500 FT CENTERS WHEN UNOPENED LANES ARE CLOSED TO TRAFFIC.

PAVEMENT MARKINGS AND MARKERS

W) INSTALL TEMPORARY PAVEMENT MARKINGS AND TEMPORARY PAVEMENT MARKERS ON INTERIM LAYERS OF PAVEMENT AS FOLLOWS:

ROAD NAME	MARKING	MARKER
APEX PEAKWAY, SOUTH SALEM STREET	PAINT	TEMPORARY RAISED

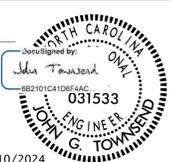
X) TIE PROPOSED PAVEMENT MARKING LINES TO EXISTING PAVEMENT MARKING LINES.

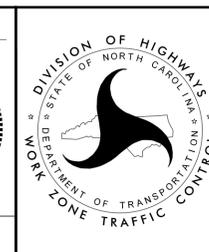
Y) REMOVE/REPLACE ANY CONFLICTING/DAMAGED PAVEMENT MARKINGS AND MARKERS BY THE END OF EACH DAY'S OPERATION.

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

APPROVED: _____
 DATE: _____


 4/10/2024
**DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED**



**TRANSPORTATION OPERATIONS
 PLAN: (GENERAL NOTES)**

GENERAL NOTES CONTINUED

MISCELLANEOUS

- Z) LAW ENFORCEMENT MAY BE USED TO MAINTAIN TRAFFIC THROUGH THE WORK AREA AND/OR INTERSECTIONS AS DIRECTED BY THE ENGINEER.
- AA) CONTRACTOR SHALL MAINTAIN SIDEWALK ACCESS AT ALL TIMES AS STATED IN THE PHASING. CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE TEMPORARY SIDEWALKS (CONCRETE, ASPHALT, OR OTHER SUITABLE MATERIAL AS APPROVED BY THE ENGINEER) AT ALL LOCATIONS WHERE THE OPEN PEDESTRIAN TRAVELWAY HAS BEEN REMOVED FOR CONSTRUCTION OPERATIONS (UTILITIES, DRAINAGE, ETC.).

LOCAL NOTES

- LN-1) WHEN HANGING PROPOSED GIRDERS ON -L- BRIDGE, CLOSE S. SALEM STREET AT NIGHT USING RSD 1101.03, SHEET 8 OF 9.
- LN-2) THE FOLLOWING OPTIONS ARE AVAILABLE DURING RESURFACING AND MILLING OPERATIONS ON MULTI-LANE FACILITIES WHEN ALL LANES OR A SINGLE LANE IN ONE DIRECTION ARE TO BE MILLED:
 - (A) MILL THE ENTIRE WIDTH OF PAVEMENT FOR ALL LANES TO BE MILLED IN ANY DIRECTION DAILY AND PAVE BACK WITHIN 72 HOURS.
 - (B) MILL A SINGLE LANE AND PAVE BACK BY THE END OF EACH WORK DAY.

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

APPROVED: _____
 DATE: _____

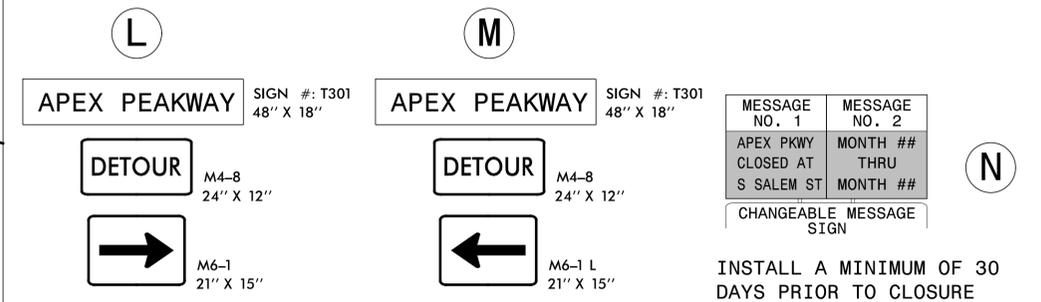
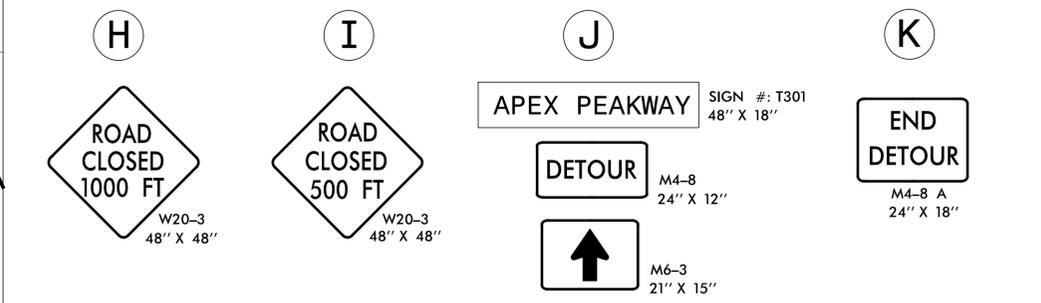
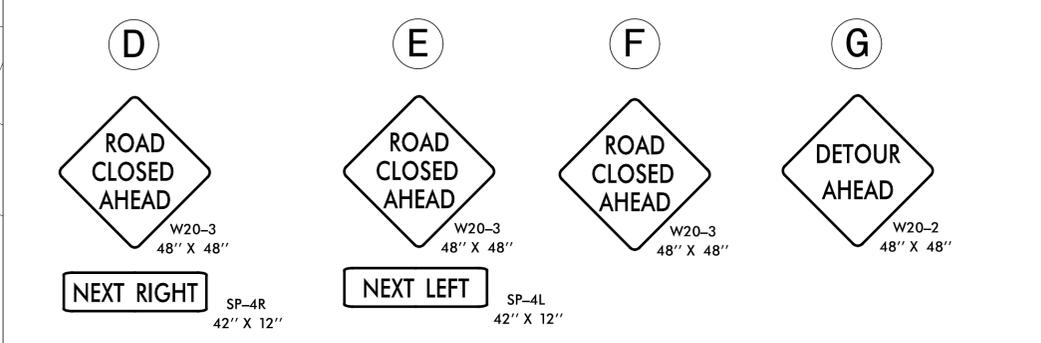
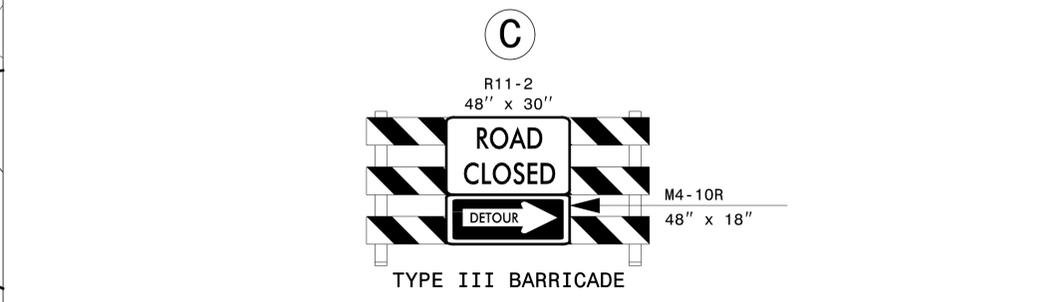
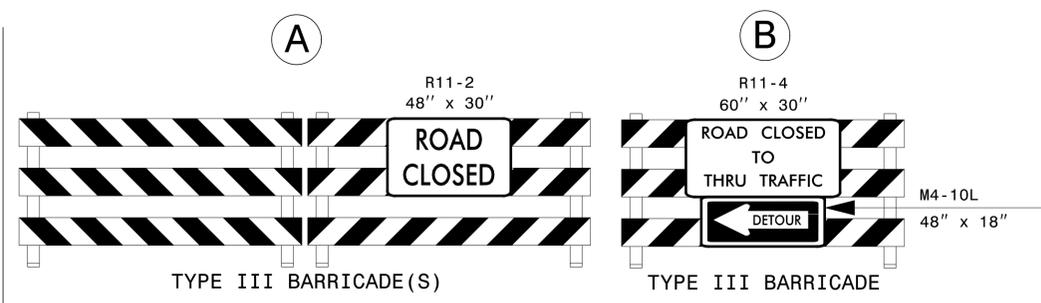
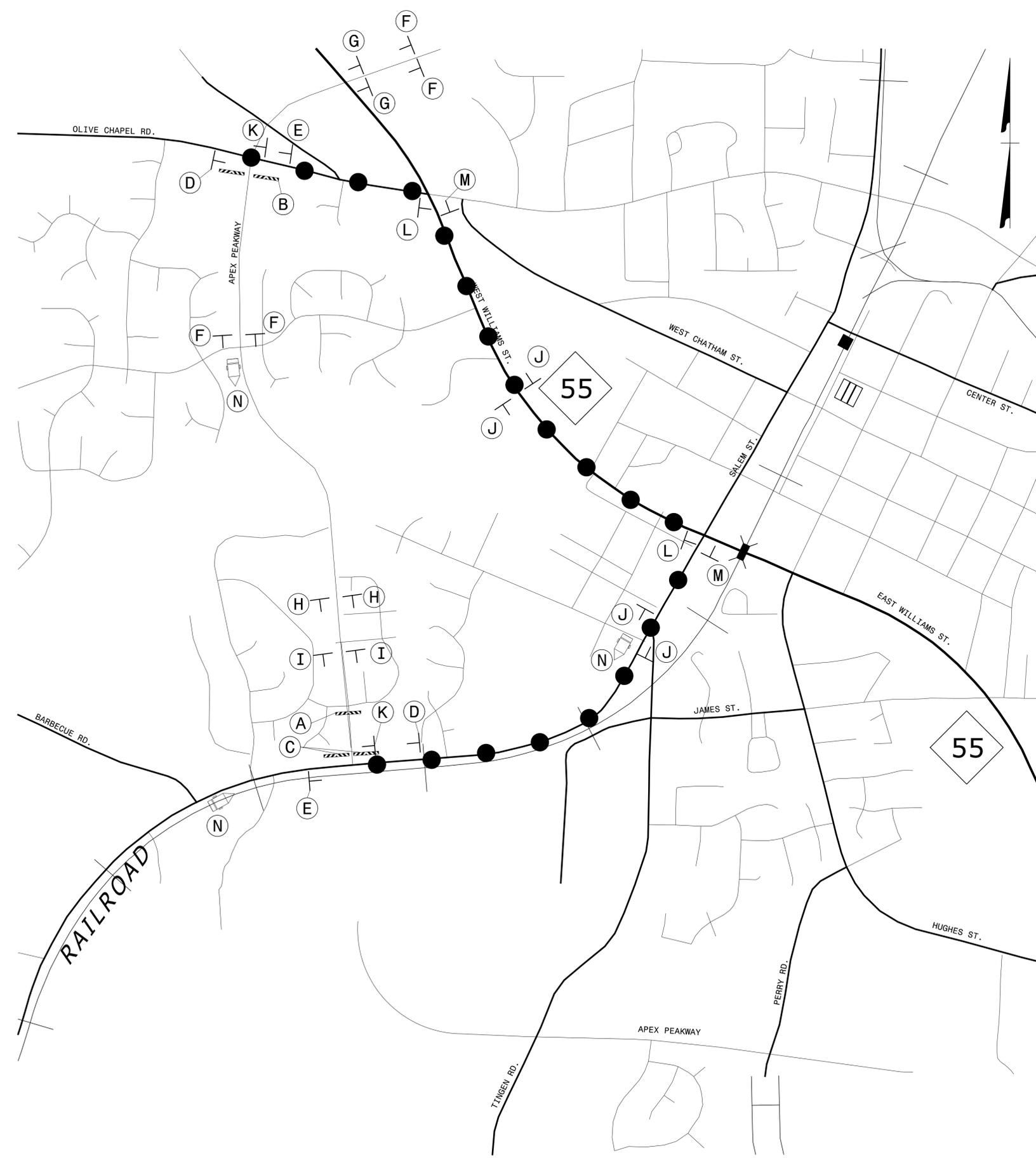


**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**



TRANSPORTATION OPERATIONS PLAN: (GENERAL NOTES)

8/25/2022
R:\Traffic\TrafficControl\CP\U-5928_TC_TMP02.dgn
User:jtownsend



APPROVED:	DATE:		DETOUR SIGNING
	7/25/2023		

7/25/2023
 R:\TrafficControl\TrafficControl\U-5928.tc.tmp_01B.dgn
 User:jtownsend

● ● ● ● ● **DETOUR ROUTE**

PHASING

PROJ. REFERENCE NO. U-5928	SHEET NO. TMP-3
-------------------------------	--------------------

COMPLETE ANY PROPOSED OR TEMPORARY WIDENING IN SUCH A MANNER THAT PONDING OF WATER WILL NOT OCCUR IN THE TRAVEL LANE.

USING INCIDENTAL STONE AS NECESSARY, MAINTAIN VEHICULAR ACCESS TO ALL DRIVEWAYS DURING THE LIFE OF THE CONTRACT UNLESS OTHERWISE NOTED IN THE PHASING OR DIRECTED BY THE ENGINEER.

REMOVE TEMPORARY LANE CLOSURES AT THE END OF EACH WORKDAY AND RESTORE TRAFFIC TO EXISTING PATTERNS.

PAVE PROPOSED CONSTRUCTION, UP TO BUT NOT INCLUDING THE FINAL LAYER OF SURFACE COURSE, IN ALL PHASES, UNTIL STATED TO INSTALL FINAL LAYER IN THE PHASING.

WHEN WEDGING IS SHOWN ON THE PLANS AND/OR CALLED FOR IN THE PHASING, PLACE ASPHALT WEDGING AS REQUIRED TO CREATE A SMOOTH TRANSITION AND POSITIVE DRAINAGE ACROSS EXISTING TRAVEL LANES.

PHASE I

STEP 1
INSTALL WORK ZONE ADVANCE WARNING SIGNS. SEE RSD 1101.01.

STEP 2
USING RSD 1101.03 CLOSE -L- (APEX PEAKWAY). DETOUR TRAFFIC ALONG ROUTE SHOWN ON TMP-2.

STEP 3
USING RSD 1101.02, SHEET 2 OF 19, INSTALL PORTABLE CONCRETE BARRIER WITH TEMPORARY CRASH CUSHION AND TEMPORARY PAVEMENT MARKINGS AS SHOWN ON SHEETS TMP-4 AND TMP-5 PRIOR TO BEGINNING SUBSTRUCTURE CONSTRUCTION.

CONTRACTOR SHALL COMPLETE THE WORK OF PHASE I STEP 4 WITHIN 90 CONSECUTIVE CALENDAR DAYS FROM NOTICE TO PROCEED. SEE INTERMEDIATE CONTRACT TIME AND LIQUIDATED DAMAGES.

STEP 4
AWAY FROM TRAFFIC, BEHIND PORTABLE CONCRETE BARRIER, AND USING LANE CLOSURES (RSD 1101.02, SHEETS 1 AND 3 OF 19) AND TEMPORARY ROAD CLOSURES (RSD 1101.03, SHEET 8 OF 9), AS NECESSARY, COMPLETE CONSTRUCTION OF THE DUCT BANK (SEE UC PLANS FOR DETAIL.)

NOTE: STEP 5 CAN BEGIN WITH STEP 4.

STEP 5
AWAY FROM TRAFFIC, BEHIND PORTABLE CONCRETE BARRIER, AND USING LANE CLOSURES (RSD 1101.02, SHEETS 1 AND 3 OF 19) AND TEMPORARY ROAD CLOSURES (RSD 1101.03, SHEET 8 OF 9), AS NECESSARY, BEGIN CONSTRUCTION OF THE FOLLOWING:

- WATERLINES (SEE UC PLANS)
- L- STA 17+40 +/- TO STA 36+29 +/-
 - Y- STA 10+00 +/- TO STA 31+63 +/-
 - LOOP- STA 10+00 +/- TO STA 16+45 +/-

AWAY FROM TRAFFIC AND USING LANE CLOSURES (RSD 1101.02, SHEETS 1 AND 3 OF 19), AS NECESSARY, BEGIN INSTALLATION THE FOLLOWING TEMPORARY SIGNALS:

- SR 1161 (APEX PEAKWAY) AT LOOP
- SR 1011 (SALEM STREET) AT LOOP

AWAY FROM TRAFFIC, AS MUCH AS POSSIBLE, AND USING LANE CLOSURES (RSD 1101.02, SHEETS 1 AND 3 OF 19), AS NECESSARY, COMPLETE CONSTRUCTION OF THE FOLLOWING: (SEE SHEET TMP-4) (MAINTAIN PEDESTRIAN ACCES VIA EXISTING SIDEWALK ON THE RIGHT SIDE OF -L-)

- L- STA 10+00 +/- TO STA 17+15 +/- (LEFT SIDE)

STEP 6

USING RSD 1101.02, SHEET 2 OF 19, REMOVE PORTABLE CONCRETE BARRIER AND TEMPORARY CRASH CUSHION FROM -Y- (S. SALEM ST.) UPON COMPLETION OF BRIDGE SUBSTRUCTURE AND MEDIAN BENT PROTECTION.

STEP 7

AWAY FROM TRAFFIC, AS MUCH AS POSSIBLE, AND USING LANE CLOSURES (RSD 1101.02, SHEETS 1 AND 3 OF 19) AND TEMPORARY ROAD CLOSURES (RSD 1101.03, SHEET 8 OF 9), AS NECESSARY, COMPLETE CONSTRUCTION OF THE FOLLOWING: (SEE SHEET TMP-4 AND TMP-5)

- L- STA 17+15 +/- TO STA 20+46 +/-
- Y- STA 10+00 +/- TO STA 29+30 +/-
- LOOP- STA 10+00 +/- TO STA 16+45 +/-
- BRIDGE GIRDER INSTALLATION OVER -Y- (SOUTH SALEM ST)

STEP 8

AWAY FROM TRAFFIC, AS MUCH AS POSSIBLE, AND USING LANE CLOSURES (RSD 1101.02, SHEETS 1 AND 3 OF 19), AS NECESSARY, PLACE TEMPORARY PHASE II PAVEMENT MARKINGS AND MARKERS FROM -L- STA 10+70 +/- TO STA 20+26 +/-, -LOOP- STA 10+00 +/- TO STA 16+45 +/- AND -Y- STA 10+00 +/- TO STA 28+90 +/-, AS SHOWN ON SHEETS TMP-6 AND TMP-7, AND USING RSD 1205.01 AND 1251.01 FOR INSTALLATION OF MARKERS, COMPLETE INSTALLATION AND ACTIVATE FINAL SIGNAL AT SR 1011 (SALEM STREET) AT LOOP AND SHIFT TRAFFIC TO THE PHASE II TRAFFIC PATTERN.

PHASE II

STEP 1

AWAY FROM TRAFFIC, AS MUCH AS POSSIBLE, AND USING LANE CLOSURES (RSD 1101.02, SHEETS 1 AND 3 OF 19), AS NECESSARY, PLACE TEMPORARY PAVEMENT MARKINGS AND MARKERS FROM -L- STA 10+70 +/- TO STA 17+14 +/- AS SHOWN ON SHEET TMP-6, AND USING RSD 1205.01 AND 1251.01 FOR INSTALLATION OF MARKERS, SHIFT TRAFFIC TO THE TEMPORARY PATTERN AND COMPLETE CONSTRUCTION OF THE FOLLOWING: (SEE SHEET TMP-6 AND TMP-7)

- L- STA 10+00 +/- TO STA 17+15 +/-
- L- STA 20+46 +/- TO STA 36+29 +/-

STEP 2

USING LANE CLOSURES (RSD 1101.02, SHEETS 1, 2 AND 3 OF 19), PLACE FINAL LAYER OF SURFACE COURSE AND PRE-MARK THE FINAL PAVEMENT MARKINGS (OR PLACE INTERIM PAINT AS REQUIRED), THEN REMOVE ALL DETOUR BARRICADES AND PLACE TRAFFIC IN THE FINAL TRAFFIC PATTERN.

STEP 3

USING LANE CLOSURES (RSD 1101.02, SHEETS 1, 2 AND 3 OF 19), PLACE FINAL PAVEMENT MARKINGS AND MARKERS (SEE PAVEMENT MARKING PLANS).

STEP 4

USING ROAD CLOSURES (RSD 1101.03, SHEET 1 OF 9), CLOSE TINGEN ROAD AT RAILROAD CROSSING AND COMPLETE REMOVAL OF ASPHALT PAVEMENT AND AT-GRADE RAILROAD CROSSING. (SEE TMP-7)

STEP 5

REMOVE ALL REMAINING TRAFFIC CONTROL DEVICES.

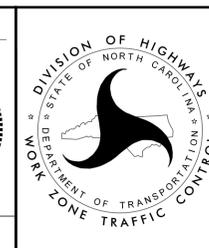
The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Transportation Engineering	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

APPROVED: _____

DATE: _____

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

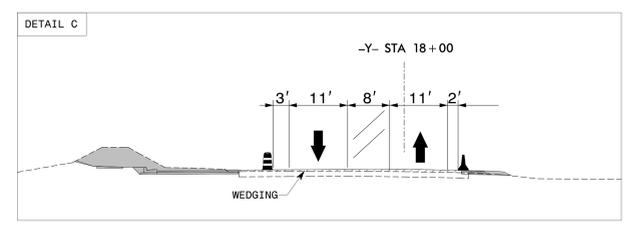
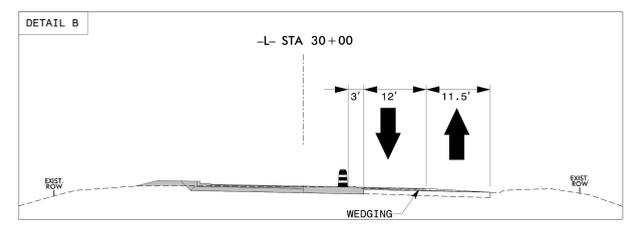
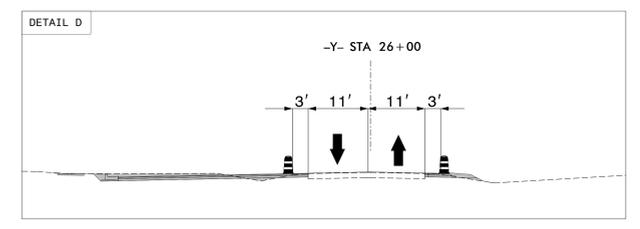
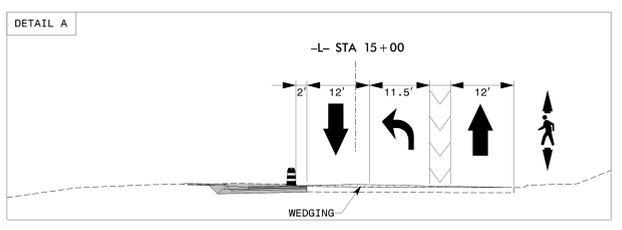
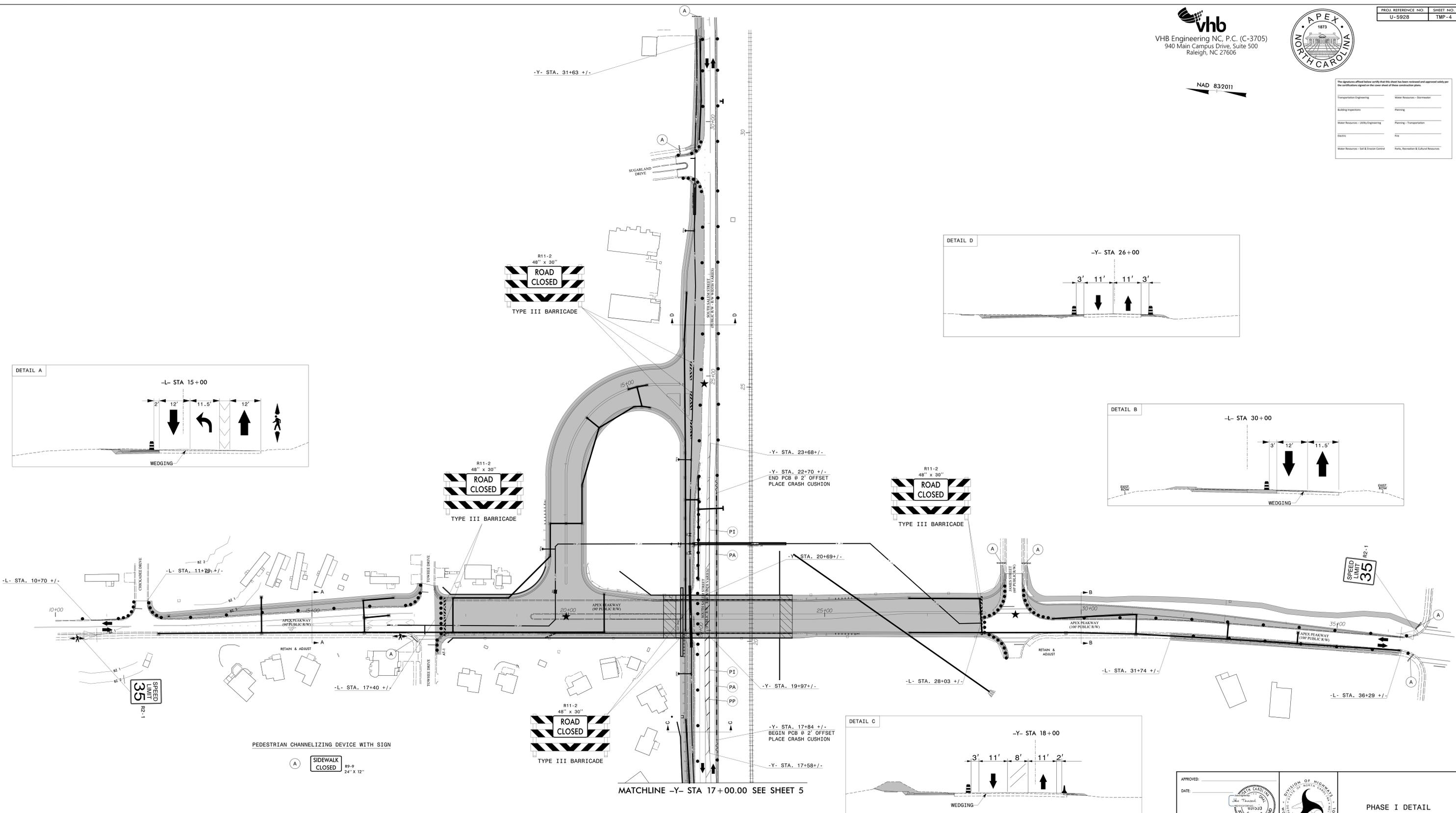


PHASING

NAD 832011

The signatures of the following certify that this sheet has been reviewed and approved solely for the construction of the project shown on this sheet of these construction plans.

Transportation Engineering	Water Resources - Stormwater
Building Inspection	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources



MATCHLINE -Y- STA 17+00.00 SEE SHEET 5

APPROVED: _____
 DATE: _____

4/9/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PHASE I DETAIL

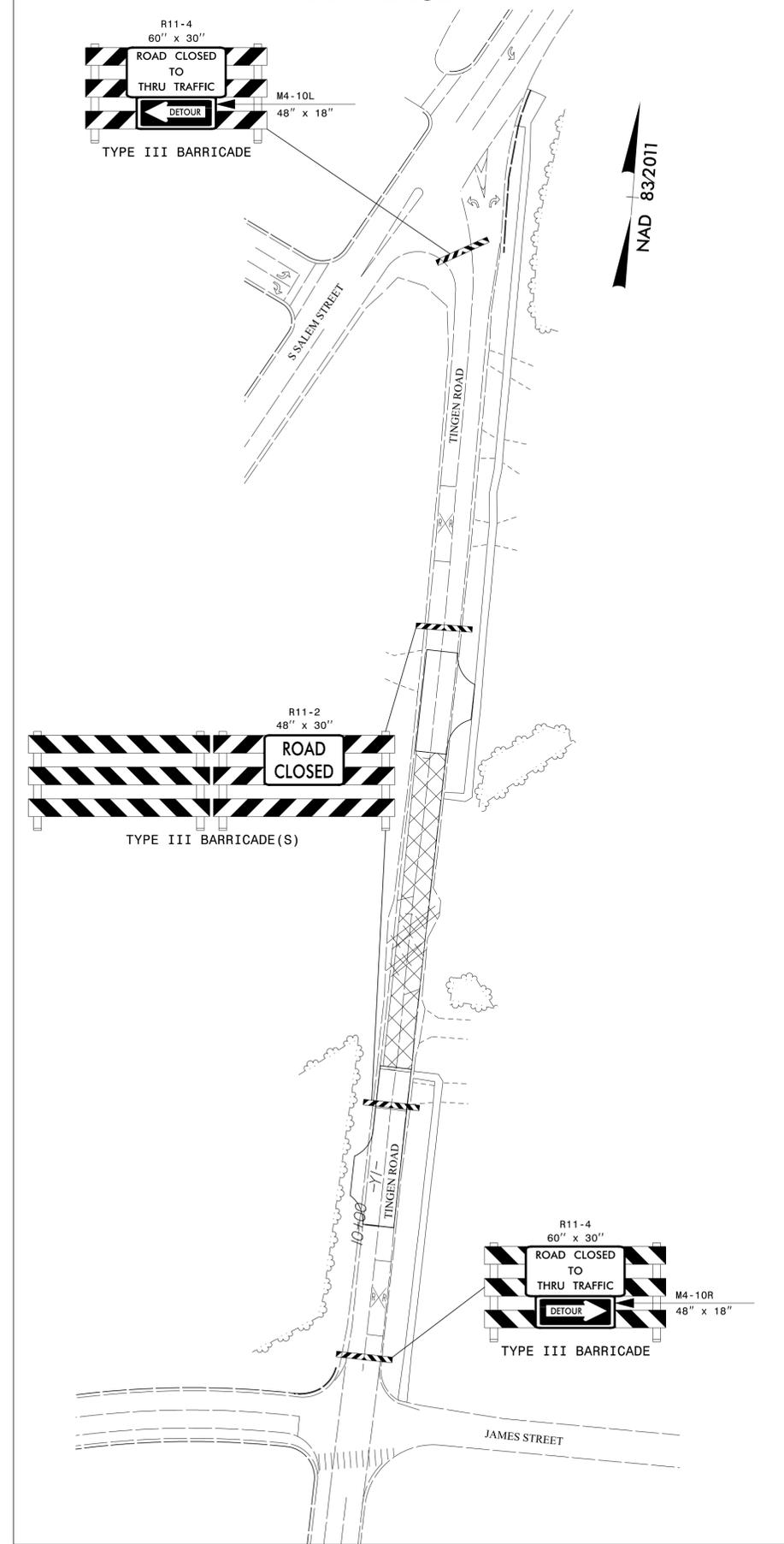
6/27/24
 R:\Projects\2024\U-5928\Drawings\Sheet\TMP-4.dwg
 User: thomasc
 Date: 4/9/2024 10:58:48 AM



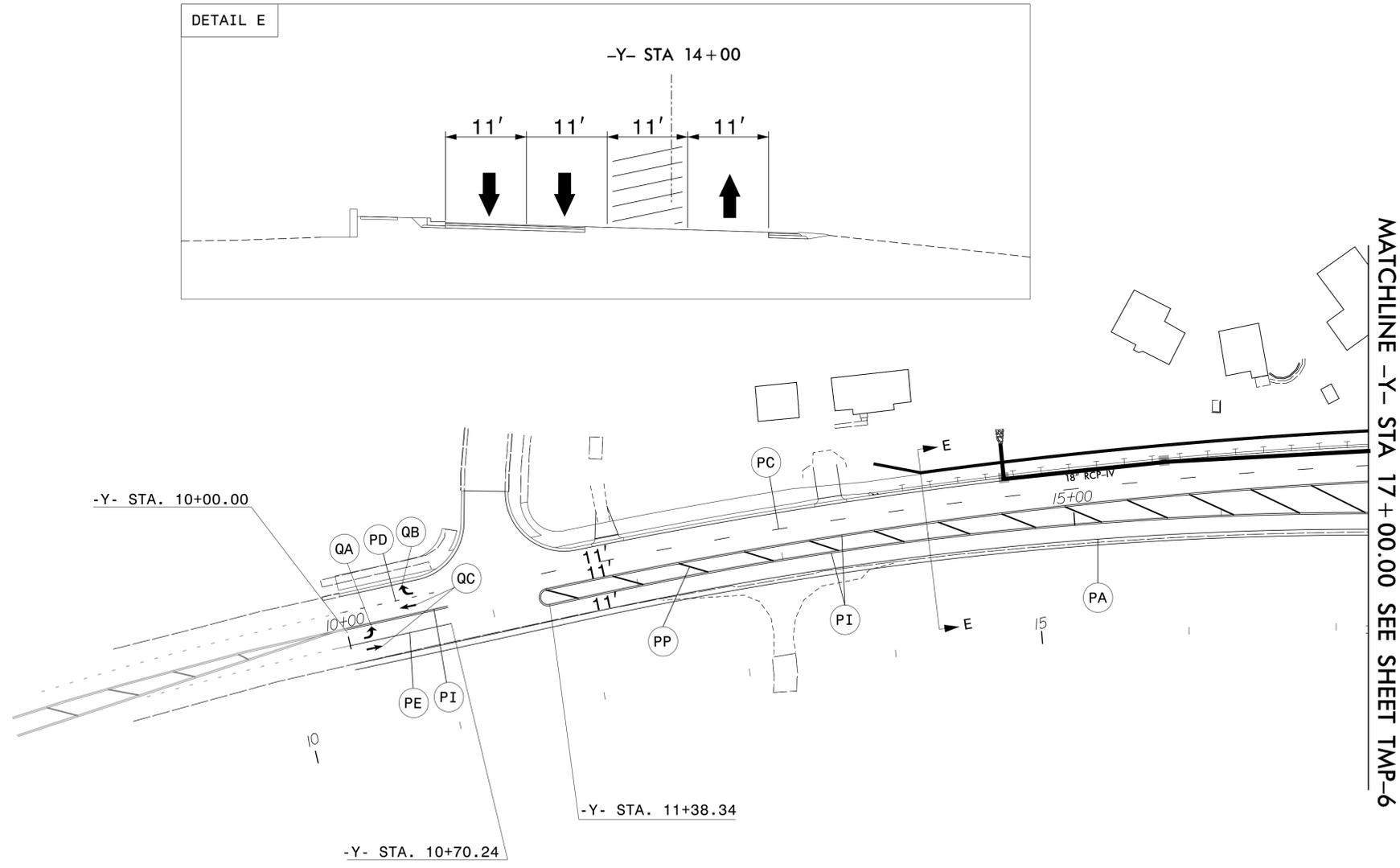
VHB Engineering NC, P.C. (C-3705)
 940 Main Campus Drive, Suite 500
 Raleigh, NC 27606



-Y1- INSET



DETAIL E



The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Transportation Engineering	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

APPROVED: _____
 DATE: _____

**DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED**



PHASE II DETAIL

4/9/2024
 R:\Traf\TrafficControl\U5928.tc.tmp07.dgn
 User:jtowndse

TIP NO.	SHEET NO.
U-5928	PMP-1
APPROVED: _____	
DATE: _____	
SEAL	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

**STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION**

**PAVEMENT MARKING PLAN
WAKE COUNTY**

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Transportation Engineering _____	Water Resources - Stormwater _____
Building Inspections _____	Planning _____
Water Resources - Utility Engineering _____	Planning - Transportation _____
Electric _____	Fire _____
Water Resources - Soil & Erosion Control _____	Parks, Recreation & Cultural Resources _____

INDEX

SHEET NO.	DESCRIPTION
PMP-1	PAVEMENT MARKING PLAN TITLE AND SCHEDULE SHEET
PMP-2-3	PAVEMENT MARKING DETAIL

PAVEMENT MARKING SCHEDULE

SYMBOL	DESCRIPTION	TOTAL QUANTITY
	COLD APPLIED PLASTIC (4")	1075 LF
CA	WHITE EDGELINE	
CB	YELLOW EDGELINE	
CC	10 FT. WHITE SKIP	
	COLD APPLIED PLASTIC (8")	160 LF
C13	3 FT. - 9FT./SP WHITE MINISKIP	
CR	WHITE SOLID LANE LINE	
	COLD APPLIED PLASTIC PAVEMENT MARKING SYMBOL	2 EA
DB	RIGHT TURN ARROW	
DC	STRAIGHT ARROW	
	COLD APPLIED PLASTIC PAVEMENT MARKING CHARACTER	4 EA
DI	ALPHANUMERIC CHAR.	
	THERMOPLASTIC (4", 90 MILS.)	18583 LF
T8	2 FT. - 6 FT./SP WHITE MINISKIP	
T9	2 FT. - 6 FT./SP YELLOW MINISKIP	
TA	WHITE EDGELINE	
TB	YELLOW EDGELINE	
TC	10 FT. WHITE SKIP	
TD	3 FT.- 9 FT./SP WHITE MINISKIP	
TE	WHITE SOLID LANE LINE	
TI	YELLOW DOUBLE CENTER	
	THERMOPLASTIC (8", 90 MILS.)	3020 LF
T13	3 FT. - 9FT./SP WHITE MINISKIP	
TN	WHITE GORELINE	
TO	WHITE DIAGONAL	
TP	YELLOW DIAGONAL	
TQ	WHITE CROSSWALK LINE	
TR	WHITE SOLID LANE LINE	
	THERMOPLASTIC (24", 90 MILS.)	1305 LF
T2	WHITE STOPBAR	
T3	WHITE CROSSWALK LINE	
	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS.)	48 EA
UA	LEFT TURN ARROW	
UB	RIGHT TURN ARROW	
UC	STRAIGHT ARROW	
UE	COMBO. RIGHT/STRAIGHT ARROW	
UN	UTURN ARROW	
UP	MERGE ARROW	
	THERMOPLASTIC PAVEMENT MARKING CHARACTER (90 MILS.)	8 EA
UI	ALPHANUMERIC CHAR.	
	PERMANENT RAISED PAVEMENT MARKERS	335 EA
MA	YELLOW & YELLOW	
MB	CRYSTAL & RED	

GENERAL NOTES

- THE FOLLOWING GENERAL NOTES APPLY AT ALL TIMES FOR THE DURATION OF THE CONSTRUCTION PROJECT, EXCEPT WHEN OTHERWISE NOTED IN THE PLAN, OR DIRECTED BY THE ENGINEER.
- A) INSTALL PAVEMENT MARKINGS AND PAVEMENT MARKERS ON THE FINAL SURFACE AS FOLLOWS:

ROAD NAME	MARKING	MARKER
APEX PEAKWAY	THERMOPLASTIC	PERM. RAISED
S. SALEM ST.	THERMOPLASTIC	PERM. RAISED
BRIDGE	COLD APPLIED PLASTIC	PERM. RAISED
 - B) TIE PROPOSED PAVEMENT MARKING LINES TO EXISTING PAVEMENT MARKING LINES.
 - C) REMOVE/REPLACE ANY CONFLICTING/DAMAGED PAVEMENT MARKINGS AND MARKERS.
 - D) PASSING ZONES WILL BE DETERMINED IN THE FIELD AND MUST BE APPROVED BY THE ENGINEER.
 - E) STOP BAR LOCATION AT NON-SIGNALIZED INTERSECTIONS MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER.
 - F) REMOVE ALL RESIDUE AND SURFACE LAITANCE BY ACCEPTABLE METHODS ON CONCRETE BRIDGE DECKS PRIOR TO PLACING COLD APPLIED PLASTIC PAVEMENT MARKING MATERIAL.
 - G) UNLESS OTHERWISE SPECIFIED, HEATED-IN-PLACE THERMOPLASTIC MAY BE USED IN LIEU OF EXTRUDED THERMOPLASTIC FOR STOP BARS, SYMBOLS, CHARACTERS AND DIAGONALS. IF HEATED-IN-PLACE IS USED, IT SHALL BE PAID FOR USING THE EXTRUDED THERMOPLASTIC PAY ITEM.
 - H) TYPE III COLD APPLIED PLASTIC MAY BE USED IN LIEU OF TYPE II COLD APPLIED PLASTIC. IF TYPE III COLD APPLIED PLASTIC IS USED, IT SHALL BE PAID FOR USING THE TYPE II COLD APPLIED PLASTIC PAY ITEM.
 - I) SEE ROADWAY PLANS FOR ALTERNATE CURB RAMP DESIGNS WHEN INDICATED ON PAVEMENT MARKING DETAIL SHEETS.

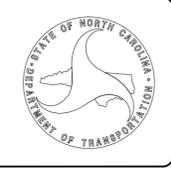
ROADWAY STANDARD DRAWING

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS" - PROJECT SERVICES UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2024 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
1205.01	PAVEMENT MARKINGS - LINE TYPES AND OFFSETS
1205.02	PAVEMENT MARKINGS - TWO-LANE AND MULTILANE ROADWAYS
1205.04	PAVEMENT MARKINGS - INTERSECTIONS
1205.05	PAVEMENT MARKINGS - TURN LANES
1205.06	PAVEMENT MARKINGS - LANE DROPS
1205.07	PAVEMENT MARKINGS - PEDESTRIAN CROSSWALKS
1205.08	PAVEMENT MARKINGS - SYMBOLS AND WORD MESSAGES
1205.09	PAVEMENT MARKINGS - PAINTED ISLANDS
1205.12	PAVEMENT MARKINGS - BRIDGES
1250.01	RAISED PAVEMENT MARKERS - INSTALLATION SPACING
1251.01	RAISED PAVEMENT MARKERS - PERMANENT AND TEMPORARY
1261.01	GUARDRAIL AND BARRIER DELINEATORS - INSTALLATION SPACING
1261.02	GUARDRAIL AND BARRIER DELINEATORS - TYPES AND MOUNTING
1262.01	GUARDRAIL END DELINEATION
1264.01	OBJECT MARKERS - TYPES
1264.02	OBJECT MARKERS - INSTALLATION

PLAN REVIEWED BY: N.C.D.O.T. SIGNING AND DELINEATION UNIT

<i>Ayman Alqudwah, PE</i>	SIGNING & DELINEATION STANDARDS ENGINEER
<i>Derrick Beard</i>	SIGNING & DELINEATION PROJECT DESIGN ENGINEER



PLAN PREPARED BY: VHB Engineering NC, P.C.

<i>John G. Townsend, PE</i>	PROJECT ENGINEER
-----------------------------	------------------



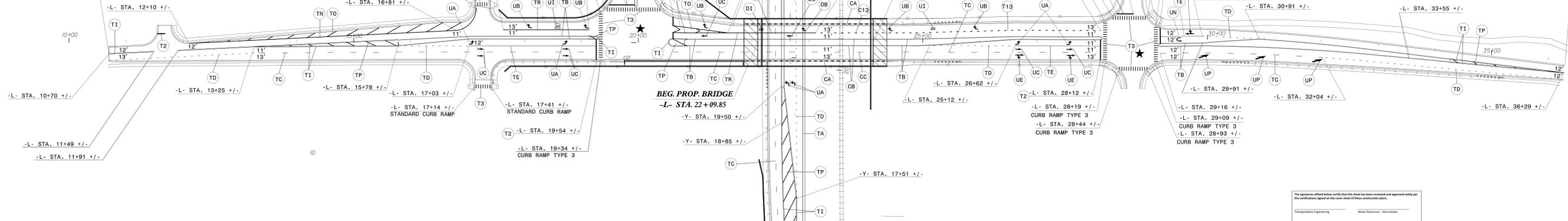
T.I.P.: U-5928

CONTRACT:

PAVEMENT MARKING SCHEDULE

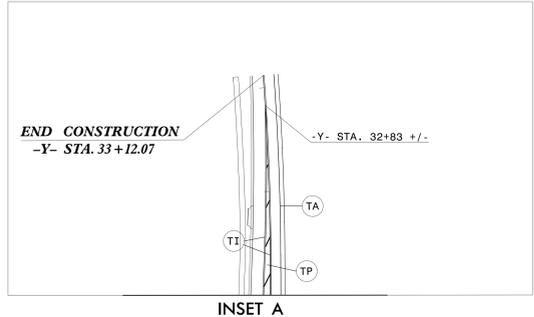
SYMBOL	DESCRIPTION
COLD APPLIED	
C13	3 FT. - 9FT./SP WHITE MINISKIP (8")
CA	WHITE EDGELINE (4")
CB	YELLOW EDGELINE (4")
CC	10 FT. WHITE SKIP (4")
CR	WHITE SOLID LANE LINE (8")
DB	RIGHT TURN ARROW
DC	STRAIGHT ARROW
DI	ALPHANUMERIC CHAR.
THERMOPLASTIC	
T2	WHITE STOPBAR (24", 90 MIL)
T3	WHITE CROSSWALK LINE (24", 90 MIL)
T8	2 FT. - 6 FT./SP WHITE MINISKIP (4", 90 MIL)
T9	2 FT. - 6 FT./SP YELLOW MINISKIP (4", 90 MIL)
T13	3 FT. - 9FT./SP WHITE MINISKIP (8", 90 MIL)
TA	WHITE EDGELINE (4", 90 MIL)
TB	YELLOW EDGELINE (4", 90 MIL)
TC	10 FT. WHITE SKIP (4", 90 MIL)
TD	3 FT. - 9 FT./SP WHITE MINISKIP (4", 90 MIL.)
TE	WHITE SOLID LANE LINE (4", 90 MIL.)
TI	YELLOW DOUBLE CENTER (4", 90 MIL.)
TN	WHITE GORELINE (8", 90 MIL)
TO	WHITE DIAGONAL (8", 90 MIL)
TP	YELLOW DIAGONAL (8", 90 MIL)
TQ	WHITE CROSSWALK LINE (8", 90 MIL)
TR	WHITE SOLID LANE LINE (8", 90 MIL)
UA	LEFT TURN ARROW (90 MIL)
UB	RIGHT TURN ARROW (90 MIL)
UC	STRAIGHT ARROW (90 MIL)
UE	COMBO. RIGHT/STRAIGHT ARROW (90 MIL)
UI	ALPHANUMERIC CHAR. (90 MIL)
UN	UTURN ARROW
UP	MERGE ARROW (90 MIL)
PERMANENT RAISED PAVEMENT MARKERS	
MA	YELLOW & YELLOW
MB	CRYSTAL & RED

BEGIN TIP PROJECT U-5928
-L- STA. 10+70.00
BEGIN MILL/RESURFACE



MATCHLINE -Y- STA 17+00.00 SEE SHEET PMP-3

MATCHLINE -Y- STA 31+00.00
SEE INSET A ON SHEET



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

TIP NO. SHEET NO.
U-5928 PMP-2

APPROVED: _____

DATE: _____

SEAL: _____

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 832011

END TIP PROJECT U-5928
-L- STA. 36+30.00
END MILL/RESURFACE

The signatures listed below certify that this sheet has been reviewed and approved solely per the certifications listed on the cover sheet of these construction plans.

Transportation Engineering	Water Resources - Stormwater
Building Inspection	Planning
Water Resources - Utility Engineering	Planning - Transportation
Public	Site
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

PAVEMENT MARKING DETAIL

12/23/2022 R:\IT\office\Pavement_Markings\U5928_bmp\psh_02.dgn
 User: jh10
 Plot: U5928_PMP-2.dwg
 Plot Date: 12/23/2022 10:58:00 AM
 Plot Scale: 1:1
 Plot Size: 11.00 x 17.00
 Plot Orientation: Landscape
 Plot Color: Black
 Plot Lineweight: 0.20
 Plot Font: Arial, 10
 Plot Font Color: Black
 Plot Font Size: 10
 Plot Font Weight: Normal
 Plot Font Style: Regular
 Plot Font Color: Black
 Plot Font Size: 10
 Plot Font Weight: Normal
 Plot Font Style: Regular

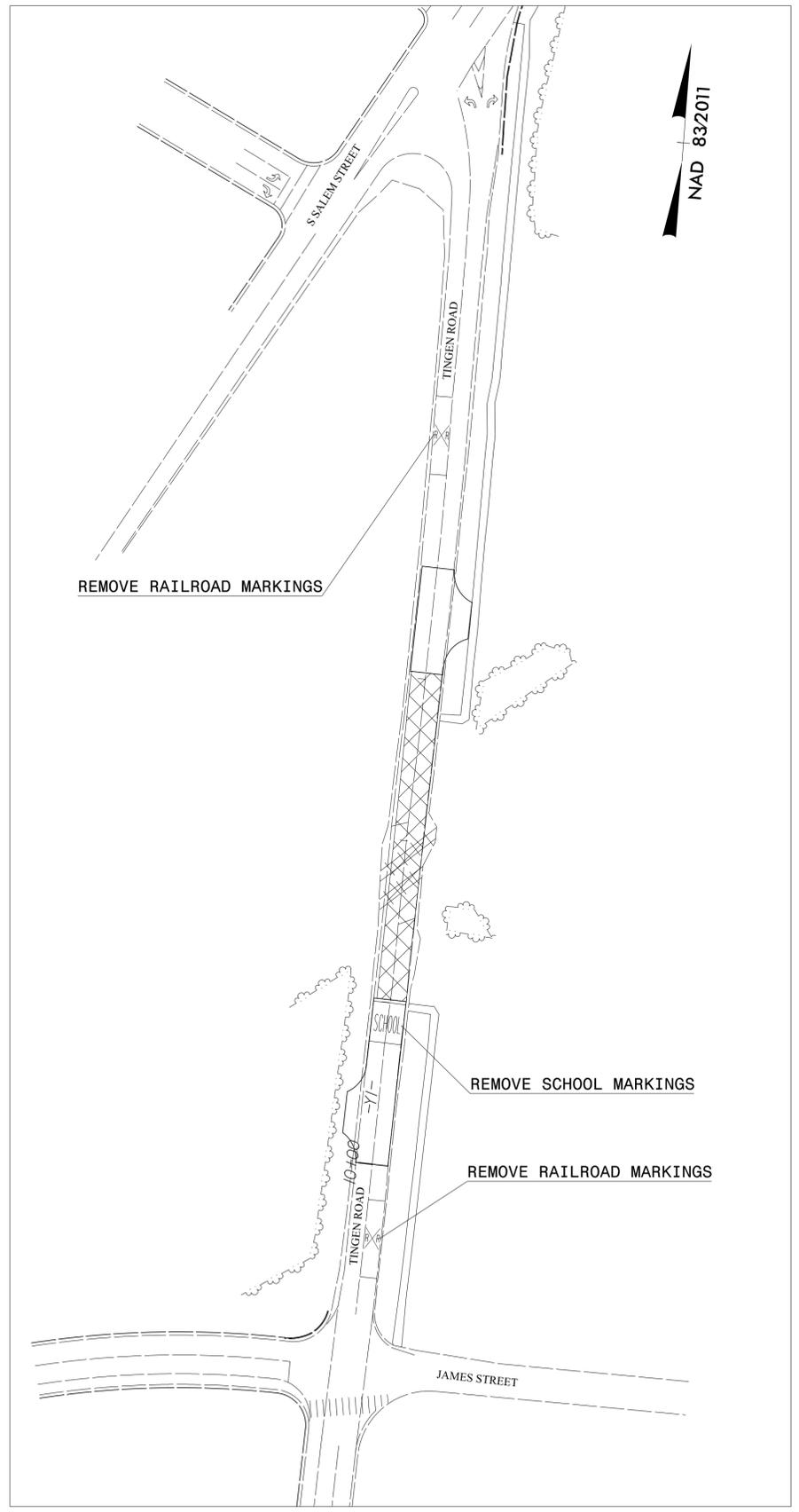
TIP NO. U-5928	SHEET NO. PMP-3
APPROVED: _____	
DATE: _____	
SEAL	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

vhb
 VHB Engineering NC, P.C. (C-3705)
 940 Main Campus Drive, Suite 500
 Raleigh, NC 27606

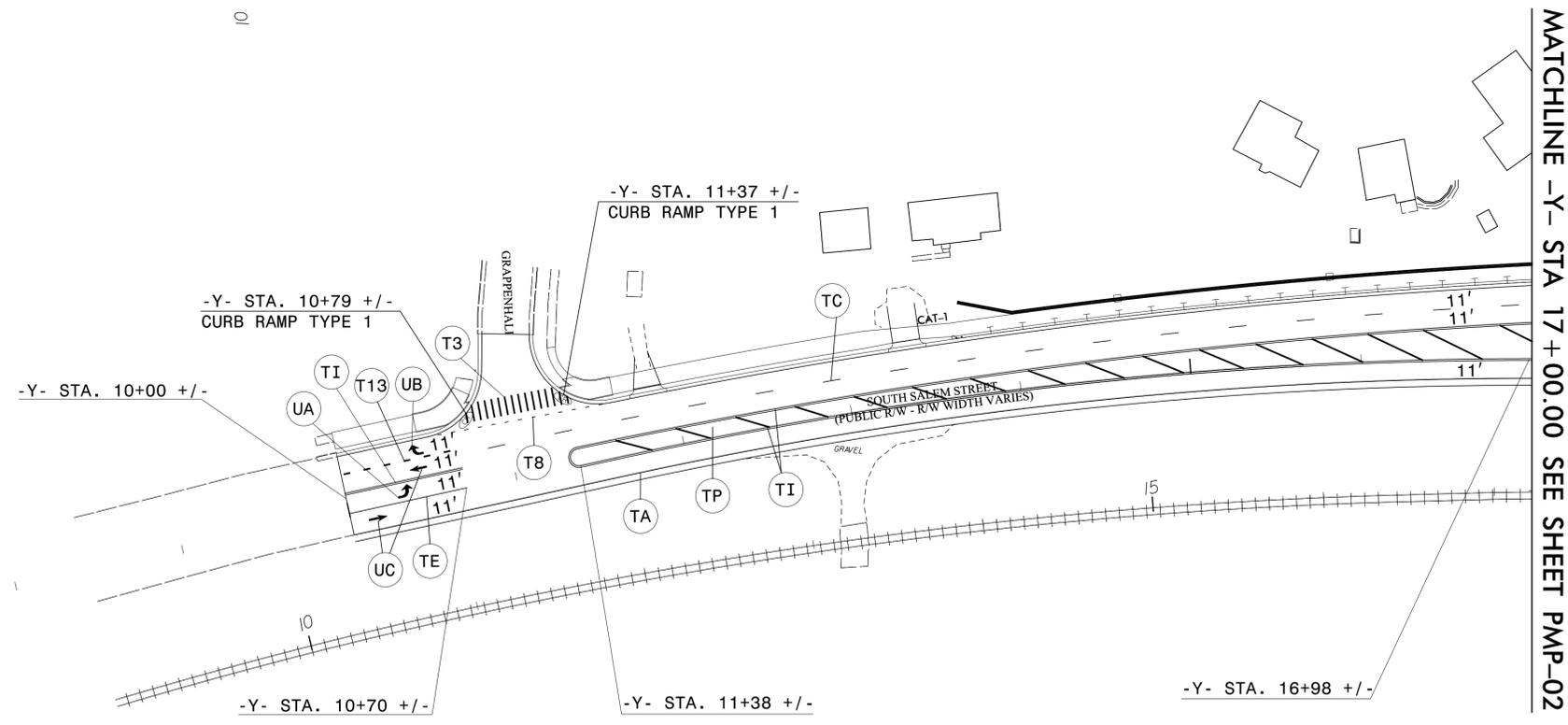


PAVEMENT MARKING SCHEDULE

SYMBOL	DESCRIPTION
COLD APPLIED	
C13	3 FT. - 9FT./SP WHITE MINISKIP (8")
CA	WHITE EDGE LINE (4")
CB	YELLOW EDGE LINE (4")
CC	10 FT. WHITE SKIP (4")
CD	WHITE SOLID LANE LINE (8")
DB	RIGHT TURN ARROW
DC	STRAIGHT ARROW
DI	ALPHANUMERIC CHAR.
THERMOPLASTIC	
T2	WHITE STOPBAR (24", 90 MIL)
T3	WHITE CROSSWALK LINE (24", 90 MIL)
T8	2 FT. - 6 FT./SP WHITE MINISKIP (4", 90 MIL)
T9	2 FT. - 6 FT./SP YELLOW MINISKIP (4", 90 MIL)
T13	3 FT. - 9FT./SP WHITE MINISKIP (8", 90 MIL)
TA	WHITE EDGE LINE (4", 90 MIL)
TB	YELLOW EDGE LINE (4", 90 MIL)
TC	10 FT. WHITE SKIP (4", 90 MIL)
TD	3 FT. - 9 FT./SP WHITE MINISKIP (4", 90 MIL.)
TE	WHITE SOLID LANE LINE (4", 90 MIL.)
TI	YELLOW DOUBLE CENTER (4", 90 MIL.)
TN	WHITE GORELINE (8", 90 MIL)
TO	WHITE DIAGONAL (8", 90 MIL)
TP	YELLOW DIAGONAL (8", 90 MIL)
TQ	WHITE CROSSWALK LINE (8", 90 MIL)
TR	WHITE SOLID LANE LINE (8", 90 MIL)
UA	LEFT TURN ARROW (90 MIL)
UB	RIGHT TURN ARROW (90 MIL)
UC	STRAIGHT ARROW (90 MIL)
UI	ALPHANUMERIC CHAR. (90 MIL)
UN	UTURN ARROW
UP	MERGE ARROW (90 MIL)
PERMANENT RAISED PAVEMENT MARKERS	
MA	YELLOW & YELLOW
MB	CRYSTAL & RED



-Y1- INSET



MATCHLINE -Y- STA 17+00.00 SEE SHEET PMP-02

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

PAVEMENT MARKING DETAIL

8/25/2022
 R:\Traffic\pavement_Markings\U5928_pm_psh_03.dgn
 User:jtownsend

5/14/24



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



PROJECT REFERENCE NO. <i>U-5928</i>	SHEET NO. <i>E1</i>
RW SHEET NO.	
LIGHTING ENGINEER	
3/7/2024	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

PLANS AND DETAILS FOR PROPOSED LIGHTING/ELECTRICAL CONSTRUCTION

NOTES

- AT THESE LOCATIONS, PROVIDE ELECTRICAL DUCT IN ACCORDANCE WITH NEC REQUIREMENTS FOR AN APPROVED RACEWAY FOR ELECTRICAL CIRCUITS. SEE TABLE B.
- INSTALL ALL BORE PITS OUTSIDE THE CLEAR ZONE, AS DEFINED BY THE 2011 AASHTO ROADSIDE DESIGN GUIDE OR AS DIRECTED BY THE ENGINEER.
- LOCATE ALL JUNCTION BOXES OUTSIDE CLEAR ZONE AND IN AN AREA UNLIKELY TO BE USED BY TRAFFIC.
- LOCATE CONTROL SYSTEMS IN AN AREA ACCESSIBLE FOR MAINTENANCE VEHICLES AND OUTSIDE OF CLEAR ZONE AS DEFINED BY THE 2011 AASHTO ROADSIDE DESIGN GUIDE.
- CONTRACTOR SHALL RECORD THE GPS COORDINATES OF EACH JUNCTION BOX IN THE JUNCTION BOX SUMMARY, TABLE D. PROVIDE A COPY OF THE JUNCTION BOX SUMMARY WITH THESE COORDINATES TO THE LIGHTING ENGINEER DURING PROJECT INSPECTION.

SCOPE OF WORK

PLACE ROADWAY LIGHTING SYSTEM INTO SERVICE BY PROVIDING AND INSTALLING DIRECT POLE MOUNTED LIGHT STANDARDS WITH LIGHT EMITTING DIODE (LED) LUMINAIRES, UNDERGROUND CIRCUITRY, POWER RISER AND JUNCTION BOXES.

DESIGN CRITERIA

- 0.8 AVERAGE FOOTCANDLE ON TRAVEL LANES
- 4:1 AVERAGE TO MINIMUM UNIFORMITY RATIO ON TRAVEL LANES
- 0.4:1 OR LESS VEILING LUMINANCE RATIO
- 2018 AASHTO ROADWAY LIGHTING DESIGN GUIDE.
- 2013 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 6TH EDITION AND LATEST INTERIM SPECIFICATIONS VALID AT THE TIME OF LETTING.
- 2023 NATIONAL ELECTRIC CODE.
- 2011 AASHTO ROADSIDE DESIGN GUIDE.
- 70 MPH WIND SPEED.

ROADWAY STANDARDS

THE FOLLOWING ROADWAY ENGLISH STANDARDS AS APPEAR IN "NCDOT ROADWAY STANDARD DRAWINGS", ROADWAY DESIGN UNIT-N.C. DEPARTMENT OF TRANSPORTATION RALEIGH, N.C., DATED JANUARY 2024 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
1404.01	LIGHT STANDARDS
1407.01	ELECTRIC SERVICE POLE AND LATERAL
1408.01	LIGHT CONTROL EQUIPMENT
1409.01	ELECTRICAL DUCT
1410.01	FEEDER CIRCUITS
1411.01	ELECTRICAL JUNCTION BOXES

ALL WORK SHALL BE IN CONFORMANCE WITH DIVISION 14 OF THE STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES, DATED JANUARY 2024.

LEGEND

- PROPOSED LIGHT STANDARD TYPE MTL5 25' MOUNTED ON MIN. 42" BARRIER. INCLUDES INTERIOR BARRIER FOUNDATION & DIRECT POLE MOUNTED 71W MAX LED ROADWAY LUMINAIRE. IES DISTRIBUTION: TYPE 11. MAXIMUM BUG RATING 2-0-2. SEE TABLE C. SEE FOUNDATION IN STRUCTURE PLANS AT PAGES 5-22 AND 5-48 THROUGH 5-50
- PROPOSED SERVICE POLE AND LATERAL 30' CLASS 4 3#1/0 USE CONDUCTORS 2" CONDUIT
- PROPOSED ELECTRICAL JUNCTION BOXES SEE DETAILS AND TABLE D.
- PROPOSED POWER RISER WITH JUNCTION BOX. BREAKER SIZE SHOWN IN LOAD SCHEDULE, SHEET E3.
- REFERENCE TO CORRESPONDING NOTE AS NUMBERED.
- PROPOSED FEEDER CIRCUIT: CONTROL SYSTEM (A), CIRCUIT (1) PLAN SYMBOL (6) - SEE TABLE A THIS SHEET.
- PROPOSED ELECTRICAL DUCT: SIZE 2", 3", OR 4" TYPE (JA) OR (BD) LOCATION SEE TABLE C, THIS SHEET.

2", 3", OR 4" ELEC. DUCT JA & BD

PLAN SYMBOL	DESCRIPTION	CONTRACT ITEM	
8	2#8 Ø 1 #10G 1.5" P	2 AWG SIZE 8 CONDUCTORS (BK & RD) 1 AWG SIZE 10 GROUNDING CONDUCTOR 1.5" PVC CONDUIT	2-8 W/G FEEDER CIRCUIT IN 1.5" CONDUIT
*8	2#8 Ø 1 #10G	2 AWG SIZE 8 CONDUCTORS (BK & RD) 1 AWG SIZE 10 GROUNDING CONDUCTOR	2-8 W/G FEEDER CIRCUIT

LOCATION	RACEWAY	SHEET	TYPE					
			JACKED (JA) FEET			BURIED (BD) FEET		
			SIZE 2"	SIZE 3"	SIZE 4"	SIZE 2"	SIZE 3"	SIZE 4"
BETWEEN CSAJB & JB1	CSAJB - JB11	E2			85	85		

POWER RISER 'A'		
LABEL	LOCATION	SHEET
LS1	STA. 19+97.75 -L- 32.75' RT	E2
LS2	STA. 20+80.64 -L- 32.75' RT	E2
LS3	STA. 21+95.18 -L- 32.75' RT	E2
LS4	STA. 23+12.02 -L- 32.75' RT	E2
LS5	STA. 24+27.34 -L- 32.75' RT	E2
LS6	STA. 21+95.18 -L- 32.75' LT	E2
LS7	STA. 23+12.02 -L- 32.75' LT	E2
LS8	STA. 24+27.34 -L- 32.75' LT	E2

NUMBER	TYPE	SIZE				LOCATION	SHEET	GPS LOCATION	
		12"x12"x4"	18"x12"x6"	30"x17"x18"	36"x24"x18"			LATITUDE	LONGITUDE
		POWER RISER 'A'							
CSAJB	CSJB				X	2' FROM POWER RISER "A"	E2		
JB1	BRJB	X				3' FROM LIGHT STANDARD "LS1"	E2		
JB2	BRJB	X				3' FROM LIGHT STANDARD "LS2"	E2		
JB3	BRJB	X				3' FROM LIGHT STANDARD "LS3"	E2		
JB4	BRJB	X				3' FROM LIGHT STANDARD "LS4"	E2		
JB5	BRJB	X				3' FROM LIGHT STANDARD "LS5"	E2		
JB6	BRJB	X				3' FROM LIGHT STANDARD "LS6"	E2		
JB7	BRJB	X				3' FROM LIGHT STANDARD "LS7"	E2		
JB8	BRJB	X				3' FROM LIGHT STANDARD "LS8"	E2		
JB9	SWJB		X			2' FROM JUNCTION BOX "JB5"	E2		
JB10	SWJB		X			2' FROM JUNCTION BOX "JB8"	E2		
JB11	IGJB			X		STA. 24+56 -L- 43' RT	E2		

3/7/2024 10:00:00 AM U-5928_1e.e1.dgn

5/14/99

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

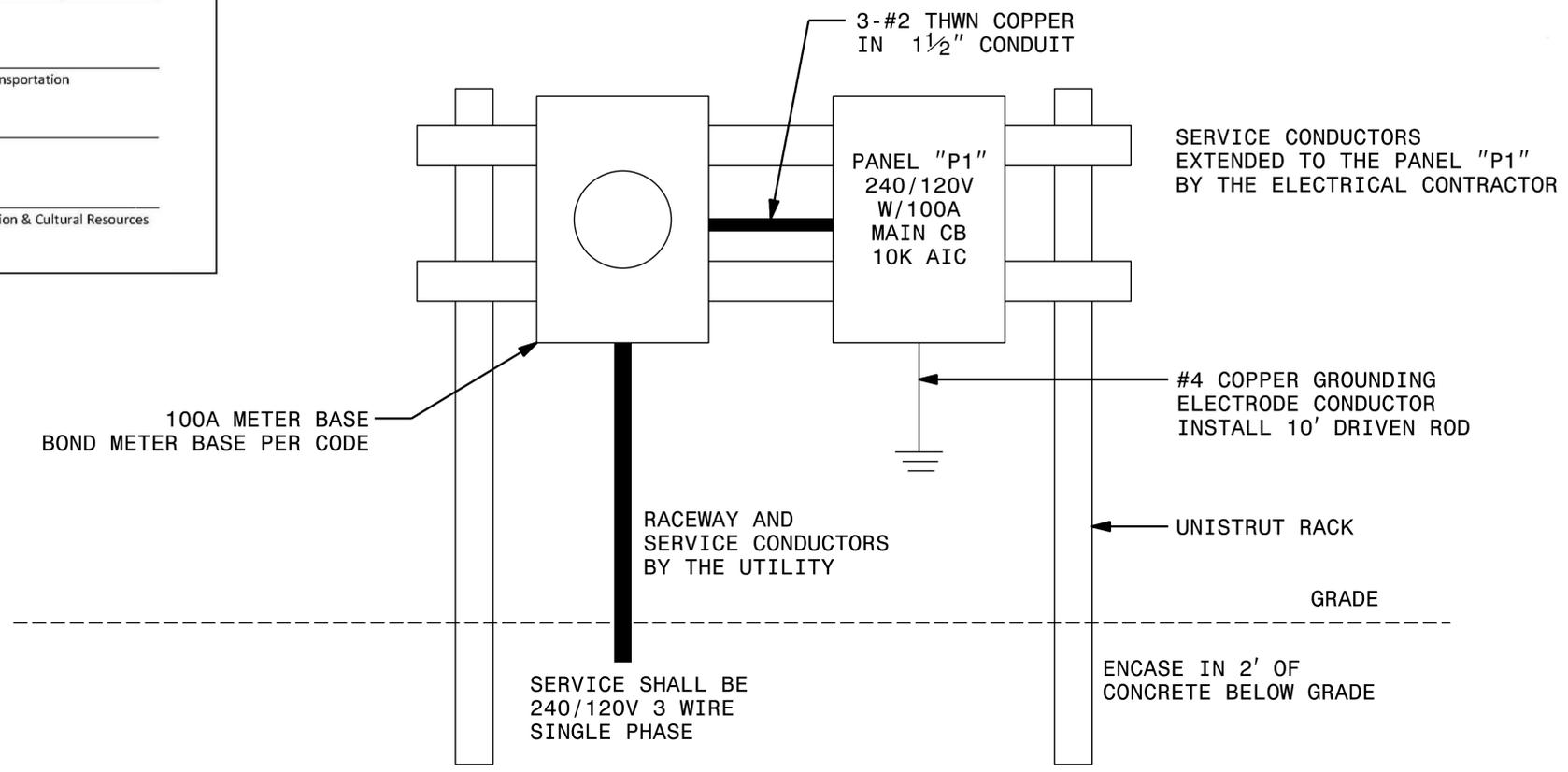
Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



PROJECT REFERENCE NO. U-5928	SHEET NO. E3
RW SHEET NO.	
LIGHTING ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



SERVICE	WIRE SZ	GRND SZ	AMPS @240V	LOAD VA	BRK AMP	CKT	P1		CKT	BRK AMP	LOAD VA	AMPS @240V	GRND SZ	WIRE SZ	SERVICE
LS1 - LS5	*	#10	2.10	504	15/1	1	A B		2	15/1	302	1.26	#10	*	LS6 - LS8
						3			4						
						5			6						
						7			8						
						9			10						
						11			12						
						13			14						
						15			16						
						17			18						
						19			20						

POWER RISER "A"
LOCATION: OUTDOOR
PANEL MOUNTING: SURFACE
SERVICE: 240/120, 1PH, 3 WIRE, AC, FULL NEUTRAL, SERVICE ENTRANCE
MAIN BREAKER: 100A
CABINET: NEMA 3R
ACCESSORIES: GROUND BAR
COMMENTS: BOLT ON BREAKERS

CONNECTED VA
PHASE "A" = 504 VA
PHASE "B" = 302 VA

* WIRE SIZE AS INDICATED ON THE PLANS

POWER RISER DIAGRAM

NTS

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



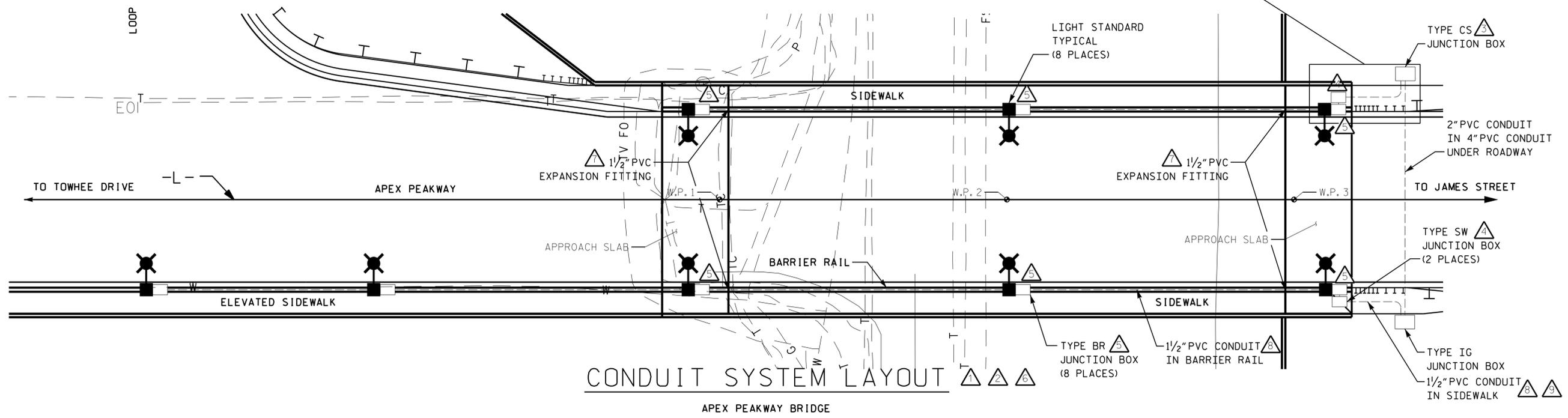
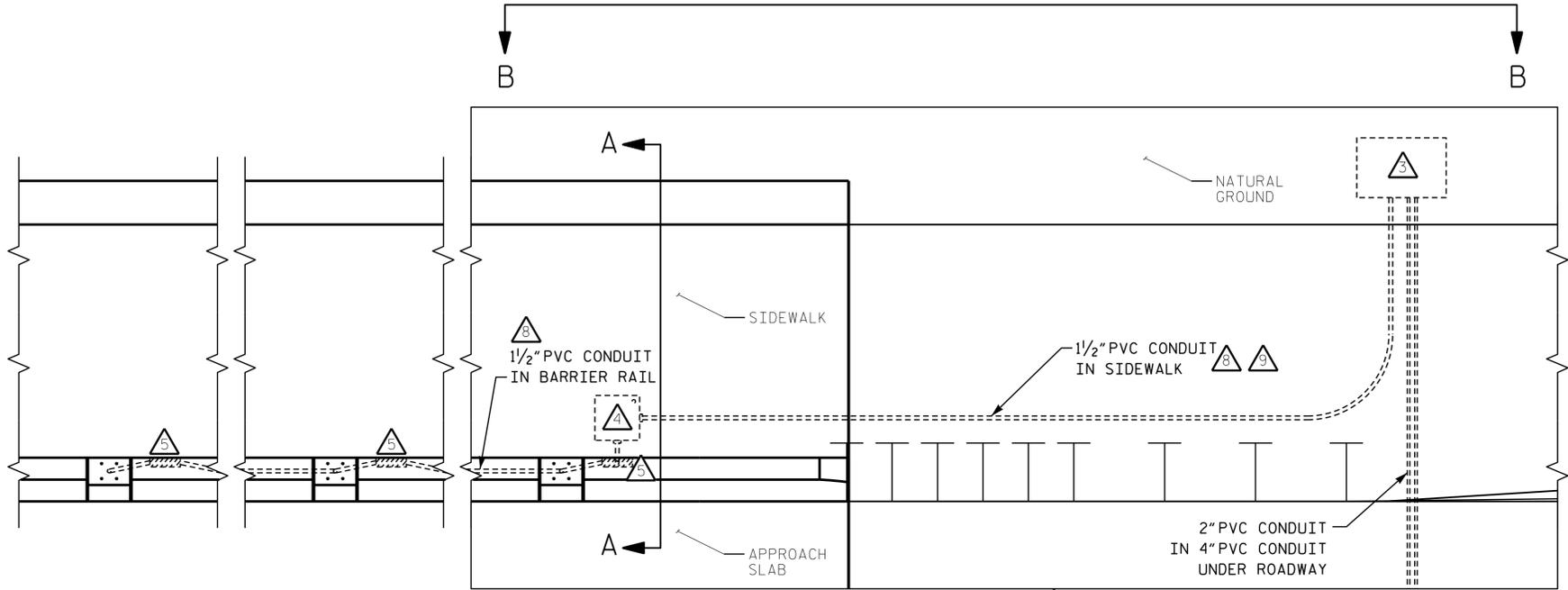
NAD 832011

PROJECT REFERENCE NO. U-5928	SHEET NO. E4
RW SHEET NO.	
LIGHTING ENGINEER	
Decoded/signed by: <i>Matthew I. Styles</i> / 16/2022 3648113442740C	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

USE FOR LIGHTING CONSTRUCTION ONLY

NOTES

- △ MIRROR DESIGN ON BOTH SIDES OF STRUCTURE.
- △ LIGHT PEDESTAL, BARRIER AND BRIDGE DETAILS SHOWN ON THIS PLAN ARE FOR SCHEMATIC PURPOSES ONLY. REFER TO STRUCTURE PLANS MORE INFORMATION.
- △ CONTROL SYSTEM JUNCTION BOX, SIZE 36"X24"X18".
- △ SIDEWALK JUNCTION BOX, SIZE 18"X12"X6", CAST IRON, WATER TIGHT
- △ BARRIER RAIL JUNCTION BOX, SIZE 12"X12"X4", CAST IRON, WATER TIGHT
- △ REFER TO STRUCTURE PLANS FOR REBAR PLACEMENT.
- △ PROVIDE EXPANSION FITTINGS WHERE APPROACH SLAB MEETS INTEGRAL END BENT.
- △ MAINTAIN A MINIMUM CONCRETE ENCASED COVER OF 2.5" FOR CONDUIT.
- △ PROVIDE SUFFICIENT COVER TO ENSURE CONDUIT WILL NOT BE DAMAGED DURING INSTALLATION OF CONTRACTION JOINTS OR WHEN THE SIDEWALK IS SAW CUT.



CONDUIT SYSTEM LAYOUT

APEX PEAKWAY BRIDGE

65
64
63
62
61
60
59
58
57
56
55
54
53
52
51
50
49
48
47
46
45
44
43
42
41
40
39
38
37
36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1

NTS

NOTES

- 1 MIRROR DESIGN ON BOTH SIDES OF STRUCTURE.
- 2 LIGHT PEDESTAL, BARRIER AND BRIDGE DETAILS SHOWN ON THIS PLAN ARE FOR SCHEMATIC PURPOSES ONLY. REFER TO STRUCTURE PLANS MORE INFORMATION.
- 3 CONTROL SYSTEM JUNCTION BOX, SIZE 36"x24"x18".
- 4 SIDEWALK JUNCTION BOX, SIZE 18"x12"x6", CAST IRON, WATER TIGHT
- 5 BARRIER RAIL JUNCTION BOX, SIZE 12"x12"x4", CAST IRON, WATER TIGHT
- 6 REFER TO STRUCTURE PLANS FOR REBAR PLACEMENT.
- 7 PROVIDE EXPANSION FITTINGS WHERE APPROACH SLAB MEETS INTEGRAL END BENT.
- 8 MAINTAIN A MINIMUM CONCRETE ENCASED COVER OF 2.5" FOR CONDUIT.
- 9 PROVIDE SUFFICIENT COVER TO ENSURE CONDUIT WILL NOT BE DAMAGED DURING INSTALLATION OF CONTRACTION JOINTS OR WHEN THE SIDEWALK IS SAW CUT.

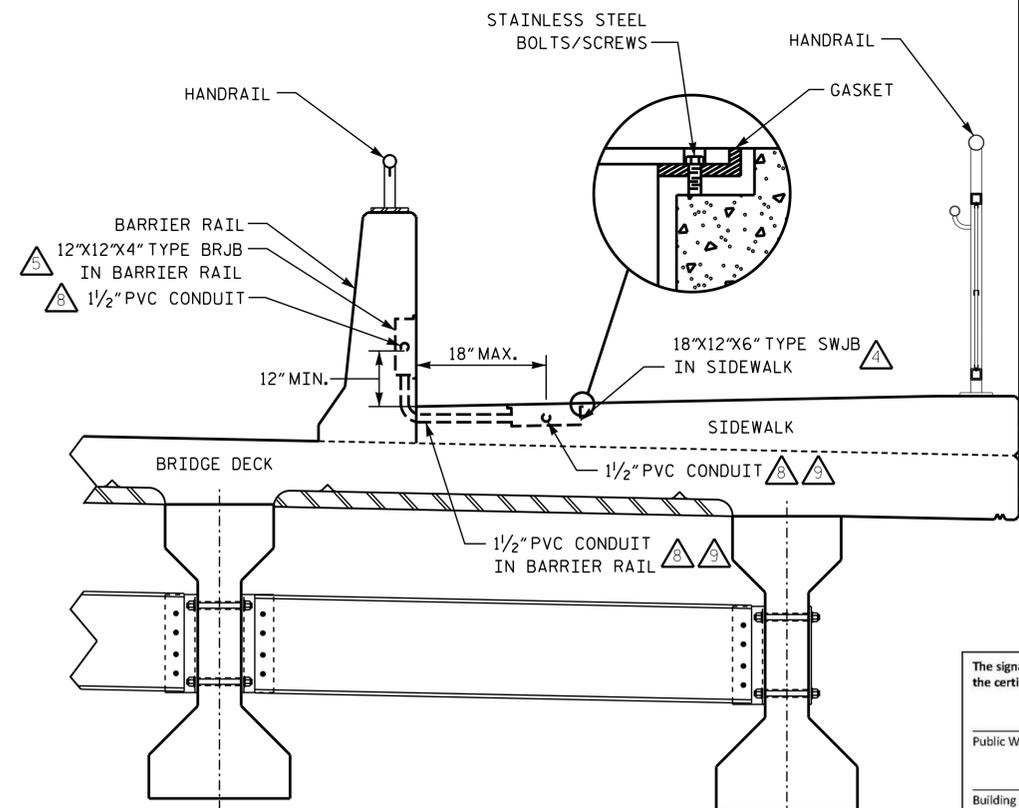


VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

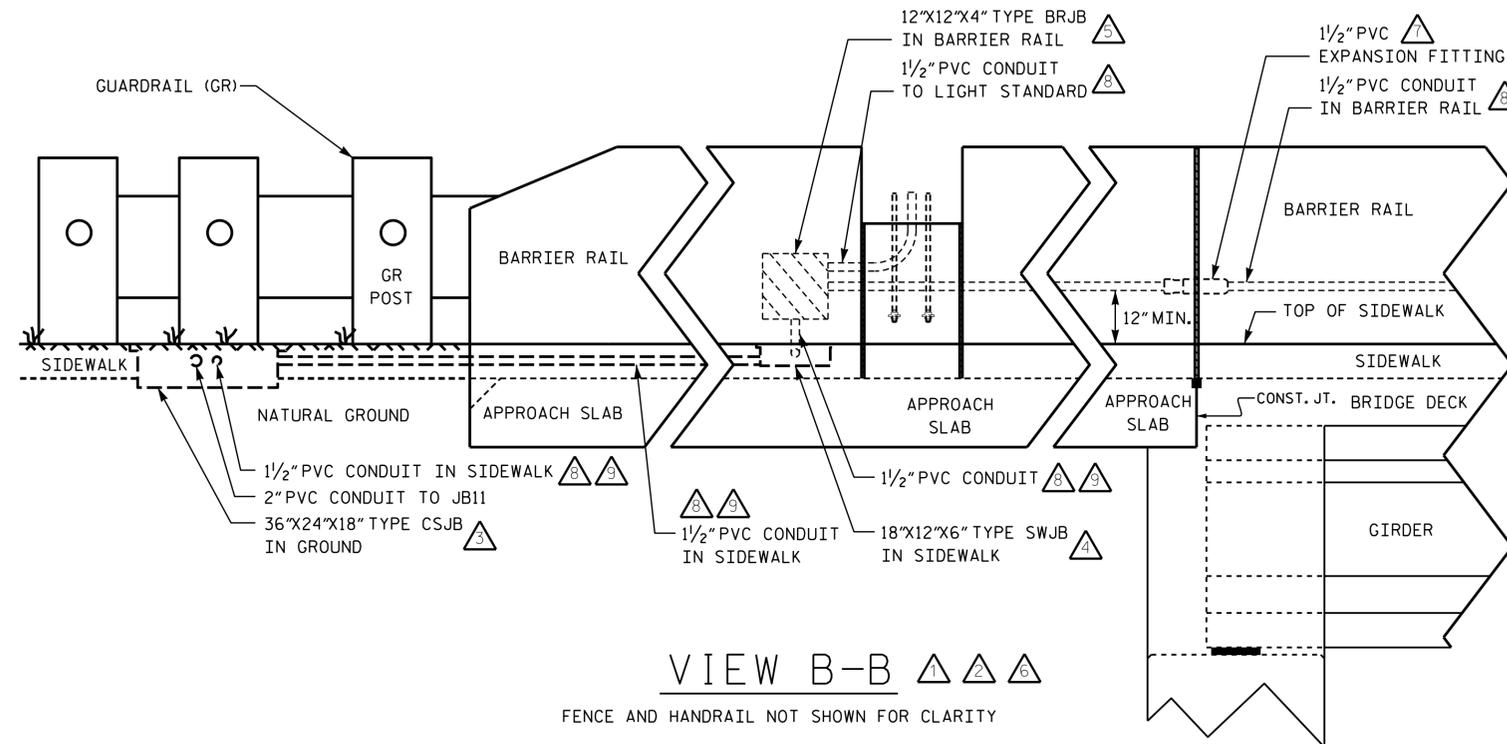


PROJECT REFERENCE NO. U-5928	SHEET NO. E5
RW SHEET NO.	
LIGHTING ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

USE FOR LIGHTING CONSTRUCTION ONLY

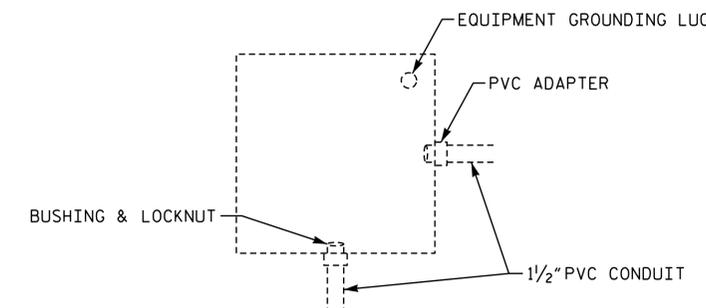


VIEW A-A



VIEW B-B

FENCE AND HANDRAIL NOT SHOWN FOR CLARITY



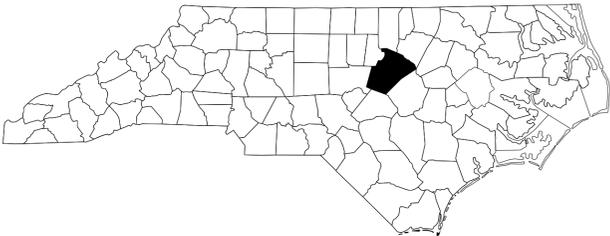
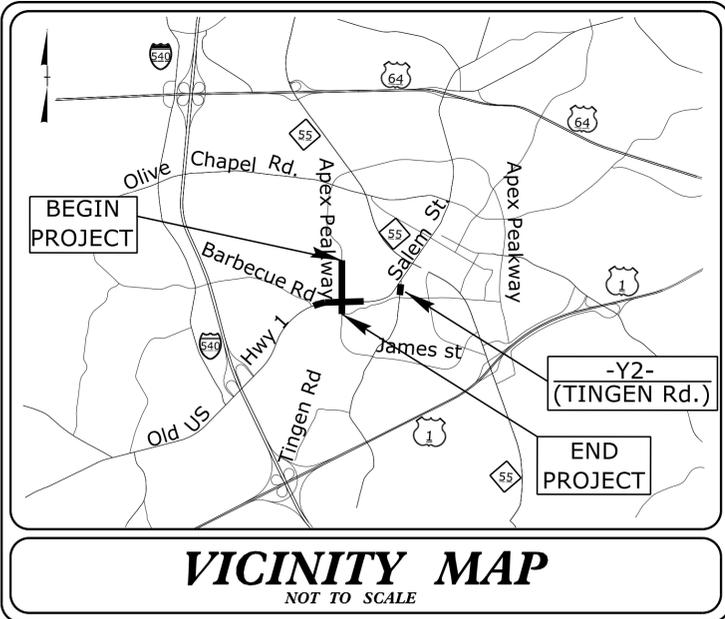
JUNCTION BOX DETAIL

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

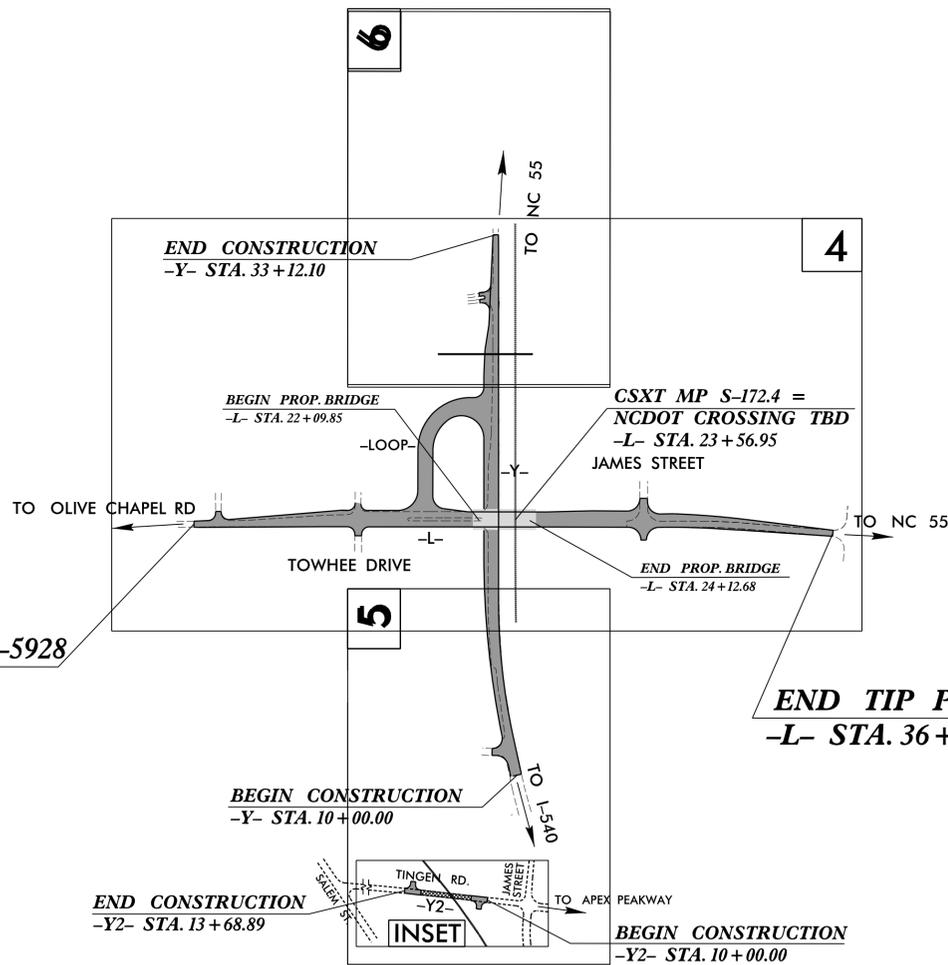
Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

65
64
63
62
61
60
59
58
57
56
55
54
53
52
51
50
49
48
47
46
45
44
43
42
41
40
39
38
37
36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1

TIP PROJECT: U-5928

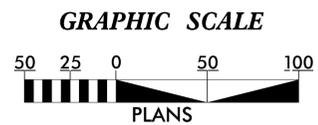


BEGIN TIP PROJECT U-5928
-L- STA. 10 + 70.00



END TIP PROJECT U-5928
-L- STA. 36 + 30.00

THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON PLANS.



THESE EROSION AND SEDIMENT CONTROL PLANS COMPLY WITH THE APPLICABLE REGULATIONS SET FORTH BY THE NCG-010000 GENERAL CONSTRUCTION PERMIT EFFECTIVE APRIL 1, 2019 AND ISSUED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF WATER RESOURCES.

Prepared in the Office of:
NV5
7500 E. INDEPENDENCE BLVD., STE 100
CHARLOTTE, NC 28227

Designed by:
DAVID P. BOCKER, P.E. 3664
NAME LEVEL III CERTIFICATION NO.

Roadway Standard Drawings

The following roadway english standards as appear in "Roadway Standard Drawings"- Roadway Design Unit - N. C. Department of Transportation - Raleigh, N. C., dated January 2024 and the latest revision thereto are applicable to this project and by reference hereby are considered a part of these plans.

- | | |
|--|--|
| 1604.01 Railroad Erosion Control Detail | 1632.01 Rock Inlet Sediment Trap Type A |
| 1605.01 Temporary Silt Fence | 1632.02 Rock Inlet Sediment Trap Type B |
| 1606.01 Special Sediment Control Fence | 1632.03 Rock Inlet Sediment Trap Type C |
| 1607.01 Gravel Construction Entrance | 1633.01 Temporary Rock Silt Check Type A |
| 1622.01 Temporary Berms and Slope Drains | 1633.02 Temporary Rock Silt Check Type B |
| 1630.01 Riser Basin | 1634.01 Temporary Rock Sediment Dam Type A |
| 1630.02 Silt Basin Type B | 1634.02 Temporary Rock Sediment Dam Type B |
| 1630.03 Temporary Silt Ditch | 1635.01 Rock Pipe Inlet Sediment Trap Type A |
| 1630.04 Stilling Basin | 1635.02 Rock Pipe Inlet Sediment Trap Type B |
| 1630.05 Temporary Diversion | 1640.01 Coir Fiber Baffle |
| 1630.06 Special Stilling Basin | 1645.01 Temporary Stream Crossing |
| 1631.01 Matting Installation | |

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
**PLAN FOR PROPOSED
HIGHWAY EROSION CONTROL**

LOCATION: JAMES STREET TO TOWHEE DRIVE, CONSTRUCT GRADE SEPERATED INTERCHANGE FOR APEX PEAKWAY AT SOUTH SALEM STREET AND CSX RAILROAD
TYPE OF WORK:

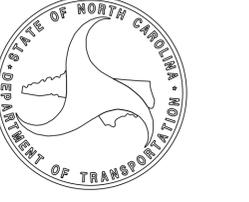
STATE		SHEET NO.	TOTAL SHEETS
N.C.		EC-1	20
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	

EROSION AND SEDIMENT CONTROL MEASURES

Std. #	Description	Symbol
1630.05	Temporary Silt Ditch	TD
1630.05	Temporary Diversion	TD
1605.01	Temporary Silt Fence	
	Silt Fence Coir Fiber Wattle Break	- CFW -
1606.01	Special Sediment Control Fence	△△△
1622.01	Temporary Berms and Slope Drains	—
1650.02	Silt Basin Type B	▨
1633.01	Temporary Rock Silt Check Type-A	▨
	Temporary Rock Silt Check Type-A with Matting and Polyacrylamide (PAM)	▨
1633.02	Temporary Rock Silt Check Type-B	▨
	Wattle Coir Fiber Wattle	▨
	Wattle Coir Fiber Wattle with Polyacrylamide (PAM)	▨
1634.01	Temporary Rock Sediment Dam Type-A	▨
1634.02	Temporary Rock Sediment Dam Type-B	▨
1635.01	Rock Pipe Inlet Sediment Trap Type-A	⊓
1635.02	Rock Pipe Inlet Sediment Trap Type-B	⊓
1650.04	Stilling Basin	▨
1650.06	Special Stilling Basin	▨
	Rock Inlet Sediment Trap:	
1632.01	Type A	A
1632.02	Type B	B
1632.03	Type C	C
	Skimmer Basin	▨
	Tiered Skimmer Basin	▨
	Infiltration Basin	▨

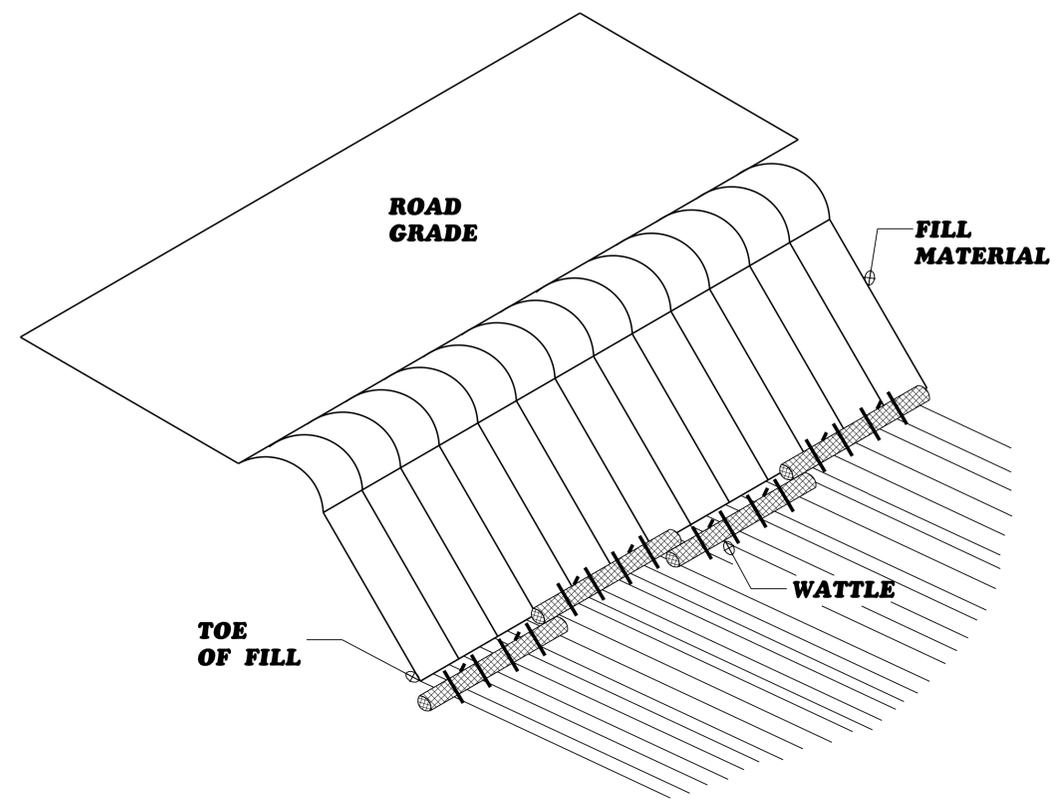
THIS PROJECT CONTAINS EROSION CONTROL PLANS FOR CLEARING AND GRUBBING PHASE OF CONSTRUCTION.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



7/25/2023 R:\Environment\Design\U5928_EC_tsh.dgn DavitaBocker

COIR FIBER WATTLE BARRIER DETAIL



ISOMETRIC VIEW

NOTES:

USE MINIMUM 18 IN. NOMINAL DIAMETER COIR FIBER (COCONUT) WATTLE AND LENGTH OF 10 FT.

EXCAVATE A 2 TO 3 INCH TRENCH FOR WATTLE TO BE PLACED.

DO NOT PLACE WATTLES ON TOE OF SLOPE.

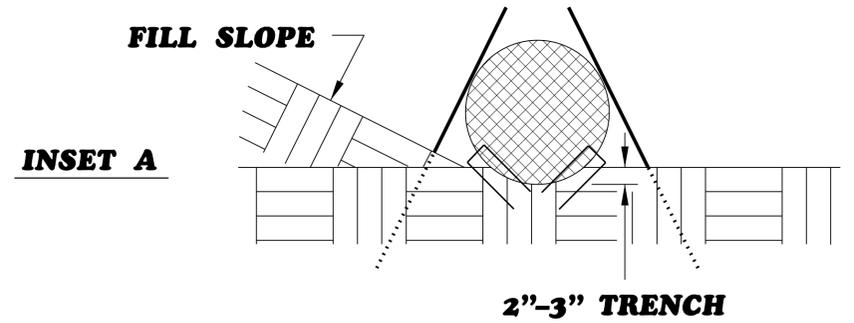
USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.

INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO GROUND.

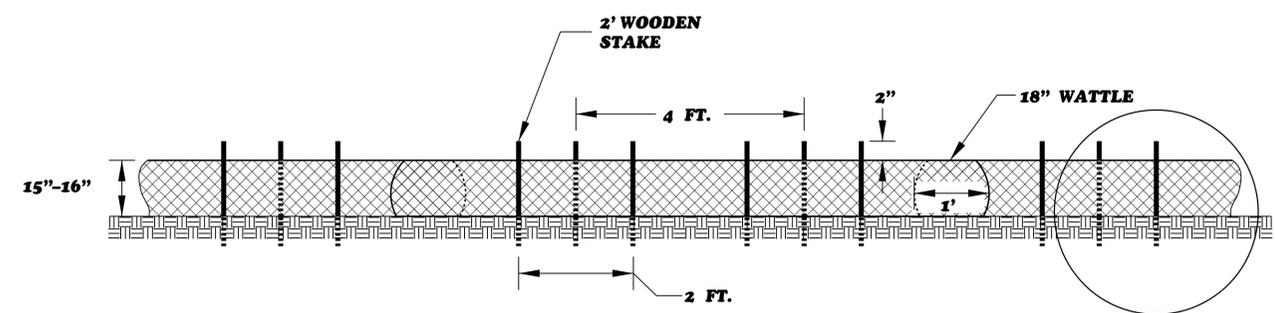
PROVIDE STAPLES MADE OF 0.125 IN. DIAMETER STEEL WIRE FORMED INTO A U SHAPE NOT LESS THAN 12" IN LENGTH.

INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.

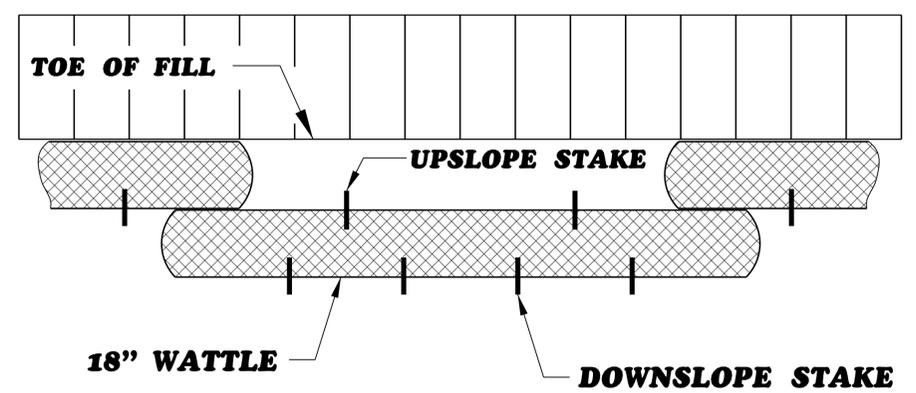
FOR BREAKS ALONG LARGE SLOPES, USE MAXIMUM SPACING OF 25 FT.



INSET A

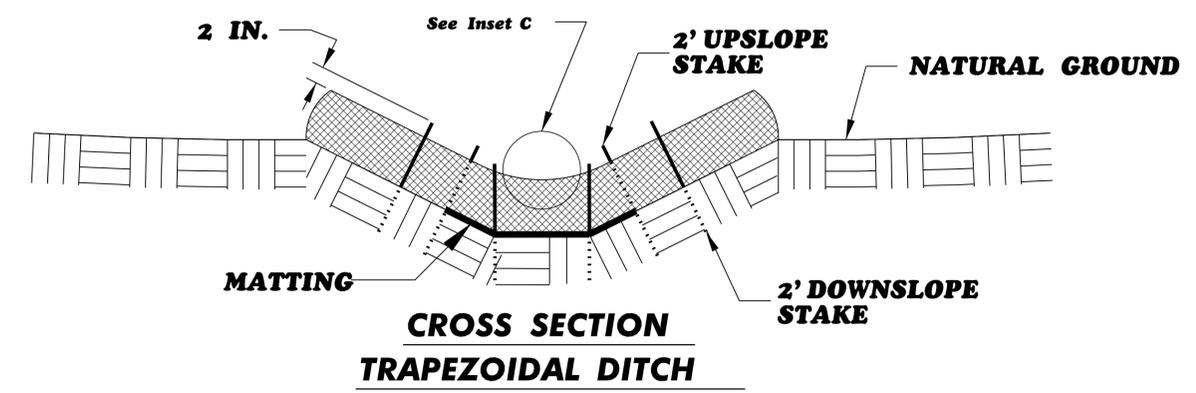
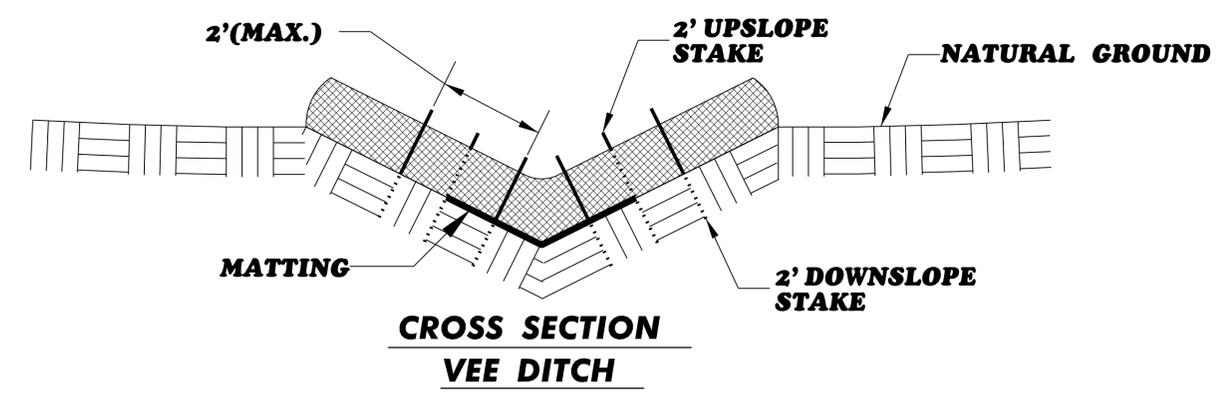
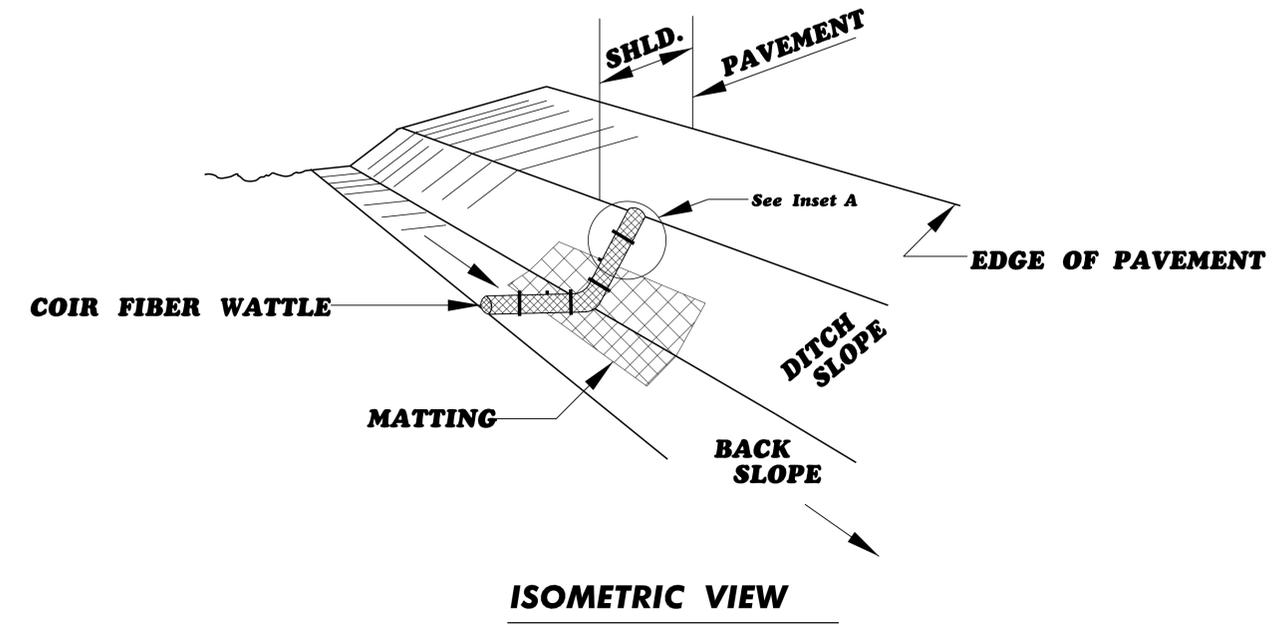


FRONT VIEW



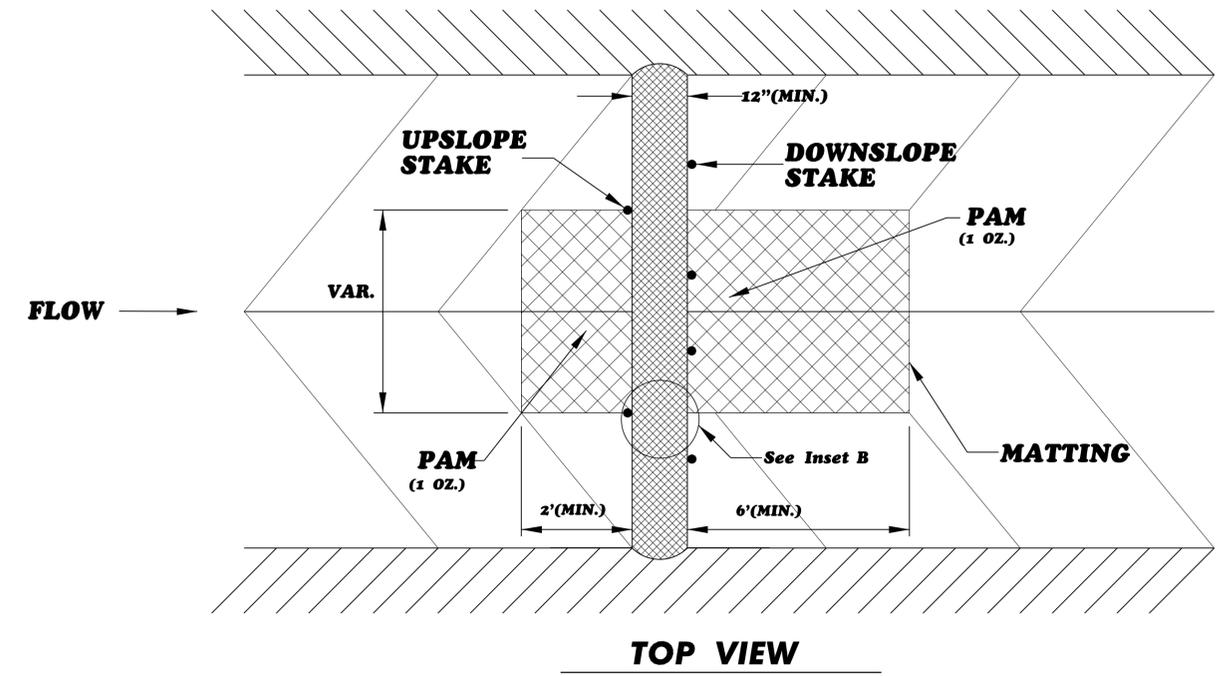
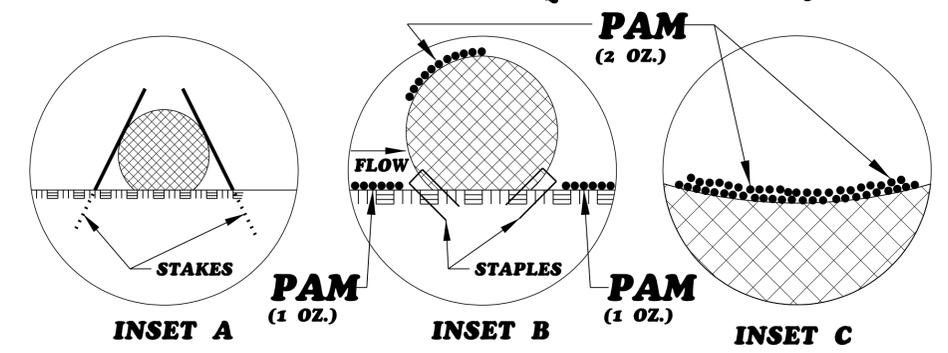
TOP VIEW

COIR FIBER WATTLE WITH POLYACRYLAMIDE (PAM) DETAIL

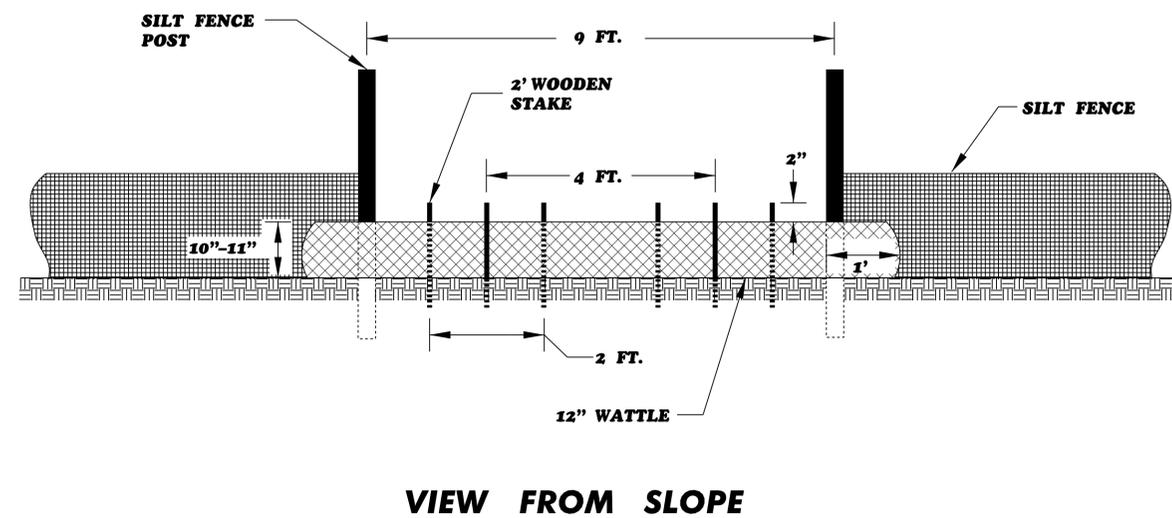
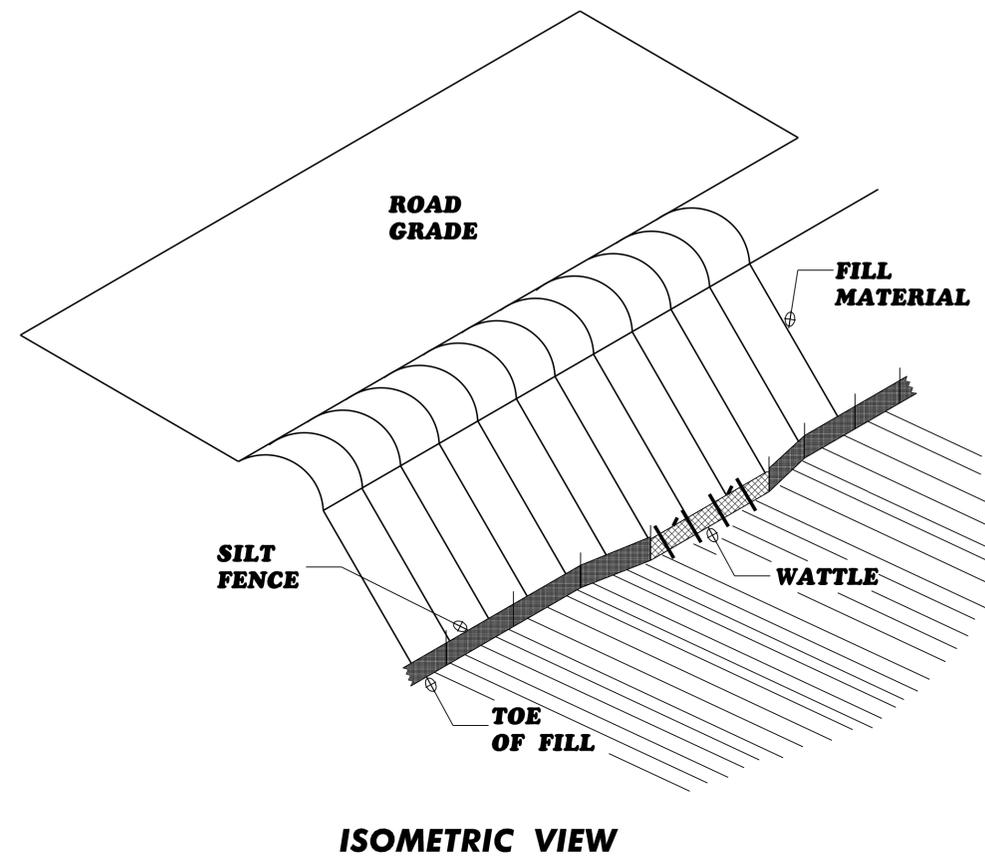


NOTES:

- USE MINIMUM 12 IN. DIAMETER COIR FIBER (COCONUT FIBER) WATTLE.
- USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.
- ONLY INSTALL WATTLE(S) TO A HEIGHT IN DITCH SO FLOW WILL NOT WASH AROUND WATTLE AND SCOUR DITCH SLOPES AND AS DIRECTED.
- INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO BOTTOM OF DITCH.
- PROVIDE STAPLES MADE OF 0.125 IN. DIAMETER STEEL WIRE FORMED INTO A U SHAPE NOT LESS THAN 12" IN LENGTH.
- INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.
- INSTALL MATTING IN ACCORDANCE WITH SECTION 1631 OF THE STANDARD SPECIFICATIONS.
- PRIOR TO POLYACRYLAMIDE (PAM) APPLICATION, OBTAIN A SOIL SAMPLE FROM PROJECT LOCATION, AND FROM OFFSITE MATERIAL, AND ANALYZE FOR APPROPRIATE PAM FLOCCULANT TO BE APPLIED TO EACH WATTLE.
- INITIALLY APPLY 2 OUNCES OF ANIONIC OR NEUTRALLY CHARGED PAM OVER WATTLE WHERE WATER WILL FLOW AND 1 OUNCE OF PAM ON EACH SIDE OF WATTLE. REAPPLY PAM AFTER EVERY RAINFALL EVENT THAT IS EQUAL TO OR EXCEEDS 0.50 IN.



SILT FENCE COIR FIBER WATTLE BREAK DETAIL



NOTES:

USE MINIMUM 12 IN. DIAMETER COIR FIBER (COCONUT FIBER) WATTLE AND LENGTH OF 10 FT.

EXCAVATE A 1 TO 2 INCH TRENCH FOR WATTLE TO BE PLACED.

DO NOT PLACE WATTLE ON TOE OF SLOPE.

USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.

INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO GROUND.

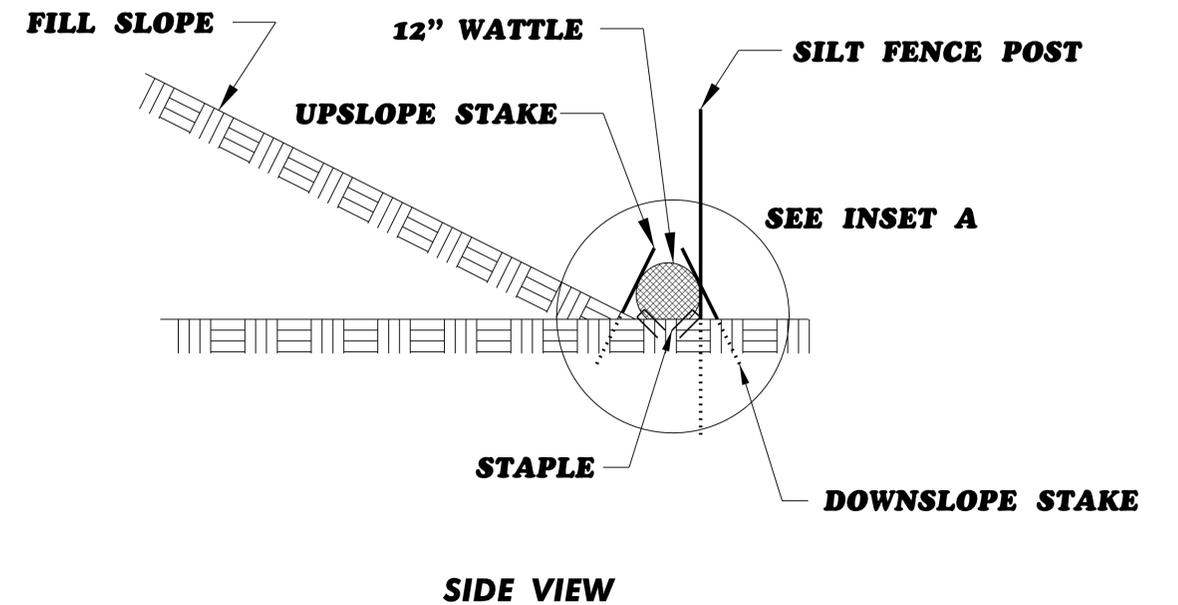
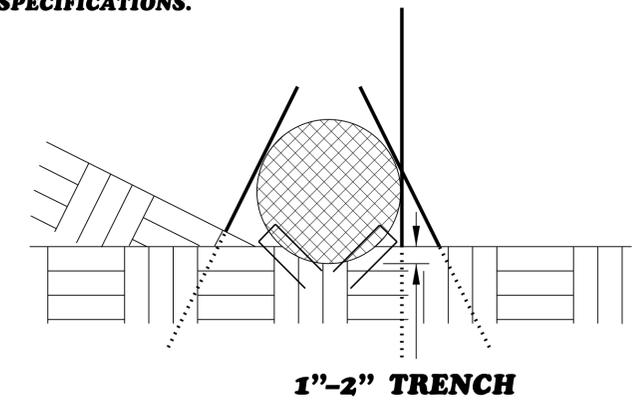
PROVIDE STAPLES MADE OF 0.125 IN. DIAMETER STEEL WIRE FORMED INTO A U SHAPE NOT LESS THAN 12" IN LENGTH.

INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.

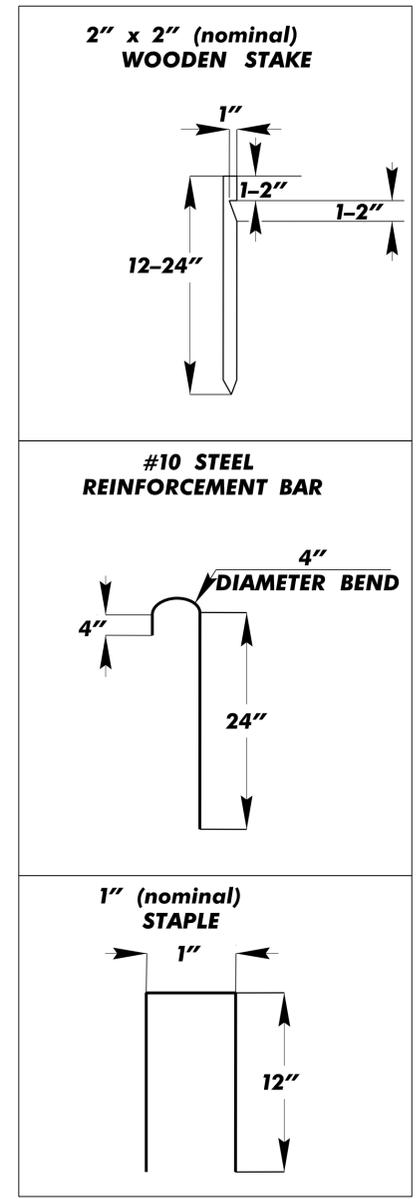
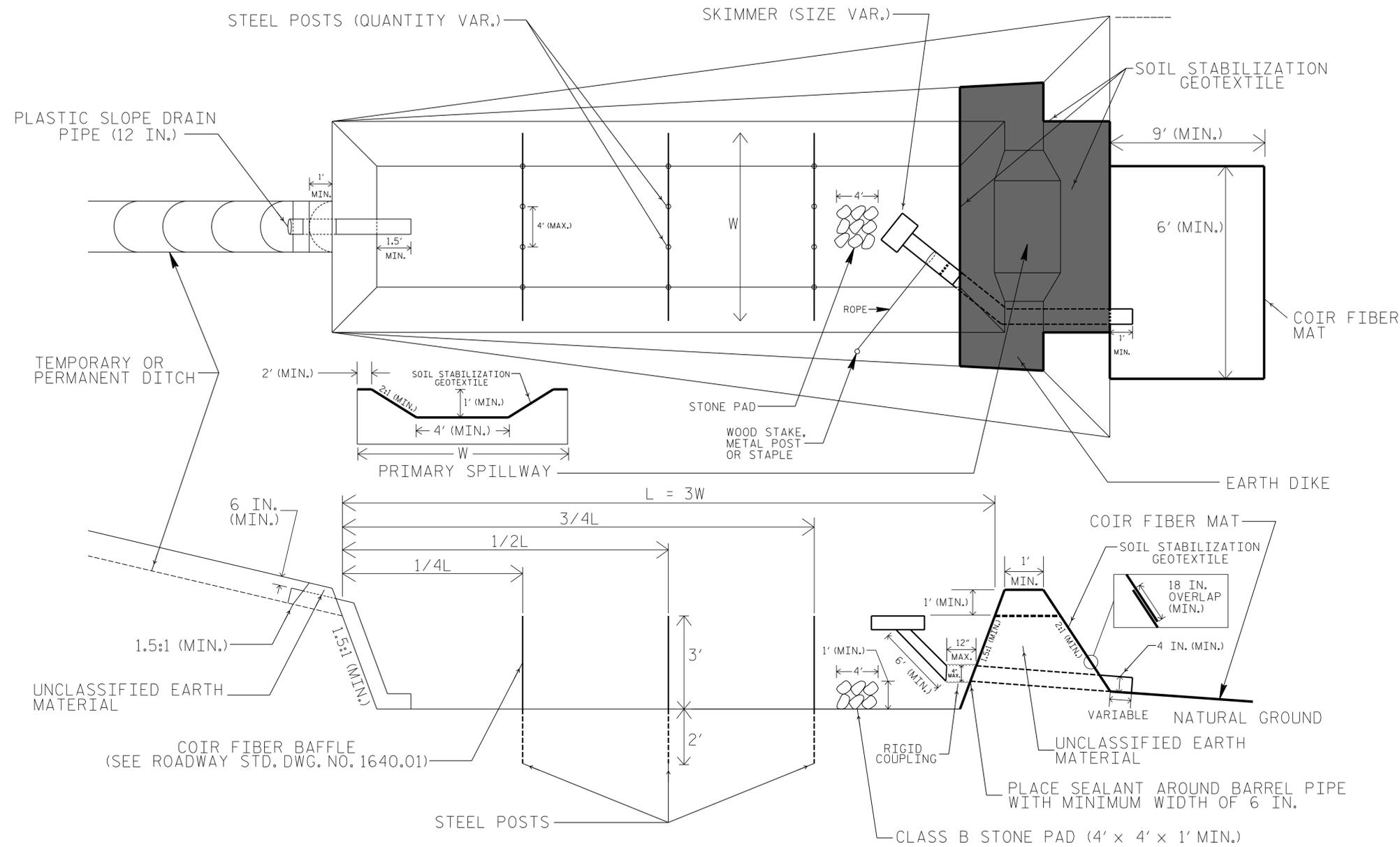
WATTLE INSTALLATION CAN BE ON OUTSIDE OF THE SILT FENCE AS DIRECTED.

INSTALL TEMPORARY SILT FENCE IN ACCORDANCE WITH SECTION 1605 OF THE STANDARD SPECIFICATIONS.

INSET A



SKIMMER BASIN WITH BAFFLES DETAIL



COIR FIBER MAT ANCHOR OPTIONS

MAINTENANCE NOTES

INSPECT SKIMMER SEDIMENT BASIN AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (ONE-HALF INCH OR GREATER) RAINFALL EVENT AND REPAIR IMMEDIATELY. REMOVE SEDIMENT AND RESTORE THE BASIN TO ITS ORIGINAL DIMENSIONS WHEN SEDIMENT ACCUMULATES TO ONE-HALF THE HEIGHT OF THE FIRST BAFFLE. PULL THE SKIMMER TO ONE SIDE SO THAT THE SEDIMENT UNDERNEATH CAN BE EXCAVATED. EXCAVATE THE SEDIMENT FROM THE ENTIRE BASIN, NOT JUST AROUND THE SKIMMER OR THE FIRST CELL. MAKE SURE VEGETATION GROWING IN THE BOTTOM OF THE BASIN DOES NOT HOLD DOWN THE SKIMMER.

REPAIR THE BAFFLES IF THEY ARE DAMAGED. RE-ANCHOR THE BAFFLES IF WATER IS FLOWING UNDERNEATH OR AROUND THEM.

IF THE SKIMMER IS CLOGGED WITH TRASH AND THERE IS WATER IN THE BASIN, USUALLY JERKING ON THE ROPE WILL MAKE THE SKIMMER BOB UP AND DOWN AND DISLodge THE DEBRIS AND RESTORE FLOW. IF THIS DOES NOT WORK, PULL THE SKIMMER OVER TO THE SIDE OF THE BASIN AND REMOVE THE DEBRIS. ALSO CHECK THE ORFICE INSIDE THE SKIMMER TO SEE IF IT IS CLOGGED; IF SO REMOVE THE DEBRIS.

IF THE SKIMMER ARM OR BARREL PIPE IS CLOGGED, THE ORFICE CAN BE REMOVED AND THE OBSTRUCTION CLEARED WITH A PLUMBER'S SNAKE OR BY FLUSHING WITH WATER. BE SURE AND REPLACE THE ORFICE BEFORE REPOSITIONING THE SKIMMER.

CHECK THE FABRIC LINED SPILLWAY FOR DAMAGE AND MAKE ANY REQUIRED REPAIRS WITH FABRIC THAT SPANS THE FULL WIDTH OF THE SPILLWAY. CHECK THE EMBANKMENT, SPILLWAYS, AND OUTLET FOR EROSION DAMAGE, AND INSPECT THE EMBANKMENT FOR PIPING AND SETTLEMENT. MAKE ALL NECESSARY REPAIRS IMMEDIATELY. REMOVE ALL TRASH AND OTHER DEBRIS FROM THE SKIMMER AND POOL AREAS.

FREEZING WEATHER CAN RESULT IN ICE FORMING IN THE BASIN. SOME SPECIAL PRECAUTIONS SHOULD BE TAKEN IN THE WINTER TO PREVENT THE SKIMMER FROM PLUGGING WITH ICE.

NOTES

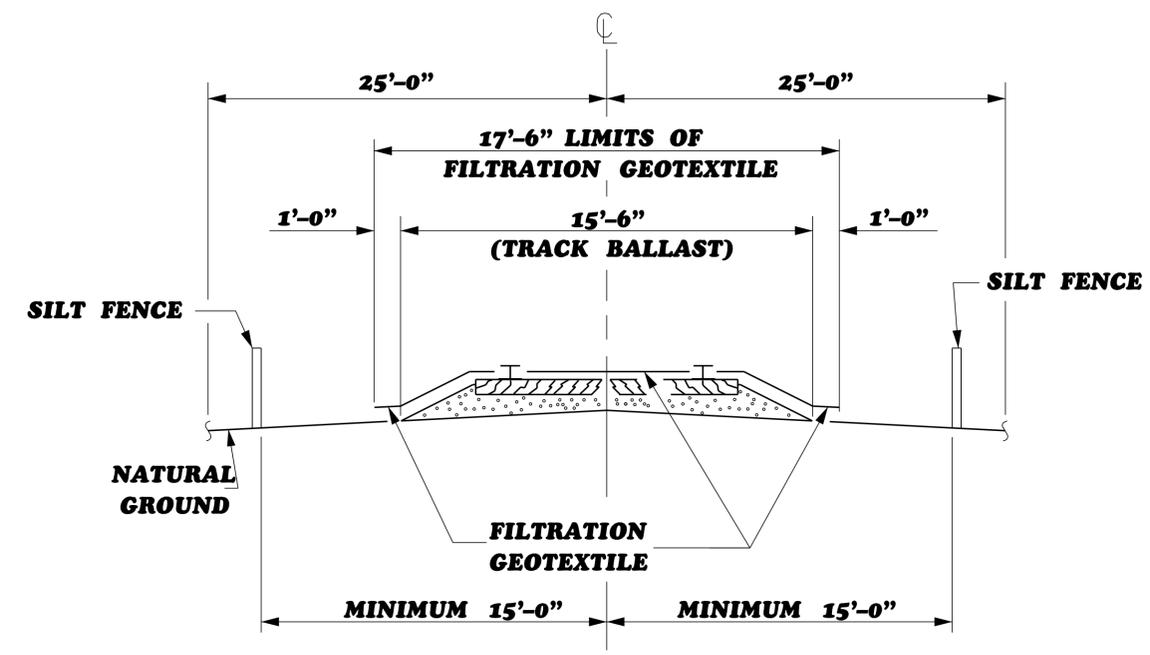
1. SEED AND PLACE MATTING FOR EROSION CONTROL ON INTERIOR AND EXTERIOR SIDESLOPES.
2. LIMIT EARTH DIKE HEIGHT TO 5 FT.
3. FOR BASIN DEPTH OF 3 FT., THE MINIMUM BASIN WIDTH SHALL BE 9 FT.
4. DETERMINE PRIMARY SPILLWAY WEIR LENGTH (FT.) USING $Q_0.8$, WHERE Q IS FLOW RATE (CFS) INTO BASIN.
5. PLASTIC SLOPE DRAIN PIPE AT INLET OF BASIN MAY BE REPLACED BY FILTRATION GEOTEXTILE OR TARP AS DIRECTED.
6. SOIL STABILIZATION GEOTEXTILE FOR PRIMARY SPILLWAY SHALL BE ONE CONTINUOUS PIECE OF MATERIAL OR OVERLAPPED 18 IN. (MIN.).

RAILROAD EROSION CONTROL DETAIL

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

ENGLISH STANDARD DRAWING FOR
 RAILROAD EROSION CONTROL DETAIL

SHEET 1 OF 1



NOTES

- INSTALL RAILROAD EROSION CONTROL MEASURES PRIOR TO PERFORMING ANY WORK IN THE RAILROAD RIGHT-OF-WAY.**
- ADDITIONAL EROSION CONTROL MEASURES FOR PROTECTION OF RAILROAD DITCHES MAY BE REQUIRED AS DIRECTED.**
- MAKE NO SEPARATE PAYMENT FOR RAILROAD EROSION CONTROL MEASURES.**
- EXTEND LIMITS OF SILT FENCE AND FILTRATION GEOTEXTILE PARALLEL TO RAILROAD A MINIMUM OF 10'-0" OUTSIDE EDGE OF SUPERSTRUCTURE OR TOE OF SLOPE ON CONSTRUCTION. A GREATER LENGTH OF SILT FENCE OR FILTRATION GEOTEXTILE MAY BE REQUIRED AS DIRECTED.**
- NAIL FILTRATION GEOTEXTILE TO TIMBER RAIL TIES WITH PRIME SOURCE "GRIP CAP" OR EQUIVALENT. SECURE FILTRATION GEOTEXTILE ON SHOULDER AS DIRECTED BY THE RAILROAD AND NCDOT.**
- AT NO TIME SHALL ORANGE BARRIER FENCE OR SILT FENCE BE PLACED CLOSER THAN 15 FT FROM THE CENTERLINE OF TRACK.**

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

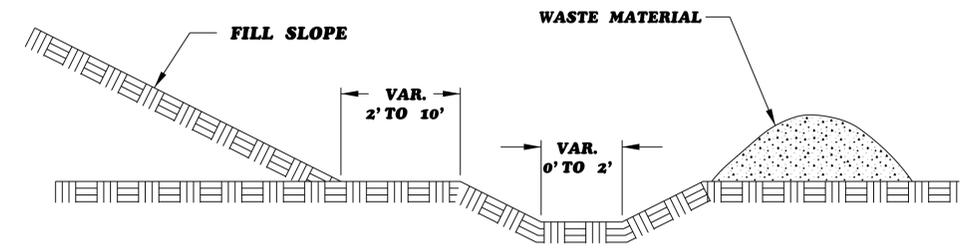
ENGLISH STANDARD DRAWING FOR
 RAILROAD EROSION CONTROL DETAIL

SHEET 1 OF 1

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

ENGLISH STANDARD DRAWING FOR
TEMPORARY SILT DITCH

SHEET 1 OF 1
1630.03



CROSS SECTIONAL VIEW

MAINTENANCE NOTES:
DEVICES SHOULD BE INSPECTED ON A REGULAR BASIS AND AFTER EACH SIGNIFICANT RAINFALL. AT A MINIMUM, SEDIMENT SHOULD BE REMOVED FROM THE CHANNEL WHEN IT ACCUMULATES TO 50 PERCENT OF THE DESIGN DEPTH. TEMPORARY SILT DITCHES SHOULD BE IMMEDIATELY REPAIRED IF DAMAGED BY EQUIPMENT, BREACHED BY RUNOFF OR COVERED BY FILL. SEDIMENT CONTROL DEVICES SHOULD BE INSPECTED AT THE OUTLET OF THE SILT DITCH AND CLEANED OUT AND REPAIRED AS NECESSARY. DITCHES SHOULD BE BACKFILLED AND STABILIZED PRIOR TO THE COMPLETION OF THE PROJECT.

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

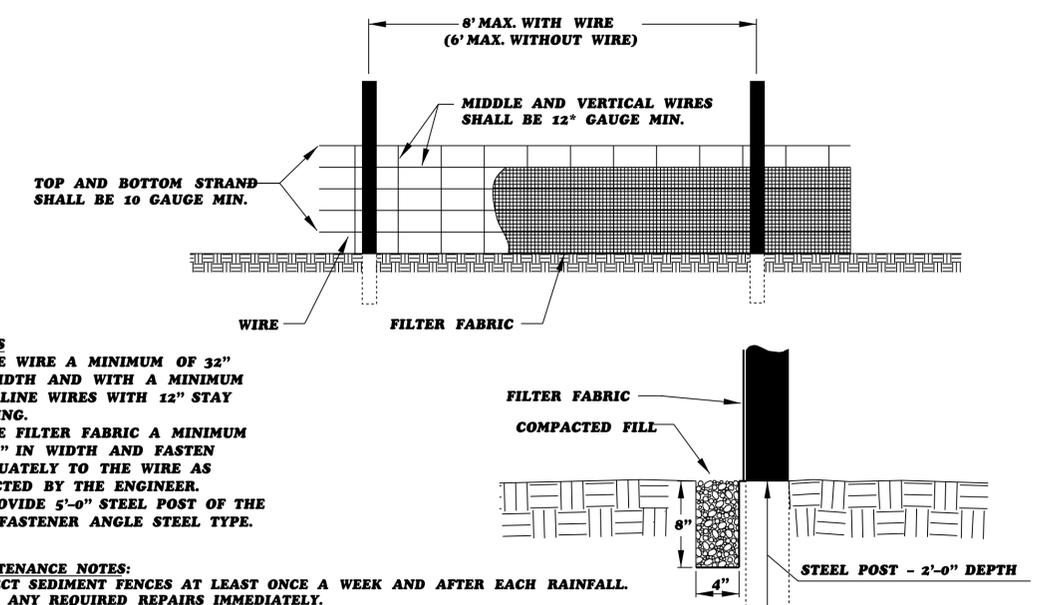
ENGLISH STANDARD DRAWING FOR
TEMPORARY SILT DITCH

SHEET 1 OF 1
1630.03

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

ENGLISH STANDARD DRAWING FOR
TEMPORARY SILT FENCE

SHEET 1 OF 1
1605.01



NOTES
USE WIRE A MINIMUM OF 32" IN WIDTH AND WITH A MINIMUM OF 6 LINE WIRES WITH 12" STAY SPACING.
USE FILTER FABRIC A MINIMUM OF 36" IN WIDTH AND FASTEN ADEQUATELY TO THE WIRE AS DIRECTED BY THE ENGINEER.
PROVIDE 5'-0" STEEL POST OF THE SELF-FASTENER ANGLE STEEL TYPE.

MAINTENANCE NOTES:
INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY. SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. TAKE CARE TO AVOID UNDERMINING THE FENCE DURING CLEANOUT. REMOVE ALL FENCING MATERIALS AND UNSTABLE SEDIMENT DEPOSITS AND BRING THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

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

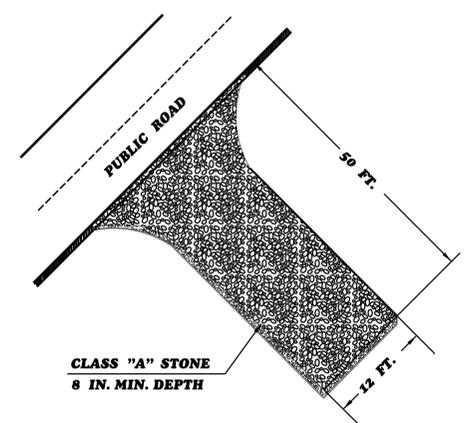
ENGLISH STANDARD DRAWING FOR
TEMPORARY SILT FENCE

SHEET 1 OF 1
1605.01

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

ENGLISH STANDARD DRAWING FOR
GRAVEL CONSTRUCTION ENTRANCE

SHEET 1 OF 1
1607.01



- NOTES:**
1. PROVIDE TURNING RADIUS SUFFICIENT TO ACCOMMODATE LARGE TRUCKS.
 2. LOCATE ENTRANCE(S) TO PROVIDE FOR UTILIZATION BY ALL CONSTRUCTION VEHICLES.
 3. MUST BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR DIRECT FLOW OF MUD ONTO STREETS. PERIODIC TOPDRESSING WITH STONE WILL BE NECESSARY.
 4. ANY MATERIAL TRACKED ONTO THE ROADWAY MUST BE CLEANED UP IMMEDIATELY.
 5. LOCATE GRAVEL CONSTRUCTION ENTRANCE AT ALL POINTS OF INGRESS AND EGRESS UNTIL SITE IS STABILIZED. PROVIDE FREQUENT CHECKS OF THE DEVICE AND TIMELY MAINTENANCE.
 6. NUMBER AND LOCATION OF CONSTRUCTION ENTRANCES TO BE DETERMINED BY THE ENGINEER.
 7. USE CLASS 'A' STONE OR OTHER COARSE AGGREGATE APPROVED BY THE ENGINEER.
 8. PLACE FILTER FABRIC BENEATH STONE.

MAINTENANCE NOTES:
MAINTAIN THE GRAVEL PAD IN A CONDITION TO PREVENT MUD OR SEDIMENT FROM LEAVING THE CONSTRUCTION SITE. THIS MAY REQUIRE PERIODIC TOPDRESSING WITH 2-INCH STONE. AFTER EACH RAINFALL, INSPECT ANY STRUCTURE USED TO TRAP SEDIMENT AND CLEAN IT OUT AS NECESSARY. IMMEDIATELY REMOVE ALL OBJECTIONABLE MATERIALS SPILLED, WASHED, OR TRACKED ONTO PUBLIC ROADWAYS.

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

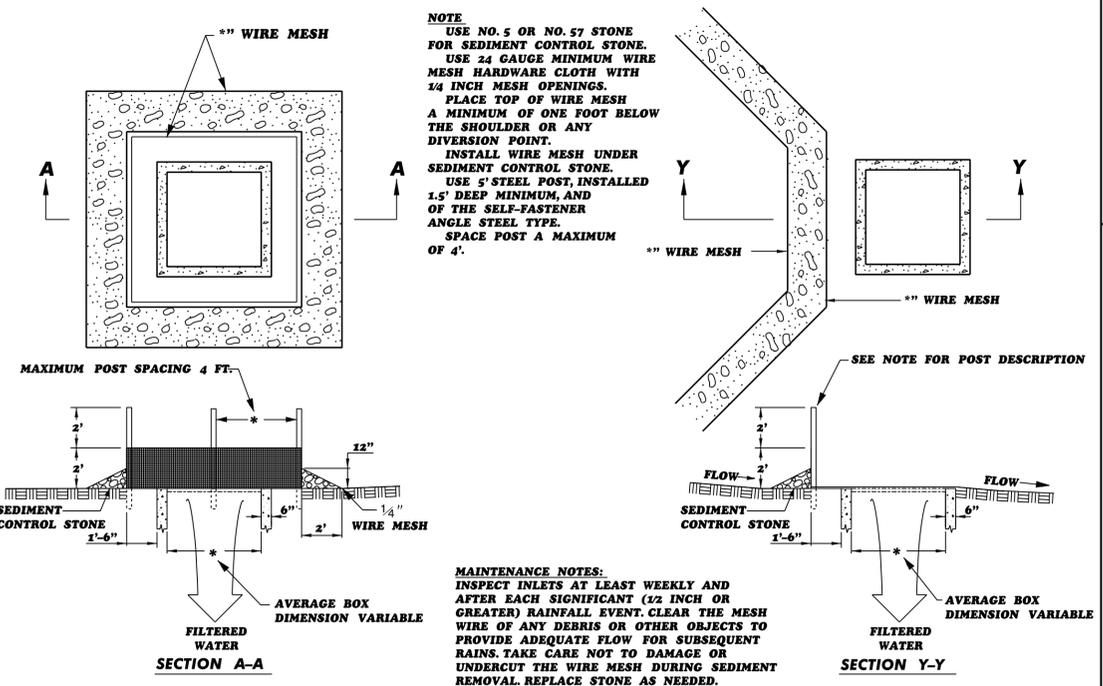
ENGLISH STANDARD DRAWING FOR
GRAVEL CONSTRUCTION ENTRANCE

SHEET 1 OF 1
1607.01

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

ENGLISH STANDARD DRAWING FOR
ROCK INLET SEDIMENT TRAP TYPE 'C'

SHEET 1 OF 1
1632.03



NOTE
USE NO. 5 OR NO. 57 STONE FOR SEDIMENT CONTROL STONE.
USE 24 GAUGE MINIMUM WIRE MESH HARDWARE CLOTH WITH 1/4 INCH MESH OPENINGS.
PLACE TOP OF WIRE MESH A MINIMUM OF ONE FOOT BELOW THE SHOULDER OR ANY DIVERSION POINT.
INSTALL WIRE MESH UNDER SEDIMENT CONTROL STONE.
USE 5" STEEL POST, INSTALLED 1.5' DEEP MINIMUM, AND OF THE SELF-FASTENER ANGLE STEEL TYPE.
SPACE POST A MAXIMUM OF 4'.

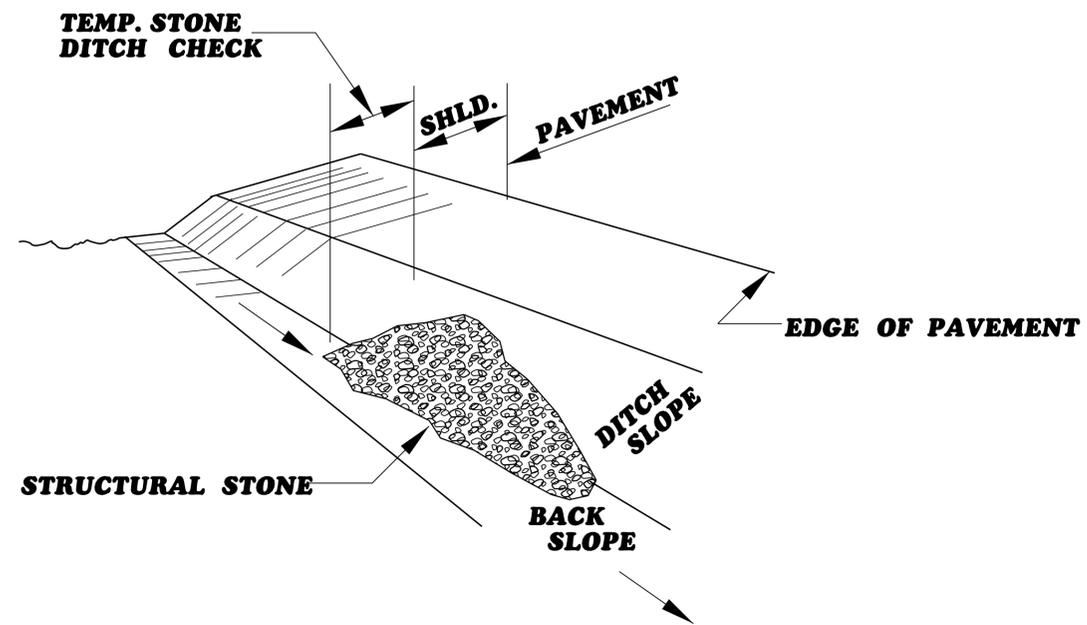
MAINTENANCE NOTES:
INSPECT INLETS AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (1/2 INCH OR GREATER) RAINFALL EVENT. CLEAR THE MESH WIRE OF ANY DEBRIS OR OTHER OBJECTS TO PROVIDE ADEQUATE FLOW FOR SUBSEQUENT RAINS. TAKE CARE NOT TO DAMAGE OR UNDERCUT THE WIRE MESH DURING SEDIMENT REMOVAL. REPLACE STONE AS NEEDED.

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

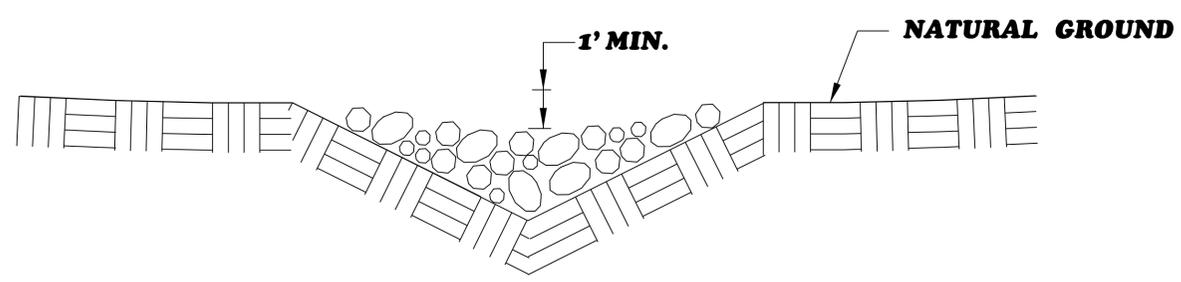
ENGLISH STANDARD DRAWING FOR
ROCK INLET SEDIMENT TRAP TYPE 'C'

SHEET 1 OF 1
1632.03

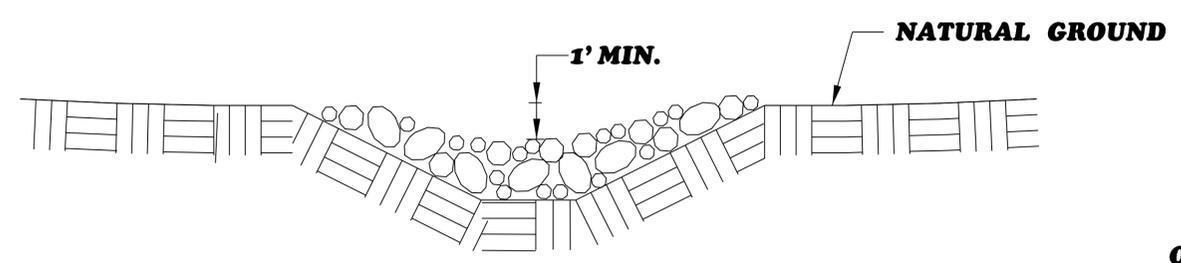
TEMPORARY ROCK SILT CHECK TYPE 'B' DETAIL



ISOMETRIC VIEW



**CROSS SECTION
VEE DITCH**



**CROSS SECTION
TRAPEZOIDAL DITCH**

NOTES:

USE CLASS 'B' EROSION CONTROL STONE FOR STRUCTURAL STONE.

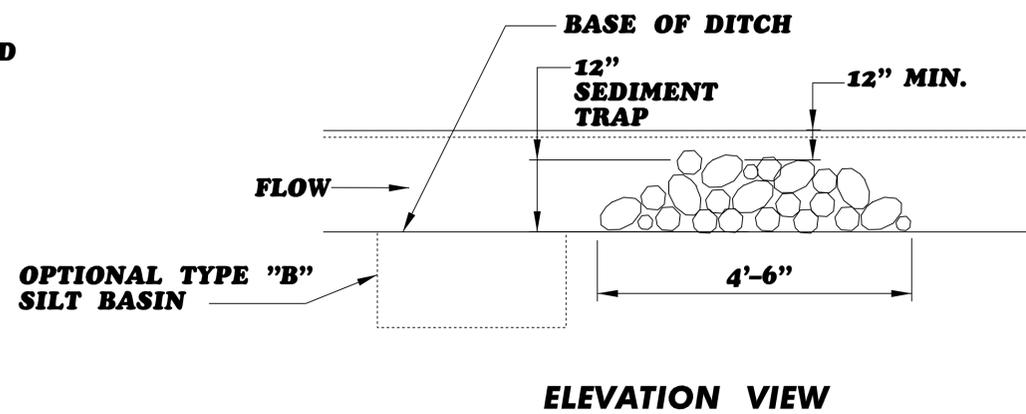
THE ENGINEER MAY DIRECT THE OPTION OF CLASS "A" STONE FOR SITES HAVING LESS THAN ONE (1) ACRE DRAINAGE AREA AND A DITCH GRADE LESS THAN 3%.

MAINTENANCE NOTES:

INSPECT CHECK DAMS AND CHANNELS AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (1/2 INCH OR GREATER) RAINFALL EVENT AND REPAIR IMMEDIATELY. CLEAN OUT SEDIEMNT, STRAW, LIMBS, OR OTHER DEBRIS THAT COULD CLOG THE CHANNEL WHEN NEEDED.

ANTICIPATE SUBMERGENCE AND DEPOSITION ABOVE THE CHECK DAM AND EROSION FROM HIGH FLOWS AROUND THE EDGES OF THE DAM. CORRECT ALL DAMAGE IMMEDIATELY. IF SIGNIFICANT EROSION OCCURS BETWEEN DAMS, ADDITIONAL MEASURES CAN BE TAKEN SUCH AS, INSTALLING A PROTECTIVE RIPRAP LINER IN THAT PORTION OF THE CHANNEL.

REMOVE SEDIMENT ACCUMULATED BEHIND THE DAMS AS NEEDED TO PREVENT DAMAGE TO CHANNEL VEGETATION, ALLOW THE CHANNEL TO DRAIN THROUGH THE STONE CHECK DAM, AND PREVENT LARGE FLOWS FROM CARRYING SEDIMENT OVER THE DAM. ADD STONES TO DAMS AS NEEDED TO MAINTAIN DESIGN HEIGHT AND CROSS SECTION.



ELEVATION VIEW

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

ENGLISH STANDARD DRAWING FOR SILT BASIN TYPE 'B'

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

ENGLISH STANDARD DRAWING FOR SILT BASIN TYPE 'B'

SHEET 1 OF 1 1630.02

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

ENGLISH STANDARD DRAWING FOR TEMPORARY ROCK SILT CHECK TYPE 'A'

NOTE
USE CLASS 'B' EROSION CONTROL STONE FOR STRUCTURAL STONE.
USE NO. 5 OR NO. 57 STONE FOR SEDIMENT CONTROL STONE.

MAINTENANCE NOTE:
INSPECT THE DEVICE ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT (1/2 INCH OR GREATER). AT A MINIMUM, REMOVE SILT FROM THE DEVICE WHEN SILT ACCUMULATES TO ONE-HALF THE HEIGHT OF THE WEIR. REPLACE OR CLEAN SEDIMENT CONTROL STONE WHEN WATER NO LONGER DRAINS THROUGH THE DEVICE BETWEEN RAINFALL EVENTS. REBUILD AND RESHAPE ROCK WEIR AND CHECK WHEN THE DEVICE IS DAMAGED.

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

ENGLISH STANDARD DRAWING FOR TEMPORARY ROCK SILT CHECK TYPE 'A'

SHEET 1 OF 1 1633.01

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

ENGLISH STANDARD DRAWING FOR SPECIAL STILLING BASIN

NOTE: Provide Stabilized Outlet to Streambank
Not To Scale

MAINTENANCE NOTE:
THE SPECIAL STILLING BASIN SHALL BE DISPOSED OF AND REPLACED WHEN ITS 3/4 FULL OF SEDIMENT OR WHEN IT IS IMPRACTICAL FOR THE BAG TO FILTER THE SEDIMENT OUT AT A REASONABLE FLOW RATE. THE INLET OF THE BAG SHOULD BE INSPECTED PERIODICALLY FOR DAMAGE AND/OR BLOCKAGE. SEDIMENT CONTROL STONE SHALL BE REPLACED IF DAMAGED BY HIGH FLOWS OR BAG FAILURE.

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

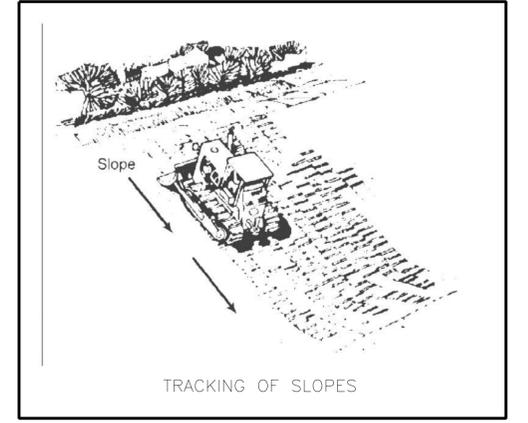
ENGLISH STANDARD DRAWING FOR SPECIAL STILLING BASIN

SHEET 1 OF 1 1630.06

NOTE: MAY BE USED WHERE EXTENSIVE HAULING WILL BE DONE.

CONSTRUCTION ENTRANCE TIRE WASH

NOT TO SCALE



NOTES:

- CLASS OR MEDIAN SIZE OF RIPRAP AND LENGTH, WIDTH AND DEPTH OF APRON TO BE DESIGNED BY THE ENGINEER.
- REFER TO THE CHARLOTTE-MECKLENBURG STORM WATER DESIGN MANUAL FOR RIPRAP APRON DESIGN STANDARDS.
- RIAPRAP SHOULD EXTEND UP BOTH SIDES OF THE APRON AND AROUND THE END OF THE PIPE OR CULVERT AT THE DOWNSTREAM END AT A MINIMUM SLOPE OF 2:1 AND A HEIGHT NOT LESS THAN TWO TIMES THE PIPE DIAMETER OR CULVERT HEIGHT.
- THERE SHALL BE NO OVERFLOW FROM THE END OF THE APRON TO THE SURFACE OF THE RECEIVING CHANNEL. THE AREA TO BE PAVED OR RIPRAPPED SHALL BE SUFFICIENT TO THAT THE INLET OF THE APRON SHALL BE AT THE SAME OR LOWEY WITH THE SURFACE OF THE RECEIVING CHANNEL. THE APRON SHALL HAVE A CUTOFF OR TOE WALL AT THE DOWNSTREAM END.
- THE WIDTH OF THE END OF THE APRON SHALL BE EQUAL TO THE BOTTOM WIDTH OF THE RECEIVING CHANNEL, MAXIMUM WATER TO RECEIVING CHANNEL 5:1
- ALL SUBGRADE FOR STRUCTURE TO BE COMPACTED TO 90% GREATER.
- THE PLACING OF FILL, EITHER LOOSE OR COMPACTED IN THE RECEIVING CHANNEL SHALL NOT BE ALLOWED.
- NO BENDS OR CURVES IN THE HORIZONTAL ALIGNMENT OF THE APRON WILL BE PERMITTED.
- FILTER FABRIC SHALL BE INSTALLED ON COMPACTED SUBGRADE PRIOR TO PLACEMENT OF RIP RAP.
- ANY DISTURBED AREA FROM END OF APRON TO RECEIVING CHANNEL MUST BE STABILIZED.

USE USDA MONOGRAPH FROM NC SEDIMENT AND EROSION CONTROL MANUAL OR CHARLOTTE-MECKLENBURG STORM WATER DESIGN MANUAL FOR DESIGN DATA.

OUTLET	L ₁	W ₁	W ₂	H ₁	H ₂
0411-18"RCP	10'	6'	4.5'	1.5'	1.0'
0421-30"RCP	14'	8'	7.5'	1.5'	1.25'
0501-18"RCP	10'	6'	4.5'	1.5'	1.0'
0505-18"RCP	10'	6'	4.5'	1.5'	1.0'
0604-15"RCP	8'	6'	3.75'	1.5'	1.0'

*450 (See Fig. B-06, 088 "NC SEDIMENT AND EROSION CONTROL MANUAL" FROM 11.2 x 400 T = 1.5' x 0.004' THICKNESS=10" MAX.

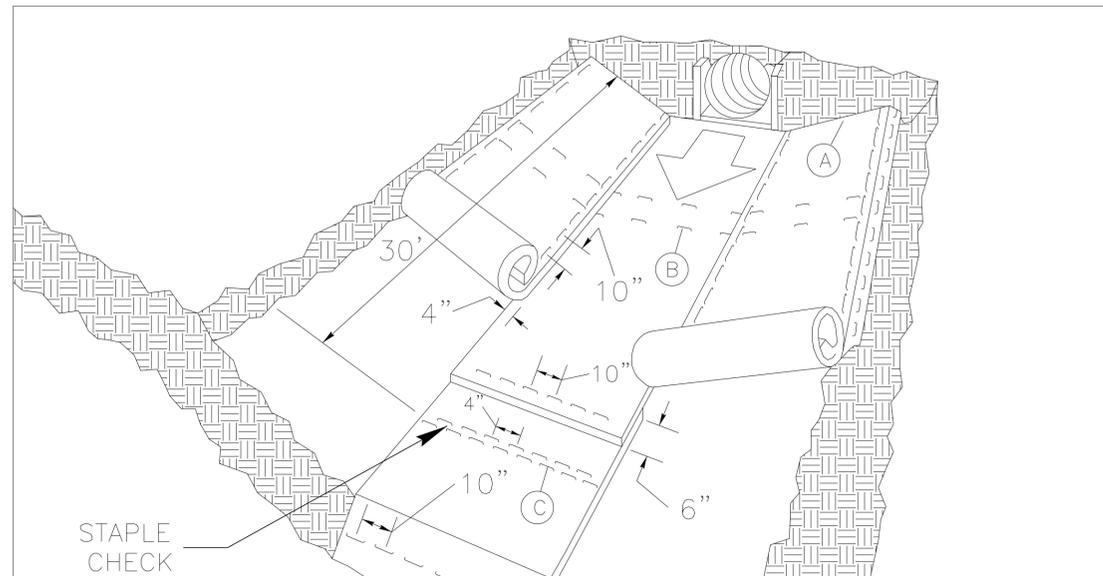
NOTE: MINIMUM 1/2" PIPE DIAMETER

SECTION B-B

RIAPRAP APRON AT PIPE OUTFALLS

STD. NO. 1871

MATTING INSTALLATION DETAIL



MATTING IN DITCHES

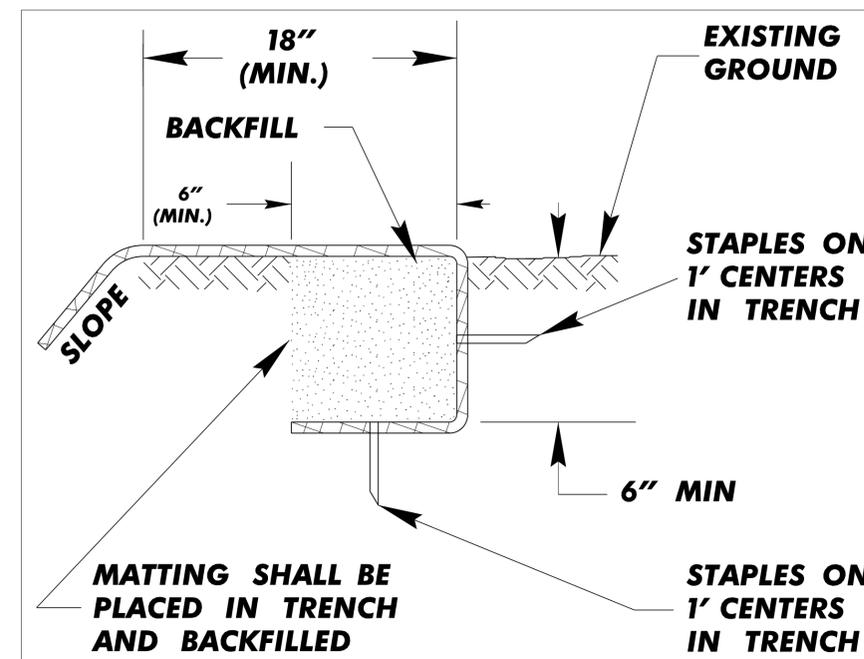
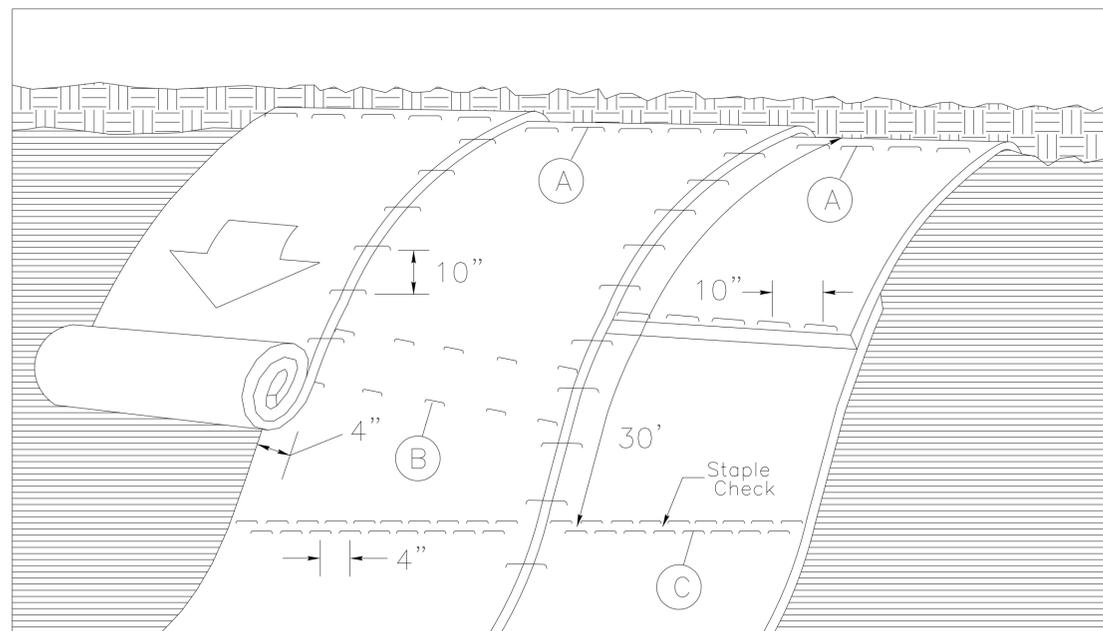


DIAGRAM (A)



MATTING ON SLOPES

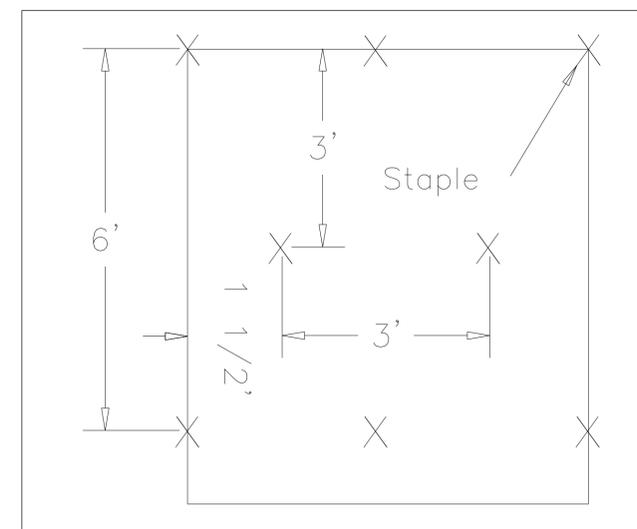


DIAGRAM (B)

Staple Check Pattern

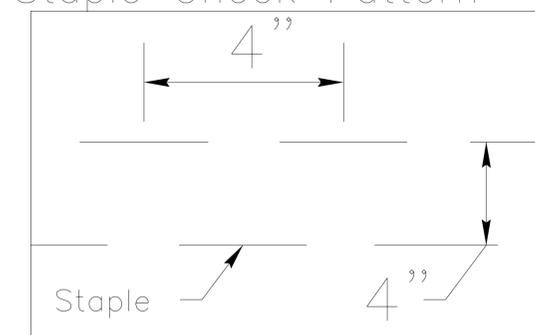


DIAGRAM (C)

NOTES:

THIS DETAIL APPLIES TO STRAW, EXCELSIOR, AND PERMANENT SOIL REINFORCEMENT MAT (PSRM) INSTALLATION.

STAPLES SHALL BE NO. 11 GAUGE STEEL WIRE FORMED INTO A "U" SHAPE WITH A MINIMUM THROAT WIDTH OF 1 INCH AND NOT LESS THAN 6 INCHES IN LENGTH.

NOT TO SCALE

EROSION AND SEDIMENTATION CONTROL NOTES

- ALL PRACTICES SHALL BE IN ACCORDANCE WITH THE GUIDELINES, STANDARDS AND PRACTICES OF THE STATE OF NORTH CAROLINA AS SET FORTH IN THE "EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL."
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER INSTALLATION, MAINTENANCE AND REMOVAL OF ALL EROSION CONTROL MEASURES AS DESIGNATED ON THESE PLANS.
- THE EROSION CONTROL PLANS DEPICT EROSION CONTROL MEASURES FOR THE ENTIRE PROJECT. THESE DEVICES SHALL BE PLACED IN ACCORDANCE WITH THE CONSTRUCTION SCHEDULE OUTLINED HEREIN AS ACTUAL CONSTRUCTION WITHIN THE WORK AREA PROGRESSES. REFER TO TRAFFIC CONTROL PLANS FOR DETAILED SEQUENCE OF CONSTRUCTION.
- THE EROSION CONTROL MEASURES SPECIFIED ON THESE PLANS ARE INTENDED TO REPRESENT THE MINIMUM REQUIREMENTS FOR THIS PROJECT. ADDITIONAL TEMPORARY MEASURES AND/OR ADJUSTMENT OF THOSE SHOWN MAY BE REQUIRED AS FIELD CONDITIONS DICTATE. THESE MAY INCLUDE, BUT NOT BE LIMITED TO: DIVERSIONS, TEMPORARY PIPING, ADDITIONAL SEDIMENT FENCE AND OR INCIDENTAL STONE.
- THE CONTRACTOR IS ADVISED TO EXERCISE DUE DILIGENCE AND CARE IN THE PLACEMENT OF EROSION CONTROL MEASURES ADJACENT TO AND/OR AFFECTING PRIVATE PROPERTY. MEASURES SHALL BE PLACED TO PERMIT DRIVEWAY ACCESS AND TO PROVIDE PEDESTRIAN SAFETY AT ALL TIMES.
- DURING CONSTRUCTION, THE CONTRACTOR SHALL MAKE EVERY EFFORT TO DIRECT AND/OR DIVERT POTENTIAL SEDIMENT-LOADED RUNOFF TO EROSION CONTROL DEVICES IN PLACE AS LAND DISTURBING ACTIVITY PROCEEDS.
- EROSION CONTROL MEASURES SHALL BE INSPECTED WEEKLY AND AFTER RAINFALL EVENTS. SEDIMENT SHALL BE PERIODICALLY REMOVED AND PROPERLY DISPOSED OF AS REQUIRED. DEVICES SHALL BE MAINTAINED AND/OR REPLACED AS NECESSARY TO ENSURE THAT THEY PERFORM AS INTENDED.
- EROSION CONTROL PLAN SHEETS ARE INTENDED FOR THE IMPLEMENTATION OF EROSION CONTROL MEASURES ONLY. REFER TO ROADWAY PLANS FOR ACTUAL DETAILS OF ROADWAY CONSTRUCTION.
- PREFABRICATED SILT FENCE IS NOT ACCEPTABLE ON THIS PROJECT. STEEL POSTS SHOULD BE USED INSTEAD OF WOODEN POSTS, BURIED OR DRIVEN TO A DEPTH OF TWO FEET IN THE GROUND.

PROJECT DESCRIPTION

THIS PROJECT, LOCATED IN APEX, NORTH CAROLINA, CONSISTS OF ROADWAY IMPROVEMENTS AND A BRIDGE OVER CSX RAILROAD. (35.7211N, -78.8681W)

THESE IMPROVEMENTS INCLUDE GRADING, NEW CONCRETE CURB AND GUTTER, BRIDGE, NEW SIDEWALK, EROSION CONTROL, AND TRAFFIC CONTROL. LAND DISTURBING ACTIVITIES RELATED TO THIS PROJECT INCLUDE GRADING FOR NEW SIDEWALK AND NEW PAVEMENT. THE TOTAL LENGTH OF THIS PROJECT IS 0.48 MILES. APPROXIMATELY 13.1 ACRES WILL BE DISTURBED DURING CONSTRUCTION, INCLUSIVE OF INTERSECTING STREETS.

SITE DESCRIPTION

THE SITE HAS ROLLING TOPOGRAPHY WITH GROUND SLOPES RANGING FROM TWO TO TEN PERCENT. THE SITE IS CURRENTLY WOODED WITH SOUTH SALEM STREET TO THE NORTH, A FARM TO THE WEST, AND A RESIDENTIAL DEVELOPMENT TO THE SOUTH.

DRAINAGE OF THE ROADWAY IS ACCOMPLISHED BY STORM SEWER SYSTEMS AT THE BEGINNING AND THE END OF THE PROJECT THAT PROPOSED SYSTEMS TIE INTO. THE SYSTEMS IN THE MIDDLE OF THE PROJECT DRAIN TO A NATURAL DRAINAGE CHANNEL THAT FLOWS FROM NORTH TO SOUTH IN THE WOODED AREA BETWEEN THE RESIDENTIAL DEVELOPMENT AND FARM. RUNOFF ULTIMATELY DRAINS TO BIG BRANCH LOCATED IN THE CAPE FEAR RIVER BASIN.

ADJACENT PROPERTY

THE ADJACENT LAND USE ALONG U-5928 CORRIDOR CONSISTS OF RESIDENTIAL PROPERTIES WITH SOME VACANT WOODED AREAS AND FARMLAND.

EROSION & SEDIMENT CONTROL CONTACT:
TOWN OF APEX
RUSSELL DALTON
919-249-3358

FINANCIALLY RESPONSIBLE CONTACT:
TOWN OF APEX
CATHERINE CROSBY
919-249-3301

SOILS

THE SOILS IN THE PROJECT AREA ARE PREDOMINANTLY CREEDMOOR-GREEN LEVEL (CrB), AND CREEDMOOR-GREEN LEVEL-URBAN (CuC).

EROSION AND SEDIMENTATION CONTROL DEVICES

THE LAND DISTURBING ACTIVITIES FOR THE CONSTRUCTION OF THIS PROJECT ARE TO TAKE PLACE IN TWO PHASES.

FILL SLOPES WILL VARY BETWEEN 2:1 AND 4:1 AND UP TO 20 FEET IN HEIGHT

EROSION CONTROL MEASURES FOR THIS PROJECT CONSIST OF SILT FENCE TO BE LOCATED ALONG THE TOE OF THE FILL SLOPES, ALONG EXISTING ROADWAY CORRIDORS AND TEMPORARY DIVERSIONS TO SEDIMENT AND SKIMMER BASINS IN NEW ALIGNMENT AREAS. THE FINAL GRADING PHASE MAINLY CONSISTS OF INDIVIDUAL INLET SEDIMENT DEVICES AND OTHER STRUCTURAL ROCK TREATMENT DEVICES.

VEGETATIVE PLAN

SEEDING MIXTURE:
BLEND OR 50% KY-31 TALL FESCUE AND 50% MIXTURE OF TWO OR MORE TURF-TYPE FESCUES AT A RATE OF 200-250 PER ACRE

OR

BLEND OF THREE OR MORE TURF-TYPE TALL FESCUES AT A RATE OF 200-250 LB. PER ACRE.

SEEDING DATES:
FALL: AUG. 25 - SEPT. 15 (BEST); AUG. 30 - OCT. 25 (POSSIBLE)
WINTER: FEB. 1 - MAR. 31 (POSSIBLE)

FOR QUALITY TURF, AVOID SPRING SEEDING. WHERE GRADING IS COMPLETED DURING LATE WINTER OR SPRING, AN ALTERNATIVE TO SEED 30 LB. PER ACRE KOBE LESPEDEZA, KEEP MOWED, PREPARE SEEDBED AND SEED PERMANENT MIXTURE BETWEEN AUG. 25 AND SEPT. 15.

SOIL PREPARATION AND TEMPORARY SEEDING:
TILL OR DISK ALL AREAS TO BE SEEDED TO A MINIMUM DEPTH OF 4 INCHES. REMOVE STONES LARGER THAN 3 INCHES ON ANY SIDE, STICKS, ROOTS AND OTHER EXTRANEOUS MATERIALS THAT SURFACE. RE-COMPACT THE AREA TO A SMOOTH EVEN SOIL SURFACE WITH A LOOSE UNIFORMLY FINE TEXTURE. SEEDING OF GRADED AREAS IS TO BE DONE IMMEDIATELY AFTER FINISHED GRADES ARE OBTAINED AND SEEDBED PREPARATION IS COMPLETE.

TEMPORARY SEEDING WILL USE GERMAN MILLET, BROWNTOP MILLET, OR SWEET SUDAN GRASS DURING SUMMER MONTHS AND RYE GRAIN THE REST OF THE YEAR. TEMPORARY SEEDING WILL BE APPLIED AT A RATE OF 50 LB PER ACRE

SOIL AMENDMENTS:
APPLY LIME AND FERTILIZER ACCORDING TO SOIL TESTS OR APPLY MINIMUM 2 TONS PER ACRE WITH 3 TONS PER ACRE FOR CLAY SOILS GROUND AGRICULTURAL LIMESTONE PER ACRE AND 1000 LB. 10-10-10 FERTILIZER.

MULCH:
APPLY 4,000 LB. PER ACRE GRAIN STRAW OR EQUIVALENT COVER OF ANOTHER SUITABLE MULCH. ANCHOR STRAW BY TACKING WITH AN ASPHALT TACKING RATE OF 400 GALLONS PER ACRE.

MAINTENANCE:
FERTILIZE ACCORDING TO SOIL TESTS OR APPLY 40 LB. PER ACRE NITROGEN IN JANUARY OR FEBRUARY, 40 LB. IN SEPTEMBER AND 40 LB. IN NOVEMBER, FROM A 12-4-8, 16-4-8 OR SIMILAR TURF FERTILIZER. AVOID FERTILIZER APPLICATIONS DURING WARM WEATHER AS THIS INCREASES STAND LOSSES TO DISEASE. RESEED, FERTILIZE AND MULCH DAMAGED AREAS IMMEDIATELY. MOW TO A HEIGHT OF 2.5 - 3.5 INCHES AS NEEDED.

CONSTRUCTION SEQUENCE

- OBTAIN PLAN APPROVAL AND ALL OTHER APPLICABLE PERMITS AS REQUIRED.
- HOLD PRECONSTRUCTION CONFERENCE AS DIRECTED PRIOR TO BEGINNING CONSTRUCTION. CALL LOS AT 919-791-4200 TO SCHEDULE PRE-CON AND FOR NOTIFICATION OF PROJECT START UP.
- LAND DISTURBING ACTIVITIES CONSIST OF CONSTRUCTION OF CURB AND GUTTER, SIDEWALK AND PAVEMENT. FINAL WORK WILL CONSIST OF PLACEMENT OF FINAL PAVEMENT LIFT, CONCRETE MEDIANS, ETC.

THE EROSION CONTROL MEASURES TO BE IMPLEMENTED ARE AS FOLLOWS:

- CLEAR AND GRUB NEW LOCATION AREAS AND INSTALL SEDIMENT & SKIMMER BASINS AS INDICATED ON THE PLANS.
- PLACE SEDIMENT CONTROL FENCE ALONG THE PROPOSED TOE OF FILL AT THE LOCATIONS INDICATED ON PLANS.
- TRANSITION TO FINAL PHASE EROSION CONTROL MEASURES AS PROJECT PROGRESSES TO FINAL GRADING PHASE.
- SEED ALL DENUDED AREAS IN ACCORDANCE WITH THE SEEDING SCHEDULE. TEMPORARY GROUND COVER MUST BE PLACED ON EXPOSED SLOPES WITHIN 7 WORKING DAYS FOLLOWING COMPLETION OF ANY PHASE OF GRADING; PERMANENT GROUND COVER MUST BE PLACED ON ALL DISTURBED AREAS WITHIN 10 WORKING DAYS FOLLOWING COMPLETION OF CONSTRUCTION OR DEVELOPMENT.
- REMOVE TEMPORARY EROSION CONTROL DEVICES AFTER THE PROJECT HAS BEEN PERMANENTLY STABILIZED.

INSPECT EROSION CONTROL DEVICES WEEKLY AND FOLLOWING RAINFALL EVENTS. REMOVE SILT AND SEDIMENT PERIODICALLY AS REQUIRED TO KEEP DEVICES FUNCTIONING AS INTENDED.

UPON STABILIZATION, REMOVE ALL TEMPORARY MEASURES AND PERMANENTLY SEED AS REQUIRED.

THE EROSION CONTROL PLAN IS SUBJECT TO CHANGE BASED ON SEDIMENT AND EROSION CONTROL MEASURES NECESSARY TO ENSURE SEDIMENT DOES NOT LEAVE THE DISTURBED AREA. ANY SEDIMENT OFF-SITE NEEDS TO BE REMOVED AND THE AREA CLEANED WHEN CONSTRUCTION IS COMPLETE TO MINIMIZE STORM WATER IMPACTS.

EROSION AND SEDIMENT CONTROL (E&S) PERMIT AND A CERTIFICATE OF COVERAGE MUST BE OBTAINED BEFORE ANY LAND DISTURBING ACTIVITIES OCCUR. THE COC CAN BE OBTAINED BY FILLING OUT THE ELECTRONIC NOTICE OF INTENT (E-NOI) FORM AT DEQ.NC.GOV/NCGOI.

ALL GROUND COVER TO BE APPLIED PER CONDITIONS OF THE NPDES PERMIT OR IN CRITICAL AREAS, AT THE END OF THE DAY.

ANY OFF-SITE BORROW AND WASTE REQUIRED FOR THIS PROJECT MUST COME FROM A SITE WITH AN APPROVED EROSION CONTROL PLAN, A SITE REGULATED UNDER THE MINING ACT OF 1971, OR A LANDFILL REGULATED BY THE DIVISION OF SOLID WASTE MANAGEMENT. TRASH/DEBRIS FROM DEMOLITION ACTIVITIES OR GENERATED BY ANY ACTIVITIES ON SITE MUST BE DISPOSED OF AT A FACILITY REGULATED BY THE DIVISION OF SOLID WASTE MANAGEMENT OR PER DIVISION OF SOLID WASTE MANAGEMENT OR DIVISION OF WATER RESOURCES RULES AND REGULATIONS.

STOCKPILES, LAYDOWN OR WASTE AREAS, CONCRETE WASHOUTS, PORTABLE TOILETS, AND FUELS MUST BE LOCATED AT LEAST 50 FEET AWAY FROM ANY OPEN WATER CONVEYANCES, SUCH AS BASINS, DITCHES, STORM DRAIN INLETS, ETC. THE LOCATION OF THESE ACTIVITIES MAY BE FIELD ADJUSTED IF THE DISTANCE REQUIREMENTS ARE MET.

INSTALL CONSTRUCTION ENTRANCE, TREE PROTECTION FENCE, SILT FENCE, AND SILT FENCE OUTLETS PRIOR TO ANY LAND DISTURBING ACTIVITIES (INCLUDING ANY TREE CLEARING OR DEMOLITION). CLEAR ONLY AS NECESSARY TO INSTALL THESE DEVICES AS SPECIFIED ON THE APPROVED PLAN SHEET. INSTALL ALL OTHER EROSION CONTROL MEASURES AS REQUIRED BY NCDENR INCLUDING SEDIMENT BASINS, BARRIERS AND DIVERSION DITCHES AS NEEDED. CLEAR ONLY AS NECESSARY TO INSTALL THESE DEVICES. INSTALL DITCH LINERS AND TEMPORARY CULVERT PIPE AS NOTED ON PLANS. SEED TEMPORARY DIVERSIONS, BERMS, AND BASINS IMMEDIATELY AFTER INSTALLATION. INSTALL COIR WATTLES OR CHECK DAMS IN TEMPORARY DIVERSIONS.

PER NPDES REQUIREMENTS, A RAIN GAUGE, SELF-INSPECTIONS RECORDS, PERMIT, CERTIFICATE OF COVERAGE, AND S&E PLAN ARE REQUIRED TO BE MAINTAINED ON SITE AND ACCESSIBLE DURING INSPECTION. IT IS RECOMMENDED THAT THESE ITEMS BE PLACED IN A PERMITS BOX AT THE BEGINNING OR ENTRANCE OF PROJECT.

WHEN THE PROJECT IS COMPLETE, THE PERMITTEES SHALL CONTACT DEMLR TO CLOSE OUT THE E&S PLAN. AFTER DEMLR INFORMS THE PERMITTEE OF THE PROJECT CLOSE OUT, VIA INSPECTION REPORT, THE PERMITTEE SHALL VISIT DEQ.NC.GOV/NCGOI TO SUBMIT AN ELECTRONIC NOTICE OF TERMINATION (E-NOT). A \$100 ANNUAL GENERAL PERMIT FEE WILL BE CHARGED UNTIL THE E-NOT HAS BEEN FILLED OUT.

MAINTENANCE PLAN

- CHECK ALL EROSION CONTROL MEASURES WEEKLY AND AFTER EACH RAINFALL.
- REMOVE SEDIMENT FROM BEHIND SEDIMENT FENCE WHEN THE ACCUMULATED MATERIAL IS 0.50 FEET DEEP. RESET AND/OR REPLACE FENCE AS REQUIRED THROUGHOUT CONSTRUCTION. ALSO, REMOVE SEDIMENT FROM OR REPLACE SEDIMENT BAGS AT CATCH BASIN INLET PROTECTION WHEN BAGS ARE HALF FULL.
- SEED NEWLY GRADED AREAS AS EARLY AS POSSIBLE. RESEED, AS NECESSARY, ANY REMAINING OR NEWLY DISTURBED AREAS AS WORK PROGRESSES THROUGHOUT THE ENTIRE CONSTRUCTION PERIOD.
- ALL E&S CONTROL MUST BE MAINTAINED UNTIL ALL UPGRADE DRAINAGE AREAS HAVE BEEN STABILIZED THE ESTABLISHMENT OF PERMANENT VEGETATION.

TO FACILITATE IN CLEANUP OF PAVED SURFACES, A LAYER OF SAND, SCREENINGS OR FINES WILL BE PLACED FOR DEPOSITION OF ANY EXCAVATED MATERIAL OR USE BY EQUIPMENT/VEHICLES ASSOCIATED WITH THE PROJECT.

ANY DEWATERING FOR THE RAILROAD BRIDGE PIERS IS TO BE DONE WITH THE SPECIAL STILLING BASIN(S).

GROUND STABILIZATION AND MATERIALS HANDLING PRACTICES FOR COMPLIANCE WITH THE NCG01 CONSTRUCTION GENERAL PERMIT

Implementing the details and specifications on this plan sheet will result in the construction activity being considered compliant with the Ground Stabilization and Materials Handling sections of the NCG01 Construction General Permit (Sections E and F, respectively). The permittee shall comply with the Erosion and Sediment Control plan approved by the delegated authority having jurisdiction. All details and specifications shown on this sheet may not apply depending on site conditions and the delegated authority having jurisdiction.

SECTION E: GROUND STABILIZATION

Required Ground Stabilization Timeframes		
Site Area Description	Stabilize within this many calendar days after ceasing land disturbance	Timeframe variations
(a) Perimeter dikes, swales, ditches, and perimeter slopes	7	None
(b) High Quality Water (HQW) Zones	7	None
(c) Slopes steeper than 3:1	7	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed
(d) Slopes 3:1 to 4:1	14	-7 days for slopes greater than 50' in length and with slopes steeper than 4:1 -7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed
(e) Areas with slopes flatter than 4:1	14	-7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed unless there is zero slope

Note: After the permanent cessation of construction activities, any areas with temporary ground stabilization shall be converted to permanent ground stabilization as soon as practicable but in no case longer than 90 calendar days after the last land disturbing activity. Temporary ground stabilization shall be maintained in a manner to render the surface stable against accelerated erosion until permanent ground stabilization is achieved.

GROUND STABILIZATION SPECIFICATION

Stabilize the ground sufficiently so that rain will not dislodge the soil. Use one of the techniques in the table below:

Temporary Stabilization	Permanent Stabilization
<ul style="list-style-type: none"> Temporary grass seed covered with straw or other mulches and tackifiers Hydroseeding Rolled erosion control products with or without temporary grass seed Appropriately applied straw or other mulch Plastic sheeting 	<ul style="list-style-type: none"> Permanent grass seed covered with straw or other mulches and tackifiers Geotextile fabrics such as permanent soil reinforcement matting Hydroseeding Shrubs or other permanent plantings covered with mulch Uniform and evenly distributed ground cover sufficient to restrain erosion Structural methods such as concrete, asphalt or retaining walls Rolled erosion control products with grass seed

POLYACRYLAMIDES (PAMS) AND FLOCCULANTS

- Select flocculants that are appropriate for the soils being exposed during construction, selecting from the NC DWR List of Approved PAMS/Flocculants.
- Apply flocculants at or before the inlets to Erosion and Sediment Control Measures.
- Apply flocculants at the concentrations specified in the NC DWR List of Approved PAMS/Flocculants and in accordance with the manufacturer's instructions.
- Provide ponding area for containment of treated Stormwater before discharging offsite.
- Store flocculants in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures.

EQUIPMENT AND VEHICLE MAINTENANCE

- Maintain vehicles and equipment to prevent discharge of fluids.
- Provide drip pans under any stored equipment.
- Identify leaks and repair as soon as feasible, or remove leaking equipment from the project.
- Collect all spent fluids, store in separate containers and properly dispose as hazardous waste (recycle when possible).
- Remove leaking vehicles and construction equipment from service until the problem has been corrected.
- Bring used fuels, lubricants, coolants, hydraulic fluids and other petroleum products to a recycling or disposal center that handles these materials.

LITTER, BUILDING MATERIAL AND LAND CLEARING WASTE

- Never bury or burn waste. Place litter and debris in approved waste containers.
- Provide a sufficient number and size of waste containers (e.g dumpster, trash receptacle) on site to contain construction and domestic wastes.
- Locate waste containers at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
- Locate waste containers on areas that do not receive substantial amounts of runoff from upland areas and does not drain directly to a storm drain, stream or wetland.
- Cover waste containers at the end of each workday and before storm events or provide secondary containment. Repair or replace damaged waste containers.
- Anchor all lightweight items in waste containers during times of high winds.
- Empty waste containers as needed to prevent overflow. Clean up immediately if containers overflow.
- Dispose waste off-site at an approved disposal facility.
- On business days, clean up and dispose of waste in designated waste containers.

PAINT AND OTHER LIQUID WASTE

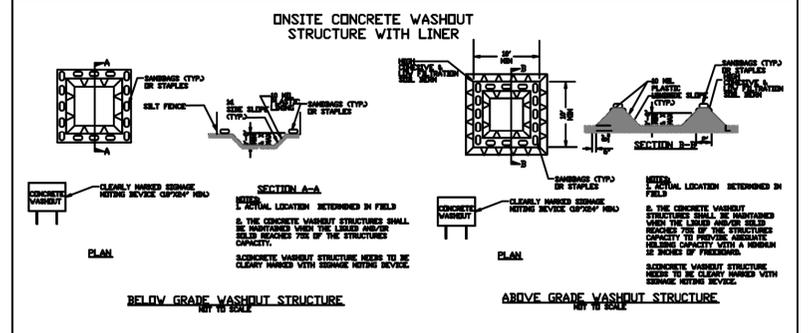
- Do not dump paint and other liquid waste into storm drains, streams or wetlands.
- Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
- Contain liquid wastes in a controlled area.
- Containment must be labeled, sized and placed appropriately for the needs of site.
- Prevent the discharge of soaps, solvents, detergents and other liquid wastes from construction sites.

PORTABLE TOILETS

- Install portable toilets on level ground, at least 50 feet away from storm drains, streams or wetlands unless there is no alternative reasonably available. If 50 foot offset is not attainable, provide relocation of portable toilet behind silt fence or place on a gravel pad and surround with sand bags.
- Provide staking or anchoring of portable toilets during periods of high winds or in high foot traffic areas.
- Monitor portable toilets for leaking and properly dispose of any leaked material. Utilize a licensed sanitary waste hauler to remove leaking portable toilets and replace with properly operating unit.

EARTHEN STOCKPILE MANAGEMENT

- Show stockpile locations on plans. Locate earthen-material stockpile areas at least 50 feet away from storm drain inlets, sediment basins, perimeter sediment controls and surface waters unless it can be shown no other alternatives are reasonably available.
- Protect stockpile with silt fence installed along toe of slope with a minimum offset of five feet from the toe of stockpile.
- Provide stable stone access point when feasible.
- Stabilize stockpile within the timeframes provided on this sheet and in accordance with the approved plan and any additional requirements. Soil stabilization is defined as vegetative, physical or chemical coverage techniques that will restrain accelerated erosion on disturbed soils for temporary or permanent control needs.



CONCRETE WASHOUTS

- Do not discharge concrete or cement slurry from the site.
- Dispose of, or recycle settled, hardened concrete residue in accordance with local and state solid waste regulations and at an approved facility.
- Manage washout from mortar mixers in accordance with the above item and in addition place the mixer and associated materials on impervious barrier and within lot perimeter silt fence.
- Install temporary concrete washouts per local requirements, where applicable. If an alternate method or product is to be used, contact your approval authority for review and approval. If local standard details are not available, use one of the two types of temporary concrete washouts provided on this detail.
- Do not use concrete washouts for dewatering or storing defective curb or sidewalk sections. Stormwater accumulated within the washout may not be pumped into or discharged to the storm drain system or receiving surface waters. Liquid waste must be pumped out and removed from project.
- Locate washouts at least 50 feet from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available. At a minimum, install protection of storm drain inlet(s) closest to the washout which could receive spills or overflow.
- Locate washouts in an easily accessible area, on level ground and install a stone entrance pad in front of the washout. Additional controls may be required by the approving authority.
- Install at least one sign directing concrete trucks to the washout within the project limits. Post signage on the washout itself to identify this location.
- Remove leavings from the washout when at approximately 75% capacity to limit overflow events. Replace the tarp, sand bags or other temporary structural components when no longer functional. When utilizing alternative or proprietary products, follow manufacturer's instructions.
- At the completion of the concrete work, remove remaining leavings and dispose of in an approved disposal facility. Fill pit, if applicable, and stabilize any disturbance caused by removal of washout.

HERBICIDES, PESTICIDES AND RODENTICIDES

- Store and apply herbicides, pesticides and rodenticides in accordance with label restrictions.
- Store herbicides, pesticides and rodenticides in their original containers with the label, which lists directions for use, ingredients and first aid steps in case of accidental poisoning.
- Do not store herbicides, pesticides and rodenticides in areas where flooding is possible or where they may spill or leak into wells, stormwater drains, ground water or surface water. If a spill occurs, clean area immediately.
- Do not stockpile these materials onsite.

HAZARDOUS AND TOXIC WASTE

- Create designated hazardous waste collection areas on-site.
- Place hazardous waste containers under cover or in secondary containment.
- Do not store hazardous chemicals, drums or bagged materials directly on the ground.



**PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING**

SECTION A: SELF-INSPECTION

Self-inspections are required during normal business hours in accordance with the table below. When adverse weather or site conditions would cause the safety of the inspection personnel to be in jeopardy, the inspection may be delayed until the next business day on which it is safe to perform the inspection. In addition, when a storm event of equal to or greater than 1.0 inch occurs outside of normal business hours, the self-inspection shall be performed upon the commencement of the next business day. Any time when inspections were delayed shall be noted in the Inspection Record.

Inspect	Frequency (during normal business hours)	Inspection records must include:
(1) Rain gauge maintained in good working order	Daily	Daily rainfall amounts. If no daily rain gauge observations are made during weekend or holiday periods, and no individual-day rainfall information is available, record the cumulative rain measurement for those unattended days (and this will determine if a site inspection is needed). Days on which no rainfall occurred shall be recorded as "zero." The permittee may use another rain-monitoring device approved by the Division.
(2) E&SC Measures	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the measures inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Indication of whether the measures were operating properly, 5. Description of maintenance needs for the measure, 6. Description, evidence, and date of corrective actions taken.
(3) Stormwater discharge outfalls (SDCs)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the discharge outfalls inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Evidence of indicators of stormwater pollution such as oil sheen, floating or suspended solids or discoloration, 5. Indication of visible sediment leaving the site, 6. Description, evidence, and date of corrective actions taken.
(4) Perimeter of site	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If visible sedimentation is found outside site limits, then a record of the following shall be made: 1. Actions taken to clean up or stabilize the sediment that has left the site limits, 2. Description, evidence, and date of corrective actions taken, and 3. An explanation as to the actions taken to control future releases.
(5) Streams or wetlands onsite or offsite (where accessible)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If the stream or wetland has increased visible sedimentation or a stream has visible increased turbidity from the construction activity, then a record of the following shall be made: 1. Description, evidence and date of corrective actions taken, and 2. Records of the required reports to the appropriate Division Regional Office per Part III, Section C, Item (2)(a) of this permit.
(6) Ground stabilization measures	After each phase of grading	1. The phase of grading (installation of perimeter E&SC measures, clearing and grubbing, installation of storm drainage facilities, completion of all land-disturbing activity, construction or redevelopment, permanent ground cover). 2. Documentation that the required ground stabilization measures have been provided within the required timeframe or an assurance that they will be provided as soon as possible.

NOTE: The rain inspection resets the required 7 calendar day inspection requirement.

**PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING**

SECTION B: RECORDKEEPING

1. E&SC Plan Documentation

The approved E&SC plan as well as any approved deviation shall be kept on the site. The approved E&SC plan must be kept up-to-date throughout the coverage under this permit. The following items pertaining to the E&SC plan shall be kept on site and available for inspection at all times during normal business hours.

Item to Document	Documentation Requirements
(a) Each E&SC measure has been installed and does not significantly deviate from the locations, dimensions and relative elevations shown on the approved E&SC plan.	Initial and date each E&SC measure on a copy of the approved E&SC plan or complete, date and sign an inspection report that lists each E&SC measure shown on the approved E&SC plan. This documentation is required upon the initial installation of the E&SC measures or if the E&SC measures are modified after initial installation.
(b) A phase of grading has been completed.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate completion of the construction phase.
(c) Ground cover is located and installed in accordance with the approved E&SC plan.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate compliance with approved ground cover specifications.
(d) The maintenance and repair requirements for all E&SC measures have been performed.	Complete, date and sign an inspection report.
(e) Corrective actions have been taken to E&SC measures.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate the completion of the corrective action.

2. Additional Documentation to be Kept on Site

In addition to the E&SC plan documents above, the following items shall be kept on the site and available for inspectors at all times during normal business hours, unless the Division provides a site-specific exemption based on unique site conditions that make this requirement not practical:

(a) This General Permit as well as the Certificate of Coverage, after it is received.

(b) Records of inspections made during the previous twelve months. The permittee shall record the required observations on the Inspection Record Form provided by the Division or a similar inspection form that includes all the required elements. Use of electronically-available records in lieu of the required paper copies will be allowed if shown to provide equal access and utility as the hard-copy records.

3. Documentation to be Retained for Three Years

All data used to complete the e-NOI and all inspection records shall be maintained for a period of three years after project completion and made available upon request. [40 CFR 122.41]

**PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING**

SECTION C: REPORTING

1. Occurrences that Must be Reported

Permittees shall report the following occurrences:

(a) Visible sediment deposition in a stream or wetland.

(b) Oil spills if:

- They are 25 gallons or more,
- They are less than 25 gallons but cannot be cleaned up within 24 hours,
- They cause sheen on surface waters (regardless of volume), or
- They are within 100 feet of surface waters (regardless of volume).

(c) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (Ref: 40 CFR 110.3 and 40 CFR 117.3) or Section 102 of CERCLA (Ref: 40 CFR 302.4) or G.S. 143-215.85.

(d) Anticipated bypasses and unanticipated bypasses.

(e) Noncompliance with the conditions of this permit that may endanger health or the environment.

2. Reporting Timeframes and Other Requirements

After a permittee becomes aware of an occurrence that must be reported, he shall contact the appropriate Division regional office within the timeframes and in accordance with the other requirements listed below. Occurrences outside normal business hours may also be reported to the Department's Environmental Emergency Center personnel at (800) 858-0368.

Occurrence	Reporting Timeframes (After Discovery) and Other Requirements
(a) Visible sediment deposition in a stream or wetland	<ul style="list-style-type: none"> Within 24 hours, an oral or electronic notification. Within 7 calendar days, a report that contains a description of the sediment and actions taken to address the cause of the deposition. Division staff may waive the requirement for a written report on a case-by-case basis. If the stream is named on the NC 303(d) list as impaired for sediment-related causes, the permittee may be required to perform additional monitoring, inspections or apply more stringent practices if staff determine that additional requirements are needed to assure compliance with the federal or state impaired-waters conditions.
(b) Oil spills and release of hazardous substances per Item 1(b)-(c) above	<ul style="list-style-type: none"> Within 24 hours, an oral or electronic notification. The notification shall include information about the date, time, nature, volume and location of the spill or release.
(c) Anticipated bypasses [40 CFR 122.41(m)(3)]	<ul style="list-style-type: none"> A report at least ten days before the date of the bypass, if possible. The report shall include an evaluation of the anticipated quality and effect of the bypass.
(d) Unanticipated bypasses [40 CFR 122.41(m)(3)]	<ul style="list-style-type: none"> Within 24 hours, an oral or electronic notification. Within 7 calendar days, a report that includes an evaluation of the quality and effect of the bypass.
(e) Noncompliance with the conditions of this permit that may endanger health or the environment [40 CFR 122.41(l)(7)]	<ul style="list-style-type: none"> Within 24 hours, an oral or electronic notification. Within 7 calendar days, a report that contains a description of the noncompliance, and its causes; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time noncompliance is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6). Division staff may waive the requirement for a written report on a case-by-case basis.

**PART II, SECTION G, ITEM (4)
DRAW DOWN OF SEDIMENT BASINS FOR MAINTENANCE OR CLOSE OUT**

Sediment basins and traps that receive runoff from drainage areas of one acre or more shall use outlet structures that withdraw water from the surface when these devices need to be drawn down for maintenance or close out unless this is infeasible. The circumstances in which it is not feasible to withdraw water from the surface shall be rare (for example, times with extended cold weather). Non-surface withdrawals from sediment basins shall be allowed only when all of the following criteria have been met:

(a) The E&SC plan authority has been provided with documentation of the non-surface withdrawal and the specific time periods or conditions in which it will occur. The non-surface withdrawal shall not commence until the E&SC plan authority has approved these items,

(b) The non-surface withdrawal has been reported as an anticipated bypass in accordance with Part III, Section C, Item (2)(c) and (d) of this permit,

(c) Dewatering discharges are treated with controls to minimize discharges of pollutants from stormwater that is removed from the sediment basin. Examples of appropriate controls include properly sited, designed and maintained dewatering tanks, weir tanks, and filtration systems,

(d) Vegetated, upland areas of the sites or a properly designed stone pad is used to the extent feasible at the outlet of the dewatering treatment devices described in Item (c) above,

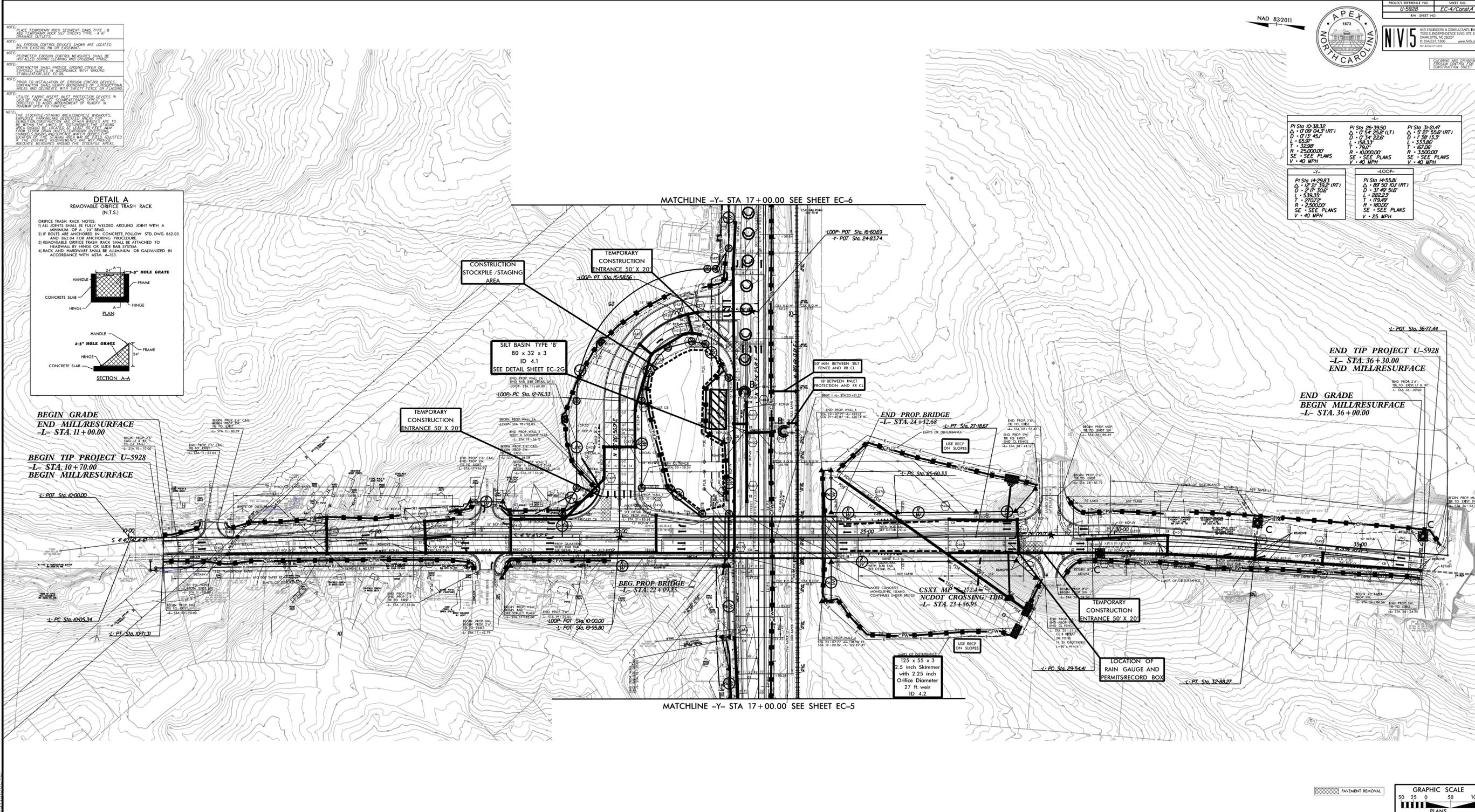
(e) Velocity dissipation devices such as check dams, sediment traps, and riprap are provided at the discharge points of all dewatering devices, and

(f) Sediment removed from the dewatering treatment devices described in Item (c) above is disposed of in a manner that does not cause deposition of sediment into waters of the United States.

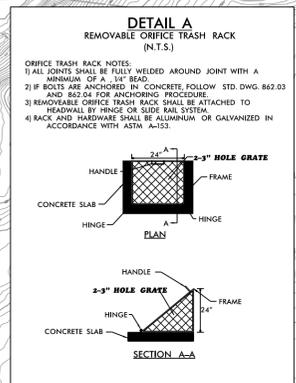


8/17/99

9/22/2023 R:\Environmental\Design\U5928_hyd_EC_4_C&G.dgn



- NOTE: PLACE TEMPORARY ROCK SEGMENT DAMS TYPE "B" AND 2" HOLES TYPE "A" AT 50' INTERVALS.
- NOTE: ALL EROSION CONTROL DEVICES SHOWN ARE LOCATED BY THE CENTERLINE OF THE ROADWAY.
- NOTE: PERMITS FOR EROSION CONTROL MEASURES SHALL BE INSTALLED DURING CLEARING AND GRADING PHASE.
- NOTE: CONTRACTOR SHALL PROTECT EXISTING UTILITIES AND STRUCTURES TO REMAIN. LOCATE AND MARK WITH SHOWN.
- NOTE: PRIOR TO INSTALLATION OF EROSION CONTROL DEVICES, CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL UTILITIES AND STRUCTURES TO REMAIN.
- NOTE: PLACE FABRIC MESH INLET PROTECTION DEVICES IN ALL EROSION CONTROL DEVICES TO PREVENT BLOCKAGE OF RUNOFF IN DOWNSTREAM CHANNELS.
- NOTE: CONSTRUCTION STAGING AREA CONCRETE BARRIERS SHALL BE 4' HIGH AND 4" THICK. ALL BARRIERS SHALL BE ANCHORED IN CONCRETE FOLLOWS STD. DWG. 842.03 AND SHALL BE ANCHORED TO REMAINING SIDEWALK SYSTEM AND BACK AND HARDWARE SHALL BE ALUMINUM OR GALVANIZED IN ACCORDANCE WITH ASTM A-533.



BEGIN GRADE
END MILL/RESURFACE
-L- STA. 11+00.00

BEGIN TIP PROJECT U-5928
BEGIN MILL/RESURFACE
-L- STA. 10+70.00

NAD 832011

PROJECT REFERENCE NO. U-5928
SHEET NO. EC-4/Const.4

NOV15
NOV ENGINEERS & CONSULTANTS, INC.
7000 S. INDEPENDENCE BLVD. STE. 100
CHARLOTTE, NC 28227
S: 704.537.7700
www.nov15.com

LEGEND AND GRADING
CONSTRUCTION SHEET 2

PI Sta 10+38.32 $\Delta = 0.09 \text{ (4.3' RT)}$ $D = 0.13 \text{ (45' L)}$ $L = 65.00$ $T = 32.50$ $R = 2500000$ SE - SEE PLANS V - 40 MPH	PI Sta 26+39.50 $\Delta = 0.58 \text{ (25.5' LT)}$ $D = 0.34 \text{ (22.6' L)}$ $L = 158.33$ $T = 79.17$ $R = 1000000$ SE - SEE PLANS V - 40 MPH	PI Sta 31+01.07 $\Delta = 0.27 \text{ (9.5' RT)}$ $D = 0.34 \text{ (13.3' L)}$ $L = 113.95$ $T = 56.98$ $R = 1000000$ SE - SEE PLANS V - 40 MPH
PI Sta 14+29.83 $\Delta = 1.12 \text{ (21.5' RT)}$ $D = 2.17 \text{ (30.6' L)}$ $L = 538.15$ $T = 270.07$ $R = 2500000$ SE - SEE PLANS V - 40 MPH	PI Sta 14+55.81 $\Delta = 0.87 \text{ (31.0' RT)}$ $D = 3.49 \text{ (51.6' L)}$ $L = 288.23$ $T = 144.12$ $R = 1800000$ SE - SEE PLANS V - 25 MPH	PI Sta 31+01.07 $\Delta = 0.27 \text{ (9.5' RT)}$ $D = 0.34 \text{ (13.3' L)}$ $L = 113.95$ $T = 56.98$ $R = 1000000$ SE - SEE PLANS V - 40 MPH

END TIP PROJECT U-5928
END MILL/RESURFACE
-L- STA. 36+30.00

END GRADE
BEGIN MILL/RESURFACE
-L- STA. 36+00.00

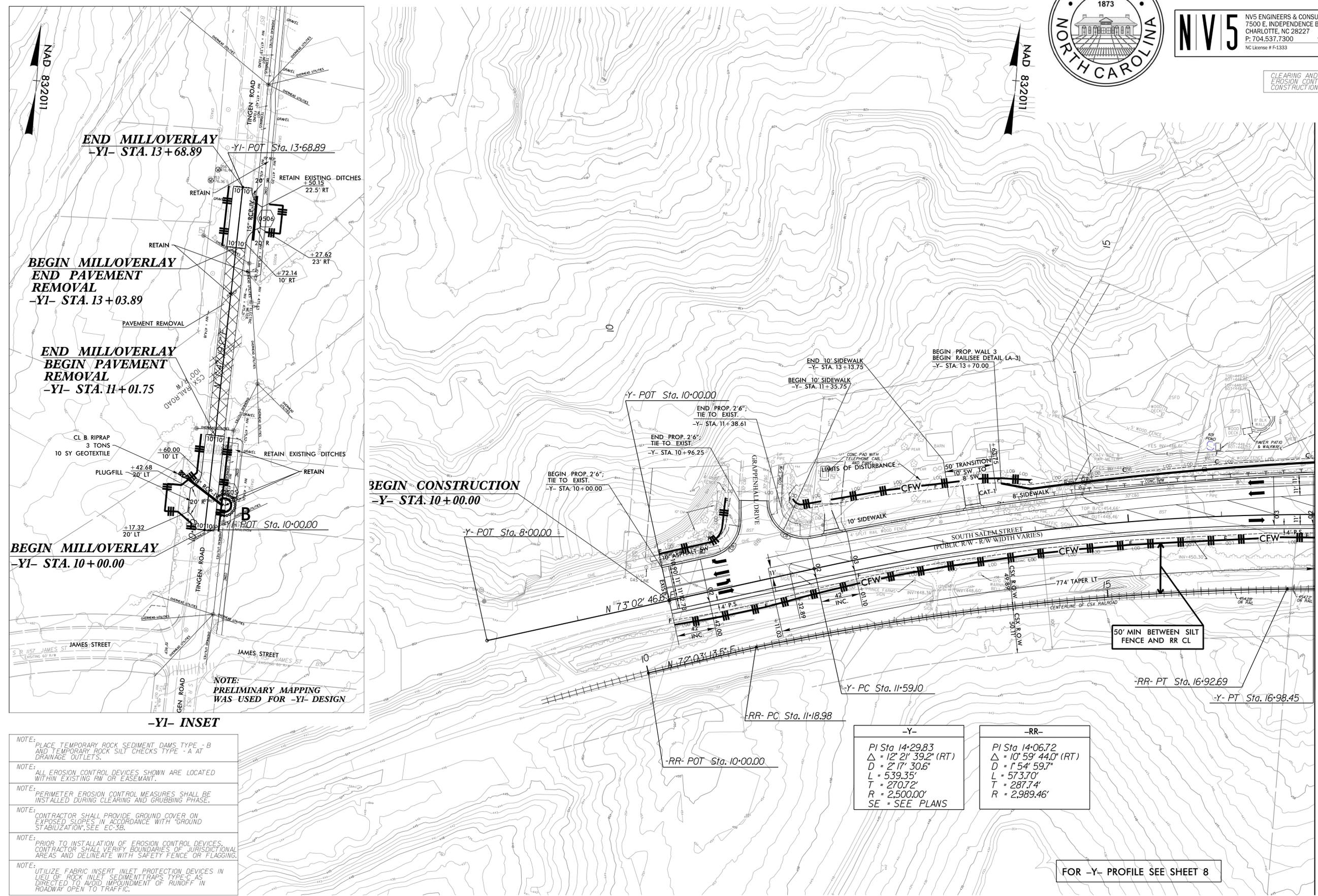
PAVEMENT REMOVAL

GRAPHIC SCALE
0 25 50 100
PLANS



NV5
 NV5 ENGINEERS & CONSULTANTS, INC.
 7500 E. INDEPENDENCE BLVD, STE 100
 CHARLOTTE, NC 28227
 P: 704.537.7300 www.NV5.com
 NC License # F-1333

CLEARING AND GRUBBING
 EROSION CONTROL FOR
 CONSTRUCTION SHEET 5



- NOTE:** PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.
- NOTE:** ALL EROSION CONTROL DEVICES SHOWN ARE LOCATED WITHIN EXISTING RW OR EASEMENT.
- NOTE:** PERIMETER EROSION CONTROL MEASURES SHALL BE INSTALLED DURING CLEARING AND GRUBBING PHASE.
- NOTE:** CONTRACTOR SHALL PROVIDE GROUND COVER ON EXPOSED SLOPES IN ACCORDANCE WITH "GROUND STABILIZATION", SEE EC-3B.
- NOTE:** PRIOR TO INSTALLATION OF EROSION CONTROL DEVICES, CONTRACTOR SHALL VERIFY BOUNDARIES OF JURISDICTIONAL AREAS AND DELINEATE WITH SAFETY FENCE OR FLAGGING.
- NOTE:** UTILIZE FABRIC INSERT INLET PROTECTION DEVICES IN LIEU OF ROCK INLET SEDIMENT TRAPS TYPE-C AS DIRECTED TO AVOID IMPEDIMENT OF RUNOFF IN ROADWAY OPEN TO TRAFFIC.

-Y-	-RR-
PI Sta 14+29.83	PI Sta 14+06.72
$\Delta = 12' 21' 39.2"$ (RT)	$\Delta = 10' 59' 44.0"$ (RT)
$D = 2' 17' 30.6"$	$D = 1' 54' 59.7"$
$L = 539.35'$	$L = 573.70'$
$T = 270.72'$	$T = 287.74'$
$R = 2,500.00'$	$R = 2,989.46'$
SE = SEE PLANS	

FOR -Y- PROFILE SEE SHEET 8

REVISIONS/REVISIONS

MATCHLINE -Y- STA 17+00.00 SEE SHEET EC-4

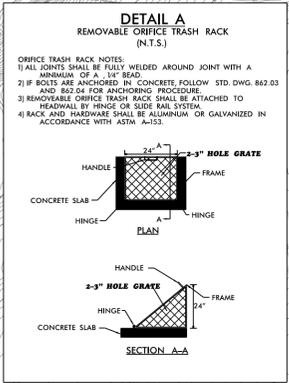
-YI- INSET

NOTE:
 PRELIMINARY MAPPING
 WAS USED FOR -YI- DESIGN

7/25/2023 R:\Environmental\Design\U5928_hyd_EC_5_C&G.dwg J:\Bocker

8/17/99

- NOTE: PLACE TEMPORARY ROCK SEGMENT DAMS TYPE "B" OVER EXISTING ROCK "SOFT CHECKS" TYPE "A" AT BRIDGE APPROACHES.
- NOTE: ALL EROSION CONTROL DEVICES SHOWN ARE LOCATED BY THE CENTERLINE OF THE ROADWAY.
- NOTE: PERMITS FOR EROSION CONTROL MEASURES SHALL BE INSTALLED DURING CLEARING AND GRADING PHASE.
- NOTE: CONTRACTOR SHALL PROTECT EXISTING UTILITIES AND STRUCTURES TO REMAIN. LOCATIONS SHOWN WITH SHOWN.
- NOTE: PRIOR TO INSTALLATION OF EROSION CONTROL DEVICES, CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UTILITIES AND STRUCTURES TO REMAIN BY SAFETY LINE OF UTILITY LOCATIONS AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING UTILITIES AND STRUCTURES TO REMAIN.
- NOTE: SLIDE FABRIC MUST BE INSTALLED PROTECTIVE DEVICES IN ALL AREAS WHERE THERE IS A POSSIBILITY OF RAINFALL IN EXISTING OR PROPOSED ROADWAY.
- NOTE: ALL STOCKPILE STAGING AREAS CONCRETE BARRIERS SHALL BE INSTALLED AND THE MINIMUM OF A 1/4" BEAD OF POLYURETHANE SEALANT SHALL BE APPLIED TO ALL JOINTS AND SEAMS TO PREVENT WATER INTRUSION INTO THE UNDERLYING STRUCTURE.



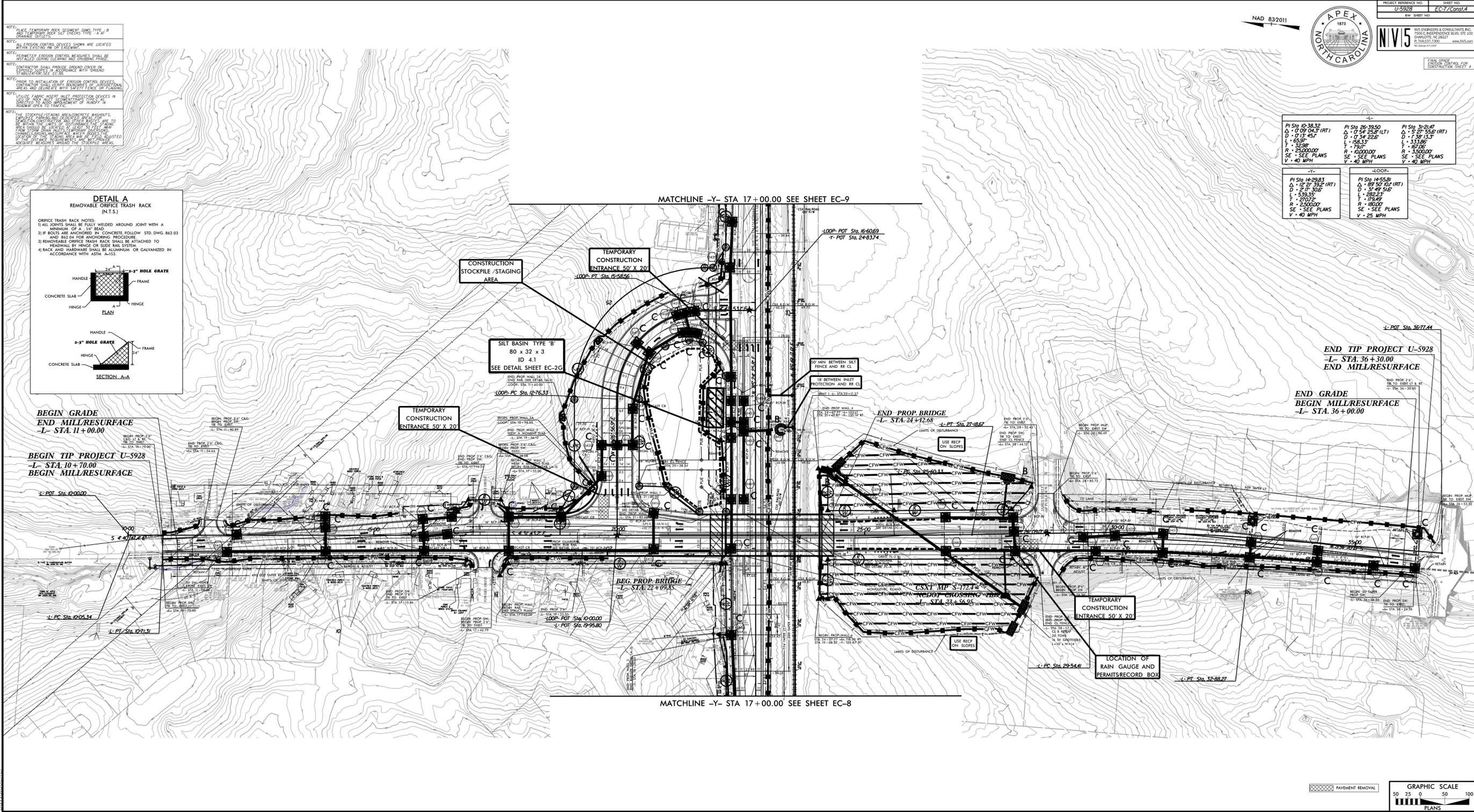
BEGIN GRADE
END MILL/RESURFACE
-L- STA. 11+00.00

BEGIN TIP PROJECT U-5928
END MILL/RESURFACE
-L- STA. 10+70.00

-L- POT Sta. 10+00.00

-L- PC Sta. 10+05.34

-L- PT Sta. 10+71.31



PI Sta 10+38.32 $\Delta = 0.09 \text{ (4.3' RT)}$ $D = 0.13 \text{ (45' L)}$ $L = 65.00$ $T = 32.50$ $R = 2500000$ $SE = \text{SEE PLANS}$ $V = 40 \text{ MPH}$	PI Sta 26+39.50 $\Delta = 0.56 \text{ (25.5' LT)}$ $D = 0.34 \text{ (22.6' L)}$ $L = 158.33$ $T = 79.17$ $R = 1000000$ $SE = \text{SEE PLANS}$ $V = 40 \text{ MPH}$	PI Sta 31+01.07 $\Delta = 0.27 \text{ (9.5' RT)}$ $D = 0.34 \text{ (13.3' L)}$ $L = 113.95$ $T = 57.00$ $R = 1000000$ $SE = \text{SEE PLANS}$ $V = 40 \text{ MPH}$
PI Sta 14+29.83 $\Delta = 2.17 \text{ (30.6' RT)}$ $L = 538.15$ $T = 270.22$ $R = 2500000$ $SE = \text{SEE PLANS}$ $V = 40 \text{ MPH}$	PI Sta 14+55.81 $\Delta = 4.89 \text{ (51.4' RT)}$ $D = 3.49 \text{ (51.6' L)}$ $L = 288.23$ $T = 144.12$ $R = 1800000$ $SE = \text{SEE PLANS}$ $V = 25 \text{ MPH}$	

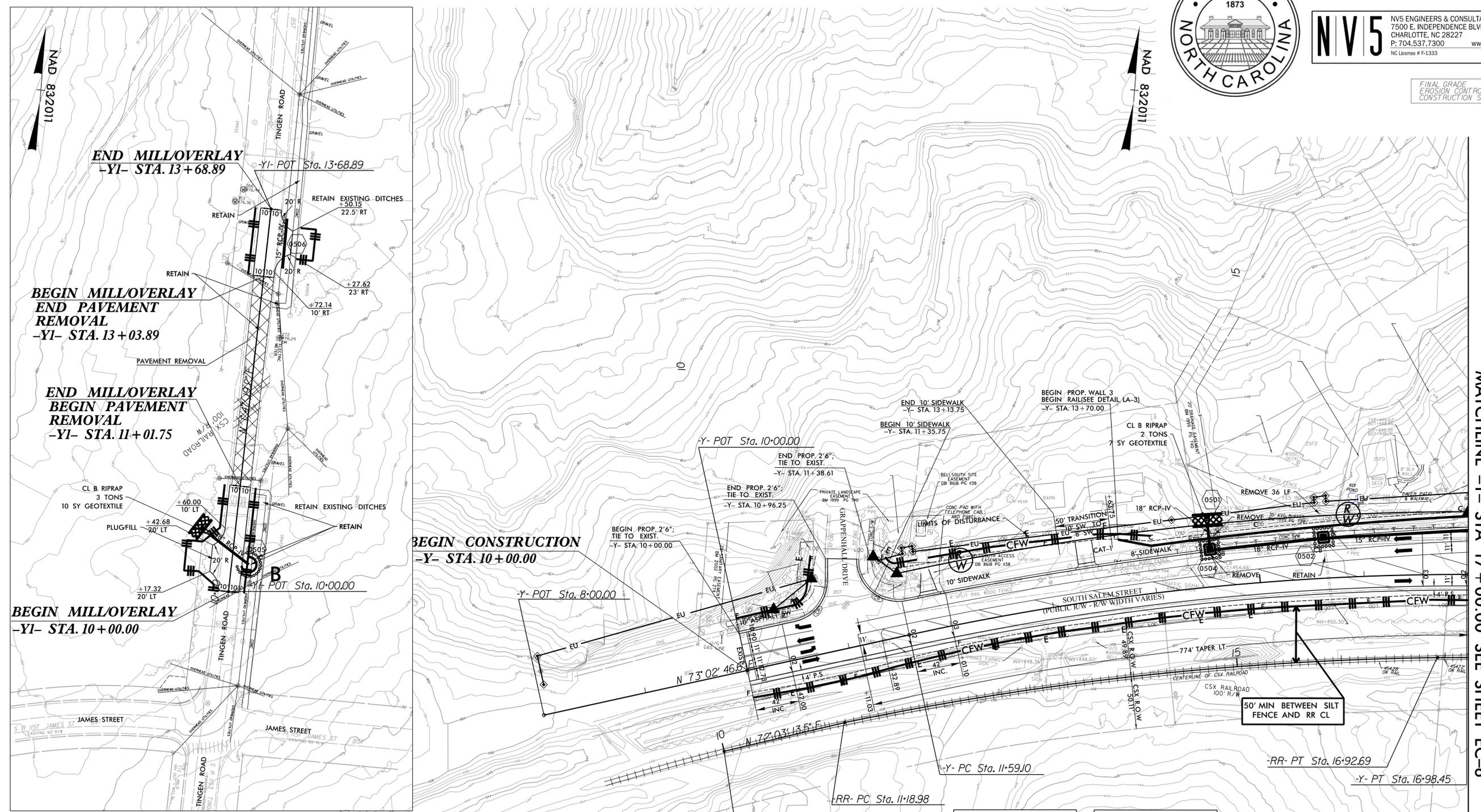
PROJECT REFERENCE NO. U-5928
SHEET NO. EC-7/Const.4
NAD 832011

NIV5
NO ENGINEERS & CONSULTANTS, INC.
7000 S. INDEPENDENCE BLVD. STE. 100
CHARLOTTE, NC 28217
S: 704.537.7700
www.niv5.com

9/22/2023
R:\Environmental\Design\U5928_hyd_EC_7_F.mxd.dgn
David Hockett

PAVEMENT REMOVAL

GRAPHIC SCALE
0 25 50 100
PLANS



REVISIONS

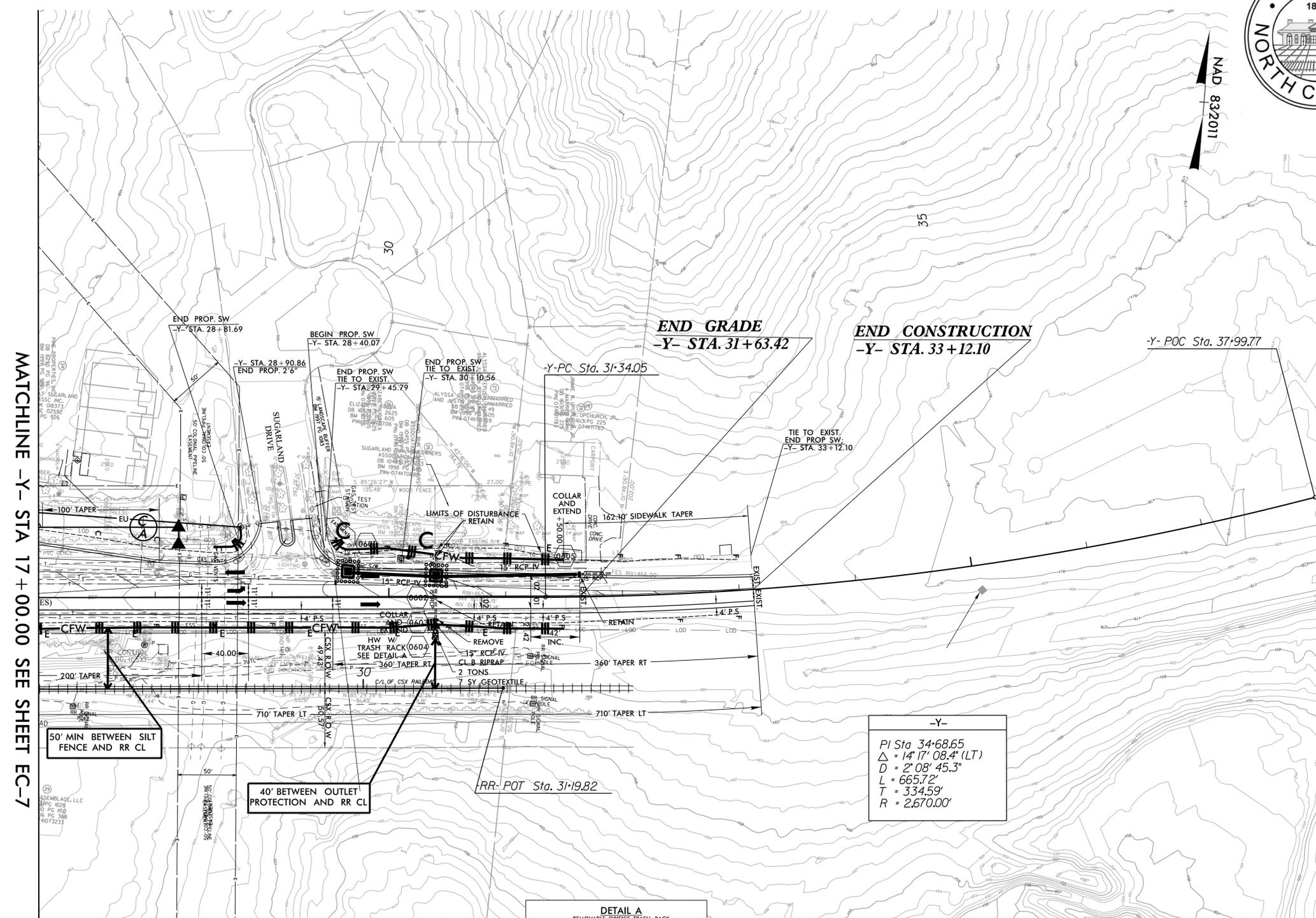
- NOTE: PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.
- NOTE: ALL EROSION CONTROL DEVICES SHOWN ARE LOCATED WITHIN EXISTING RW OR EASEMENT.
- NOTE: PERIMETER EROSION CONTROL MEASURES SHALL BE INSTALLED DURING CLEARING AND GRUBBING PHASE.
- NOTE: CONTRACTOR SHALL PROVIDE GROUND COVER ON EXPOSED SLOPES IN ACCORDANCE WITH "GROUND STABILIZATION", SEE EC-3B.
- NOTE: PRIOR TO INSTALLATION OF EROSION CONTROL DEVICES CONTRACTOR SHALL VERIFY BOUNDARIES OF JURISDICTIONAL AREAS AND DELINEATE WITH SAFETY FENCE OR FLAGGING.
- NOTE: UTILIZE FABRIC INSERT INLET PROTECTION DEVICES IN LIEU OF ROCK INLET SEDIMENT TRAPS TYPE-C AS DIRECTED TO AVOID IMPEDIMENT OF RUNOFF IN ROADWAY OPEN TO TRAFFIC.

-Y-	-RR-
PI Sta 14+29.83	PI Sta 14+06.72
$\Delta = 12' 21' 39.2''$ (RT)	$\Delta = 10' 59' 44.0''$ (RT)
$D = 2' 17' 30.6''$	$D = 1' 54' 59.7''$
$L = 539.35'$	$L = 573.70'$
$T = 270.72'$	$T = 287.74'$
$R = 2,500.00'$	$R = 2,989.46'$
SE = SEE PLANS	

-Y-	-RR-
PI Sta 14+29.83	PI Sta 14+06.72
$\Delta = 12' 21' 39.2''$ (RT)	$\Delta = 10' 59' 44.0''$ (RT)
$D = 2' 17' 30.6''$	$D = 1' 54' 59.7''$
$L = 539.35'$	$L = 573.70'$
$T = 270.72'$	$T = 287.74'$
$R = 2,500.00'$	$R = 2,989.46'$
SE = SEE PLANS	

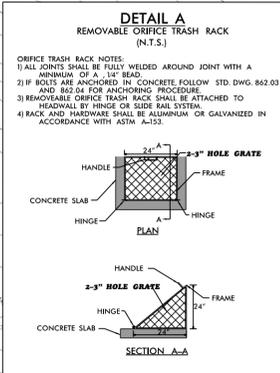
MATCHLINE -Y- STA 17+00.00 SEE SHEET EC-6

7/25/2023 R:\Environmental\Design\U5928_hyd_EC-8_Final.dgn
 8/17/99
 J:\Projects\2023\U5928\U5928_hyd_EC-8_Final.dgn
 J:\Projects\2023\U5928\U5928_hyd_EC-8_Final.dgn



MATCHLINE -Y- STA 17+00.00 SEE SHEET EC-7

- NOTE: PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE - B AND TEMPORARY ROCK SILT CHECKS TYPE - A AT DRAINAGE OUTLETS.
- NOTE: ALL EROSION CONTROL DEVICES SHOWN ARE LOCATED WITHIN EXISTING RW OR EASEMENT.
- NOTE: PERIMETER EROSION CONTROL MEASURES SHALL BE INSTALLED DURING CLEARING AND GRUBBING PHASE.
- NOTE: CONTRACTOR SHALL PROVIDE GROUND COVER ON EXPOSED SLOPES IN ACCORDANCE WITH "GROUND STABILIZATION" SEE EC-3B.
- NOTE: PRIOR TO INSTALLATION OF EROSION CONTROL DEVICES, CONTRACTOR SHALL VERIFY BOUNDARIES OF JURISDICTIONAL AREAS AND DELINEATE WITH SAFETY FENCE OR FLAGGING.
- NOTE: UTILIZE FABRIC INSERT INLET PROTECTION DEVICES IN LIEU OF ROCK INLET SEDIMENT TRAPS TYPE-C AS DIRECTED TO AVOID IMPOUNDMENT OF RUNOFF IN ROADWAY OPEN TO TRAFFIC.



T.I.P.: U-5928

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Transportation Engineering	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

**STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION**

**SIGNING PLAN
WAKE COUNTY**

**LOCATION: JAMES STREET TO TOWHEE DRIVE CONSTRUCT GRADE SEPARATED INTERCHANGE FOR
APEX PEAKWAY AT SOUTH SALEM STREET AND CSX RAILROAD**

ROADWAY STANDARD DRAWING

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS" - PROJECT SERVICES UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2024 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
903.10	GROUND MOUNTED SIGN SUPPORTS
904.10	ORIENTATION OF GROUND MOUNTED SIGNS
904.50	MOUNTING OF TYPE 'D', 'E' AND 'F' SIGNS ON 'U' CHANNEL POSTS
1264.01	OBJECT MARKERS, TYPE
1264.02	OBJECT MARKERS, INSTALLATION

PROJECT NOTES

- 1 DISPOSAL OF SIGN SYSTEM, U-CHANNEL
- 2 DISPOSAL OF SUPPORT, U-CHANNEL
- 3 SIGN ERECTION, TYPE D, E, AND F
- 4 SIGN ERECTION, RELOCATE SIGN TYPE D

GENERAL NOTES

- SIGNS FURNISHED BY STATE
- CONFIRM IN WRITING AT LEAST 4 MONTHS IN ADVANCE, THE ACTUAL DATE THE DEPARTMENT FURNISHED SIGNS WILL BE REQUIRED.
- ALL TYPE 'D' SIGNS SHALL BE MOUNTED ON TWO U-CHANNEL POSTS UNLESS OTHERWISE INDICATED ON THE PLANS.
- IF REMOVAL OR RELOCATION OF SIGNS ON PRIVATE STREET (NON-STATE MAINTAINED) IS REQUIRED DUE TO CONSTRUCTION, THE CONTRACTOR SHALL INFORM THE ENGINEER. THE WORK WILL BE COMPLETED BY OTHERS.
- WHEN NOT STATIONED OR DIMENSIONED ON PLANS, ALL 'E' AND 'F' SIGNS SHALL BE FIELD LOCATED BY THE ENGINEER
- ALL EXISTING SIGNS ON "U" CHANNEL POST WITHIN THE PROJECT LIMITS SHALL BE REMOVED AND DISPOSED OF UNLESS OTHERWISE NOTED ON PLANS.
- WHEN EXISTING SIGNS ARE REMOVED AND INSTALLED ON NEW SUPPORTS, THE RE-ERECTION SHALL IMMEDIATELY FOLLOW THE REMOVAL.
- THE BACKGROUND FOR TYPE E & F SIGNS SHALL BE TYPE C REFLECTIVE SHEETING.
- SEE ROADWAY PLANS FOR GUARD/GUIDE RAIL DETAILS.
- ALL SIGN SUPPORTS PLACED WITHIN 12' OF FACE OF CURB OR EDGE OF TRAVEL SHALL BE OF A BREAKAWAY DESIGN THAT COMPLIES WITH THE LATEST EDITION OF ASSHTO MANUAL FOR ASSESSING SAFETY HARDWARE (MASH) AND NCHRP REPORT 350.

ROADWAY SPECIAL DETAIL

SHEET NO.	TITLE
SIGN-2B	BULLNOSE MARKER

SUMMARY OF QUANTITIES

ITEM NO.		ITEM DESCRIPTION	QUANTITY	UNIT
DESC. NO.	SECT. NO.			
4072000000	903	SUPPORTS, 3 LB STEEL U-CHANNEL	630	L.F.
4096000000	904	SIGN ERECTION, TYPE D	5	EA.
4102000000	904	SIGN ERECTION, TYPE E	34	EA.
4116100000	904	SIGN ERECTION, RELOCATE SIGN TYPE D	1	EA.
4155000000	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	24	EA.
4192000000	907	DISPOSAL OF SUPPORT, U-CHANNEL	3	EA.
4915000000	1264	7' U-CHANNEL POST	6	EA.
4955000000	1264	OBJECT MARKERS (END OF ROAD)	6	EA.
4360000000	SP	BULLNOSE MARKER	9	EA.

INDEX

SHEET NO.	DESCRIPTION
SIGN-1	TITLE SHEET
SIGN-2-2A	SIGN DESIGNS
SIGN-2B	BULLNOSE MARKER
SIGN-3	TYPE "E" & "F" SIGNS
SIGN-4-5	SIGN DETAIL SHEETS

PLAN REVIEWED BY: N.C.D.O.T. SIGNING AND DELINEATION UNIT

Ayman Alqudwah, PE SIGNING & DELINEATION REGIONAL ENGINEER
Derrick Beard SIGNING & DELINEATION PROJECT DESIGN ENGINEER



PLAN PREPARED BY: VHB Engineering, NC P.C.

John G. Townsend, PE Signing Project Engineer



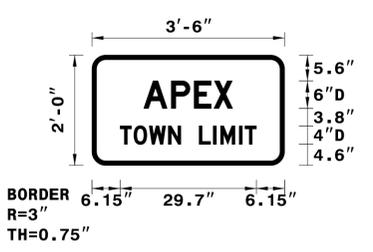
SIGN NUMBER: 301
 TYPE: D
 QUANTITY: 1
 SIGN WIDTH: 3'-6"
 HEIGHT: 2'-0"
 TOTAL AREA: 7.0 Sq.Ft.
 BORDER TYPE: FLUSH
 RECESS: 0"
 WIDTH: 0.75"
 RADII: 3"
 NO. Z BARS:
 LENGTH:

BACKG COLOR: Green
 COPY COLOR: White

SYMBOL	X	Y	WID	HT
AR_Type D	6.3	19.3	6	9
AR_Type D	56.7	4.7	6	9

USE NOTES:
 1. Legend and border(except those that are colored black) shall be direct applied Grade C sheeting.
 2. Background shall be Grade C reflective sheeting.

DESIGN BY: JGT
 PROJECT ID: U-5928
 CHECKED BY:
 LOCATION:
 Apr 30, 2020
 DIV: 05



LETTER POSITIONS

Letter spacings are to start of next letter

Letter spacings are to start of next letter												Series/Size
												Text Length
A	P	E	X									D 2000
11.3	6	5	4.3	4.1	11.3							19.4
T	O	W	N	L	I	M	I	T				D 2000
6.1	3	3.4	4.2	2.7	4	3.1	1.6	4.1	1.2	2.5	6.1	29.7

FILENAME: U5928_sgn_301

NORTH CAROLINA D.O.T. SIGN DETAIL

vhb
 VHB Engineering NC, P.C. (C-3705)
 940 Main Campus Drive, Suite 500
 Raleigh, NC 27606



TIP NO. SHEET NO.
 U-5928 SIGN-2
 APPROVED: _____
 DATE: _____
 SEAL

 DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

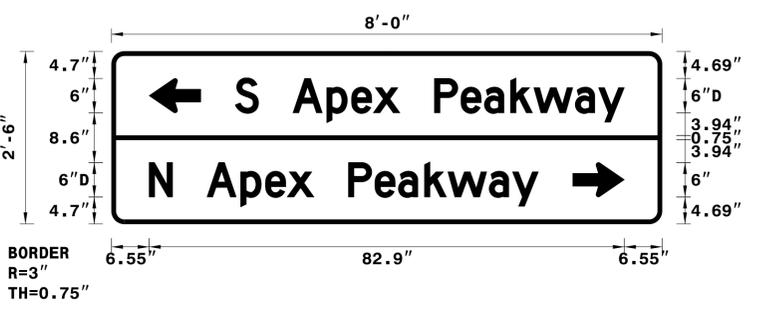
SIGN NUMBER: 303
 TYPE: D
 QUANTITY: 1
 SIGN WIDTH: 8'-0"
 HEIGHT: 2'-6"
 TOTAL AREA: 20.0 Sq.Ft.
 BORDER TYPE: FLUSH
 RECESS: 0"
 WIDTH: 0.75"
 RADII: 3"
 NO. Z BARS:
 LENGTH:

BACKG COLOR: Green
 COPY COLOR: White

SYMBOL	X	Y	WID	HT
AR_Type D	6.6	19.3	6	9
AR_Type D	80.4	4.7	6	9

USE NOTES:
 1. Legend and border(except those that are colored black) shall be direct applied Grade C sheeting.
 2. Background shall be Grade C reflective sheeting.
 3. Shields; A, B, and C type arrows shall be on 0.032" (0.8mm) aluminum with Grade C reflective sheeting and demountable.

DESIGN BY: VHB
 PROJECT ID: U-5928
 CHECKED BY:
 LOCATION:
 Dec 23, 2022
 DIV: 05



LETTER POSITIONS

Letter spacings are to start of next letter

Letter spacings are to start of next letter															Series/Size	
															Text Length	
S	A	p	e	x	P	e	a	k	w	a	y				D 2000	
21.6	4.1	6	5.9	4.3	3.8	4.7	6	4.6	4.1	4.6	4.1	7.2	4.1	4.5	6.6	67.9
N	A	p	e	x	P	e	a	k	w	a	y				D 2000	
6.6	4.1	6	5.9	4.3	3.8	4.7	6	4.6	4.1	4.6	4.1	7.2	4.1	4.5	21.6	67.9

FILENAME: U5928_sgn_303

NORTH CAROLINA D.O.T. SIGN DETAIL

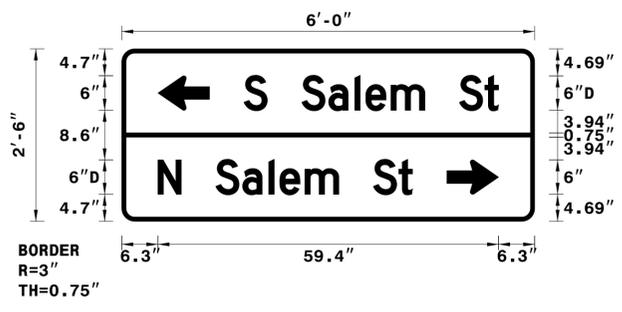
SIGN NUMBER: 302
 TYPE: D
 QUANTITY: 1
 SIGN WIDTH: 6'-0"
 HEIGHT: 2'-6"
 TOTAL AREA: 15.0 Sq.Ft.
 BORDER TYPE: FLUSH
 RECESS: 0"
 WIDTH: 0.75"
 RADII: 3"
 NO. Z BARS:
 LENGTH:

BACKG COLOR: Green
 COPY COLOR: White

SYMBOL	X	Y	WID	HT
AR_Type D	6.3	19.3	6	9
AR_Type D	56.7	4.7	6	9

USE NOTES:
 1. Legend and border(except those that are colored black) shall be direct applied Grade C sheeting.
 2. Background shall be Grade C reflective sheeting.
 3. Shields; A, B, and C type arrows shall be on 0.032" (0.8mm) aluminum with Grade C reflective sheeting and demountable.

DESIGN BY: VHB
 PROJECT ID: U-5928
 CHECKED BY:
 LOCATION:
 Dec 23, 2022
 DIV: 05



LETTER POSITIONS

Letter spacings are to start of next letter

Letter spacings are to start of next letter												Series/Size
												Text Length
S	S	a	l	e	m	S	t					D 2000
21.3	4.1	6	4.7	4.6	1.9	4.4	5.9	6	4.4	2.4	6.3	44.4
N	S	a	l	e	m	S	t					D 2000
6.3	4.1	6	4.7	4.6	1.9	4.4	5.9	6	4.4	2.4	21.3	44.4

FILENAME: U5928_sgn_302

NORTH CAROLINA D.O.T. SIGN DETAIL

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Transportation Engineering _____	Water Resources - Stormwater _____
Building Inspections _____	Planning _____
Water Resources - Utility Engineering _____	Planning - Transportation _____
Electric _____	Fire _____
Water Resources - Soil & Erosion Control _____	Parks, Recreation & Cultural Resources _____

SIGN DESIGNS

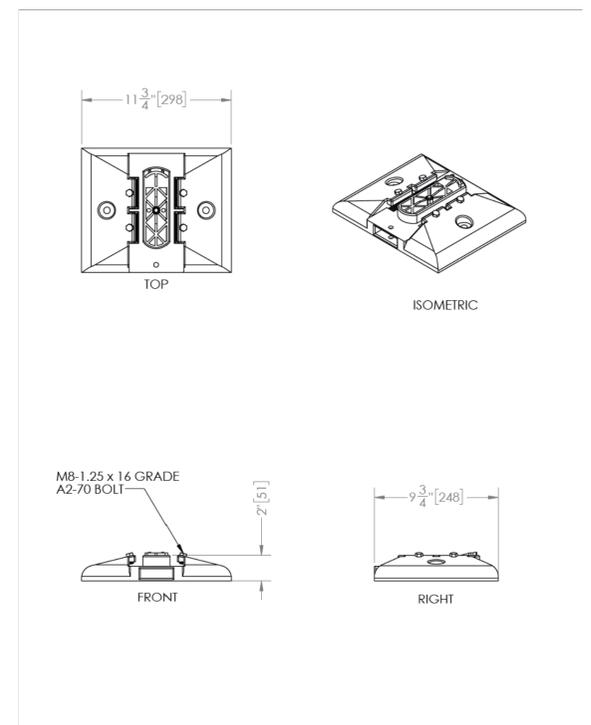
03/14/23
 R:\Triffin\Signing\CADD\Sign_Designs\U5928_sgn_02.dgn
 User: townsend



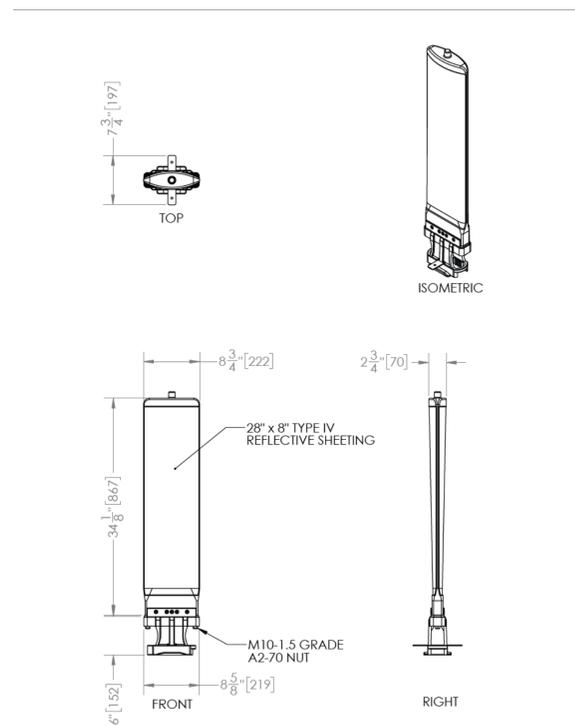
VHB Engineering NC, P.C. (C-3705)
 940 Main Campus Drive, Suite 500
 Raleigh, NC 27606



TIP NO. U-5928	SHEET NO. SIGN-2B
APPROVED: _____	
DATE: _____	
SEAL	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

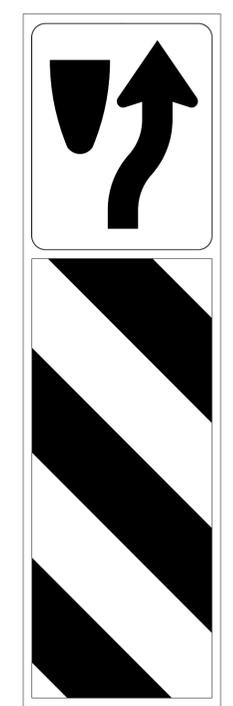


BULLNOSE BASE



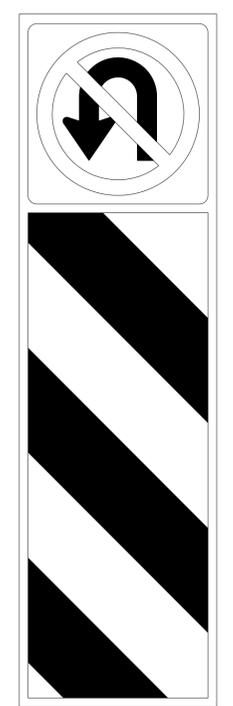
BULLNOSE MARKER

FRONT



**28" X 8" SHEETING
 R4-7 ABOVE OM3-L**

BACK



**28" X 8" SHEETING
 R3-4 ABOVE OM3-L**

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Transportation Engineering	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

BULLNOSE MARKER

08/08/23
 R:\Traffic\Signing\CADD\Sign_Designs\U5928_sign_02B.dgn
 User: jtownsen

APPROVED: _____

DATE: _____

SEAL



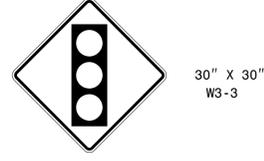
**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

401 QUANTITY REQ'D 5



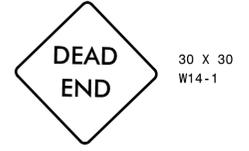
ONE "U" POST PER SIGN

406 QUANTITY REQ'D 3



ONE "U" POST PER SIGN

411 QUANTITY REQ'D 2



ONE "U" POST PER SIGN

416 QUANTITY REQ'D 2



ONE "U" POST PER SIGN

402 QUANTITY REQ'D 1



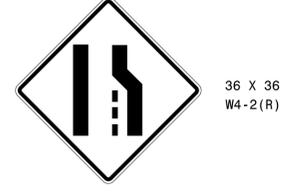
ONE "U" POST PER SIGN

407 QUANTITY REQ'D 2



MOUNT ABOVE SIGN 401
IN 2 INSTALLATIONS

412 QUANTITY REQ'D 1



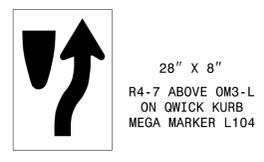
ONE "U" POST PER SIGN

403 QUANTITY REQ'D 6



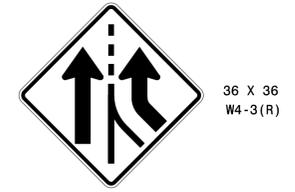
ONE "U" POST PER SIGN

408 QUANTITY REQ'D 9



ONE BULLNOSE BASE PER SIGN
** SEE SIGN-2A FOR DETAIL **

413 QUANTITY REQ'D 1



ONE "U" POST PER SIGN

404 QUANTITY REQ'D 3



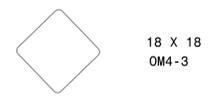
ONE "U" POST PER SIGN

409 QUANTITY REQ'D 1



ONE "U" POST PER SIGN

414 QUANTITY REQ'D 6



ONE 7' U-CHANNEL PER SIGN

405 QUANTITY REQ'D 1



ONE "U" POST PER SIGN

410 QUANTITY REQ'D 1



TWO "U" POSTS PER SIGN

415 QUANTITY REQ'D 1



ONE "U" POST PER SIGN

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

_____ Transportation Engineering	_____ Water Resources – Stormwater
_____ Building Inspections	_____ Planning
_____ Water Resources – Utility Engineering	_____ Planning – Transportation
_____ Electric	_____ Fire
_____ Water Resources – Soil & Erosion Control	_____ Parks, Recreation & Cultural Resources

TYPE "E" & "F" SIGNS

08/08/23
R:\Traffic\Signing\CADD\Signing_Layout_Plans\U5928_s1gn_03.dgn
User: townsend



PROJECT NOTES

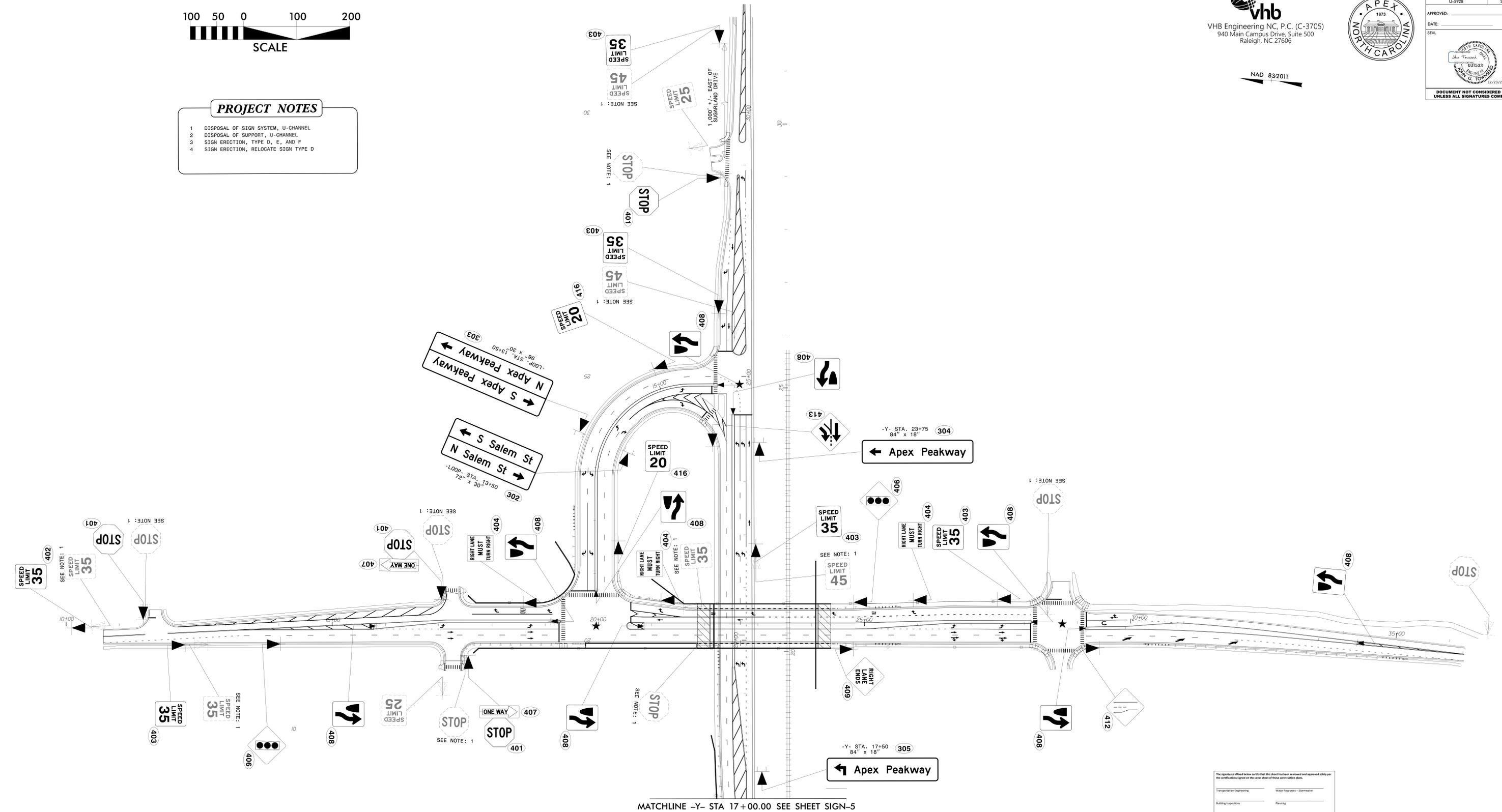
- 1 DISPOSAL OF SIGN SYSTEM, U-CHANNEL
- 2 DISPOSAL OF SUPPORT, U-CHANNEL
- 3 SIGN ERECTION, TYPE D, E, AND F
- 4 SIGN ERECTION, RELOCATE SIGN TYPE D

vhb
 VHB Engineering NC, P.C. (C-3705)
 940 Main Campus Drive, Suite 500
 Raleigh, NC 27606



TIP NO. U-5928	SHEET NO. SIGN-4
APPROVED:	
DATE:	
SEAL:	

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



MATCHLINE -Y- STA 17+00.00 SEE SHEET SIGN-5

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Transportation Engineering	Water Resources - Stormwater
Building Inspection	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

EXISTING AND PROPOSED SIGNS

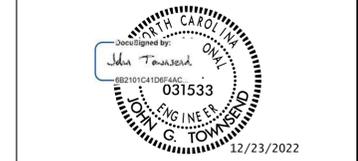
C:\Users\jgarcia\Documents\Projects\17-0000\17-0000_Signs\17-0000_Signs.dwg
 17-0000_Signs.dwg
 12/21/2023



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



APPROVED: _____
DATE: _____



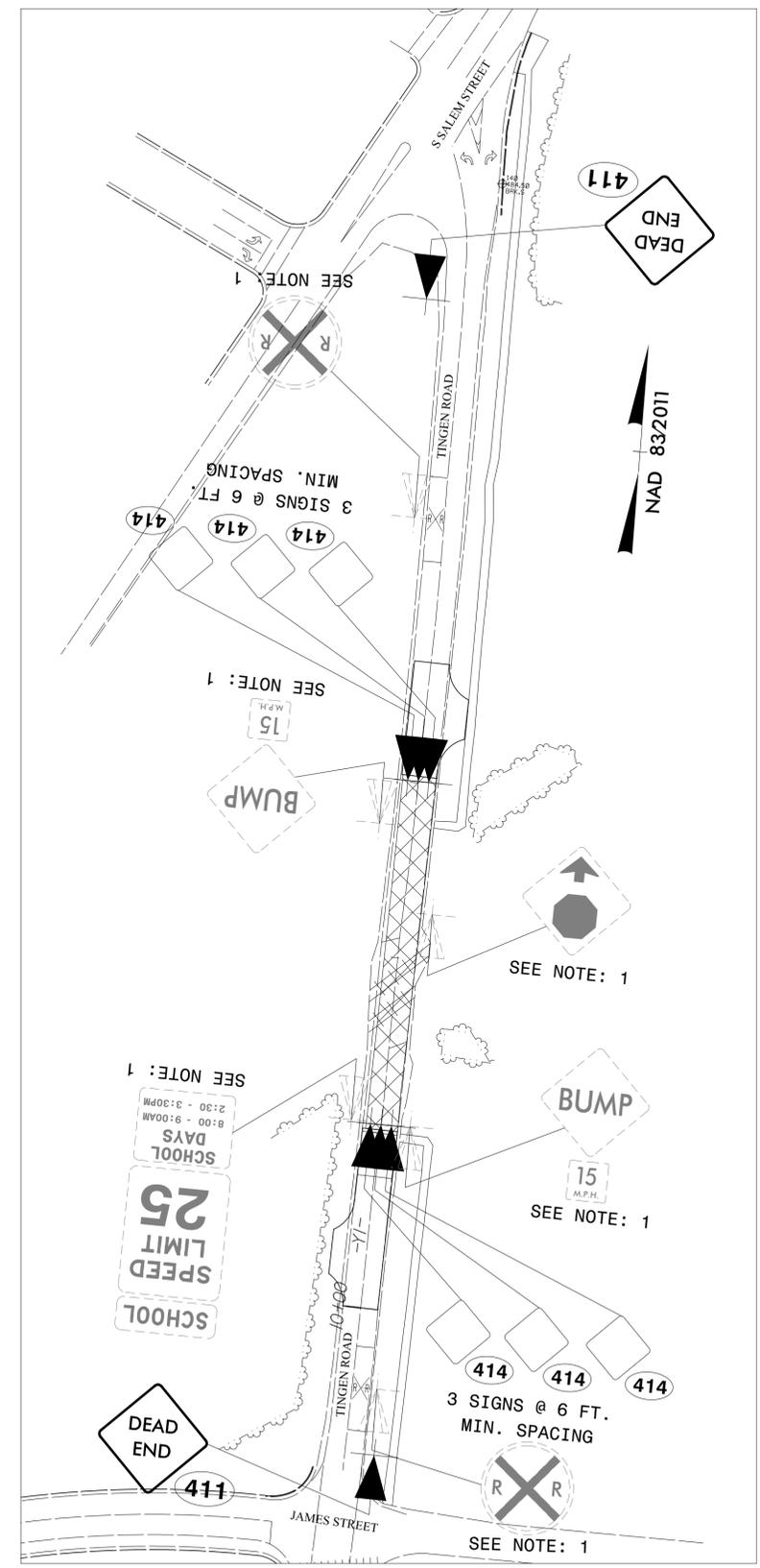
**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

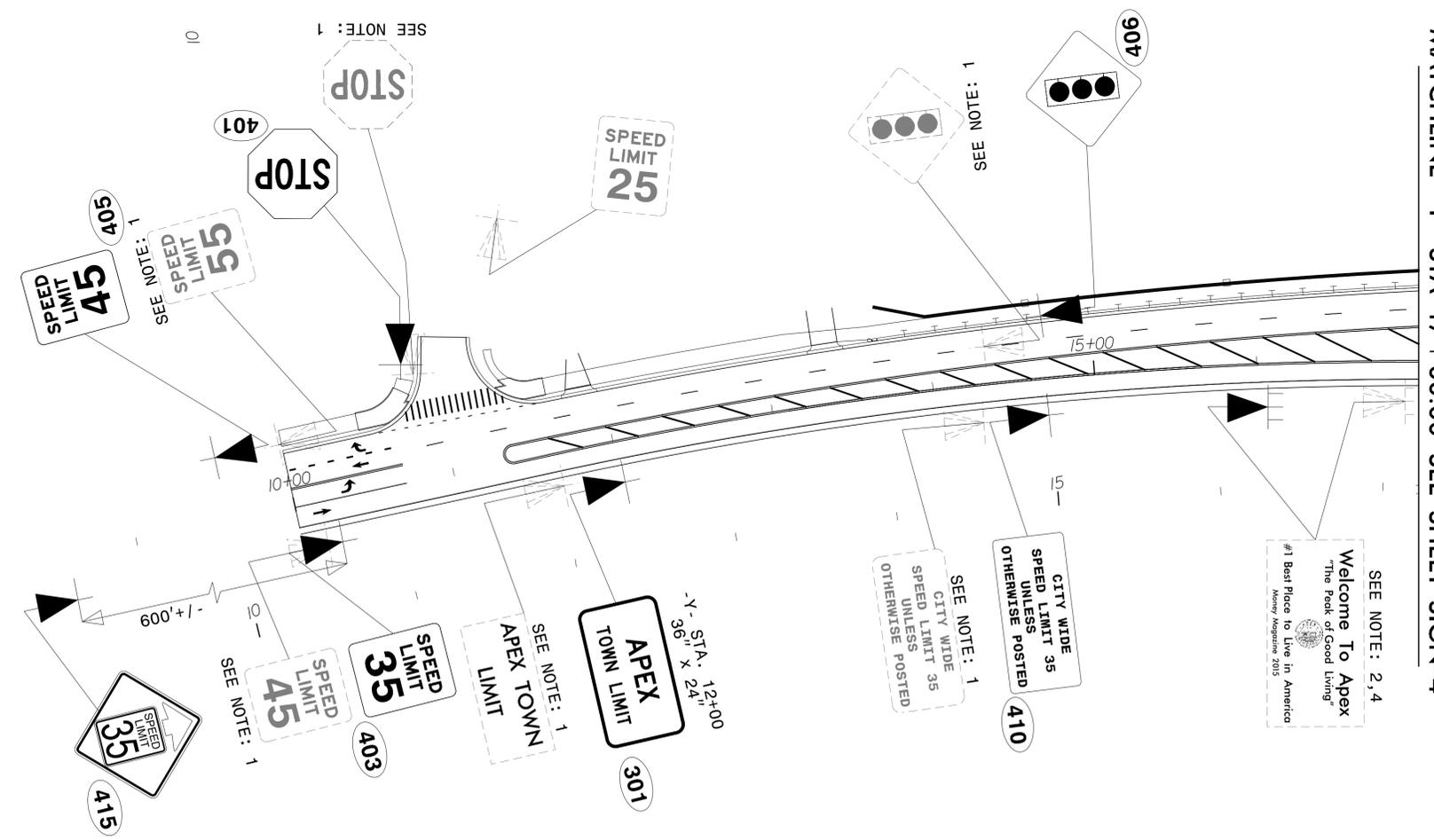
Transportation Engineering	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

PROJECT NOTES

- 1 DISPOSAL OF SIGN SYSTEM, U-CHANNEL
- 2 DISPOSAL OF SUPPORT, U-CHANNEL
- 3 SIGN ERECTION, TYPE D, E, AND F
- 4 SIGN ERECTION, RELOCATE SIGN TYPE D



-Y1- INSET



MATCHLINE -Y- STA 17+00.00 SEE SHEET SIGN-4

SEE NOTE: 2, 4
Welcome To Apex
"The Peak of Good Living"
#1 Best Place to Live in America
Mayor Magazine 2015

EXISTING AND PROPOSED SIGNS

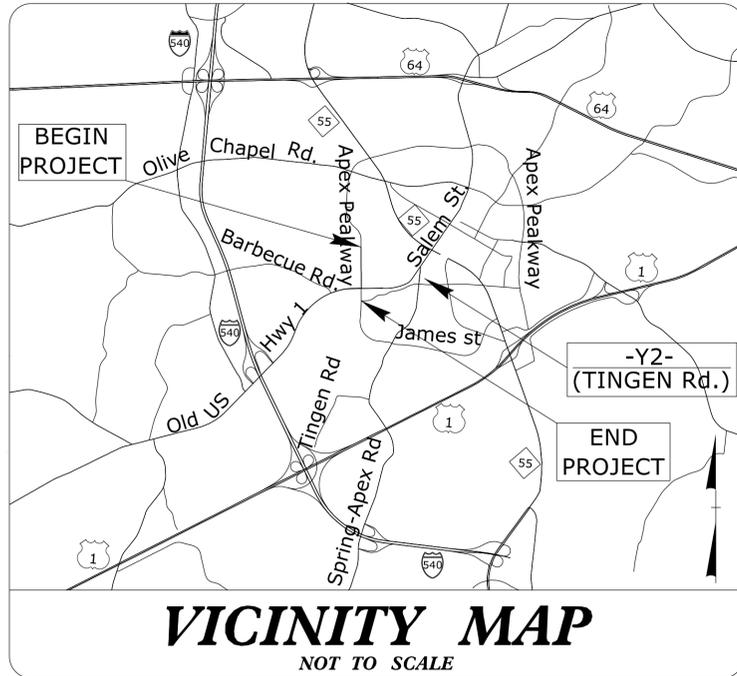
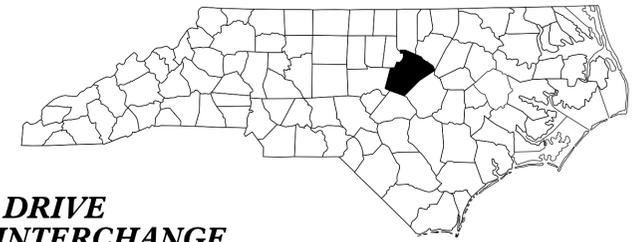
12/23/22
R:\Triffino\Signing\CADD\Signing Layout Plans\U5928_s1gn_05.dgn
User: jtownsen

TIP PROJECT: U-5928

CONTRACT:

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

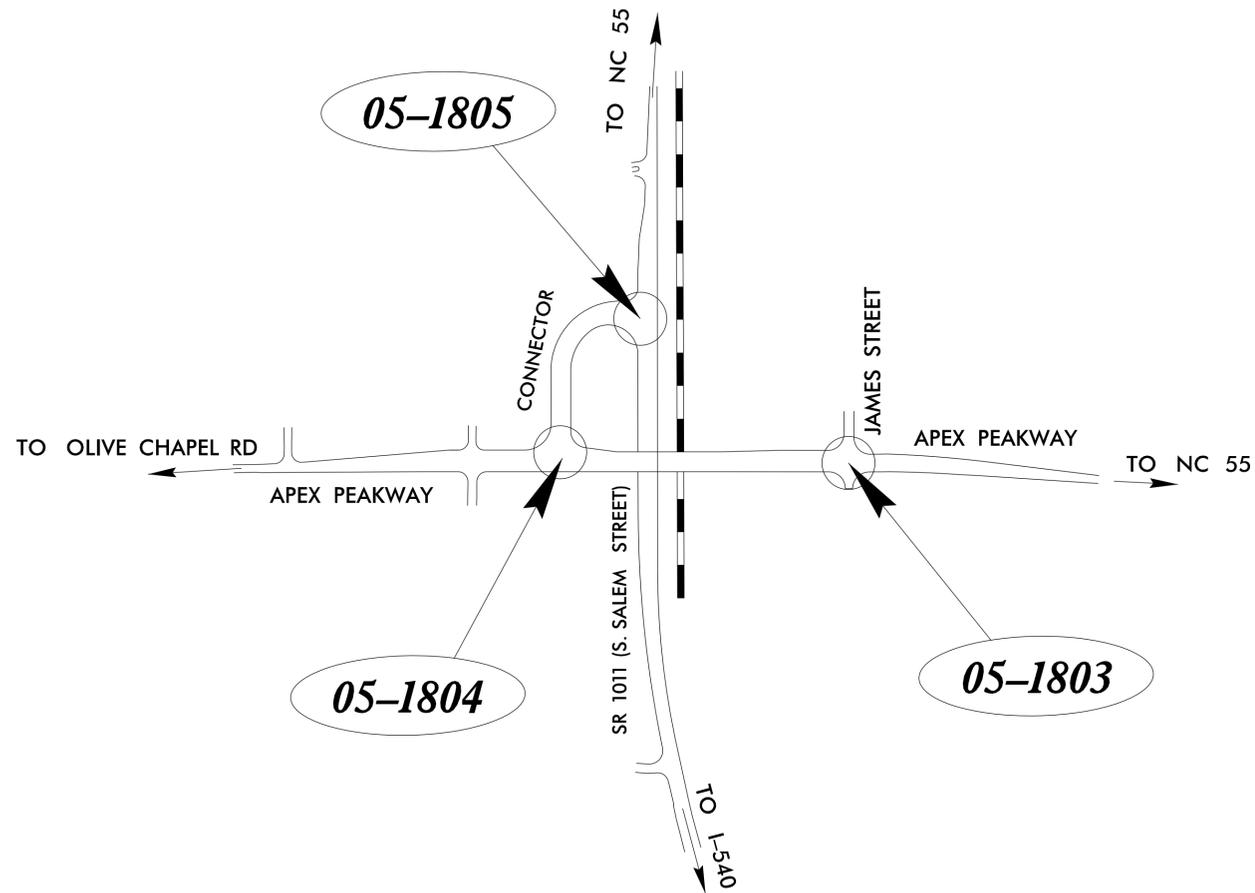
Project No.	Sheet No.
U-5928	Sig. 1.0



WAKE COUNTY

LOCATION: APEX PEAKWAY FROM JAMES STREET TO TOWHEE DRIVE INCLUDING CONSTRUCTION OF GRADE SEPARATED INTERCHANGE FOR APEX PEAKWAY AT SR 1011 (SOUTH SALEM STREET) AND CSX RAILROAD

TYPE OF WORK: TRAFFIC SIGNALS AND SIGNAL COMMUNICATIONS



The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

INDEX OF PLANS		
Sheet #	Reference #	Location /Description
Sig. 1.0	-----	Title Sheet
Sig. 2.0-2.4	05-1804	Apex Peakway at Connector to SR 1011 (S. Salem St.)
Sig. 3.0-3.4	05-1805	SR 1011 (S. Salem St.) at Connector to Apex Peakway
Sig. 4.0-4.5	05-1803	Apex Peakway at James St.
MIA-M9	-----	Standard Metal Pole Details
SCP. 1-5	-----	Signal Communication Plans

LEGEND

##-#### SIGNAL INVENTORY NUMBER

**TRANSPORTATION SYSTEMS
MANAGEMENT & OPERATIONS UNIT**

Contacts:

Robert J. Ziemba, PE – Central Region Signals Engineer
Todd Joyce, PE – Signal Equipment Design Engineer
Gregory A. Green – Signal Communications Project Engineer

Prepared for the North Carolina Department of Transportation
In the Office of:



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0329

Refer to Roadway Standard Drawings NCDOT” dated January 2024 and Standard Specifications for Roads and Structures” dated January 2024.

Tim D. Goins, PE
PROJECT ENGINEER

Jianxin (Justine) Ma, PE, PTOE
PROJECT DESIGN ENGINEER

SEAL



DocuSigned by:
Jianxin Ma
827E1953081444F

6/18/2024
SIGNATURE DATE

DIVISION OF HIGHWAYS
**TRANSPORTATION MOBILITY
AND SAFETY DIVISION**



750 N. Greenfield Parkway, Garner, NC 27529

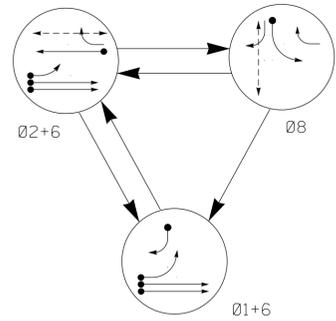


3 Phase Fully Actuated
 (S. Salem Street @ Apex Peakway CLS)
 Signal System #: D05-72_Apex

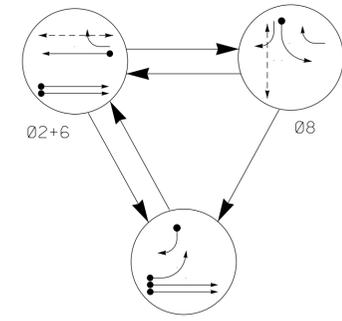
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Program pedestrian heads to count down the flashing "Don't Walk" time only.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. To provide a leading pedestrian interval on phase 2, program FYA heads 11 and 23 to delay for 7 seconds after the start of the phase 2 walk interval. See Electrical Details for programming.
9. To provide a leading pedestrian interval on phase 8, program FYA head 82 to delay for 7 seconds after the start of the phase 8 walk interval. See Electrical Details for programming.
10. Street name signs will be provided by Town of Apex.
11. All metal poles, arms, pedestals and signal head housings shall be black in color as specified in the project special provisions.
12. This intersection features a multizone microwave detection system. Install detectors according to manufacturer's specifications to ensure optimum detection zone coverage.
13. The Division Traffic Engineer will determine the hours of use for each phasing plan.
14. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE			FLASH
	Ø 1+6	Ø 2+6	Ø 8	
11	←	→	→	—
21, 22, 24	R	G	R	R
23	R	←	→	R
61, 62	G	G	R	R
81	R	R	←	R
82	→	R	←	R
P21, P22	DW	W	DW	DRK
P81, P82	DW	DW	W	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE			FLASH
	Ø 1+6	Ø 2+6	Ø 8	
11	←	→	→	—
21, 22, 24	R	G	R	R
23	R	←	→	R
61, 62	G	G	R	R
81	R	R	←	R
82	→	R	←	R
P21, P22	DW	W	DW	DRK
P81, P82	DW	DW	W	DRK

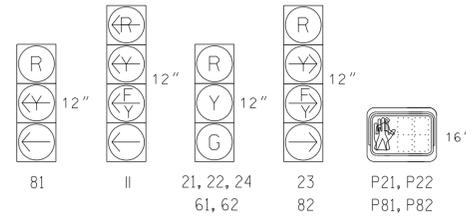
MAXTIME DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL CALL	DELAY DURING GREEN	NEW CARD	
1A	6X40	0	2-4-2	X	1	15.0*	-	X	-	X	-	X
					6#	3.0	-	X	-	X	X	X
1B	6X40	0	2-4-2	X	1	15.0	-	X	-	X	-	X
1C	6X6	0	3	X	1	15.0	-	X	-	X	-	X
6A	6X6	160	4	X	6	-	-	X	X	X	-	X
6B	6X6	160	4	X	6	-	-	X	X	X	-	X
8A	6X40	0	2-4-2	X	8	-	-	X	-	X	-	X

* Disable delay during Alternate Phasing Operation.
 # Disable phase call for loop(s) during Alternate Phasing Operation.

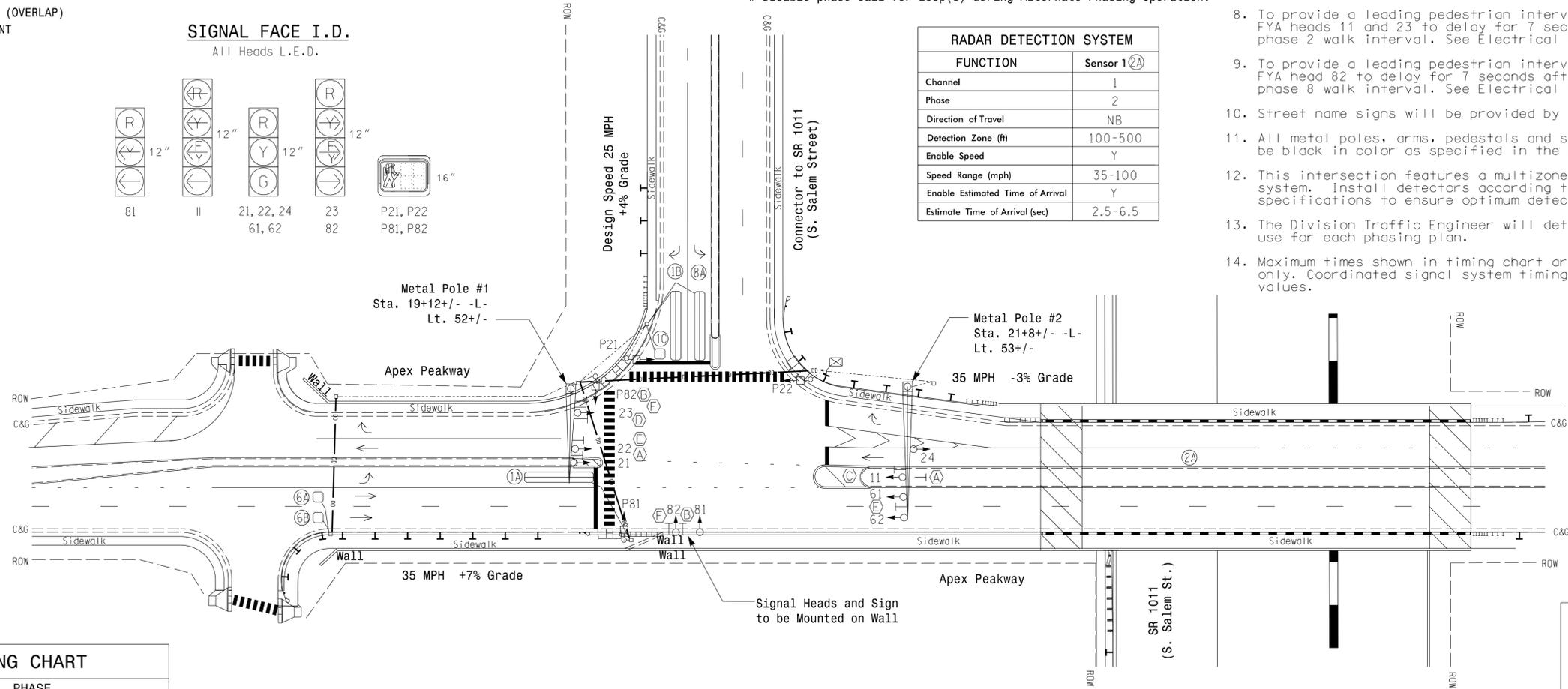
SIGNAL FACE I.D.

All Heads L.E.D.



RADAR DETECTION SYSTEM

FUNCTION	Sensor 1 (A)
Channel	1
Phase	2
Direction of Travel	NB
Detection Zone (ft)	100-500
Enable Speed	Y
Speed Range (mph)	35-100
Enable Estimated Time of Arrival	Y
Estimate Time of Arrival (sec)	2.5-6.5



MAXTIME TIMING CHART

FEATURE	PHASE			
	1	2	6	8
Walk *	-	14	-	14
Ped Clear *	-	25	-	23
Min Green	7	10	10	7
Passage *	2.0	2.0	6.0	2.0
Max 1 *	20	50	50	25
Yellow Change	3.0	4.1	4.1	3.0
Red Clear	3.2	2.7	2.7	3.3
Added Initial *	-	-	1.5	-
Maximum Initial *	-	-	20	-
Time Before Reduction *	-	-	15	-
Time To Reduce *	-	-	30	-
Minimum Gap	-	-	3.0	-
Advance Walk	-	**	-	***
Non Lock Detector	X	-	-	X
Vehicle Recall	-	MIN RECALL	MIN RECALL	-
Dual Entry	-	-	-	-

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

** See Note 8 (LPI).

*** See Note 9 (LPI).

LEGEND

- | | | | |
|--|--|---|---|
| PROPOSED | EXISTING | PROPOSED | EXISTING |
| ○ Traffic Signal Head Sign | ● Traffic Signal Head Sign | N/A Railroad Tracks | — Railroad Tracks |
| □ Pedestrian Signal Head With Push Button & Sign | ■ Pedestrian Signal Head With Push Button & Sign | N/A Guardrail | — Guardrail |
| □ Inductive Loop Detector | □ Inductive Loop Detector | N/A Concrete Barrier | — Concrete Barrier |
| □ Controller & Cabinet Junction Box | □ Controller & Cabinet Junction Box | N/A Curb Ramp | — Curb Ramp |
| --- 2-in Underground Conduit | --- 2-in Underground Conduit | (A) No U-Turn Sign (R 3-4) | (A) No U-Turn Sign (R 3-4) |
| N/A Right of Way | N/A Right of Way | (B) Right Arrow "TURNING VEHICLES" Sign (R10-15R) | (B) Right Arrow "TURNING VEHICLES" Sign (R10-15R) |
| → Directional Arrow | → Directional Arrow | (C) "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) | (C) "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) |
| ○ Metal Pole with Mastarm | ○ Metal Pole with Mastarm | (D) Right Arrow "ONLY" Sign (R3-5R) | (D) Right Arrow "ONLY" Sign (R3-5R) |
| ○ Type II Signal Pedestal | ○ Type II Signal Pedestal | (E) Street Name Sign (D3-1) | (E) Street Name Sign (D3-1) |
| — Directional Drill | — Directional Drill | (F) "RIGHT TURN SIGNAL" Sign (R10-10R) | (F) "RIGHT TURN SIGNAL" Sign (R10-10R) |

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

NC Dept of Transportation
 Division of Highways
 Final Drawing Date: _____
 NCDOT Approval



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 J. L. LEWIS
 033108

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 J. MA
 821633081444F
 6/18/2024

Division 5 Wake County Apex
 Apex Peakway at Connector to SR 1011 (S. Salem Street)

Prepared For the Office of: _____
 Prepared By: J. Ma
 PLAN DATE: June 2024 REVIEWED BY: J. L. Lewis
 VHB PROJECT NO.: 38523.00

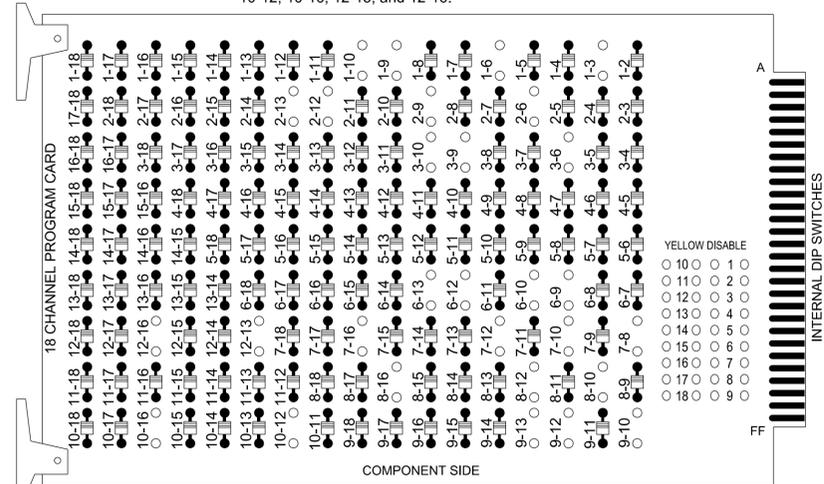
750 N. Greenfield Pkwy, Garner, NC 27529
 SCALE 0 40
 1"=40'

SIG. INVENTORY NO. 05-1804

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

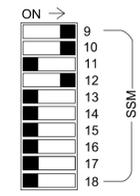
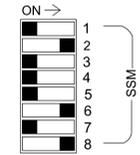
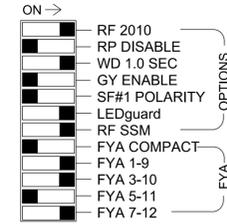
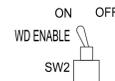
REMOVE DIODE JUMPERS 1-3, 1-6, 1-9, 1-10, 2-6, 2-9, 2-12, 2-13, 3-6, 3-9, 3-10, 6-9, 6-10, 6-12, 6-13, 7-8, 7-10, 7-12, 7-16, 8-10, 8-12, 8-16, 9-10, 9-12, 9-13, 10-12, 10-16, 12-13, and 12-16.



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.



■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and phase 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the Apex Peakway Closed Loop system.

EQUIPMENT INFORMATION

Controller.....2070LX
 Cabinet.....332 w/ Aux
 Software.....Q-Free MAXTIME
 Cabinet Mount.....Base
 Output File Positions.....18 With Aux. Output File
 Load Switches Used.....S1,S2,S3,S4,S8,S10,S11,S12, AUXS1,AUXS2,AUXS5
 Phases Used.....1,2,2PED,6,8,8PED
 Overlap "1".....*
 Overlap "2".....*
 Overlap "4".....*
 Overlap "7".....*
 Overlap "8".....*

*See overlap programming detail on sheet 2.

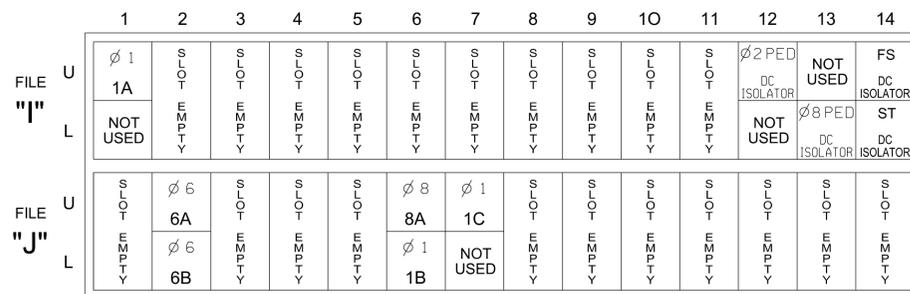
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	OL7	4	4 PED	5	6	6 PED	OL8	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	21,22, 24	P21, P22	82	NU	NU	NU	61,62	NU	23	81	P81, P82	11	82	NU	NU	23	NU
RED		128						134		107				A124				A101
YELLOW	*	129		*				135		*								
GREEN		130						136										
RED ARROW														A121				
YELLOW ARROW										108			A122	A125				A102
FLASHING YELLOW ARROW													A123	A126				A103
GREEN ARROW	127			118						124	109							
Hand				113									110					
Walking				115									112					

NU = Not Used
 * Denotes install load resistor. See load resistor installation detail this sheet.
 * See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

SPECIAL DETECTOR NOTE

Install a multizone microwave detection zone for vehicle detection for zone 2A. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

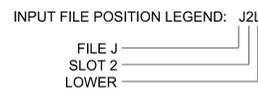
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15		X		X	
1B	TB5-11,12	J6L	46	8	23	1	15		X		X	
1C	TB7-1,2	J7U	66	32	24	1	15		X		X	
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
6B	TB3-7,8	J2L	44	6	17	6			X	X	X	
8A	TB5-9,10	J6U	42	4	22	8			X		X	
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P81,P82	TB8-8,9	I13L	70	36	8	PED 8						

* For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.



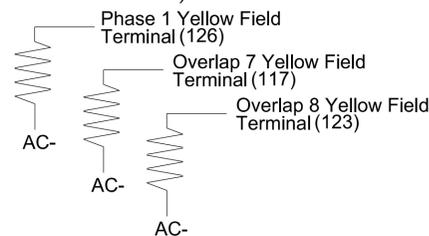
The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	Value (ohms)	Wattage
1.5K - 1.9K	25W (min)	
2.0K - 3.0K	10W (min)	



NC Dept of Transportation
 Division of Highways

Final Drawing Date: _____
 NCDOT Approval _____

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1804
 DESIGNED: June 2024
 SEALED: 6/18/2024
 REVISED: N/A

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



Electrical Detail - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:



750 N. Greenfield Pkwy, Garner, NC 27529

Apex Peakway at Connector to SR 1011 (S. Salem Street)

Division 5	Wake County	Apex
PLAN DATE: June 2024	REVIEWED BY: J. L. Lewis	
PREPARED BY: J. Ma	VHB Project No.: 38523.00	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL	SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER	SEAL 033108
JIANXIN MA	03/18/2024
827E1963081444F	DATE
SIG. INVENTORY NO. 05-1804	

vhb
 VHB Engineering NC, P.C. (C-3705)
 940 Main Campus Drive, Suite 500
 Raleigh, NC 27606
 919.829.0328

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

Front Panel
Main Menu >Controller >Overlap >Overlap Parameters/Overlap Timings

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	4	7	8
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	NORMAL	NORMAL
Included Phases	2	8	2	1	8
Modifier Phases	1	-	-	-	-
Modifier Overlaps	-	7	8	-	-
Trail Green	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0	0.0
FYA Ped Delay	7.0	7.0	7.0	0.0	0.0

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

*The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

Front Panel
Main Menu >Controller >Overlap >Overlap Parameters/Overlap Timings

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	1	2	4	7	8
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	NORMAL	NORMAL
Included Phases	-	8	2	1	8
Modifier Phases	1	-	-	-	-
Modifier Overlaps	-	7	8	-	-
Trail Green	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0	0.0
FYA Ped Delay	0.0	7.0	7.0	0.0	0.0

← NOTICE INCLUDED PHASE

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 1A & 5A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

Detector	Call Phase	Delay
1	1	-
29	0	-

1A

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.	
Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

NC Dept of Transportation
Division of Highways

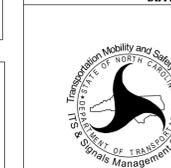
Final Drawing Date: _____

NCDOT Approval _____

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1804
DESIGNED: June 2024
SEALED: 6/18/2024
REVISED: N/A

Electrical Detail - Sheet 2 of 3

ELECTRICAL AND PROGRAMMING
DETAILS FOR:



750 N. Greenfield Pkwy, Garner, NC 27529

Apex Peakway
at
Connector to SR 1011
(S. Salem Street)

Division 5 Wake County Apex

PLAN DATE: June 2024 REVIEWED BY: J. L. Lewis

PREPARED BY: J. Ma VHB Project No.: 38523.00

REVISIONS INIT. DATE

DocuSigned by: J. Ma 6/18/2024

827E1953081444F DATE

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



SIG. INVENTORY NO. 05-1804



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2. A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for head 11 to run protected turns only.

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 0 seconds.

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Phase Vehicle	1		X	X	1
2	Phase Vehicle	2		X		2
3	Overlap	7		X	X	3
4	Phase Vehicle	4		X		4
5	Phase Vehicle	5		X		5
6	Phase Vehicle	6		X	X	6
7	Overlap	8		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1		X	X	9
10	Overlap	2		X	X	10
11	Overlap	3		X		11
12	Overlap	4		X		12
13	Phase Ped	2				13
14	Phase Ped	4				14
15	Phase Ped	6				15
16	Phase Ped	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

NOTICE CONTROL SOURCE 7
ASSIGNED TO CHANNEL 3 →

NOTICE CONTROL SOURCE 8
ASSIGNED TO CHANNEL 7 →

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

- ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2.
- ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3.
- REMOVE FLASHER UNIT 2.

THE CHANGES LISTED ABOVE TIES ALL PHASES AND OVERLAPS TO FLASHER UNIT 1.

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

NC Dept of Transportation
Division of Highways

Final Drawing Date: _____

NCDOT Approval _____

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1804
DESIGNED: June 2024
SEALED: 6/18/2024
REVISED: N/A

Electrical Detail - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING
DETAILS FOR:



750 N. Greenfield Pkwy, Garner, NC 27529

Apex Peakway
at
Connector to SR 1011
(S. Salem Street)

Division 5 Wake County Apex

PLAN DATE: June 2024 REVIEWED BY: J. L. Lewis

PREPARED BY: J. Ma VHB Project No.: 38523.00

REVISIONS	INIT.	DATE



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

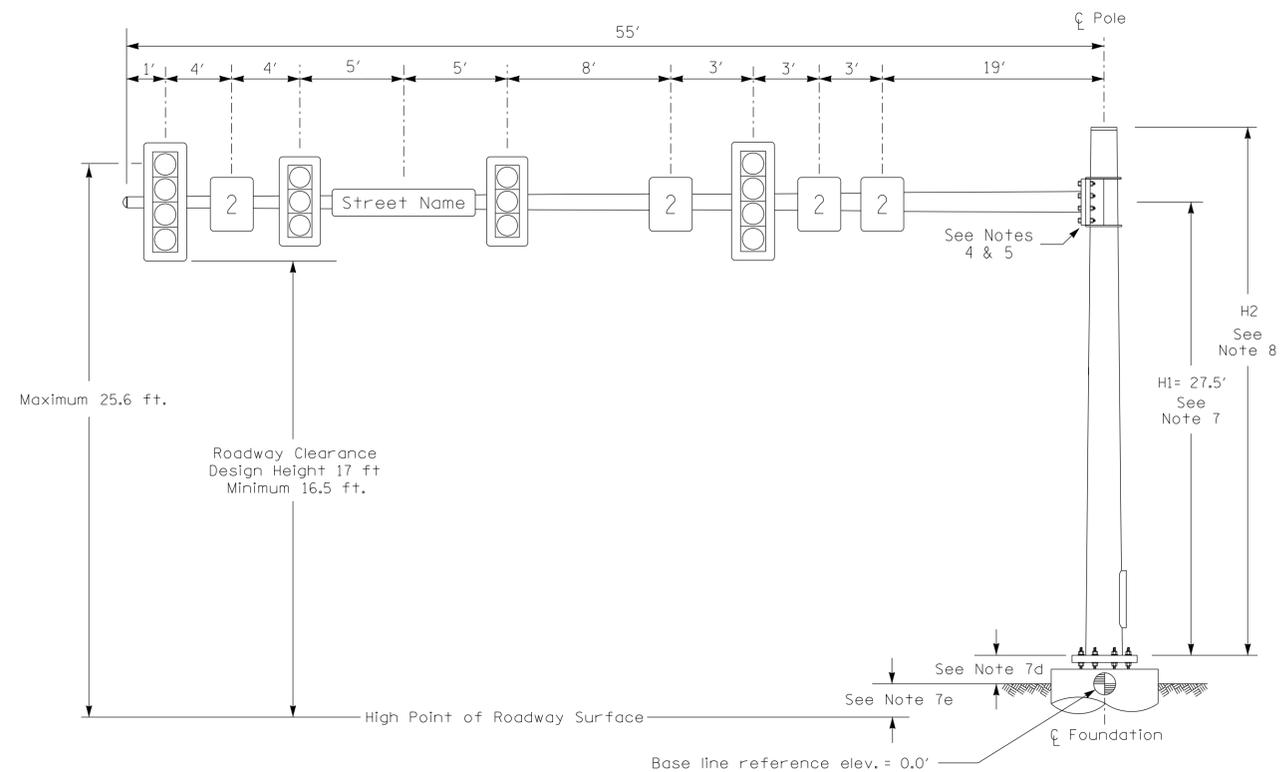
DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



SIG. INVENTORY NO. 05-1804

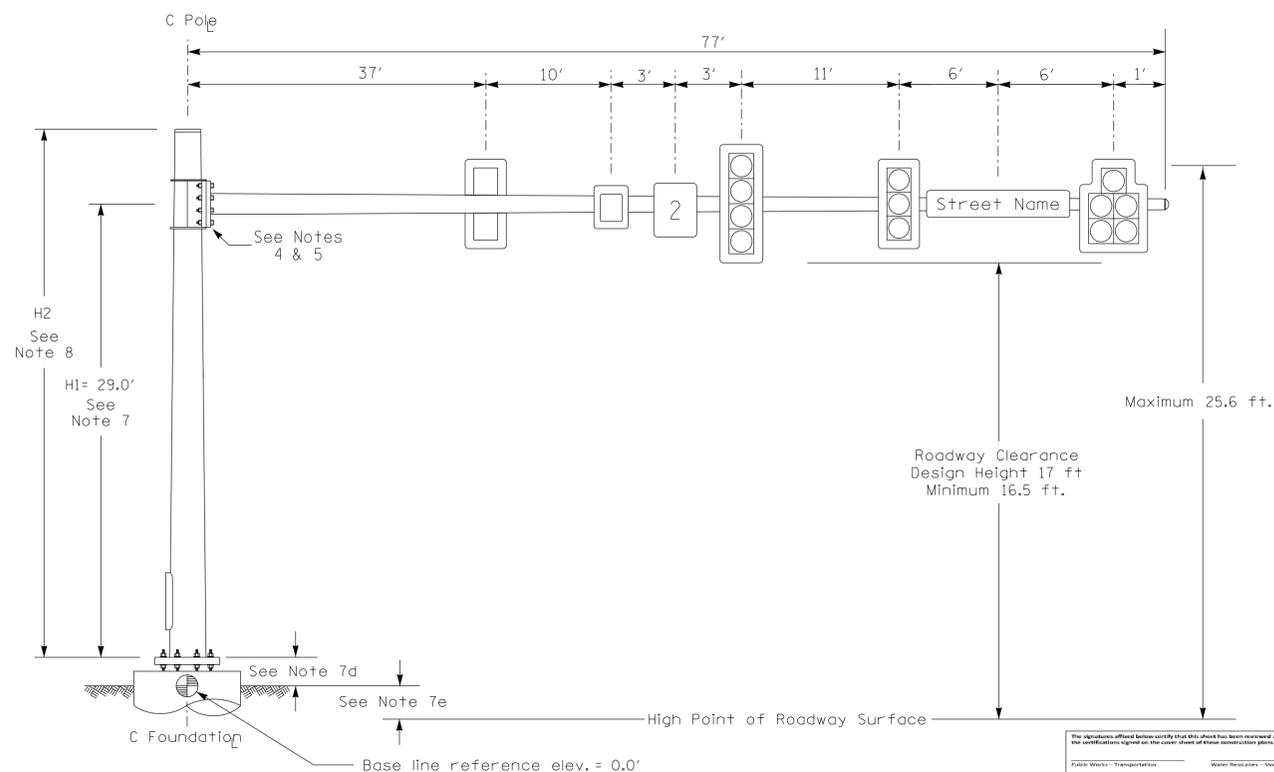
METAL POLE No. 1 and 2

Design Loading for METAL POLE NO. 1



Elevation View

Design Loading for METAL POLE NO. 2



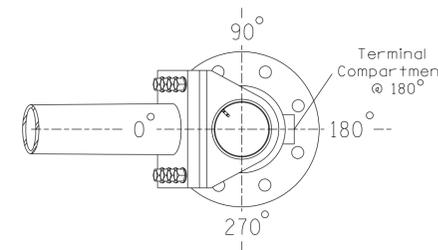
Elevation View

SPECIAL NOTE

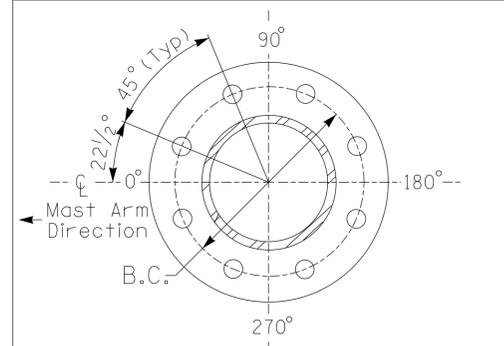
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+8.13 ft.	+9.94 ft.
Elevation difference at Edge of travelway or face of curb	+7.29 ft.	+9.15 ft.

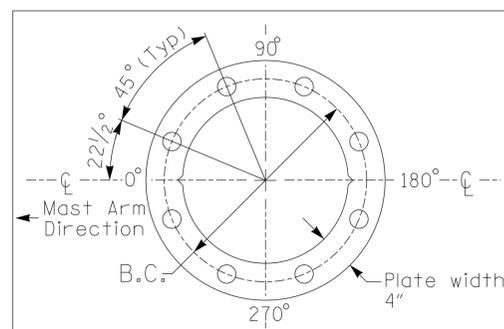


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS
	MICROWAVE MOTION SENSOR	4.0 S.F.	6.0" W X 6.0" L	1 LB

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 1st Edition 2015 AASHTO LRFD "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2024 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2024 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using force ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signalheads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signalheads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles, arms and pedestals should be black in color as specified in the project special provisions.

NC Dept of Transportation
Division of Highways

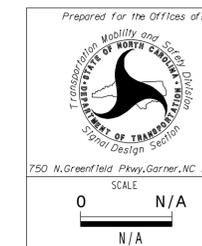
Final Drawing Date: _____

NCDOT Approval _____



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NCDOT Wind Zone 4 (120 mph)



Prepared for the Offices of:		Apex Peakway at Connector to SR 1011 (S. Salem Street)	
Division 5	Wake County	Apex	
PLAN DATE: June 2024	REVIEWED BY: J. L. Lewis		
PREPARED BY: J. Ma	VHB PROJECT NO.: 38523.00		
REVISIONS	INIT.	DATE	

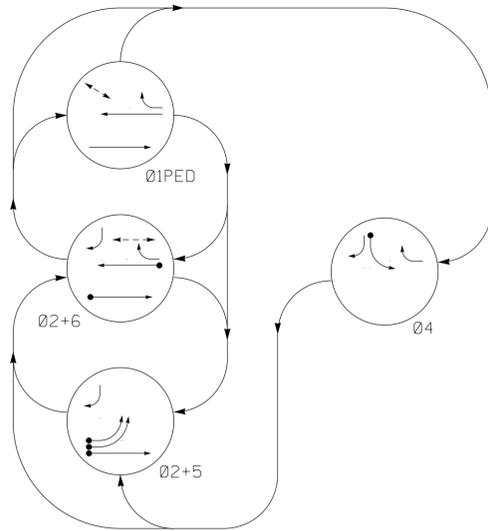


6/18/2024
DATE
05-1804

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

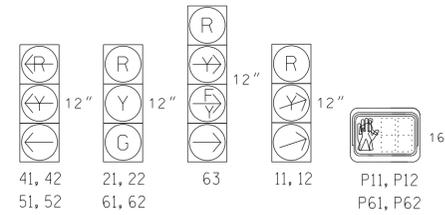
4 Phase Fully Actuated
S. Salem Street @ Apex Peakway CLS
Signal System #: D05-72_Apex

PHASING DIAGRAM



SIGNAL FACE	PHASE				
	02+5	02+6	04	01 PED	02+5
11, 12	/	/	/	R	R
21, 22	G	G	R	G	R
41, 42	←	←	←	←	←
51, 52	←	←	←	←	←
61, 62	R	G	R	G	R
63	R	←	←	←	R
P11, P12	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	DW	DRK

SIGNAL FACE I.D.
All Heads L.E.D.



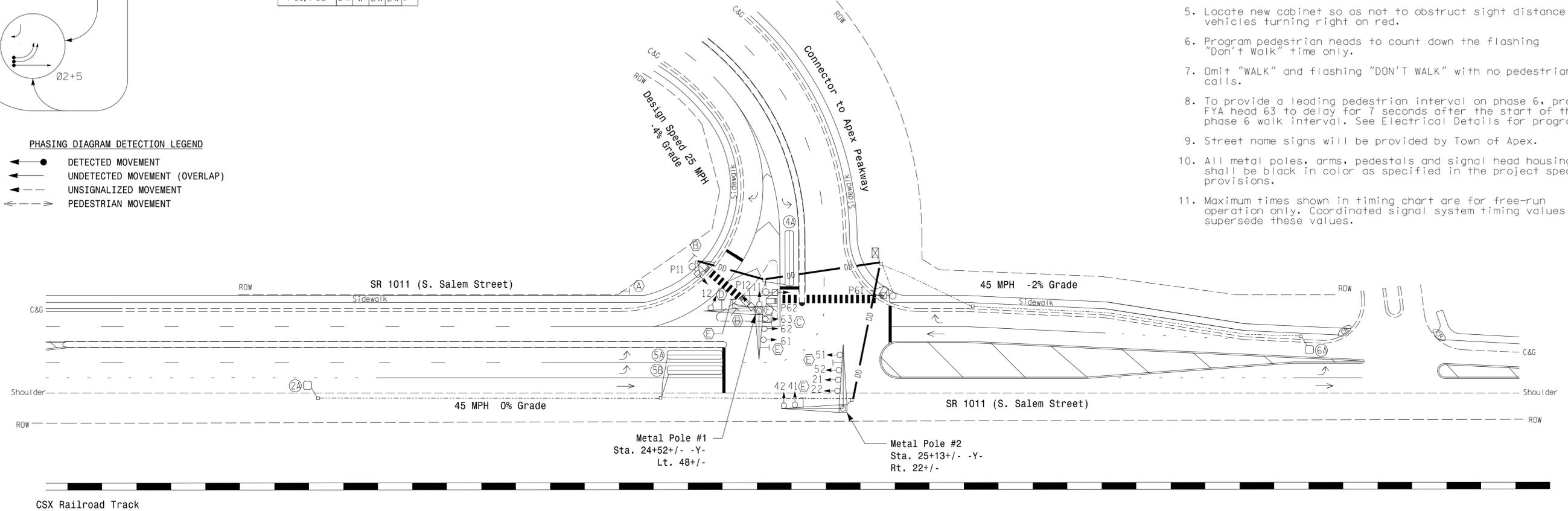
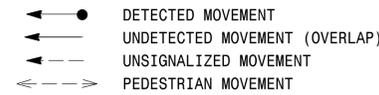
MAXTIME DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING							
					CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	
2A	6X6	300	6	X	2	-	-	X	X	X	-	X
4A	6X40	0	2-4-2	X	4	-	-	X	-	X	-	X
5A	6X40	0	2-4-2	X	5	-	-	X	-	X	-	X
5B	6X40	0	2-4-2	X	5	-	-	X	-	X	-	X
6A	6X6	300	4	X	6	-	-	X	X	X	-	X

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- The order of phase 1 and phase 5 may be reversed, but phase 1 and phase 5 shall not operate simultaneously.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Program pedestrian heads to count down the flashing "Don't Walk" time only.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- To provide a leading pedestrian interval on phase 6, program FYA head 63 to delay for 7 seconds after the start of the phase 6 walk interval. See Electrical Details for programming.
- Street name signs will be provided by Town of Apex.
- All metal poles, arms, pedestals and signal head housings shall be black in color as specified in the project special provisions.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND



CSX Railroad Track

FEATURE	PHASE				
	1 PED	2	4	5	6
Walk *	7	-	-	-	14
Ped Clear *	5	-	-	-	15
Min Green	7	12	7	7	12
Passage *	2.0	6.0	2.0	2.0	6.0
Max I *	20	50	25	20	50
Yellow Change	3.0	4.5	3.0	3.0	4.7
Red Clear	3.2	1.4	2.8	3.2	1.3
Added Initial *	-	1.5	-	-	2.5
Maximum Initial *	-	34	-	-	34
Time Before Reduction *	-	15	-	-	15
Time To Reduce *	-	30	-	-	30
Minimum Gap	-	3.0	-	-	3.0
Advance Walk	-	-	-	-	**
Non Lock Detector	-	-	X	X	-
Vehicle Recall	-	MIN RECALL	-	-	MIN RECALL
Dual Entry	-	-	-	-	-

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.
** See Note 8 (LPI).

PROPOSED	LEGEND	EXISTING
	Traffic Signal Head Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Inductive Loop Detector	
	Controller & Cabinet Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Metal Pole with Mastarm	
	Type II Signal Pedestal	
N/A	Railroad Tracks	
	Directional Drill	N/A
N/A	Curb Ramp	
	Entering Added Lane Sign (W4-6)	
	Pedestrian Crossing Sign (W11-2)	
	Right Arrow "TURNING VEHICLES"	
	Yield To Pedestrians Sign (R10-15R)	
	"NO TURN ON RED" Sign (R10-11)	
	Street Name Sign (D3-1)	
	"RIGHT TURN SIGNAL" Sign (R10-10R)	

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

NC Dept of Transportation
Division of Highways
Final Drawing Date: _____
NCDOT Approval



New Installation

Prepared For the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

SR 1011 (S. Salem Street) at Connector to Apex Peakway

Division 5 Wake County Apex

PLAN DATE: June 2024 REVIEWED BY: J. L. Lewis

PREPARED BY: J. Ma VHB PROJECT NO.: 38523.00

SCALE 1"=40'

REVISIONS

INIT. DATE

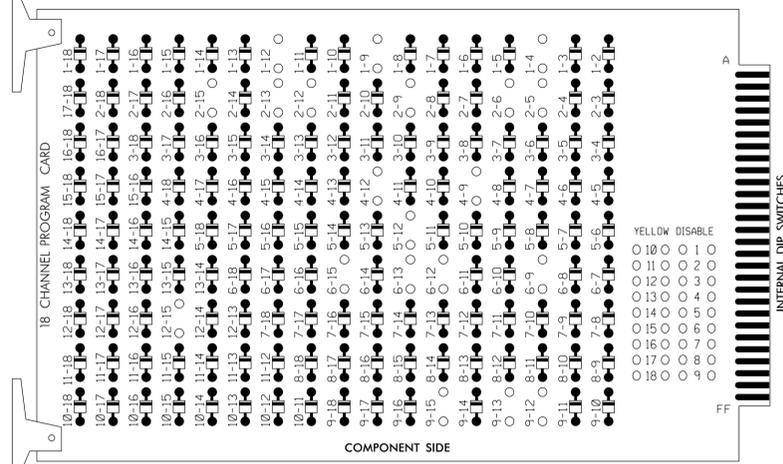
Signature: J. Ma 6/18/2024

SIG. INVENTORY NO. 05-1805

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-4, 1-9, 1-12, 2-5, 2-6, 2-9, 2-12, 2-13, 2-15, 4-9, 4-12, 5-12, 6-9, 6-12, 6-13, 6-15, 9-12, 9-13, 9-15, and 12-15.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
- Program controller to start up in phase 2 Green No Walk and phase 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
- The cabinet and controller are part of the Apex Peakway Closed Loop system.

EQUIPMENT INFORMATION

Controller.....2070LX
 Cabinet.....332 w/ Aux
 Software.....Q-Free MAXTIME
 Cabinet Mount.....Base
 Output File Positions.....18 With Aux. Output File
 Load Switches Used.....S1,S2,S3,S5,S7,S8,S9, AUXS1,AUXS5
 Phases Used.....1PED,2,4,5,6,6PED
 Overlap "1".....*
 Overlap "4".....*
 Overlap "7".....*
 Overlap "8".....*
 Overlap "9".....*

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	OL9	OL7	1 PED	3	4	4 PED	5	OL8	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	63	21,22	P11, P12	NU	41,42	NU	51,52	61,62	P61, P62	NU	NU	NU	63	NU	NU	NU	11,12	NU
RED		128								134			A121					A101
YELLOW	*	129								135								
GREEN		130								136								
RED ARROW						101		131										
YELLOW ARROW						102		132					A122					A102
FLASHING YELLOW ARROW													A123					
GREEN ARROW	127					103		133										A103
Hand			113							119								
Walker			115							121								

NU = Not Used

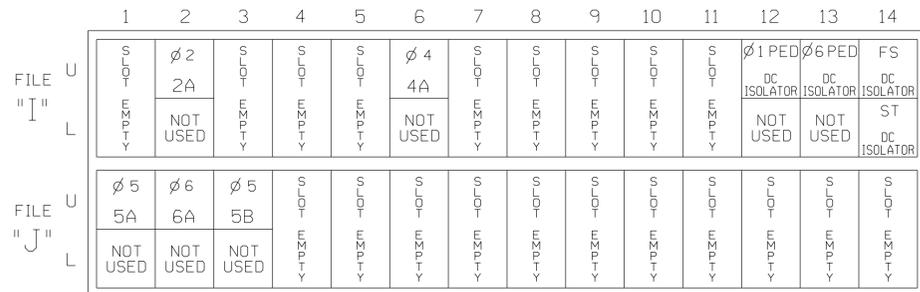
* See pictorial of head wiring in detail below.

* Denotes install load resistor. See load resistor installation detail this sheet.

NOTE: Channel output has been reconfigured for channels 1, 2, 6 and 13. See sheet 2.

INPUT FILE POSITION LAYOUT

(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
2A	TB2-5,6	I2U	39	1	2	2			X	X	X	
4A	TB4-9,10	I6U	41	3	8	4			X		X	
5A	TB3-1,2	J1U	55	17	15	5			X		X	
5B	TB3-9,10	J3U	64	30	18	5			X		X	
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
PED PUSH BUTTONS												
* P11,P12	TB8-4,6	I12U	67	33	2	PED 1						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6						

* See PED 1 programming detail on Sheet 2.

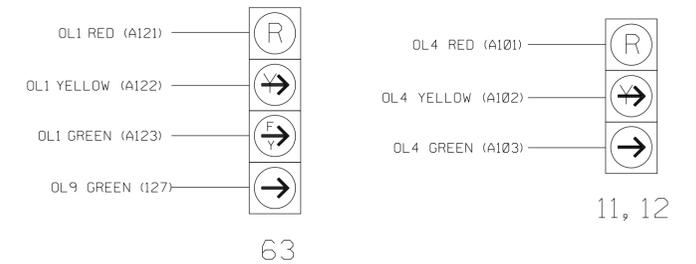
NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS 112 AND 113.

INPUT FILE POSITION LEGEND: J2L



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

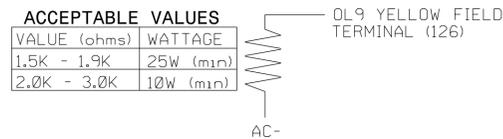
The sequence display for signal head 63 requires special logic programming. See sheet 2 for programming instructions.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)



The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

NC Dept of Transportation
Division of Highways

Final Drawing Date: _____

NCDOT Approval

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1805
 DESIGNED: June 2024
 SEALED: 6/18/2024
 REVISED: N/A

Electrical Detail Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1011 (S. Salem Street) at Connector to Apex Peakway

Division 5 Wake County Apex

PLAN DATE: June 2024 REVIEWED BY: J. L. Lewis

PREPARED BY: J. Ma VHB Project No.: 38523.00

REVISIONS INIT. DATE

750 N. Greenfield Pkwy, Garner, NC 27529



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



SIG. INVENTORY NO. 05-1805

SEQUENCE DETAIL

Front Panel
Main Menu >Controller >Sequence & Phs Config>Sequences

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	2,a,1,b,4,c
2	5,6,a,b,c

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

PED DETECTOR PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Detector >Ped Det Plans

Web Interface
Home >Controller >Detector Configuration >Pedestrian Detector

Plan 1

Detector	Description	Call Phase	Call Overlap
2		1	0

MODIFY PHASE ASSIGNED TO PED
DETECTOR #2 FROM PHASE 2 TO PHASE 1 →

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Overlap	9	-	X	X	1
2	Overlap	7	-	X	-	2
3	Phase Vehicle	3	-	X	X	3
4	Phase Vehicle	4	-	X	-	4
5	Phase Vehicle	5	-	X	-	5
6	Overlap	8	-	X	X	6
7	Phase Vehicle	7	-	X	-	7
8	Phase Vehicle	8	-	X	X	8
9	Overlap	1	-	X	X	9
10	Overlap	2	-	X	X	10
11	Overlap	3	-	X	-	11
12	Overlap	4	-	X	-	12
13	Phase Ped	1	-	-	-	13
14	Phase Ped	4	-	-	-	14
15	Phase Ped	6	-	-	-	15
16	Phase Ped	8	-	-	-	16
17	Overlap	5	-	X	X	17
18	Overlap	6	-	X	-	18

MAXTIME OVERLAP PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Overlap >Overlap Parameters/Overlap Timings

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	4	7	8	9
Type	FYA 4 - Section	Normal	Normal	Normal	Normal
Included Phases	1, 6	2, 4	1, 2	1, 6	4
Modifier Phases	-	-	-	-	-
Modifier Overlap	9	-	-	-	-
Trail Green	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0	0.0
FYA Ped Delay	0.0	0.0	0.0	0.0	0.0

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1805
DESIGNED: June 2024
SEALED: 6/18/2024
REVISED: N/A

Electrical Detail Sheet 2 of 2

ELECTRICAL AND PROGRAMMING
DETAILS FOR:

SR 1011 (S. Salem Street)
at
Connector to Apex Peakway



750 N. Greenfield Pkwy, Garner, NC 27529

Division 5	Wake County	Apex
PLAN DATE: June 2024	REVIEWED BY: J. L. Lewis	
PREPARED BY: J. Ma	VHB Project No.: 38523.00	
REVISIONS	INIT.	DATE



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



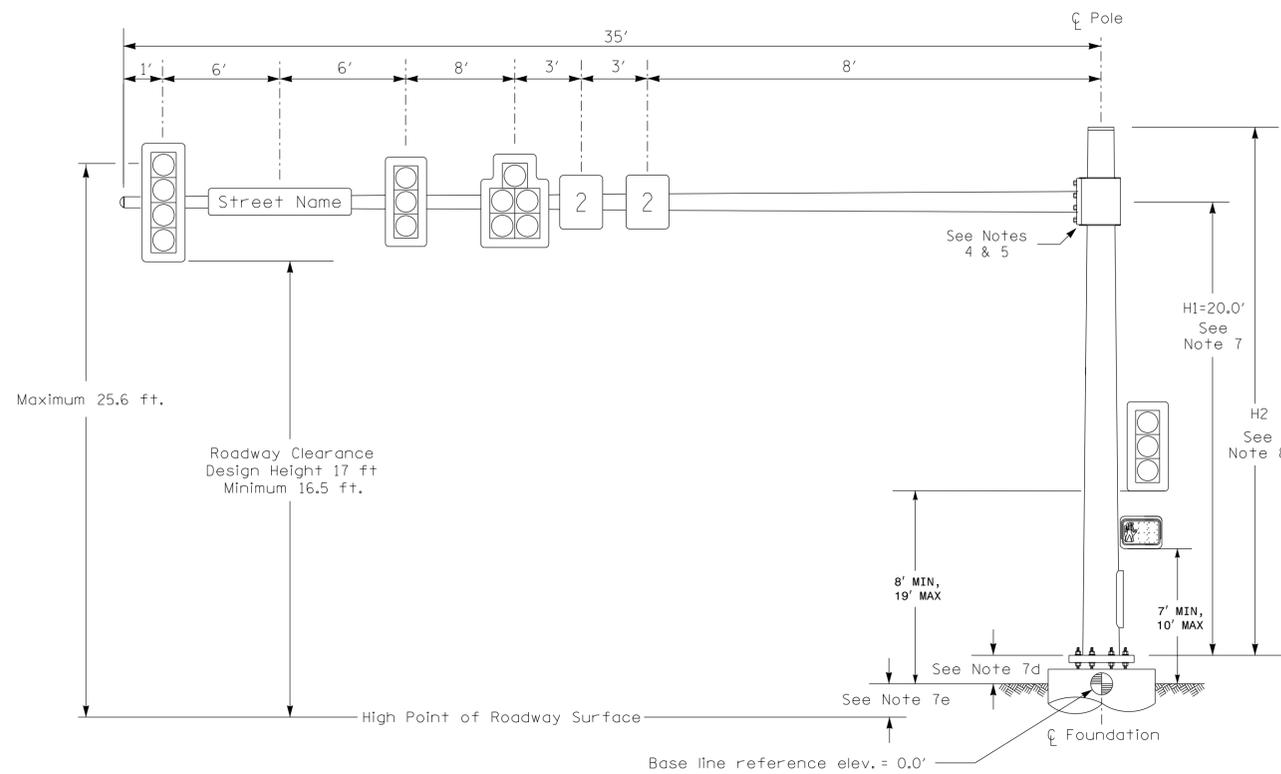
NC Dept of Transportation
Division of Highways

Final Drawing Date: _____

NCDOT Approval

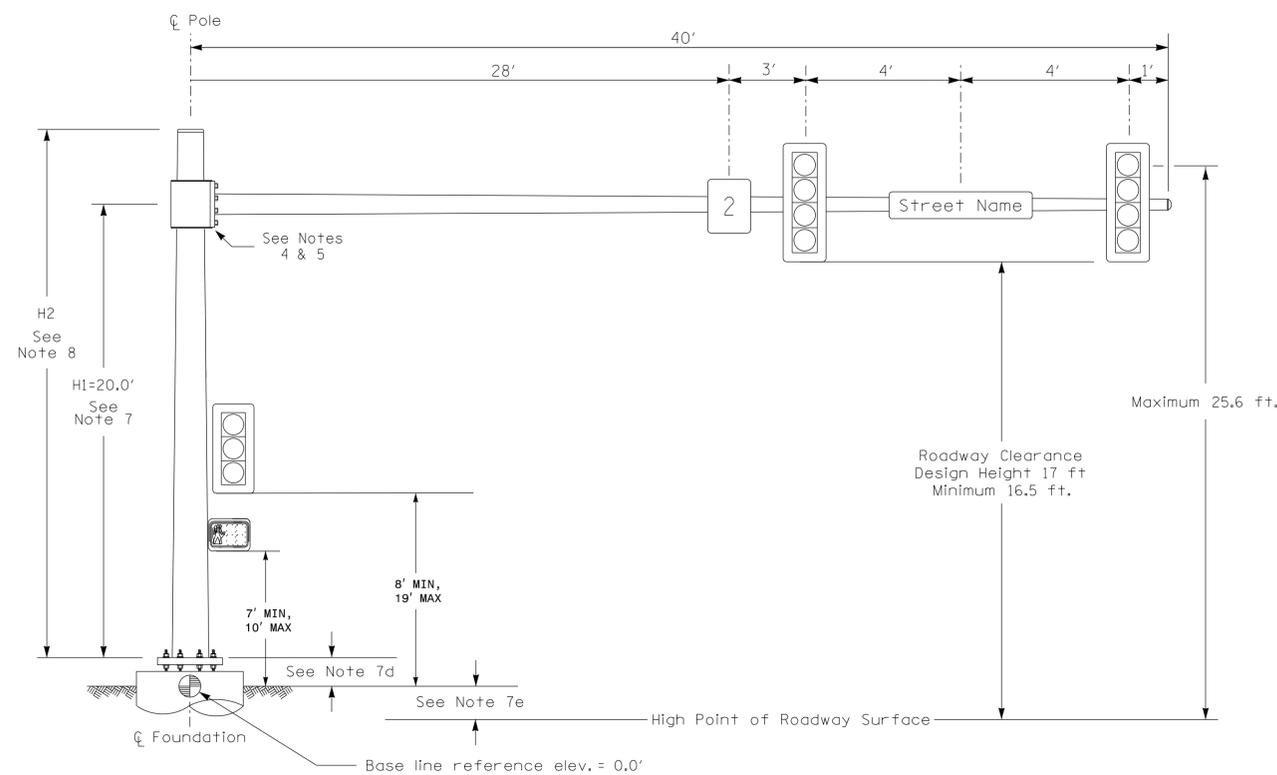
SIG. INVENTORY NO. 05-1805

Design Loading for METAL POLE NO. 1, MAST ARM A



Elevation View

Design Loading for METAL POLE NO. 1, MAST ARM B



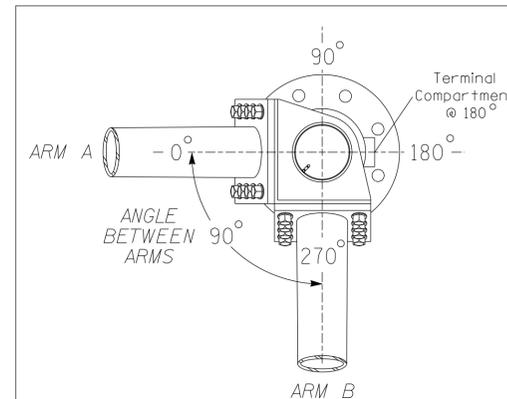
Elevation View @ 0°

SPECIAL NOTE

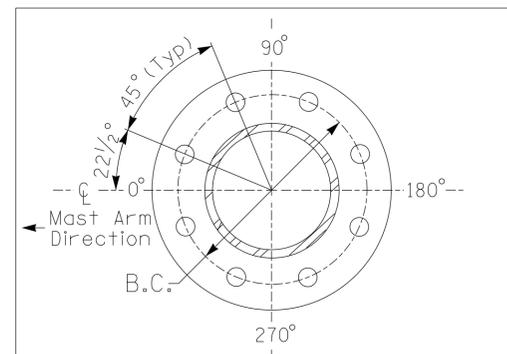
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	ARM A	ARM B
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.51 ft.	-0.17 ft.
Elevation difference at Edge of travelway or face of curb	-0.07 ft.	0.00 ft.

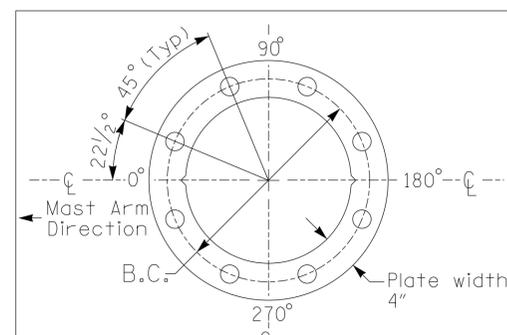


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 1st Edition 2015 AASHTO LRFD "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2024 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2024 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

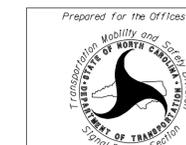
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using force ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NC Dept of Transportation Division of Highways

Final Drawing Date: _____

NCDOT Approval

NCDOT Wind Zone 4 (120 mph)



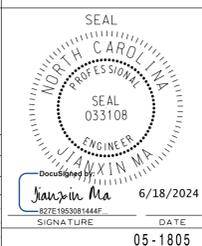
750 N. Greenfield Pkwy, Garner, NC 27529

All metal poles, arms and pedestals should be black in color as specified in the project special provisions.

Public Review: Transportation	Water Resources: Transportation
Planning: Transportation	Planning: Transportation
Finance	Finance
Other Resources: Traffic & Incident Control	Other Resources: Cultural Resources



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



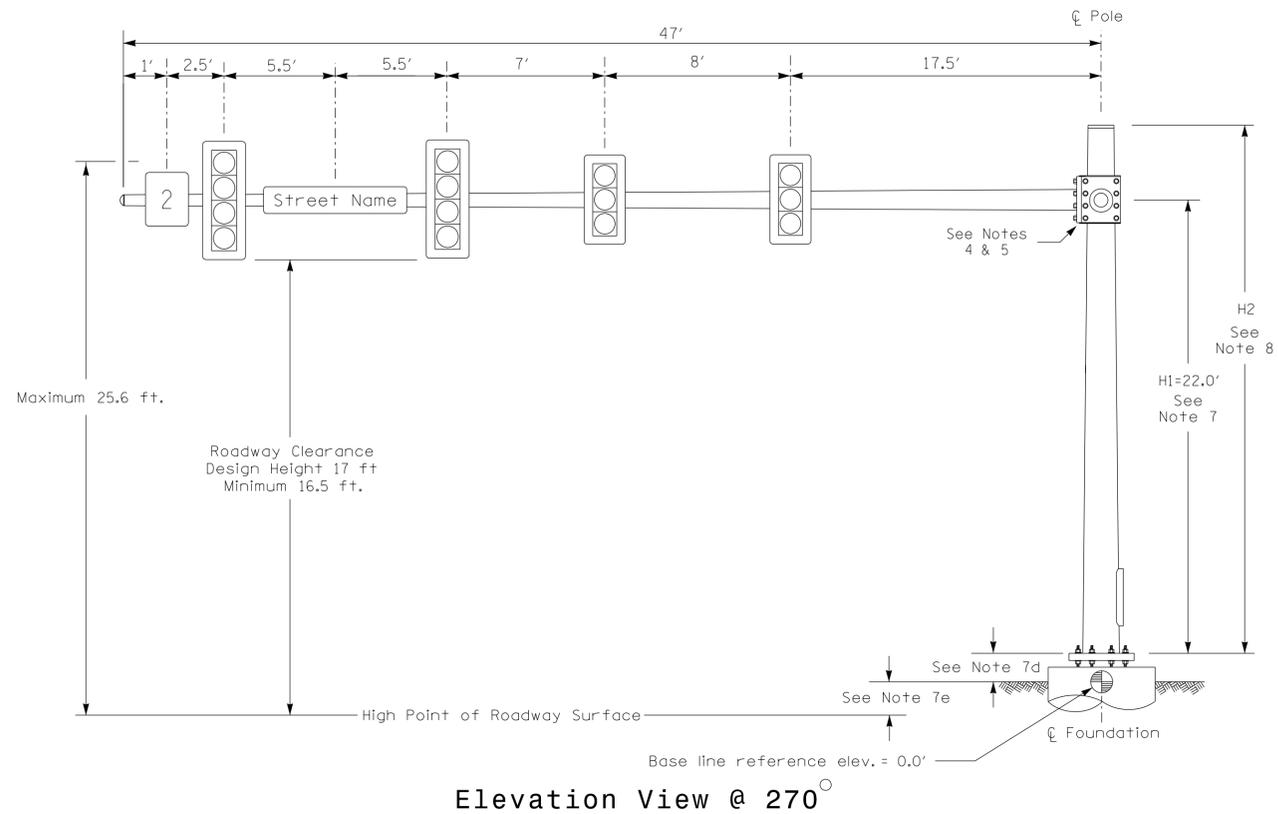
SR 1011 (S. Salem Street) at Connector to Apex Peakway

Division 5	Wake County	Apex
PLAN DATE: June 2024	REVIEWED BY: J. L. Lewis	
PREPARED BY: J. Ma	VHB PROJECT NO.: 38523.00	
REVISIONS	INIT.	DATE

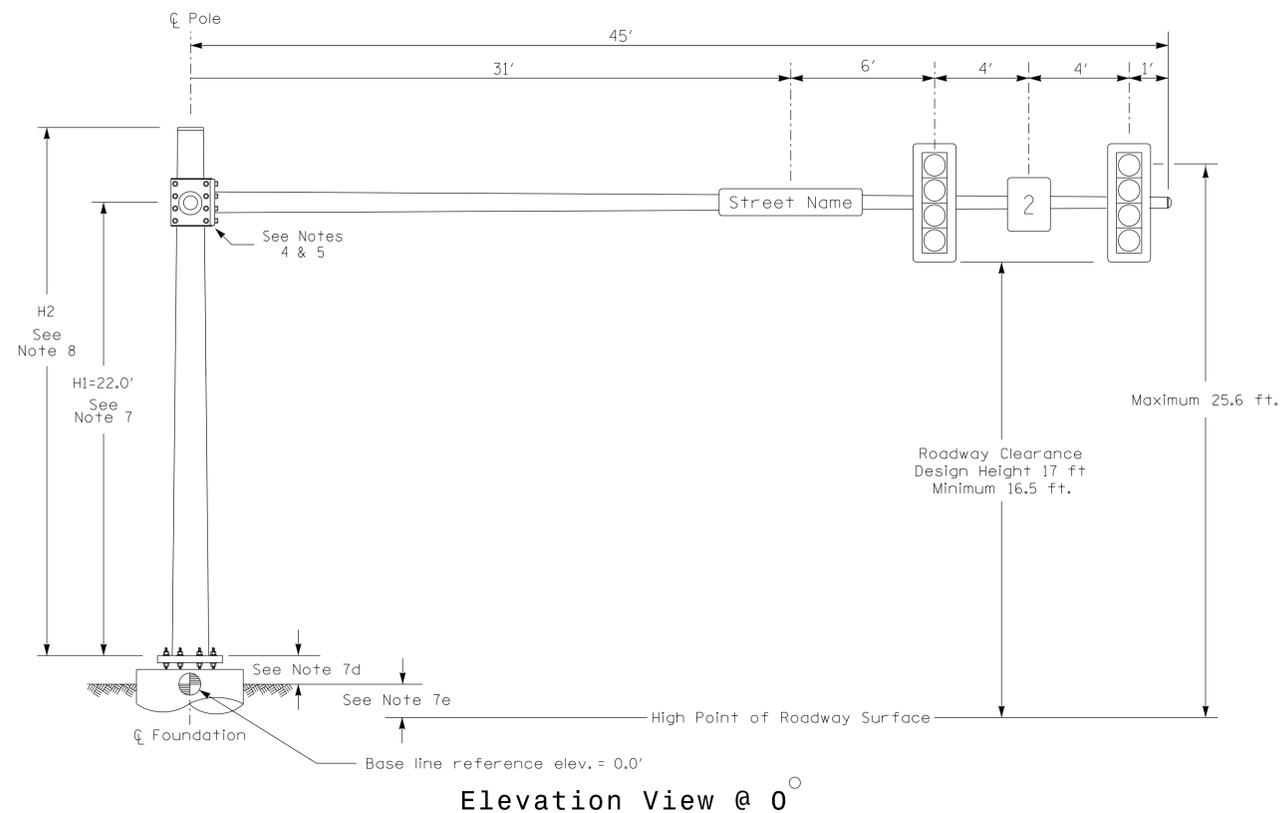
SCALE: 0 N/A

DATE: 6/18/2024

Design Loading for METAL POLE NO. 2, MAST ARM A



Design Loading for METAL POLE NO. 2, MAST ARM B

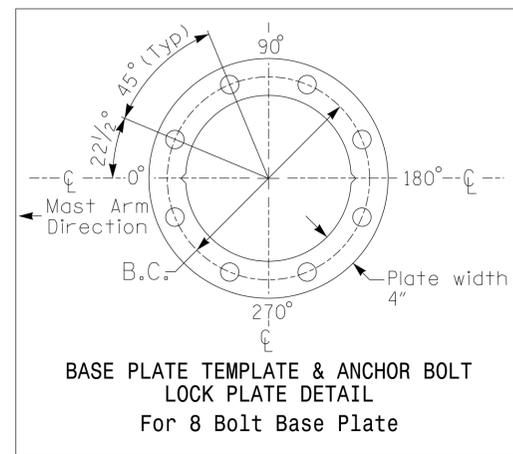
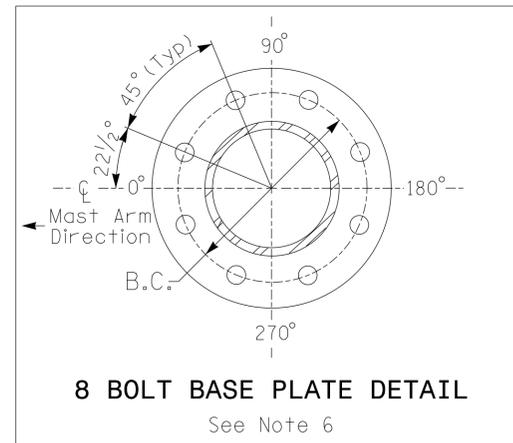
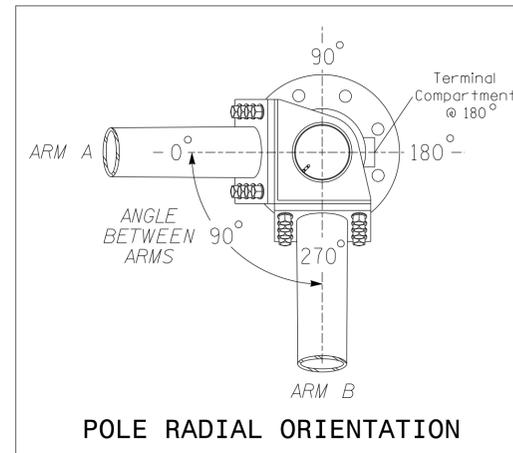


SPECIAL NOTE

The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	ARM A	ARM B
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+2.57 ft.	+0.00 ft.
Elevation difference at Edge of travelway or face of curb	+2.35 ft.	N/A



METAL POLE No. 2

PROJECT REFERENCE NO.	SHEET NO.
U-5928	Sig. 3.4

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 1st Edition 2015 AASHTO LRFD "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2024 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2024 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using force ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

**NC Dept of Transportation
Division of Highways**

Final Drawing Date: _____

NCDOT Approval

All metal poles, arms and pedestals should be black in color as specified in the project special provisions.

Public Works - Transportation	Water Resources - Transportation
Building Inspection	Planning
Signal Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Signal Resources - Traffic & Signal Control	Public Relations & Cultural Resources



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NCDOT Wind Zone 4 (120 mph)



750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: 0 N/A N/A

**SR 1011 (S. Salem Street)
at
Connector to Apex Peakway**

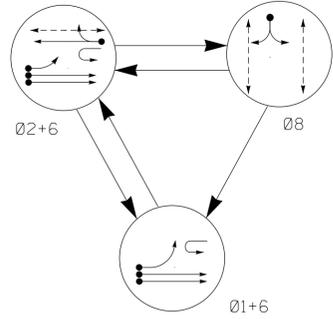
Division 5	Wake County	Apex
PLAN DATE: June 2024	REVIEWED BY: J. L. Lewis	
PREPARED BY: J. Ma	VHB PROJECT NO.: 38523.00	
REVISIONS	INIT.	DATE



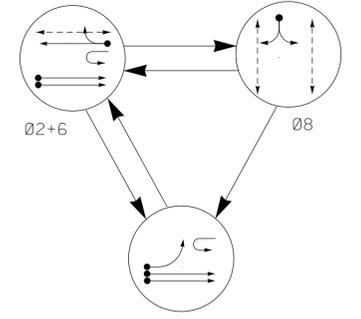
DocuSigned by: J. Lewis
6/18/2024
DATE
05-1805

3 Phase Fully Actuated
S. Salem Street @ Apex Peakway CLS
Signal System #: D05-72_Apex

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM

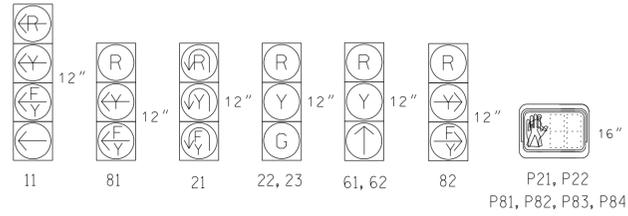


PHASING DIAGRAM DETECTION LEGEND

- ← ● → DETECTED MOVEMENT
- ← ○ → UNDETECTED MOVEMENT (OVERLAP)
- ← ○ ○ → UNSIGNALIZED MOVEMENT
- ← ○ ○ ○ → PEDESTRIAN MOVEMENT

SIGNAL FACE I.D.

All Heads L.E.D.



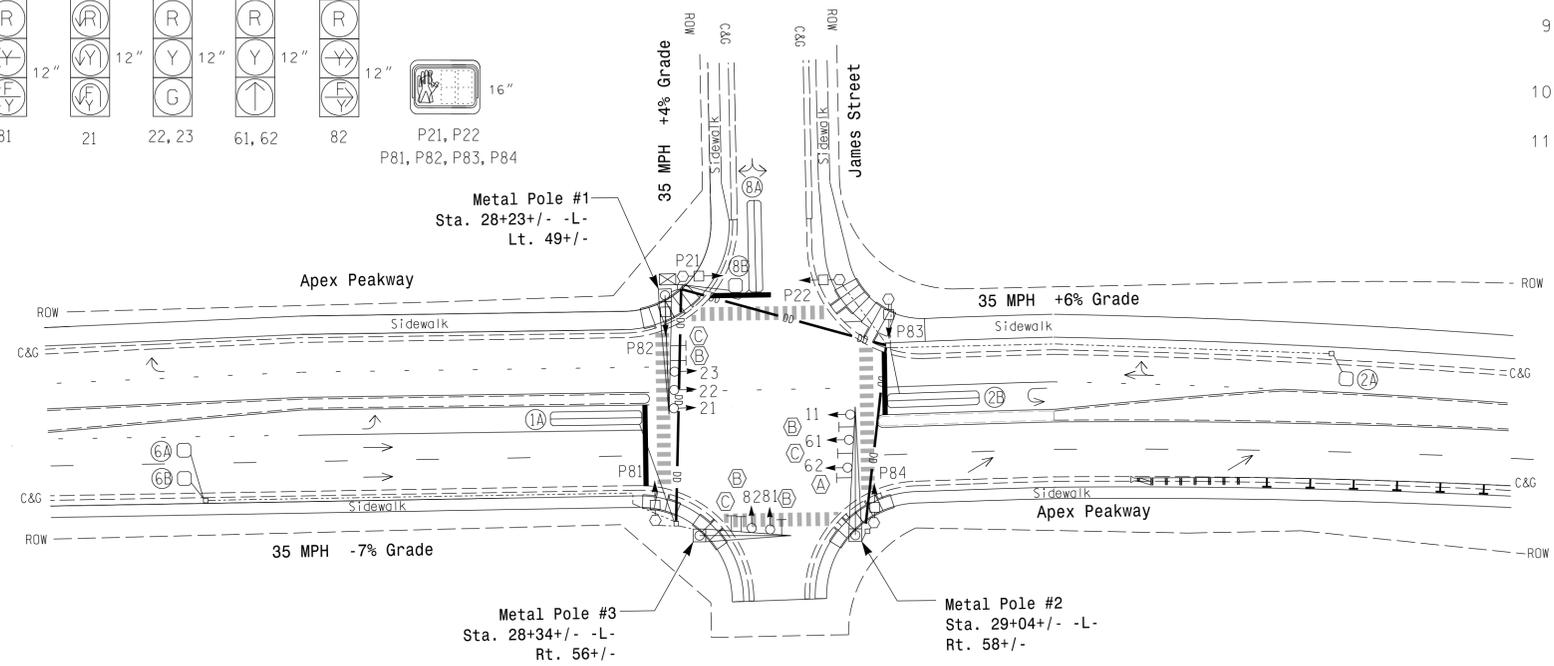
SIGNAL FACE	PHASE			FLASH
	1	2	6	
11	←	→	←	→
21	←	→	←	→
22, 23	R	G	R	R
61, 62	↑	↑	R	R
81	R	R	←	→
82	R	R	←	→
P21, P22	DW	W	DW	DRK
P81, P82, P83, P84	DW	DW	W	DRK

SIGNAL FACE	PHASE			FLASH
	1	2	6	
11	←	→	←	→
21	←	→	←	→
22, 23	R	G	R	R
61, 62	↑	↑	R	R
81	R	R	←	→
82	R	R	←	→
P21, P22	DW	W	DW	DRK
P81, P82, P83, P84	DW	DW	W	DRK

MAXTIME DETECTOR INSTALLATION CHART												
DETECTOR				PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	X	1	15.0*	-	X	-	X	-	X
2A	6X6	200	4	X	2	-	-	X	X	X	-	X
2B	6X6	0	2-4-2	X	2	-	-	X	-	X	-	X
6A	6X6	200	4	X	6	-	-	X	X	X	-	X
6B	6X6	200	4	X	6	-	-	X	X	X	-	X
8A	6X40	0	2-4-2	X	8	10.0	-	X	-	X	-	X
8B	6X6	0	3	X	8	15.0	-	X	-	X	-	X

* Disable delay during Alternate Phasing Operation.
Disable phase call for loop(s) during Alternate Phasing Operation.

- NOTES**
- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
 - Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
 - Phase 1 may be lagged.
 - Set all detector units to presence mode.
 - Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
 - Program pedestrian heads to count down the flashing "Don't Walk" time only.
 - Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
 - Street name signs will be provided by Town of Apex.
 - All metal poles, arms, pedestals and signal head housings shall be black in color as specified in the project special provisions.
 - The Division Traffic Engineer will determine the hours of use for each phasing plan.
 - Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



LEGEND

PROPOSED	EXISTING
○ → Traffic Signal Head	● → Traffic Signal Head
□ → Pedestrian Signal Head With Push Button & Sign	□ → Pedestrian Signal Head With Push Button & Sign
□ → Inductive Loop Detector	□ → Inductive Loop Detector
□ → Controller & Cabinet	□ → Controller & Cabinet
□ → Junction Box	□ → Junction Box
--- 2-in Underground Conduit	--- 2-in Underground Conduit
N/A Right of Way	N/A Right of Way
→ Directional Arrow	→ Directional Arrow
○ → Metal Pole with Mastarm	○ → Metal Pole with Mastarm
○ → Type II Signal Pedestal	○ → Type II Signal Pedestal
--- Directional Drill	N/A
N/A Guardrail	N/A
N/A Curb Ramp	N/A
⊙ No Right Turn Sign (R3-1)	⊙ No Right Turn Sign (R3-1)
⊙ "TURNING TRAFFIC MUST YIELD TO" PEDESTRIANS Sign (R10-15)	⊙ "TURNING TRAFFIC MUST YIELD TO" PEDESTRIANS Sign (R10-15)
⊙ Street Name Sign (D3-1)	⊙ Street Name Sign (D3-1)

MAXTIME TIMING CHART

FEATURE	PHASE			
	1	2	6	8
Walk *	-	14	-	12
Ped Clear *	-	16	-	19
Min Green	7	10	10	7
Passage *	2.0	6.0	6.0	2.0
Max I *	20	50	50	25
Yellow Change	3.0	4.4	4.4	3.0
Red Clear	2.6	2.3	2.3	3.1
Added Initial *	-	2.5	1.5	-
Maximum Initial *	-	24	24	-
Time Before Reduction *	-	15	15	-
Time To Reduce *	-	30	30	-
Minimum Gap	-	3.0	3.0	-
Advance Walk	-	7	-	5
Non Lock Detector	X	-	-	X
Vehicle Recall	-	MIN RECALL	MIN RECALL	-
Dual Entry	-	-	-	-

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

NC Dept of Transportation
Division of Highways
Final Drawing Date: _____
NCDOT Approval

New Installation

Prepared For the Offices of:

Apex Peakway at James Street

Division 5 Wake County Apex

PLAN DATE: June 2024 REVIEWED BY: J. L. Lewis

PREPARED BY: J. Ma VHB PROJECT NO.: 38523.00

SCALE: 1" = 40'

SEAL: J. Ma 6/18/2024

SIG. INVENTORY NO. 05-1803



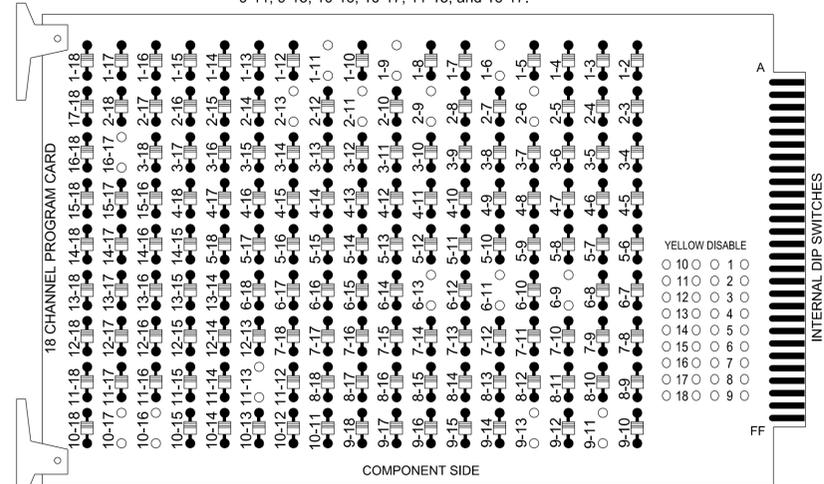
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 033108 J. Ma 6/18/2024

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-6, 1-9, 1-11, 2-6, 2-9, 2-11, 2-13, 6-9, 6-11, 6-13, 9-11, 9-13, 10-16, 10-17, 11-13, and 16-17.



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and phase 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the Apex Peakway Closed Loop system.

EQUIPMENT INFORMATION

Controller.....2070LX
 Cabinet.....332 w/ Aux
 Software.....Q-Free MAXTIME
 Cabinet Mount.....Base
 Output File Positions.....18 With Aux. Output File
 Load Switches Used.....S1,S2,S3,S8,S12,AUXS1, AUXS2,AUXS3,AUXS4
 Phases Used.....1,2,2PED,6,8,8PED
 Overlap "1".....*
 Overlap "2".....*
 Overlap "3".....*
 Overlap "5".....*

*See overlap programming detail on sheet 2.

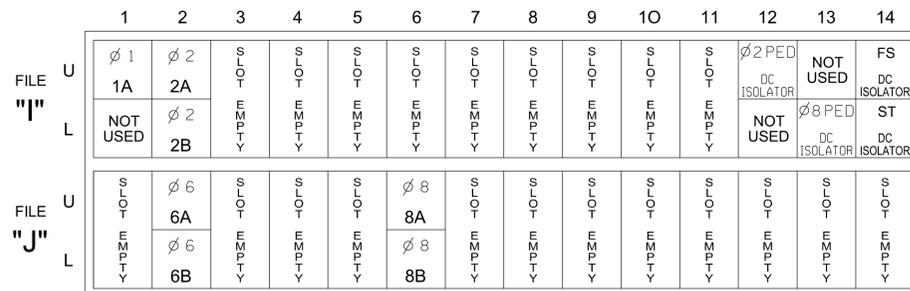
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	SPARE
SIGNAL HEAD NO.	11	22,23	P21, P22	NU	NU	NU	NU	61,62	NU	NU	NC	P81,P82 P83,P84	11	81	82	21	NU	NU
RED		128								134						A124	A111	
YELLOW	*	129								135								
GREEN		130																
RED ARROW													A121				A114	
YELLOW ARROW													A122	A125	A112	A115		
FLASHING YELLOW ARROW													A123	A126	A113	A116		
GREEN ARROW	127									136								
Hand symbol																		110
Walking person symbol																		112

NU = Not Used
 NC = No Connection
 * Denotes install load resistor. See load resistor installation detail this sheet.
 ★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1 ★	1	15		X		X	
2A	TB2-5,6	I2U	39	1	29 ★	6	3		X	X	X	X
2B	TB2-7,8	I2L	43	5	3	2			X		X	
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
6B	TB3-7,8	J2L	44	6	17	6			X	X	X	
8A	TB5-9,10	J6U	42	4	22	8	10		X		X	
8B	TB5-11,12	J6L	46	8	23	8	15		X		X	
PED PUSH BUTTONS												
P21,P22	TB8-4,6	I12U	67	33	2	PED 2						
P81,P82,P83,P84	TB8-8,9	I13L	70	36	8	PED 8						

NOTE: INSTALL DC ISOLATORS IN INPUT FILE SLOT I13.
 ★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

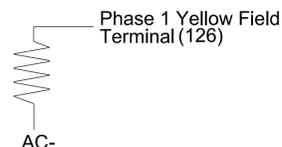
INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



NC Dept of Transportation
 Division of Highways

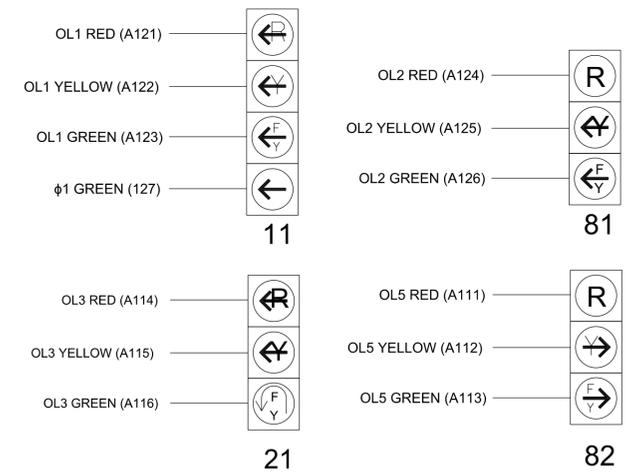
Final Drawing Date: _____

NCDOT Approval _____

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1803
 DESIGNED: June 2024
 SEALED: 6/18/2024
 REVISED: N/A

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

Electrical Detail - Sheet 1 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Apex Peakway
 at
 James Street

Division 5	Wake County	Apex
PLAN DATE: June 2024	REVIEWED BY: J. L. Lewis	
PREPARED BY: J. Ma	W/B Project No.: 38523.00	
REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 033108
 J. L. Lewis
 6/18/2024
 SIG. INVENTORY NO. 05-1803

750 N. Greenfield Pkwy, Garner, NC 27529

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

Front Panel
Main Menu >Controller >Overlap >Overlap Parameters/Overlap Timings

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	5
Type	FYA 4 - Section			
Included Phases	2	8	6	8
Modifier Phases	1	-	-	-
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

*The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

Front Panel
Main Menu >Controller >Overlap >Overlap Parameters/Overlap Timings

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	1	2	3	5
Type	FYA 4 - Section			
Included Phases	-	8	6	8
Modifier Phases	1	-	-	-
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

← NOTICE INCLUDED PHASE

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 1A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

Detector	Call Phase	Delay
1	1	-
29	0	-

1A

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

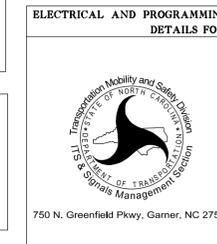
DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED



NC Dept of Transportation
Division of Highways
Final Drawing Date: _____
NCDOT Approval _____

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1803
DESIGNED: June 2024
SEALED: 6/18/2024
REVISED: N/A

Electrical Detail - Sheet 2 of 3



ELECTRICAL AND PROGRAMMING DETAILS FOR:		Apex Peakway at James Street	
Division 5	Wake County	Apex	
PLAN DATE: June 2024	REVIEWED BY: J. L. Lewis		
PREPARED BY: J. Ma	VHB Project No.: 38523.00		
REVISIONS	INIT.	DATE	

DocuSigned by:
J. L. Lewis
6/18/2024
DATE
SIG. INVENTORY NO. 05-1803

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2.
A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

<u>PHASING</u>	<u>OVERLAP PLAN</u>	<u>VEH DET PLAN</u>
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for head 11 to run protected turns only.

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 0 second.

MAXTIME STARTUP AND SOFTWARE FLASH PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Unit

Web Interface
Home >Controller >Unit

Modify parameters as shown below and save changes.

Start Up Parameters

StartUp Clearance Hold
6

Unit Flash Parameters

All Red Flash Exit Time
6

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

1. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2.
2. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3.
3. REMOVE FLASHER UNIT 2.

THE CHANGES LISTED ABOVE TIES ALL PHASES AND OVERLAPS TO FLASHER UNIT 1.

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

NC Dept of Transportation
Division of Highways
Final Drawing Date: _____
NCDOT Approval _____

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1803
DESIGNED: June 2024
SEALED: 6/18/2024
REVISED: N/A

Electrical Detail - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING
DETAILS FOR:



750 N. Greenfield Pkwy, Garner, NC 27529

Apex Peakway
at
James Street

Division 5	Wake County	Apex
PLAN DATE: June 2024	REVIEWED BY: J. L. Lewis	
PREPARED BY: J. Ma	VHB Project No.: 38523.00	
REVISIONS	INIT.	DATE



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

**DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED**

SEAL

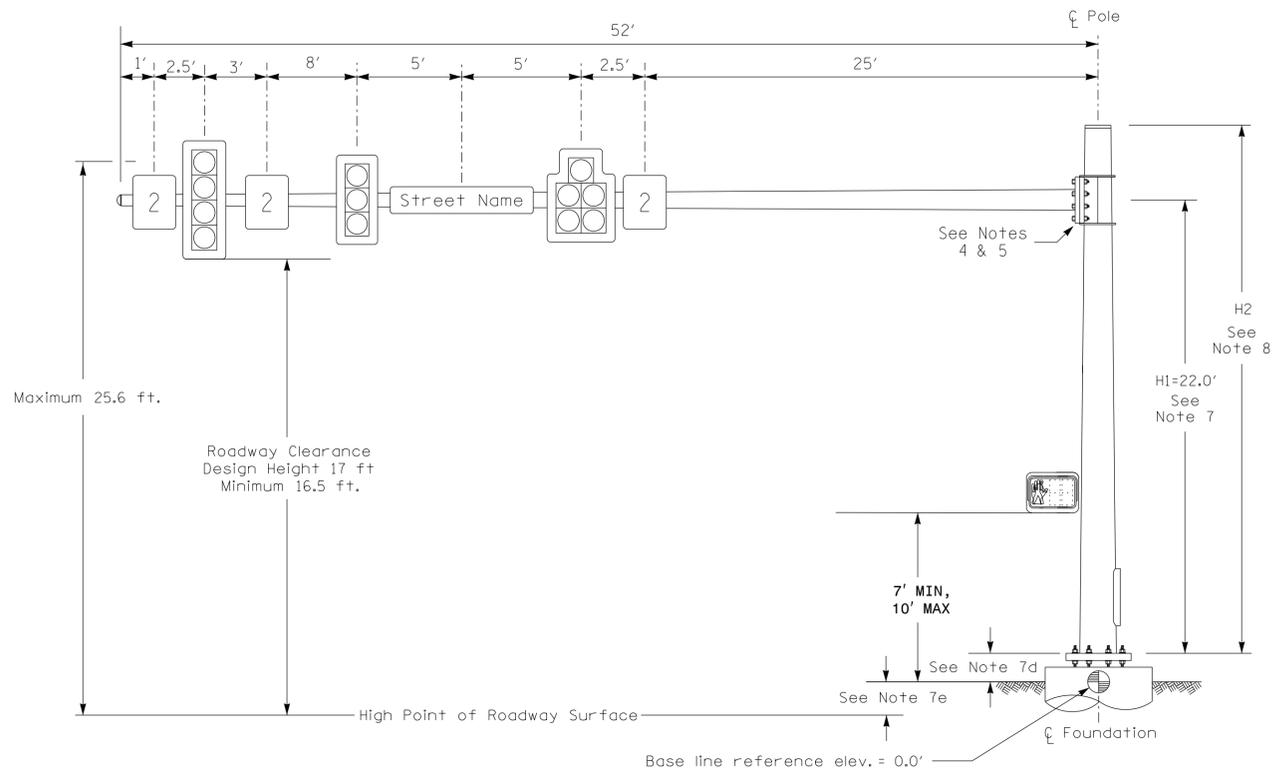
NORTH CAROLINA
PROFESSIONAL
ENGINEERS
JIANXIN MA

SEAL
033108

DocuSigned By: Jianxin Ma 6/18/2024
DATE

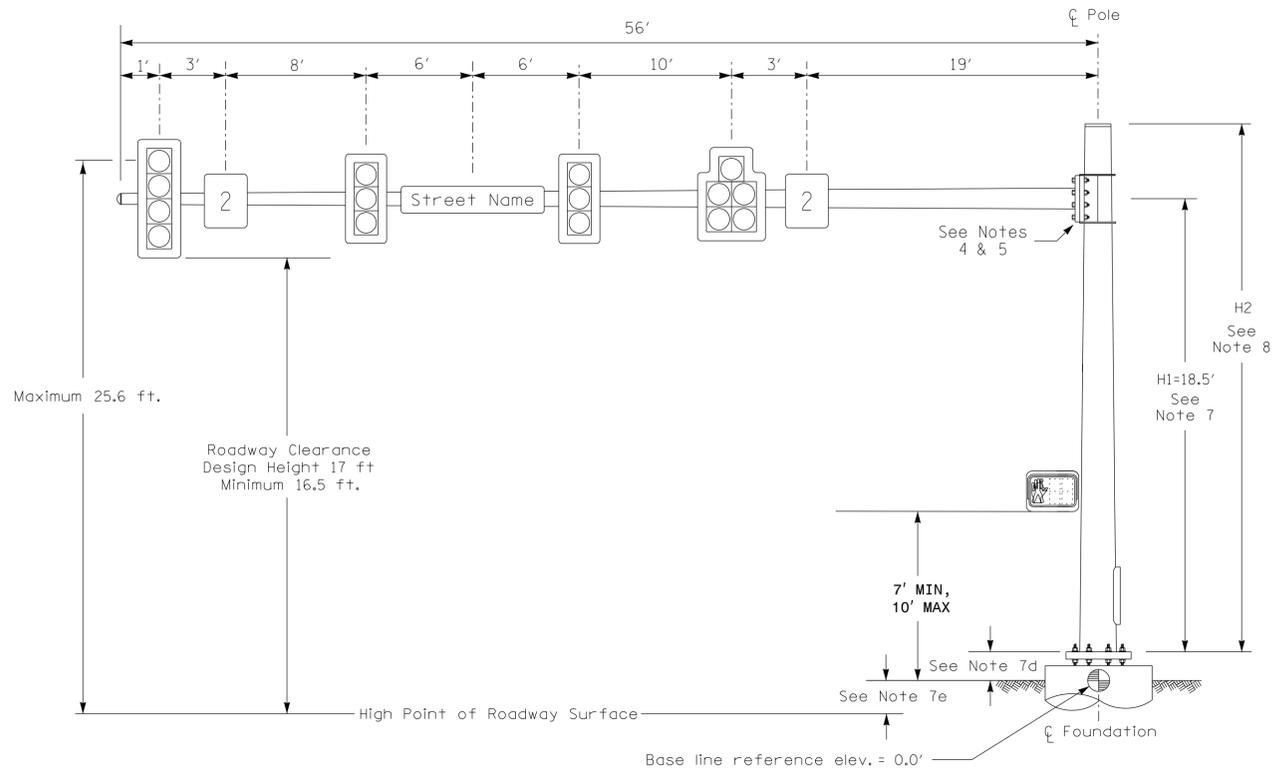
SIG. INVENTORY NO. 05-1803

Design Loading for METAL POLE NO. 1



Elevation View

Design Loading for METAL POLE NO. 2



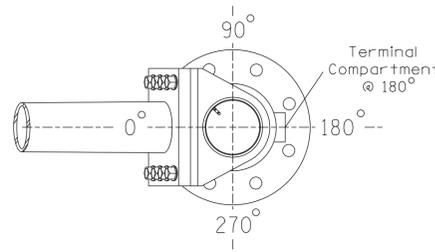
Elevation View

SPECIAL NOTE

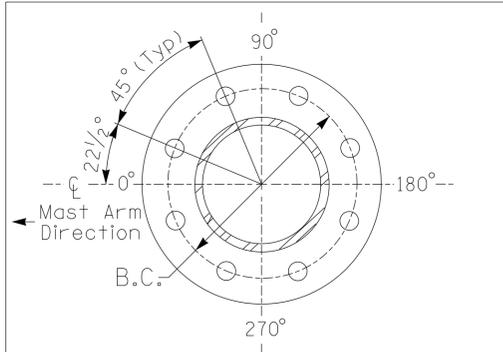
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+2.69 ft.	-0.57 ft.
Elevation difference at Edge of travelway or face of curb	+1.94 ft.	-1.47 ft.

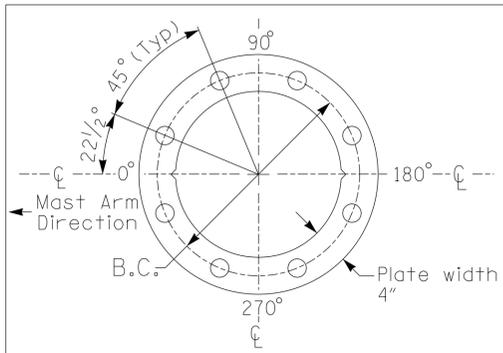


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate

METAL POLE No. 1 and 2

MAST ARM LOADING SCHEDULE				
LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 1st Edition 2015 AASHTO LRFD "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2024 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2024 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using force ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NC Dept of Transportation
Division of Highways

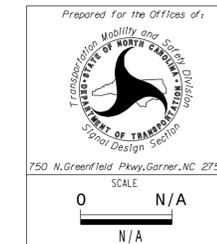
Final Drawing Date: _____

NCDOT Approval _____

All metal poles, arms and pedestals should be black in color as specified in the project special provisions.

DATE: _____	BY: _____

NCDOT Wind Zone 4 (120 mph)



Prepared for the Offices of:	
750 N. Greenfield Pkwy, Garner, NC 27529	
SCALE	N/A
N/A	

Apex Peakway
at
James Street

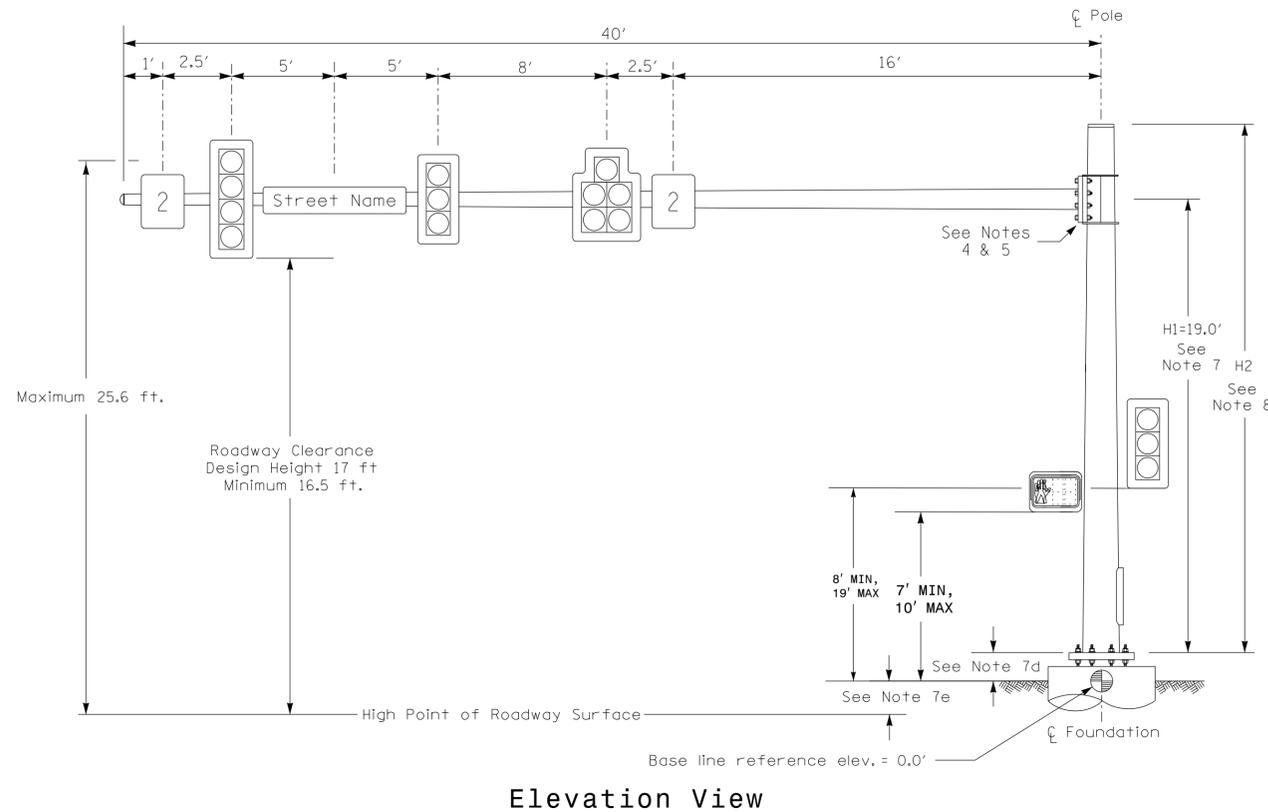
Division 5	Wake County	Apex
PLAN DATE: June 2024	REVIEWED BY: J. L. Lewis	
PREPARED BY: J. Ma	VHB PROJECT NO.: 38523.00	
REVISIONS	INIT.	DATE



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



Design Loading for METAL POLE NO. 3



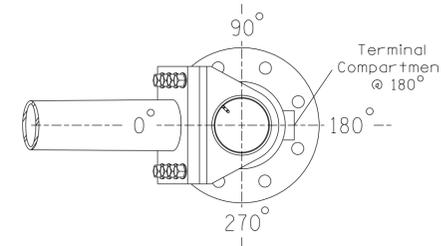
Elevation View

SPECIAL NOTE

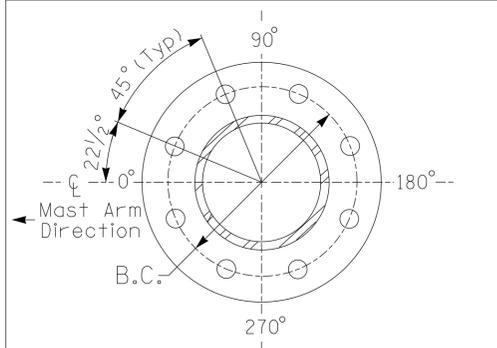
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 3
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	-0.46 ft.
Elevation difference at Edge of travelway or face of curb	-0.46 ft.

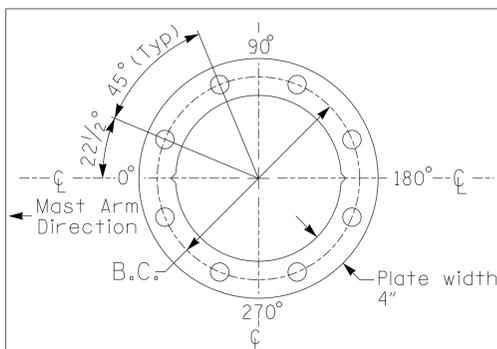


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5" W X 66.0" L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS
	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0" W X 96.0" L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 1st Edition 2015 AASHTO LRFD "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2024 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2024 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using force ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 814-5000.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles, arms and pedestals should be black in color as specified in the project special provisions.

NC Dept of Transportation
Division of Highways
Final Drawing Date: _____
NCDOT Approval

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

NCDOT Wind Zone 4 (120 mph)

Prepared for the Offices of:

Apex Peakway at James Street

Division 5 Wake County Apex

PLAN DATE: June 2024 REVIEWED BY: J. L. Lewis

PREPARED BY: J. Ma VHB PROJECT NO.: 38523.00

SCALE: 0 N/A

REVISIONS: _____ INIT. DATE

750 N. Greenfield Pkwy, Garner, NC 27529

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER J. L. LEWIS 033108

SIGNATURE: J. L. Lewis 6/18/2024

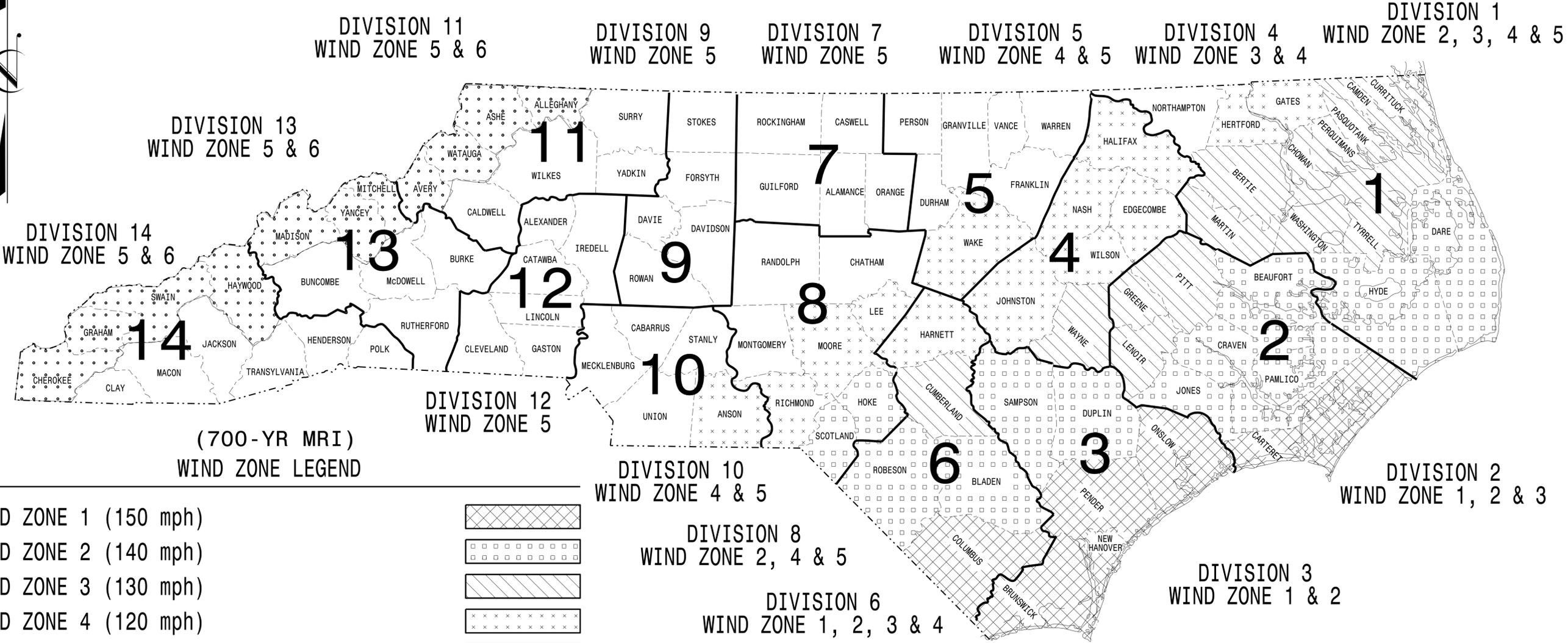
05-1803



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STANDARD DRAWINGS FOR ALL METAL POLES (LRFD)



<https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

NC DOT METAL POLE STANDARDS

03-001-2023 1P-07
S:\IT\AS\11\115\Sig\Drawings\Drawings\2024\Metal Pole Standards\2024 Sig-M1A Standard 411 Metal Pole (700-yr MRI).cdm
Kcarrington

Prepared in the Offices of:

750 N. Greenfield Pkwy.
Garner, NC 27529

Designed in conformance
with the latest
2020 Interim to the
1st Edition 2015

AASHTO LRFD

Standard Specifications for
Highway Signs, Luminaires,
and Traffic Signals

DRAWING NUMBER	INDEX OF PLANS DESCRIPTION
Sig. M 1A	Statewide Wind Zone Map (700-yr MRI)
Sig. M 1B	Statewide Wind Zone Map (10-yr MRI)
Sig. M 2	Typical Fabrication Details-All Metal Poles
Sig. M 3	Typical Fabrication Details-Strain Poles
Sig. M 4	Typical Fabrication Details-Mast Arm Poles
Sig. M 5	Typical Fabrication Details-Mast Arm Connection
Sig. M 6	Typical Fabrication Details-Strain Pole Attachments
Sig. M 7	Construction Details-Foundations
Sig. M 8	Standard Strain Pole Foundation-All Soil Conditions
Sig. M 9	Typical Fabrication Details-CCTV Camera Poles

**MOBILITY AND SAFETY DIVISION -
TRANSPORTATION SYSTEMS MANAGEMENT
AND OPERATIONS UNIT**

D.Y. ISHAK - STATE SIGNALS ENGINEER
K. DURIGON, P.E. - ITS AND SIGNALS STRUCTURAL ENGINEER
B. WALKER, P.E. - ITS AND SIGNALS STRUCTURAL ENGINEER

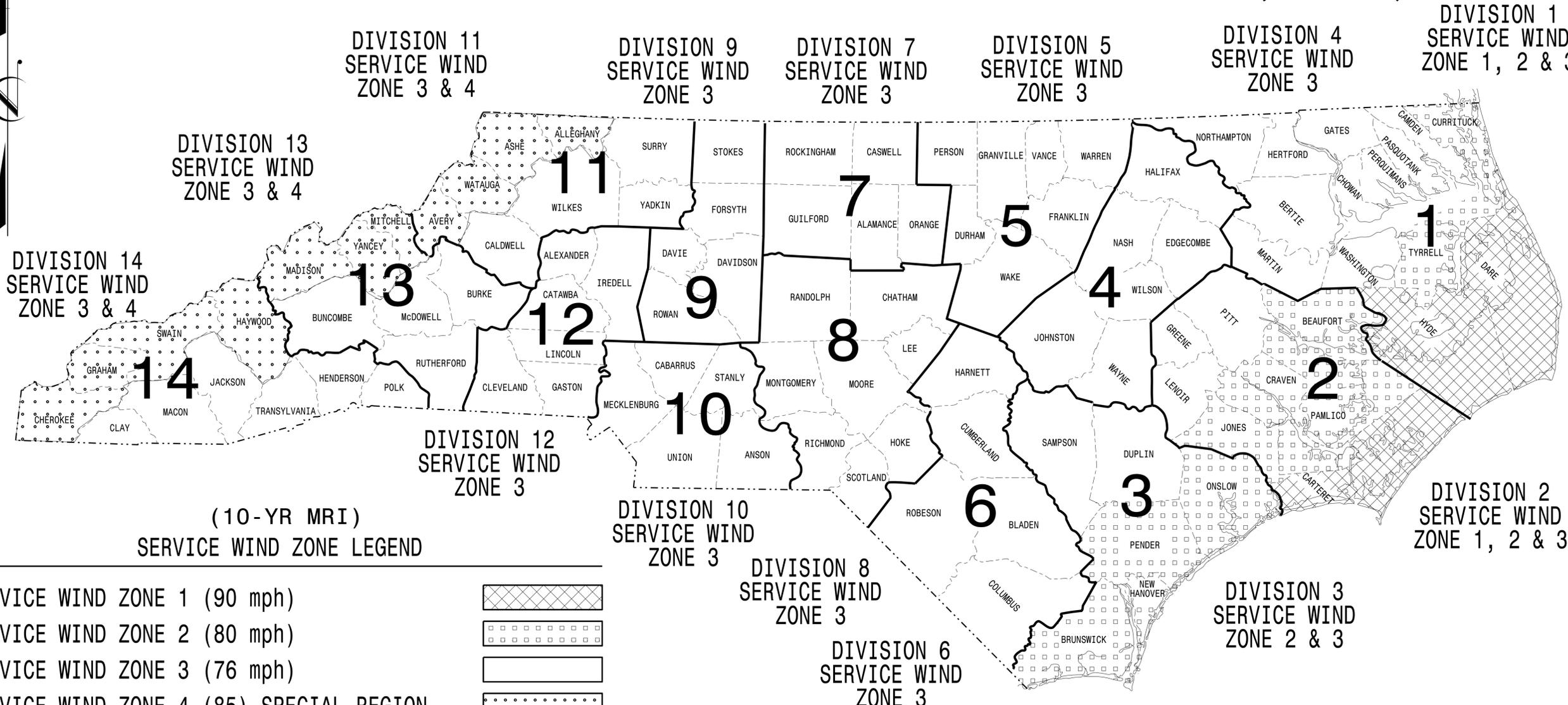
SEAL

DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3764DA

09/21/2023
DATE

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STANDARD DRAWINGS FOR ALL METAL POLES (LRFD)



(10-YR MRI)
SERVICE WIND ZONE LEGEND

SERVICE WIND ZONE 1 (90 mph)	
SERVICE WIND ZONE 2 (80 mph)	
SERVICE WIND ZONE 3 (76 mph)	
SERVICE WIND ZONE 4 (85) SPECIAL REGION	

<https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

NC DOT METAL POLE STANDARDS

03-OCT-2023 10:51 S:\IT\AS\11\15\Sig\Drawings\Drawings\2024_Metal_Pole_Standards\11-Metal_Pole_Standards.dwg

Prepared in the Offices of:

750 N. Greenfield Pkwy.
Garner, NC 27529

Designed in conformance with the latest 2020 Interim to the 1st Edition 2015

AASHTO LRFD

Standard Specifications for Highway Signs, Luminaires, and Traffic Signals

DRAWING NUMBER	INDEX OF PLANS DESCRIPTION
Sig. M 1A	Statewide Wind Zone Map (700-yr MRI)
Sig. M 1B	Statewide Wind Zone Map (10-yr MRI)
Sig. M 2	Typical Fabrication Details-All Metal Poles
Sig. M 3	Typical Fabrication Details-Strain Poles
Sig. M 4	Typical Fabrication Details-Mast Arm Poles
Sig. M 5	Typical Fabrication Details-Mast Arm Connection
Sig. M 6	Typical Fabrication Details-Strain Pole Attachments
Sig. M 7	Construction Details-Foundations
Sig. M 8	Standard Strain Pole Foundation-All Soil Conditions
Sig. M 9	Typical Fabrication Details-CCTV Camera Poles

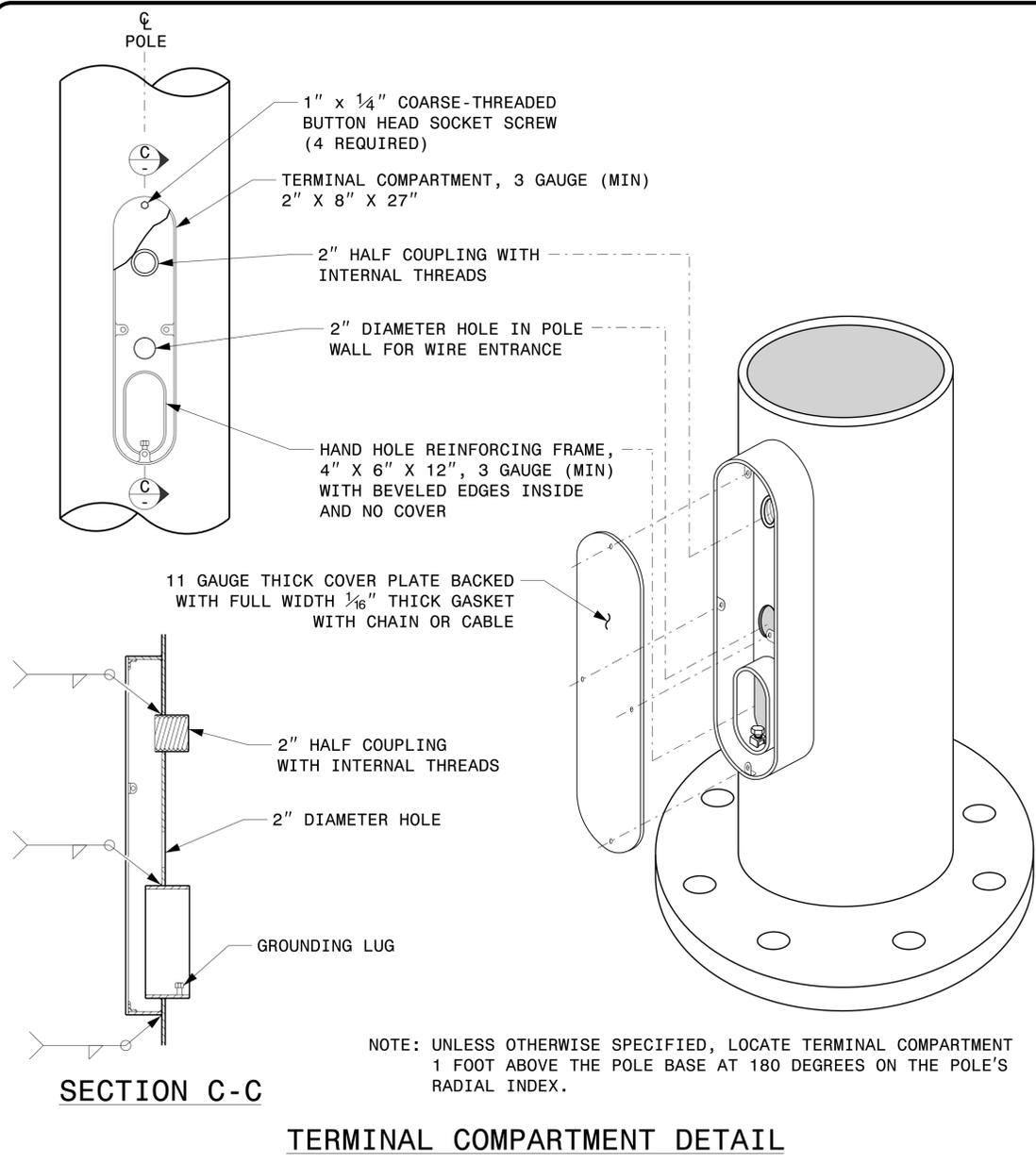
NC DOT CONTACTS:
MOBILITY AND SAFETY DIVISION -
TRANSPORTATION SYSTEMS MANAGEMENT
AND OPERATIONS UNIT

D.Y. ISHAK - STATE SIGNALS ENGINEER
K. DURIGON, P.E. - ITS AND SIGNALS STRUCTURAL ENGINEER
B. WALKER, P.E. - ITS AND SIGNALS STRUCTURAL ENGINEER

SEAL

DocuSigned by:
Kevin Durigon
4B23DC78B3784DA

09/21/2023
DATE



MFG _____	MFG. DATE: MM/YY
SHAFT D/T/L/Y/...../.....
ARM-A D/T/L/Y/...../.....
ARM-B D/T/L/Y/...../.....
A.B. DIA./B.C./L/Y/...../.....
NCDOT SIG. INV. NO.
NCDOT POLE NO.

MFG _____	MFG. DATE: MM/YY
SECTION D/T/L/Y/...../.....
NCDOT SIG. INV. NO.
NCDOT POLE NO.

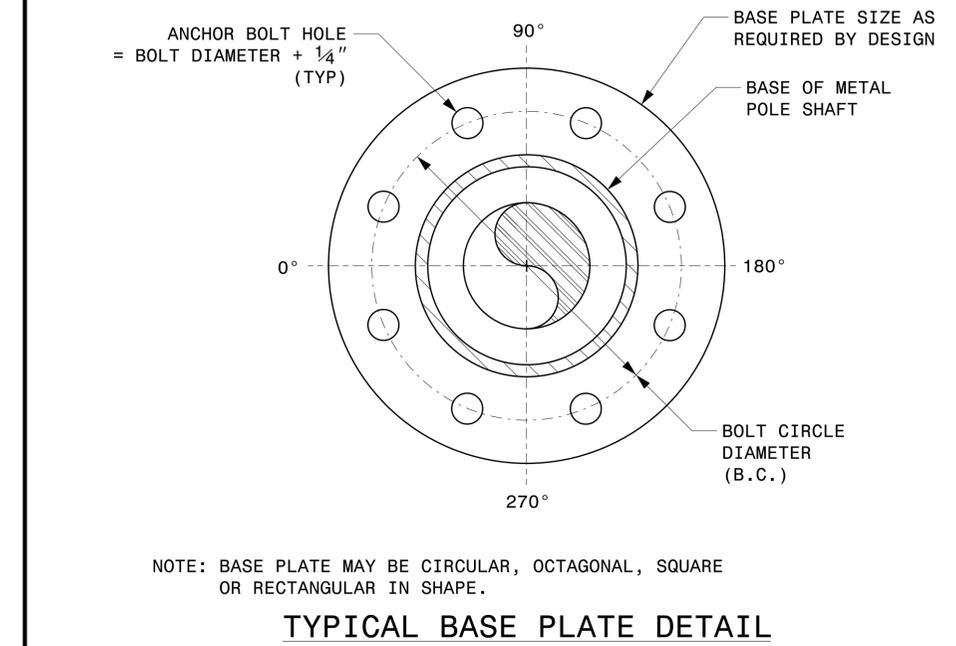
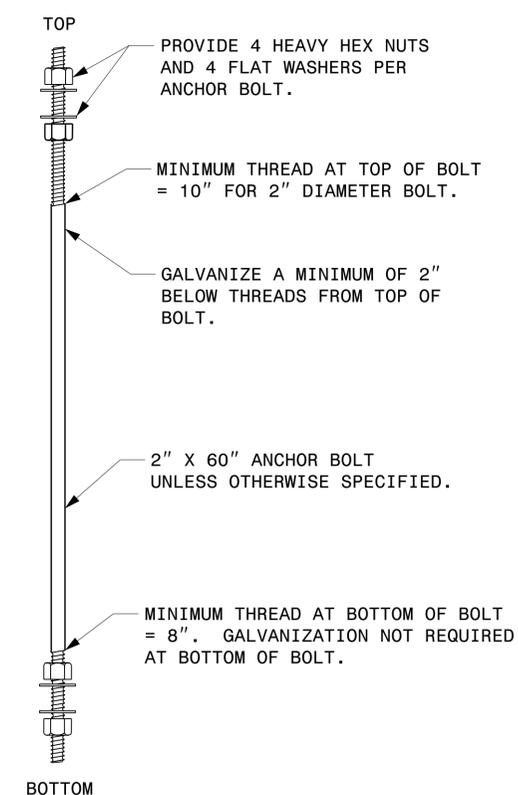
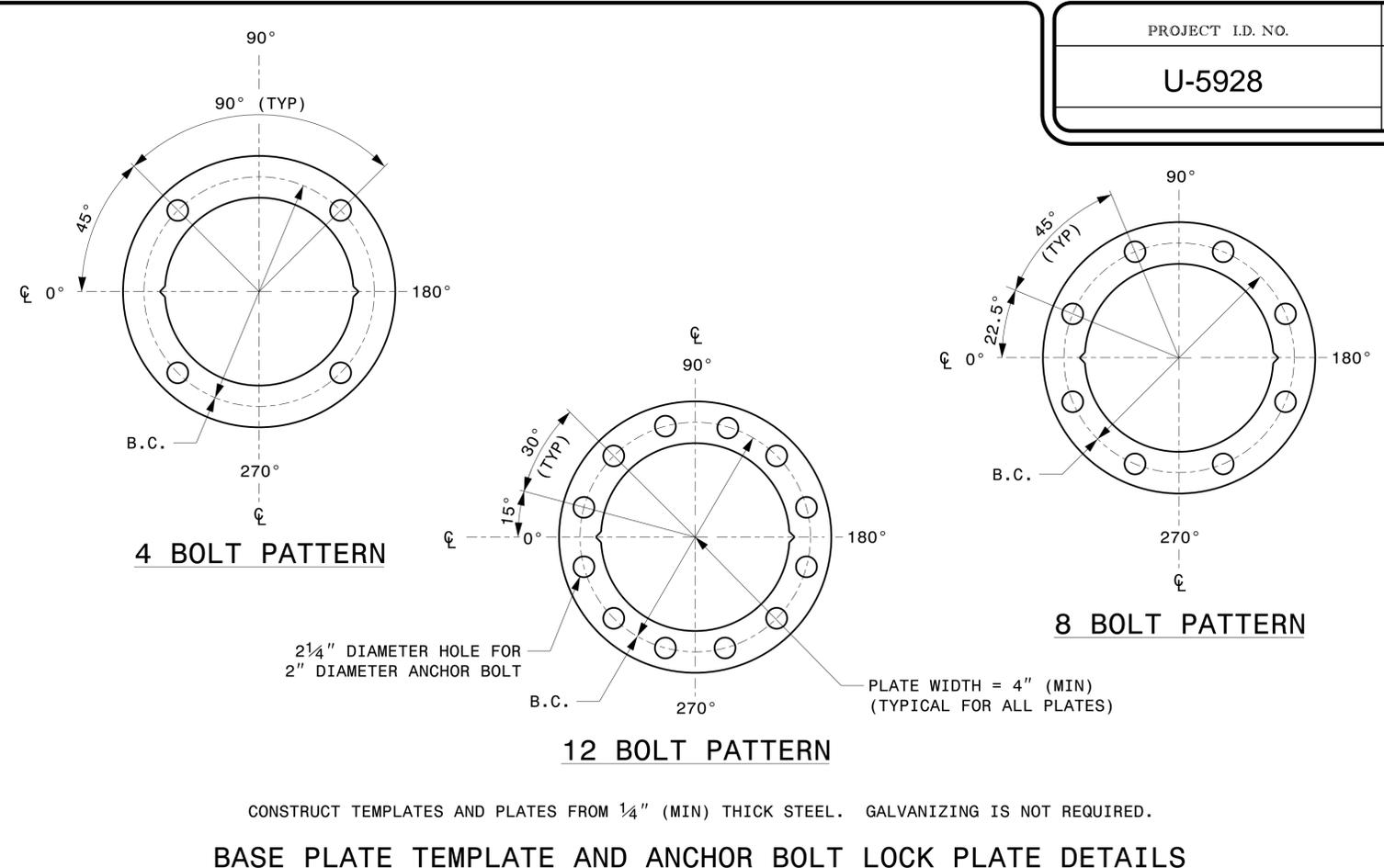
ARM I.D. TAG
(PROVIDE ON EACH SECTION OF A MULTI-SECTION MAST ARM)

SHAFT I.D. TAG
(PROVIDE ON SHAFT OF STRAIN POLES AND MAST ARM POLE SHAFT)

NOTES:

- D = DIAMETER, T = THICKNESS, L = LENGTH, Y = YIELD STRENGTH
- A.B. = ANCHOR BOLT
- B.C. = BOLT CIRCLE OF ANCHOR BOLTS
- IF STANDARD DESIGN, INCLUDE CASE NUMBER IN ADDITION TO POLE NUMBER ON "NCDOT POLE NO." LINE.
- SIGNAL INV. NUMBER AND POLE I.D. NUMBER. SEE DRAWING M3 AND M4 FOR MOUNTING POSITIONS OF I.D. TAGS.

IDENTIFICATION TAG DETAILS



Prepared in the Offices of:
Typical Fabrication Details For All Metal Poles

PLAN DATE: SEPTEMBER 2023 DESIGNED BY: C.F. ANDREWS
PREPARED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR

REVISIONS	INIT.	DATE

DocuSigned by:
Kevin Durigon
4P23DC79B3784DA

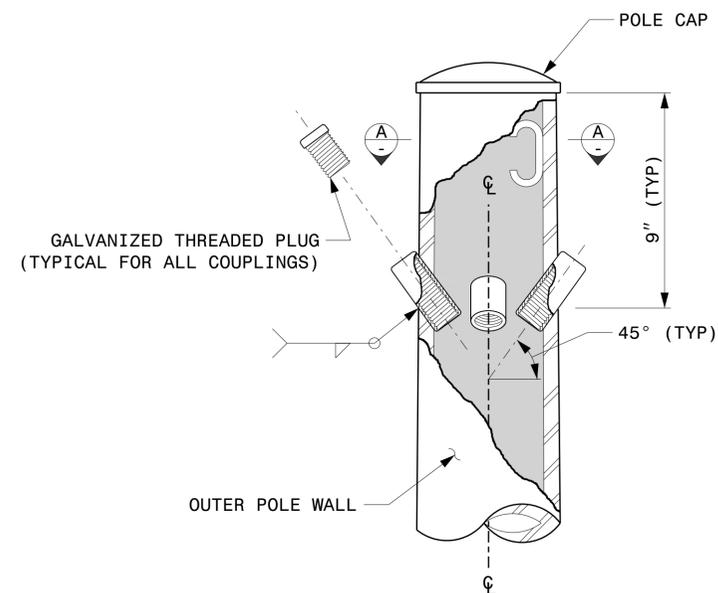
09/21/2023
DATE

04_dpt_2023_10.dwg
S:\155\1551415_Signal\Signal Design Section\Structures\Drawings\2024 Metal Pole Std Drawings For U-5928\Sig.M2_Std_Fabrication_Details-411_Poles.dgn
Kedar Figue

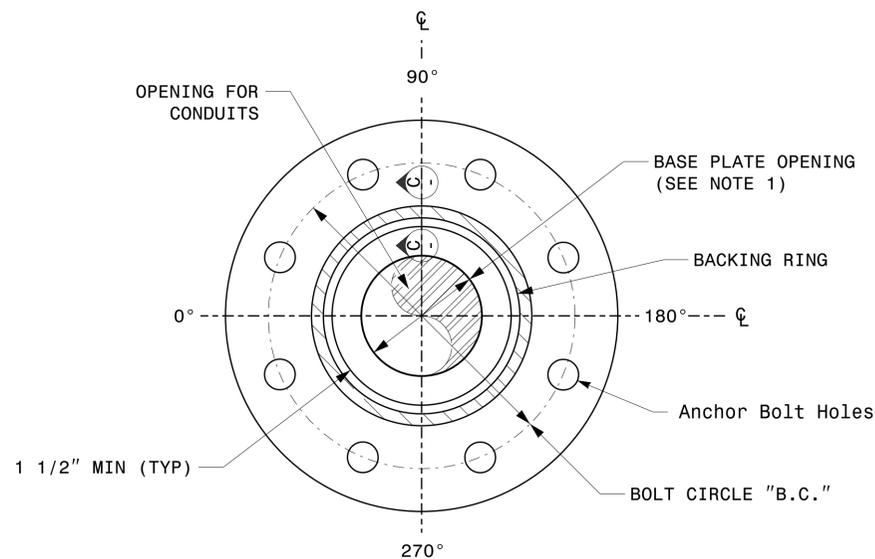
Fabrication Details – All Metal Poles

NOTE:

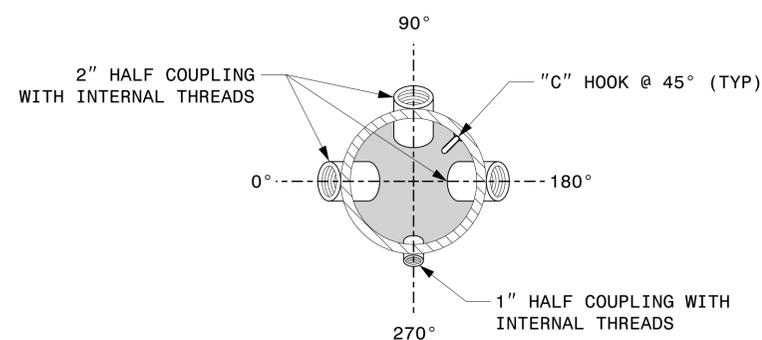
1. OPENING IN POLE BASE PLATE SHALL BE EQUAL TO POLE BASE INSIDE DIAMETER MINUS $3\frac{1}{2}$ " BUT SHALL NOT BE LESS THAN $8\frac{1}{2}$ ".



CABLE ENTRANCES AT TOP OF POLE

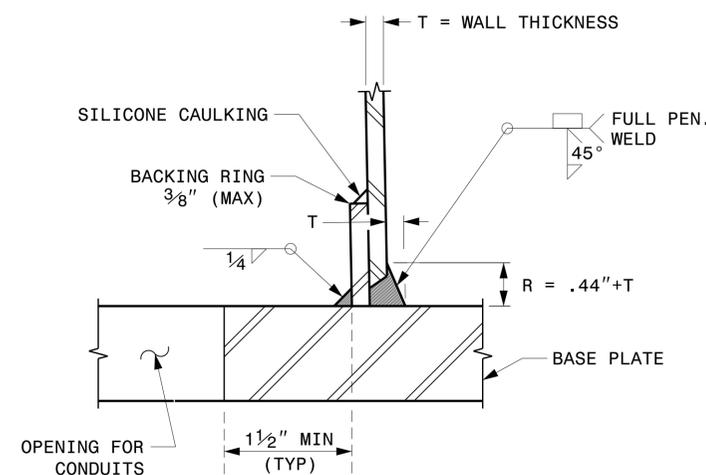


SECTION B-B
POLE BASE PLATE DETAILS
(8 AND 12 BOLT PATTERN)

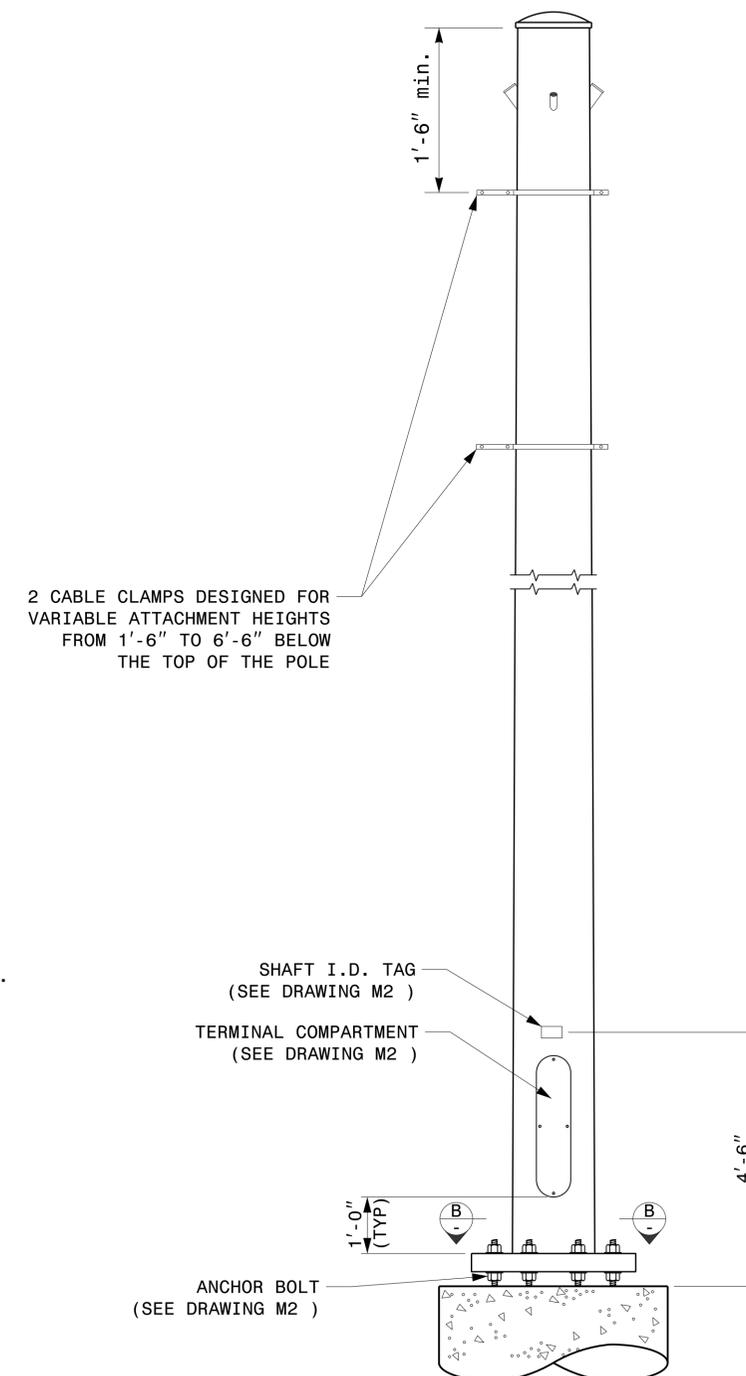


SECTION A-A

RADIAL ORIENTATION OF FACTORY INSTALLED ACCESSORIES AT TOP OF POLE



SECTION C-C
(POLE ATTACHMENT TO BASE PLATE)
FULL-PENETRATION GROOVE WELD DETAIL



MONOTUBE STRAIN POLE

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

Typical Fabrication Details For Strain Poles	
PLAN DATE: SEPTEMBER 2023	DESIGNED BY: K.C. DURIGON
PREPARED BY: K.C. DURIGON	REVIEWED BY: D.C. SARKAR
REVISIONS	INIT. DATE

SEAL

DocuSigned by:
Kevin Durigon
SIGNATURE

09/23/2023
DATE

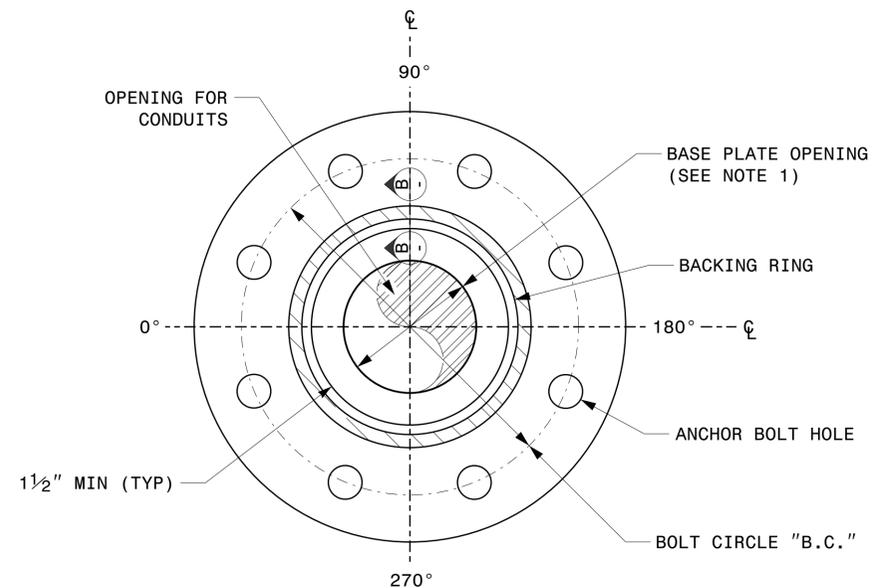
4B23DC79B3728ADA

08-dt-2023-10-31
S:\ISSUES\15-SIGNAL\Signal Design Section\Structures\Drawings\2024\Monot Pole Str Drawing for LRF\2024 Sig.M3 Str. Fabrication Details-Strain Poles.dgn
Kedar Durigon

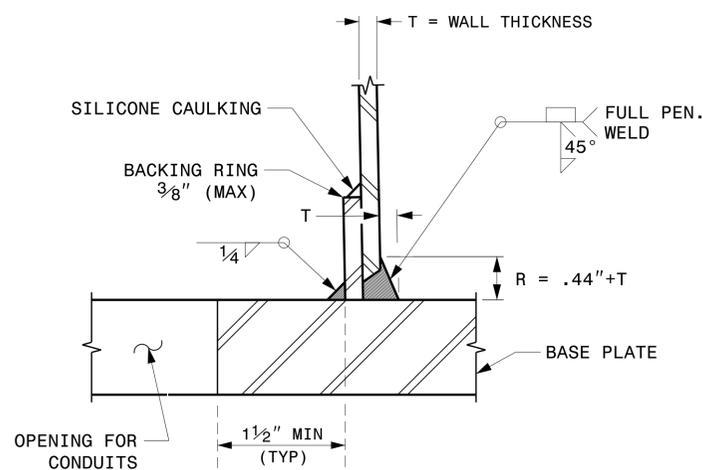
Fabrication Details – Strain Poles

NOTE:

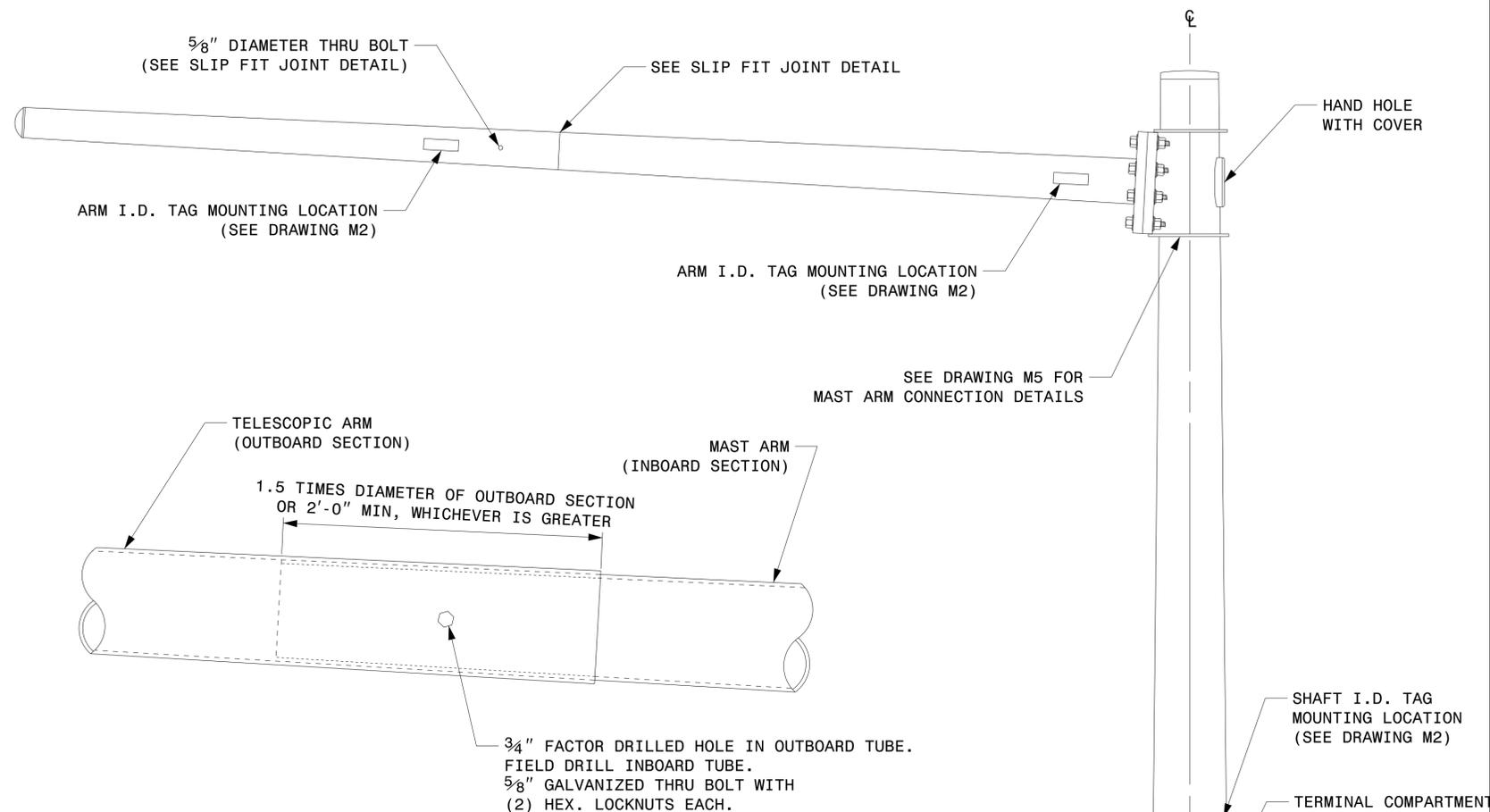
1. OPENING IN POLE BASE PLATE SHALL BE EQUAL TO POLE BASE INSIDE DIAMETER MINUS 3 1/2" BUT SHALL NOT BE LESS THAN 8 1/2".



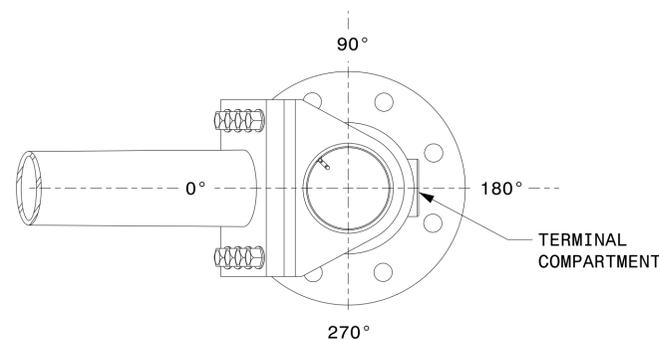
SECTION A-A
POLE BASE PLATE DETAILS



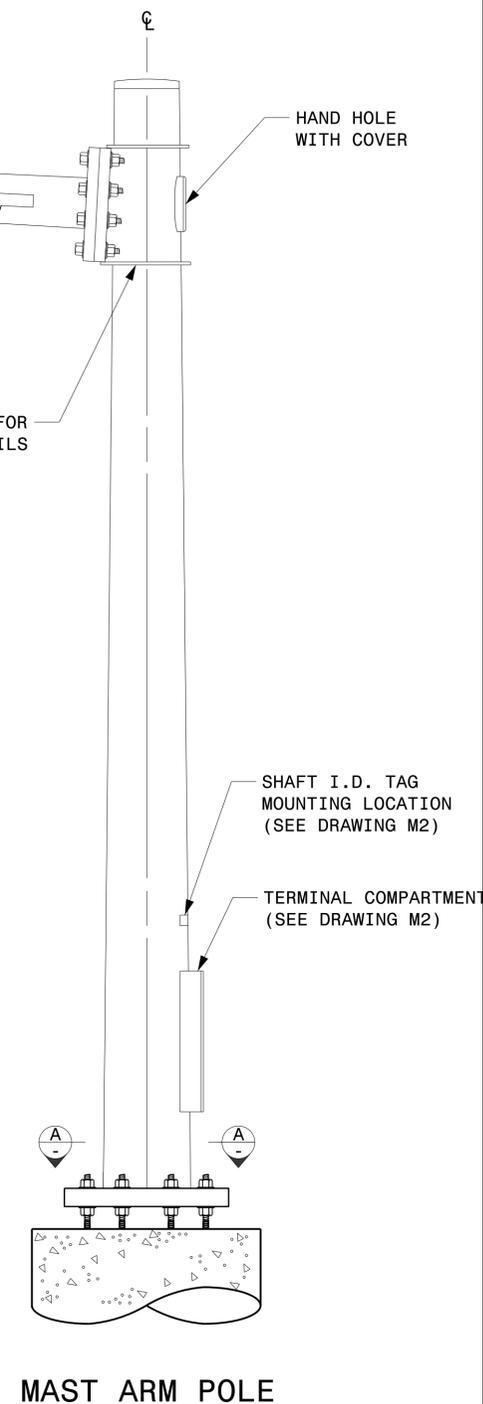
SECTION B-B
(POLE ATTACHMENT TO BASE PLATE)
FULL-PENETRATION
GROOVE WELD DETAIL



SLIP FIT JOINT DETAIL FOR MAST ARM



MAST ARM RADIAL ORIENTATION



MAST ARM POLE

Fabrication Details – Mast Arm Poles

<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>Typical Fabrication Details For Mast Arm Poles</p>		<p>SEAL</p>								
	<p>PLAN DATE: SEPTEMBER 2023 DESIGNED BY: K.C. DURIGON</p> <p>PREPARED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR</p>	<table border="1"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		REVISIONS	INIT.	DATE					
REVISIONS	INIT.	DATE									

03-dt-2023-10-31
S:\ISSUES\415-Signal\Signal Design\Structures\Drawings\2024\Metal Pole Std Drawings for LRF\042024_Sig.M4 Str. Fabrication Details-Mast Arm Poles.dgn
Kedar Durigon

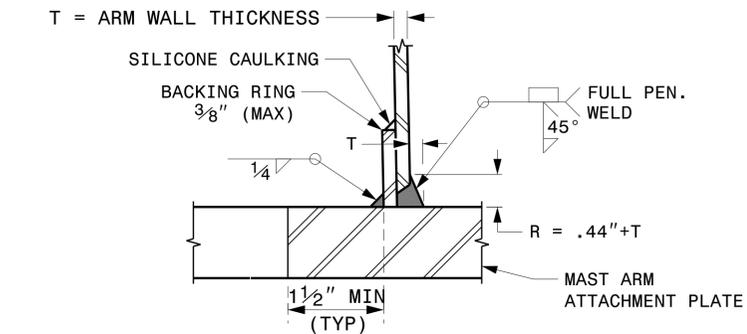
WELDED RING STIFFENED MAST ARM CONNECTION

PROJECT I.D. NO.

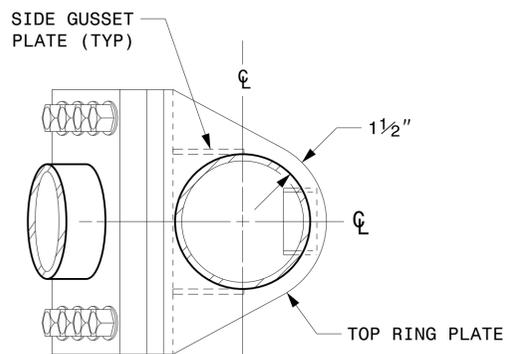
SHEET NO.

U-5928

Sig.M5



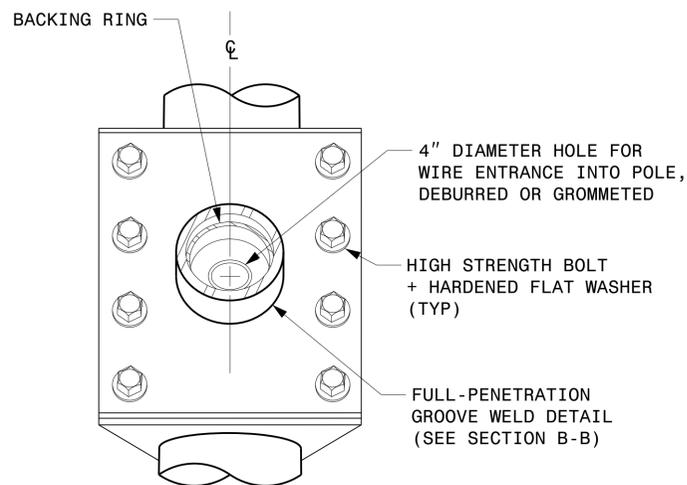
**SECTION B-B
FULL-PENETRATION GROOVE WELD DETAIL**



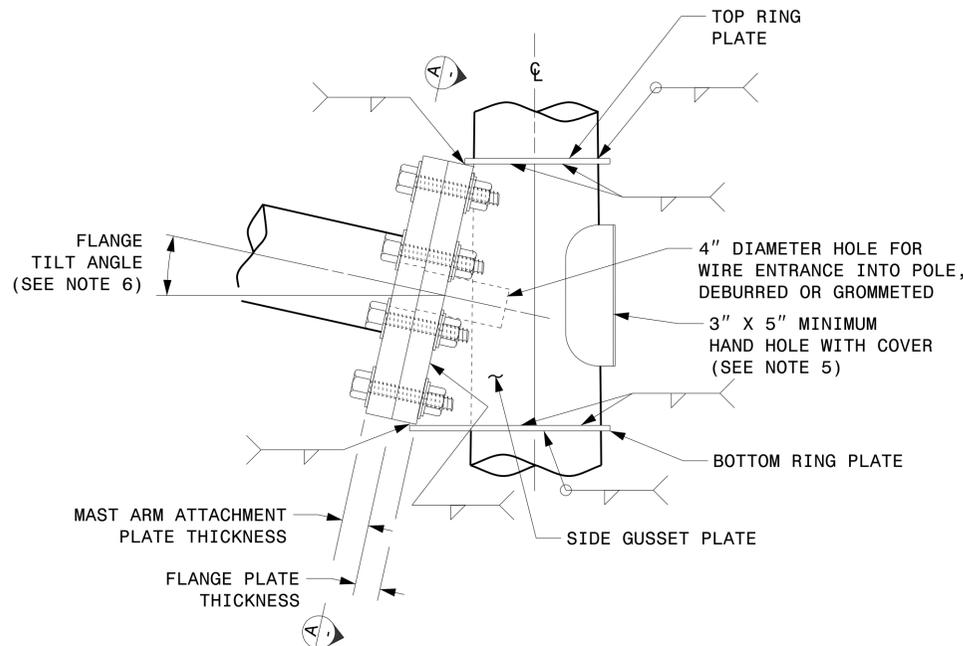
PLAN VIEW

NOTES:

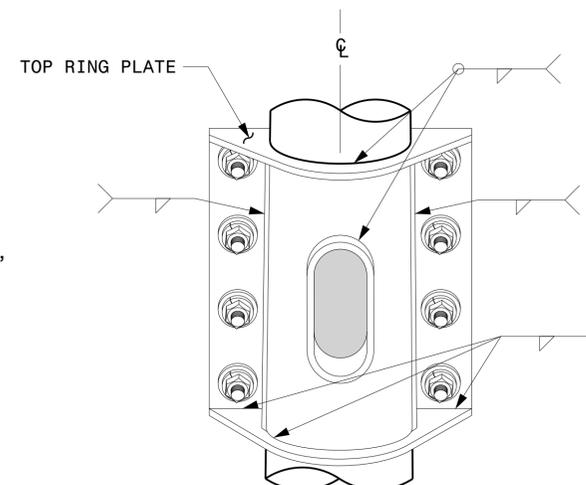
1. PROVIDE A PERMANENT MEANS OF IDENTIFICATION ABOVE THE MAST ARM TO INDICATE PROPER ATTACHMENT ORIENTATION OF THE MAST ARM.
2. DESIGNER WILL DETERMINE THE SIZE OF ALL STRUCTURAL COMPONENTS, PLATES, FASTENERS, AND WELDS SHOWN UNLESS THEY ARE ALREADY SPECIFIED.
3. FABRICATOR IS RESPONSIBLE FOR PROVIDING APPROPRIATE HOLES AT DRAINAGE POINTS TO DRAIN GALVANIZING MATERIALS.
4. FOR MINIMUM EDGE DISTANCE AND NOMINAL BOLT HOLE SIZE, FOLLOW THE LATEST AISC STEEL CONSTRUCTION MANUAL.
5. PROVIDE UPPER HANDHOLE AS NECESSARY WHEN SHAFT EXTENSIONS ARE REQUIRED FOR LUMINAIRE ARMS OR CAMERA. FOR POLES WITHOUT LUMINAIRES/CAMERA, WIRING CAN BE DONE THROUGH THE TOP OF POLE.
6. ALLOWABLE RANGE OF FLANGE TILT ANGLE WILL VARY FROM 0° TO AS REQUIRED.



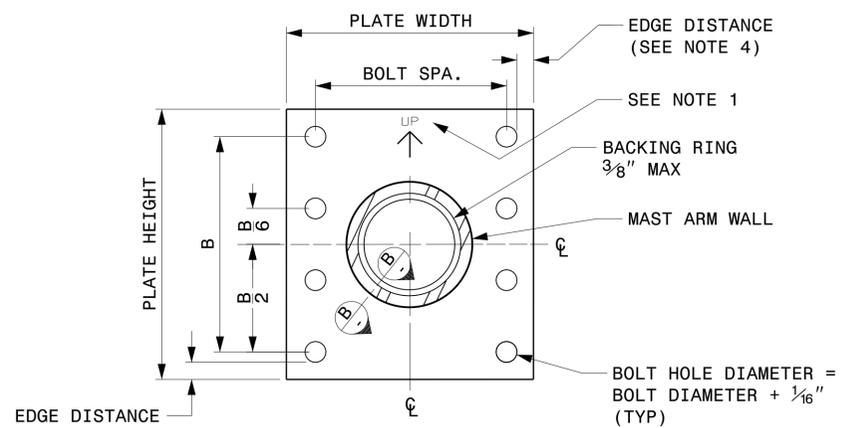
FRONT ELEVATION VIEW



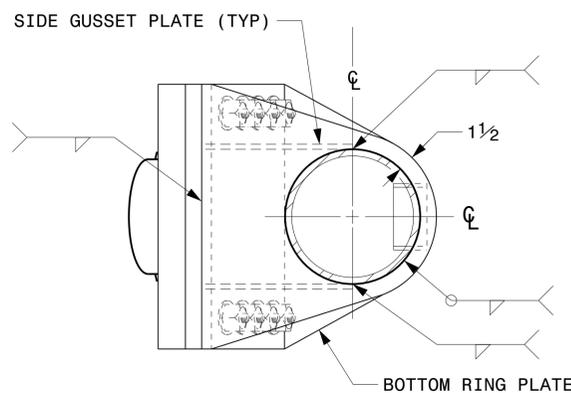
SIDE ELEVATION VIEW



BACK ELEVATION VIEW



**SECTION A-A
MAST ARM ATTACHMENT PLATE**



BOTTOM VIEW

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: NA
NONE

Typical Fabrication Details For Mast Arm Connection To Pole	
PLAN DATE: SEPTEMBER 2023	DESIGNED BY: C.F. ANDREWS
PREPARED BY: K.C. DURIGON	REVIEWED BY: D.C. SARKAR
REVISIONS	INIT. DATE

SEAL

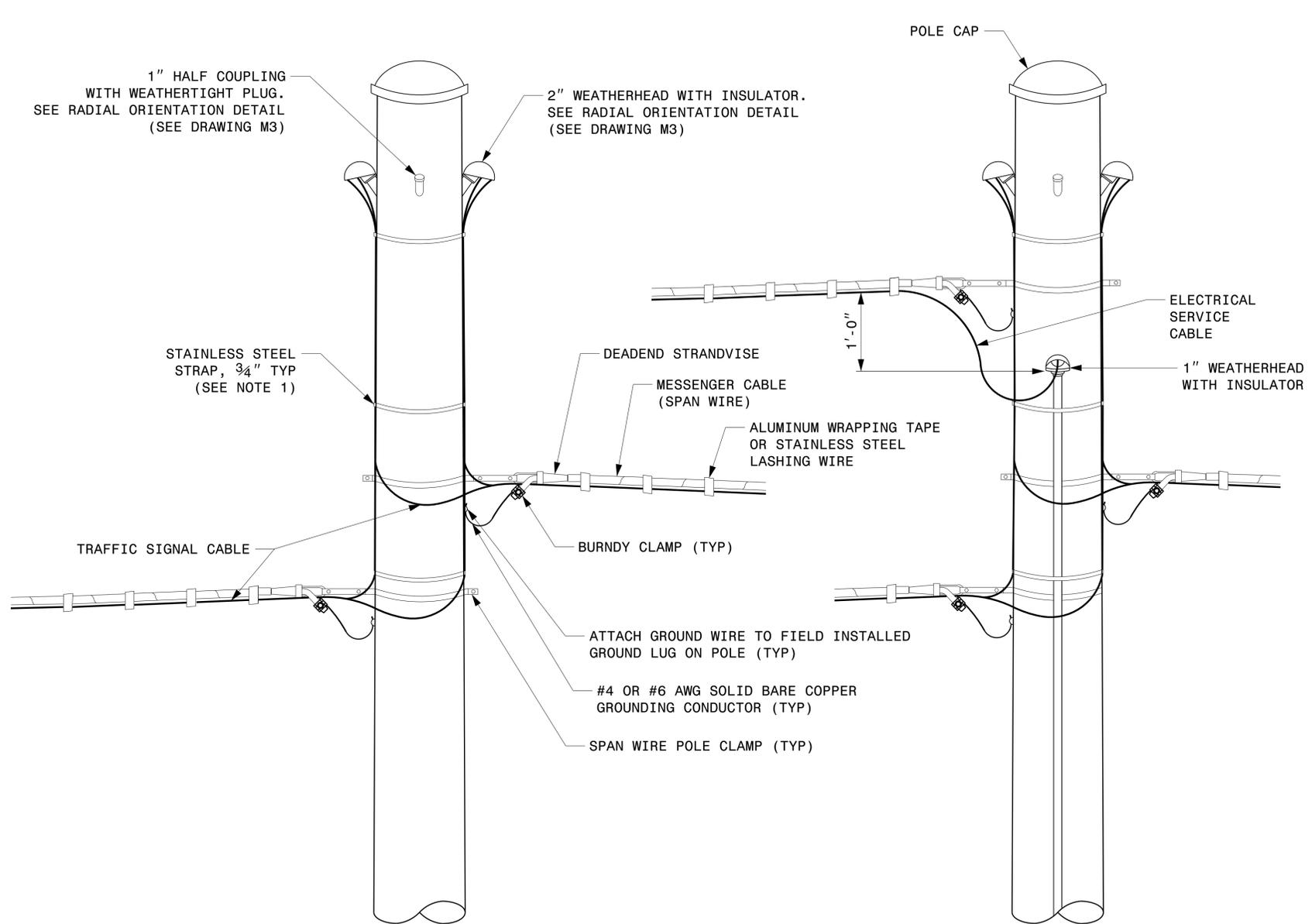
DocuSigned by:
Kevin Durigon
SIGNATURE

09/21/2023
DATE

4B23DC79B3784DA

03-dt-2023-10-30
S:\SSS\415\Sigal\Signal Design Section\Structures\Drawings\2024 Merit Pole Std Drawings for LRF\0204_Sig.M5 Str. Connection Fabrication Detail\1-Mast Arm Poles.dgn
Kedar Tagon

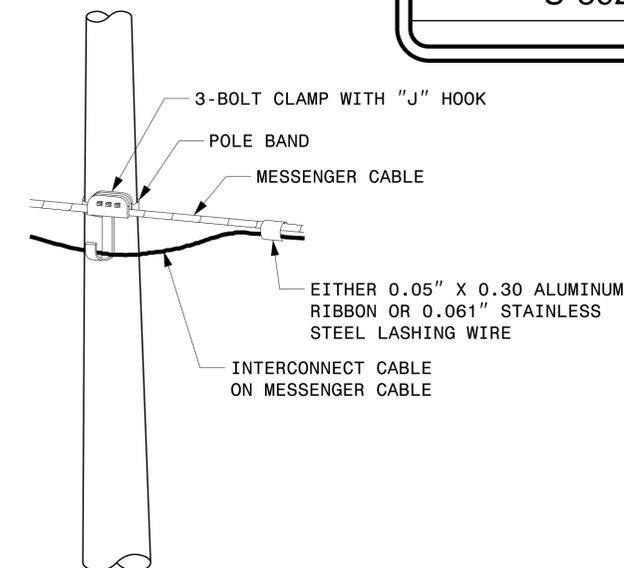
Fabrication Details – Mast Arm Connection



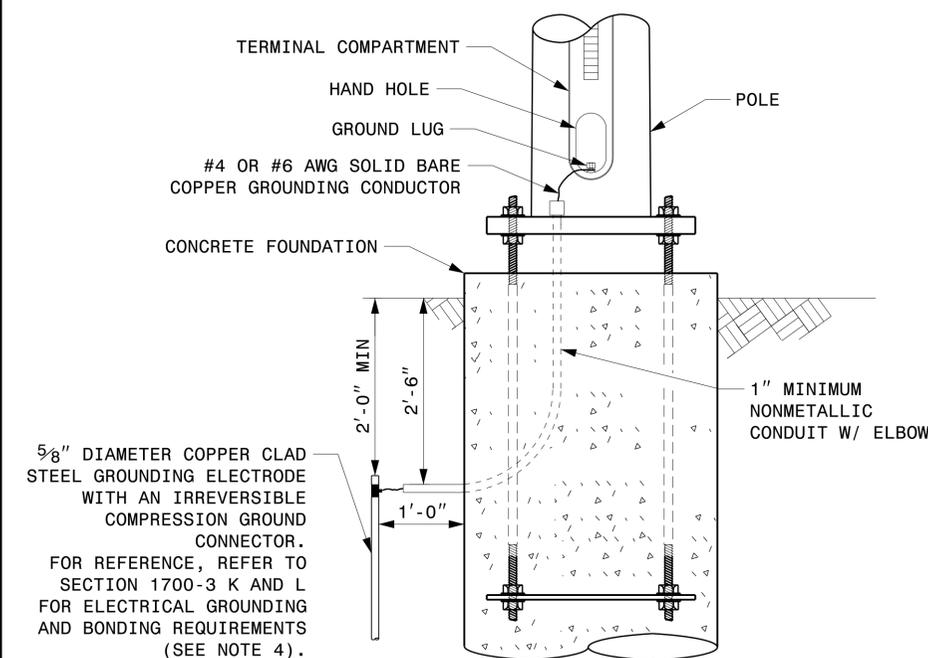
STRAIN POLE ATTACHMENTS

NOTES:

1. STRAP ALL SIGNAL CABLES TO THE SIDE OF THE POLE WITH 3/4" STAINLESS STEEL STRAPS WHEN THE DISTANCE BETWEEN SPAN WIRE ATTACHMENT CLAMP AND WEATHERHEADS EXCEEDS 3'-0".
2. PROVIDE MINIMUM TWO SPAN WIRE POLE CLAMPS PER POLE.
3. IT IS PROHIBITED TO ATTACH TWO SPAN WIRES AT ONE POLE CLAMP.
4. FOR GENERAL REQUIREMENTS, REFER TO NCDOT STANDARD SPECIFICATIONS FOR ROADWAY AND STRUCTURES, JANUARY 2024.



ATTACHMENT OF CABLE TO INTERMEDIATE METAL POLE



METAL POLE GROUNDING DETAIL FOR STRAIN POLE AND MAST ARM

08-dpt-2023-10-11
S:\ISSUES\15 Signal\Signal Design\Structures\Drawings\2024 Metal Pole Str. Fabrication Details-Strain Poles.dgn
Kedar Tigon

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: 0 NA NONE

Typical Fabrication Details For Strain Pole Attachments

PLAN DATE: SEPTEMBER 2023 DESIGNED BY: C.F. ANDREWS

PREPARED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR

REVISIONS	INIT.	DATE

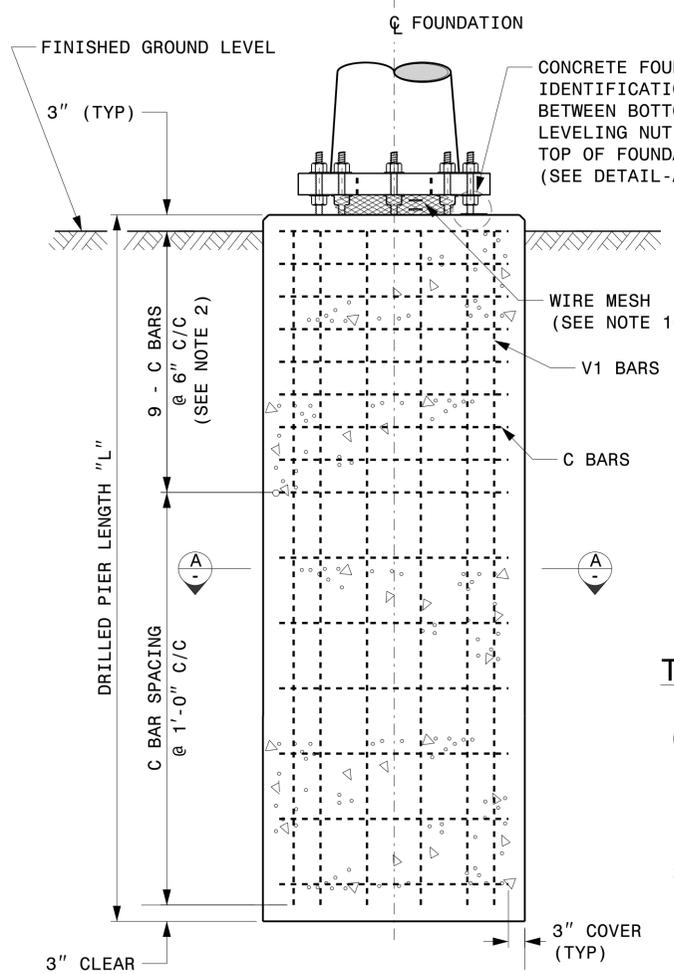
SEAL

DocuSigned by: Kevin Durigon

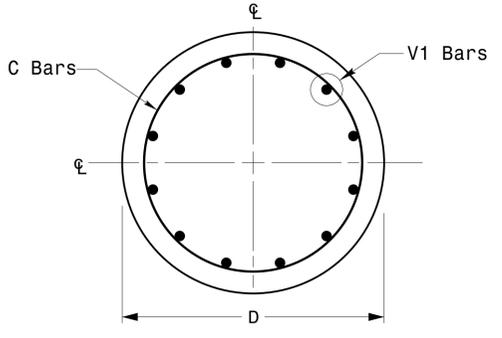
4B23DC79B3784DA

09/21/2023 DATE

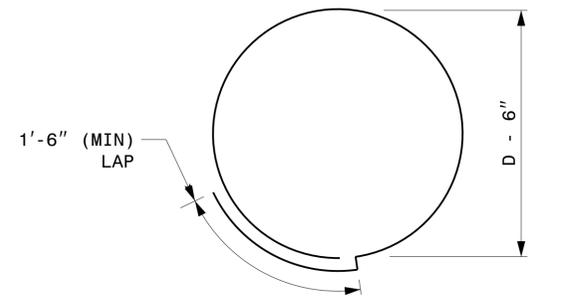
Fabrication Details – Strain Pole Attachments



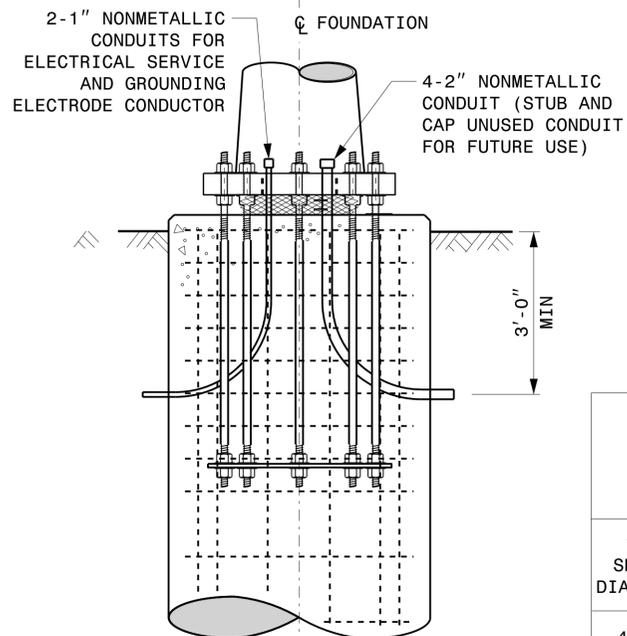
CONCRETE SHAFT ELEVATION



SECTION A-A



TYPICAL "C" BAR DETAIL



TYPICAL FOUNDATION CONDUIT DETAILS

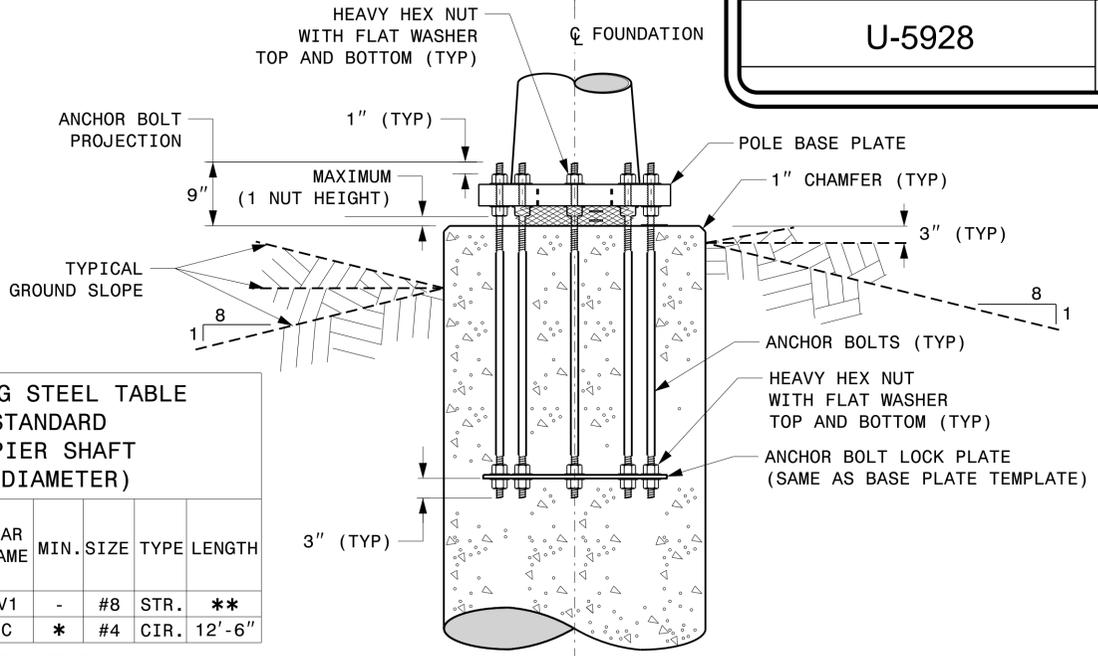
GENERAL NOTES:

- IF ACTUAL SUBSURFACE CONDITIONS DIFFER SIGNIFICANTLY FROM BORING DATA, CONTACT THE ENGINEER BEFORE EXCAVATING OR PLACING CONCRETE.
- CIRCULAR TIE REINFORCING RINGS MAY BE VERTICALLY ADJUSTED BY +/-3" AT A DEPTH BETWEEN 2'-0" AND 3'-0" TO FACILITATE THE INSTALLATION OF ELECTRICAL CONDUIT ENTERING IN THE CAGE.
- FOR STANDARD FOUNDATIONS, SEE SHEET SIG. M8 FOR DETAILS. VERTICAL REINFORCING BARS (V1) MAY BE HORIZONTALLY ADJUSTED BY +/-3" TO FACILITATE THE INSTALLATION OF ELECTRICAL CONDUIT ENTERING INTO THE CAGE.
- PROVIDE 2" TO 5" FOUNDATION PROJECTION ABOVE GROUND LEVEL, DEPENDING ON THE GROUND SLOPE.
- UNLESS OTHERWISE SHOWN, FOUNDATION DESIGNS ARE BASED ON NON-SLOPING LEVEL GROUND SURFACES WITH SLOPE RATIOS OF 8:1 (H:V) OR FLATTER. IF ACTUAL GROUND LINE SLOPES ARE STEEPER, CONTACT THE ENGINEER BEFORE EXCAVATING OR PLACING CONCRETE.
- CONSTRUCT FOUNDATIONS IN ACCORDANCE WITH NCDOT STANDARD PROVISIONS SP09 R005- FOUNDATIONS AND ANCHOR ROD ASSEMBLIES FOR METAL POLES. ALL APPLICABLE 2024 NCDOT STANDARD SPECIFICATIONS ARE REFERENCED IN THIS PROVISION. REFER TO THE NCDOT RESOURCES/SPECIFICATIONS PAGE LOCATED ON THE CONNECT NCDOT WEBSITE.
[https://connect.ncdot.gov/resources/Specifications and Special Provisions.aspx](https://connect.ncdot.gov/resources/Specifications%20and%20Special%20Provisions.aspx)
- USE AIR ENTRAINED AA CONCRETE MIX WITH A COMPRESSION STRENGTH OF $f'c=4500$ psi (MIN) AFTER 28 DAYS.
- USE ASTM A615 GRADE 60 DEFORMED BARS FOR ALL REINFORCING STEEL. MAINTAIN AT LEAST 3" COVER ON ALL REINFORCEMENT.
- LOCATE IDENTIFICATION TAG ON TOP OF THE FOUNDATION, DIRECTLY ABOVE THE CONDUIT'S ENTRY POINT.
- PROVIDE TWO LAYERS OF 4 MESH GALVANIZED WELDED 23 GAUGE (0.025) 6" WIDE AROUND PIPES UNDER THE BASE PLATE AND SECURE IT WITH TIES IF NECESSARY.
- PREFERRED LOCATION FOR THE I.D. TAG IS AS SHOWN IN DETAIL-A: DIRECTLY ABOVE THE CONDUIT ENTERING THE FOUNDATION.

REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (4'-0" DIAMETER)

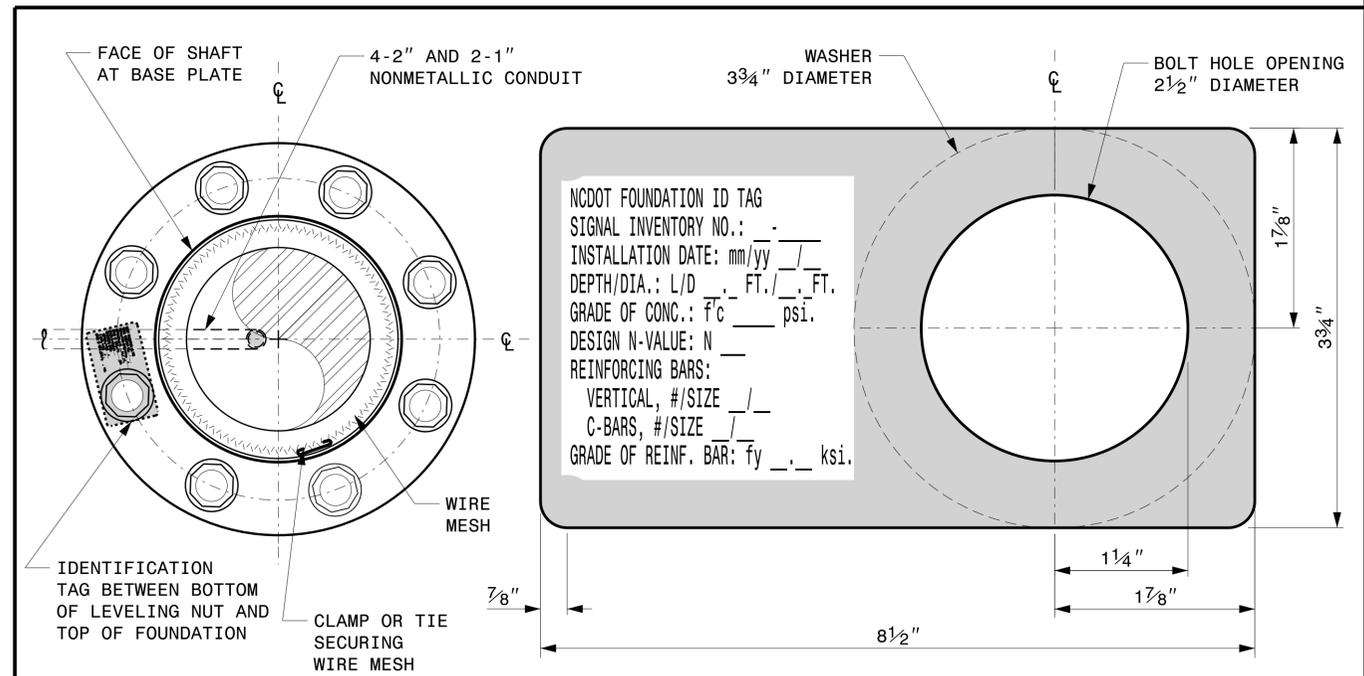
"D" SHAFT DIAMETER	CONCRETE VOLUME (CU. YDS)	BAR NAME	MIN. SIZE	TYPE	LENGTH
4'-0"	.465 X L	V1	#8	STR.	**
		C	#4	CIR.	12'-6"

* SEE NOTE 2
** SEE NOTE 3



TYPICAL FOUNDATION ANCHOR BOLT DETAILS

(REINFORCING CAGE NOT SHOWN FOR CLARITY)



CONCRETE FOUNDATION IDENTIFICATION TAG DETAILS

D = DIAMETER
L = LENGTH / DEPTH
mm = MONTH
yy = YEAR

DETAIL-A

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

Construction Details For Foundations

PLAN DATE: SEPTEMBER 2023 DESIGNED BY: K.C. DURIGON
PREPARED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR

SCALE: NA
NONE

SEAL
KEVIN C. DURIGON
ENGINEER
036626

DocuSigned by:
Kevin Durigon
4B23DC78F8784DA

09/21/2023 DATE

03-dt-2023-10-4f
S:\SSS\0415\Sig.M7\Str. Construction Details\Strain Poles.dgn
Kedar Tigon

Construction Details - Foundations

SOIL CONDITION

PROJECT I.D. NO. SHEET NO.

U-5928

Sig.M8

STANDARD STRAIN POLES						STANDARD FOUNDATIONS 48" Diameter Drilled Pier Length (L) – Feet							Reinforcement			
Case No.	Pole Height (Ft.)	Base Plate BC (In.)	Reactions at the Pole Base			Clay				Sand			Longitudinal		Stirrups	
			Axial (kip)	Shear (kip)	Moment (ft-kip)	Medium N-Value 4-8	Stiff N-Value 9-15	Very Stiff N-Value 16-30	Hard N-Value >30	Loose N-Value 4-10	Medium N-Value 11-30	Dense N-Value >30	Bar Size (#)	Quantity (ea.)	Bar Size (#)	Spacing (in.)
S26L1	26	22	2	9	210	19.5	12.5	9	6.5	15.5	14.5	13	8	12	4	12
S26L2	26	23	2	10	240	19.5	12	9	6.5	15.5	14.5	13	8	12	4	12
S26L3	26	25	2	11	260	20.5	12	10	8	16	15	13	8	12	4	12
S30L1	30	22	2	9	230	19	11	9	7	15.5	14	12.5	8	12	4	12
S30L2	30	23	2	10	270	20	12	10	8	16	14.5	13	8	12	4	12
S30L3	30	25	2	11	290	21	12	10	8	17	15	13.5	8	12	4	12
S30H1	30	25	3	13	355	23	13	11	9	18	16.5	14.5	8	12	4	12
S30H2	30	29	3	15	405	25	14	11	9	19	17.5	15.5	8	14	4	12
S30H3	30	29	3	16	430	26	15	12	9	20	18	16	8	14	4	6
S35L1	35	22	3	8	260	19.5	12	10	8	15.5	14.5	13	8	12	4	12
S35L2	35	23	3	10	300	21	12	10	8	16.5	15	13.5	8	12	4	12
S35L3	35	25	3	10	320	21.5	13	10	8	17	15.5	14	8	12	4	12
S35H1	35	25	3	12	390	23.5	14	11	9	18	17	15	8	14	4	12
S35H2	35	29	4	14	460	26	15	12	9	20	18	16	8	14	4	6
S35H3	35	29	4	16	495	28.5	15	13.5	10	21.5	19	17	8	14	4	6

GENERAL NOTES:

1. VALUES SHOWN IN THE "REACTIONS AT THE POLE BASE" COLUMN REPRESENT THE MINIMUM ACCEPTABLE CAPACITY ALLOWED FOR DESIGN USING A COMBINED FORCE RATIO (CFR) OF 1.00.
2. USE CHAIRS AND SPACERS TO MAINTAIN PROPER CLEARANCE.
3. FOR FOUNDATION, ALWAYS USE AIR-ENTRAINED CONCRETE MIX.

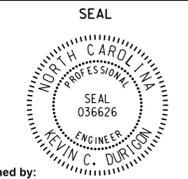
FOUNDATION SELECTION:

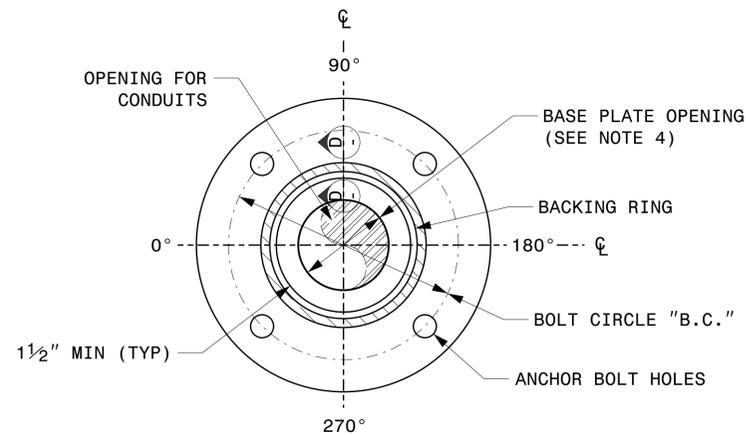
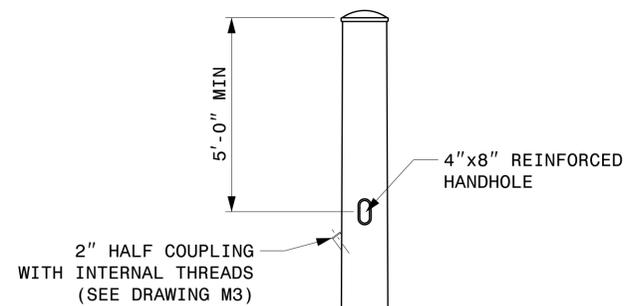
1. PERFORM A STANDARD PENETRATION TEST AT EACH PROPOSED FOUNDATION SITE TO DETERMINE "N" VALUE.
2. SELECT THE APPROPRIATE WIND ZONE FROM M1 DRAWING.
3. SELECT THE SOIL TYPE (CLAY OR SAND) THAT BEST DESCRIBES THE SOIL CHARACTERISTICS.
4. GET THE APPROPRIATE STANDARD POLE CASE NUMBER FROM THE PLANS OR FROM THE ENGINEER.
5. SELECT THE APPROPRIATE COLUMN UNDER "STANDARD FOUNDATIONS" BASED ON SOIL TYPE AND "N" VALUE. SELECT THE APPROPRIATE ROW BASED ON THE POLE LOAD CASE.
6. THE FOUNDATION DEPTH IS THE VALUE SHOWN IN THE "STANDARD FOUNDATIONS" CATEGORY WHERE THE COLUMN AND THE ROW INTERSECT.
7. USE CONSTRUCTION PROCEDURES AND DESIGN METHODS PRESCRIBED BY FHWA-NHI-10-016 MANUAL FOR DRILLED SHAFTS.

48" DIAMETER FOUNDATION CONCRETE VOLUME (CUBIC YARDS) = (0.465) x DRILLED PIER LENGTH

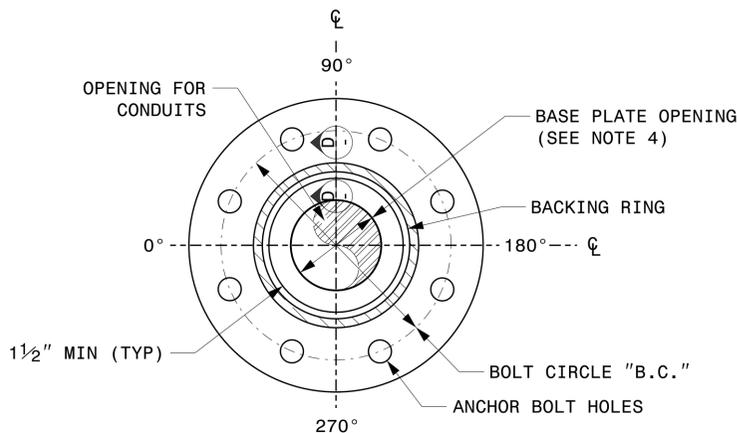
09-21-2023 10:46 S:\SSS\415\SIGNAL\Signal Design Section\Structures\Drawings\2024 Merol Pole Str. Drawings for LRF\0204_Sig.M8 Str. Strain Pole Found.-Saturated Soil Condition.dgn Kedar Tigon

Standard Strain Pole Foundation – All Soil Conditions

 Prepared in the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	Standard Strain Pole Foundation for All Soil Conditions	SEAL 
SCALE: 0 NONE	PLAN DATE: SEPTEMBER 2023 DESIGNED BY: K.C. DURIGON PREPARED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR	DocuSigned by: 
	REVISIONS: INIT. DATE	09/21/2023 DATE

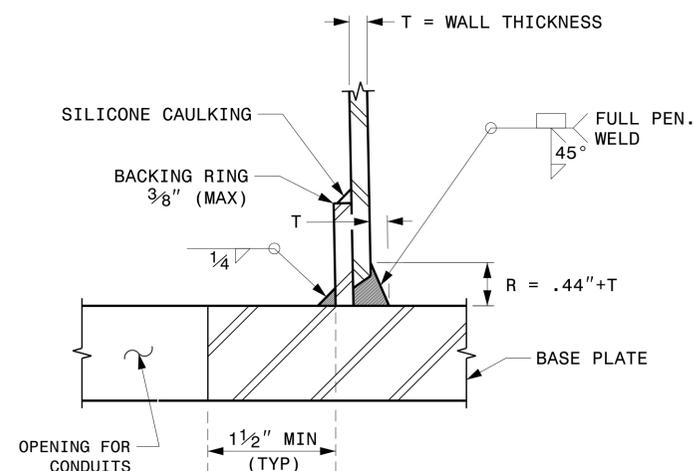
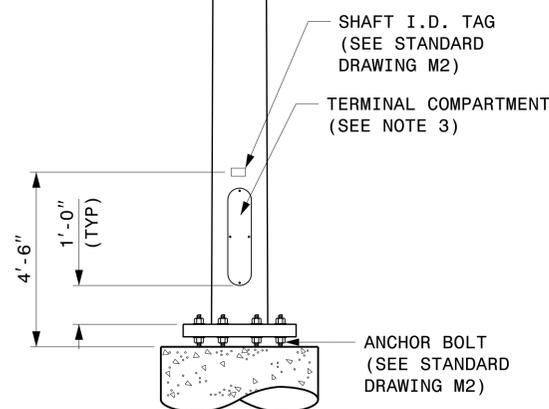


4 BOLT PATTERN FOR POLES UP TO 40'



8 BOLT PATTERN FOR POLES TALLER THAN 40'

BASE PLATE DETAILS



SECTION D-D (POLE ATTACHMENT TO BASE PLATE) FULL-PENETRATION GROOVE WELD DETAIL

CCTV CAMERA POLE (NOT TO SCALE)

NOTES:

1. THIS DRAWING PROVIDES BASIC DETAILS FOR CCTV POLES. PROJECT REQUIREMENTS MAY REQUIRE SPECIAL FACTORY PREPS THAT ARE NOT SHOWN ON THESE DETAILS.
2. DETAILS FOR INTERNAL CAMERA LOWERING SYSTEMS ARE NOT SHOWN.
3. POLE MOUNTED CABINETS MAY REQUIRE MODIFICATIONS TO THE LOWER HANDHOLE OPENING TO MOUNT CABINETS. 4" X 8" REINFORCED HANDHOLES ARE ACCEPTABLE OPTIONS, AND MAY BE PREFERRED.
4. OPENING IN POLE BASE SHALL BE EQUAL TO POLE BASE INSIDE DIAMETER MINUS 3 1/2" BUT SHALL NOT BE LESS THAN 8 1/2".
5. USE COMPACT SECTION CRITERIA D/T RATIO PER AASHTO LTS-LRFD 1ST EDITION SECTION 5.7.2.

02-dct-2023-10-15-1
S:\ISSUES\415 Signal\Signal Design\Structures\Drawings\2024 Merit Pole Std Drawings for LRF02024 Sig.M9 Fabrication Details - CCTV Poles.dgn
Kedar Tigon

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

Typical Fabrication Details For CCTV Poles	
PLAN DATE: SEPTEMBER 2023	DESIGNED BY: K.C. DURIGON
PREPARED BY: K.C. DURIGON	REVIEWED BY: C.F. ANDREWS
REVISIONS	INIT. DATE

DocuSigned by:

Kevin Durigon

4B23DC79B3784DA

09/23/2023

- 1 INSTALL REA, PE - 22, SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
- 2 INSTALL COAX CABLE
- 3 INSTALL ETHERNET CABLE
- 4 INSTALL SMFO CABLE
- 5 INSTALL MMFO CABLE
- 6 INSTALL FIBER OPTIC DROP CABLE
- 7 INSTALL TRACER WIRE
- 8 TRENCH
- 9 INSTALL PVC CONDUIT
- 10 INSTALL RIGID, GALVANIZED STEEL CONDUIT
- 11 INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
- 12 INSTALL RIGID, GALVANIZED STEEL RISER WITH FIBER OPTIC CABLE SEAL
- 13 INSTALL OUTER-DUCT POLYETHYLENE CONDUIT
- 14 INSTALL POLYETHYLENE CONDUIT
- 15 DIRECTIONAL DRILL CONDUIT
- 16 BORE AND JACK CONDUIT
- 17 INSTALL CABLE(S) IN EXISTING CONDUIT
- 18 INSTALL CABLE(S) IN NEW CONDUIT
- 19 INSTALL CABLE(S) IN EXISTING RISER
- 20 INSTALL CABLE(S) IN NEW RISER
- 21 INSTALL CABLE(S) IN EXISTING CONDUIT STUB-OUTS
- 22 INSTALL NEW CONDUIT INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
- 23 INSTALL NEW RISER INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
- 24 INSTALL NEW CONDUIT INTO EXISTING POLE MOUNTED CABINET
- 25 INSTALL NEW RISER INTO EXISTING POLE MOUNTED CABINET
- 26 MODIFY EXISTING INTERCONNECT CENTER /SPLICE ENCLOSURE
- 27 INSTALL NEW FIBER OPTIC TRANSCEIVER
- 28 INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS AND FUSION SPLICE CABLE IN CABINET
- 29 INSTALL UNDERGROUND SPLICE ENCLOSURE
- 30 INSTALL AERIAL SPLICE ENCLOSURE
- 31 INSTALL POLE MOUNTED SPLICE CABINET
- 32 INSTALL BASE MOUNTED SPLICE CABINET
- 33 REMOVE EXISTING SPLICE CABINET

- 34 INSTALL CABINET FOUNDATION
- 35 INSTALL CCTV CAMERA POLE MOUNTED CABINET
- 36 INSTALL CCTV CAMERA ASSEMBLY
- 37 INSTALL CCTV CAMERA WOOD POLE
- 38 INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
- 39 INSTALL JUNCTION BOX
- 40A INSTALL OVERSIZED JUNCTION BOX
- 40B INSTALL SPECIAL OVERSIZED JUNCTION BOX (36" x 36" x 24")
- 41 REMOVE EXISTING JUNCTION BOX
- 42 INSTALL WOOD POLE
- 43 REMOVE EXISTING WOOD POLE
- 44 INSTALL AERIAL GUY ASSEMBLY
- 45 INSTALL STANDARD GUY ASSEMBLY
- 46 INSTALL SIDEWALK GUY ASSEMBLY
- 47 INSTALL MESSENGER CABLE
- 48A REMOVE EXISTING COMMUNICATIONS AND MESSENGER CABLE
- 48B REMOVE EXISTING COMMUNICATIONS CABLE
- 49 BACK PULL EXISTING COMMUNICATIONS CABLE
- 50 INSTALL CELLULAR MODEM
- 51 INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
- 52A INSTALL DELINEATOR MARKER
- 52B INSTALL JUNCTION BOX MARKER
- 53 STORE 20 FEET OF COMMUNICATIONS CABLE
- 54 LASH CABLE(S) TO EXISTING COMMUNICATIONS CABLE
- 55 LASH CABLE(S) TO EXISTING MESSENGER CABLE
- 56 LASH CABLE(S) TO NEW MESSENGER CABLE
- 57 MODIFY EXISTING ELECTRICAL SERVICE
- 58 INSTALL NEW ELECTRICAL SERVICE
- 59 INSTALL NEW ETHERNET EDGE SWITCH
- 60 BOND TRACER WIRE TO EQUIPMENT GROUND BUS
DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS
- 61 BOND RISER AND MESSENGER CABLE TO POLE GROUND
- 62 BOND RISER TO POLE GROUND
- 63 BOND MESSENGER CABLE TO POLE GROUND
- 64 BOND MESSENGER CABLE TO POLE GROUND
- 65 INSTALL HEAT SHRINK TUBING RETROFIT KIT
- 66 INSTALL MOLDABLE DUCT SEAL
- 67 SLACK SPAN

LEGEND

	NEW FIBER OPTIC COMMUNICATIONS CABLE		NEW CABLE STORAGE RACKS (SNOW SHOES)
	NEW TWISTED PAIR COMMUNICATIONS CABLE		EXISTING CABLE STORAGE RACK (SNOW SHOE)
	EXISTING COMMUNICATIONS CABLE		EXISTING CONTROLLER AND CABINET
	EXISTING COMMUNICATIONS CABLE TO BE REMOVED		NEW CCTV CABINET
	NEW AERIAL GUY ASSEMBLY		EXISTING SPLICE CABINET
	NEW CONDUIT		NEW SPLICE CABINET
	EXISTING CONDUIT		SIGNAL POLE
	NEW DIRECTIONAL DRILLED CONDUIT		FLAT PANEL ANTENNA (SINGLE)
	NEW BORED AND JACKED CONDUIT		YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION
	NEW JUNCTION BOX		YAGI ANTENNA (SINGLE)
	EXISTING JUNCTION BOX		OMNI ANTENNA
	NEW WOOD POLE		
	EXISTING WOOD POLE		
	AERIAL SPLICE ENCLOSURE		
	UNDERGROUND SPLICE ENCLOSURE		
	NEW METAL POLE		
	EXISTING METAL POLE		
	NEW CCTV ASSEMBLY		
	NEW STANDARD GUY ASSEMBLY		
	NEW SIDEWALK GUY ASSEMBLY		
	SIGNAL INVENTORY NUMBER		

CONSTRUCTION NOTE SYMBOLOGY KEY

	INDICATES NUMBER OF CABLES, LOOPS, ETC.
	INDICATES NUMBER OF FIBERS PER CABLE, TWISTED PAIRS PER CABLE, ETC.
	INDICATES NUMBER OF RISER(S)/CONDUIT(S)
	INDICATES DIAMETER OF RISER(S)/CONDUIT(S) (INCH)

NUMBER OF CABLE(S) → XX
 DIAMETER OF RISER(S)/CONDUIT(S) (INCH) → XX
 NUMBER OF FIBER/TWISTED PAIRS → XX

NEW/EXISTING CABLE
 REMOVE/MODIFY CABLE
 CONDUIT/RISER

ATTACHMENT POINT:

<td>DISTANCE ABOVE (IN)/ATTACHMENT POINT REFERENCE POINT</td>	DISTANCE ABOVE (IN)/ATTACHMENT POINT REFERENCE POINT
YYY	REFERENCE POINT DISTANCE BELOW (IN)/ATTACHMENT POINT

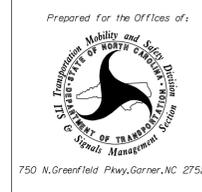
"SS" REFERENCE LOCATION

FS = FRONT SIDE OF POLE
 BS = BACK SIDE OF POLE

NC Dept of Transportation
 Division of Highways
 Final Drawing Date: _____
 NCDOT Approval _____

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources



Prepared for the Offices of:

Apex Peakway Closed Loop System Signal Communication

Division 5	Wake County	Apex
PLAN DATE: June 2024	REVIEWED BY: J. L. Lewis	
PREPARED BY: J. Ma	VHB PROJECT NO.: 38523.00	
REVISIONS	INIT.	DATE



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

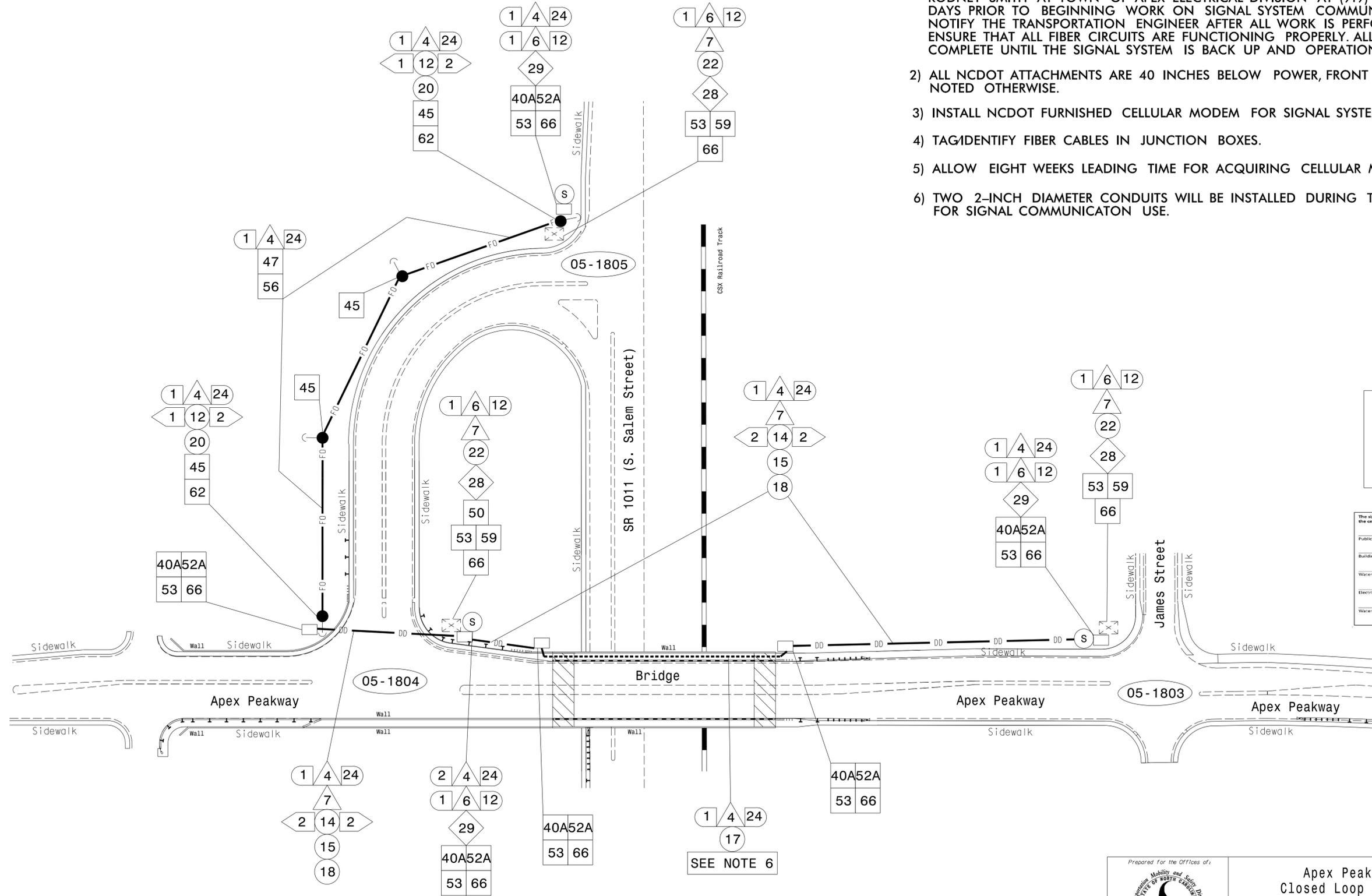
SEAL

SEAL 033108

J. Ma
 6/18/2024

NOTES

- 1) NOTIFY THE NCDOT HIGHWAY DIVISION 5 TRAFFIC ENGINEER AT (919) 220-4600, AND RODNEY SMITH AT TOWN OF APEX ELECTRICAL DIVISION AT (919) 249-3342, FIVE (5) DAYS PRIOR TO BEGINNING WORK ON SIGNAL SYSTEM COMMUNICATIONS CABLE. NOTIFY THE TRANSPORTATION ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. ALL WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS BACK UP AND OPERATIONAL.
- 2) ALL NCDOT ATTACHMENTS ARE 40 INCHES BELOW POWER, FRONT SIDE OF POLE, UNLESS NOTED OTHERWISE.
- 3) INSTALL NCDOT FURNISHED CELLULAR MODEM FOR SIGNAL SYSTEM INTERFACE.
- 4) TAG/IDENTIFY FIBER CABLES IN JUNCTION BOXES.
- 5) ALLOW EIGHT WEEKS LEADING TIME FOR ACQUIRING CELLULAR MODEMS.
- 6) TWO 2-INCH DIAMETER CONDUITS WILL BE INSTALLED DURING THE BRIDGE CONSTRUCTION FOR SIGNAL COMMUNICATON USE.



NC Dept of Transportation
Division of Highways
Final Drawing Date: _____
NCDOT Approval _____

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources



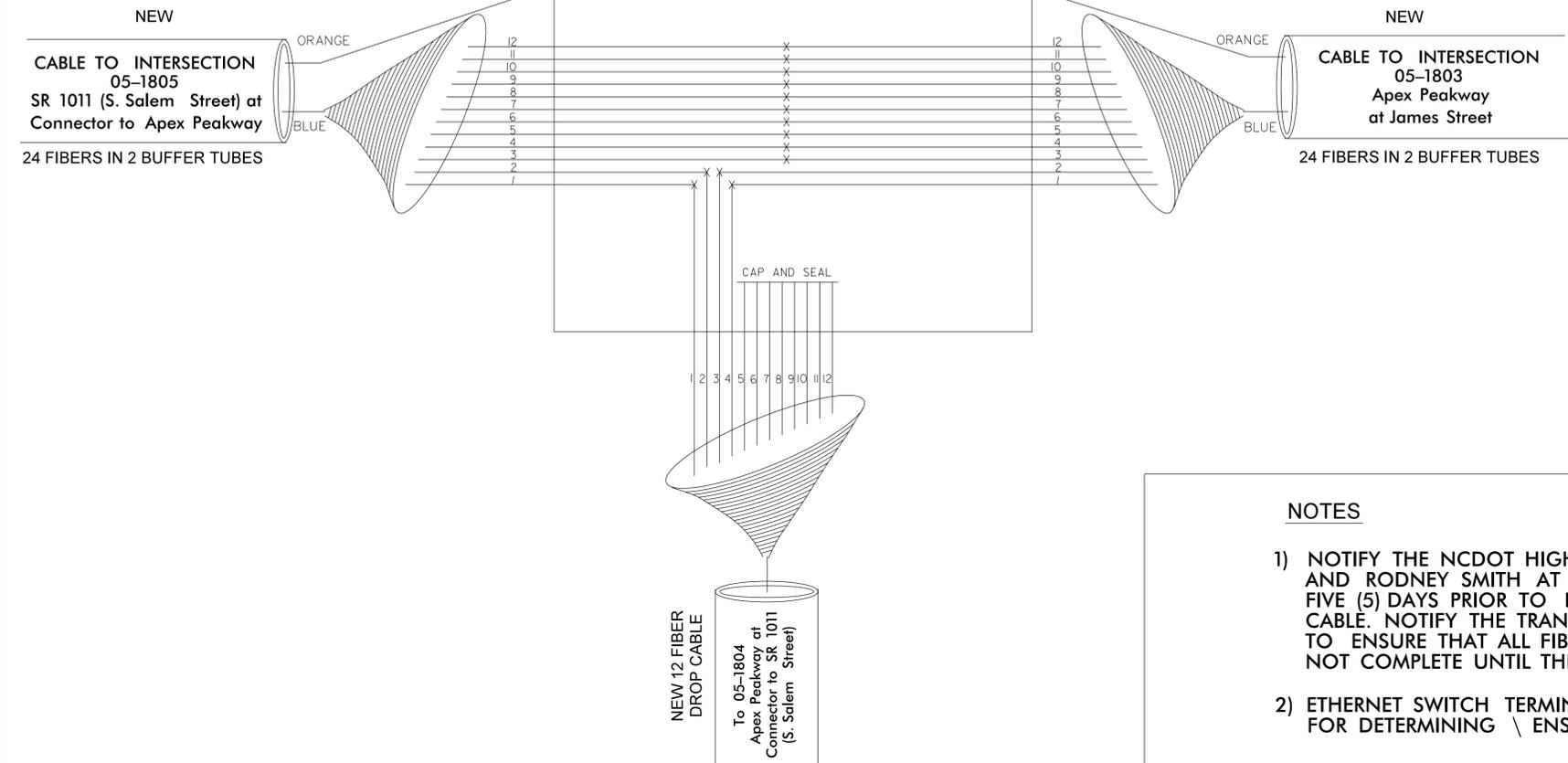
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

	Apex Peakway Closed Loop System Signal Communication Plan		
	Division 5 Wake County Apex		
PLAN DATE: June 2024 REVIEWED BY: J. L. Lewis	PREPARED BY: J. Ma VHB PROJECT NO.: 38523.00		
SCALE: N/A	REVISIONS:	INIT. DATE	
750 N. Greenfield Pkwy, Garner, NC 27529			
		Signature: <i>Jianxin Ma</i> DATE: 6/18/2024	

New Underground Splice Enclosure at

Apex Peakway
at
Connector to SR 1011
(S. Salem Street)
SIG. INV. # 05-1804

Notes:
Unused fibers left coiled and stored in splice tray.



COLOR CODE
TIA/EIA 598-A

- | | |
|------------|-------------|
| (1) BLUE | (7) RED |
| (2) ORANGE | (8) BLACK |
| (3) GREEN | (9) YELLOW |
| (4) BROWN | (10) VIOLET |
| (5) SLATE | (11) ROSE |
| (6) WHITE | (12) AQUA |

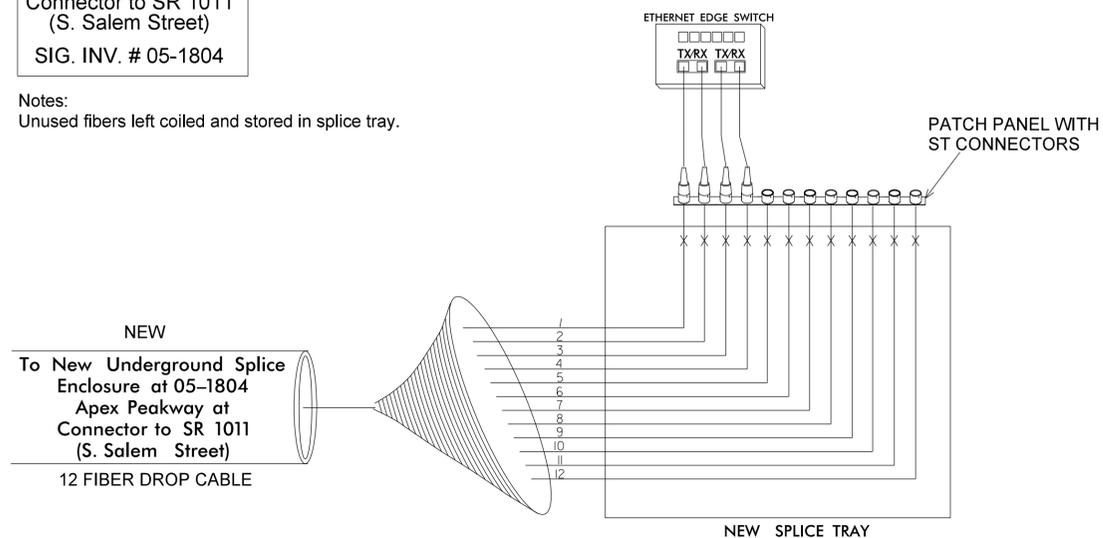
NOTES

- 1) NOTIFY THE NCDOT HIGHWAY DIVISION 5 TRAFFIC ENGINEER AT (919) 220-4600, AND RODNEY SMITH AT TOWN OF APEX ELECTRICAL DIVISION AT (919) 249-3342, FIVE (5) DAYS PRIOR TO BEGINNING WORK ON SIGNAL SYSTEM COMMUNICATIONS CABLE. NOTIFY THE TRANSPORTATION ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. ALL WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS BACK UP AND OPERATIONAL.
 - 2) ETHERNET SWITCH TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING PROPER TERMINATIONS.
 - 3) INCLUDE ON THE COVER OF EACH SPLICE TRAY THE FOLLOWING:
REFERENCE SECTION 1731 "FIBER OPTIC SPLICE ENCLOSURE"
 - 1) SPLICE LOCATION
 - 2) DATE
 - 3) COMPANY NAME
 - 4) NAME OF INDIVIDUAL PERFORMING THE SPLICING
- PRIOR TO INSTALLING THE COVER ON THE SPLICE TRAY TAKE A DIGITAL PHOTOGRAPH SHOWING THE SPLICE TRAY AND INFORMATION SHOWN ABOVE (1-4) AND SUBMIT PHOTOGRAPH ALONG WITH OTDR TEST RESULTS.
- 4) ALLOW EIGHT WEEKS LEADING TIME FOR ACQUIRING CELLULAR MODEMS.

Master Controller

Apex Peakway at
Connector to SR 1011
(S. Salem Street)
SIG. INV. # 05-1804

Notes:
Unused fibers left coiled and stored in splice tray.



NC Dept of Transportation
Division of Highways
Final Drawing Date: _____
NCDOT Approval _____



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

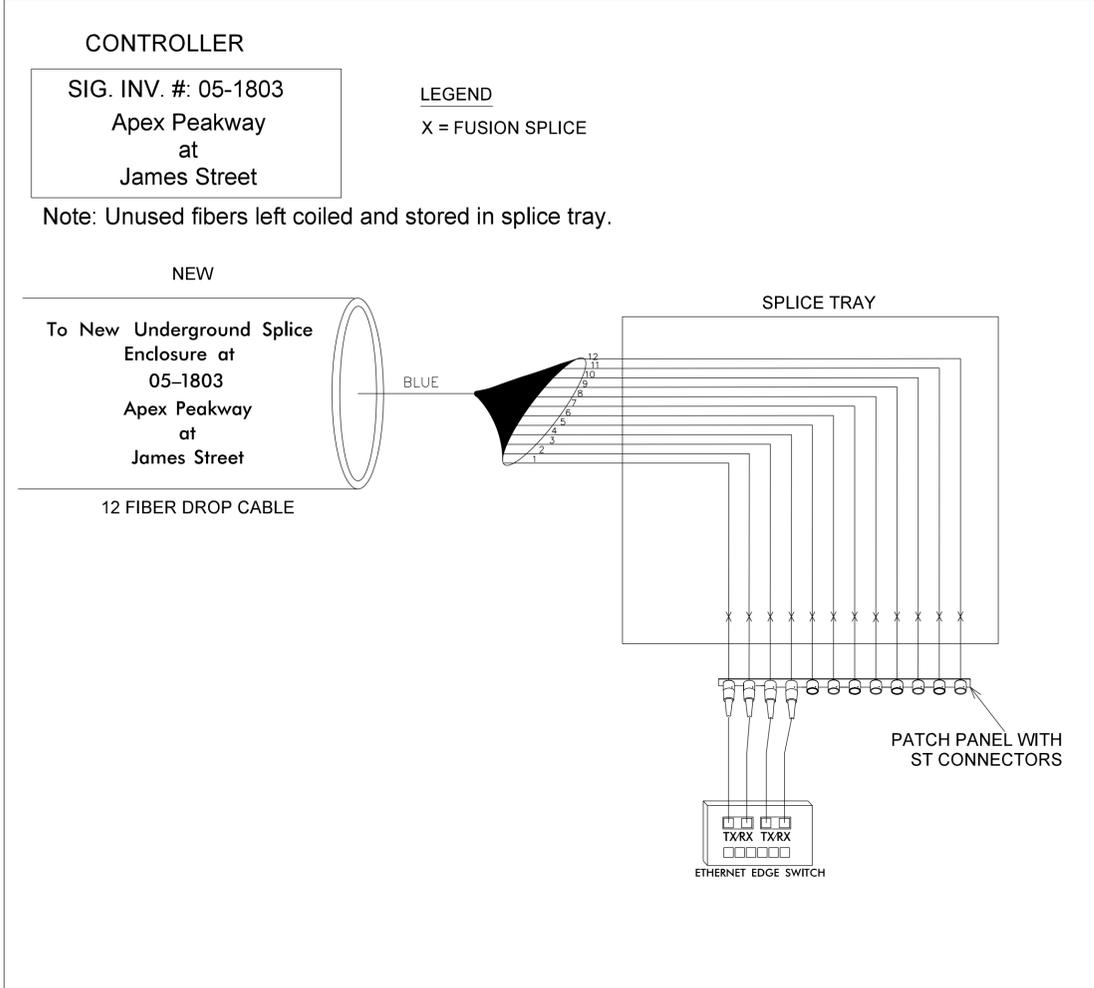
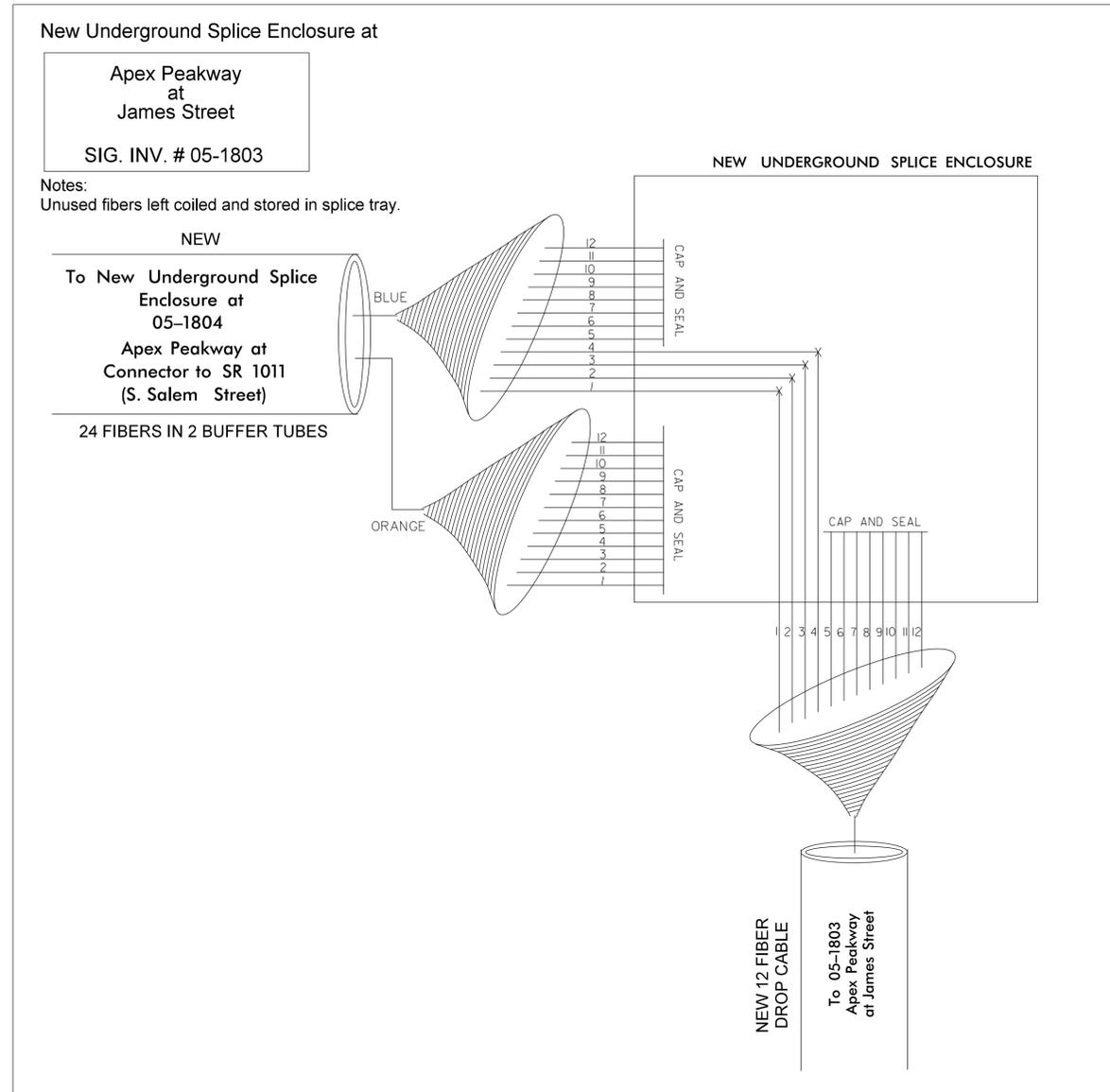
Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources



Apex Peakway
Closed Loop System
Splicing Details

Division 5	Wake County	Apex
PLAN DATE: June 2024	REVIEWED BY: J. L. Lewis	
PREPARED BY: J. Ma	VHB PROJECT NO.: 38523.00	
REVISIONS	INIT.	DATE





NOTES

- 1) NOTIFY THE NCDOT HIGHWAY DIVISION 5 TRAFFIC ENGINEER AT (919) 220-4600, AND RODNEY SMITH AT TOWN OF APEX ELECTRICAL DIVISION AT (919) 249-3342, FIVE (5) DAYS PRIOR TO BEGINNING WORK ON SIGNAL SYSTEM COMMUNICATIONS CABLE. NOTIFY THE TRANSPORTATION ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. ALL WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS BACK UP AND OPERATIONAL.
- 2) ETHERNET SWITCH TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING PROPER TERMINATIONS.
- 3) INCLUDE ON THE COVER OF EACH SPLICE TRAY THE FOLLOWING: REFERENCE SECTION 1731 "FIBER OPTIC SPLICE ENCLOSURE"
 - 1) SPLICE LOCATION
 - 2) DATE
 - 3) COMPANY NAME
 - 4) NAME OF INDIVIDUAL PERFORMING THE SPLICING

PRIOR TO INSTALLING THE COVER ON THE SPLICE TRAY TAKE A DIGITAL PHOTOGRAPH SHOWING THE SPLICE TRAY AND INFORMATION SHOWN ABOVE (1-4) AND SUBMIT PHOTOGRAPH ALONG WITH OTDR TEST RESULTS.
- 4) ALLOW EIGHT WEEKS LEADING TIME FOR ACQUIRING CELLULAR MODEMS.

COLOR CODE
TIA/EIA 598-A

- | | |
|------------|-------------|
| (1) BLUE | (7) RED |
| (2) ORANGE | (8) BLACK |
| (3) GREEN | (9) YELLOW |
| (4) BROWN | (10) VIOLET |
| (5) SLATE | (11) ROSE |
| (6) WHITE | (12) AQUA |

NC Dept of Transportation
Division of Highways

Final Drawing Date: _____

NCDOT Approval _____

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

**Apex Peakway
Closed Loop System
Splicing Details**

Division 5 Wake County Apex

PLAN DATE: June 2024 REVIEWED BY: J. L. Lewis

PREPARED BY: J. Ma VHB PROJECT NO.: 38523.00

REVISIONS	INIT.	DATE

SEAL

SEAL 033108

J. Ma

6/18/2024

SIGNATURE DATE

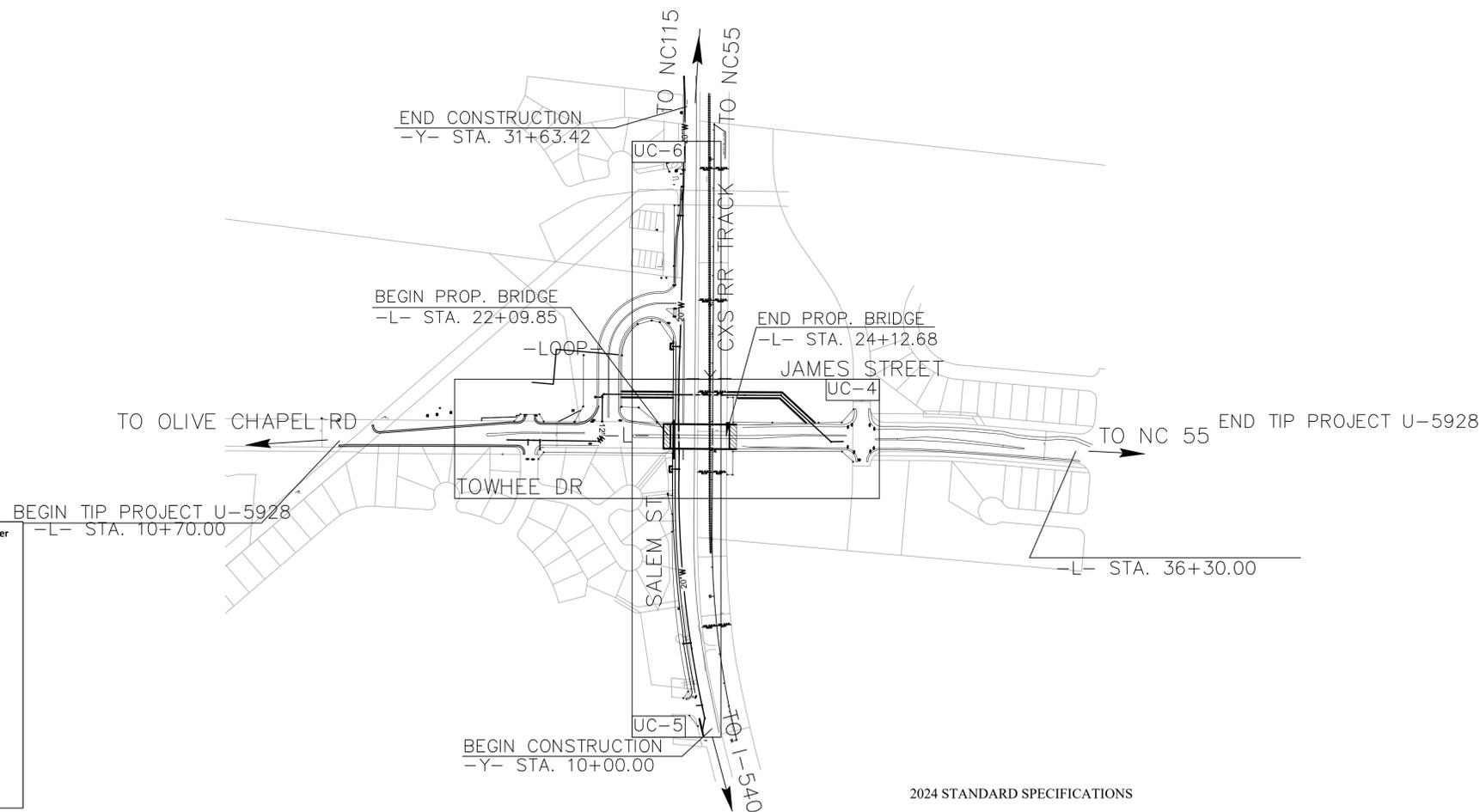
TIP PROJECT: U-5928

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

T.I.P. NO. U-5928	SHEET NO. UC-1
----------------------	-------------------

UTILITY CONSTRUCTION PLANS WAKE COUNTY

LOCATION: JAMES STREET TO TOWHEE DRIVE
CONSTRUCT GRADE SEPARATED INTERCHANGE FOR APEX
PEAKWAY AT SOUTH SALEM STREET AND CSX RAILROAD
TYPE OF WORK: WATER LINE RELOCATION



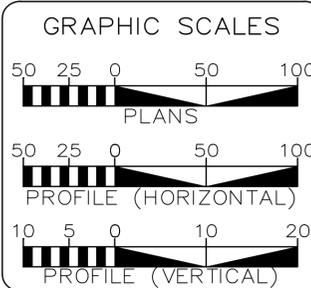
The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Building Inspections	Planning
Water Resources - Utility Engineering	Planning - Transportation
Electric	Fire
Water Resources - Soil & Erosion Control	Parks, Recreation & Cultural Resources

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL
UNTIL ALL SIGNATURES ARE COMPLETED

2024 STANDARD SPECIFICATIONS



INDEX OF SHEETS

SHEET NO.:	DESCRIPTION:
UC-1	TITLE SHEET
UC-2	UTILITY SYMBOLOGY
UC-3 & UC-3A	NOTES
UC-3C & UC-3D	DETAILS
UC-4 THRU UC-6	PLAN & PROFILE SHEETS

WATER AND SEWER OWNERS ON PROJECT

(A) WATER TOWN OF APEX
(B) SANITARY SEWER TOWN OF APEX

LETTING DATE: ?? 2024

PREPARED IN THE OFFICE OF

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

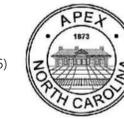
JOHN M. KAMPRATH, PE	CONSULTANT CONTACT #1
BRANDON T. BARHAM, PE	CONSULTANT CONTACT #2
TIM GOINS, PE	CONSULTANT CONTACT #3



**DIVISION OF HIGHWAYS
UTILITIES UNIT**
1555 MAIL SERVICES CENTER
RALEIGH, NC 27699-1555
PHONE (919) 707-6690
FAX (919) 250-4151

DONALD PROPER	UTILITIES REGIONAL ENGINEER
JAMES SWINSON	UTILITIES ENGINEER
XXXX	UTILITIES AREA COORDINATOR
MONROE BROWN	UTILITIES COORDINATOR

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS



UTILITIES PLAN SHEET SYMBOLS

PROPOSED WATER SYMBOLS

Water Line (Sized as Shown)	----- 12" WL -----
11¼ Degree Bend	----- †† -----
22½ Degree Bend	----- †X -----
45 Degree Bend	----- †X -----
90 Degree Bend	----- † -----
Plug	----- † -----
Tee	----- † -----
Cross	----- † -----
Reducer	----- ▶ -----
Gate Valve	----- GV -----
Butterfly Valve	----- BV -----
Tapping Valve	----- TGV -----
Line Stop	----- LS -----
Line Stop with Bypass	----- LS/BP -----
Blow Off	----- BO -----
Fire Hydrant	----- PFH -----
Relocate Fire Hydrant	----- RFH -----
Remove Fire Hydrant	----- REM FH -----
Water Meter	----- PWM -----
Relocate Water Meter	----- RWM -----
Remove Water Meter	----- REM WM -----
Water Pump Station	----- PST(W) -----
RPZ Backflow Preventer	----- PRPZ -----
DCV Backflow Preventer	----- PBEP -----
Relocate RPZ Backflow Preventer	----- RRPZ -----
Relocate DCV Backflow Preventer	----- RBEP -----

PROPOSED SEWER SYMBOLS

Gravity Sewer Line (Sized as Shown)	----- 12" SS -----
Force Main Sewer Line (Sized as Shown)	----- 12" FSS -----
Manhole (Sized per Note)	----- • -----
Sewer Pump Station	----- PST(SS) -----

PROPOSED MISCELLANEOUS UTILITIES SYMBOLS

Power Pole	----- 0 -----
Telephone Pole	----- 0 -----
Joint Use Pole	----- 0 -----
Telephone Pedestal	----- TP PED -----
Utility Line by Others (Type as Shown)	----- PROP O/H POW LINES -----
Trenchless Installation	----- 12" TL INSTALL -----
Encasement by Open Cut	----- 24" ENCAS BY OC -----
Encasement	----- 24" ENCASMENT -----

Thrust Block	----- I -----
Air Release Valve	----- AR -----
Utility Vault	----- UV -----
Concrete Pier	----- CP -----
Steel Pier	----- SP -----
Plan Note	----- NOTE -----
Pay Item Note	----- PAY ITEM -----

EXISTING UTILITIES SYMBOLS

Power Pole	----- • -----	*Underground Power Line	----- -----
Telephone Pole	----- • -----	*Underground Telephone Cable	----- -----
Joint Use Pole	----- • -----	*Underground Telephone Conduit	----- -----
Utility Pole	----- • -----	*Underground Fiber Optics Telephone Cable	----- -----
Utility Pole with Base	----- □ -----	*Underground TV Cable	----- -----
H-Frame Pole	----- •-----	*Underground Fiber Optics TV Cable	----- -----
Power Transmission Line Tower	----- ☒ -----	*Underground Gas Pipeline	----- -----
Water Manhole	----- ⊗ -----	Aboveground Gas Pipeline	----- A/G Gas -----
Power Manhole	----- ⊗ -----	*Underground Water Line	----- -----
Telephone Manhole	----- ⊗ -----	Aboveground Water Line	----- A/G Water -----
Sanitary Sewer Manhole	----- ⊗ -----	*Underground Gravity Sanitary Sewer Line	----- SS -----
Hand Hole for Cable	----- ☒ -----	Aboveground Gravity Sanitary Sewer Line	----- A/G Sanitary Sewer -----
Power Transformer	----- ☒ -----	*Underground SS Forced Main Line	----- -----
Telephone Pedestal	----- □ -----	Underground Unknown Utility Line	----- -----
CATV Pedestal	----- □ -----	SUE Test Hole	----- • -----
Gas Valve	----- ◇ -----	Water Meter	----- ⊖ -----
Gas Meter	----- ◇ -----	Water Valve	----- ⊖ -----
Located Miscellaneous Utility Object	----- ○ -----	Fire Hydrant	----- ◇ -----
Abandoned According to Utility Records	----- AATUR -----	Sanitary Sewer Cleanout	----- ⊗ -----
End of Information	----- E.O.I. -----		

*For Existing Utilities
 Utility Line Drawn from Record (Type as Shown) -----
 Designated Utility Line (Type as Shown) -----

CONSTRUCTION

Notes

General

- CONTRACTOR SHALL NOTIFY NORTH CAROLINA 811 (811 OR 1-800-632-4949) AT LEAST 72 HOURS BEFORE EXCAVATING.
- CONTRACTOR SHALL BE RESPONSIBLE FOR SITE SECURITY AND JOB SAFETY. CONSTRUCTION ACTIVITIES SHALL BE IN ACCORDANCE WITH OSHA STANDARDS AND LOCAL REQUIREMENTS.
- AREAS DISTURBED DURING CONSTRUCTION AND NOT RESTORED WITH IMPERVIOUS SURFACES (BUILDINGS, PAVEMENTS, WALKS, ETC) SHALL RECEIVE FOUR INCHES OF TOPSOIL, SEED AND MULCH.
- WORK WITHIN THE LOCAL RIGHTS-OF-WAY SHALL CONFORM TO LOCAL MUNICIPAL STANDARDS. WORK WITHIN STATE RIGHTS-OF-WAY SHALL CONFORM TO THE LATEST EDITION OF THE STATE HIGHWAY DEPARTMENTS STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.
- UPON AWARD OF CONTRACT, CONTRACTOR SHALL MAKE NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN NECESSARY PERMITS, PAY FEES, AND POST BONDS ASSOCIATED WITH THE WORK INDICATED ON THE DRAWINGS, IN THE SPECIFICATIONS, AND IN THE CONTRACT DOCUMENTS. DO NOT CLOSE OR OBSTRUCT ROADWAYS, SIDEWALKS, AND FIRE HYDRANTS, WITHOUT APPROPRIATE PERMITS.
- AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
- IN THE EVENT THAT SUSPECTED CONTAMINATED SOIL, GROUNDWATER, AND OTHER MEDIA ARE ENCOUNTERED DURING EXCAVATION AND CONSTRUCTION ACTIVITIES BASED ON VISUAL, OLFACTORY, OR OTHER EVIDENCE, THE CONTRACTOR SHALL STOP WORK IN THE VICINITY OF THE SUSPECT MATERIAL TO AVOID FURTHER SPREADING OF THE MATERIAL, AND SHALL NOTIFY THE OWNER IMMEDIATELY SO THAT THE APPROPRIATE TESTING AND SUBSEQUENT ACTION CAN BE TAKEN.
- CONTRACTOR SHALL PREVENT DUST, SEDIMENT, AND DEBRIS FROM EXITING THE SITE AND SHALL BE RESPONSIBLE FOR CLEANUP, REPAIRS AND CORRECTIVE ACTION IF SUCH OCCURS.
- DAMAGE RESULTING FROM CONSTRUCTION LOADS SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO OWNER.
- CONTRACTOR SHALL CONTROL STORMWATER RUNOFF DURING CONSTRUCTION TO PREVENT ADVERSE IMPACTS TO OFF-SITE AREAS, AND SHALL BE RESPONSIBLE TO REPAIR RESULTING DAMAGES, IF ANY, AT NO COST TO OWNER.

Utilities

- THE LOCATIONS, SIZES, AND TYPES OF EXISTING UTILITIES ARE SHOWN AS AN APPROXIMATE REPRESENTATION ONLY. THE OWNER OR ITS REPRESENTATIVE(S) HAVE NOT INDEPENDENTLY VERIFIED THIS INFORMATION AS SHOWN ON THE PLANS. THE UTILITY INFORMATION SHOWN DOES NOT GUARANTEE THE ACTUAL EXISTENCE, SERVICEABILITY, OR OTHER DATA CONCERNING THE UTILITIES, NOR DOES IT GUARANTEE AGAINST THE POSSIBILITY THAT ADDITIONAL UTILITIES MAY BE PRESENT THAT ARE NOT SHOWN ON THE PLANS. PRIOR TO ORDERING MATERIALS AND BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY AND DETERMINE THE EXACT LOCATIONS, SIZES, AND ELEVATIONS OF THE POINTS OF CONNECTIONS TO EXISTING UTILITIES AND, SHALL CONFIRM THAT THERE ARE NO INTERFERENCES WITH EXISTING UTILITIES AND THE PROPOSED UTILITY ROUTES, INCLUDING ROUTES WITHIN THE PUBLIC RIGHTS OF WAY.
- WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, OR EXISTING CONDITIONS DIFFER FROM THOSE SHOWN SUCH THAT THE WORK CANNOT BE COMPLETED AS INTENDED, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED IN WRITING TO THE OWNER'S REPRESENTATIVE FOR THE RESOLUTION OF THE CONFLICT AND CONTRACTOR'S FAILURE TO NOTIFY PRIOR TO PERFORMING ADDITIONAL WORK RELEASES OWNER FROM OBLIGATIONS FOR ADDITIONAL PAYMENTS WHICH OTHERWISE MAY BE WARRANTED TO RESOLVE THE CONFLICT.
- UTILITY PIPE MATERIALS SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED ON THE PLAN:
 - A. WATER PIPES SHALL BE DUCTILE IRON PIPE (DIP).
- CONTRACTOR SHALL COORDINATE WITH PRIVATE UTILITY CONTRACTOR FOR EXCAVATION AND BACKFILL OF PRIVATE UTILITY FURNISHED RELATED ITEMS SUCH AS PULL BOXES, CONDUITS, DUCT BANKS, LIGHT POLE BASES, AND CONCRETE PADS. SITE CONTRACTOR SHALL FURNISH CONCRETE ENCASUREMENT OF DUCT BANKS IF REQUIRED BY THE UTILITY COMPANY AND AS INDICATED ON THE DRAWINGS.

Layout and Materials

- DIMENSIONS ARE FROM THE BACK OF CURB, FACE OF BUILDING, FACE OF WALL, AND CENTER LINE OF PAVEMENT MARKINGS, UNLESS OTHERWISE NOTED.
- PROPOSED BOUNDS AND ANY EXISTING PROPERTY LINE MONUMENTATION DISTURBED DURING CONSTRUCTION SHALL BE SET OR RESET BY A LICENSED PROFESSIONAL LAND SURVEYOR.

Abbreviations

General	Utility
ABAN	ABANDON
ACR	ACCESSIBLE CURB RAMP
ADA	AMERICANS WITH DISABILITIES ACT
ADJ	ADJUST
APPROX	APPROXIMATE
BIT	BITUMINOUS
BC	BEGIN CURVE
BS	BOTTOM OF SLOPE
CON	CONNECT
CONC	CONCRETE
CSF	COMBINATION TREE PROTECTION/SILT FENCE
EC	END CURVE
EL	ELEVATION
ELEV	ELEVATION
EXIST	EXISTING
FDN	FOUNDATION
FFE	FINISHED FLOOR ELEVATION
GRAN	GRANITE
GRD	GRADE TO DRAIN
HCP	HANDICAP PARKING
LA	LANDSCAPE AREA
LOD	LIMIT OF DISTURBANCE
MAX	MAXIMUM
MIN	MINIMUM
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
PERF	PERFORATED
PROP	PROPOSED
REM	REMOVE
RET	RETAIN
R&R	REMOVE AND RESET
R&R	REMOVE AND RESET
TFP	TREE PROTECTION FENCE
TS	TOP OF SLOPE
TYP	TYPICAL
CB	CATCH BASIN
CMP	CORRUGATED METAL PIPE
CO	CLEANOUT
CU	TYPE "K" COPPER
DCB	DOUBLE CATCH BASIN
DMH	DRAIN MANHOLE
CIP	CAST IRON PIPE
COND	CONDUIT
DIP	DUCTILE IRON PIPE
FES	FLARED END SECTION
FM	FORCE MAIN
F&G	FRAME AND GRATE
F&C	FRAME AND COVER
GI	GUTTER INLET
GT	GREASE TRAP
HDPE	HIGH DENSITY POLYETHYLENE PIPE
HH	HANDHOLE
HW	HEADWALL
HYD	HYDRANT
INV	INVERT ELEVATION
LP	LIGHT POLE
MES	METAL END SECTION
MH	SANITARY SEWER MANHOLE
PWW	PAVED WATER WAY
PVC	POLYVINYLCHLORIDE PIPE
PV	POST INDICATOR VALVE
RCP	REINFORCED CONCRETE PIPE
RIM	RIM ELEVATION
RJDIP	RESTRAINED JOINT DUCTILE IRON PIPE
SMH	STORM DRAIN MANHOLE
TSV	TAPPING SLEEVE, VALVE AND BOX
UG	UNDERGROUND
UP	UTILITY POLE

Demolition

- CONTRACTOR SHALL REMOVE AND DISPOSE OF EXISTING MANMADE SURFACE FEATURES WITHIN THE LIMIT OF WORK INCLUDING BUILDINGS, STRUCTURES, PAVEMENTS, SLABS, CURBS, FENCES, UTILITY POLES, SIGNS, ETC. UNLESS INDICATED OTHERWISE ON THE DRAWINGS.
- EXISTING UTILITIES SHALL BE TERMINATED, UNLESS OTHERWISE NOTED, IN CONFORMANCE WITH LOCAL, STATE AND INDIVIDUAL UTILITY COMPANY STANDARD SPECIFICATIONS AND DETAILS. THE CONTRACTOR IS RESPONSIBLE FOR DISCONNECTS WITH THE UTILITY REPRESENTATIVES.
- CONTRACTOR SHALL DISPOSE OF DEMOLITION DEBRIS IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS, ORDINANCES AND STATUTES.
- THE DEMOLITION LIMITS DEPICTED IN THE PLANS IS INTENDED TO AID THE CONTRACTOR DURING THE BIDDING AND CONSTRUCTION PROCESS AND IS NOT INTENDED TO DEPICT EACH AND EVERY ELEMENT OF DEMOLITION. THE CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING THE DETAILED SCOPE OF DEMOLITION BEFORE SUBMITTING ITS BID/PROPOSAL TO PERFORM THE WORK AND SHALL MAKE NO CLAIMS AND SEEK NO ADDITIONAL COMPENSATION FOR CHANGED CONDITIONS OR UNFORESEEN OR LATENT SITE CONDITIONS RELATED TO ANY CONDITIONS DISCOVERED DURING EXECUTION OF THE WORK.
- UNLESS OTHERWISE SPECIFICALLY PROVIDED ON THE PLANS OR IN THE SPECIFICATIONS, THE ENGINEER HAS NOT PREPARED DESIGNS FOR AND SHALL HAVE NO RESPONSIBILITY FOR THE PRESENCE, DISCOVERY, REMOVAL, ABATEMENT OR DISPOSAL OF HAZARDOUS MATERIALS, TOXIC WASTES OR POLLUTANTS AT THE PROJECT SITE. THE ENGINEER SHALL NOT BE RESPONSIBLE FOR ANY CLAIMS OF LOSS, DAMAGE, EXPENSE, DELAY, INJURY OR DEATH ARISING FROM THE PRESENCE OF HAZARDOUS MATERIAL AND CONTRACTOR SHALL, INDEMNIFY AND HOLD HARMLESS THE ENGINEER FROM ANY CLAIMS MADE IN CONNECTION THEREWITH. MOREOVER, THE ENGINEER SHALL HAVE NO ADMINISTRATIVE OBLIGATIONS OF ANY TYPE WITH REGARD TO ANY CONTRACTOR AMENDMENT INVOLVING THE ISSUES OF PRESENCE, DISCOVERY, REMOVAL, ABATEMENT OR DISPOSAL OF ASBESTOS OR OTHER HAZARDOUS MATERIALS.

Erosion Control

- PRIOR TO STARTING ANY OTHER WORK ON THE SITE, THE CONTRACTOR SHALL NOTIFY APPROPRIATE AGENCIES AND SHALL INSTALL EROSION CONTROL MEASURES AS SHOWN ON THE PLANS AND AS IDENTIFIED IN FEDERAL, STATE, AND LOCAL APPROVAL DOCUMENTS PERTAINING TO THIS PROJECT.
- CONTRACTOR SHALL INSPECT AND MAINTAIN EROSION CONTROL MEASURES ON A WEEKLY BASIS (MINIMUM) OR AS REQUIRED PER THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP). THE CONTRACTOR SHALL ADDRESS DEFICIENCIES AND MAINTENANCE ITEMS WITHIN TWENTY-FOUR HOURS OF INSPECTION. CONTRACTOR SHALL PROPERLY DISPOSE OF SEDIMENT SUCH THAT IT DOES NOT ENCUMBER OTHER DRAINAGE STRUCTURES AND PROTECTED AREAS.
- CONTRACTOR SHALL BE FULLY RESPONSIBLE TO CONTROL CONSTRUCTION SUCH THAT SEDIMENTATION SHALL NOT AFFECT REGULATORY PROTECTED AREAS, WHETHER SUCH SEDIMENTATION IS CAUSED BY WATER, WIND, OR DIRECT DEPOSIT.
- CONTRACTOR SHALL PERFORM CONSTRUCTION SEQUENCING SUCH THAT EARTH MATERIALS ARE EXPOSED FOR A MINIMUM OF TIME BEFORE THEY ARE COVERED, SEEDED, OR OTHERWISE STABILIZED TO PREVENT EROSION.
- UPON COMPLETION OF CONSTRUCTION AND ESTABLISHMENT OF PERMANENT GROUND COVER, CONTRACTOR SHALL REMOVE AND DISPOSE OF EROSION CONTROL MEASURES AND CLEAN SEDIMENT AND DEBRIS FROM ENTIRE DRAINAGE AND SEWER SYSTEMS.

Existing Conditions Information

- BASE PLAN: THE PROPERTY LINES SHOWN WERE DETERMINED BY AN ACTUAL FIELD SURVEY CONDUCTED BY CALYX ENGINEERS AND CONSULTANTS. THE TOPOGRAPHY AND PHYSICAL FEATURES BASED ON AN ACTUAL FIELD SURVEY PERFORMED ON THE GROUND BY CALYX ENGINEERS AND CONSULTANTS, DURING AUGUST 2016.
- TOPOGRAPHY: ELEVATIONS ARE BASED ON NAVD88 IN FEET.

Document Use

- THESE PLANS AND CORRESPONDING CADD DOCUMENTS ARE INSTRUMENTS OF PROFESSIONAL SERVICE, AND SHALL NOT BE USED, IN WHOLE OR IN PART, FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS CREATED WITHOUT THE EXPRESSED, WRITTEN CONSENT OF VHB. ANY UNAUTHORIZED USE, REUSE, MODIFICATION OR ALTERATION, INCLUDING AUTOMATED CONVERSION OF THIS DOCUMENT SHALL BE AT THE USER'S SOLE RISK WITHOUT LIABILITY OR LEGAL EXPOSURE TO VHB.
- CONTRACTOR SHALL NOT RELY SOLELY ON ELECTRONIC VERSIONS OF PLANS, SPECIFICATIONS, AND DATA FILES THAT ARE OBTAINED FROM THE DESIGNERS, BUT SHALL VERIFY LOCATION OF PROJECT FEATURES IN ACCORDANCE WITH THE PAPER COPIES OF THE PLANS AND SPECIFICATIONS THAT ARE SUPPLIED AS PART OF THE CONTRACT DOCUMENTS.
- SYMBOLS AND LEGENDS OF PROJECT FEATURES ARE GRAPHIC REPRESENTATIONS AND ARE NOT NECESSARILY SCALED TO THEIR ACTUAL DIMENSIONS OR LOCATIONS ON THE DRAWINGS. THE CONTRACTOR SHALL REFER TO THE DETAIL SHEET DIMENSIONS, MANUFACTURERS' LITERATURE, SHOP DRAWINGS AND FIELD MEASUREMENTS OF SUPPLIED PRODUCTS FOR LAYOUT OF THE PROJECT FEATURES.

ALL WORK ASSOCIATED WITH THE INSTALLATION OF WATERLINE SHALL BE COMPLETED AS PER THE TOWN OF APEX STANDARD SPECIFICATIONS AND DETAILS, LATEST EDITION. A PORTION OF THE TOWN SPECIFICATIONS ARE PROVIDED BELOW FOR INFORMATION. REFER TO THE TOWN'S WEBSITE FOR THE FULL SPECIFICATION MANUAL.

MATERIALS:

DUCTILE IRON PIPE:

ALL DUCTILE IRON PIPE SHALL BE DESIGNED AS PER AWWA STANDARD C150. PIPE SHALL BE MANUFACTURED IN ACCORDANCE WITH ALL APPLICABLE REQUIREMENTS OF AWWA STANDARD C151.

PIPE JOINTS SHALL BE OF THE PUSH-ON TYPE AS PER AWWA STANDARD C111. PIPE LINING SHALL BE CEMENT MORTAR WITH A SEAL COAT OF BITUMINOUS MATERIAL. ALL IN ACCORDANCE WITH AWWA STANDARD C104.

DUCTILE IRON PIPE SHALL BE FURNISHED IN 18 OR 20 FOOT LENGTHS.

SPECIAL RESTRAINT SYSTEMS FOR FIRE HYDRANT INSTALLATION:

IN LIEU OF REACTION BLOCKING FOR FIRE HYDRANTS, HYDRANTS SHALL BE INSTALLED WITH AN APPROVED SPECIAL RESTRAINT SYSTEM. SUCH RESTRAINTS SHALL BE INDIVIDUALLY INTEGRAL TO THE FIRE HYDRANT SHOE, THE FIRE HYDRANT SHUTOFF GATE VALVE AND/OR THE TAPPING VALVE SUCH THAT THE SPECIAL RESTRAINT SYSTEM, IN WHOLE OR IN PART, ADEQUATELY RESTRAINS THE ENTIRE HYDRANT SERVICE LEG BACK TO THE WATER MAIN. SPECIAL RESTRAINTS SHALL BE CONSTRUCTED OF DUCTILE IRON AND PROVIDE FULL CIRCUMFERENTIAL ENGAGEMENT TO THE DUCTILE IRON PIPE. SUCH SPECIAL RESTRAINTS SHALL HAVE A MINIMUM WORKING PRESSURE OF 250 PSI WITH A MINIMUM FACTOR OF SAFETY OF 2:1. RESTRAINTS SHALL BE SUPPLIED WITH INSPECTION 'BREAK NUTS' THAT SHEAR UPON THE ATTAINMENT OF PROPER INSTALLATION TORQUE. RESTRAINTS THAT 'POINT LOAD' AROUND THE CIRCUMFERENCE OF THE PIPE WILL NOT BE ALLOWED WITHOUT RESTRAINT GLAND AND RODDING.

GATE VALVES

ALL GATE VALVES SHALL BE THE SAME MAKE, NEW, RESILIENT SEAT, NUT-OPERATED (2-INCH SQUARE), NON-RISING STEM, OPEN LEFT, CAST OR DUCTILE IRON BODY, DOUBLE DISC, PARALLEL SEAT, FULLY BRONZE MOUNTED, DESIGNED FOR 250 PSI WORKING PRESSURE, AND COMPLIANT WITH THE LATEST AWWA SPECIFICATION. THE END CONNECTIONS OF ALL GATE VALVES FURNISHED SHALL BE MECHANICAL JOINTS COMPLIANT WITH LATEST AWWA SPECIFICATION. THE STUFFING BOX SHALL BE EQUIPPED WITH "O-RING" SEALS.

IRON FITTINGS

IRON FITTINGS SHALL BE DUCTILE IRON, ALL BELL, MECHANICAL JOINT, CONFORMING TO THE FOLLOWING SPECIFICATIONS:

- 3" - 16" SIZE - STANDARD FITTINGS - AWWA C110, LATEST REVISION
- 18" - 48" SIZE - STANDARD FITTINGS - AWWA C110, LATEST REVISION
- MECHANICAL JOINT - AWWA C111
- INSIDE LININGS - CEMENT MORTAR WITH BITUMINOUS SEAL COAT - AWWA C104

AIR RELEASE VALVES

AIR RELEASE VALVES SHALL BE PLACED AT ALL CREST LOCATIONS WHEREIN AN ELEVATION CHANGE OF 10 FEET OR GREATER IS INCURRED.

LEAD FREE REQUIREMENTS

AS OF JANUARY 4, 2014, ALL WATER MAIN AND SERVICE MATERIALS SHALL COMPLY WITH THE "REDUCTION OF LEAD IN DRINKING WATER ACT" AS MANDATED BY THE EPA.

INSTALLATION

ABANDONMENT OF EXISTING WATER MAINS

EXISTING WATER LINES LOCATED OUTSIDE ROAD SECTIONS SHALL BE REMOVED, UNLESS OTHERWISE DIRECTED BY THE INSPECTOR. ALL MATERIALS AND LABOR SHALL BE PROVIDED BY THE CONTRACTOR. ANY NEW CONNECTIONS SHALL BE PERFORMED BY THE CONTRACTOR.

UNLOADING & STORAGE OF MATERIALS

THE UNLOADING AND LOADING OF PIPE, FITTINGS, VALVES, AND RELATED ACCESSORIES SHALL BE PERFORMED WITH CARE SO AS TO AVOID ANY DAMAGE TO THESE MATERIALS. ALL SUCH MATERIALS SHALL NOT BE STORED DIRECTLY ON THE GROUND, BUT SHALL BE ON PALLETS, OR OTHER SUITABLE SUPPORTS, SO AS TO PREVENT THE ENTRY OF MUD AND DEBRIS INTO THE PIPE OR OTHER MATERIALS. CONTRACTORS SHALL ALSO ENDEAVOR TO STORE THESE MATERIALS IN ACCORDANCE WITH ANY SPECIAL PRACTICES AS MAY BE RECOMMENDED BY THE MANUFACTURER.

TRENCH EXCAVATION

WATER MAIN TRENCHES SHALL BE EXCAVATED TO SUCH DEPTH THAT THE PIPE WILL HAVE A MINIMUM COVER OF 3 FEET, WHERE WATER MAINS ARE INSTALLED IN NEW SUBDIVISION STREETS, THE DEPTH OF COVER SHALL BE MEASURED FROM THE FINISHED SUBGRADE.

TRENCH WIDTH SHALL BE A MINIMUM OF 16 INCHES PLUS THE OUTSIDE DIAMETER OF THE PIPE AND A MAXIMUM OF 24 INCHES PLUS THE OUTSIDE DIAMETER OF THE PIPE, UNLESS APPROVAL FOR DEVIATION FROM THIS REQUIREMENT IS GRANTED BY THE INSPECTOR.

WHERE WATER MAIN TRENCH EXCAVATION IS IN ROCK, THE ROCK SHALL BE EXCAVATED TO A MINIMUM DEPTH OF 6 INCHES BELOW THE BOTTOM OF THE PIPE. THIS SPACE SHALL BE FILLED WITH SCREENINGS OR OTHER MATERIAL APPROVED BY THE INSPECTOR. ROCK EXCAVATION REQUIREMENTS FOR WATER MAINS SHALL CONFORM TO REQUIREMENTS OUTLINED HEREINAFTER IN SECTION 705.

IN TRENCHES WHERE WATER IS PRESENT OR WHERE DEWATERING IS REQUIRED, THE TRENCH BOTTOM SHALL BE STABILIZED WITH NO. 67 OR NO. 57 STONE. WHEN MATERIAL OF POOR SUPPORTING VALUE IS ENCOUNTERED IN THE TRENCH, IT SHALL BE REMOVED AND REPLACED WITH NO.67 OR NO.57 STONE OR OTHER MATERIAL APPROVED BY THE INSPECTOR.

ALL WATER MAIN TRENCHES SHALL BE PROTECTED FROM THE ENTRANCE OF SURFACE WATER. ANY WATER OBSERVED IN THE TRENCH SHALL BE PROMPTLY REMOVED BY PUMPING, PROVIDED THAT WATER PUMPED FROM TRENCHES IS DIRECTED TO SUITABLE EROSION CONTROL DEVICES TO PREVENT DEPOSITION OF SEDIMENT INTO NEARBY STREAMS, PONDS, ETC. THE CONTRACTOR SHALL USE ALL MEANS NECESSARY TO PREVENT THE ENTRANCE OF WATER, INCLUDING THE CONSTRUCTION OF TEMPORARY BERMS OR DIKES.

PIPE INSTALLATION

GENERAL - ALL WATER MAIN PIPE SHALL BE CLEAN BEFORE INSTALLATION. ANY DIRTY PIPE SHALL BE THOROUGHLY SWABBED BY THE CONTRACTOR. PIPE SHOWING EVIDENCE OF OIL OR GREASE CONTAMINATION SHALL NOT BE USED.

PIPE LAYING AND JOINTING SHALL BE ACCOMPLISHED IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE PIPE MANUFACTURER AND TOWN SPECIFICATIONS.

OPEN ENDS OF THE PIPE SHALL BE PLUGGED WITH A MECHANICAL FITTING AT ALL TIMES THAT PIPE LAYING IS NOT IN PROGRESS.

BELL ENDS SHALL GENERALLY FACE THE DIRECTION OF LAYING, WHERE WATER MAINS ARE INSTALLED ON AN APPRECIABLE SLOPE, THE INSPECTOR MAY REQUIRE THAT THE BELL ENDS FACE UPGRADE.

SEQUENCE OF CONNECTIONS

CONTRACTOR SHALL COORDINATE THE INSTALLATION OF THE WATERLINE TO ENSURE THE SHORTEST DURATION POSSIBLE FOR THE EXISTING NETWORK WITHIN THE PROJECT LIMITS TO BE OUT OF SERVICE. DURING INSTALLATION THE CONTRACTOR SHALL ISOLATE THE PORTIONS OF WATER NETWORK SHUTDOWN TO THE AREAS OF INSTALLATION TO MINIMIZE DISRUPTION OF SERVICE. CONTRACTOR SHALL COORDINATE THE WATER SYSTEM SHUT DOWN WITH THE TOWN OF APEX WATER DEPARTMENT. WATERLINE SHUT DOWN TO OCCUR WITHIN THE FALL AND WINTER MONTHS. CONTRACTOR SHALL INSTALL THE WATERLINE AS FOLLOWS:

- EXTEND 16" WATER STARTING AT STA -W- 0+00 TO STA 7+00. INSTALLING BORE UNDER RAILROAD AND SALEM ST AND THE PROPOSED 20" 16" GROSS WITH ALL THREE GATE VALVES SHOWN FOR THIS CROSS.
- INSTALL THE 20" WATERLINE FROM STA -L- 22+00 TO STA 29+00 WHILE MAINTAINING SERVICE. COORDINATE WITH COLONIAL PIPELINES PERSONNEL FOR CROSSING OF COLONIAL PIPELINE EASEMENT. CONTACT COLONIAL PIPELINE BEFORE DIGGING IN THEIR EASEMENT. A REPRESENTATIVE OF COLONIAL PIPELINE SHALL BE ON SITE WHILE WORK IS BEING DONE WITHIN THEIR EASEMENT. ONCE WATERLINE IS INSTALLED TO STA 29+00, COORDINATE SHUTDOWN OF SALEM WATERLINE FROM STATION -L- 20+00 TO 30+00 TO ALLOW CONNECTION TO EX. 12" WATERLINE AT STA -L- ~31+50.
- COORDINATE SHUTDOWN OF SALEM WATERLINE FROM STATION -L- 10+00 TO 22+00 TO ALLOW CONNECTION TO EX. 12" WATERLINE AT STA -L- ~10+00. INSTALL THE 20" WATERLINE FROM STA -L- 10+00 TO STA 22+00.
- COORDINATE SHUTDOWN OF APEX PEAKWAY WATERLINE FROM STATION -Y- 15+00 TO 22+00 TO ALLOW CONNECTION TO EX. 12" WATERLINE AT STA -Y- ~16+50. INSTALL THE REMAINING 12" WATERLINE FROM STA -W- 7+00 TO STA 13+00 AND CONNECT TO EXISTING NETWORKS AS SHOWN.
- TEST AND DISINFECT WATERLINE IN ACCORDANCE WITH TOWN OF APEX SPECIFICATIONS. DO NOT PUT LINES IN SERVICE UNTIL APPROVED BY THE TOWN OF APEX.

Town Of Apex Specifications:

PIPE BEDDING

THE BARREL OF THE PIPE SHALL BEAR UNIFORMLY UPON THE SUPPORTING TRENCH BOTTOM AT ALL TIMES. THE FOUNDATIONS OF DUCTILE IRON PIPE SHALL CONFORM TO THE MINIMUM REQUIREMENTS DESCRIBED BELOW.

DUCTILE IRON PIPE - SHALL REST ON A FIRM AND STABLE FLAT BOTTOM TRENCH WITH BELL HOLES EXCAVATED SUCH THAT THE PIPE RESTS UNIFORMLY ON ITS ENTIRE BARREL LENGTH.

BACKFILLING

ALL WATER MAINS SHALL BE BACKFILLED IN ACCORDANCE WITH THE STANDARD DETAIL AS APPLICABLE AND COMPACTED SO THAT THE PIPE IS PROPERLY SUPPORTED IN ACCORDANCE WITH THE PIPE MANUFACTURER'S RECOMMENDATIONS AND TOWN SPECIFICATIONS.

NO ROCKS, BouldERS, OR STONES SHALL BE INCLUDED IN THE BACKFILL MATERIAL FOR AT LEAST 2 FEET ABOVE THE TOP OF THE PIPE IN TRAFFIC AREAS, THE FINAL BACKFILL SHALL BE PLACED AND COMPACTED IN 6-INCH LAYERS. BACKFILL SHALL BE OF SUCH DENSITY AS TO ENSURE NO SETTLEMENT OF THE TRENCH. A COMPACTION TEST PERFORMED IN TRAFFIC AREAS AND CERTIFIED BY A LICENSED PROFESSIONAL ENGINEER SHALL BE SUBMITTED AT THE CONTRACTOR'S EXPENSE. ORGANIC MATERIAL SHALL NOT BE PERMITTED FOR BACKFILL.

SHOULD ANY WATER LINE TRENCH EXHIBIT SETTLEMENT, THE CONTRACTOR SHALL CORRECT THE DEFICIENCY TO THE COMPLETE SATISFACTION OF THE INSPECTOR. WHERE A WATER LINE IS IN OR CROSSES EXISTING STATE ROADS OR OTHER PUBLIC ROADS, THE BACKFILL SHALL BE COMPACTED TO AT LEAST 95% STANDARD DENSITY AS MEASURED BY AASHTO METHOD T-99. WHERE DEEMED NECESSARY, THE INSPECTOR SHALL REQUIRE COMPACTION TESTS TO BE PERFORMED (AT THE CONTRACTOR'S EXPENSE) ON BACKFILL PLACED IN TRENCHES ACROSS SUCH ROADS.

FOR PERMITTED OPEN-CUT WATER MAIN EXTENSIONS AND/OR TIE-INS, THE INSPECTOR MAY REQUIRE THAT "FLOWABLE FILL" BE USED FOR BACKFILL MATERIAL. IF REQUIRED, 1 FOOT OF APPROVED NATURAL BACKFILL MATERIAL SHALL BE COMPACTED OVER THE WATER MAIN PER APEX SPECIFICATIONS, THE REMAINING EXCAVATED TRENCH SHALL BE BACKFILLED WITH "FLOWABLE FILL" WITHIN SEVEN (7) DAYS AFTER THE EXCAVATION HAS BEEN FILLED, THE OPEN-CUT AREA SHALL BE REPAIRED PER THE STANDARD DETAIL.

SETTING VALVES & VALVE BOXES

VALVES SHALL BE SET AT LOCATIONS SHOWN ON THE PLANS WITH CARE BEING TAKEN TO SUPPORT THE VALVE PROPERLY AND TO ACCURATELY POSITION THE VALVE BOX OVER THE OPERATING NUT OF THE VALVE. WHEN VALVES ARE LOCATED IN STREET RIGHT-OF-WAY, BUT OUT OF PAVEMENT, THE BOXES SHALL BE ADJUSTED TO FINISH GRADE AND A CONCRETE COLLAR 2- FEET SQUARE AND 6-INCHES THICK SHALL BE POURED AROUND THE BOX 1/4-INCH FROM THE TOP OF THE CASTING. VALVE BOXES LOCATED IN THE PAVEMENT SHALL BE SET FLUSH WITH THE CURRENT PAVEMENT. IF THE PAVEMENT REQUIRES A FUTURE FINAL LIFT, THE VALVE BOXES SHALL BE ADJUSTED NO MORE THAN 60 DAYS PRIOR TO COMPLETION OF THE FINAL LIFT.

WHEN VALVES ARE LOCATED OUTSIDE OF STREET RIGHT-OF-WAY, THE BOXES SHALL BE ADJUSTED 6 INCHES ABOVE THE FINISHED GRADE, AND A CONCRETE COLLAR 2- FEET SQUARE AND 6-INCHES THICK SHALL BE POURED AROUND THE CASTING.

SETTING FITTINGS

FITTINGS SHALL BE INSTALLED AT THE LOCATION INDICATED ON THE DRAWINGS WITH CARE TAKEN TO INSURE THAT JOINTS ARE FULLY HOMED AND THAT THE FITTINGS ARE FULLY AND PROPERLY SUPPORTED.

REACTION BLOCKING

FITTINGS SHALL BE BLOCKED TO SOLID, UNDISTURBED EARTH WITH CONCRETE. THIS REACTION BLOCKING SHALL BE OF SUFFICIENT SIZE TO PREVENT THE FITTING FROM BLOWING OFF THE MAIN AT MAXIMUM TEST PRESSURE, AND AS LOCATED IN THE STANDARD DETAIL. ALL BLOCKING SHALL BE PLACED SO THAT THE PIPE AND FITTING JOINTS WILL BE ACCESSIBLE FOR REPAIRS. MINIMUM 6 MIL PLASTIC SHALL BE USED TO WRAP THE FITTING IN ITS ENTIRETY INCLUDING GLAND AND BOLTS TO ENSURE CONCRETE DOES NOT ADHERE.

INSTALLATION OF STEEL CASING PIPES BY BORING & JACKING

THE INSTALLATION OF STEEL CASING PIPE ACROSS DESIGNED ROADWAYS, RAILROADS, ETC. FOR THE PLACEMENT OF WATER MAINS SHALL CONFORM TO THE SPECIFICATIONS PRESENTED IN SECTION 700 OF THESE SPECIFICATIONS. CARRIER PIPE SHALL BE RESTRAINED JOINT DUCTILE IRON PIPE.

CUTTING & REPLACEMENT OF EXISTING PAVEMENTS

THE OPEN CUTTING OF EXISTING PAVEMENTS MAY BE PERMITTED FOR WATER LINE INSTALLATIONS ACROSS DESIGNATED TOWN STREETS AND STATE MAINTAINED ROADWAYS. THE CUTTING AND REPLACEMENT OF SUCH PAVEMENTS SHALL CONFORM TO THE STANDARD DETAIL.

TESTING AND DISINFECTION

PIGGING OF WATER MAINS

ALL NEW WATER MAINS SHALL BE PIGGED AS A PART OF THE TESTING PROCEDURE. PIGGING SHALL TAKE PLACE AT THE CONCLUSION OF PIPE INSTALLATION UTILIZING THE INITIAL WATER FILL OR LOADING OF THE PIPE. PIGGING SHALL TAKE PLACE PRIOR TO ANY INTRODUCTION OF CHLORINE SOLUTION TO THE PIPE. THE CONTRACTOR SHALL USE A 5 POUNDS/CUBIC FOOT DENSITY POLYETHYLENE PIG AND SHALL WRITE HIS COMPANY NAME AND THE STREET NAME WHERE THE WORK IS TAKING PLACE IN A PERMANENT MANNER ON THE PIG.

HYDROSTATIC TESTING

NO VALVE IN THE EXISTING TOWN OF APEX WATER SYSTEM SHALL BE OPERATED WITHOUT A TOWN REPRESENTATIVE PRESENT.

A SECTION OF LINE TO BE HYDROSTATICALLY TESTED SHALL BE SLOWLY FILLED WITH WATER AT A RATE WHICH WILL ALLOW COMPLETE EVACUATION OF AIR FROM THE LINE. THE LINE SHALL BE TESTED TO A PRESSURE OF 200 PSI AS MEASURED AT THE HIGHEST ELEVATION OF THE LINE FOR A DURATION OF 2 HOURS. THE PRESSURE GAUGE USED IN THE HYDROSTATIC TEST SHALL INDICATE IN INCREMENTS OF 50 PSI OR LESS AND SHALL HAVE BEEN CALIBRATED WITHIN THE LAST 12 MONTHS. AT THE END OF THE TEST PERIOD, THE LEAKAGE SHALL BE MEASURED WITH AN ACCURATE WATER METER. ALL LINES SHALL BE FILLED FROM THE LOWEST ELEVATION. TESTS SHALL INCLUDE FIRE HYDRANTS AND WATER LINE VALVES

DISINFECTION

ALL ADDITIONS OR REPLACEMENTS TO THE APEX WATER SYSTEM SHALL BE CHLORINATED BEFORE BEING PLACED INTO SERVICE. SUCH CHLORINATION MUST TAKE PLACE UNDER THE SUPERVISION OF AN INSPECTOR. THE UTILITY CONTRACTOR PERFORMING THE CHLORINATION OF THE MAIN SHALL BE RESPONSIBLE FOR ANY HEALTH OR ENVIRONMENTAL DAMAGE THAT MIGHT OCCUR AS A RESULT OF HIS OPERATIONS.

BACTERIOLOGICAL SAMPLING

FREE RESIDUAL CHLORINE AFTER 24 HOURS SHALL BE A LEAST 10 PPM, OR THE INSPECTOR WILL REQUIRE THAT THE LINES BE RE-CHLORINATED.

METHOD OF ABANDONMENT

ALL EXISTING WATERLINES WITHIN PROJECT LIMITS TO BE RELOCATED OR UP-SIZED SHALL BE REMOVED TO THE EXTENT PRACTICAL AND DISPOSED OF BY THE CONTRACTOR AS PER LOCAL REQUIREMENTS. EXISTING WATERLINE ALONG APEX PEAKWAY (-Y-) FROM STA 20+00 TO 22+00 MAY BE ABANDONED IN PLACE. IF ABANDONED IN PLACE THE EXISTING WATERLINE IS TO BE DRAINED COMPLETELY OF WATER AND THEN FILLED COMPLETELY WITH FLOWABLE FILL AND CAPPED WITH CLASS A CONCRETE ON EACH END. THE LOCATION OF ALL ABANDONED WATERLINES SHALL BE RECORDED ON THE RECORDED DRAWINGS.

PROJECT REFERENCE NO.	SHEET NO.
U-5928	UC-3
DESIGNED BY: JK	
DRAWN BY: JT	
CHECKED BY: JK	
APPROVED BY: TG	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	
UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

UTILITY CONSTRUCTION DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

POLYETHYLENE FILM SPECIFICATIONS

ALL WATERLINES INSTALLED WITHIN CASINGS, ACROSS THE COLONIAL PIPELINE EASEMENT, AND WHERE SPECIFIED BY TOWN REPRESENTATIVES DURING CONSTRUCTION, ARE TO BE DOUBLE WRAPPED WITH POLYETHYLENE FILM IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS.

MATERIALS:

POLYETHYLENE FILM:

PROVIDE POLYETHYLENE FILM IN ACCORDANCE WITH AWWA C105-10 AND ANSI A21.5-10, GROUP 2, UNLESS OTHERWISE SHOWN ON THE PLANS, PROVIDE FILM 8 MILS THICK COLOR BLUE, EITHER IN TUBULAR OR SHEET FORM WITH:

- MINIMUM TENSILE STRENGTH OF 3600 PSI (ASTM D882)
- MINIMUM ELONGATION OF 800% (ASTM D882)
- MINIMUM DIELECTRIC STRENGTH OF 800V/mil (ASTM D149)
- MINIMUM IMPACT RESISTANCE OF 600g (ASTM D1709-B)
- MINIMUM TEAR RESISTANCE OF 2550 g-f (ASTM D1922)

FURNISH FILM SUPPLIED IN TUBULAR FORM IN THE MINIMUM WIDTHS SHOWN IN THE FOLLOWING TABLE:

NOMINAL PIPE SIZE (IN)	PUSH-ON JOINT FLAT TUBE WIDTH (IN)
6	17
8	21

UTILITY CONSTRUCTION

GENERAL NOTES:

1. THE PROPOSED UTILITY CONSTRUCTION SHALL MEET THE APPLICABLE REQUIREMENTS OF THE NC DEPARTMENT OF TRANSPORTATION'S "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" DATED JANUARY 2024.
2. THE EXISTING UTILITIES BELONG TO THE TOWN OF APEX .
3. ALL WATER LINES TO BE INSTALLED WITHIN COMPLIANCE OF THE RULES AND REGULATIONS OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER RESOURCES, PUBLIC WATER SUPPLY SECTION. ALL SEWER LINES TO BE INSTALLED WITHIN COMPLIANCE OF THE RULES AND REGULATIONS OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT QUALITY, DIVISION OF WATER RESOURCES, WATER QUALITY SECTION. PERFORM ALL WORK IN ACCORDANCE WITH THE APPLICABLE PLUMBING CODES.
4. THE UTILITY OWNER OWNS THE EXISTING UTILITY FACILITIES AND WILL OWN THE NEW UTILITY FACILITIES AFTER ACCEPTANCE BY THE DEPARTMENT. THE DEPARTMENT OWNS THE CONSTRUCTION CONTRACT AND HAS ADMINISTRATIVE AUTHORITY. COMMUNICATIONS AND DECISIONS BETWEEN THE CONTRACTOR AND UTILITY OWNER ARE NOT BINDING UPON THE DEPARTMENT OR THIS CONTRACT UNLESS AUTHORIZED BY THE ENGINEER. AGREEMENTS BETWEEN THE UTILITY OWNER AND CONTRACTOR FOR THE WORK THAT IS NOT PART OF THIS CONTRACT OR IS SECONDARY TO THIS CONTRACT ARE ALLOWED, BUT ARE NOT BINDING UPON THE DEPARTMENT.
5. PROVIDE ACCESS FOR THE DEPARTMENT PERSONNEL AND THE OWNER'S REPRESENTATIVES TO ALL PHASES OF CONSTRUCTION. NOTIFY DEPARTMENT PERSONNEL AND THE UTILITY OWNER TWO WEEKS PRIOR TO COMMENCEMENT OF ANY WORK AND ONE WEEK PRIOR TO SERVICE INTERRUPTION. KEEP UTILITY OWNERS' REPRESENTATIVES INFORMED OF WORK PROGRESS AND PROVIDE OPPORTUNITY FOR INSPECTION OF CONSTRUCTION AND TESTING.

6. THE PLANS DEPICT THE BEST AVAILABLE INFORMATION FOR THE LOCATION, SIZE, AND TYPE OF MATERIAL FOR ALL EXISTING UTILITIES. MAKE INVESTIGATIONS FOR DETERMINING THE EXACT LOCATION, SIZE, AND TYPE MATERIAL OF THE EXISTING FACILITIES AS NECESSARY FOR THE CONSTRUCTION OF THE PROPOSED UTILITIES AND FOR AVOIDING DAMAGE TO EXISTING FACILITIES. REPAIR ANY DAMAGE INCURRED TO EXISTING FACILITIES TO THE ORIGINAL OR BETTER CONDITION AT NO ADDITIONAL COST TO THE DEPARTMENT.
7. MAKE FINAL CONNECTIONS OF THE NEW WORK TO THE EXISTING SYSTEM WHERE INDICATED ON THE PLANS, AS REQUIRED TO FIT THE ACTUAL CONDITIONS, OR AS DIRECTED.
8. MAKE CONNECTIONS BETWEEN EXISTING AND PROPOSED UTILITIES AT TIMES MOST CONVENIENT TO THE PUBLIC, WITHOUT ENDANGERING THE UTILITY SERVICE, AND IN ACCORDANCE WITH THE UTILITY OWNER'S REQUIREMENTS. MAKE CONNECTIONS ON WEEKENDS, AT NIGHT, AND ON HOLIDAYS IF NECESSARY.
9. ALL UTILITY MATERIALS SHALL BE APPROVED PRIOR TO DELIVERY TO THE PROJECT. SEE 1500-7, " SUBMITTALS AND RECORDS" IN SECTION 1500 OF THE STANDARD SPECIFICATIONS.

PROJECT SPECIFIC NOTES:

1. PROPOSED WATER LINES SHALL BE R.J.D.I.P. (RESTRAINED JOINT DUCTILE IRON PIPE) FOR THE STATION LIMITS SHOWN ON PLANS SHEETS UC-4 TO UC-6.
2. INSTALL DUAL LAYER OF 8 MIL POLYETHYLENE WRAP AROUND ALL DUCTILE IRON PIPE INSTALLED WITHIN 60' OF THE COLONIAL GAS PIPELINE EASEMENT. SEE ADDITIONAL NOTES ON SHEETS UC-3 AND UC-6.
3. CONTRACTOR'S ATTENTION IS DIRECTED TO SECTIONS 102, 107, AND 1550 OF THE STANDARD SPECIFICATIONS CONCERNING TRENCHLESS INSTALLATION. IT IS CONTRACTOR'S RESPONSIBILITY TO HAVE BORE DESIGNED AND SEALED BY A LICENSED NORTH CAROLINA PROFESSIONAL ENGINEER. NO DAMAGE IS ALLOWED TO RIVER, WETLANDS, OR BUFFER ZONES.
4. IF HDPE PIPE IS INSTALLED BY DIRECTIONAL DRILL. IT SHALL BE FILLED WITH WATER AND NOT BE CONNECTED TO ANY OTHER PIPE OR FITTINGS FOR ONE WEEK FROM THE TIME OF INSTALLATION.

LIST OF STANDARD DRAWINGS

SEE SHEETS UC-3C & UC-3D FOR TOWN OF APEX STANDARD DRAWINGS.



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

PROJECT REFERENCE NO.	SHEET NO.
U-5928	UC-3A
DESIGNED BY: JK	
DRAWN BY: JT	
CHECKED BY: JK	
APPROVED BY: TG	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	
UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

UTILITY CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Salem Waterline Line and Curve Data

No.	Delta	Radius	Length	Bearing	Ch. Dist.	Start Northing	Start Easting	End Northing	End Easting
L1		19.91'		N73°13'38"E		717393.44	2039060.45	717399.19	2039079.51
L2		43.07'		S84°27'13"E		717399.19	2039079.51	717395.03	2039122.38
C1	012°25'45"	3638.12'	789.21'	N78°30'22"E	787.66'	717395.03	2039122.38	717551.98	2039894.24
L3		124.47'		N85°27'19"E		717551.98	2039894.24	717561.84	2040018.32
L4		121.11'		N84°05'07"E		717561.84	2040018.32	717574.32	2040138.79
L5		139.14'		N85°24'41"E		717574.32	2040138.79	717585.46	2040277.48
L6		449.28'		N86°52'10"E		717585.46	2040277.48	717609.99	2040726.09
L7		93.98'		N84°09'35"E		717609.99	2040726.09	717619.55	2040819.58
L8		184.63'		N85°55'47"E		717619.55	2040819.58	717632.66	2041003.74
L9		62.66'		N87°33'53"E		717632.66	2041003.74	717635.32	2041066.34
C2	003°18'24"	1800.00'	103.88'	N85°54'41"E	103.86'	717635.32	2041066.34	717642.73	2041169.94
L10		76.66'		N84°15'29"E		717642.73	2041169.94	717650.40	2041246.22
C3	003°28'10"	1854.99'	112.32'	N83°05'44"E	112.30'	717650.40	2041246.22	717663.90	2041357.71

-W- Line and Curve Data

No.	Delta	Radius	Length	Bearing	Ch. Dist.	Start Northing	Start Easting	End Northing	End Easting
L11		42.18'		N05°45'31"W		717002.84	2040109.84	717044.81	2040105.60
L12		234.70'		N37°36'41"E		717044.81	2040105.60	717230.73	2040248.84
L13		608.71'		N04°37'50"W		717230.73	2040248.84	717837.46	2040199.70
L14		608.71'		N04°37'50"W		717230.73	2040248.84	717837.46	2040199.70
L15		7.08'		N49°35'05"W		717837.46	2040199.70	717842.05	2040194.31
L16		143.37'		S85°26'57"W		717842.05	2040194.31	717830.67	2040051.40
L17		18.00'		N49°37'50"W		717830.67	2040051.40	717842.33	2040037.68
L18		241.80'		N04°13'13"W		717842.33	2040037.68	718083.48	2040019.89
L19		73.16'		N04°12'38"W		718083.48	2040019.89	718156.44	2040014.52

NOTES KEYED TO PLAN

- CONNECT TO EX. WATERLINE WITH THRUST COLLAR.
- ~180 LF 16" DIP WATERLINE JACK AND BORE INSTALLATION WITH 36" DIA (0.532" THICK) UNCOATED SPIRAL WELDED STEEL MEETING ASTM A-139, GRADE B WITH A YIELD STRENGTH OF 35,000 PSI. JOINTS TO BE BUTT WELDED. SEE DETAIL, SHEET UC-3D. CARRIER PIPE THICKNESS DUE TO CSX CROSSING REQUIREMENTS. ALL CSX REQUIREMENTS ARE TO BE MET WITH THIS INSTALLATION. WATERLINE TO BE WRAPPED IN TWO LAYERS OF 6 MIL POLYETHYLENE FILM WRAP FOR THE LENGTH OF THE CASING.
- ~120 LF 20" DIP WATER LINE CARRIER PIPE INSIDE 42" DIA (0.312" THICK) UNCOATED SPIRAL WELDED STEEL PIPE MEETING ASTM A-139, GRADE B WITH A YIELD STRENGTH OF 35,000 PSI (42" ENCASMENT PIPE). 42" WELDED STEEL PIPE SHALL BE INSTALLED BY JACK AND BORE OPERATION. JOINTS TO BE BUTT WELDED. SEE DETAIL, SHEET UC-3D. WATER LINE TO BE WRAPPED IN TWO LAYERS OF 8 MIL POLYETHYLENE FILM WRAP FOR THE LENGTH OF THE CASING.
- ~60 LF 20" RIDIP WATER LINE OPEN CUT INSTALLATION. WATERLINE TO BE WRAPPED IN TWO LAYERS OF 8 MIL POLYETHYLENE FILM WRAP FOR 60 LF LEADING TO THE EASEMENT (~180 LF WRAPPED). MAINTAIN MINIMUM 18" VERTICAL SEPARATION FROM COLONIAL PIPELINE CASING MATERIALS. NO WORK TO OCCUR WITHIN COLONIAL PIPELINE EASEMENT UNTIL EXISTING CASING HAS BEEN EXTENDED PAST PROPOSED RIGHT-OF-WAY. ALL COLONIAL PIPELINE REQUIREMENTS ARE TO BE MET WITH THIS INSTALLATION.
- REMOVE EXISTING MANHOLE AND APPROXIMATELY 15 LF OF 8" SEWER. SET NEW MANHOLE. RIM: 457.10' INVERT OUT: 449.90'. SEE DETAILS, SHEET UC-3D.
- 45° BEND C/W FACTORY RESTRAINED JOINTS AND CONCRETE REACTION BLOCKING. SEE DETAIL 600.13 ON SHEET UC-3C.
- INSTALL FIRE HYDRANT ASSEMBLY. SEE DETAIL SHEET UC-3C.
- INSTALL 20" BLOW-OFF ASSEMBLY. SEE DETAIL SHEET UC-3C.

Notes

Town of Apex Notes:

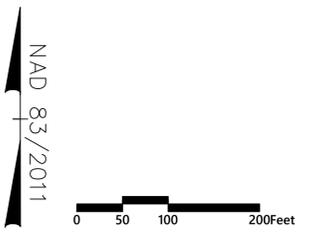
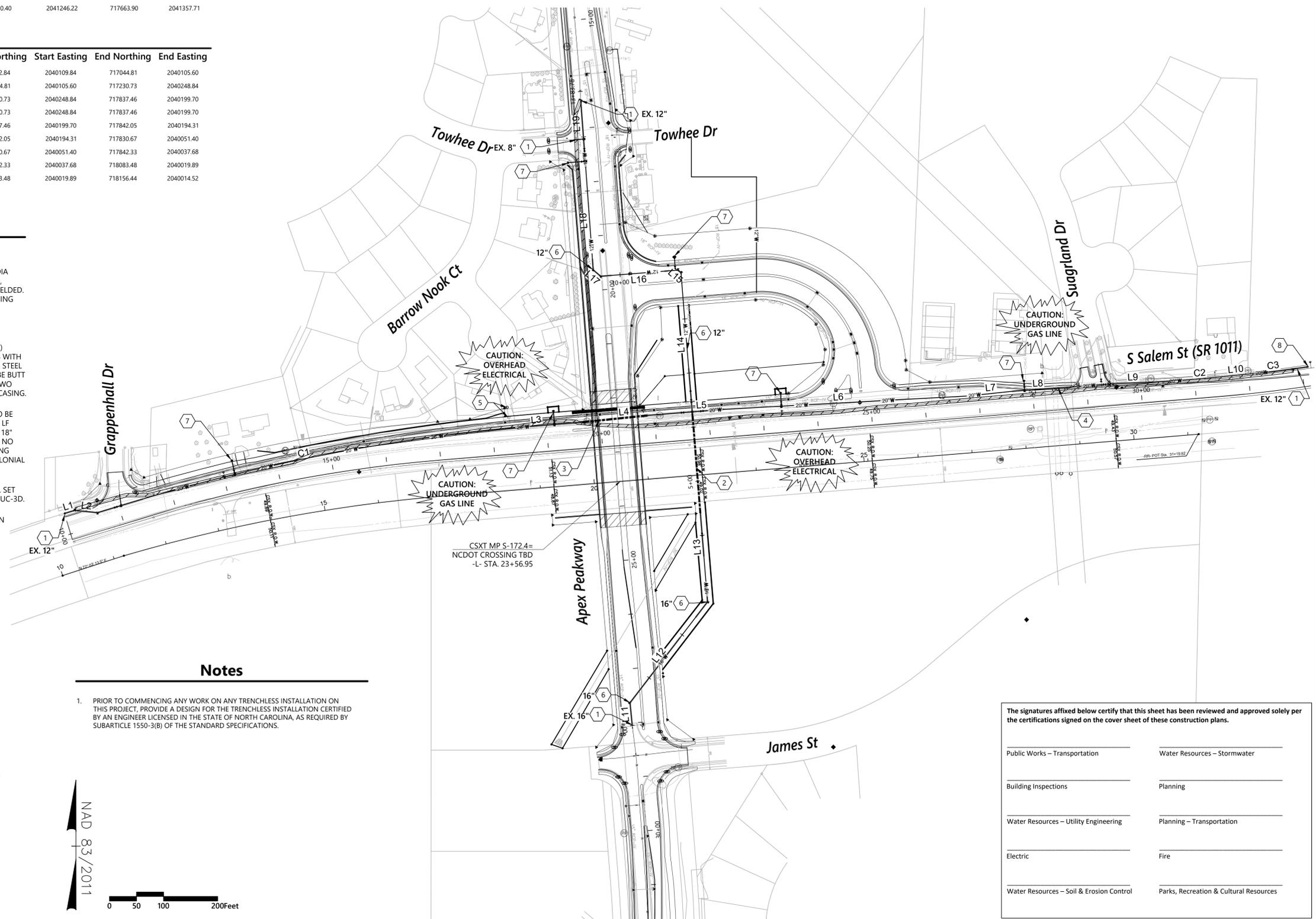
- ALL WATER LINES SHALL BE INSTALLED WITH A MINIMUM OF 3 FEET OF COVER.
- MAINTAIN 18" MINIMUM VERTICAL SEPARATION BETWEEN UTILITIES.
- VERIFY ALL ILLUSTRATED UTILITY CROSSINGS PRIOR TO CONSTRUCTION AND NOTIFY THE ENGINEER IF CONFLICTS ARE ENCOUNTERED.
- CONTRACTOR SHALL COORDINATE UTILITY RELOCATION OR ABANDONMENT WITH LOCAL UTILITY COMPANIES AS REQUIRED.
- WATER SHALL BE AT LEAST 10 FEET LATERALLY FROM EXISTING OR PROPOSED SEWERS. WHERE LOCAL CONDITIONS PREVENT A SEPARATION OF 10 FEET, THE WATER MAIN MAY BE LAID CLOSER, PROVIDED THAT THE ELEVATION OF THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER WITH A HORIZONTAL SEPARATION OF AT LEAST 3 FEET.
- ALL GATE VALVES SHALL BE APPROVED BY THE TOWN OF APEX. BUTTERFLY VALVES ARE NOT APPROVED FOR USE.

Notes

- PRIOR TO COMMENCING ANY WORK ON ANY TRENCHLESS INSTALLATION ON THIS PROJECT, PROVIDE A DESIGN FOR THE TRENCHLESS INSTALLATION CERTIFIED BY AN ENGINEER LICENSED IN THE STATE OF NORTH CAROLINA, AS REQUIRED BY SUBARTICLE 1550-3(B) OF THE STANDARD SPECIFICATIONS.

LEGEND

- EX. WATERLINE
- PROPOSED DIP WATERLINE
- PROPOSED RIDIP WATERLINE
- TRENCHLESS INSTALLATION (JACK AND BORE)
- DRY UTILITY DUCT BANK
- PUBLIC UTILITY EASEMENT
- EX. WATERLINE TO BE REMOVED OR ABANDONED



PROJECT REFERENCE NO.	SHEET NO.
U-5928	UC-3B
DESIGNED BY: JK	
DRAWN BY: JT	
CHECKED BY: JK	
APPROVED BY: TG	
REVISED:	6/28/2024
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	UTILITY CONSTRUCTION PLANS ONLY
UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	

UTILITY CONSTRUCTION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

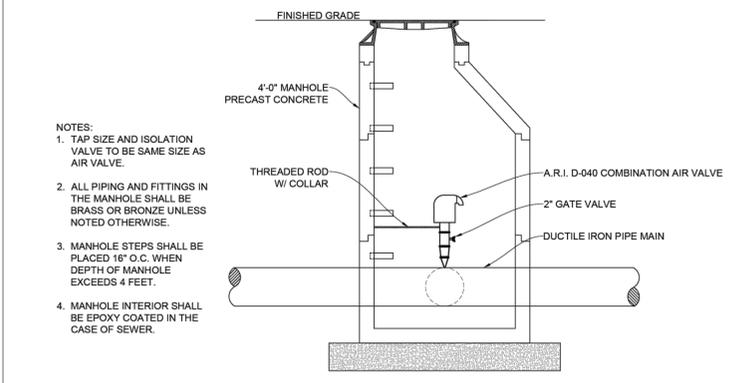
Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources



vhb
 VHB Engineering NC, P.C. (C-3705)
 940 Main Campus Drive, Suite 500
 Raleigh, NC 27606

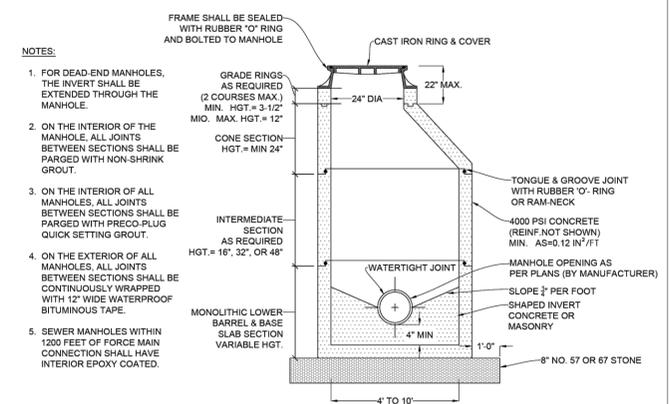
PROJECT REFERENCE NO. U-5928	SHEET NO. UC-3D
DESIGNED BY: JK	3/5/2024 NORTH CAROLINA PROFESSIONAL SEAL 14101 John M. Esampietro 8002907748@ncsbe.org
DRAWN BY: JT	
CHECKED BY: JK	
APPROVED BY: TG	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

UTILITY CONSTRUCTION
 DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED



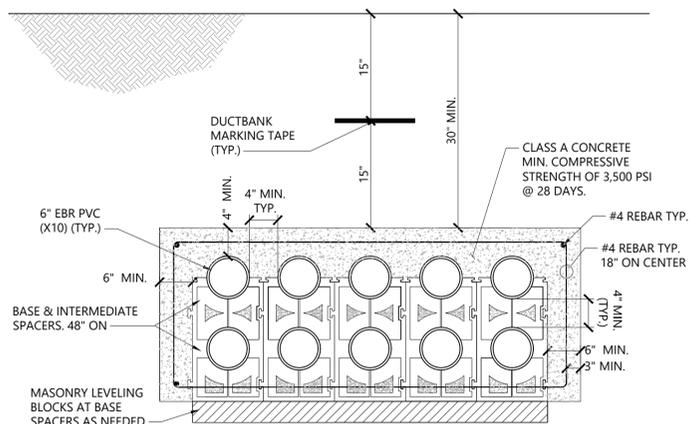
- NOTES:**
1. TAP SIZE AND ISOLATION VALVE TO BE SAME SIZE AS AIR VALVE.
 2. ALL PIPING AND FITTINGS IN THE MANHOLE SHALL BE BRASS OR BRONZE UNLESS NOTED OTHERWISE.
 3. MANHOLE STEPS SHALL BE PLACED 16" O.C. WHEN DEPTH OF MANHOLE EXCEEDS 4 FEET.
 4. MANHOLE INTERIOR SHALL BE EPOXY COATED IN THE CASE OF SEWER.

TOWN OF APEX STANDARDS
 AIR RELEASE MANHOLE FOR WATER MAINS
 EFFECTIVE: NOVEMBER 20, 2007
 STD. NO. 600.12
 SHEET 1 OF 1



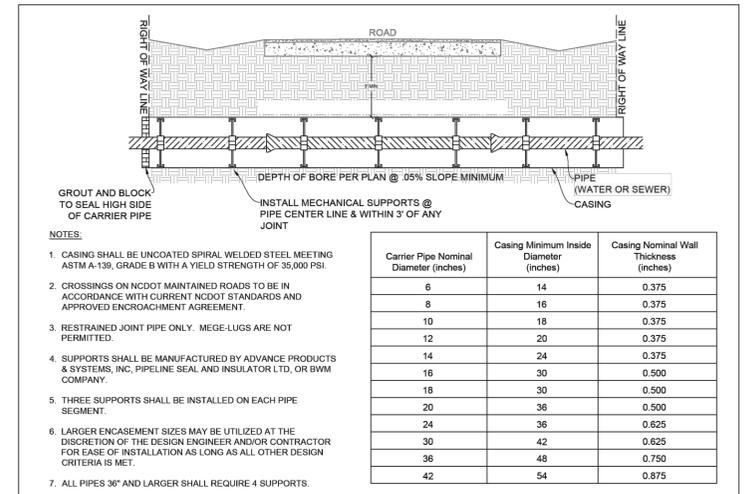
- NOTES:**
1. FOR DEAD END MANHOLES, THE INVERT SHALL BE EXTENDED THROUGH THE MANHOLE.
 2. ON THE INTERIOR OF THE MANHOLE ALL JOINTS BETWEEN SECTIONS SHALL BE PARGED WITH NON-SHRINK GROUT.
 3. ON THE INTERIOR OF ALL MANHOLES ALL JOINTS BETWEEN SECTIONS SHALL BE PARGED WITH PRECO-PLUG QUICK SETTING GROUT.
 4. ON THE EXTERIOR OF ALL MANHOLES ALL JOINTS BETWEEN SECTIONS SHALL BE CONTINUOUSLY WRAPPED WITH 12" WIDE WATERPROOF BITUMINOUS TAPE.
 5. SEWER MANHOLES WITHIN 1200 FEET OF FORCE MAIN CONNECTION SHALL HAVE INTERIOR EPOXY COATED.

TOWN OF APEX STANDARDS
 PRECAST MANHOLE TRAFFIC RATED
 EFFECTIVE: APRIL 12, 2022
 STD. NO. 700.04
 SHEET 1 OF 3



- NOTES:**
1. GEOTECH TEST, IN ACCORD WITH ASTM D698, THE BOTTOM OF EXCAVATION TO ACHIEVE 98% OF MAXIMUM DRY DENSITY, PRIOR TO CONCRETE PLACEMENT.

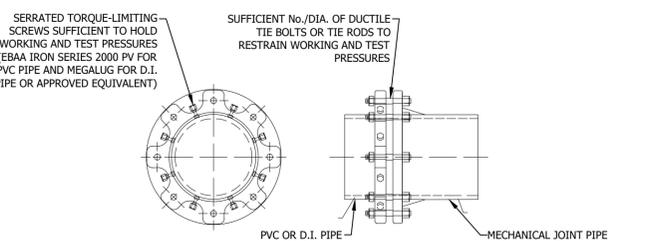
DRY UTILITY DUCT BANK DETAIL
 N.T.S. Source: VHB 11/12/18 0



- NOTES:**
1. CASING SHALL BE UNCOATED SPIRAL WELDED STEEL MEETING ASTM A-139, GRADE B WITH A YIELD STRENGTH OF 35,000 PSI.
 2. CROSSINGS ON NCDOT MAINTAINED ROADS TO BE IN ACCORDANCE WITH CURRENT NCDOT STANDARDS AND APPROVED ENCROACHMENT AGREEMENT.
 3. RESTRAINED JOINT PIPE ONLY. MEGE-LUGS ARE NOT PERMITTED.
 4. SUPPORTS SHALL BE MANUFACTURED BY ADVANCE PRODUCTS & SYSTEMS, INC., PIPELINE SEAL AND INSULATOR LTD, OR BWM COMPANY.
 5. THREE SUPPORTS SHALL BE INSTALLED ON EACH PIPE SEGMENT.
 6. LARGER ENCASMENT SIZES MAY BE UTILIZED AT THE DISCRETION OF THE DESIGN ENGINEER AND/OR CONTRACTOR FOR EASE OF INSTALLATION AS LONG AS ALL OTHER DESIGN CRITERIA IS MET.
 7. ALL PIPES 36" AND LARGER SHALL REQUIRE 4 SUPPORTS.

Carrier Pipe Nominal Diameter (inches)	Casing Minimum Inside Diameter (inches)	Casing Nominal Wall Thickness (inches)
6	14	0.375
8	16	0.375
10	18	0.375
12	20	0.375
14	24	0.375
16	30	0.500
18	30	0.500
20	36	0.500
24	36	0.625
30	42	0.625
36	48	0.750
42	54	0.875

TOWN OF APEX STANDARDS
 BORE & JACK
 EFFECTIVE: MARCH 23, 2021
 STD. NO. 450.06
 SHEET 1 OF 1

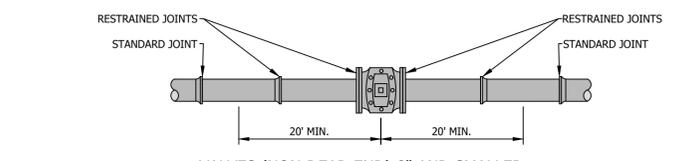


RESTRAINED JOINTS ON MECHANICAL JOINT PIPE & FITTINGS

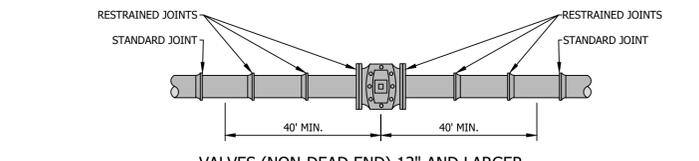
MINIMUM FOOTAGE OF RESTRAINED PIPE FOR VARIOUS DIAMETERS & DEGREES CAST & DUCTILE IRON ELBOWS

COVER DIA. MAIN	DEGREE OF ELBOW						BRANCH OF TEE	REDUCER (LARGE SIDE ONLY)
	11.25°	22.5°	45°	90°	VERTICAL OFFSET 45°			
	3'	3'	3'	3'	UPPER BEND (3')	LOWER BEND (3')		
6"	2'	5'	10'	25'	15'	10'	15'	20'
8"	4'	6'	14'	33'	25'	15'	30'	40'
12"	5'	10'	20'	50'	30'	20'	55'	45'
16"	7'	13'	28'	67'	45'	30'	80'	45'
20"	8'	17'	35'	84'	55'	35'	105'	45'

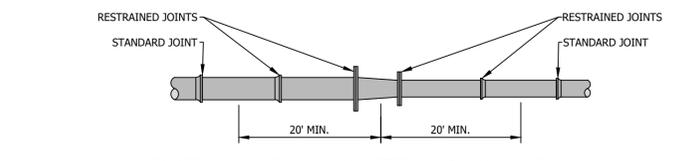
RESTRAINED JOINT DETAIL
 N.T.S. Source: VHB 6/14/19 0



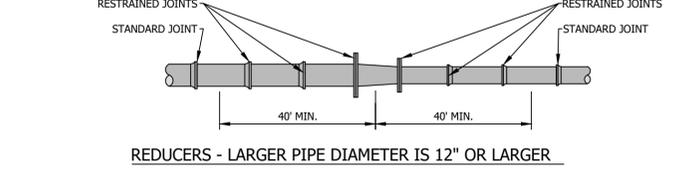
VALVES (NON-DEAD END) 8" AND SMALLER



VALVES (NON-DEAD END) 12" AND LARGER

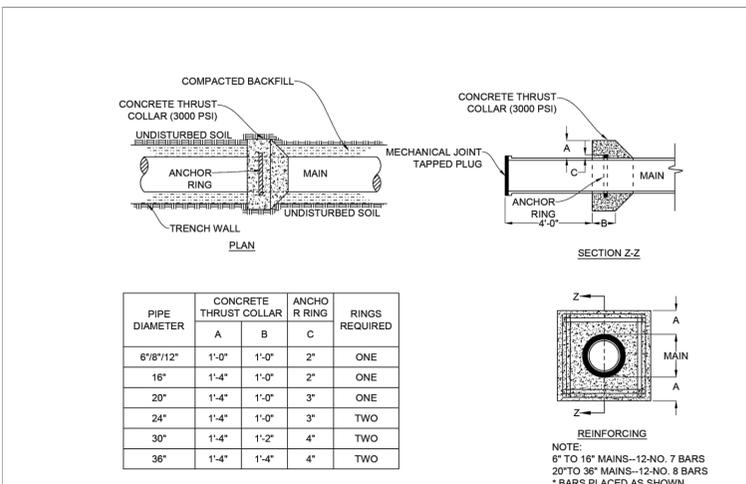


REDUCERS - LARGER PIPE DIAMETER IS 8" OR SMALLER



REDUCERS - LARGER PIPE DIAMETER IS 12" OR LARGER

TYP. RESTRAINING FOR VALVES AND REDUCERS
 N.T.S. Source: VHB 6/14/19 0



PIPE DIAMETER	CONCRETE THRUST COLLAR			ANCHOR RING	RINGS REQUIRED
	A	B	C		
6"/8"/12"	1'-0"	1'-0"	2"	ONE	
16"	1'-4"	1'-0"	2"	ONE	
20"	1'-4"	1'-0"	3"	ONE	
24"	1'-4"	1'-0"	3"	TWO	
30"	1'-4"	1'-2"	4"	TWO	
36"	1'-4"	1'-4"	4"	TWO	

TOWN OF APEX STANDARDS
 THRUST COLLAR INSTALLATION
 EFFECTIVE: DECEMBER 3, 2002
 STD. NO. 600.11
 SHEET 1 OF 1

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

5/14/1999
 3/4/2024 9:30:59 AM
 \\vhl\proj\proj\RAlegh\proj\38523.00 Apex Peakway\NCDOT\Utilities\Engineering\UC\Proj\Plan Sheets\U-5928_DT.dwg

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

NOTES KEYED TO PLAN

- CONNECT TO EX. 16" WATERLINE W/ THRUST COLLAR PRIOR TO CONNECTION.
- CONNECT TO EX. 12" WATERLINE W/ THRUST COLLAR PRIOR TO CONNECTION.
- EXTEND EXISTING 8" WATERLINE AND CONNECT WITH 12" X 8" TEE. RESTRAIN VALVE WITH THRUST COLLAR AND RODS PRIOR TO NEW CONNECTION.
- ~180 LF 16" DIP WATERLINE JACK AND BORE INSTALLATION WITH 36" DIA (0.532" THICK) UNCOATED SPIRAL WELDED STEEL MEETING ASTM A-139, GRADE B WITH A YIELD STRENGTH OF 35,000 PSI. JOINTS TO BE BUTT WELDED. SEE DETAIL, SHEET UC-3D. CARRIER PIPE THICKNESS DUE TO CSX CROSSING REQUIREMENTS. ALL CSX REQUIREMENTS ARE TO BE MET WITH THIS INSTALLATION. WATERLINE TO BE WRAPPED IN TWO LAYERS OF 6 MIL POLYETHYLENE FILM WRAP FOR THE LENGTH OF THE CASING.
- AIR RELEASE MANHOLE. SEE DETAIL, SHEET UC-3D.
- 16" DIP 45° BEND C/W FACTORY RESTRAINED JOINTS AND CONCRETE THRUST BLOCK. SEE DETAIL, SHEETS UC-3C AND UC-3D.
- 12" DIP 45° BEND C/W FACTORY RESTRAINED JOINTS AND CONCRETE THRUST BLOCK. SEE DETAIL, SHEETS UC-3C AND UC-3D.
- REMOVE EX. FIRE HYDRANT.
- INSTALL FIRE HYDRANT ASSEMBLY. SEE DETAIL, SHEET UC-3C.
- RETAINING WALL. DESIGN BY OTHERS.
- DRY UTILITY DUCT BANK. SEE DETAIL SHEET UC-3D.

LEGEND

- EX. WATERLINE
- PROPOSED DIP WATERLINE
- PROPOSED RJDIP WATERLINE
- TRENCHLESS INSTALLATION (JACK AND BORE)
- DRY UTILITY DUCT BANK
- PUBLIC UTILITY EASEMENT
- EX. WATERLINE TO BE REMOVED OR ABANDONED

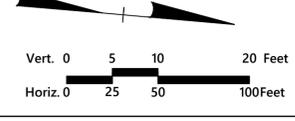
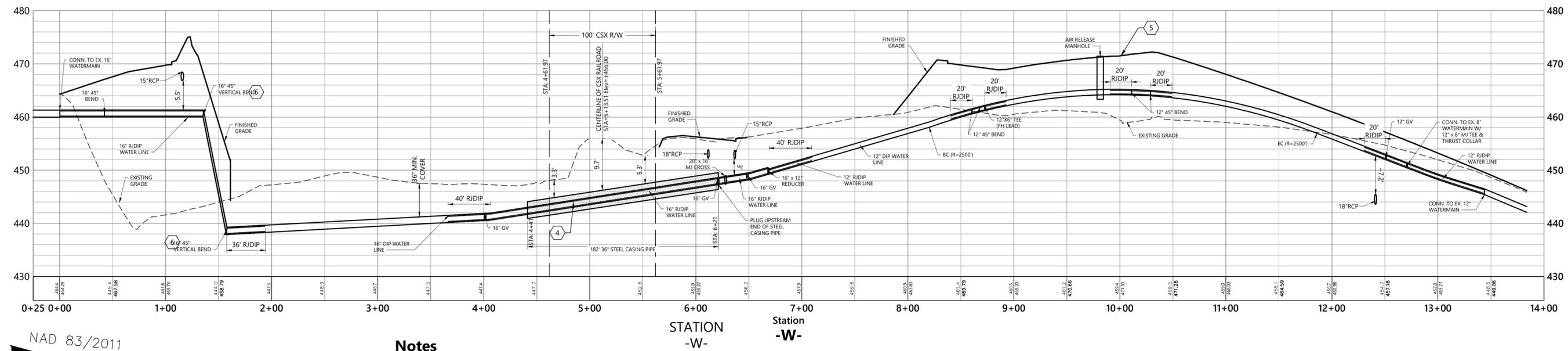
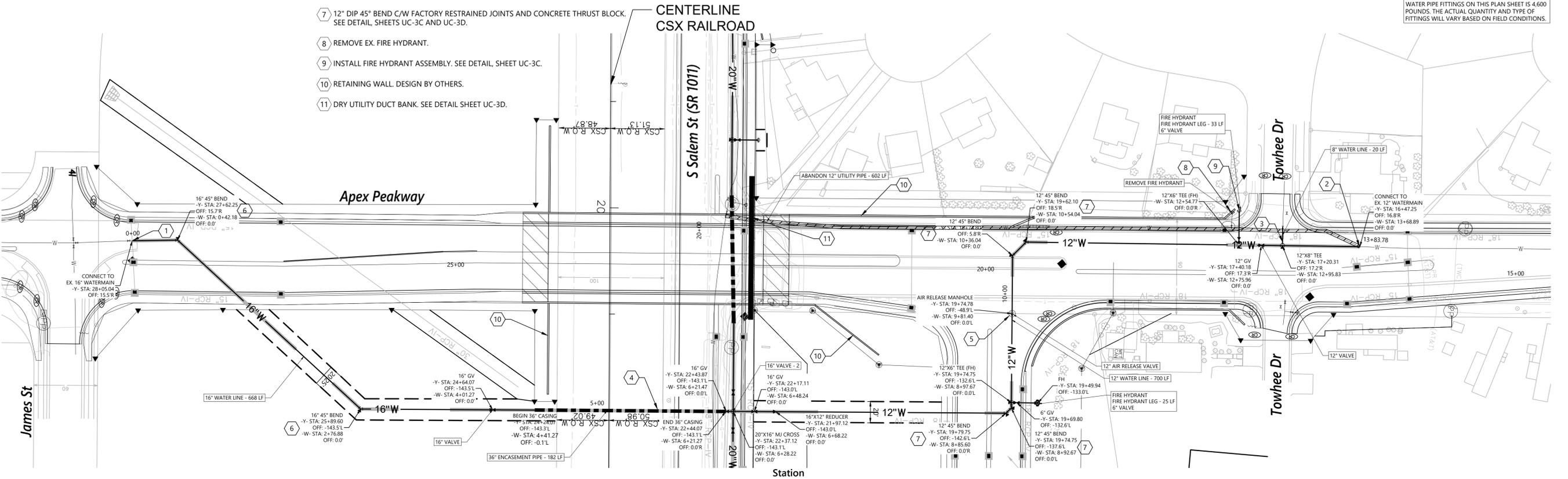
Notes

- Town of Apex Notes:**
- ALL WATER LINES SHALL BE INSTALLED WITH A MINIMUM OF 3 FEET OF COVER.
 - MAINTAIN 18" MINIMUM VERTICAL SEPARATION BETWEEN UTILITIES.
 - VERIFY ALL ILLUSTRATED UTILITY CROSSINGS PRIOR TO CONSTRUCTION AND NOTIFY THE ENGINEER IF CONFLICTS ARE ENCOUNTERED.
 - CONTRACTOR SHALL COORDINATE UTILITY RELOCATION OR ABANDONMENT WITH LOCAL UTILITY COMPANIES AS REQUIRED.
 - WATER SHALL BE AT LEAST 10 FEET LATERALLY FROM EXISTING OR PROPOSED SEWERS. WHERE LOCAL CONDITIONS PREVENT A SEPARATION OF 10 FEET, THE WATER MAIN MAY BE LAID CLOSER, PROVIDED THAT THE ELEVATION OF THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER WITH A HORIZONTAL SEPARATION OF AT LEAST 3 FEET.
 - ALL GATE VALVES SHALL BE APPROVED BY THE TOWN OF APEX. BUTTERFLY VALVES ARE NOT APPROVED FOR USE.

PROJECT REFERENCE NO. U-5928	SHEET NO. UC-4
DESIGNED BY: JK	
DRAWN BY: JT	
CHECKED BY: JK	
APPROVED BY: TG	REVISIONS:
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

UTILITY CONSTRUCTION
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

THE ESTIMATED QUANTITY OF DUCTILE IRON WATER PIPE FITTINGS ON THIS PLAN SHEET IS 4,600 POUNDS. THE ACTUAL QUANTITY AND TYPE OF FITTINGS WILL VARY BASED ON FIELD CONDITIONS.



- Notes**
- PRIOR TO COMMENCING ANY WORK ON ANY TRENCHLESS INSTALLATION ON THIS PROJECT, PROVIDE A DESIGN FOR THE TRENCHLESS INSTALLATION CERTIFIED BY AN ENGINEER LICENSED IN THE STATE OF NORTH CAROLINA, AS REQUIRED BY SUBARTICLE 1550-3(B) OF THE STANDARD SPECIFICATIONS.

3/5/2024 10:53:39 AM \\vhl\gbl\proj\ Raleigh\proj\Engineering\UC\Pro\Plan\Sheets\U-5928_UC.dwg

5/14/2019

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

NOTES KEYED TO PLAN

- CONNECT TO EX. 12" WATERLINE. INSTALL THRUST COLLAR ON 20" WATERLINE PRIOR TO CONNECTION.
- EXTEND EXISTING 8" WATERLINE AND CONNECT WITH 20" X 8" TEE. RESTRAIN VALVE WITH THRUST COLLAR AND RODS PRIOR TO NEW CONNECTION.
- REMOVE EX. FIRE HYDRANT.
- INSTALL FIRE HYDRANT ASSEMBLY. SEE DETAIL, SHEET UC-3C.
- ~120 LF 20" DIP WATER LINE CARRIER PIPE INSIDE 42" DIA (0.312" THICK) UNCOATED SPIRAL WELDED STEEL PIPE MEETING ASTM A-139, GRADE B WITH A YIELD STRENGTH OF 35,000 PSI (42" ENCASEMENT PIPE). 42" WELDED STEEL PIPE SHALL BE INSTALLED BY JACK AND BORE OPERATION. JOINTS TO BE BUTT WELDED. SEE DETAIL, SHEET UC-3D. WATER LINE TO BE WRAPPED IN TWO LAYERS OF 8 MIL POLYETHYLENE FILM WRAP FOR THE LENGTH OF THE CASING.
- REMOVE EXISTING MANHOLE AND APPROXIMATELY 15 LF OF 8" SEWER. SET NEW MANHOLE. RIM: 457.10' INVERT OUT: 449.90'. SEE DETAIL, SHEET UC-3D.
- RETAINING WALL. DESIGN BY OTHERS.
- DRY UTILITY DUCT BANK. SEE DETAIL SHEET UC-3D.

LEGEND

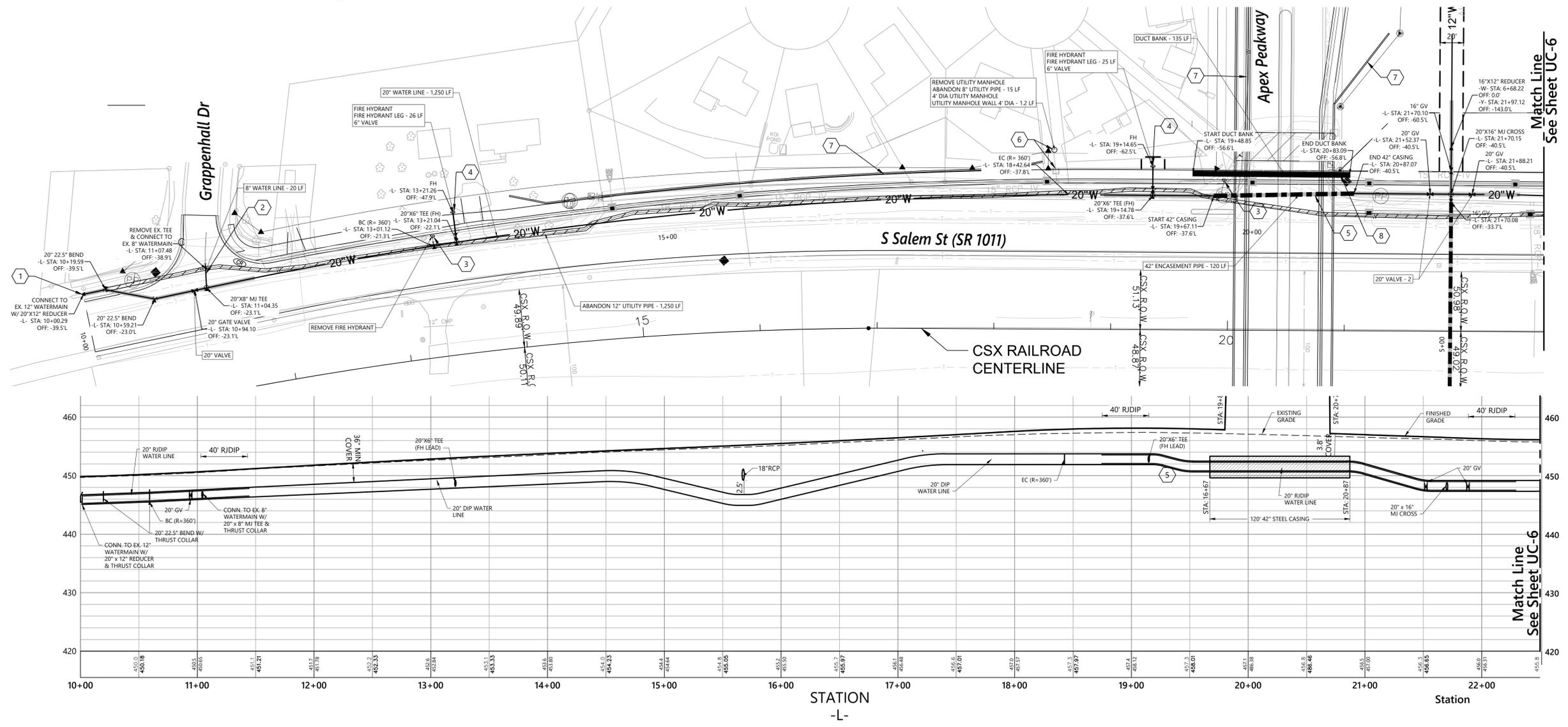
- W --- EX. WATERLINE
- 16"W --- PROPOSED DIP WATERLINE
- 16"W --- PROPOSED RIDIP WATERLINE
- TRENCHLESS INSTALLATION (JACK AND BORE)
- DRY UTILITY DUCT BANK
- PUBLIC UTILITY EASEMENT
- EX. WATERLINE TO BE REMOVED OR ABANDONED

Notes

- Town of Apex Notes:**
- ALL WATER LINES SHALL BE INSTALLED WITH A MINIMUM OF 3 FEET OF COVER.
 - MAINTAIN 18" MINIMUM VERTICAL SEPARATION BETWEEN UTILITIES.
 - VERIFY ALL ILLUSTRATED UTILITY CROSSINGS PRIOR TO CONSTRUCTION AND NOTIFY THE ENGINEER IF CONFLICTS ARE ENCOUNTERED.
 - CONTRACTOR SHALL COORDINATE UTILITY RELOCATION OR ABANDONMENT WITH LOCAL UTILITY COMPANIES AS REQUIRED.
 - WATER SHALL BE AT LEAST 10 FEET LATERALLY FROM EXISTING OR PROPOSED SEWERS. WHERE LOCAL CONDITIONS PREVENT A SEPARATION OF 10 FEET, THE WATER MAIN MAY BE LAID CLOSER, PROVIDED THAT THE ELEVATION OF THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER WITH A HORIZONTAL SEPARATION OF AT LEAST 3 FEET.
 - ALL GATE VALVES SHALL BE APPROVED BY THE TOWN OF APEX. BUTTERFLY VALVES ARE NOT APPROVED FOR USE.

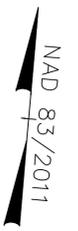
PROJECT REFERENCE NO. U-5928	SHEET NO. UC-5
DESIGNED BY: JK	
DRAWN BY: JT	
CHECKED BY: JK	
APPROVED BY: TG	6/28/2024
REVISION:	UTILITY CONSTRUCTION PLANS ONLY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	

THE ESTIMATED QUANTITY OF DUCTILE IRON WATER PIPE FITTINGS ON THIS PLAN SHEET IS 3,660 POUNDS. THE ACTUAL QUANTITY AND TYPE OF FITTINGS WILL VARY BASED ON FIELD CONDITIONS.



Notes

- PRIOR TO COMMENCING ANY WORK ON ANY TRENCHLESS INSTALLATION ON THIS PROJECT, PROVIDE A DESIGN FOR THE TRENCHLESS INSTALLATION CERTIFIED BY AN ENGINEER LICENSED IN THE STATE OF NORTH CAROLINA, AS REQUIRED BY SUBARTICLE 1550-3(B) OF THE STANDARD SPECIFICATIONS.



6/27/2024 10:30:38 AM \\vhb.com\gbl\pro\Raleigh\38523.00 Apex Apex Peakway\NCDOT\Utilities\Engineering\UC\Pro\Plan Sheets U-5928_UC.dwg

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

NOTES KEYED TO PLAN

- CONNECT TO EX. 12" WATERLINE. INSTALL THRUST COLLAR ON 12" WATERLINE PRIOR TO CONNECTION.
- REMOVE EX. FIRE HYDRANT.
- INSTALL FIRE HYDRANT ASSEMBLY. SEE DETAIL, SHEET UC-3C.
- EXTEND EXISTING 8" WATERLINE AND CONNECT WITH 12" X 8" TEE. RESTRAIN VALVE WITH THRUST COLLAR AND RODS PRIOR TO NEW CONNECTION.
- ~60 LF 20" RJDIP WATER LINE OPEN CUT INSTALLATION. WATERLINE TO BE WRAPPED IN TWO LAYERS OF 8 MIL POLYETHYLENE FILM WRAP (REFER TO NOTE 6 FOR ADDITIONAL INFORMATION). MAINTAIN MINIMUM 18" VERTICAL SEPARATION FROM COLONIAL PIPELINE CASING MATERIALS. NO WORK TO OCCUR WITHIN COLONIAL PIPELINE EASEMENT UNTIL EXISTING CASING HAS BEEN EXTENDED PAST PROPOSED RIGHT-OF-WAY. ALL COLONIAL PIPELINE REQUIREMENTS ARE TO BE MET WITH THIS INSTALLATION. REFER TO ADDITIONAL NOTES THIS SHEET.
- ADDITIONAL POLYETHYLENE ENCASEMENT NOTES:
 - ALL DUCTILE IRON PIPE THAT IS INSTALLED WITHIN 60 FEET OF ANY GAS LINE SHALL BE WRAPPED WITH A DUAL LAYER OF 8 MIL POLYETHYLENE ENCASEMENT. THE DUAL POLYETHYLENE ENCASEMENT SHALL MEET AWWA C105 REQUIREMENTS FOR DIELECTRIC STRENGTH OF 800 VOLTS PER MIL (12,800 VOLTS PER A 16-MILS THICK DUAL POLYETHYLENE SYSTEM) TO SHIELD THE DUCTILE PIPE FROM ELEVATED STRAY CURRENTS.
 - PERPENDICULAR CROSSINGS OF GAS LINES/EASEMENTS WITH DUCTILE IRON PIPE SHALL INCLUDE A DUAL LAYER OF 8 MIL POLYETHYLENE ENCASEMENT ACROSS THE ENTIRE EASEMENT WIDTH PLUS A DISTANCE OF 60 FEET ON EACH SIDE OF THE EASEMENT.
 - ALL RJDIP MUST BE RE-CALCULATED TO INCLUDE THE POLY WRAP ON PIPE.
 - ALL WATERLINES MUST HAVE A MINIMUM OF 3' OF COVER IN NON-LOAD BEARING AREAS. LOAD BEARING AREAS MUST HAVE 3' OF COVER TO THE FINISHED SUB-GRADE
- REFER TO 20" WATERMAIN CONNECTION DETAIL THIS SHEET.

Notes

Town of Apex Notes:

- ALL WATER LINES SHALL BE INSTALLED WITH A MINIMUM OF 3 FEET OF COVER.
- MAINTAIN 18" MINIMUM VERTICAL SEPARATION BETWEEN UTILITIES.
- VERIFY ALL ILLUSTRATED UTILITY CROSSINGS PRIOR TO CONSTRUCTION AND NOTIFY THE ENGINEER IF CONFLICTS ARE ENCOUNTERED.
- CONTRACTOR SHALL COORDINATE UTILITY RELOCATION OR ABANDONMENT WITH LOCAL UTILITY COMPANIES AS REQUIRED.
- WATER SHALL BE AT LEAST 10 FEET LATERALLY FROM EXISTING OR PROPOSED SEWERS, WHERE LOCAL CONDITIONS PREVENT A SEPARATION OF 10 FEET, THE WATER MAIN MAY BE LAID CLOSER, PROVIDED THAT THE ELEVATION OF THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER WITH A HORIZONTAL SEPARATION OF AT LEAST 3 FEET.
- ALL GATE VALVES SHALL BE APPROVED BY THE TOWN OF APEX. BUTTERFLY VALVES ARE NOT APPROVED FOR USE.



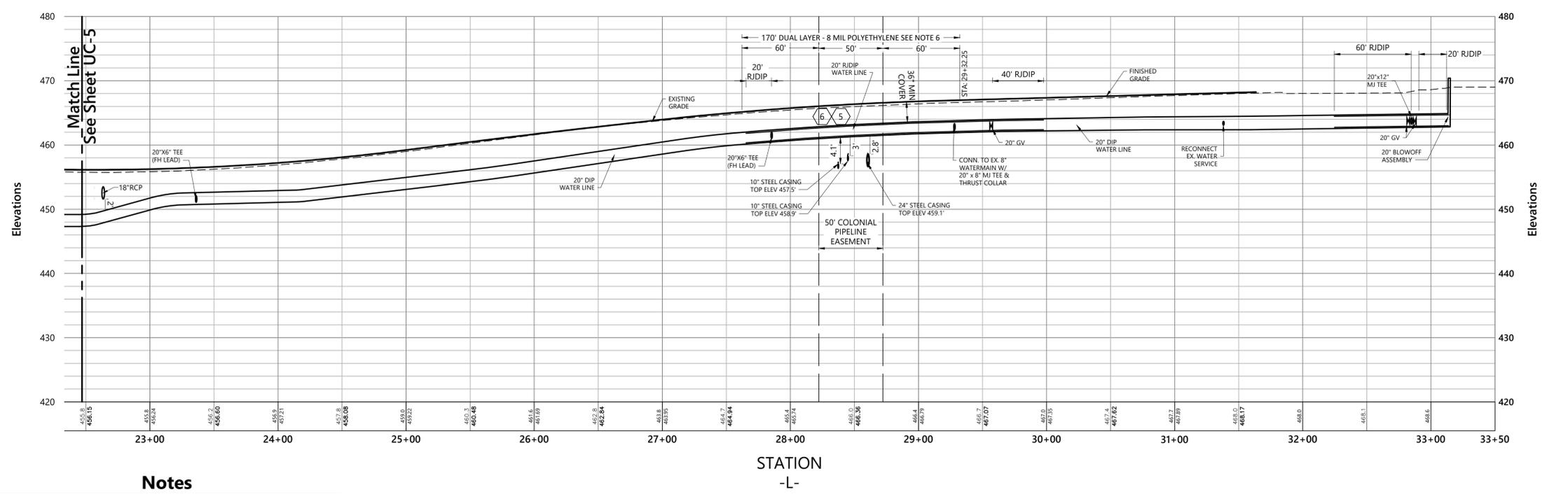
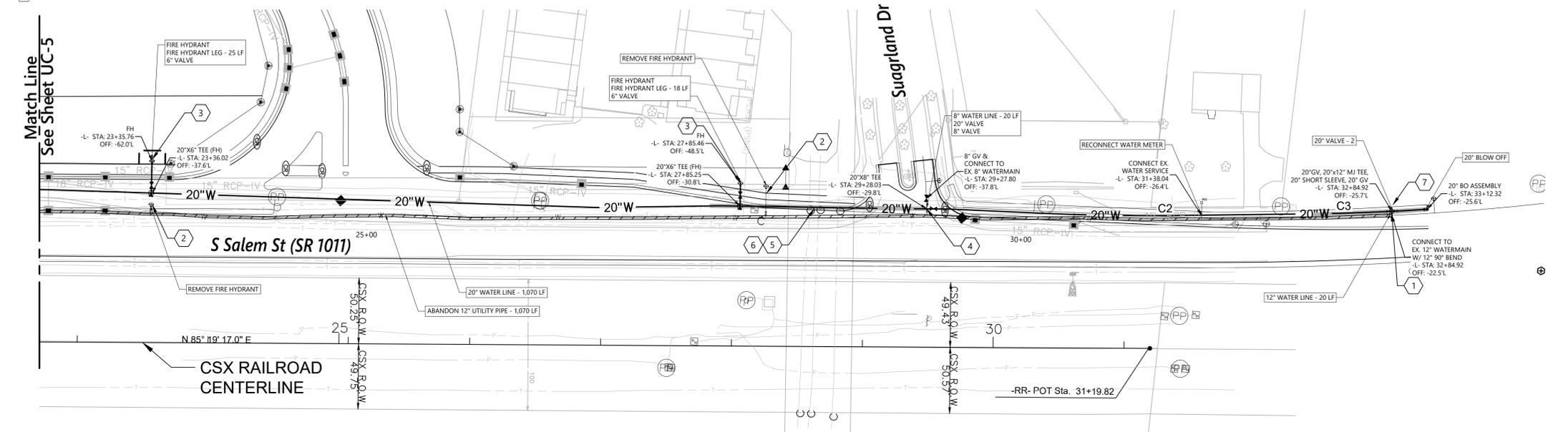
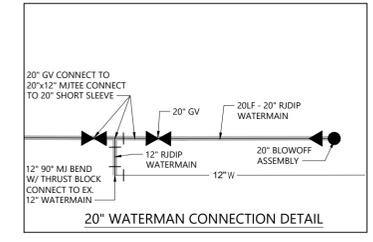
PROJECT REFERENCE NO. U-5928	SHEET NO. UC-6
DESIGNED BY: JK	
DRAWN BY: JT	
CHECKED BY: JK	
APPROVED BY: TG	REVISID:
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	
UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

UTILITY CONSTRUCTION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THE ESTIMATED QUANTITY OF DUCTILE IRON WATER PIPE FITTINGS ON THIS PLAN SHEET IS 3,215 POUNDS. THE ACTUAL QUANTITY AND TYPE OF FITTINGS WILL VARY BASED ON FIELD CONDITIONS.

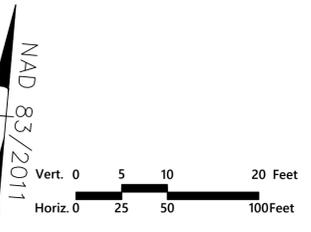
LEGEND

- EX. WATERLINE
- 16" W PROPOSED DIP WATERLINE
- 16" W PROPOSED RJDIP WATERLINE
- TRENCHLESS INSTALLATION (JACK AND BORE)
- DRY UTILITY DUCT BANK
- PUBLIC UTILITY EASEMENT
- EX. WATERLINE TO BE REMOVED OR ABANDONED



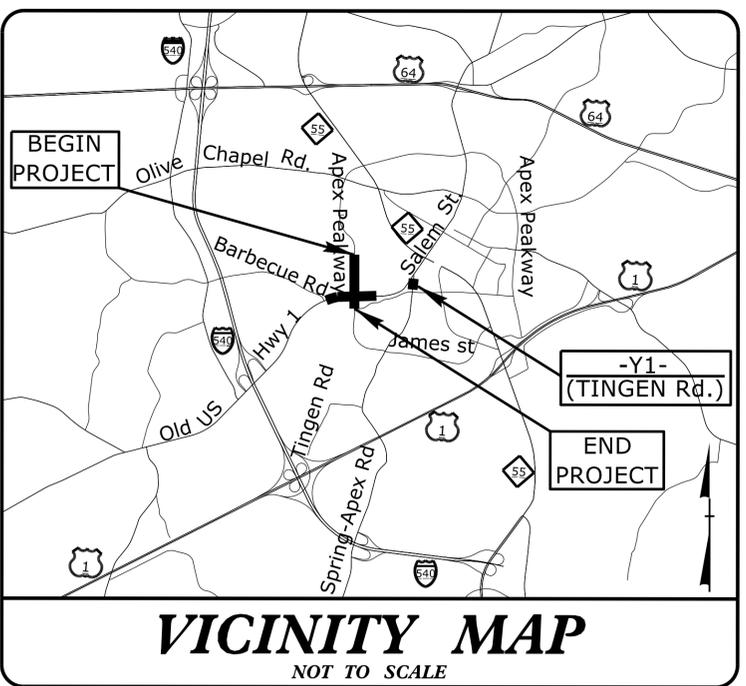
Notes

- PRIOR TO COMMENCING ANY WORK ON ANY TRENCHLESS INSTALLATION ON THIS PROJECT, PROVIDE A DESIGN FOR THE TRENCHLESS INSTALLATION REQUIRED BY AN ENGINEER LICENSED IN THE STATE OF NORTH CAROLINA, AS REQUIRED BY SUBARTICLE 1550-3(B) OF THE STANDARD SPECIFICATIONS.



09/28/09

TIP PROJECT: U-5928



PLANNING/ZONING TOWN OF APEX CERTIFICATION
 This construction drawing has been reviewed by the Town of Apex Planning Department, and to the best of my knowledge and belief, conforms to the Subdivision or Site Plan that was approved by the Town of Apex Council or Technical Review Committee, as appropriate, and meets the standards of the Town of Apex Unified Development Ordinance. This signature does not constitute a variance from any requirements of the originally approved Subdivision or Site Plan cited above, or any federal, state, or local code, law, specification, rule, guideline, or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements.

ELECTRIC TOWN OF APEX CERTIFICATION
 This drawing has been reviewed by the Town of Apex Electric Department, and to the best of my knowledge and belief, conforms to the requirements established in the Standard Specifications and Construction Details and the Unified Development Ordinance of the Town of Apex. However, this signature does not constitute a variance from any requirements contained in any federal, state, or local code, law, specification, rule or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements.

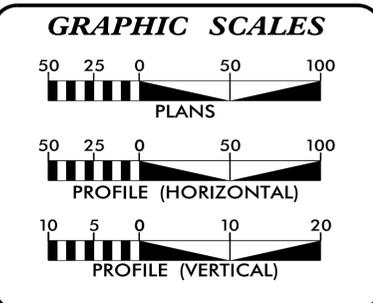
PUBLIC WORKS & TRANSPORTATION TOWN OF APEX CERTIFICATION
 This drawing has been reviewed by the Town of Apex Public Works & Transportation Department, and to the best of my knowledge and belief, provides an acceptable transportation system with consideration for the elements contained within the Transportation Plan conforming to the requirements established in the Standard Specifications & Standard Details and the Unified Development Ordinance of the Town of Apex. However, this signature does not constitute a variance from any requirements contained in any federal, state, or local code, law, specification, rule or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements.

WATER RESOURCES SOIL EROSION & SEDIMENTATION CONTROL TOWN OF APEX CERTIFICATION
 This drawing has been reviewed by the Town of Apex, and to the best of my knowledge and belief, conforms to the requirements established in the Soil Erosion and Sedimentation Control Ordinance of the Town of Apex. However, this signature does not constitute a variance from any requirements contained in any federal, state, or local code, law, specification, rule or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements. This signature does not constitute plan approval, only plan requirements. A separate letter of plan approval will be mailed to the financially responsible person at a later date according to the construction sequence.

WATER RESOURCES STORMWATER ENGINEERING TOWN OF APEX CERTIFICATION
 This drawing has been reviewed by the Town of Apex Water Resources Stormwater & Utility Engineering Division and to the best of my knowledge and belief, conforms to the requirements established in the Standard Specifications and Standard Details and the Unified Development Ordinance of the Town of Apex. However, this signature does not constitute a variance from any requirements contained in any federal, state, or local code, law, specification, rule or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements. This signature serves as the stormwater permit for this project.

WATER RESOURCES UTILITY ENGINEERING TOWN OF APEX CERTIFICATION
 This drawing has been reviewed by the Town of Apex Water Resources Department, and to the best of my knowledge and belief, conforms to the requirements established in the Standard Specifications and Standard Details of the Town of Apex. However, this signature does not constitute a variance from any requirements contained in any federal, state, or local code, law, specification, rule or ordinance. It is the sole responsibility of the owner/developer, or any of his agents or contract professionals to ensure that this construction plan meets all the aforementioned requirements.

THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON PLANS.



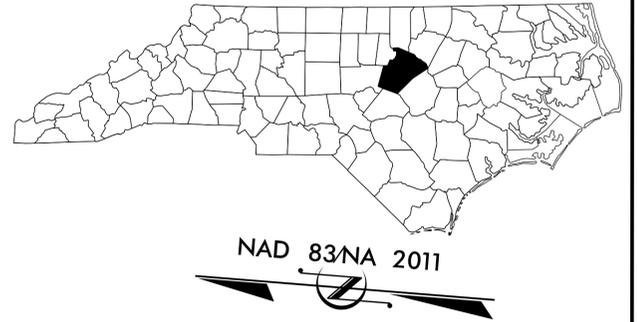
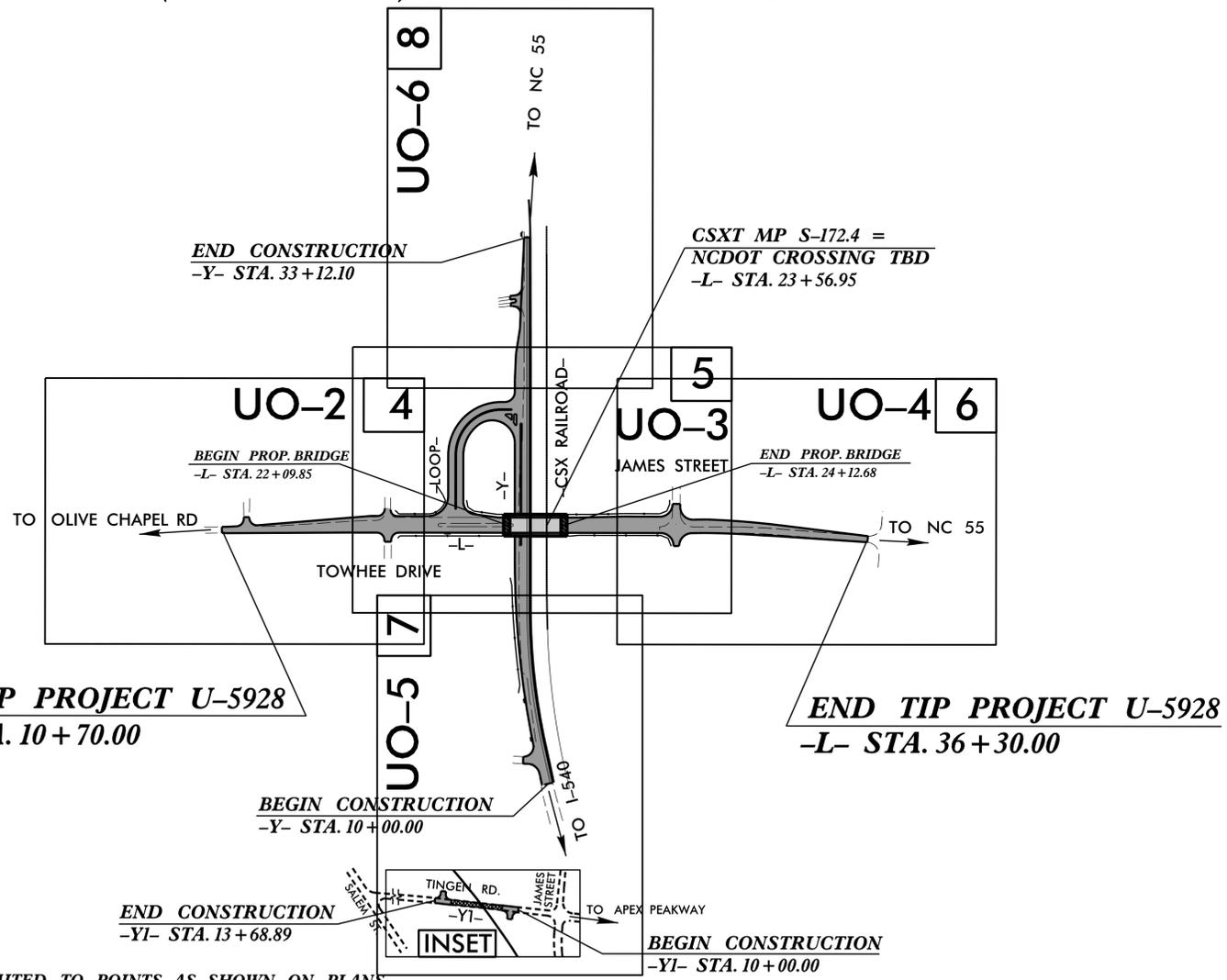
INDEX OF SHEETS

SHEET NO.:	DESCRIPTION:
UO-1	TITLE SHEET
UO-2 THRU UO-6	UBO PLAN SHEETS

STATE OF NORTH CAROLINA
 DIVISION OF HIGHWAYS
UTILITIES BY OTHERS PLANS
WAKE COUNTY

**LOCATION: JAMES STREET TO TOWHEE DRIVE
 CONSTRUCT GRADE SEPERATED INTERCHANGE FOR
 APEX PEAKWAY AT SOUTH SALEM STREET AND
 CSX RAILROAD**

**TYPE OF WORK: POWER (DISTRIBUTION), GAS (DISTRIBUTION),
 GAS (TRANSMISSION) AND COMMUNICATIONS**



T.I.P. NO.	SHEET NO.
U-5928	UO-1

NOTE:
 ALL UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS.
 NO PAYMENT WILL BE MADE TO THE CONTRACTOR FOR UTILITY WORK SHOWN ON THIS SHEET.



CONTRACT:

11/21/2023 10:12:22 PM I:\P\09\U5928-rdy-tsh.dgn

PREPARED IN THE OFFICE OF:

SAIM™
 2641 Sumner Boulevard
 Suite 116
 Raleigh, NC 27616
 (919) 878-7466

Freddie Bunn UTILITY PROJECT MANAGER
 Matthew Ward PROJECT UTILITY COORDINATOR

- UTILITY OWNERS WITH CONFLICTS**
- (A) GAS (TRANSMISSION) - COLONIAL PIPELINE
 - (B) POWER (DISTRIBUTION) - TOWN OF APEX
 - (C) GAS (DISTRIBUTION) - PSNC
 - (D) COMMUNICATIONS - SPECTRUM
 - (E) COMMUNICATIONS - AT&T
 - (F) COMMUNICATIONS - VERIZON
 - (G) COMMUNICATIONS - HOTWIRE

5/14/99
8/16/2023 U-5928-r.dwg-psh04.dgn
1:31:35 PM

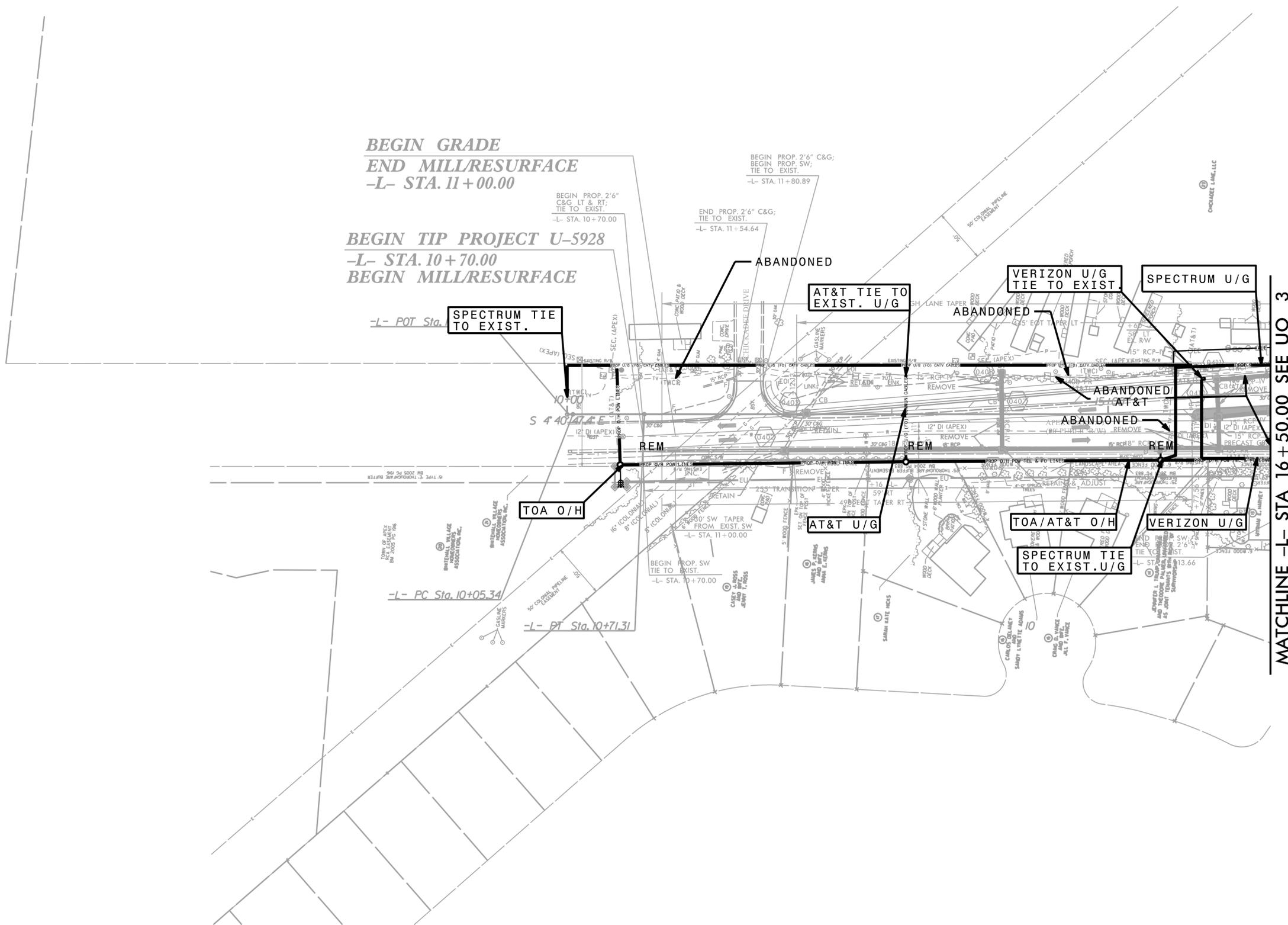


PROJECT REFERENCE NO.	SHEET NO.
U-5928	U0-2
THIS SHEET CORRESPONDS TO RDY- 04	

UTILITIES BY OTHERS

ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS. NO PAYMENT WILL BE MADE TO THE CONTRACTOR FOR PROPOSED UTILITY WORK SHOWN ON THIS SHEET.

NAD 832011



MATCHLINE -L- STA 16+50.00 SEE UO 3

FOR -L- PROFILE SEE SHEET 9

5/14/99
11/2/2023 15928_r.dwg psf05.dgn

MATCHLINE -Y- STA 27+00.00 SEE SHEET UO-6

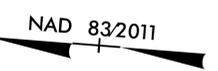


VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

PROJECT REFERENCE NO.	SHEET NO.
U-5928	UO-3
THIS SHEET CORRESPONDS TO RDY-05	

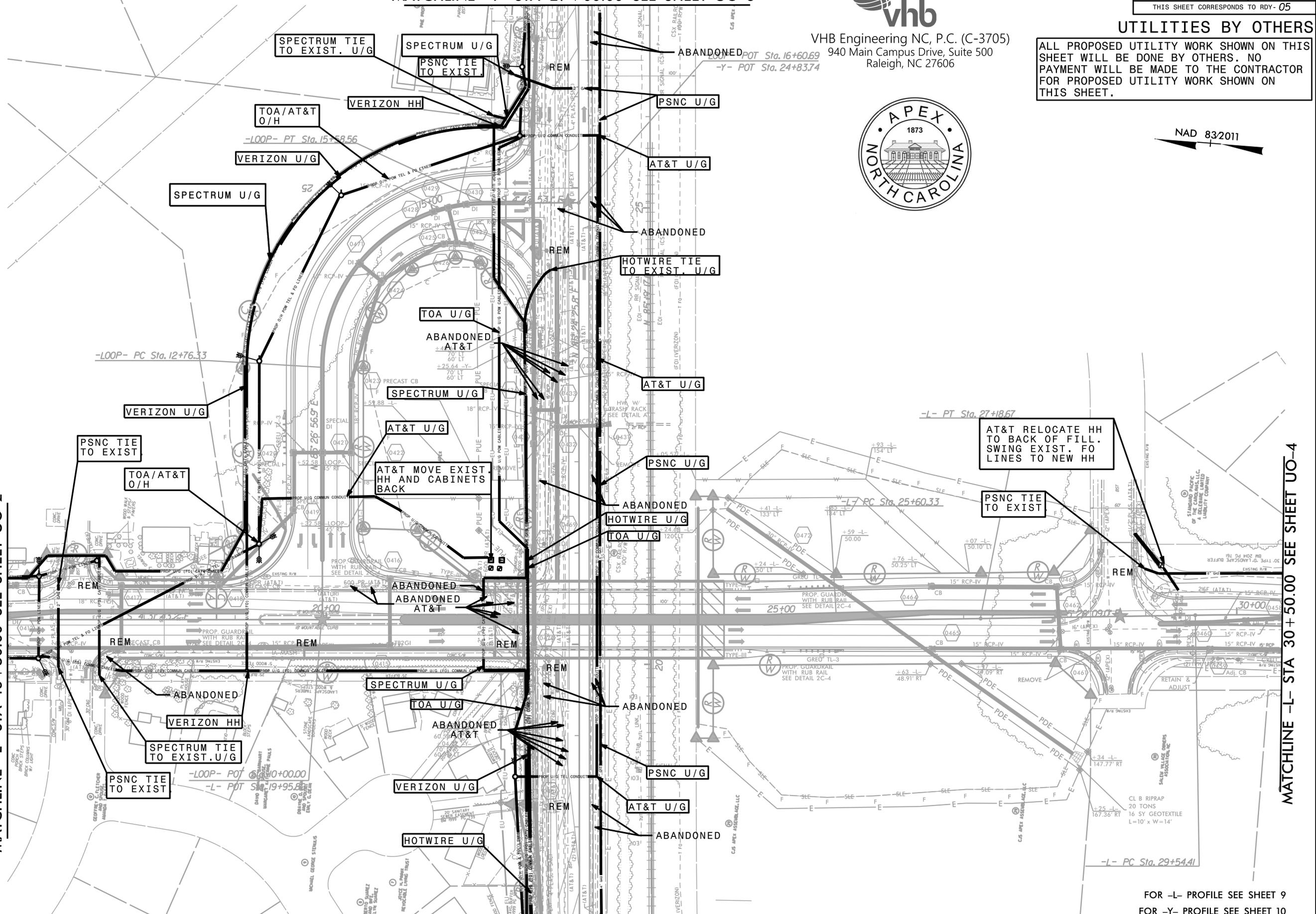
UTILITIES BY OTHERS

ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS. NO PAYMENT WILL BE MADE TO THE CONTRACTOR FOR PROPOSED UTILITY WORK SHOWN ON THIS SHEET.



MATCHLINE -L- STA 16+50.00 SEE SHEET UO-2

MATCHLINE -L- STA 30+50.00 SEE SHEET UO-4



MATCHLINE -Y- STA 17+00.00 SEE SHEET UO-5

FOR -L- PROFILE SEE SHEET 9
FOR -Y- PROFILE SEE SHEET 10
FOR -LOOP- PROFILE SEE SHEET 11

5/14/99

8/16/2023 U:\928_r.dwg-psh06.dgn
1:07:01 PM



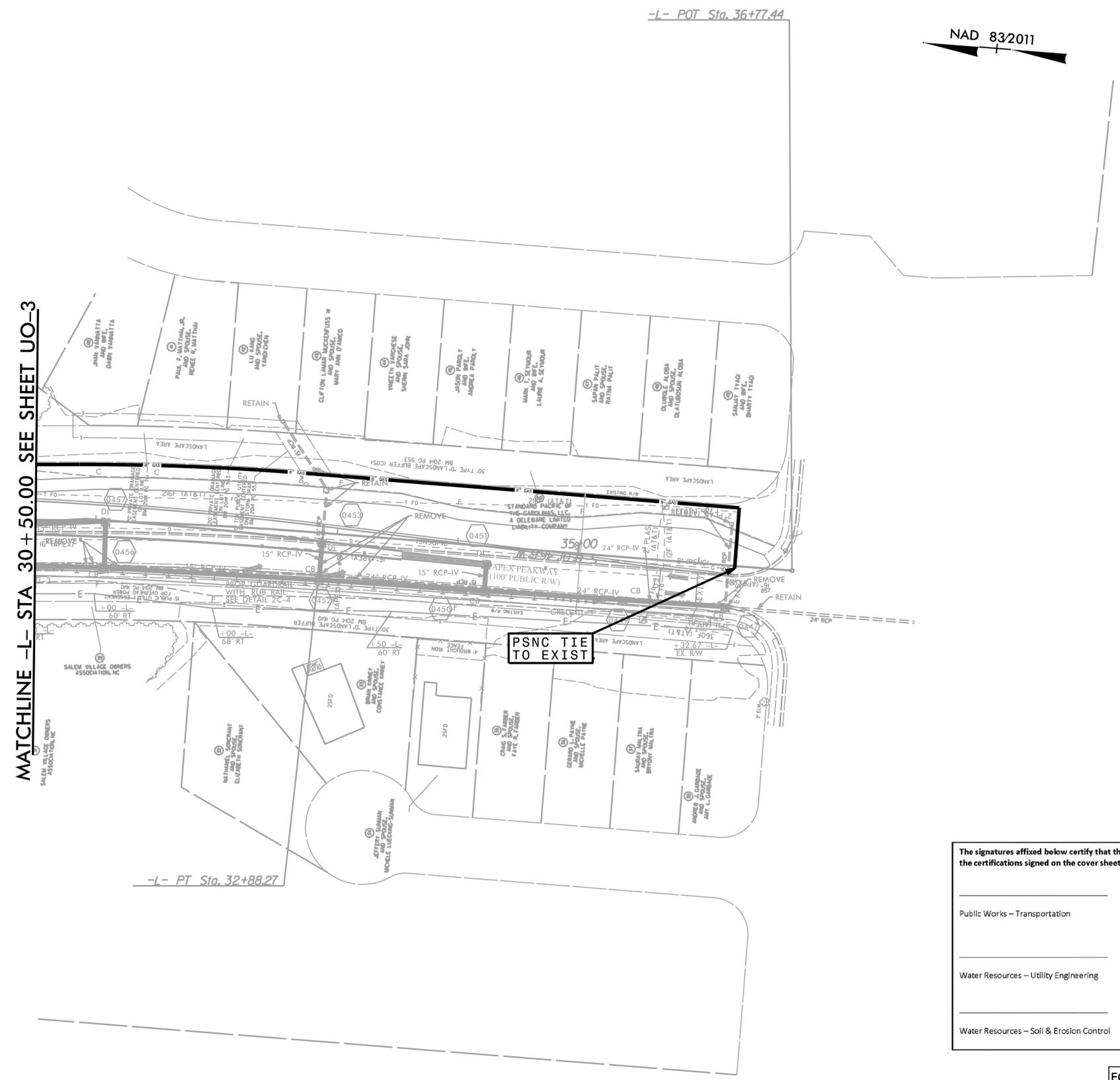
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



PROJECT REFERENCE NO.	SHEET NO.
U-5928	U0-4
THIS SHEET CORRESPONDS TO RDY-06	

UTILITIES BY OTHERS

ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS. NO PAYMENT WILL BE MADE TO THE CONTRACTOR FOR PROPOSED UTILITY WORK SHOWN ON THIS SHEET.



The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

_____	_____
Public Works – Transportation	Water Resources – Stormwater
_____	_____
Water Resources – Utility Engineering	Planning – Transportation
_____	_____
Water Resources – Soil & Erosion Control	Electric

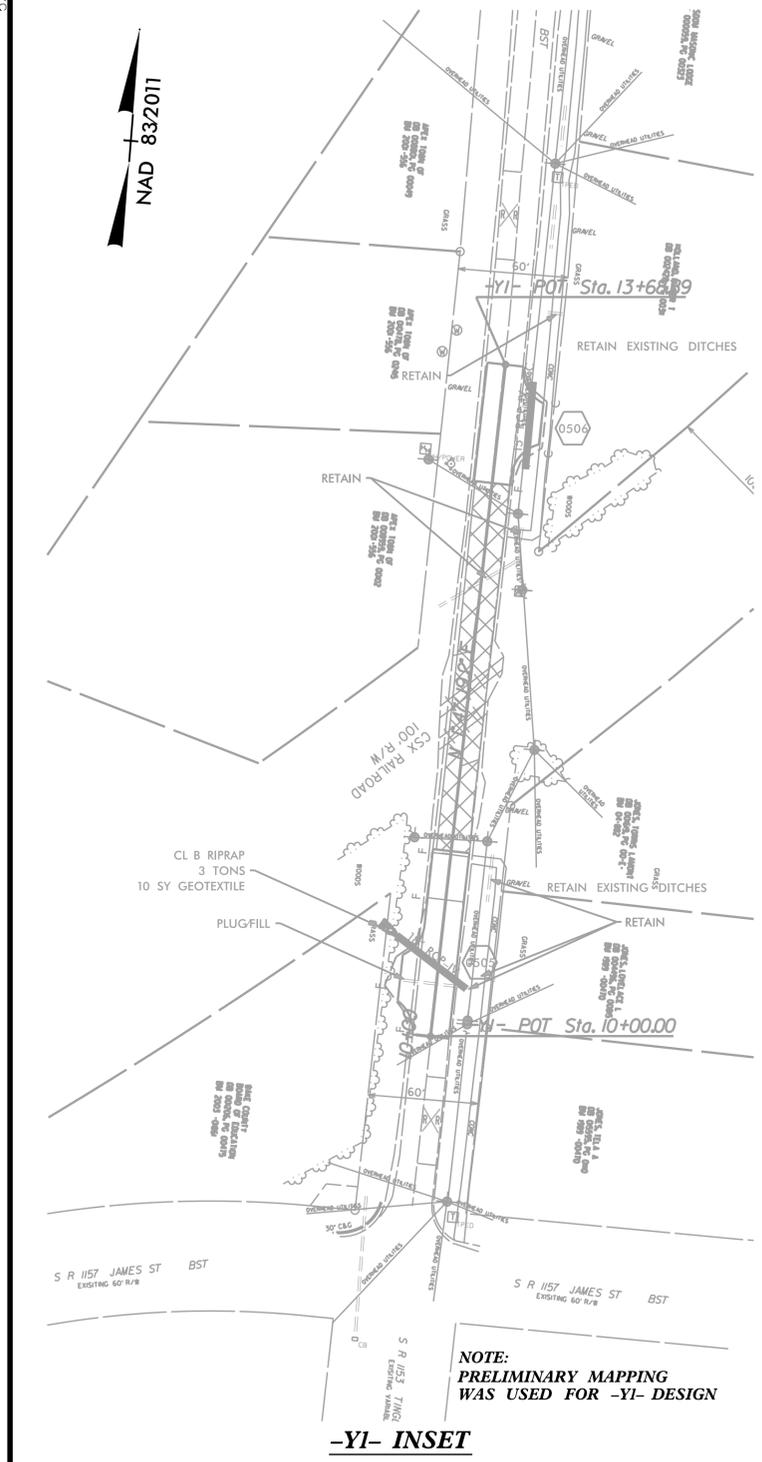
FOR -L- PROFILE SEE SHEET 9

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

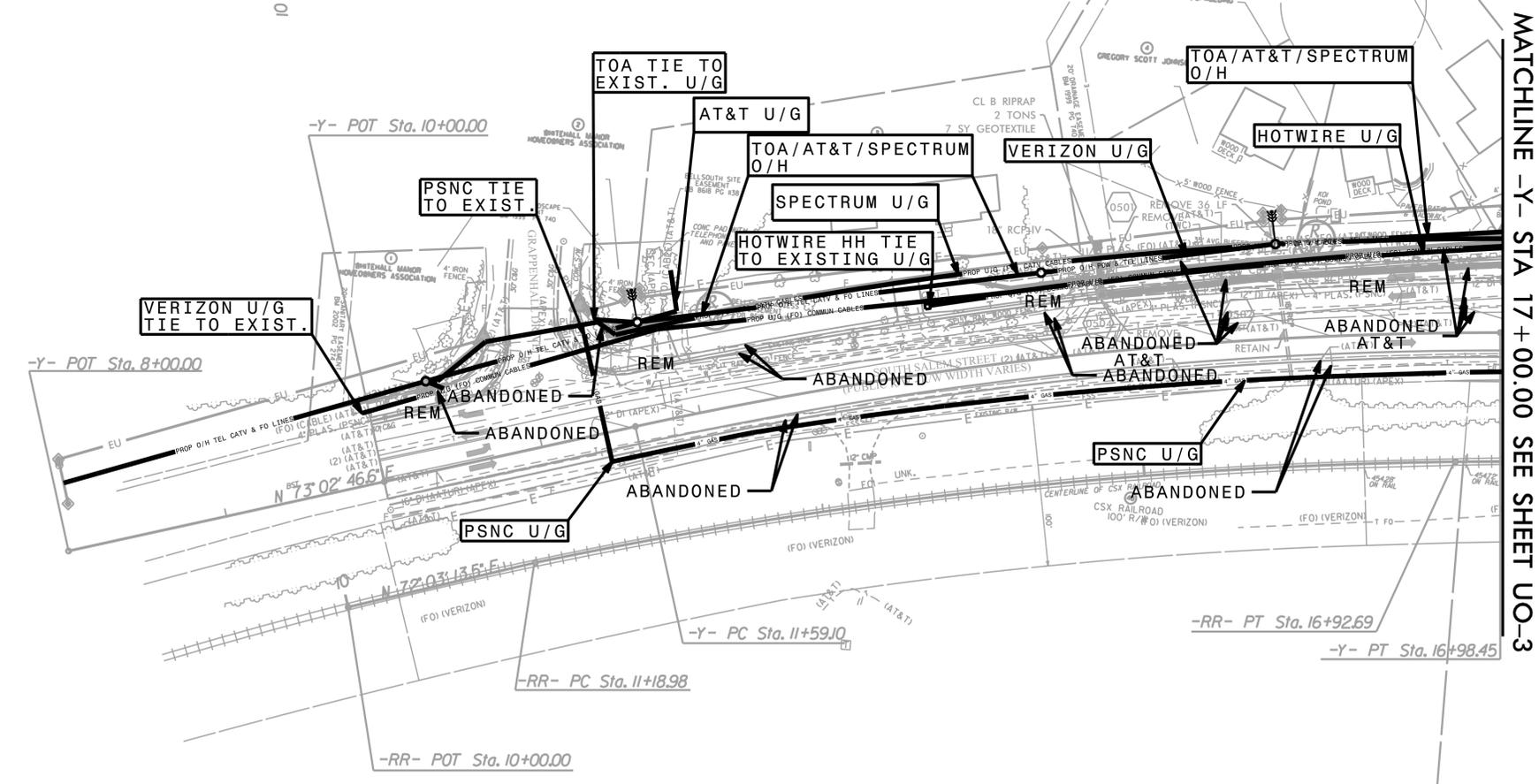


UTILITIES BY OTHERS

ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS. NO PAYMENT WILL BE MADE TO THE CONTRACTOR FOR PROPOSED UTILITY WORK SHOWN ON THIS SHEET.



-YI- INSET



MATCHLINE -Y- STA 17+00.00 SEE SHEET UO-3

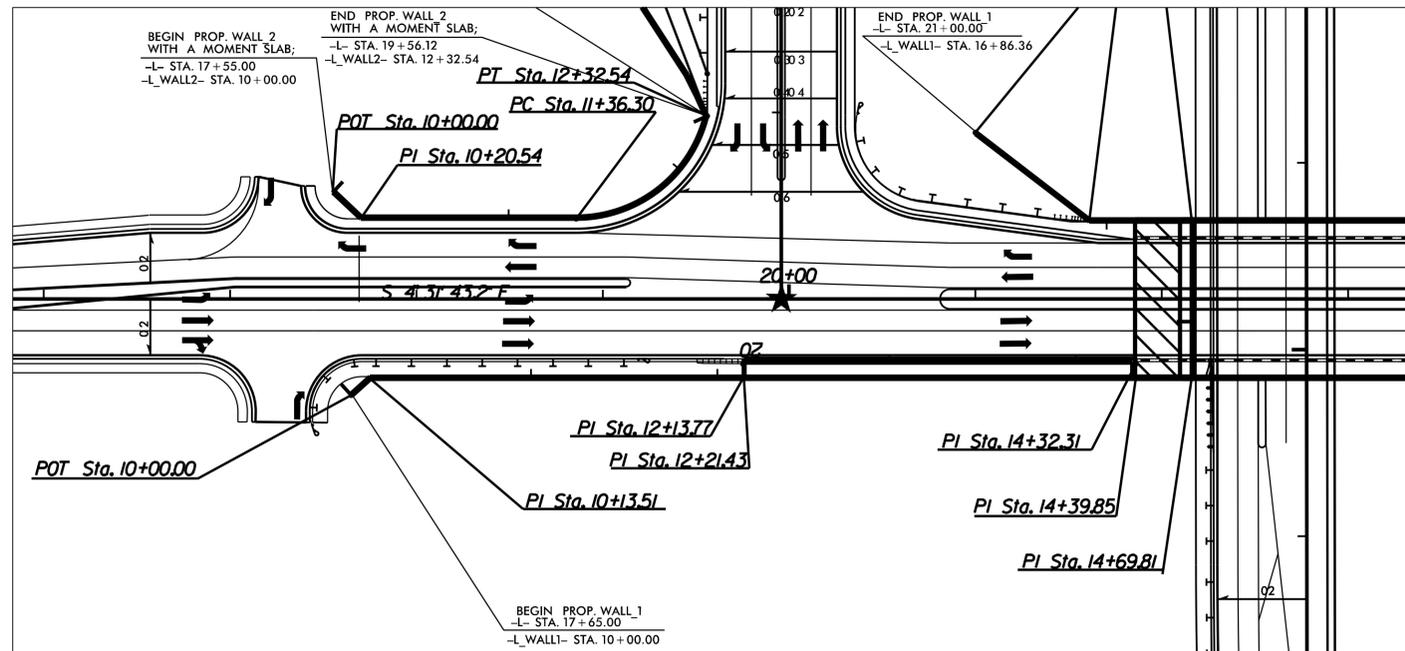
The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works - Transportation	Water Resources - Stormwater
Water Resources - Utility Engineering	Planning - Transportation
Water Resources - Soil & Erosion Control	Electric

FOR -Y- PROFILE SEE SHEET 10

11/2/2023 10:59:28_rdy-ps07.dgn 9:31:38 AM

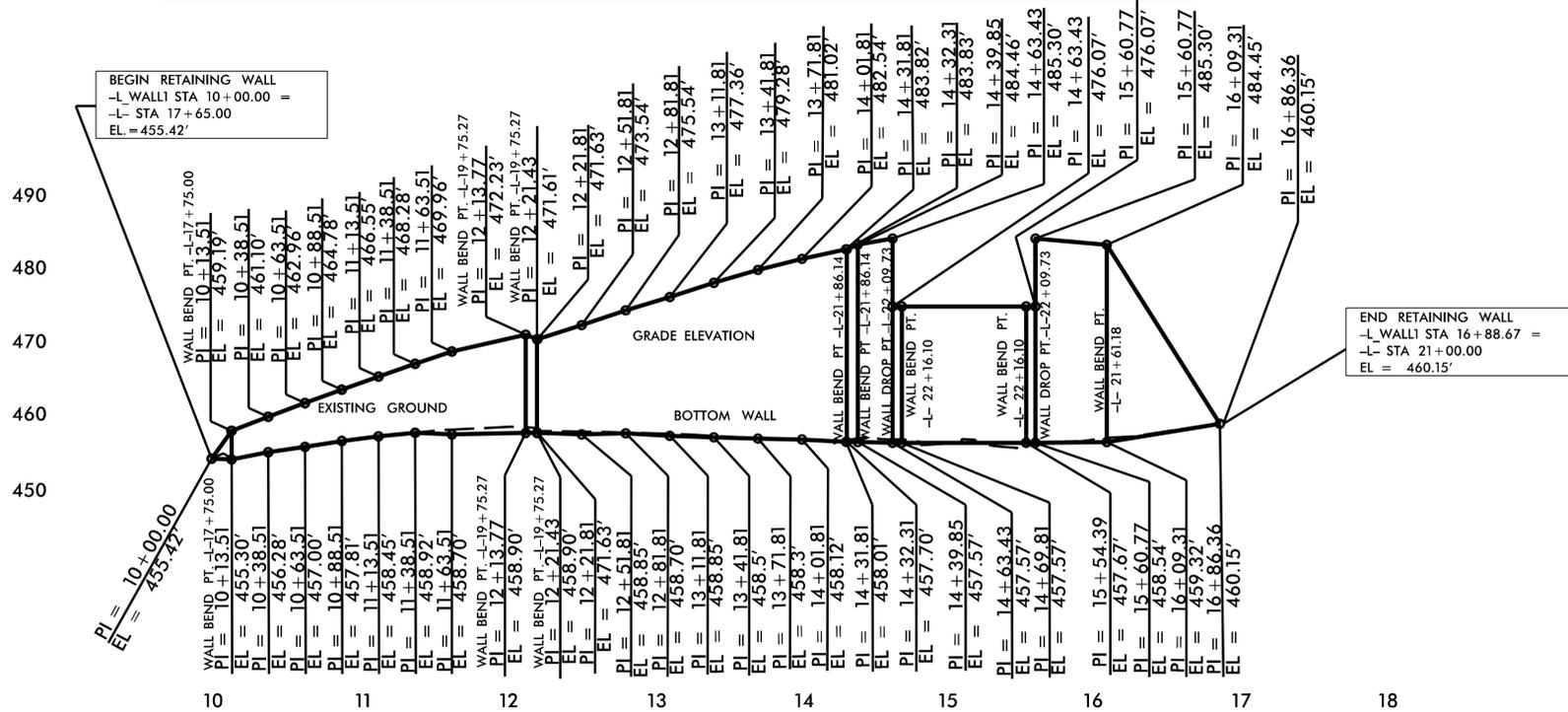
GEOTECHNICAL ENGINEER  Signed by <i>Kristen Hill</i> DATE: 8/11/2021	ENGINEER DATE: _____ SIGNATURE: _____ DATE: _____
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



ESTIMATED MSE WALL QUANTITY (SQURE FEET)	
MSE RETAINING WALL I	10,975 SF

PLAN OF MSE WALL I WITH PRECAST PANELS
(-L_WALLI- STA. 10+00 TO 12+21.43 AND 14+32.31 TO 16+88.67)

PLAN OF MSE WALL I WITH PRECAST PANELS AND
CONCRETE MOMENT SLAB INCORPORATING CANTILEVERED SIDEWALK
(-L_WALLI- STA. 12+21.43 TO 14+32.31)



ELEVATION VIEW OF MSE RETAINING WALL I

ALL DIMENSIONS AND STATIONS ARE ALONG FRONT FACE OF WALL
LOOKING AT THE FRONT FACE OF WALL

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

PROJECT NO.: U-5928
WAKE COUNTY



**NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

**GEOTECHNICAL
ENGINEERING UNIT**

MSE WALL 1 WITH PRECAST PANELS
AND CONCRETE MOMENT SLAB
INCORPORATING CANTILEVERED SIDEWALK

SHEET NO. _____
 DATE: 8-10-21

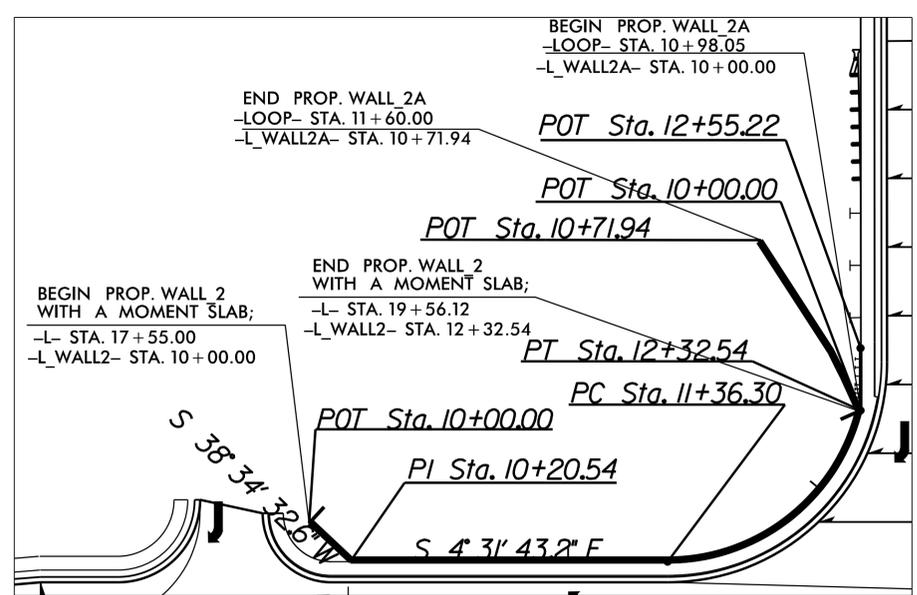
GEOTECHNICAL ENGINEER

ENGINEER

DocuSigned by:
Kristen Hill 12/1/2020

EB767025544548E

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



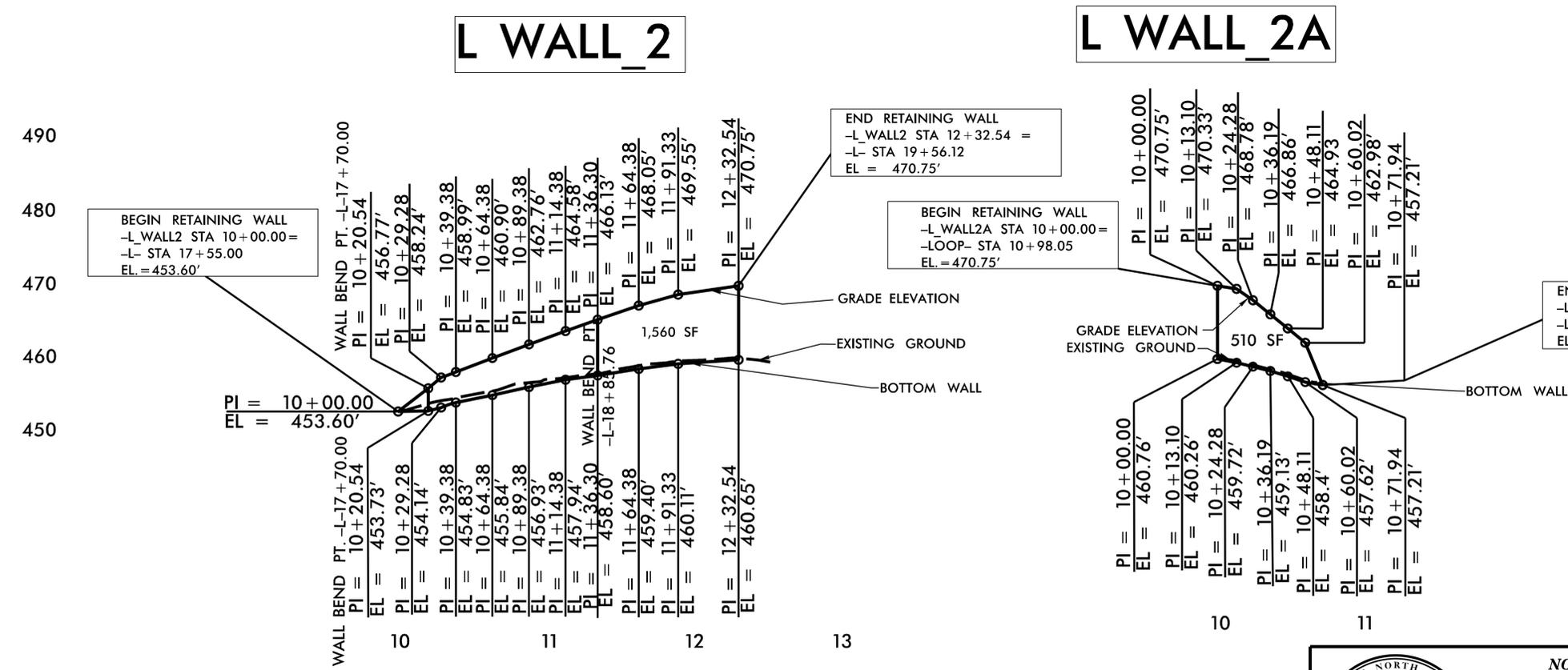
ESTIMATED MSE WALL QUANTITIES
(SQUARE FEET)

MSE RETAINING WALL 2	1,560 SF
MSE RETAINING WALL 2A	510 SF

PLAN OF MSE WALL 2 WITH PRECAST PANELS AND CONCRETE BARRIER WITH MOMENT SLAB AND WALL 2A WITH PRECAST PANELS

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources



ELEVATION VIEW OF MSE RETAINING WALLS 2 AND 2A

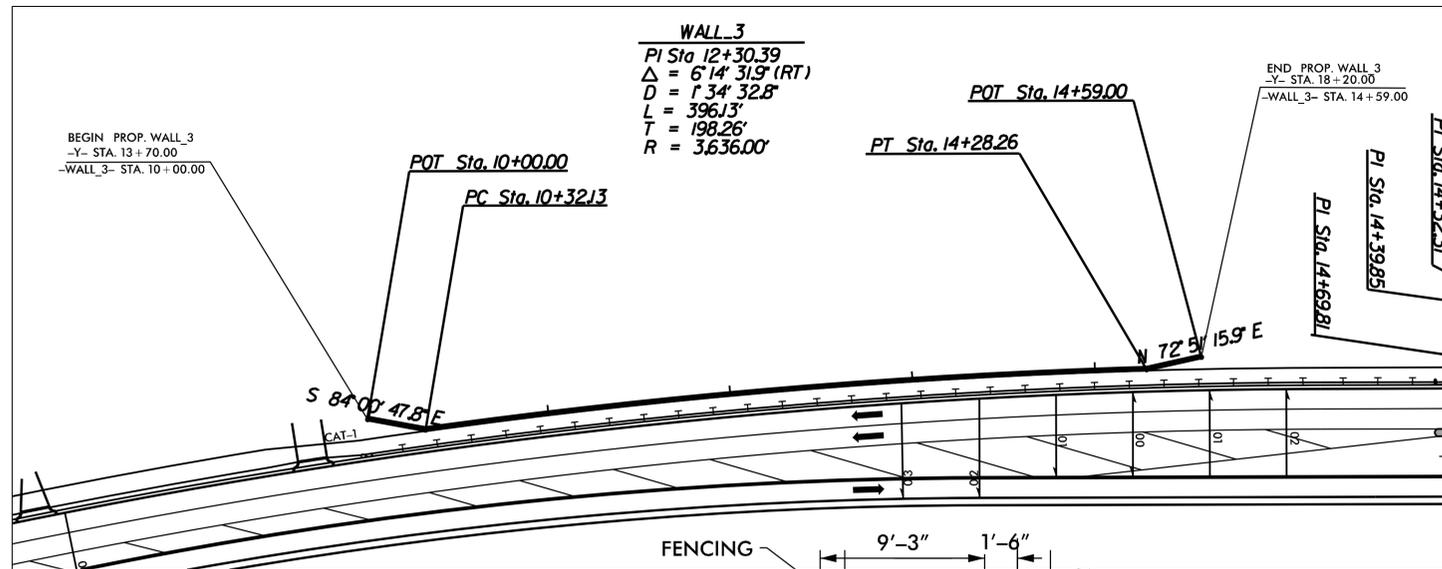
ALL DIMENSIONS AND STATIONS ARE ALONG FRONT FACE OF WALLS
LOOKING AT THE FRONT FACE OF WALLS

**NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

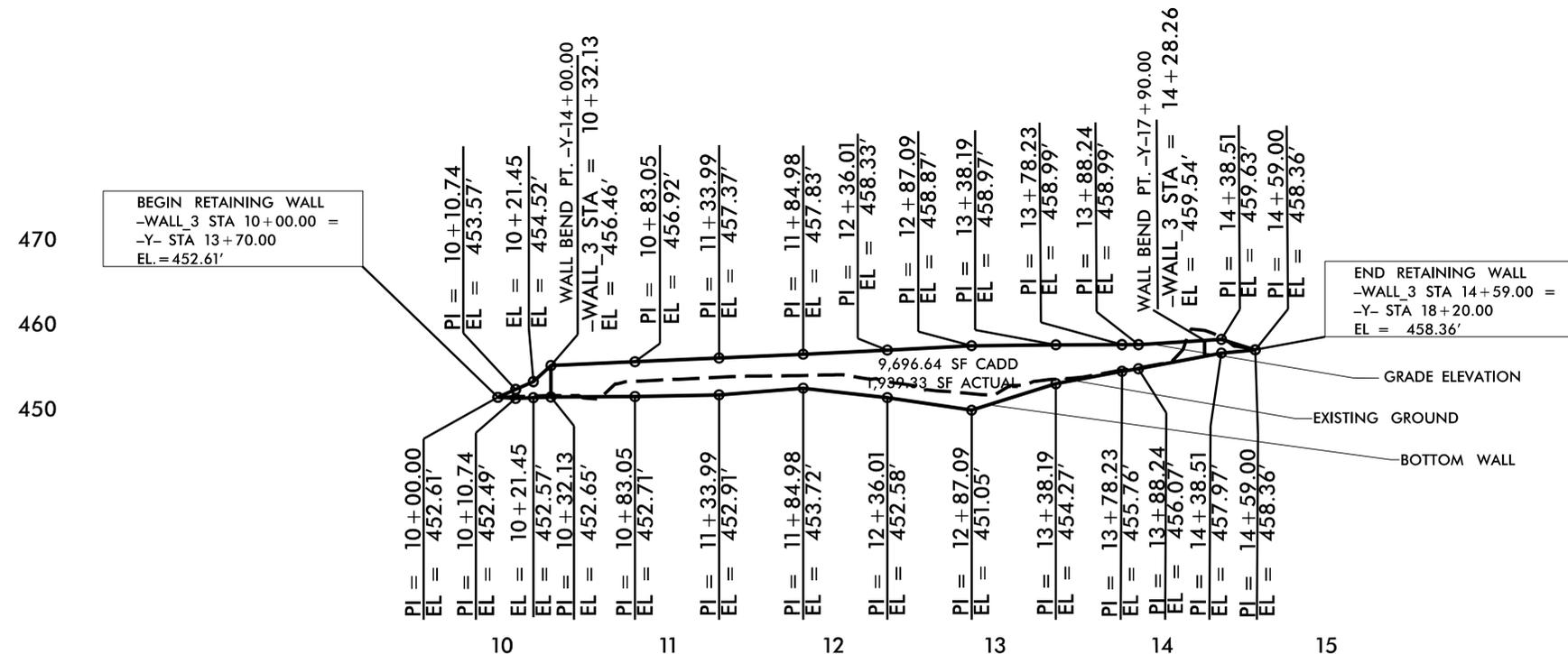
**GEOTECHNICAL
ENGINEERING UNIT**

PROJECT NO.: U-5928
WAKE COUNTY

MSE WALL 2 WITH PRECAST PANELS AND CONCRETE MOMENT SLAB
MSE WALL 2A WITH PRECAST PANELS



PLAN OF MSE WALL 3 WITH PRECAST PANELS



ELEVATION VIEW OF MSE RETAINING WALL 3

ALL DIMENSIONS AND STATIONS ARE ALONG FRONT FACE OF WALL
LOOKING AT THE FRONT FACE OF WALL

GEOTECHNICAL ENGINEER DocuSigned by Kristen Hill DATE: 12/1/2020	ENGINEER SIGNATURE: _____ DATE: _____
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

ESTIMATED MSE WALL QUANTITY (SQUARE FEET)	
MSE RETAINING WALL 3	1,939 SF

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

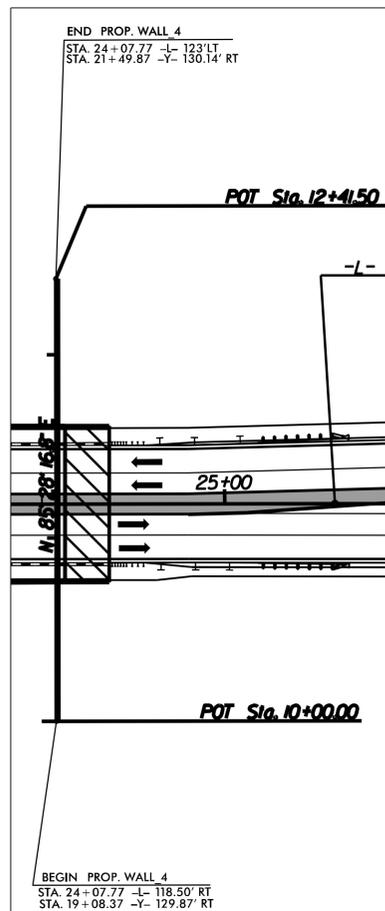
PROJECT NO.: U-5928
WAKE COUNTY

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

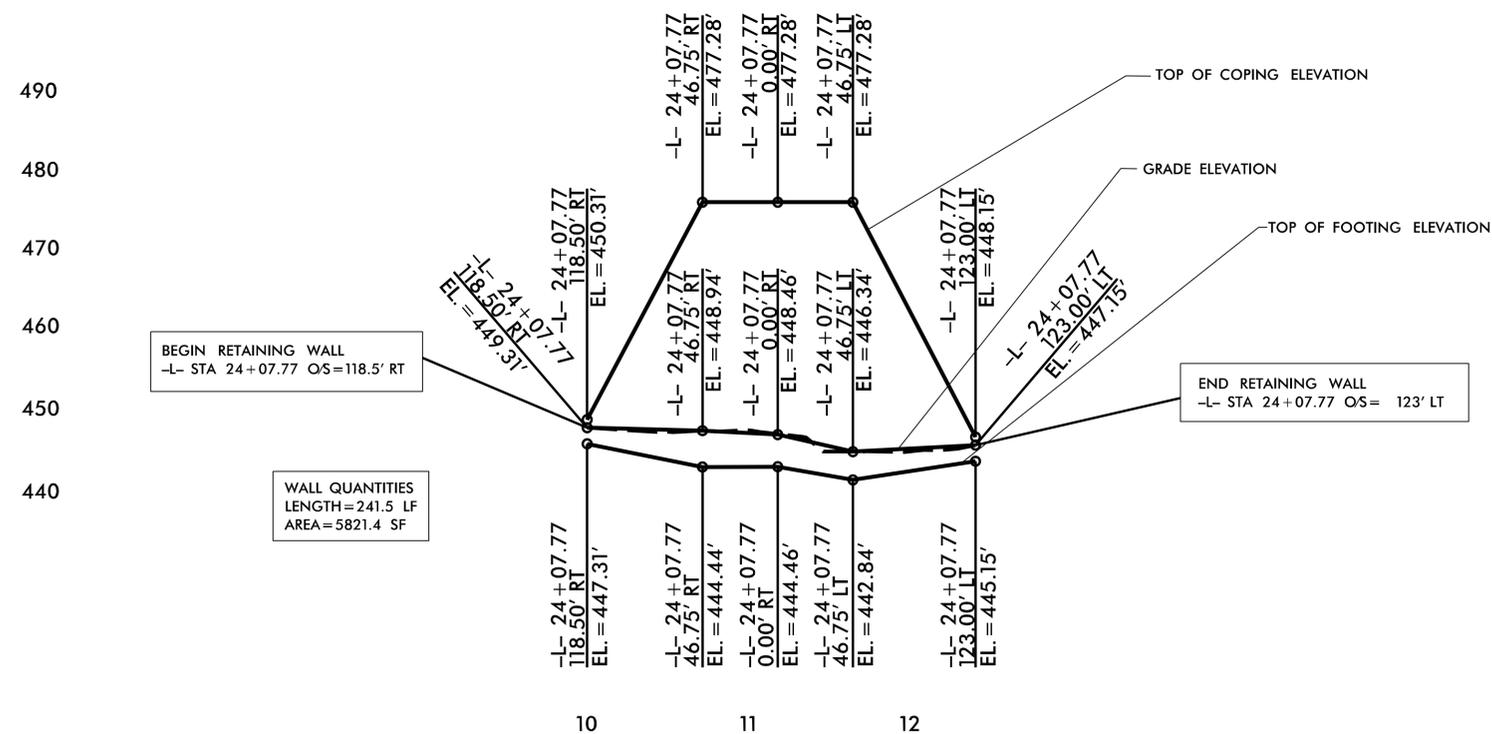
GEOTECHNICAL ENGINEERING UNIT

MSE WALL 3 WITH PRECAST PANELS

SHEET NO. 3
DATE: 8-29-19



PLAN OF MSE WALL 4 WITH PRECAST PANELS



ELEVATION VIEW OF MSE RETAINING WALL 4

ALL DIMENSIONS AND STATIONS ARE ALONG FRONT FACE OF WALL
LOOKING AT THE FRONT FACE OF WALL

GEOTECHNICAL ENGINEER  Documented by: Signature: <i>Kristen Hill</i> DATE: 12/1/2020	ENGINEER Signature: _____ DATE: _____
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

ESTIMATED MSE WALL QUANTITY (SQUARE FEET)	
MSE RETAINING WALL 4	5,821 SF

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources

PROJECT NO.: U-5928
WAKE COUNTY



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

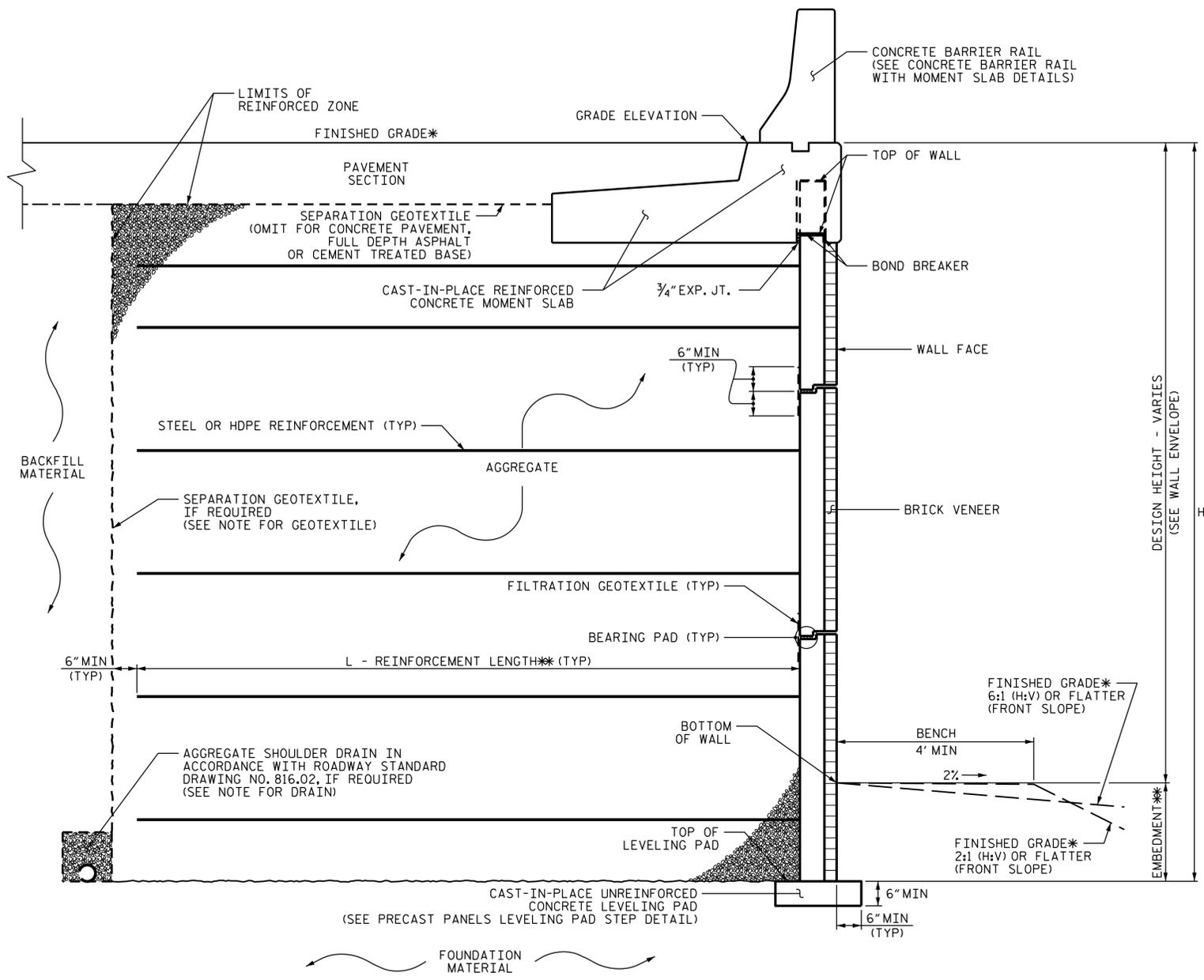
**GEOTECHNICAL
ENGINEERING UNIT**

MSE WALL 4 WITH PRECAST PANELS

DATE: 8-29-19

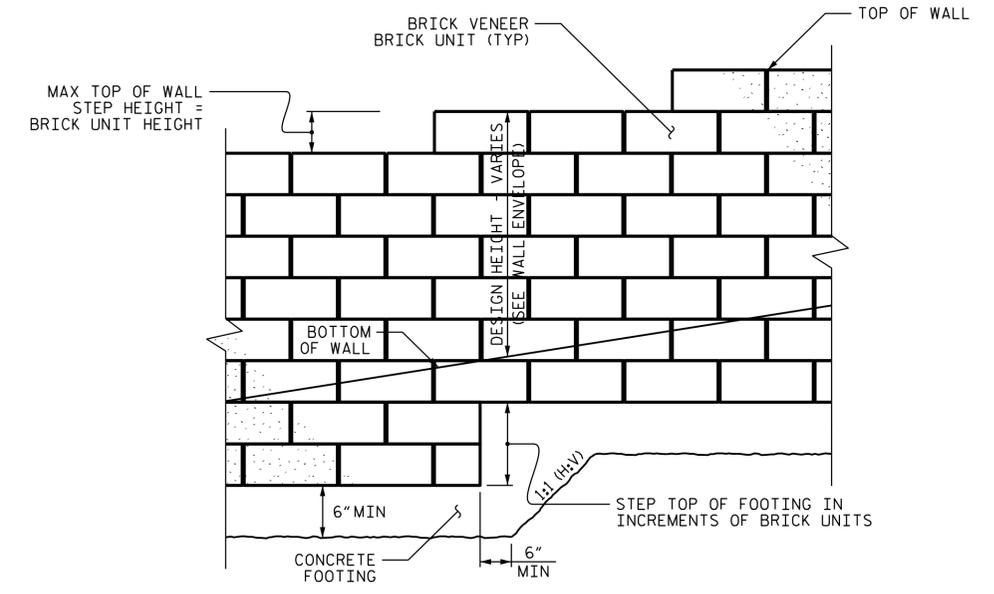
SHEET NO. 4

GEOTECHNICAL ENGINEER  SEAL 029147 ENGINEER Kristen Hill 8/30/2023	ENGINEER _____ SIGNATURE DATE
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



MSE WALL WITH PRECAST PANELS AND BRICK VENEER - TYPICAL SECTION

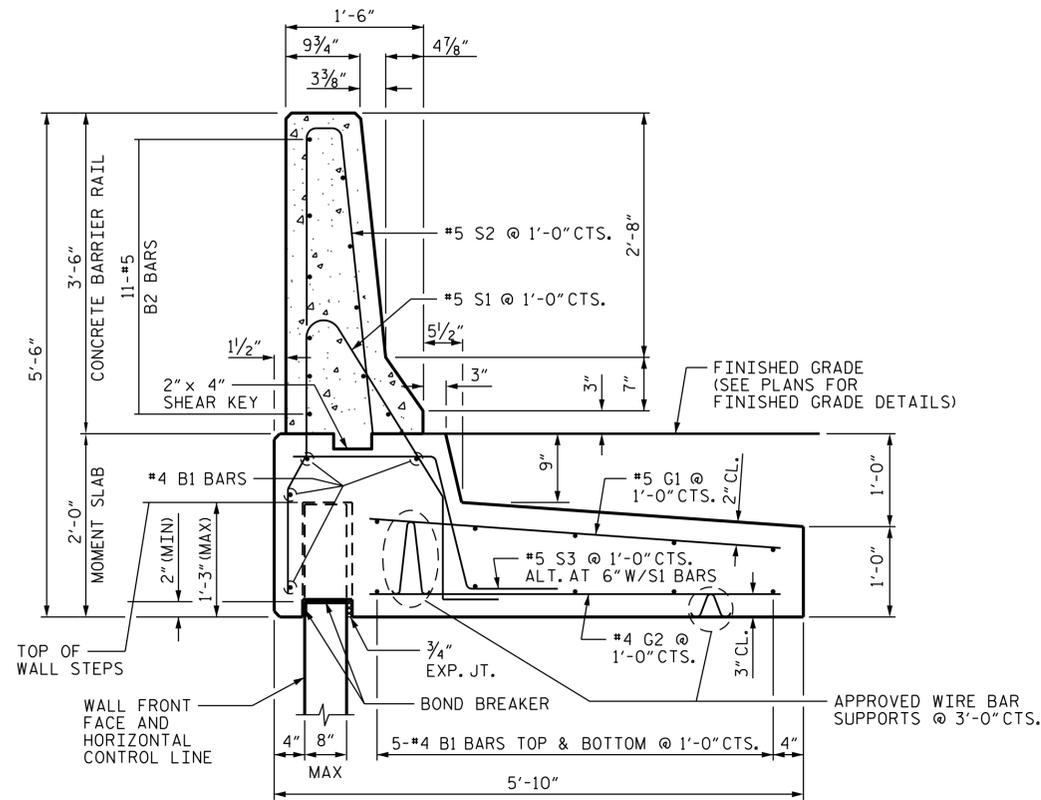
*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.
**SEE MSE RETAINING WALLS PROVISION AND IF APPLICABLE, MSE WALL NOTES FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.



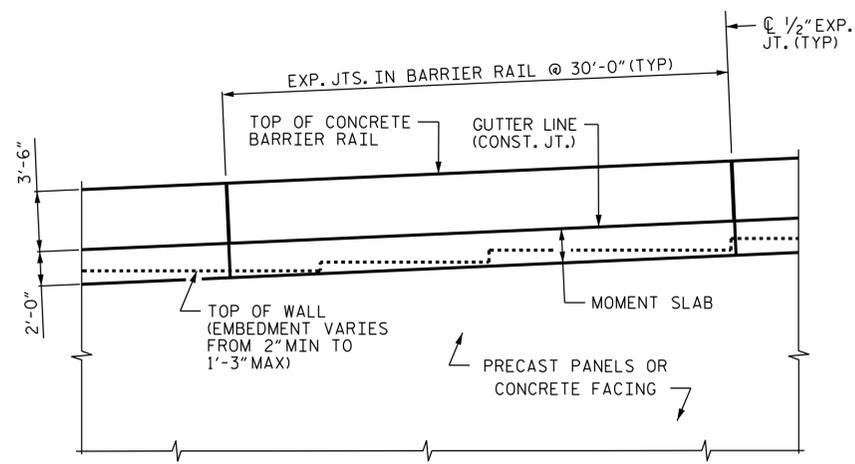
BRICK VENEER TYPICAL STEPPING

PROJECT NO.: U-5928
WAKE COUNTY

 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT	STD CELL Wall_MSE_Panels_Abutment_HPiles_Sleeves
	MSE WALL WITH PRECAST PANELS, AND MOMENT SLAB - TYPICAL DETAILS
DATE: 3-17-15	



CONCRETE BARRIER RAIL WITH MOMENT SLAB



CONCRETE BARRIER RAIL WITH MOMENT SLAB - PARTIAL ELEVATION

NOTES:

FOR CONCRETE BARRIER RAIL WITH MOMENT SLAB, SEE CONCRETE BARRIER RAIL WITH MOMENT SLAB PROVISION.
CONCRETE BARRIER RAIL WITH MOMENT SLAB SHALL BE A MINIMUM OF 15' IN LENGTH.

EXPANSION JOINTS SHALL BE PLACED IN THE BARRIER RAIL AND MOMENT SLAB AT A MAXIMUM SPACING OF 30'.

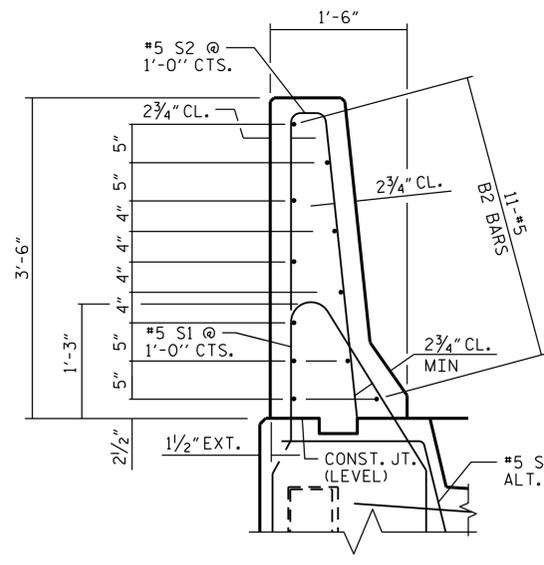
GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED SURFACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MID-POINT OF BARRIER RAIL SEGMENTS LESS THAN 20' IN LENGTH.

THE BARRIER RAIL SHALL NOT BE CAST UNTIL THE MOMENT SLAB HAS ATTAINED AN AGE OF THREE CURING DAYS OR A MINIMUM COMPRESSIVE STRENGTH OF 2,000 PSI. IN ADDITION, NO FILL MATERIAL, ASPHALT, OR CONSTRUCTION EQUIPMENT IS ALLOWED ON THE MOMENT SLAB PRIOR TO SATISFYING THE MINIMUM CONCRETE CURING AND STRENGTH REQUIREMENTS.

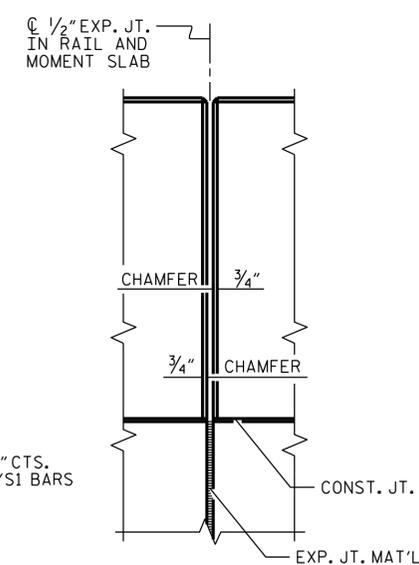
ALL REINFORCING STEEL IN THE BARRIER RAIL SHALL BE EPOXY COATED.

IF EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, BARRIERS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH CONCRETE BARRIER RAIL WITH MOMENT SLAB OR CONCRETE FACING FOR RETAINING WALL WILL BE THICKER THAN 8", CONCRETE BARRIER RAIL WITH MOMENT SLAB DETAILS SHALL BE REVISED AND SUBMITTED FOR APPROVAL.

CONCRETE BARRIER RAIL WITH MOMENT SLAB
PAY LENGTH = 232.5 LIN FT



SECTION THRU RAIL



ELEV. @ EXP. JOINTS

BARRIER RAIL DETAILS

STRUCTURE ENGINEER	ENGINEER
SIGNATURE	DATE
<i>Kristen Hill</i>	8/30/2023
	E5ZCFCB546224FZ...

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
FOR ONE 30'-0" SECTION OF CONCRETE BARRIER RAIL WITH MOMENT SLAB

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	14	#4	STR	29'-7"	277
* B2	11	#5	STR	29'-7"	339
G1	31	#5	STR	4'-4"	140
G2	31	#4	STR	4'-4"	90
* S1	31	#5	1	7'-4"	237
* S2	31	#5	2	7'-0"	226
S3	30	#5	3	4'-1"	128
REINFORCING STEEL					635 LB
* EPOXY COATED REINFORCING STEEL					802 LB
CLASS AA CONCRETE BARRIER RAIL					4.1 CY
CLASS A CONCRETE MOMENT SLAB					9.1 CY
CONCRETE BARRIER RAIL WITH MOMENT SLAB					30 LIN FT

PROJECT NO.: U-5928
WAKE COUNTY

SHEET 3 OF 3

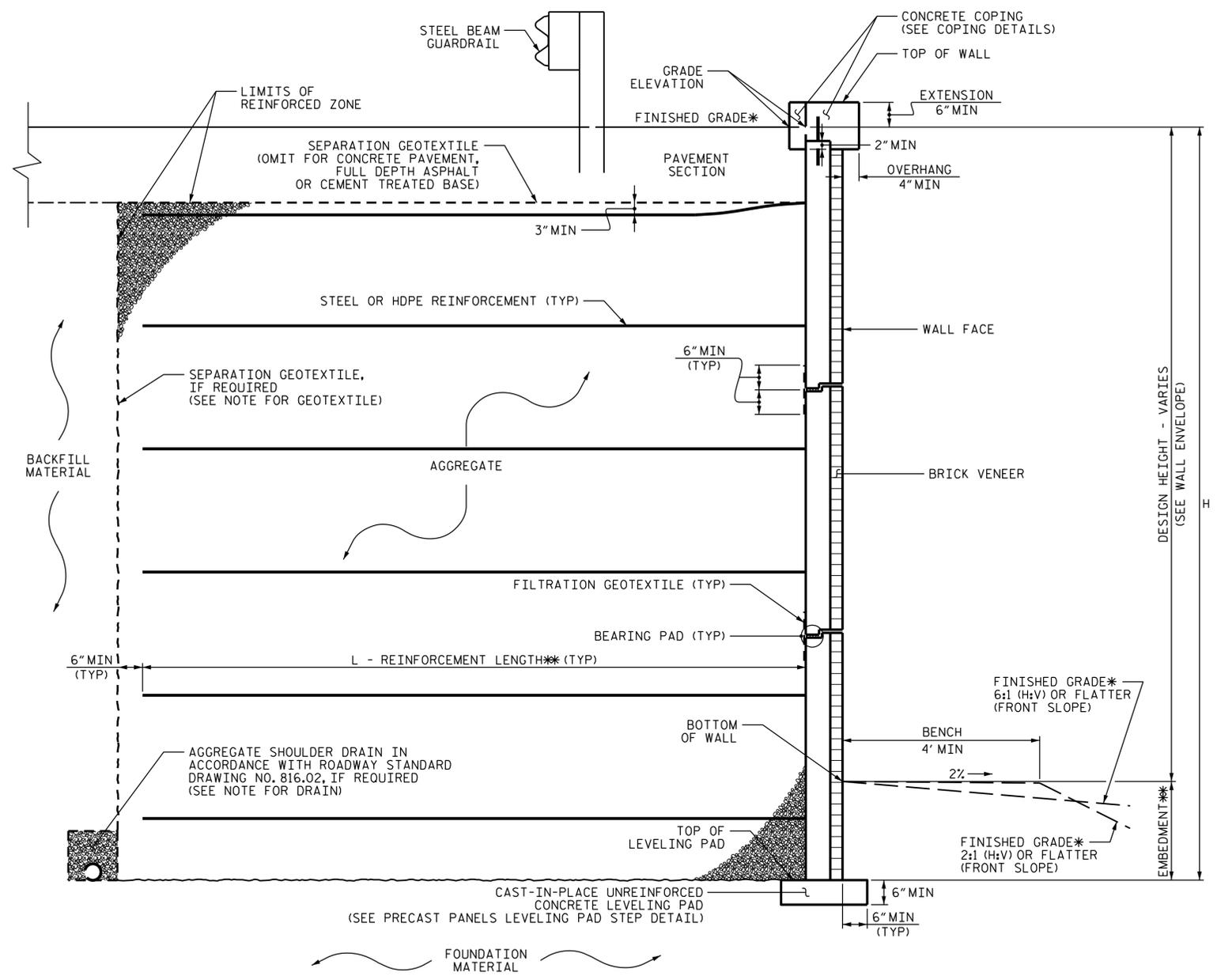
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

CONCRETE BARRIER RAIL WITH MOMENT SLAB FOR PRECAST PANELS AND CONCRETE FACING

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1			3			6
2			4			

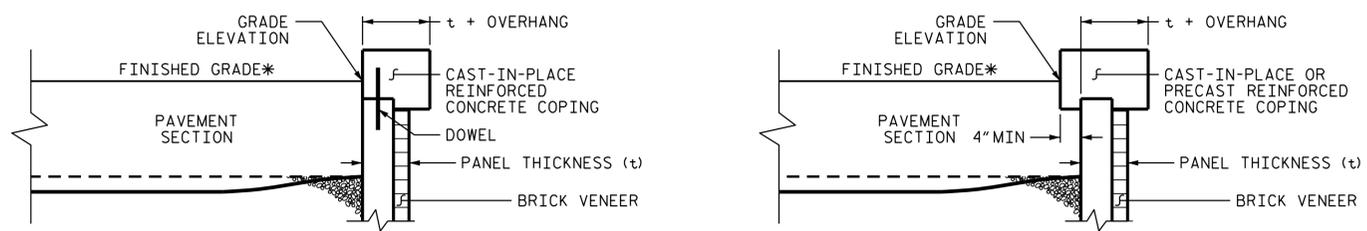
PREPARED BY:	DATE:
REVIEWED BY:	DATE:

GEOTECHNICAL ENGINEER  Signature: <i>Kristen Hill</i> Date: 8/30/2023	ENGINEER Signature: _____ Date: _____
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



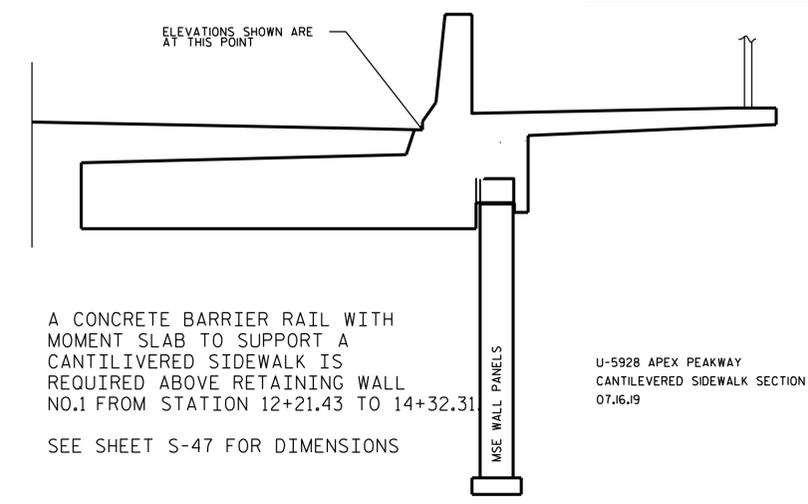
MSE WALL WITH PRECAST PANELS AND BRICK VENEER - TYPICAL SECTION

*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.
 *SEE MSE RETAINING WALLS PROVISION AND TABLE ON THIS PAGE FOR REINFORCEMENT LENGTH REQUIREMENTS.

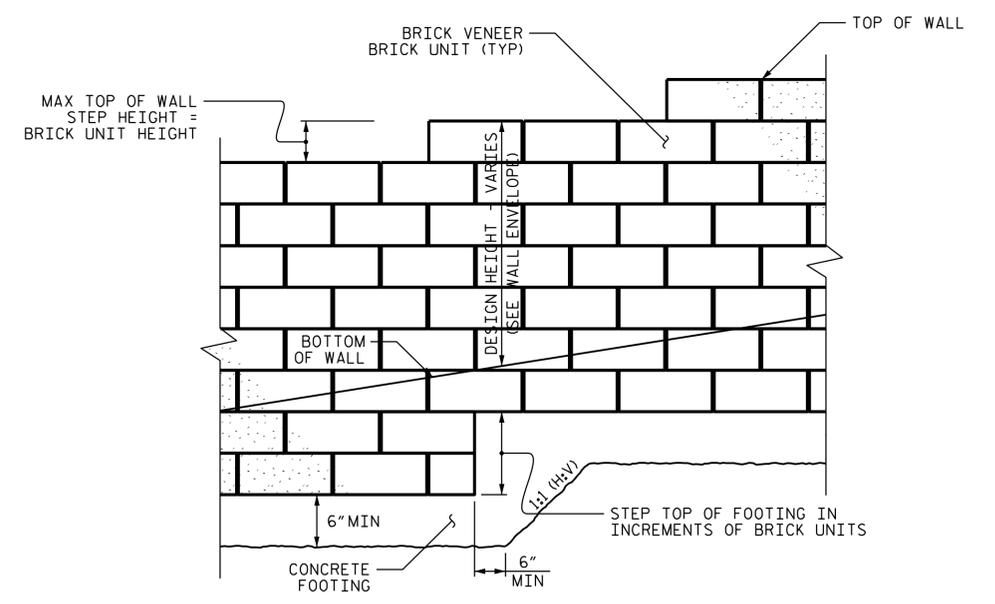


COPING DETAILS

AT THE CONTRACTOR'S OPTION, CONNECT COPING TO PANELS WITH DOWELS OR EXTEND COPING DOWN BACK OF PANELS.
 *SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.



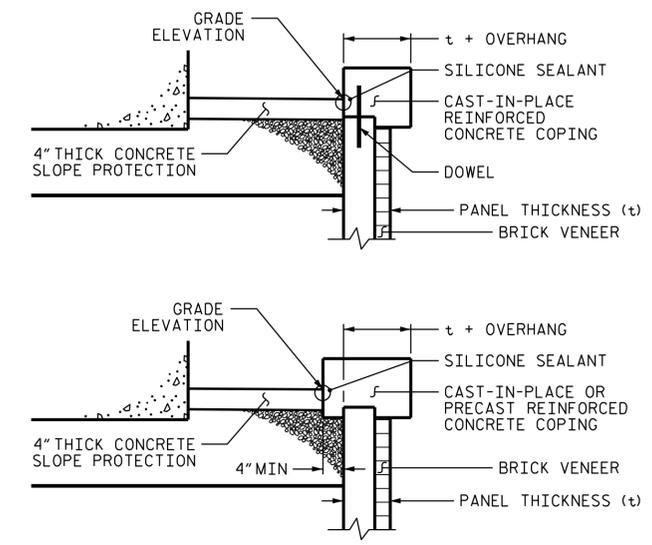
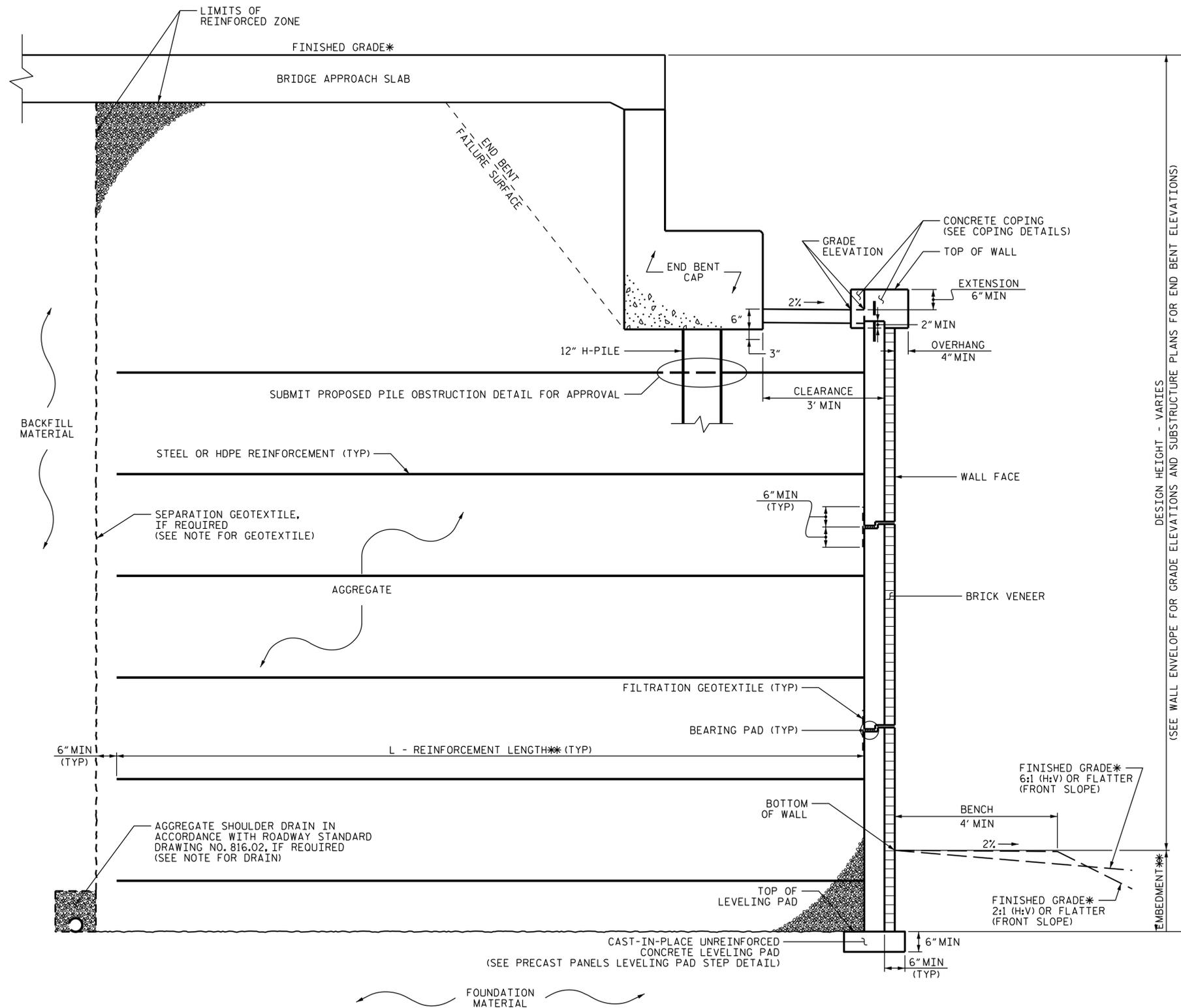
A CONCRETE BARRIER RAIL WITH MOMENT SLAB TO SUPPORT A CANTILEVERED SIDEWALK IS REQUIRED ABOVE RETAINING WALL NO.1 FROM STATION 12+21.43 TO 14+32.31
 SEE SHEET S-47 FOR DIMENSIONS



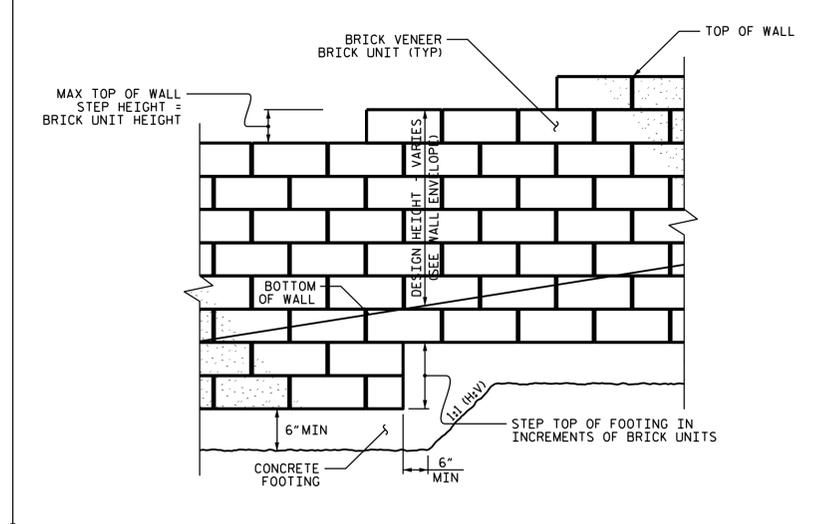
BRICK VENEER TYPICAL STEPPING

PROJECT NO.: U-5928
 WAKE COUNTY

 <p>NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS</p> <p>GEOTECHNICAL ENGINEERING UNIT</p>	<p>STD CELL WALL_MSE_Panels_Guardrail</p>
	<p>MSE WALL WITH PANELS AND GUARDRAIL - TYPICAL AND COPING DETAILS</p>
DATE: 5-6-17	



COPING DETAILS
 AT THE CONTRACTOR'S OPTION, CONNECT COPING TO PANELS WITH DOWELS OR EXTEND COPING DOWN BACK OF PANELS.



BRICK VENEER TYPICAL STEPPING

GEOTECHNICAL ENGINEER Signature: <i>Kristen Hill</i> Date: 8/30/2023	ENGINEER Signature: _____ Date: _____
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

PROJECT NO.: U-5928
 WAKE COUNTY

MSE ABUTMENT WALL WITH PRECAST PANELS AND BRICK VENEER - TYPICAL SECTION

*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.
 **SEE MSE RETAINING WALLS PROVISION AND IF APPLICABLE, MSE WALL NOTES FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.

NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STD CELL Wall_MSE_Panels_Abutment_HPiles_Sleeves
MSE ABUTMENT WALL WITH PANELS, END BENT ON H-PILES AND PILE SLEEVES - TYPICAL & COPING DETAILS

SHEET NO. 8
 DATE: 3-17-15

NOTES:

- FOR MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALLS, SEE MECHANICALLY STABILIZED EARTH RETAINING WALLS PROVISION.
- FOR MECHANICALLY STABILIZED MSE RETAINING WALLS, SEE MECHANICALLY STABILIZED EARTH RETAINING WALLS PROVISION.
 - BEFORE BEGINNING MSE WALL DESIGN FOR RETAINING WALLS NO.1, 2, 2A, 3, AND 4, SURVEY WALL LOCATION AND SUBMIT A REVISED WALL PROFILE VIEW (WALL ENVELOPE) FOR REVIEW. DO NOT START WALL DESIGN OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPE IS ACCEPTED.
 - USE AN MSE WALL SYSTEM WITH PRECAST CONCRETE PANELS AND BRICK VENEER THAT MEET SECTION 1077 OF THE STANDARD SPECIFICATIONS FOR RETAINING WALLS NO.1, NO.2, NO.2A, NO.3, AND NO.4
 - A CONCRETE BARRIER RAIL WITH MOMENT SLAB TO SUPPORT A CANTILVERED SIDEWALK IS REQUIRED ABOVE RETAINING WALL NO.1 FROM STATION 12+21.43 TO 14+32.31. SEE ROADWAY PLANS AND STRUCTURAL DRAWINGS FOR CONCRETE MOMENT SLAB DETAILS AND LOCATIONS.
 - A CONCRETE BARRIER RAIL WITH MOMENT SLAB IS REQUIRED ABOVE RETAINING WALL WALL 2. SEE PLANS FOR CONCRETE BARRIER RAIL WITH MOMENT SLAB DETAILS.
 - EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL, FENCE OR HANDRAIL POSTS, PAVEMENTS, PIPES, INLETS OR UTILITIES MAY INTERFERE WITH REINFORCEMENT FOR RETAINING WALL NOS. 1, 2, 2A, 3, AND 4.
 - A SEPARATION GEOTEXTILE IS REQUIRED AT THE BACK OF THE REINFORCED ZONE FOR RETAINING WALLS NO.1, NO.2, NO. 2A, NO.3, AND NO. 4.
 - A DRAIN IS REQUIRED FOR RETAINING WALLS NO.1, NO.2, NO.2A, NO.3, AND NO.4.
 - DESIGN RETAINING WALL NO.1 FROM STA. 10+00 TO 12+21.43 FOR THE FOLLOWING:
 - H = DESIGN HEIGHT + EMBEDMENT
 - DESIGN LIFE = 100 YEARS
 - MAXIMUM FACTORED VERTICAL STRESS ON FOUNDATION MATERIAL = 4,000PSF.
 - MINIMUM REINFORCEMENT LENGTH (L) = 0.7*H (OR 6 FEET, WHICHEVER IS GREATER).
 - DESIGN RETAINING WALL NO.1 FROM STA. 12+21.43 TO 14+32.31 FOR THE FOLLOWING:
 - H = DESIGN HEIGHT + EMBEDMENT
 - DESIGN LIFE = 100 YEARS
 - MAXIMUM FACTORED VERTICAL STRESS ON FOUNDATION MATERIAL = 8,000PSF.
 - MINIMUM REINFORCEMENT LENGTH (L) = 1.0*H OR 6 FEET, WHICHEVER IS GREATER"
 - DESIGN RETAINING WALL NO.1 FROM STA. 14+32.31 TO 16+88.67 FOR THE FOLLOWING:
 - H = DESIGN HEIGHT + EMBEDMENT
 - DESIGN LIFE = 100 YEARS
 - MAXIMUM FACTORED VERTICAL STRESS ON FOUNDATION MATERIAL = 7,200PSF.
 - MINIMUM REINFORCEMENT LENGTH (L) = 0.7*H (OR 6 FEET, WHICHEVER IS GREATER).
 - DESIGN WALL NO.2 FOR THE FOLLOWING:
 - H = DESIGN HEIGHT + EMBEDMENT
 - DESIGN LIFE = 100 YEARS
 - MAXIMUM FACTORED VERTICAL STRESS ON FOUNDATION MATERIAL = 3,800PSF.
 - MINIMUM REINFORCEMENT LENGTH (L) = 1.0*H (OR 6 FEET, WHICHEVER IS GREATER)."
 - DESIGN WALL NO.2A FOR THE FOLLOWING:
 - H = DESIGN HEIGHT + EMBEDMENT
 - DESIGN LIFE = 100 YEARS
 - MAXIMUM FACTORED VERTICAL STRESS ON FOUNDATION MATERIAL = 3,500PSF.
 - MINIMUM REINFORCEMENT LENGTH (L) = 0.7*H (OR 6 FEET, WHICHEVER IS GREATER)."
 - DESIGN WALL NO.3 FOR THE FOLLOWING:
 - H = DESIGN HEIGHT + EMBEDMENT
 - DESIGN LIFE = 100 YEARS
 - MAXIMUM FACTORED VERTICAL STRESS ON FOUNDATION MATERIAL = 3,000PSF.
 - MINIMUM REINFORCEMENT LENGTH (L) = 0.7*H OR 6 FEET, WHICHEVER IS GREATER"
 - DESIGN WALL NO.4 FOR THE FOLLOWING:
 - H = DESIGN HEIGHT + EMBEDMENT
 - DESIGN LIFE = 100 YEARS
 - MAXIMUM FACTORED VERTICAL STRESS ON FOUNDATION MATERIAL = 8,100PSF.
 - MINIMUM REINFORCEMENT LENGTH (L) = 0.7*H OR 6 FEET, WHICHEVER IS GREATER"
 - REINFORCED ZONE AGGREGATE PARAMETERS:

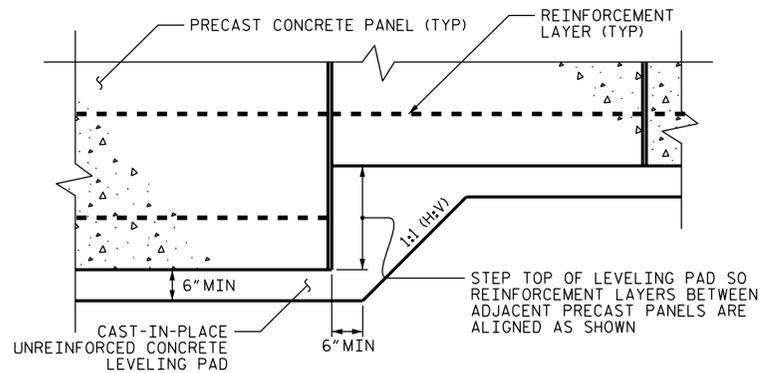
AGGREGATE TYPE*	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
COARSE	110	38	0
FINE	115	34	0

*SEE MSE RETAINING WALLS PROVISION FOR COARSE AND FINE AGGREGATE MATERIAL REQUIREMENTS.
 - IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
BACKFILL	125	30	0
FOUNDATION	115	33	0
 - SUBMIT RETAINING WALL PLANS AND GEOTECHNICAL CALCULATIONS TO THE NCDOT GEOTECHNICAL OPERATIONS ENGINEER FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
 - DESIGN ALL RETAINING WALLS FOR A LIVE LOAD (TRAFFIC) SURCHARGE.
 - DESIGN RETAINING WALL NO.1 FROM STA. 12+21.43 TO 14+32.31, AND RETAINING WALL NO.2 FOR THE ADDITIONAL STRIP SURCHARGE LOADS GENERATED FROM MOMENT SLABS AS SHOWN.
 - DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR RETAINING WALL UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.
 - MSE WALL CONSTRUCTION SEQUENCE WILL REQUIRE COORDINATION WITH PILE INSTALLATION FOR BRIDGE FOUNDATIONS. AFTER EXCAVATING WALL AREA TO BOTTOM OF WALL SUBGRADE ELEVATION, PILES SHALL BE DRIVEN TO SATISFACTORY BEARING.
 - UNDERCUT SOILS BENEATH WALL NO.1, WALL NO. 2, WALL NO. 2A, AND WALL NO. 3 TO A DEPTH OF 2 FEET BENEATH BOTTOM OF FOOTING ELEVATION OR COMPENTENT SOILS.
 - NO WAITING PERIOD IS REQUIRED AFTER CONSTRUCTING THE MSE ABUTMENT WALLS.

GEOTECHNICAL ENGINEER  SIGNATURE: <i>Kristen Hill</i> DATE: 8/30/2023	ENGINEER SIGNATURE: _____ DATE: _____
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

MINIMUM REQUIRED REINFORCEMENT LENGTH/HEIGHT (L/H) RATIO		
WALL	WALL ALIGN. STATIONS	L/H
1	10+00 to 12+21.43	0.7
1	12+21.43 to 14+32.31	1.0
1	14+32.31 to 16+88.67	0.7
2	10+00 to 12+32.54	1.0
2A	10+00 to 10+71.94	0.7
3	10+00 to 14+59	0.7
4	10+00 to 12+41.5	0.7



PRECAST PANELS LEVELING PAD STEP DETAIL

PROJECT NO.: U-5928
 WAKE COUNTY
 STATION: _____
 SHEET OF _____

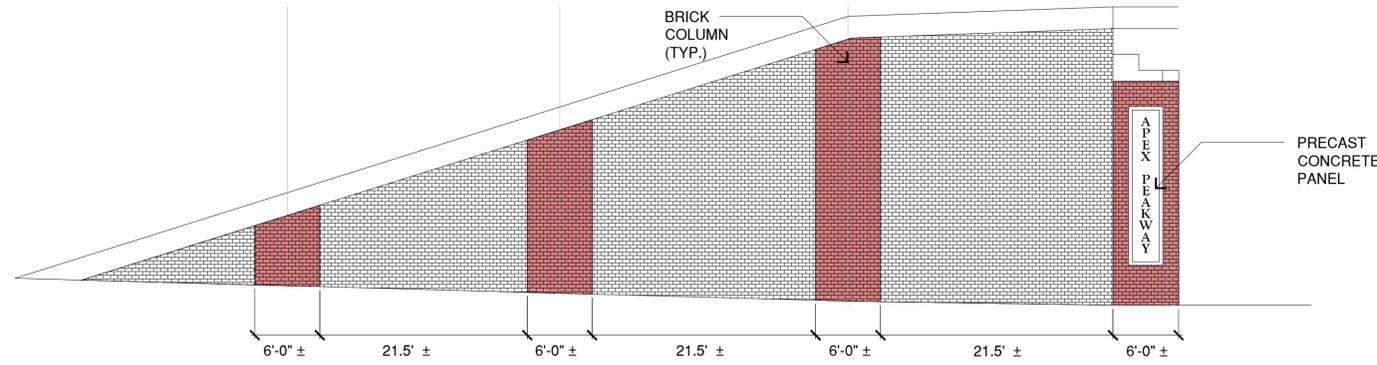
 <p>NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS</p> <p>GEOTECHNICAL ENGINEERING UNIT</p>

<p>MSE WALL NOTES & PRECAST PANELS LEVELING PAD STEP DETAIL</p>	SHEET NO. 9
DATE: 3-17-15	



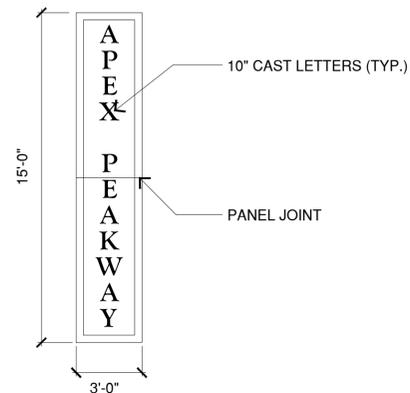
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

PROJECT REFERENCE NO.	SHEET NO.
U-5928	LA-2
R/W SHEET NO. ---	



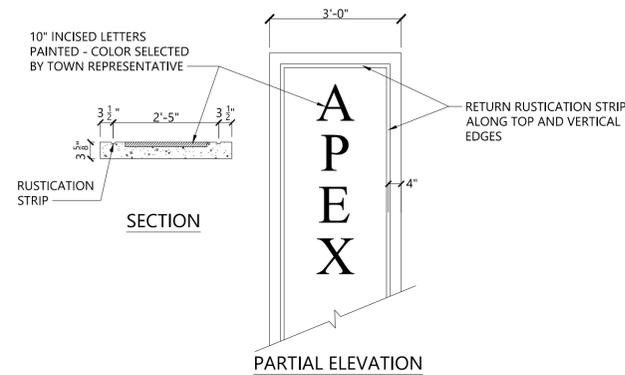
AESTHETIC TREATMENT OF MSE WALL 4

SCALE: N.T.S.



PRECAST CONCRETE NAMING PANEL

SCALE: N.T.S.



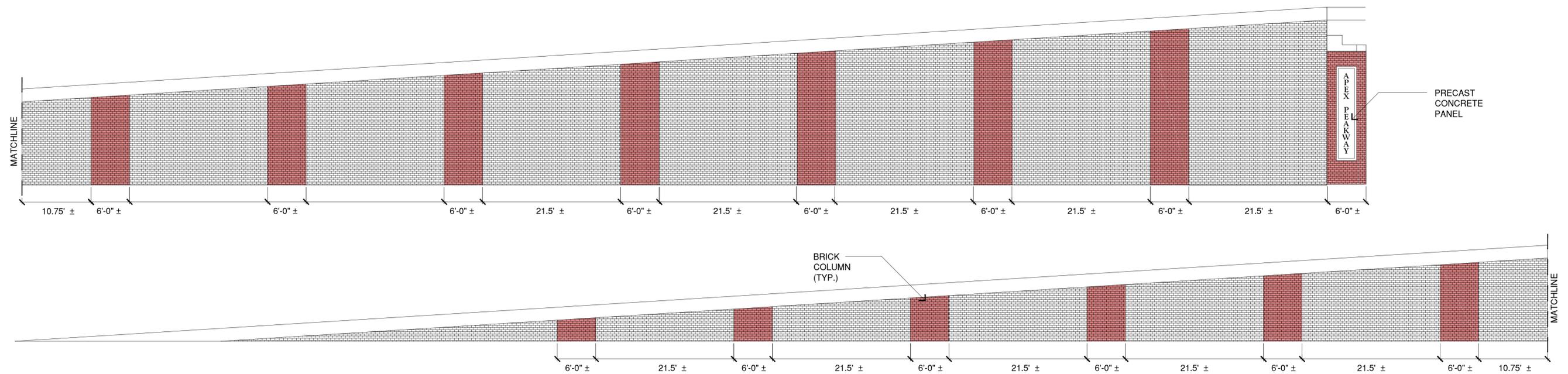
PRECAST SIGN DETAILS

SCALE: N.T.S.

NOTE: CONCRETE COLOR TO BE SELECTED BY THE TOWN OF APEX
FONT STYLE TO BE SELECTED BY THE TOWN OF APEX

The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources



AESTHETIC TREATMENT OF MSE WALL 1

SCALE: N.T.S.

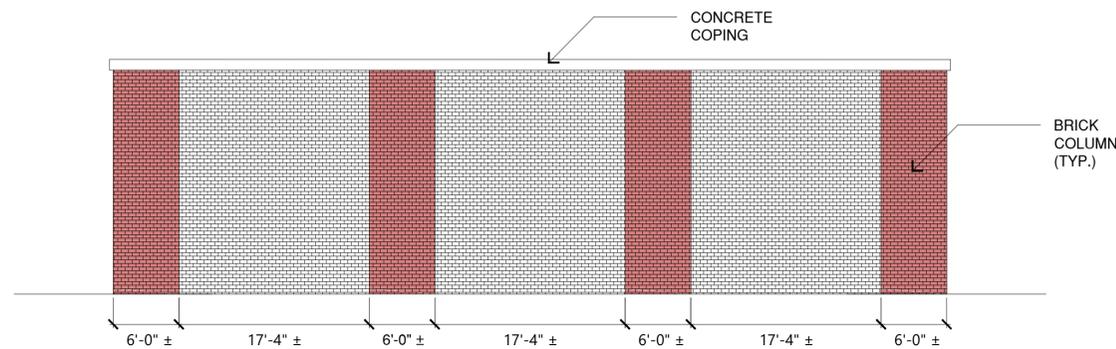
The signatures affixed below certify that this sheet has been reviewed and approved solely per the certifications signed on the cover sheet of these construction plans.

Public Works – Transportation	Water Resources – Stormwater
Building Inspections	Planning
Water Resources – Utility Engineering	Planning – Transportation
Electric	Fire
Water Resources – Soil & Erosion Control	Parks, Recreation & Cultural Resources



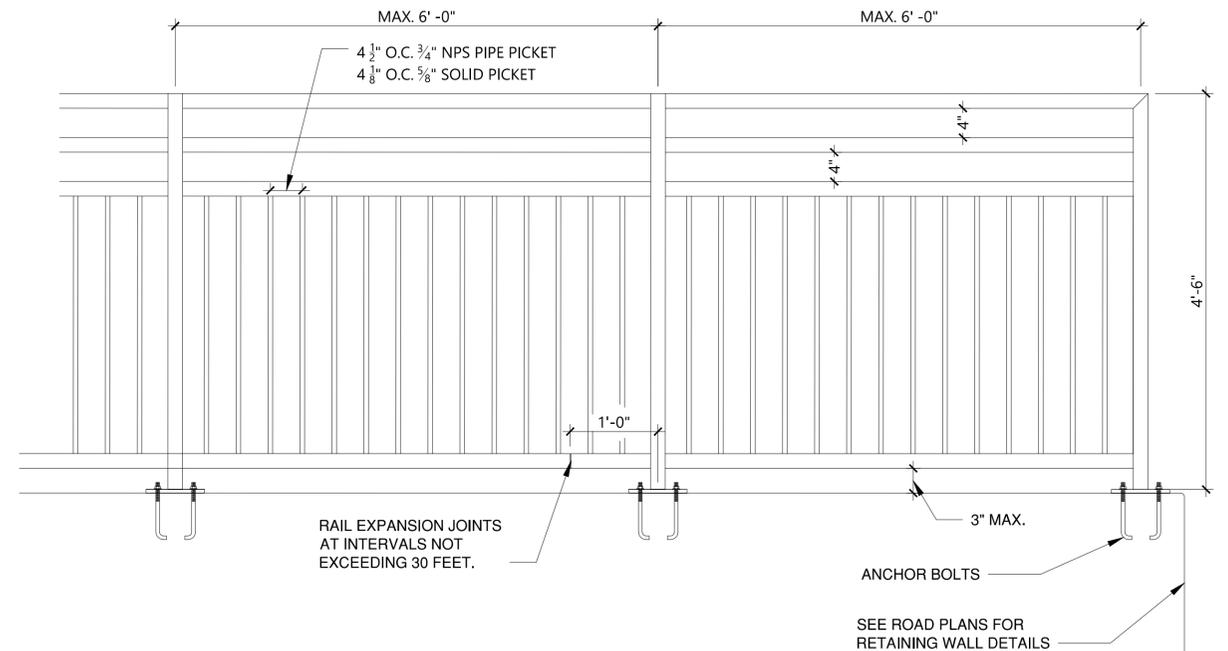
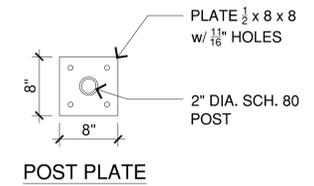
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

PROJECT REFERENCE NO.	SHEET NO.
U-5928	LA-3
R/W SHEET NO. _____	



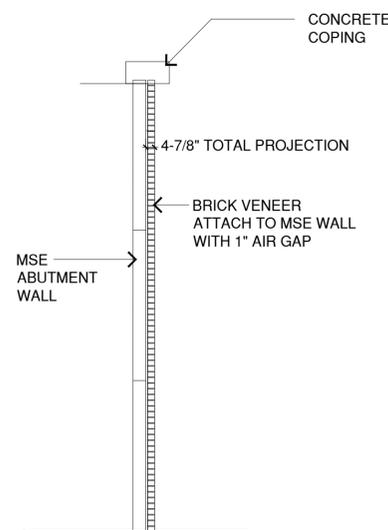
AESTHETIC TREATMENT OF ABUTMENT WALL
SCALE: N.T.S.

COMPONENTS:
POSTS: 2" MIN. NPS (2.375" O.D.) SCHEDULE 80 PIPE
RAILS: 2" MIN. NPS (2.375" O.D.) SCHEDULE 40 PIPE
PICKETS: 3/4" MIN. NPS (1.05") SCHEDULE 40 PIPE OR 5/8" MIN. SOLID STEEL SMOOTH ROUND ROD

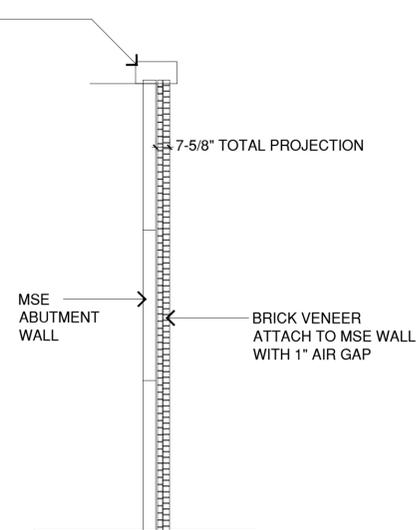


- NOTES:
1. THE CONTRACTOR SHALL SUBMIT DRAWINGS DETAILING ALL ASPECTS OF FABRICATION AND INSTALLATION OF RAILING, INCLUDING CONCRETE FOUNDATIONS FOR APPROVAL BY THE ENGINEER PRIOR TO INSTALLATION. SHOP DRAWINGS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER, HOLDING A VALID LICENSE TO PRACTICE ENGINEERING IN THE STATE OF NORTH CAROLINA.
 2. ALL RAILING COMPONENTS AND FASTENERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE CURRENT ROAD AND BRIDGE SPECIFICATIONS. TO ACHIEVE A UNIFORM COATING ON ALL SURFACES VENTING AND DRAINAGE HOLES FOR GALVANIZING SHALL BE INCLUDED IN THE SHOP DRAWINGS.
 3. ALL FASTENERS SHALL BE IN ACCORDANCE WITH ASTM A307, ASTM A563, AND ASTM F844. ALL ANCHOR BOLTS SHALL BE IN ACCORDANCE WITH AASHTO M314, GRADE 36.
 4. A CHEMICAL ANCHOR SYSTEM MAY BE USED IN LIEU OF CAST IN PLACE ANCHORS AND SHALL BE INCLUDED IN THE SHOP DRAWINGS.
 5. POSTS SHALL BE MITERED TO MATCH GRADE OF RAMPS, SIDEWALKS, STEPS AND TOP OF WALLS.
 6. HANDRAILS SHALL MATCH GRADE OF RAMPS SIDEWALKS AND STEPS.
 7. ALL POSTS AND PICKETS SHALL BE SET PLUMB.
 8. RAILINGS SHALL BE GROUNDED AND EFFECTIVELY BONDED. GROUNDING MATERIALS INSTALLATION TO BE IN ACCORDANCE WITH ST' D. FE-6.
 9. COMMERCIALY AVAILABLE RAILING SYSTEMS MAY BE USED IN LIEU OF DESIGNING AND FABRICATING THE RAILING. DOCUMENTATION FROM THE MANUFACTURER VERIFYING THAT PROJECT REQUIREMENTS ARE MET WITH THE RAILING SYSTEM SHALL BE SUBMITTED WITH THE INSTALLATION DRAWINGS AND APPROVED BY THE ENGINEER IN ACCORDANCE WITH NOTE 1.
 10. HANDRAIL TO BE IN ACCORDANCE WITH THE LATEST EDITION OF THE NORTH CAROLINA STATE BUILDING CODE.
 11. THIS HANDRAIL IS TO BE USED ONLY AS PROTECTION FOR PEDESTRIANS AND SHOULD NOT BE PLACED IN ANY LOCATION WHERE IT MIGHT BE SUBJECT TO ANY VEHICULAR IMPACT.

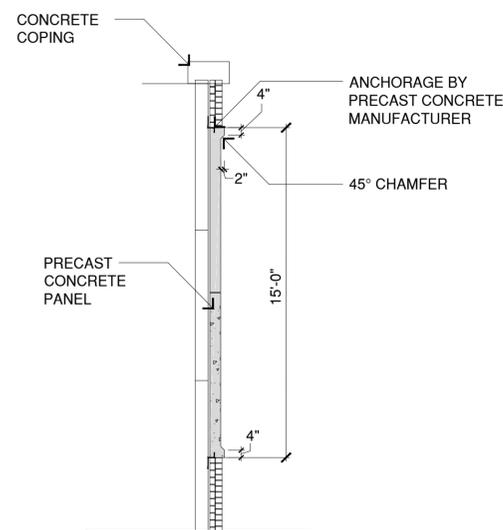
RAILING FOR RETAINING WALL-2 AND WALL-3
SCALE: N.T.S.



ABUTMENT WALL BRICK PANEL SECTION
SCALE: N.T.S.



ABUTMENT WALL BRICK COLUMN SECTION
SCALE: N.T.S.



ABUTMENT WALL PRECAST PANEL SECTION
SCALE: N.T.S.

- NOTE:
- CONCRETE COLOR TO BE SELECTED BY THE TOWN OF APEX
 - FONT STYLE TO BE SELECTED BY THE TOWN OF APEX