Roadside Toll Collection System
I-485 Express Lanes

Request for Information

APPENDICES

Table of Contents

Description of Appendices	3
Appendix A Sample Gantry	4
Appendix B I-485 AET and ITS Schematic	7
Appendix C Suggested KPI Categories	9
Appendix D I-485 ITS Concept Plans	11
Appendix E NCTA Express Lane Signing Typical Layouts	24
Appendix F NCTA Standard Express Lane Drawings	34
Appendix G AET Pull Off Areas Standard Detail	37
Appendix H ITS Final Early Works Plans	39
Appendix I AET Site Locations	52
Appendix J NCTA ITS Standard Details	76
Appendix K NCTA Express Lane Pavement Marking Standards	104
Appendix L Sample MVD Sensor Locations	111
Appendix M Existing Traffic Information	113

Description of Appendices

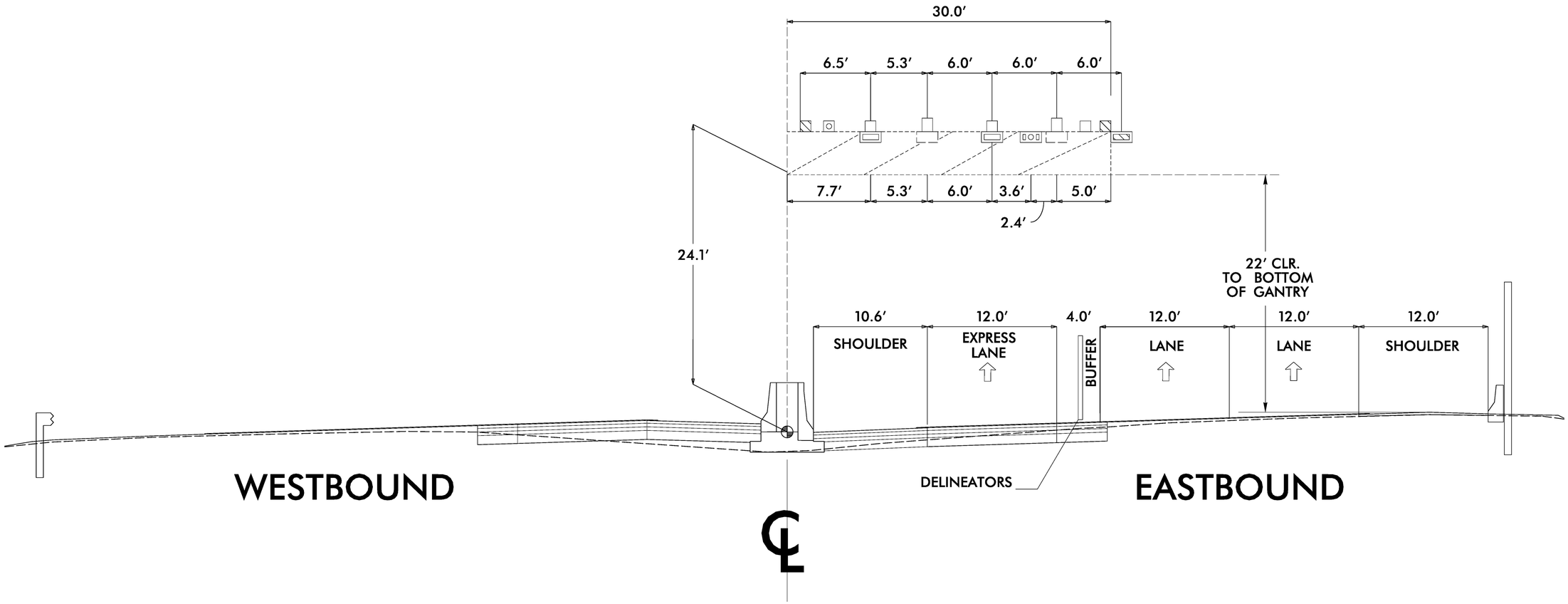
Appendix Name	Discipline	Description
Appendix A Sample Gantry	AET	Sample of cross-sectional design of toll zones gantries on the I-485 Express Lanes Project.
Appendix B I-485 AET and ITS Schematic	ITS, AET, Signing	Strip map schematic showing major signs, toll point, ingress/egress, and ITS device locations on a single plan. This is a "living document" updated with each contractor submittal.
Appendix C Suggested KPI Categories	AET	List of suggested KPIs, performance requirements and frequency of measurement.
Appendix D I-485 ITS Concept Plans	ITS	ITS-related conceptual drawings used by the I-485 Express Lanes Project Design-Build team to complete the project's ITS design plans.
Appendix E NCTA Express Lane Signing Typical Layouts	Signing	Includes NCTA standards for express lanes signing design (including delineators) used by the I-485 Express Lanes Project Design-Build team to complete the project's signing design plans.
Appendix F NCTA Standard Express Lane Drawings	AET	NCTA standards for express lanes toll gantry and toll cabinet designs used by the I-485 Express Lanes Project Design-Build team to complete the project's AET design plans.
Appendix G AET Pull Off Areas Standard Detail	AET	Detailed design for AET maintenance pull-off areas.
Appendix H ITS Final Early Works Plans	ITS	ITS plans related to early construction work taking place along the median. It includes plans for median conduit runs and devices.
Appendix I AET Site Locations	AET	Design plans showing the location of AET sites and their corresponding maintenance pull-off areas.
Appendix J NCTA ITS Standard Details	ITS	NCTA standards for ITS design used by the I-485 Express Lanes Project Design-Build team to complete the project's ITS design plans.
Appendix K NCTA Express Lane Pavement Marking Standards	Pavement Marking	NCTA standards for express lanes pavement markings design used by the I-485 Express Lanes Project Design-Build team to complete the project's pavement marking design plans.
Appendix L Sample MVD Sensor Locations	ITS	Drawings showing sample cross-sections of MVD poles (best case, worst case). This is not a formal submittal.
Appendix M Existing Traffic Information	Traffic	Charts showing average weekday hourly volumes and weekday peak period speed summaries for existing I-485 corridor.

Appendix A

Sample Gantry

PROJECT REFERENCE NO.	SHEET NO.
I-5507/R-0211EC/U4714AB	TG-07

Example of Less Constrained Buffer and Shoulder



NOTES: GANTRY EQUIPMENT SHOWN IS FOR LOADING PURPOSES AND MAY NOT BE ACTUAL EQUIPMENT CONFIGURATION BASED ON SITE SPECIFIC GANTRY NEEDS.

MAXIMUM GANTRY DEFLECTION: 0.5″

EQUIPMENT ICONS NOT MEANT TO REPRESENT HEIGHT ABOVE PAVEMENT.

TOLL GANTRY 4.2
678+26 EB

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Plans Prepared By:
BLYTHE
wsp

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
750 N. Greenfield Pkwy., Garner, NC 27529

SCALE
0 5
1″ = 5′

I-485 AET
TOLL GANTRY PLAN

Division 10 Mecklenburg County Charlotte

PLAN DATE:	OCTOBER 2019	REVIEWED BY:	
PREPARED BY:	R Dahiya	REVIEWED BY:	D Johnson

REVISIONS	INIT.	DATE

SEAL
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
DATE
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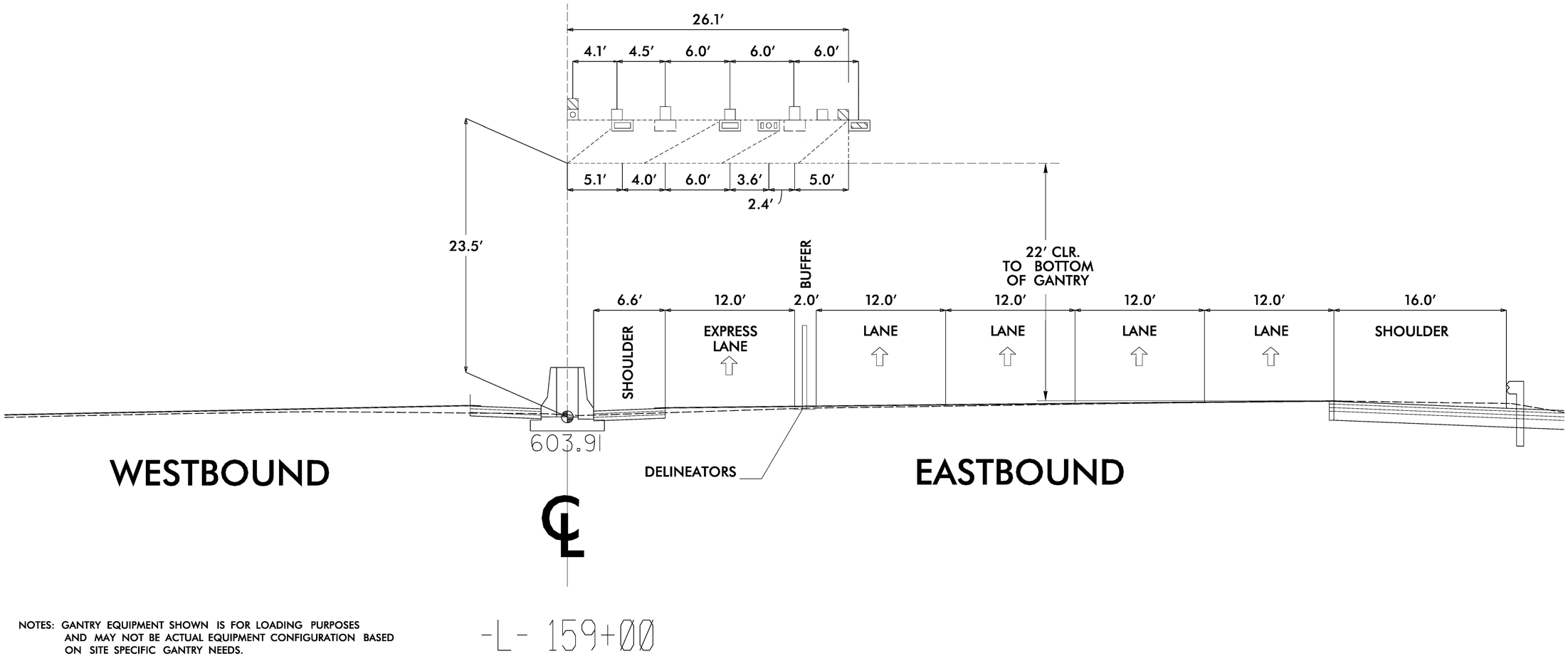
USER:daniel.a.johnson

PROJECT REFERENCE NO.	SHEET NO.
I-5507/R-0211EC/U4714AB	TG-03

Example of Highly Constrained Buffer and Shoulder



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TOLL GANTRY 2.2
159+00 EB

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Plans Prepared By: BLYTHE wsp

Prepared for the Offices of: Transportation Mobility and Safety Division, Intelligent Transportation Systems Section, STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
750 N. Greenfield Pkwy., Garner, NC 27529

SCALE 0 5 1″ = 5′

I-485 AET
TOLL GANTRY PLAN

Division 10 Mecklenburg County Charlotte

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REVISIONS	INIT.	DATE

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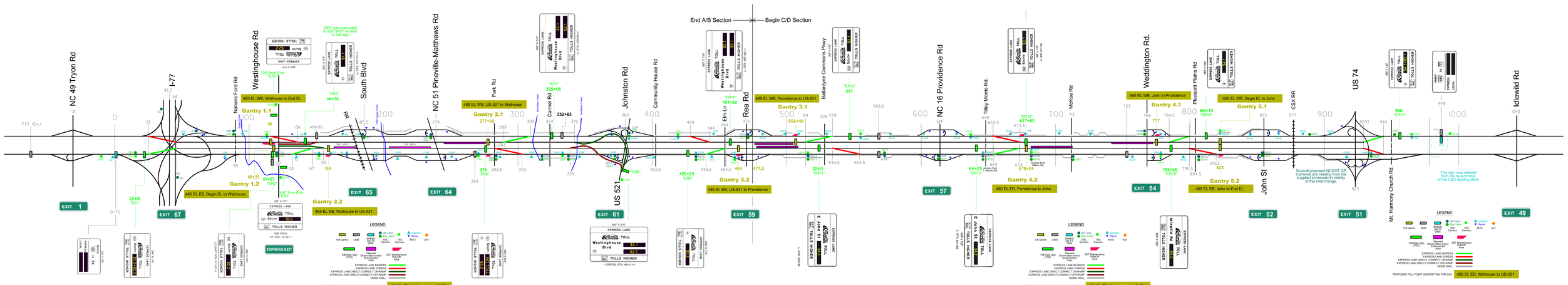
Appendix B

I-485 AET and ITS Schematic

I-5507: I-485 Express Lanes Tolling, ITS and Signing Schematic v2.2 DLJ 09/12/19



Appendix C

Suggested KPI Categories

Category	KPI	Performance Requirement	Measurement Frequency
Availability	Express Lanes	Each lane (travel lanes and shoulders) 99.9% of the time excluding scheduled and Approved maintenance	Monthly
Availability	Toll Rate Dynamic Message Signs and Cameras	99.95% of the time, excluding scheduled and Approved maintenance.	Monthly
Availability	Roadway Support System (RSS)	Functioning as per system design 99.95% of the time, excluding scheduled and Approved maintenance.	Monthly
Availability	Dynamic Pricing System	Functioning as per system design 99.95% of the time, excluding scheduled and Approved maintenance.	Monthly
Completeness	Toll Facility Maintenance	All Maintenance is complete, documented, and report provided to NCTA	Monthly
Operations	ITS - Complete and timely data transmission	100% of required traffic data is transmitted to the Dymamic Pricing System for processing in time to be used in the calculations 99.5% or greater of the time.	Monthly
Operations	AVI Transaction Complete and Timely Transmission to back office	Within 2 hours of the transaction date/time for 100% of the transactions	Monthly
Operations	Image Transaction Complete and Timely Transmission to back office	Within 72 hours of the transaction date/time for 100% of the transactions.	Monthly
Operations	AVI Transaction Accuracy	Provide accurate and complete AVI transaction with an error rate of 0.01% or less.	Monthly
Operations	Image Transaction Accuracy	Provide accurate and complete image transactions with an error rate of 0.2% or less.	Monthly
Operations	Image Rejection Accuracy	Correctly reject un-pursuable images with an error rate of 0.01% or less.	Monthly
Operations	Image Quality	0.1% or less of the images are rejected for reasons under the Contractor's control.	Monthly
Operations	Back Office File Communications	Received and processed 100% files and Updates per Requirements	Daily
Operations	Wrong-Way Vehicle Detection and Notification	Correctly detect 100% of wrong-way vehicles and provide notifications and alerts per requirements	Daily

Appendix D

ITS Concept Plans

NORTH CAROLINA TURNPIKE AUTHORITY
ITS Concept Plans
I-5507
I-485 Express Lanes

Sheet Index

1 - 9	Conceptual ITS Design Layout Sheets
10	Communications Schematic
11	Communications Backhaul Schematic
attached	NCTA ITS Standard Details

Abbreviations

AET - All-Electronic Tolling
CCTV - Closed-Circuit Television
C/L - Centerline
DMS - Dynamic Message Sign
EOP - Edge of Pavement
EQ - Equal Distance
FON - Fiber Optic Network
(includes conduit, fiber, boxes, etc.)
GFI - Ground Fault Interrupter
ITS - Intelligent Transportation Systems
LD - Lowering Device
LPS - Lightning Protection System
MVD - Microwave Vehicle Detector
NEC - National Electrical Code
NEMA - National Electrical Manufacturers Association
RFP - Request for Proposals
R/W - Right-of-Way
RWIS - Roadside Weather Information System
SOW - Scope of Work
SPD - Surge Protection Device
TYP - Typical
UL - Underwriters Laboratories
UPS - Uninterruptable Power Supply

NORTH CAROLINA
Turnpike Authority

All design and installation shall conform to the latest published edition/version of the NCDOT Standard Specifications, Roadway Standard Drawings, and, as applicable, the NFPA 70 (NEC) and UL standards.

REVISION DATE - 02/01/2018

NORTH CAROLINA Turnpike Authority

NOTES:
1. AT ALL PROPOSED DETECTION POINTS, INSTALL 2-2" CONDUITS BETWEEN TRUNK COMMUNICATIONS AND ALL DETECTION DEVICES.

LEGEND

- PROPOSED EXPRESS LANES TRAFFIC CAMERA
- PROPOSED NCDOT TRAFFIC CAMERA
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- PROPOSED FIBER-OPTIC COMMUNICATIONS CABLE IN EXISTING CONDUIT
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- PROPOSED DETECTION POINT (MAINLINE)
- PROPOSED DETECTION POINT (RAMP OR DIRECT CONNECT)
- AET EXPRESS LANE TOLL COLLECTION SITE
- EGRESS FROM EXPRESS LANES
- INGRESS TO EXPRESS LANES

INTERSTATE 485 — I-485 EXPRESS LANES — MECKLENBURG COUNTY

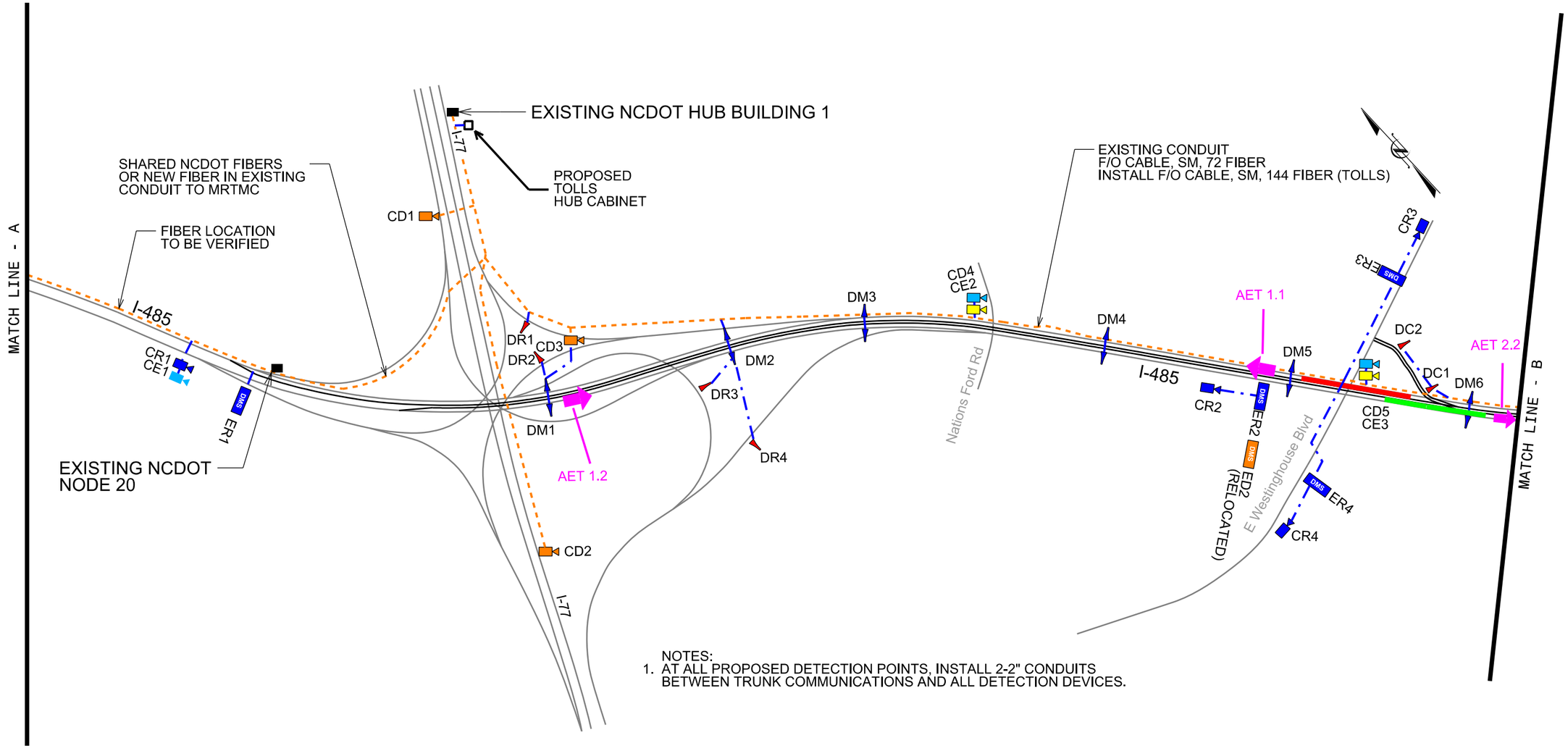
ATKINS
5200 77 Center Drive, Suite 500
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

I-5507: I-485 EXPRESS LANES

CONCEPTUAL ITS DESIGN

SCALE:	1" = 1000'	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.
DATE:	February 1, 2018		1
DWG. BY:	B. Slocum		
DESIGN BY:	D. Jones		
APPROVED:			

NORTH CAROLINA Turnpike Authority



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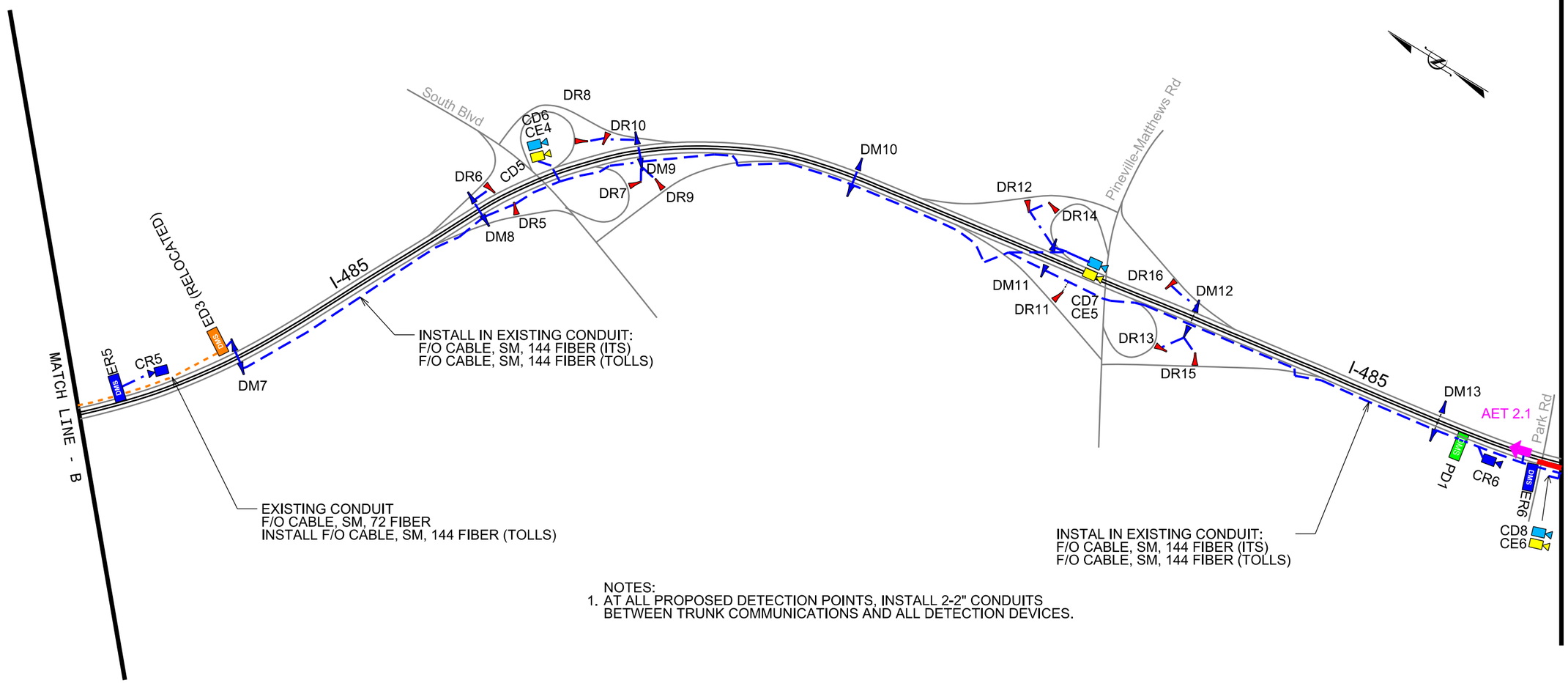

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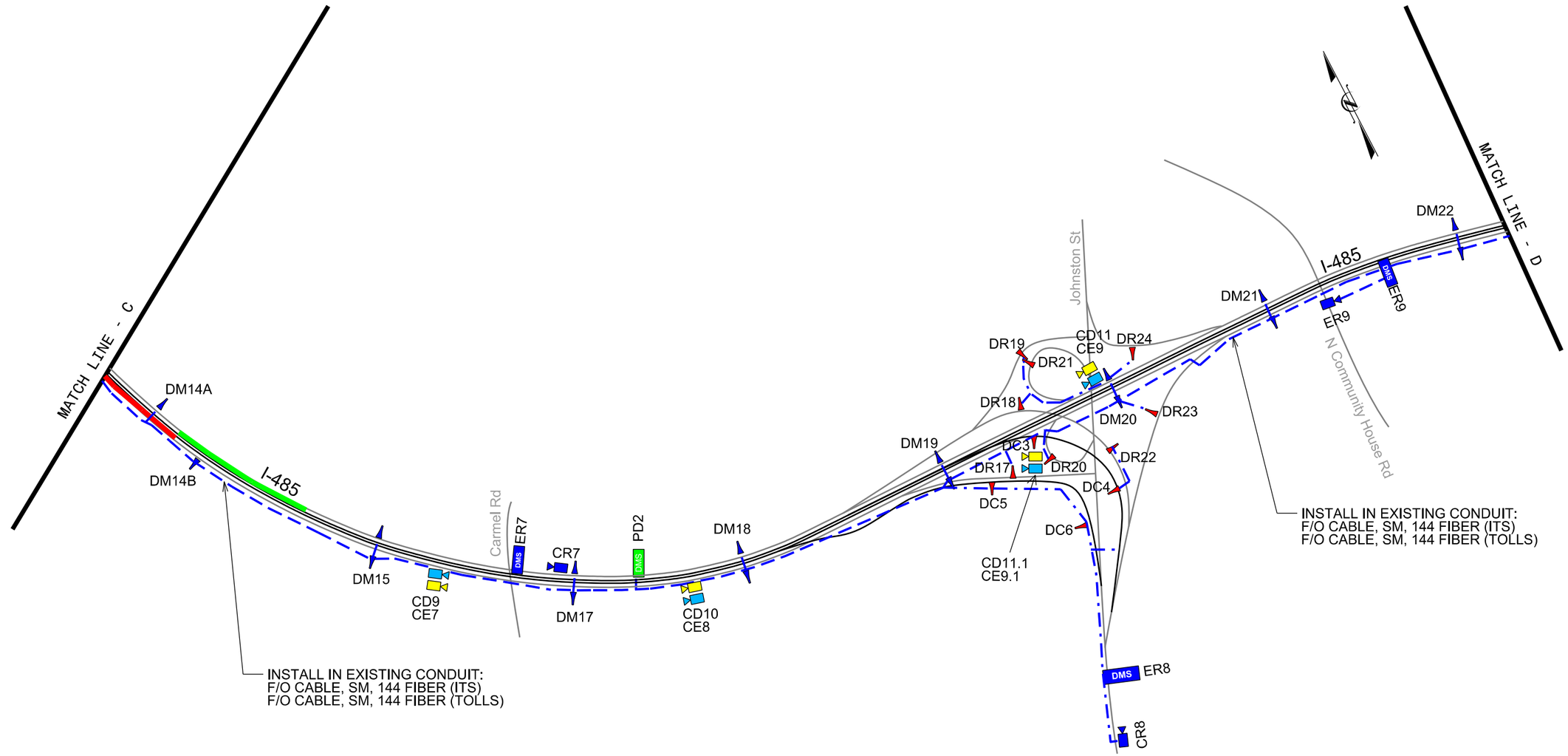

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DESIGN BY:	D. Jones		
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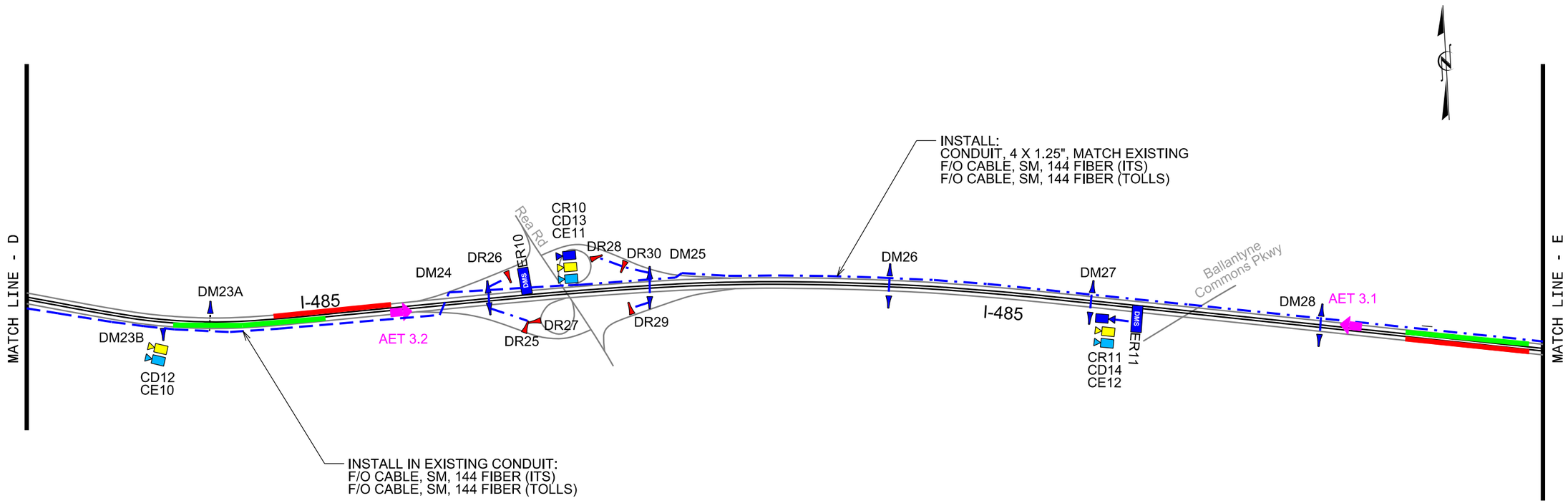

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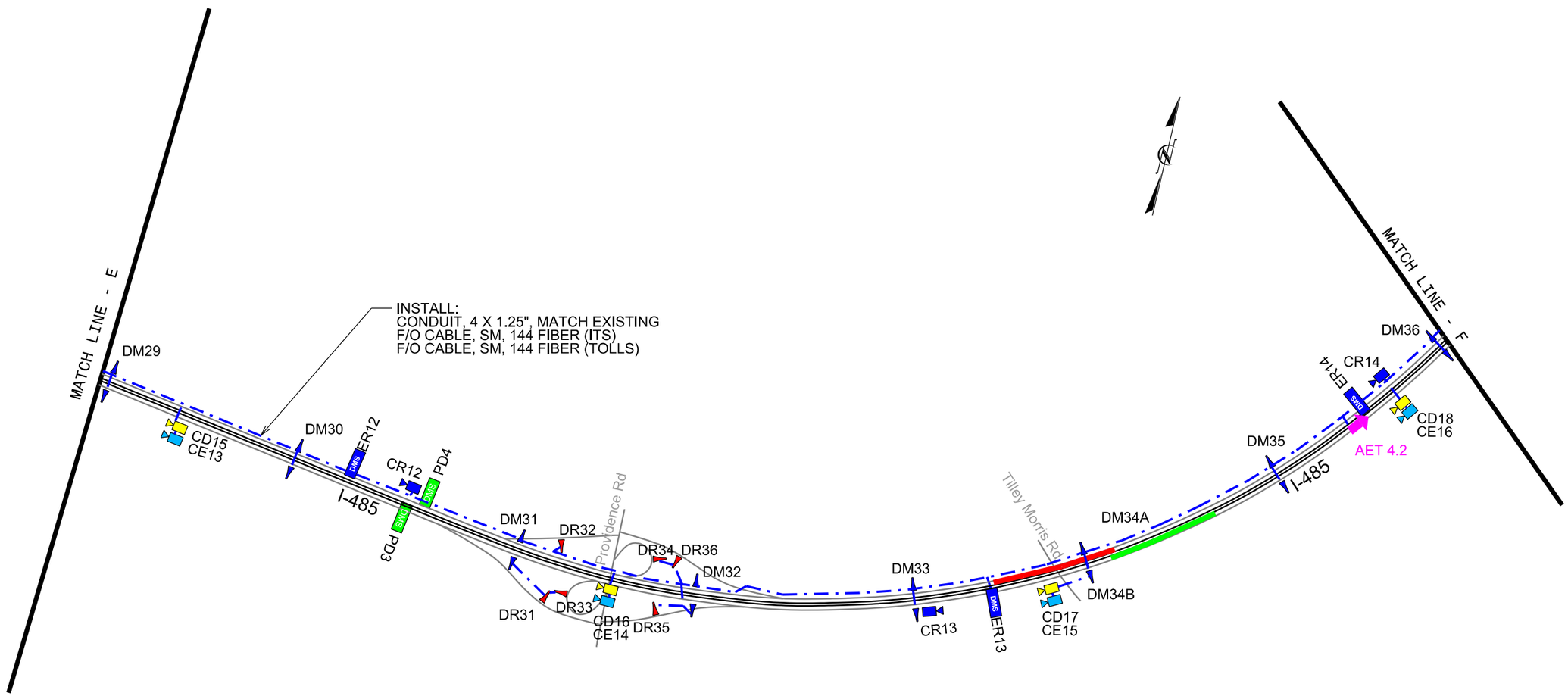

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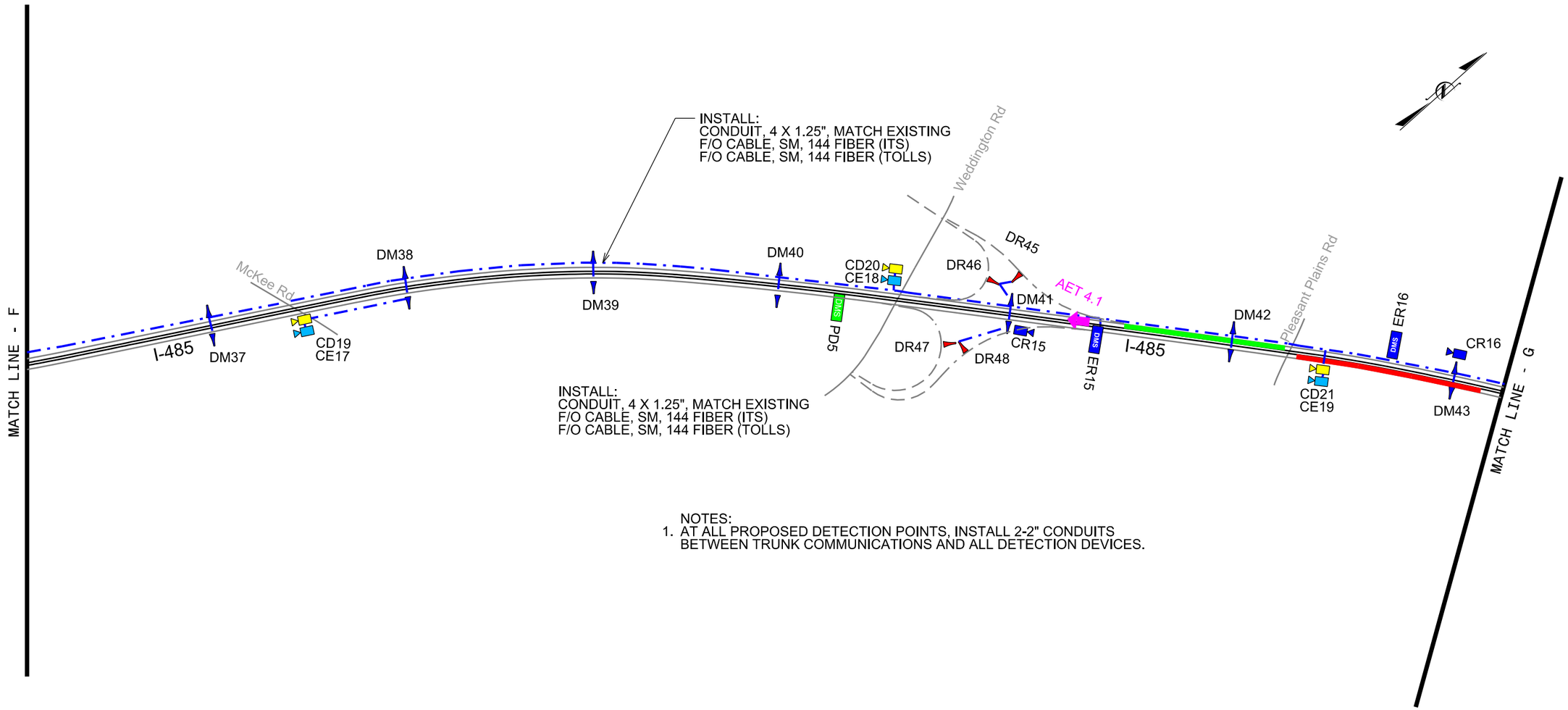

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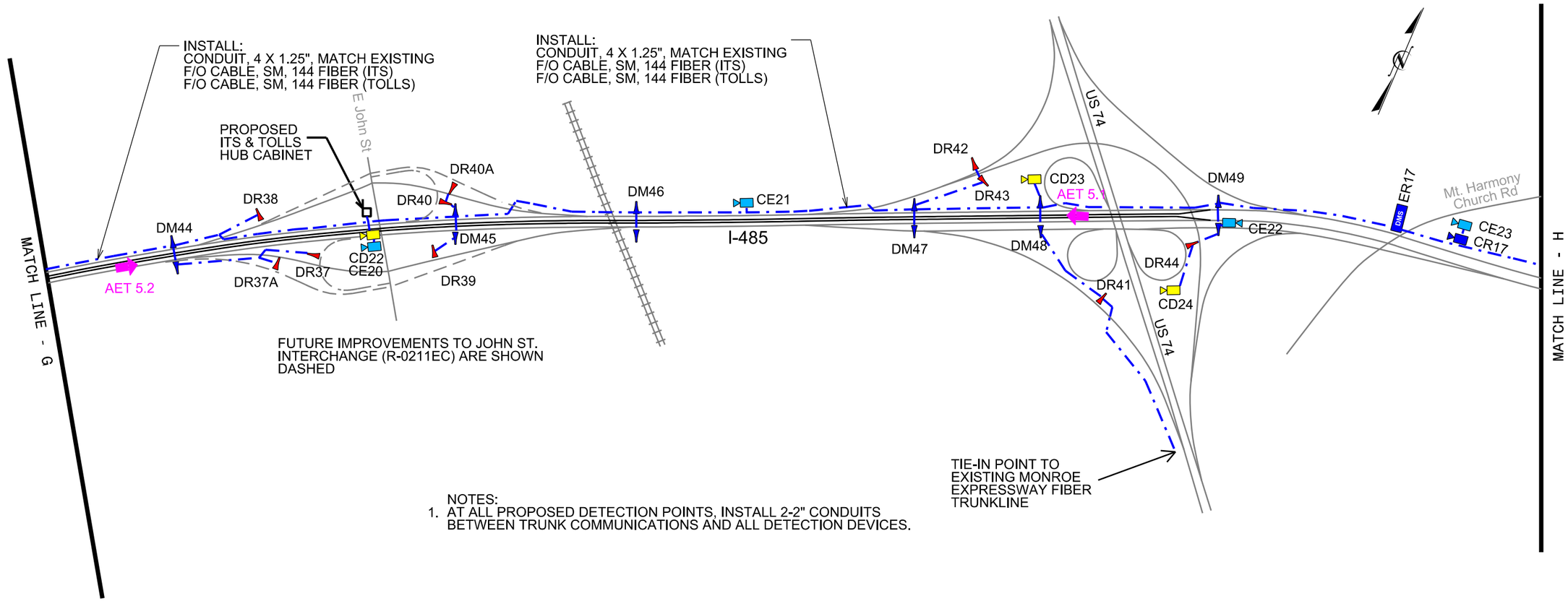

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DESIGN BY:	D. Jones		
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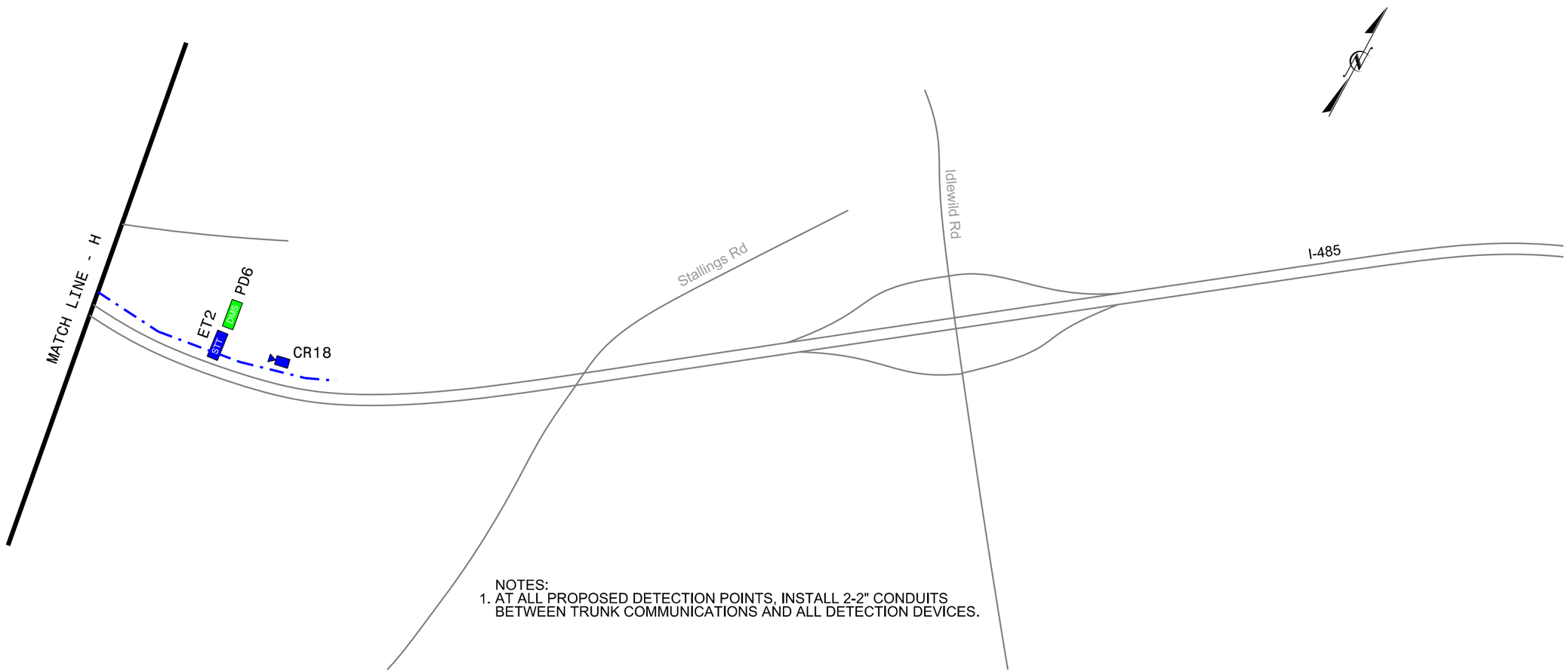

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SCALE:	1" = 1000'	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.
DATE:	February 1, 2018		9
DWG. BY:	B. Slocum		
DESIGN BY:	D. Jones		
APPROVED:			

ITS / TOLLS NETWORK DEMARC

THE TRIANGLE EXPRESSWAY

TOLL NC 540 (S.W. OF RALEIGH)

ITS DEVICES

ROADSIDE TOLLING LANE EQUIPMENT

NCTA FIBER NETWORK

CUSTOMER SERVICE CENTER MORRISVILLE

VPN

NCTA/NCDOT OFFICES

STOC SECONDARY/BACKUP CONTROL TMC

NCTA FIBER NETWORK

DOT ADMIN NETWORK WKSTNS

DOT ITS WKSTNS, SWITCHES AND SERVERS

DOT IT STATEWIDE NETWORK

MOBILE APPLICATION

TOLLS WKSTNS, SWITCHES

EXISTING TSI PIPE FOR TOLLS SYSTEM ACCESS

TOLLS BACK OFFICE

RALEIGH STOREFRONT APPLICATION

(2) PROPOSED TSI PIPE FOR TOLLS ACCOUNT ACCESS

(2) PROPOSED TSI PIPE FOR TOLLS DATA AND TRANSACTIONS

FIREWALL

FIREWALL

RALEIGH

CHARLOTTE

FIREWALL

CHARLOTTE STOREFRONT APPLICATION (LOCATION TBD)

(2) TSI PIPES COULD BE SEPARATE OR CONSOLIDATED

(3) IF SPACE DOES NOT ALLOW, TOLL HEAD-END EQUIPMENT COULD BE LOCATED AT THE ROADSIDE OR IN CABINETRY LOCATED OUTSIDE AT THE MRTMC COMPOUND.

VIDEO DECODERS

VIDEO

VIDEO

VIDEO MATRIX SWITCH

DOT ADMIN NETWORK WKSTNS

DOT ITS WKSTNS

TOLLS WKSTNS

CLIENT-BASED REMOTE ACCESS FROM STOC

CLIENT-BASED REMOTE ACCESS FROM STOC

VIDEO WALL CONTROLLER

DOT ITS SERVERS

PLAZA EQUIPMENT SERVERS, STORAGE, CONTROLLERS, SECURITY, TRANSACTION PACKAGING

(4) NCDOT HOMERUN FIBER NETWORK

(2)

TOLLS/ITS NETWORK DEMARC

OTHER NCDOT CAMERAS

DYNAMIC PRICING ALGORITHM & SERVERS

(3)

MRTMC PRIMARY CONTROL TMC

NCTA FIELD HUB TOLL SWITCH

ROADSIDE CABINETRY

OTHER NCDOT DMS

DOT ITS SWITCHES

FIREWALL

(1)

FIREWALL

TOLLS SWITCHES

LANE EQUIPMENT MASTERS, LOOP RACKS, POWER, ENCODERS

(1) TOLLS ACCESS VIA FIREWALL FOR NON-TOLL DMS

(4) NCDOT HOMERUN FIBER NETWORK

(4) NCDOT HOMERUN FIBER NETWORK

I-485 EXPRESS LANES CORRIDOR

TYPICAL TOLL SITE

(5)

NCDOT FIELD HUB SWITCHES

NCTA FIELD HUB TOLL SWITCH

(4) I-485 CCTV FOR NCDOT TRAFFIC MGMT (RE-USED)

I-485 CCTV FOR NCDOT TRAFFIC MGMT (PROPOSED)

I-485 DMS FOR TRAFFIC MGMT (RELOCATED AND PROPOSED)

WRONG-WAY DRIVER HARDWARE

EXPRESS LANES DMS (FOR DISPLAY OF TOLL RATES)

ALL DETECTORS (MVDS)

I-485 CCTV FOR EXPRESS LANES TRAFFIC MGMT

TOLL ROCS AND SECURITY CAMERAS

IN-LANE EQUIPMENT AVI, AVC, VES

ITS / TOLLS NETWORK DEMARC

LEGEND

- ITEMS IN BLUE PROVIDED BY I-485 CONTRACT
- ITEMS IN GRAY WILL BE ON TSI NETWORK
- FUTURE DOT CONNECTION
- LEASED TOLLS PIPE(S) PROVIDED BY TSI OR NCDOT

(4) EXISTING NCDOT FIBER & CONDUIT FROM CORRIDOR TO MRTMC; FIBERS TBD BY MRTMC

(5) ALONG CORRIDOR, TRUNKLINE IS:
- DBT INSTALLED FIBER & CONDUIT
- DBT FIBER IN EXIST. NCDOT CONDUIT
- EXISTING NCDOT FIBER AND CONDUIT

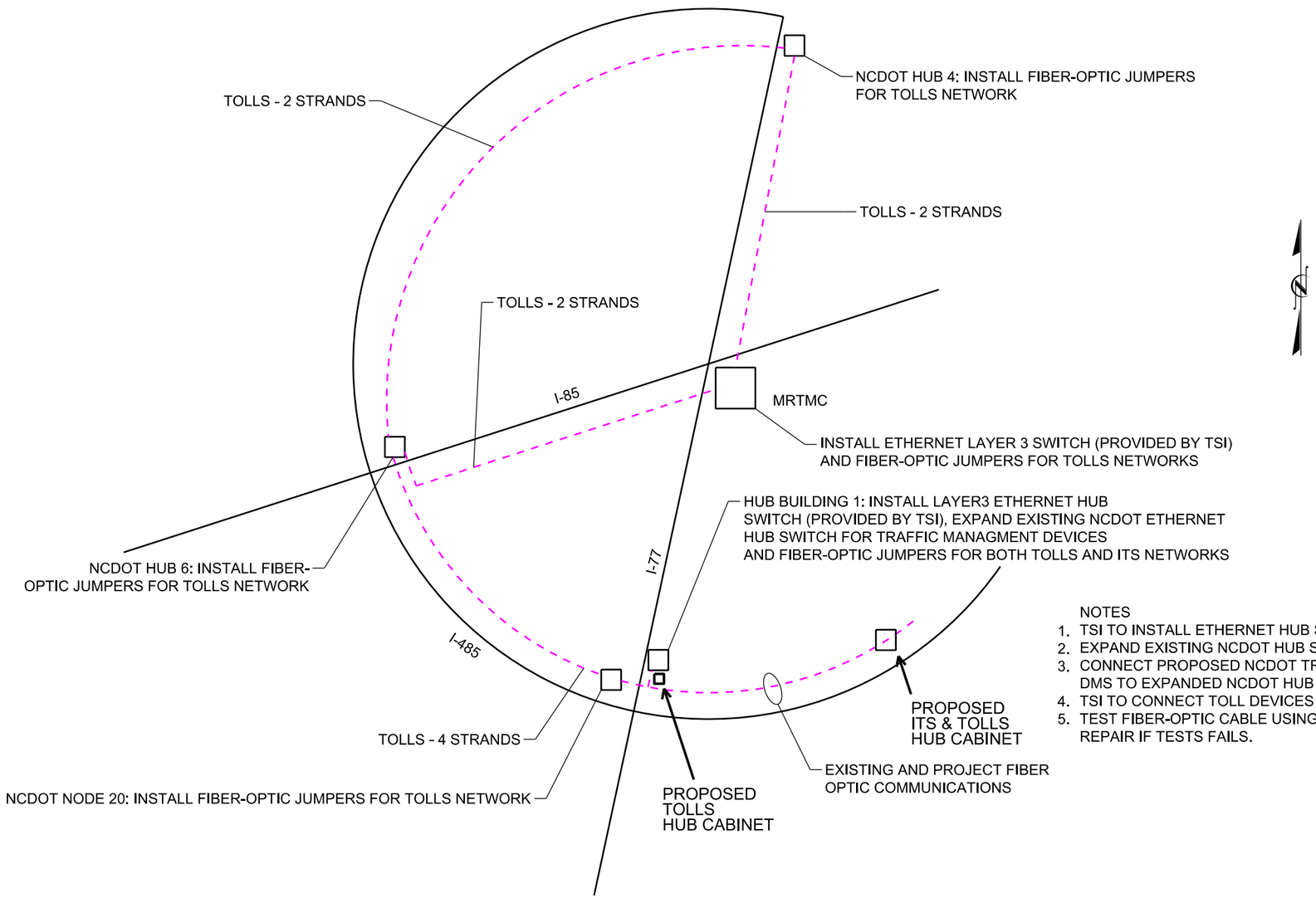
INTERSTATE 485 I-485 EXPRESS LANES MECKLENBURG COUNTY

ATKINS 5200 77 Center Drive, Suite 500 Charlotte, North Carolina 28217 (704) 522-7275 NCBEES #F-0326

I-5507: I-485 EXPRESS LANES

COMMUNICATIONS SCHEMATIC

SCALE:	1" = 1000'	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO. 10
DATE:	February 1, 2018		
DWG. BY:	B. Slocum		
DESIGN BY:	D. Jones		
APPROVED:			



NOTES

1. TSI TO INSTALL ETHERNET HUB SWITCH FOR TOLLS DEVICES IN HUB BUILDING 1.
2. EXPAND EXISTING NCDOT HUB SWITCH IN HUB 1.
3. CONNECT PROPOSED NCDOT TRAFFIC MANAGEMENT CCTV AND DMS TO EXPANDED NCDOT HUB SWITCH 1.
4. TSI TO CONNECT TOLL DEVICES TO TSI-FURNISHED AND INSTALLED HUB SWITCH IN HUB 1.
5. TEST FIBER-OPTIC CABLE USING OTDR. NOTIFY ENGINEER FOR REPAIR IF TESTS FAILS.

I-485 EXPRESS LANES
MECKLENBURG COUNTY

ATKINS
5200 77 Center Drive, Suite 500
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

I-5507: I-485 EXPRESS LANES

COMMUNICATIONS BACKHAUL SCHEMATIC

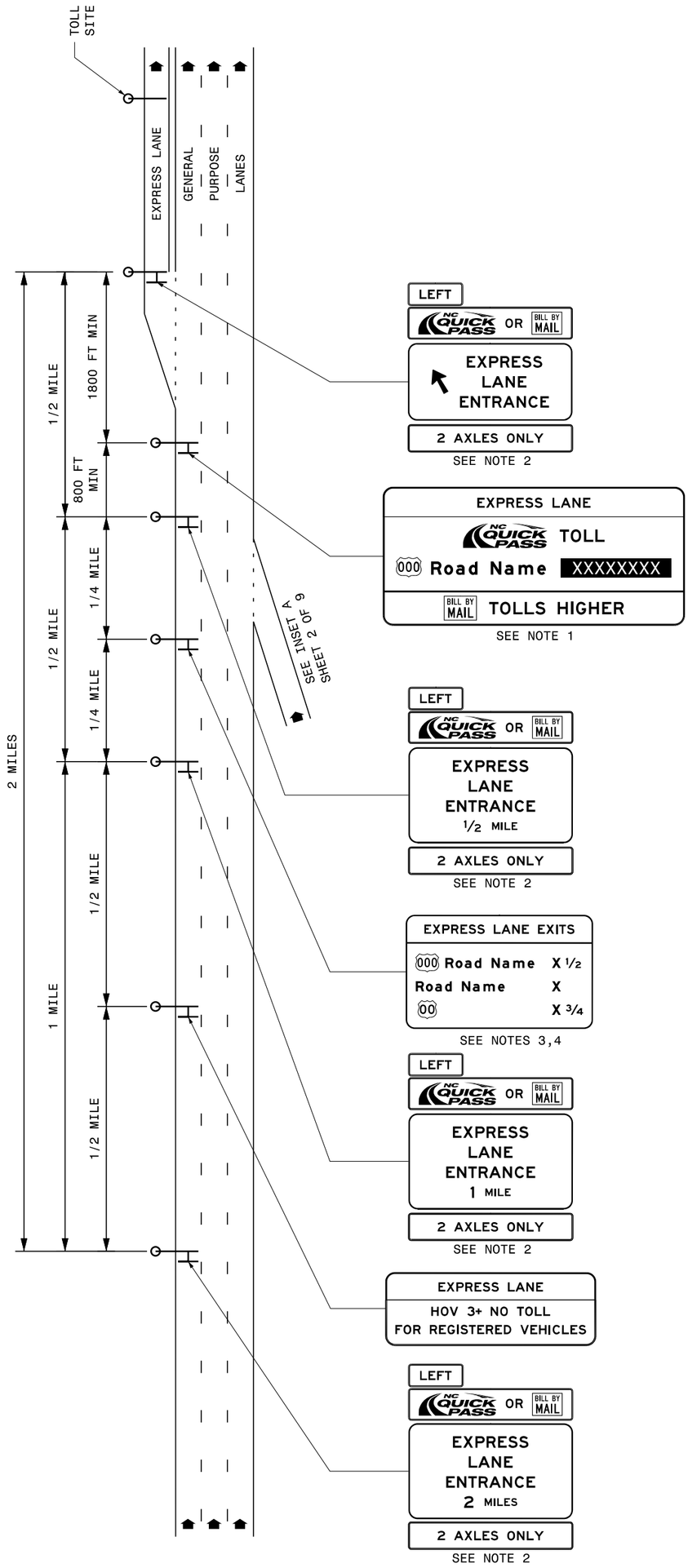
SCALE:	1" = 1000'	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.
DATE:	February 1, 2018		11
DWG. BY:	B. Slocum		
DESIGN BY:	D. Jones		
APPROVED:			

Appendix E

NCTA Express Lane Signing

Typical Layouts

2-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
ENGLISH STANDARD DRAWING FOR
EXPRESS LANE SIGNING TYPICAL LAYOUTS
INITIAL MAINLINE INGRESS
SHEET 1 OF 9



NOTES

1. TWO OR MORE DESTINATIONS WITH RATES SHALL BE SHOWN ON RATE SIGN IF ADDITIONAL DESTINATIONS ARE ACCESSIBLE VIA THE NEXT SEGMENT PRIOR TO THE NEXT EGRESS TO THE GENERAL PURPOSE LANES.
2. VEHICLE RESTRICTION PANEL NOT REQUIRED IF FACILITY HAS NO VEHICLE RESTRICTIONS.
3. DESTINATIONS SHALL BE THE FIRST THREE OF THE FOLLOWING: THE FIRST GENERAL PURPOSE EXIT ACCESSIBLE AFTER EGRESS FROM EACH OF THE NEXT EXPRESS LANE SEGMENTS; AND EXPRESS LANE DIRECT EXITS.
4. DISTANCES SHOWN SHALL BE TO THE DECISION POINT OF EGRESS OR EXIT FROM THE EXPRESS LANE.

2-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR

EXPRESS LANE SIGNING TYPICAL LAYOUTS

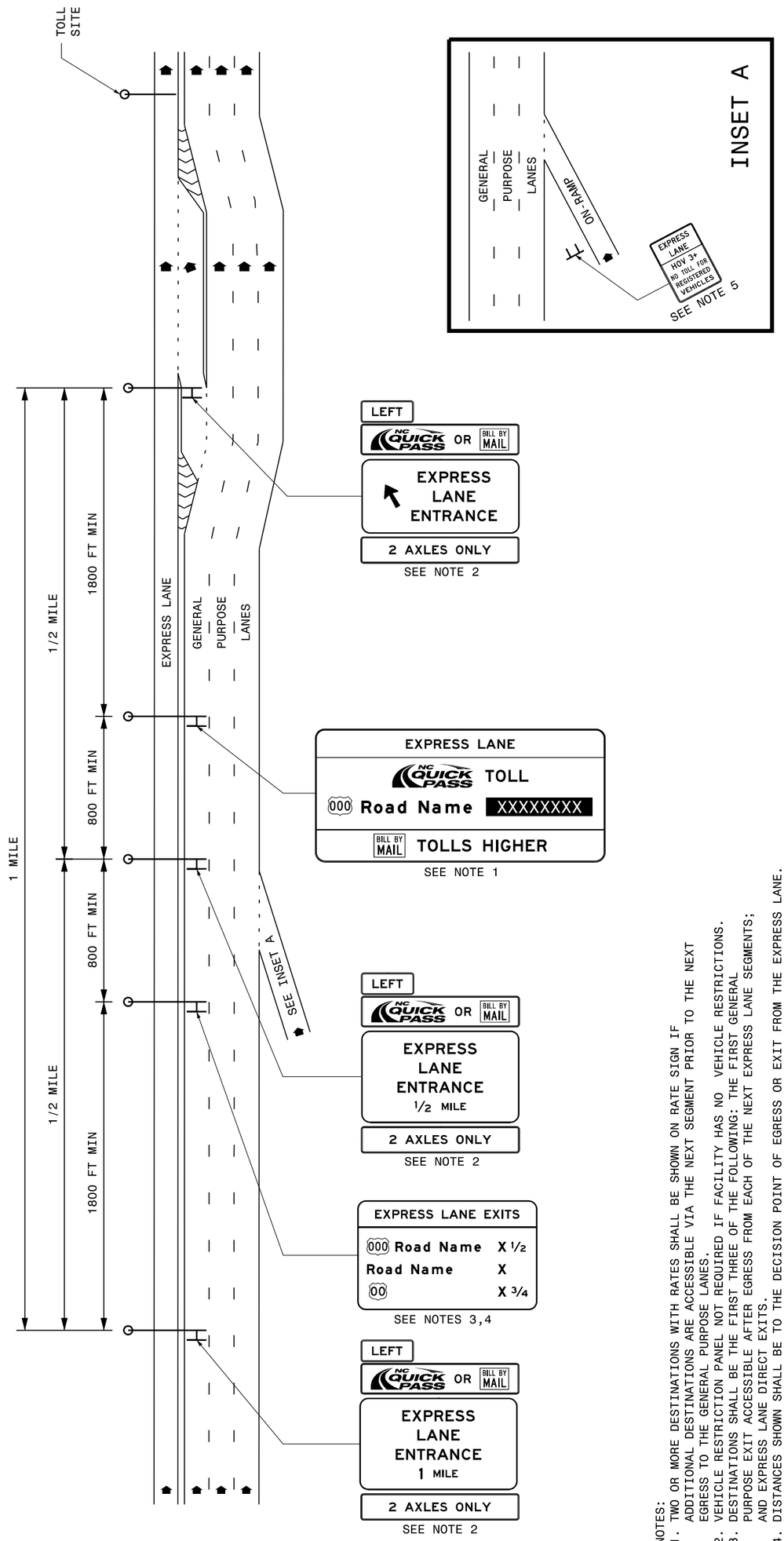
INITIAL MAINLINE INGRESS

SHEET 1 OF 9

2-18
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR
EXPRESS LANE SIGNING TYPICAL LAYOUTS
INTERMEDIATE INGRESS

SHEET 2 OF 9



NOTES:
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4. DISTANCES SHOWN SHALL BE TO THE DECISION POINT OF EGRESS OR EXIT FROM THE EXPRESS LANE.
5. GROUND MOUNTED RAMP SIGN SHALL BE ERECTED ON THE LEFT ALONG EACH ON-RAMP WITHIN EXPRESS LANE SIGNING EXTENTS.

2-18
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

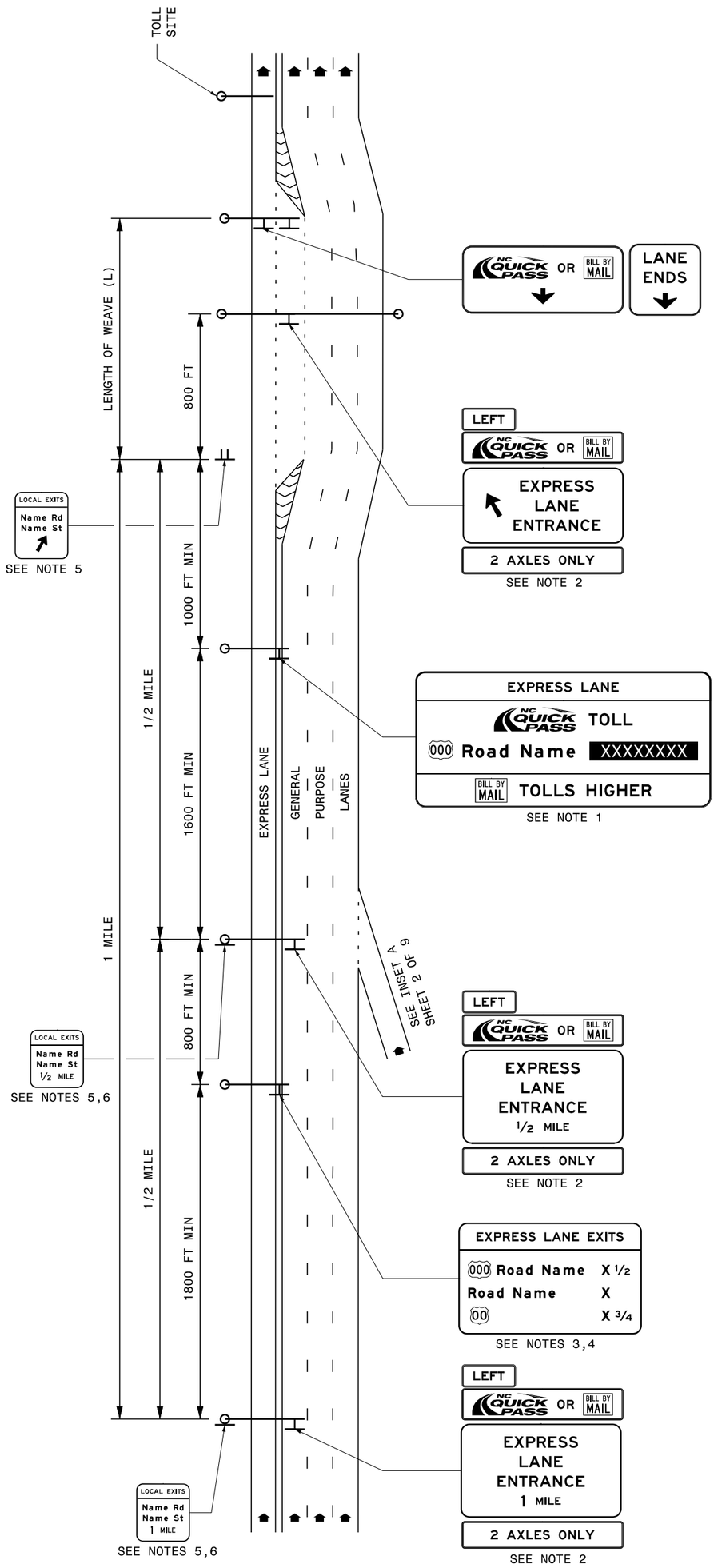
ENGLISH STANDARD DRAWING FOR
EXPRESS LANE SIGNING TYPICAL LAYOUTS
INTERMEDIATE INGRESS

SHEET 2 OF 9

2-18
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR
EXPRESS LANE SIGNING TYPICAL LAYOUTS
INTERMEDIATE INGRESS AND EGRESS (WEAVE)
ONE EXPRESS LANE

SHEET 3 OF 9



NOTES

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3. DESTINATIONS SHALL BE THE FIRST THREE OF THE FOLLOWING: THE FIRST GENERAL PURPOSE EXIT ACCESSIBLE AFTER EGRESS FROM EACH OF THE NEXT EXPRESS LANE SEGMENTS; AND EXPRESS LANE DIRECT EXITS.
4. DISTANCES SHOWN SHALL BE TO THE DECISION POINT OF EGRESS OR EXIT FROM THE EXPRESS LANE.
5. DESTINATIONS SHALL BE FOR GENERAL PURPOSE EXITS ACCESSIBLE VIA THE NEXT EGRESS ONLY, UP TO A MAXIMUM OF THREE.
6. FOR MEDIAN BARRIER SECTIONS, ERECT SIGN WITH REDUCED LETTER HEIGHT ON VERTICAL OVERHEAD STRUCTURE SUPPORT. FOR SHOULDER SECTIONS AND OVERHEAD INSTALLATIONS, ERECT STANDARD SIZE PANELS ON SUPPORTS OR OVERHEAD STRUCTURE.

2-18
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

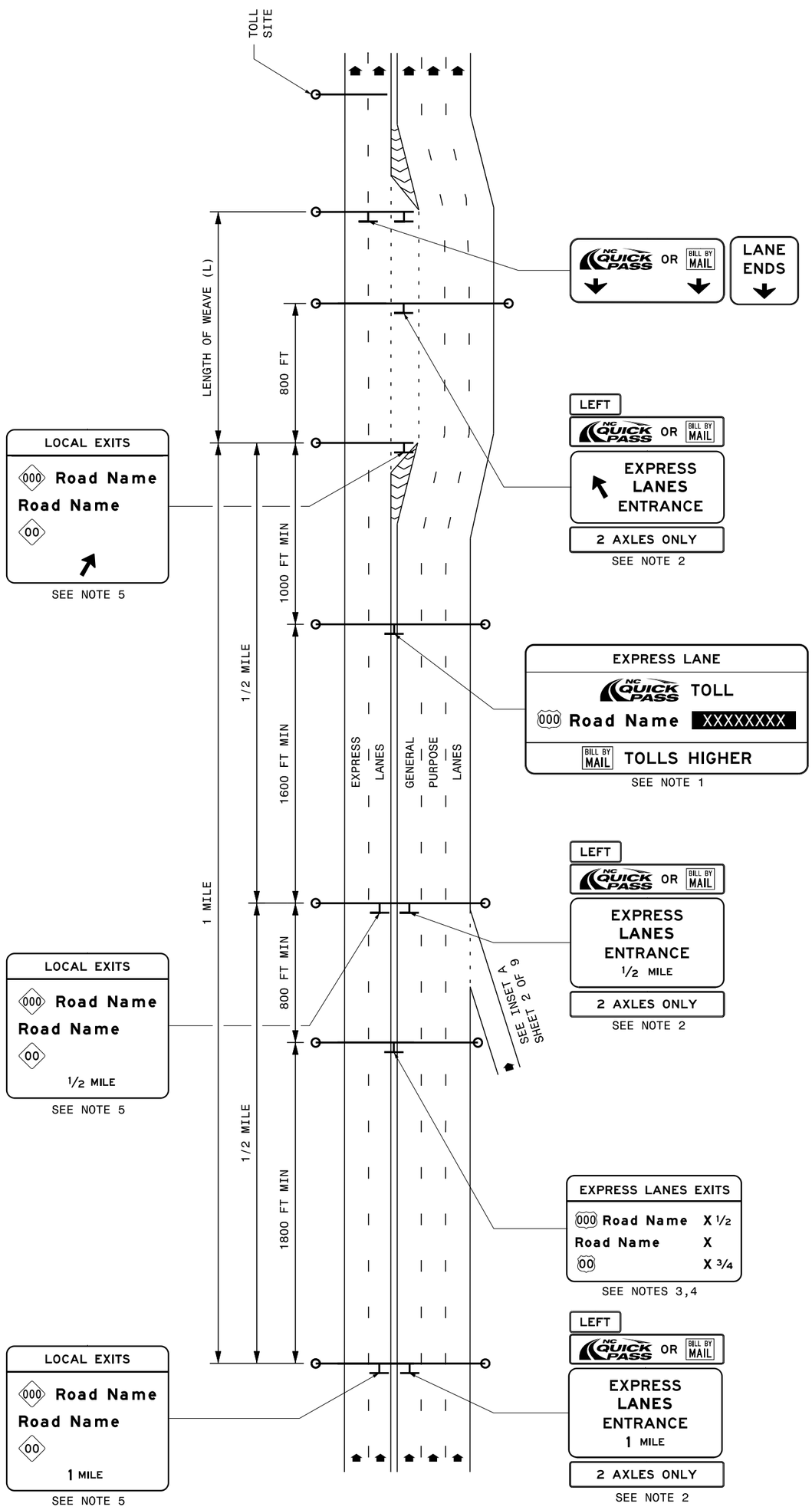
ENGLISH STANDARD DRAWING FOR
EXPRESS LANE SIGNING TYPICAL LAYOUTS
INTERMEDIATE INGRESS AND EGRESS (WEAVE)
ONE EXPRESS LANE

SHEET 3 OF 9

2-18
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR
EXPRESS LANE SIGNING TYPICAL LAYOUTS
INTERMEDIATE INGRESS AND EGRESS (WEAVE)
TWO EXPRESS LANES

SHEET 4 OF 9



NOTES

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2-18

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

ENGLISH STANDARD DRAWING FOR

EXPRESS LANE SIGNING TYPICAL LAYOUTS

INTERMEDIATE INGRESS AND EGRESS (WEAVE)

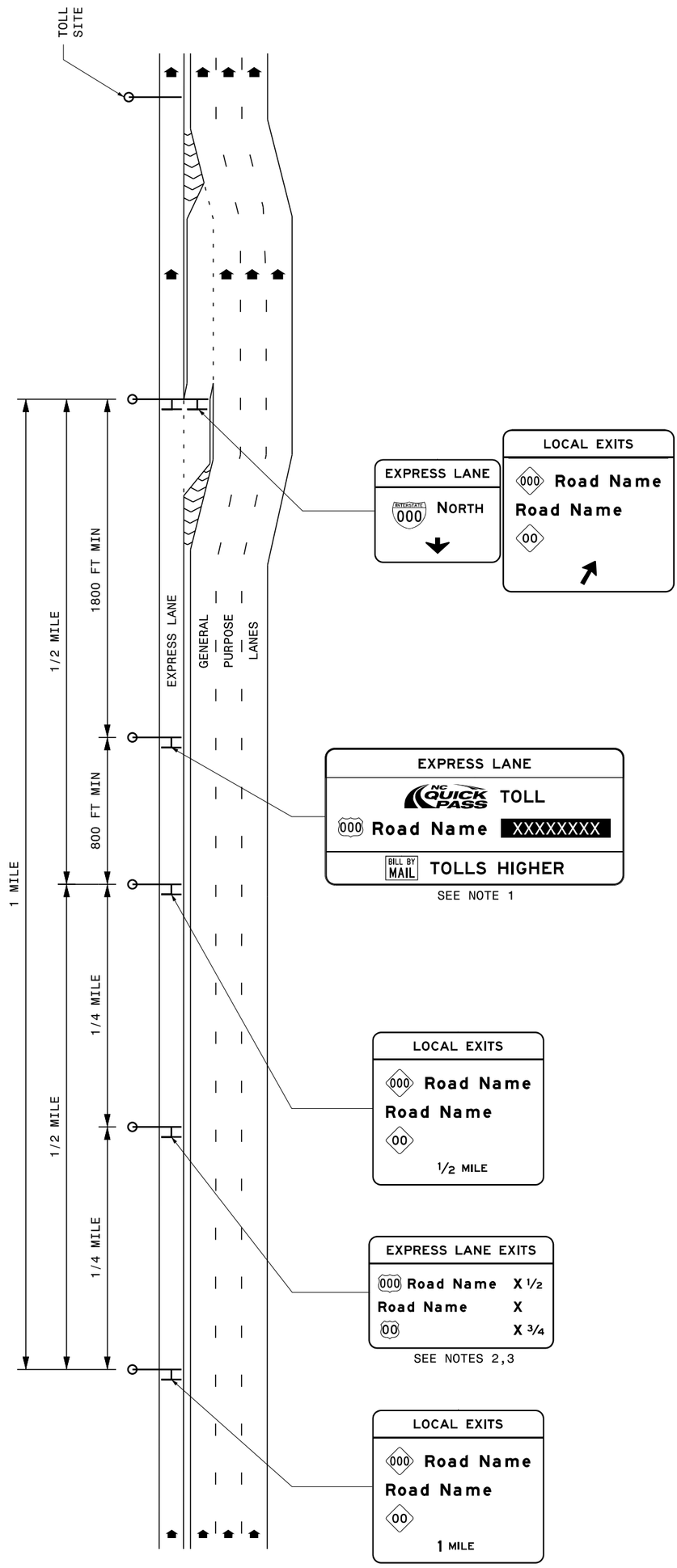
TWO EXPRESS LANES

SHEET 4 OF 9

2-18
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR
EXPRESS LANE SIGNING TYPICAL LAYOUTS
INTERMEDIATE EGRESS

SHEET 5 OF 9



NOTES

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3. DISTANCES SHOWN SHALL BE TO THE DECISION POINT OF EGRESS OR EXIT FROM THE EXPRESS LANE.

2-18

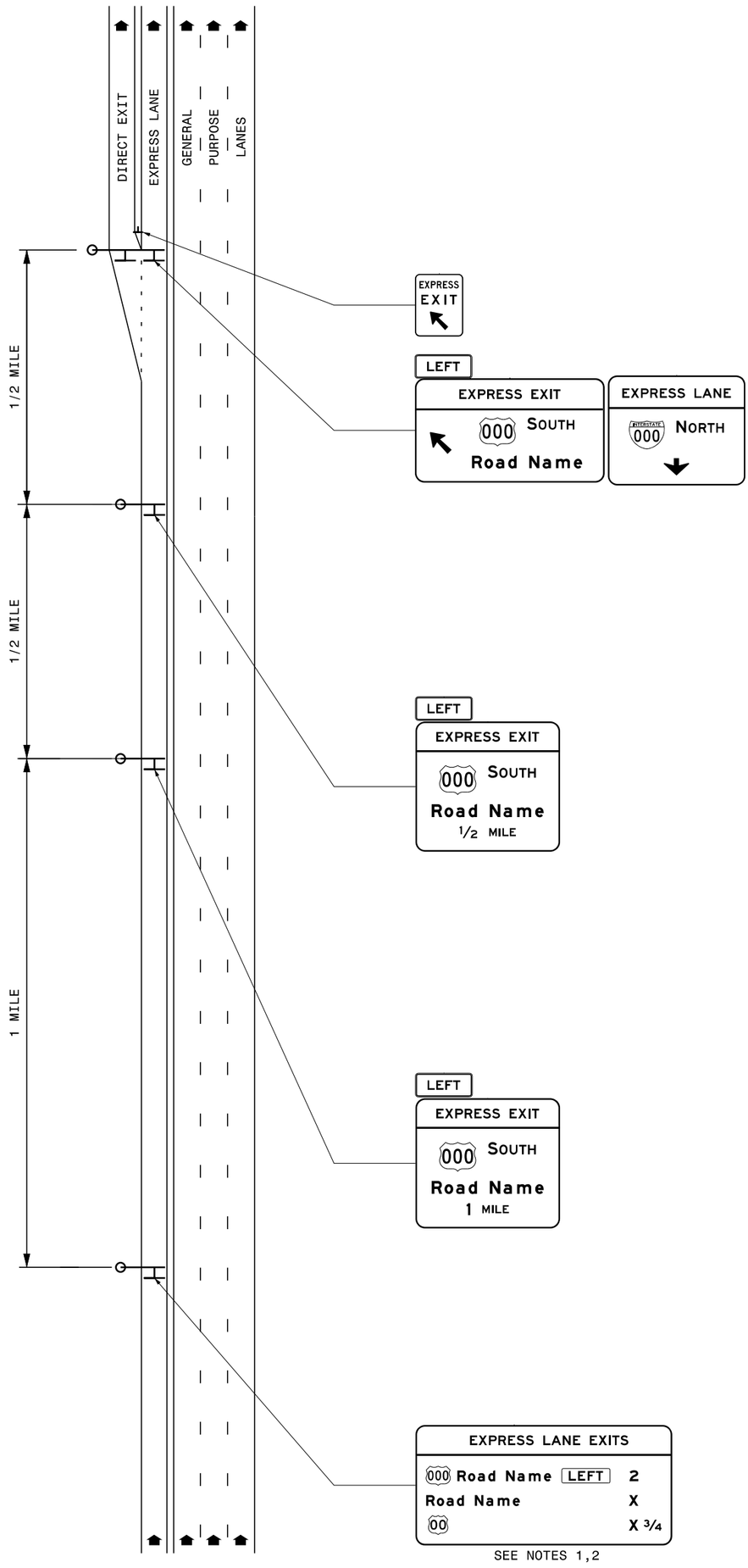
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR

EXPRESS LANE SIGNING TYPICAL LAYOUTS

INTERMEDIATE EGRESS

SHEET 5 OF 9



NOTES

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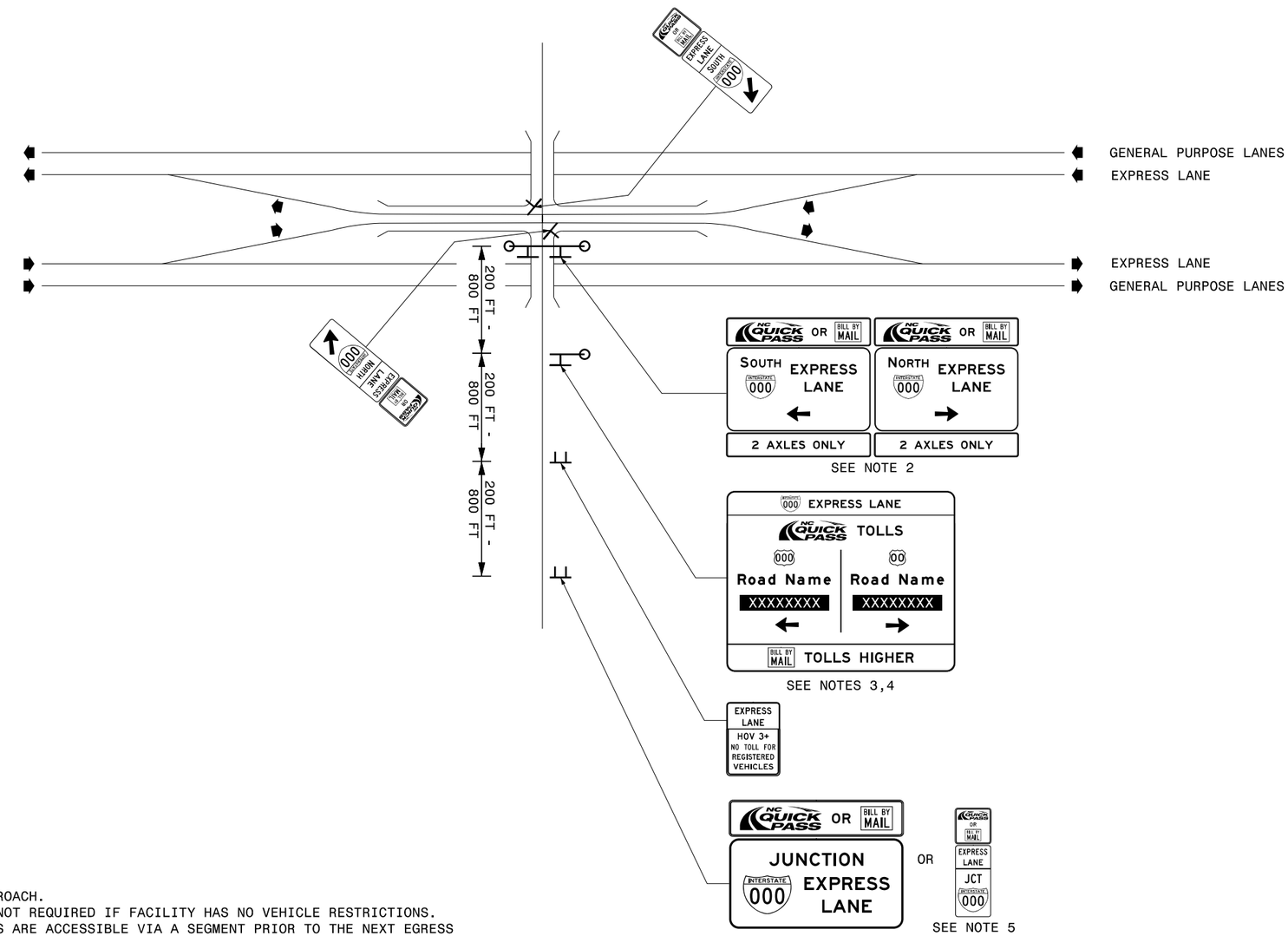
2. DISTANCES SHOWN SHALL BE TO THE DECISION POINT OF EGRESS OR EXIT FROM THE EXPRESS LANE.

ENGLISH STANDARD DRAWING FOR

EXPRESS LANE SIGNING TYPICAL LAYOUTS

DIRECT ENTRANCE



NOTES

1. GRAPHIC SHOWS ONLY ONE APPROACH.
2. VEHICLE RESTRICTION PANEL NOT REQUIRED IF FACILITY HAS NO VEHICLE RESTRICTIONS.
3. IF TWO OR MORE DESTINATIONS ARE ACCESSIBLE VIA A SEGMENT PRIOR TO THE NEXT EGRESS TO THE GENERAL PURPOSE LANES, TWO OR MORE DESTINATIONS WITH RATES SHALL BE SHOWN ON RATE SIGN. IN THIS CASE, SEPARATE RATE SIGNS FOR DIFFERENT DIRECTIONS SHALL BE USED.
4. SIGN MAY BE GROUND MOUNTED FOR SINGLE LANE APPROACH.
5. ROUTE MARKER ASSEMBLY MAY BE USED FOR A SINGLE LANE APPROACH.

2-18
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR
EXPRESS LANE SIGNING TYPICAL LAYOUTS
DIRECT ENTRANCE

SHEET 7 OF 9

2-18

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

ENGLISH STANDARD DRAWING FOR

EXPRESS LANE SIGNING TYPICAL LAYOUTS

MAINLINE END

SHEET 8 OF 9

LANE ENDS

LANE RESTRICTION ENDS

2-18

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

ENGLISH STANDARD DRAWING FOR

EXPRESS LANE SIGNING TYPICAL LAYOUTS

MAINLINE END

SHEET 8 OF 9

Date	Sheet(s)	Revisions
07/08/2016	All	Revised sheet numbering
07/08/2016	ES-1.1 thru 1.5, ES-1.7	Revised Toll Rate Sign wording from "RATE" to "TOLL"
07/08/2016	ES-1.1, ES-1.2	Added notes 3 and 4
07/08/2016	ES-1.3, ES-1.4	Moved Toll Rate Sign and Entrance Direction Sign
07/08/2016	ES-1.3	Added notes 3,4,5 and 6
07/08/2016	ES-1.3	Revised "LOCAL EXIT" Guide Signs to include multiple destinations
07/08/2016	ES-1.4	Added notes 3,4 and 5
07/08/2016	ES-1.5	Added notes 2 and 3
07/08/2016	ES-1.6	Added notes 1 and 2
07/08/2016	ES-1.7	Added option to ground mount Toll Rate Sign if approach is a single lane
07/08/2016	ES-1.7	Revised Trailblazer Assembly
07/08/2016	ES-1.7	Revised locations of signs
07/08/2016	ES-1.7	Added signs for guidance to both directions of express lanes
07/08/2016	ES-1.7	Reversed order of Toll Rate Sign and HOV 3+ Sign
07/08/2016	ES-1.7	Revised Junction Assembly
07/08/2016	R-1	Added development log sheet
08/26/2016	ES-1.1-1.6	Revised notes
02/14/2018	1-9	Revised format and revision date.
02/14/2018	1-5, 7	Revised toll rate module size and added note.

1-18
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

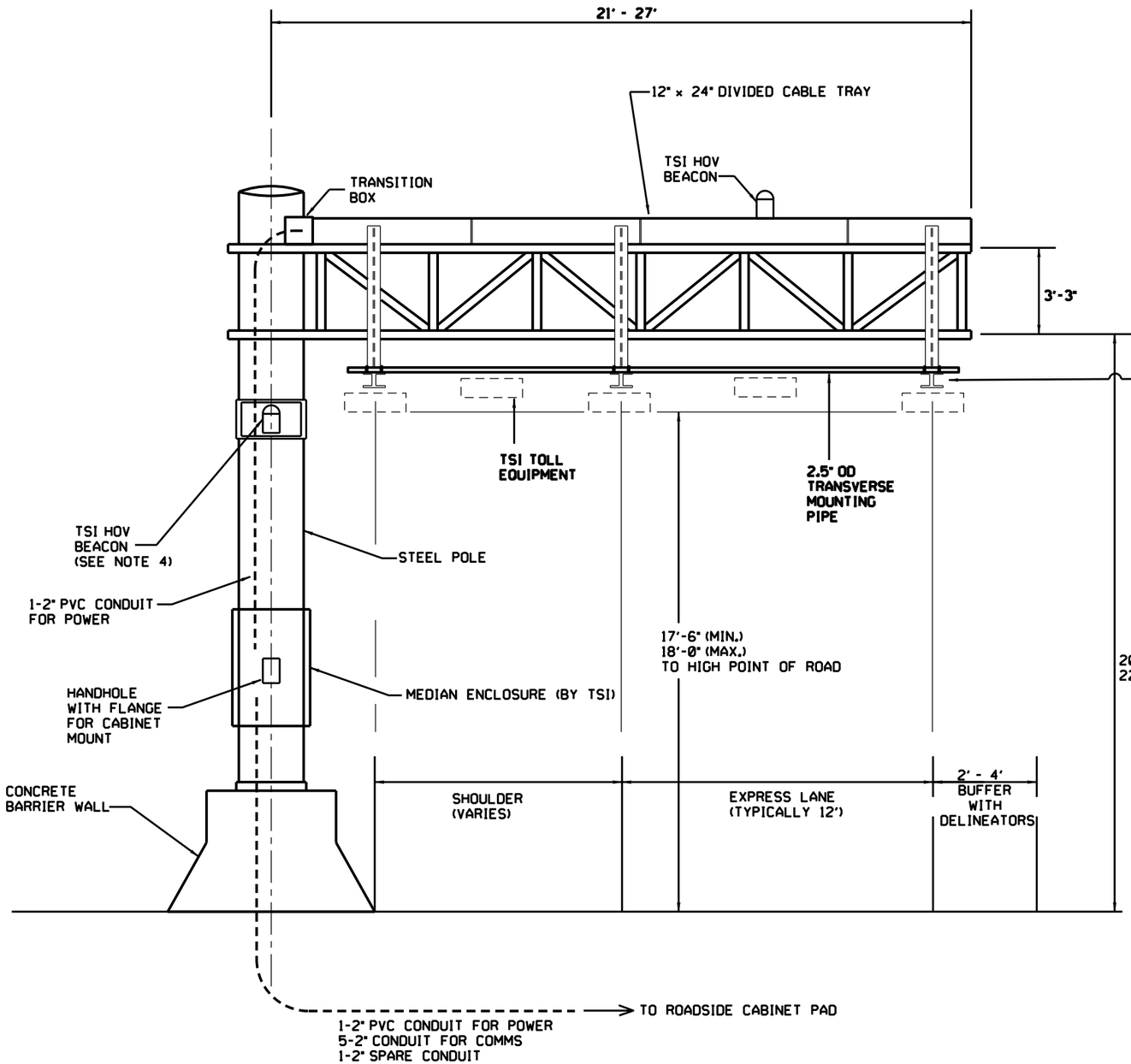
ENGLISH STANDARD DRAWING FOR
EXPRESS LANE SIGNING TYPICAL LAYOUTS
DEVELOPMENT LOG

SHEET 9 OF 9

Appendix F

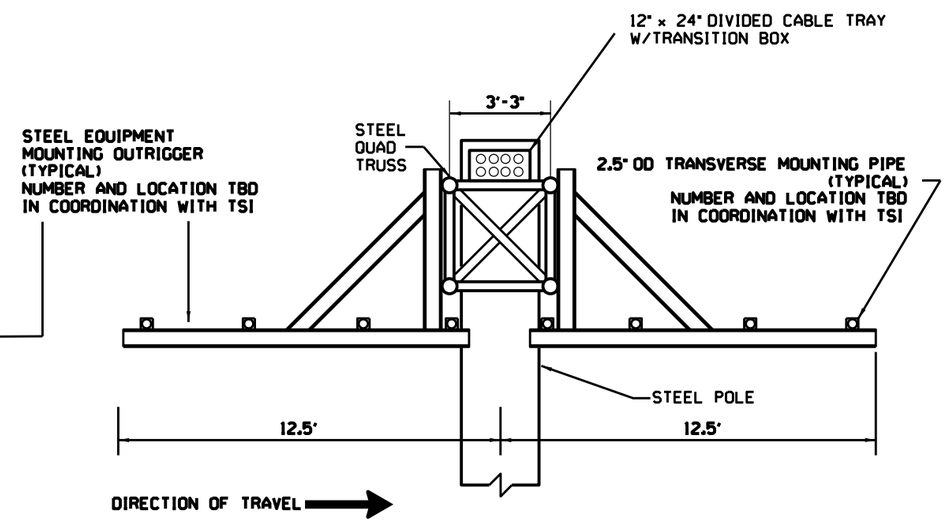
NCTA Standard Express Lane Drawings

NORTH CAROLINA
Turnpike Authority



SIDE VIEW

Not to Scale



NOTES:

1. EQUIPMENT MOUNTING BRACKET AND ASSEMBLY SHALL BE FABRICATED WITH SUITABLE CORROSION RESISTANT COMPONENTS.
2. COMPLETE ASSEMBLY SHALL BE DESIGNED FOR EQUIPMENT AND WIND LOADS AND SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN NORTH CAROLINA.
3. THIS IS A TYPICAL EXPRESS LANE SITE. WIDTH OF MEDIAN, MEDIAN SHOULDER AND BUFFER MAY VARY. MEDIAN TREATMENT MAY BE DIFFERENT.
4. CABLE EGRESS TO BE PROVIDED AT TSI BEACON LOCATION ON THE GANTRY COLUMN. SIZE, LOCATION, AND TYPE OF EGRESS TO BE COORDINATED WITH THE TSI.

DELINEATORS EXAMPLE

INTERSTATE 485
I-485 EXPRESS LANES
MECKLENBURG COUNTY

ATKINS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

NORTH CAROLINA TURNPIKE AUTHORITY
I-485 EXPRESS LANES
TOLL SITE CROSS SECTION

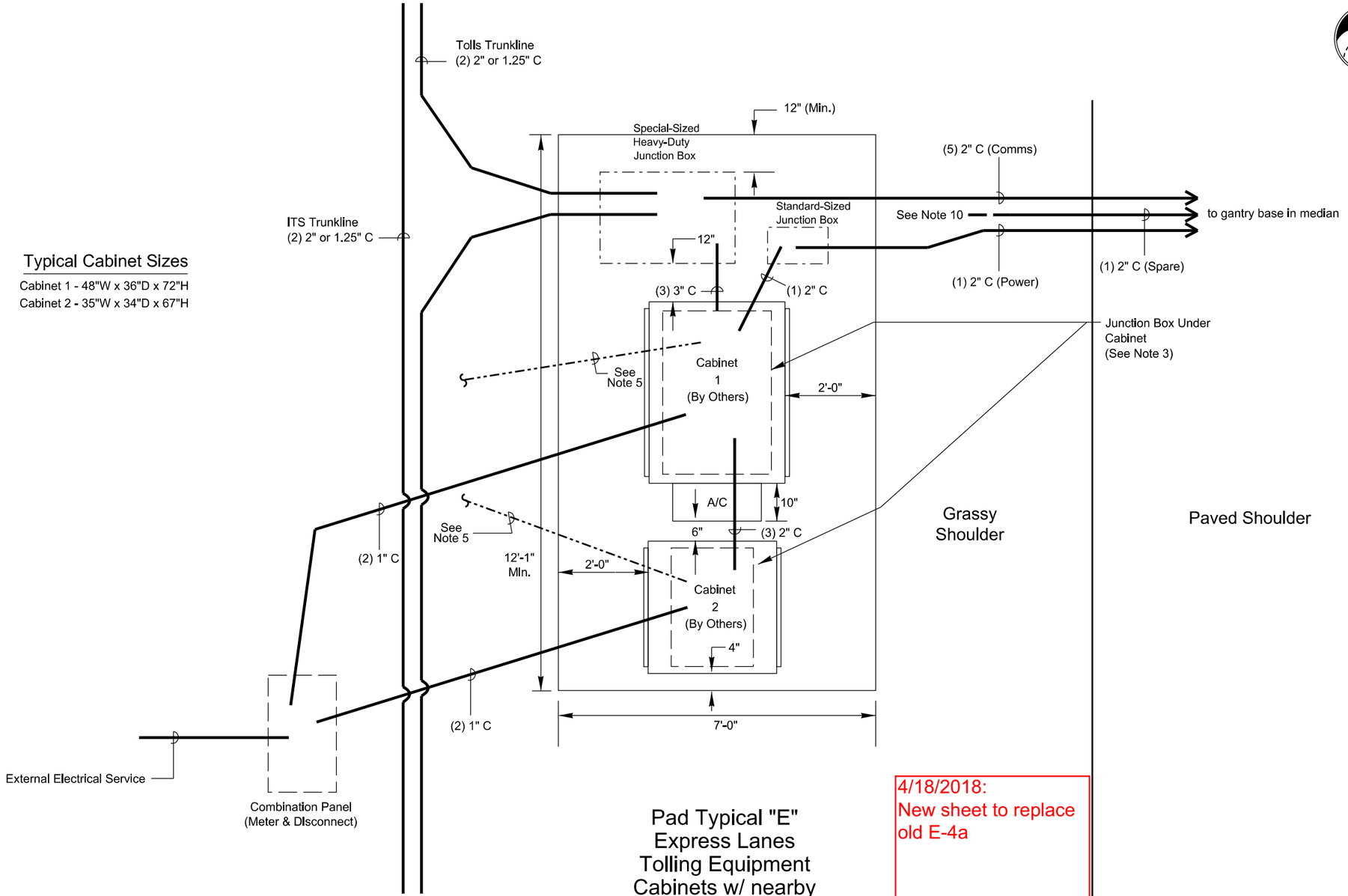
SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.
DATE: APRIL 2018		A-5

$DATE$ $TIME$ $FILE$

NORTH CAROLINA
Turnpike Authority

Typical Cabinet Sizes

Cabinet 1 - 48"W x 36"D x 72"H
Cabinet 2 - 35"W x 34"D x 67"H



Pad Typical "E"
Express Lanes
Tolling Equipment
Cabinets w/ nearby
Power Panel

N.T.S.

4/18/2018:
New sheet to replace
old E-4a

1. Provide detailed conduit stub-up and interconnect diagrams. Coordinate conduit layout with Toll System Integrator.
2. Size junction boxes as needed to fit conduit needs and cabinet sizes.
3. Coordinate pad conduit entry points with Toll System Integrator to provide proper location of stub-ups.
4. All cabinet sizes/dimensions are best information available and are subject to change.
5. Provide box drain for all boxes below equipment cabinets.
6. Pad shall be 8" thick (4" above and below finished grade).
7. Provide 3/4" chamfered edge on equipment pads.
8. Provide wire and conduit to ground cabinets.
9. TSI provides conductors from combination panel to cabinets.
10. Route this conduit to either the power box or the comms box, after consultation with the TSI.

ATKINS 1616 EAST MILLBROOK ROAD, SUITE 310
RALEIGH, NORTH CAROLINA 27609
(919) 876-6888 NCBEES #F-0326

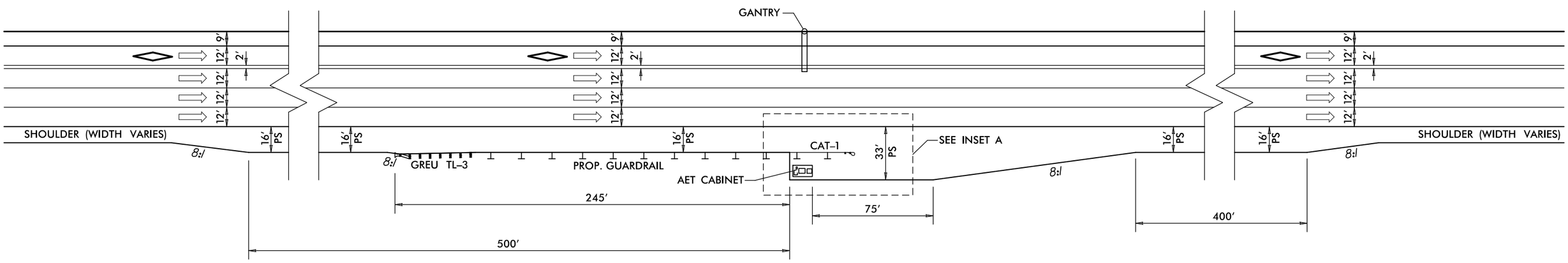
NORTH CAROLINA TURNPIKE AUTHORITY
AET STANDARD DRAWINGS

Express Lanes Toll Zone Cabinets with Concrete Pads

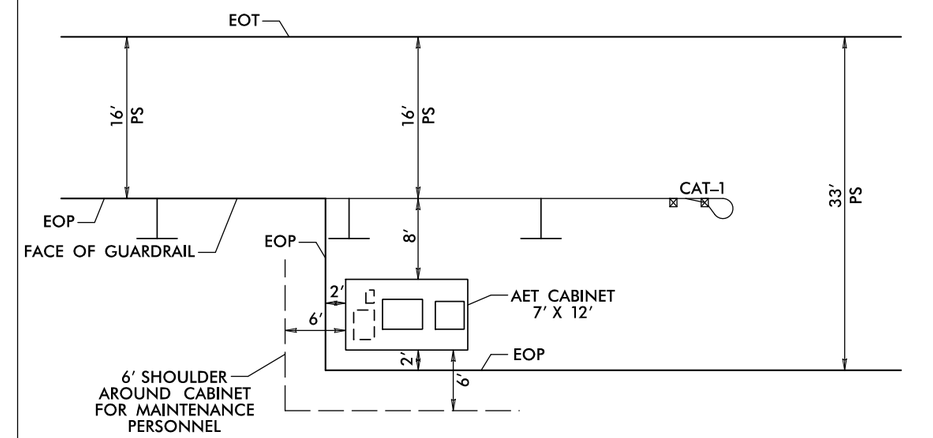
SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.
Rev. Mar 2016		E-4a

Appendix G

AET Pull Off Areas Standard Detail



INSET A



ACCESS DETAIL FOR AET FACILITY

Appendix H

ITS Final Early Works Plan

CONTRACT: C203970 T.I.P.: I-5507/R-0211EC/U-4714AB

PROJECT REFERENCE NO.	SHEET NO.
I-5507/R-0211EC/U4714AB	IT-01

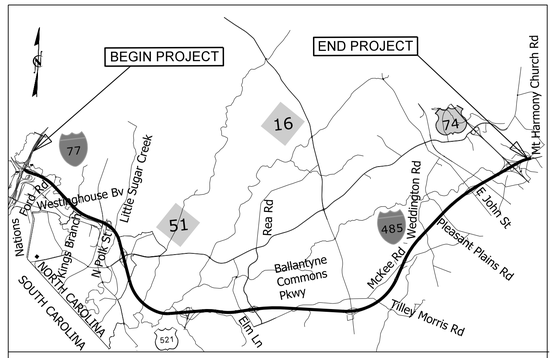
APPROVED: _____

DATE: _____

SEAL

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

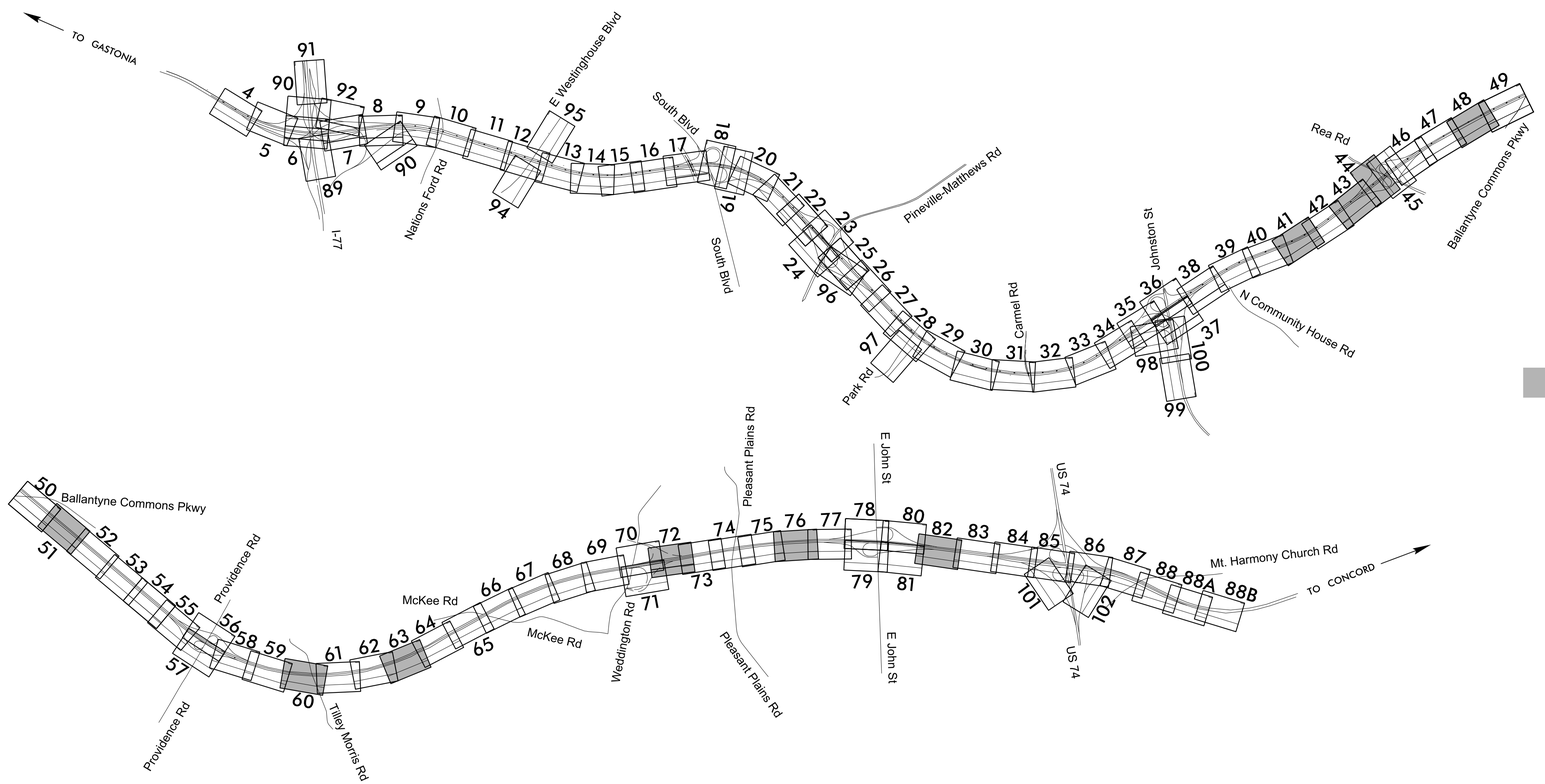


VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

MECKLENBURG COUNTY ITS PLAN

LOCATION: I–485 FROM I–77 TO US 74 (INDEPENDENCE BOULEVARD); I–485 / WEDDINGTON ROAD INTERCHANGE; AND I–485 / EAST JOHN STREET – OLD MONROE ROAD INTERCHANGE



NAD 83/2011

INDICATES AREA WITH EARLY WORKS

DESIGN-BUILD TEAM

Plans Prepared By:

DRMP
DRMP, Inc.
8000 Regency Parkway, Suite 110
Cary, NC 27518
NC License No. C-2213 (919) 650-1038

WSP

2018 STANDARD SPECIFICATIONS

NCDOT Contact: Andrew Skuce
PROJECT ENGINEER

NCTA Contact: Rachel Ruiz
PROJECT DESIGN ENGINEER

CONTRACTOR :

BLYTHE

FINAL
EARLY WORKS
ITS PLANS

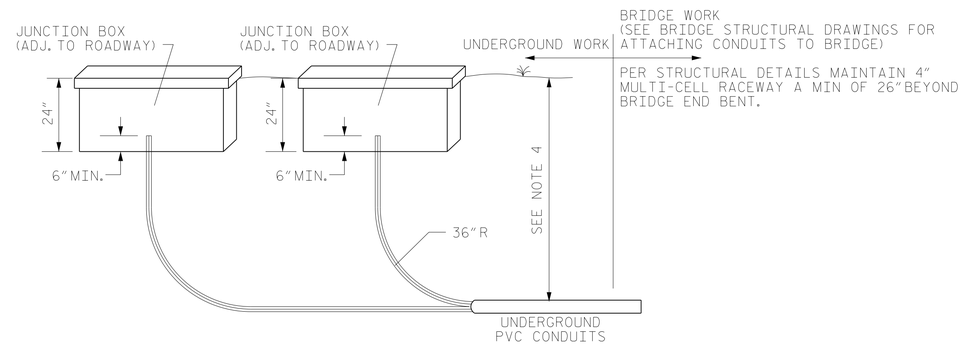
SUBMITTED 08–26–2019

SUBMITTAL # B–072

PROJECT REFERENCE NO.	SHEET NO.
I-5507/R-0211EC/U4714AB	SD-1

BRIDGE-MOUNTED CONDUIT NOTES

1. CONDUIT SHALL BE INSTALLED UNDERGROUND FROM OVERSIZED JUNCTION BOXES LOCATED ADJACENT TO ROADWAY, UP TO AND THRU THE BRIDGE END WALL TO BRIDGE MOUNTED ATTACHMENT.
2. UNDERGROUND PVC CONDUITS SHALL BE 4 - 1¼" PVC CONDUIT.
3. CONDUIT ROUTING SHALL MAINTAIN NO MORE THAN 180 DEGREES OF BENDS BETWEEN PULL POINTS FOR ANY RUN.
4. CONDUIT INSTALLATION SHALL CONFORM TO THE MINIMUM CLEARANCE REQUIREMENTS AS STATED IN SECTION 1715 - UNDERGROUND CONDUITS.



OUTER DUCT CAN BE ENDED AT ANT POINT AFTER MIN. 26' FROM END BENT AT DESCRETION OF CONTRACTOR.

SECTION AT JUNCTION BOX/BRIDGE BOX
(TYPICAL FOR CONFIGURATION AT BEGIN/END OF BRIDGE)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Plans Prepared By:

DRMP

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Prepared for the Offices of:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Intelligent Transportation Systems Section

750 N. Greenfield Pkwy., Garner, NC 27529

I-485 ITS

TYPICAL CONFIGURATION AT BEGIN/END OF BRIDGE

Division 10 Mecklenburg County Charlotte

PLAN DATE:	Sept 2019	REVIEWED BY:	LM Moon
PREPARED BY:	DJ White	REVIEWED BY:	N DeVito

SCALE	REVISIONS	INIT.	DATE
N.T.S.			

SEAL

PRELIMINARY PLANS
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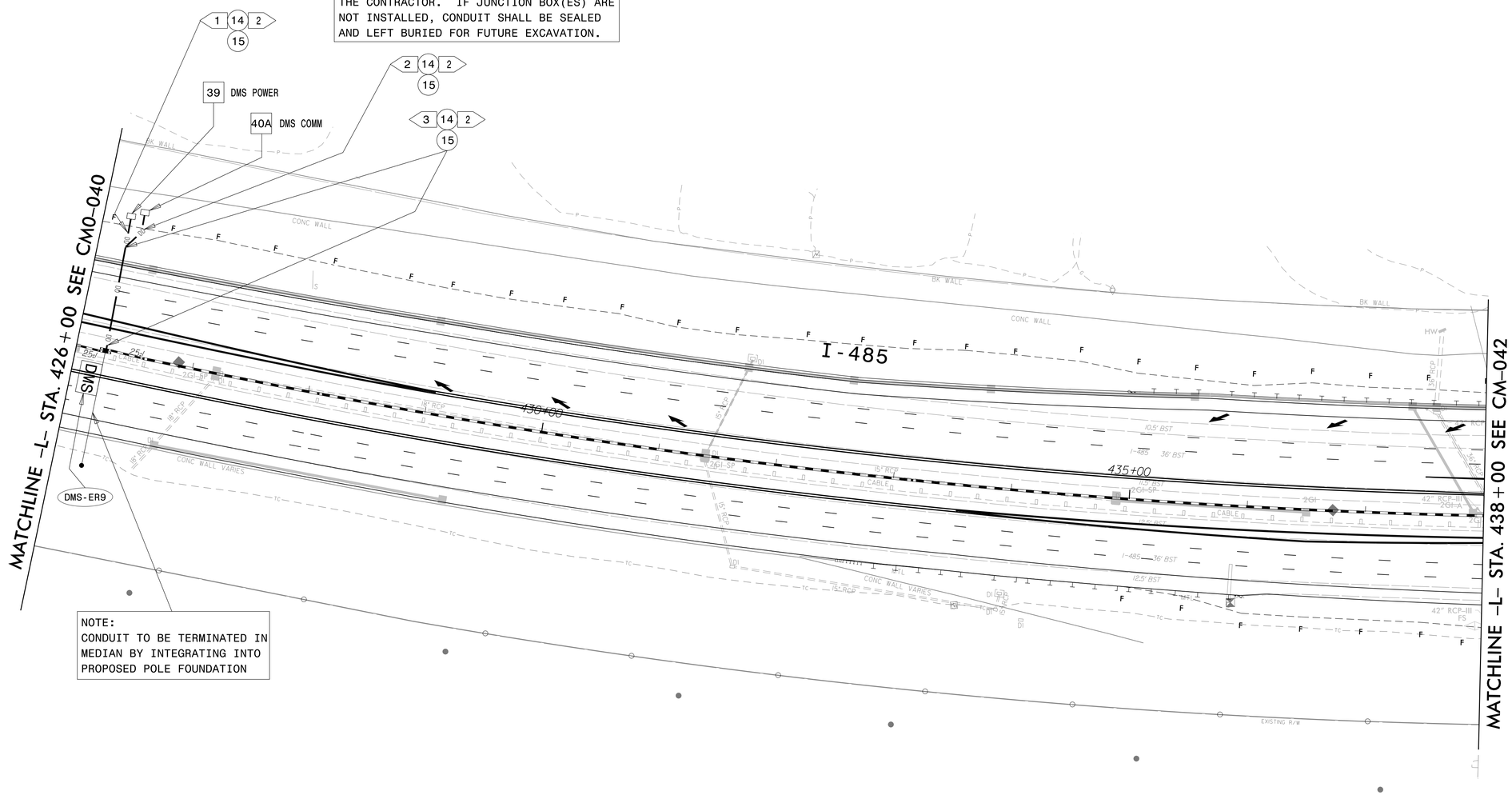
PROJECT REFERENCE NO.	SHEET NO.
I-5507/R-0211EC/U4714AB	CM-041

NOTE:
DUE TO ON-GOING CONSTRUCTION, JUNCTION BOX(ES) INSTALLED AT THE DISCRETION OF THE CONTRACTOR. IF JUNCTION BOX(ES) ARE NOT INSTALLED, CONDUIT SHALL BE SEALED AND LEFT BURIED FOR FUTURE EXCAVATION.



NOTES:
1. SEAL ALL CONDUIT ENDS WITH DUCT AND CONDUIT SEALER, AT ALL JUNCTION BOX/CABINET ENTRANCES.
2. WHEN A JUNCTION BOX IS USED TO CHANGE INSTALLATION METHOD ONLY, THE JUNCTION BOX CAN BE ELIMINATED WITH THE APPROVAL OF THE ENGINEER.

1	INSTALL ELECTRICAL SERVICE WIRE (BY TYPE)	15	DIRECTIONAL DRILL CONDUIT	31A	INSTALL INDUSTRIAL GRADE UPS WITH DMS CABINET	38A	INSTALL CCTV METAL POLE AND FOUNDATION	52A	INSTALL DELINEATOR MARKER
2	INSTALL COMPOSITE CABLE	16	BORE AND JACK CONDUIT	31B	INSTALL CCTV CABINET	38B	INSTALL MVDS METAL POLE AND FOUNDATION	52B	INSTALL JUNCTION BOX MARKER
2A	INSTALL SPECIAL COMPOSITE CABLE	17	INSTALL CABLE(S) IN EXISTING CONDUIT	31C	INSTALL WRONG WAY DETECTION SYSTEM CABINET	39	INSTALL STANDARD JUNCTION BOX	53A	STORE 50 FEET OF EACH COMMUNICATIONS CABLE
2B	INSTALL WRONG WAY SIGN AND DETECTION CABLES	18	INSTALL CABLE(S) IN NEW CONDUIT	31D	INSTALL MVDS CABINET	40A	INSTALL OVERSIZED JUNCTION BOX (30" x 15" x 24")	53B	STORE 100 FEET OF EACH COMMUNICATIONS CABLE
3	INSTALL ETHERNET CABLE	19	INSTALL CABLE(S) IN EXISTING RISER	31E	INSTALL POLE MOUNTED MVDS SLAVE CABINET	40B	INSTALL SPECIAL-SIZED JUNCTION BOX (36" x 24" x 24")	54	INSTALL TRAFFIC BEARING JUNCTION BOX
4	INSTALL SMFO CABLE	20	INSTALL CABLE(S) IN NEW RISER	32A	INSTALL BASE MOUNTED HUB CABINET	41	REMOVE EXISTING JUNCTION BOX	55	LASH CABLE(S) TO EXISTING MESSENGER CABLE
5	INSTALL DMS COMM AND POWER	21	INSTALL CABLE(S) IN EXISTING CONDUIT STUBOUTS	32B	MODIFY EXISTING HUB CABINET/BUILDING	42	INSTALL WOOD POLE	56	LASH CABLE(S) TO NEW MESSENGER CABLE
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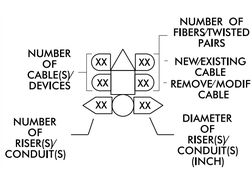

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Intermodal Transportation Systems Section
759 N. Greenfield Pkwy., Garner, NC 27529

I-485 ITS
Cable Routing Plans

Division 10 Mecklenburg County Charlotte

PLAN DATE:	Sept 2019	REVIEWED BY:	LM Moon
PREPARED BY:	DJ White	REVIEWED BY:	N DeVito

REVISIONS	INIT.	DATE

SCALE 0 50 1" = 50'

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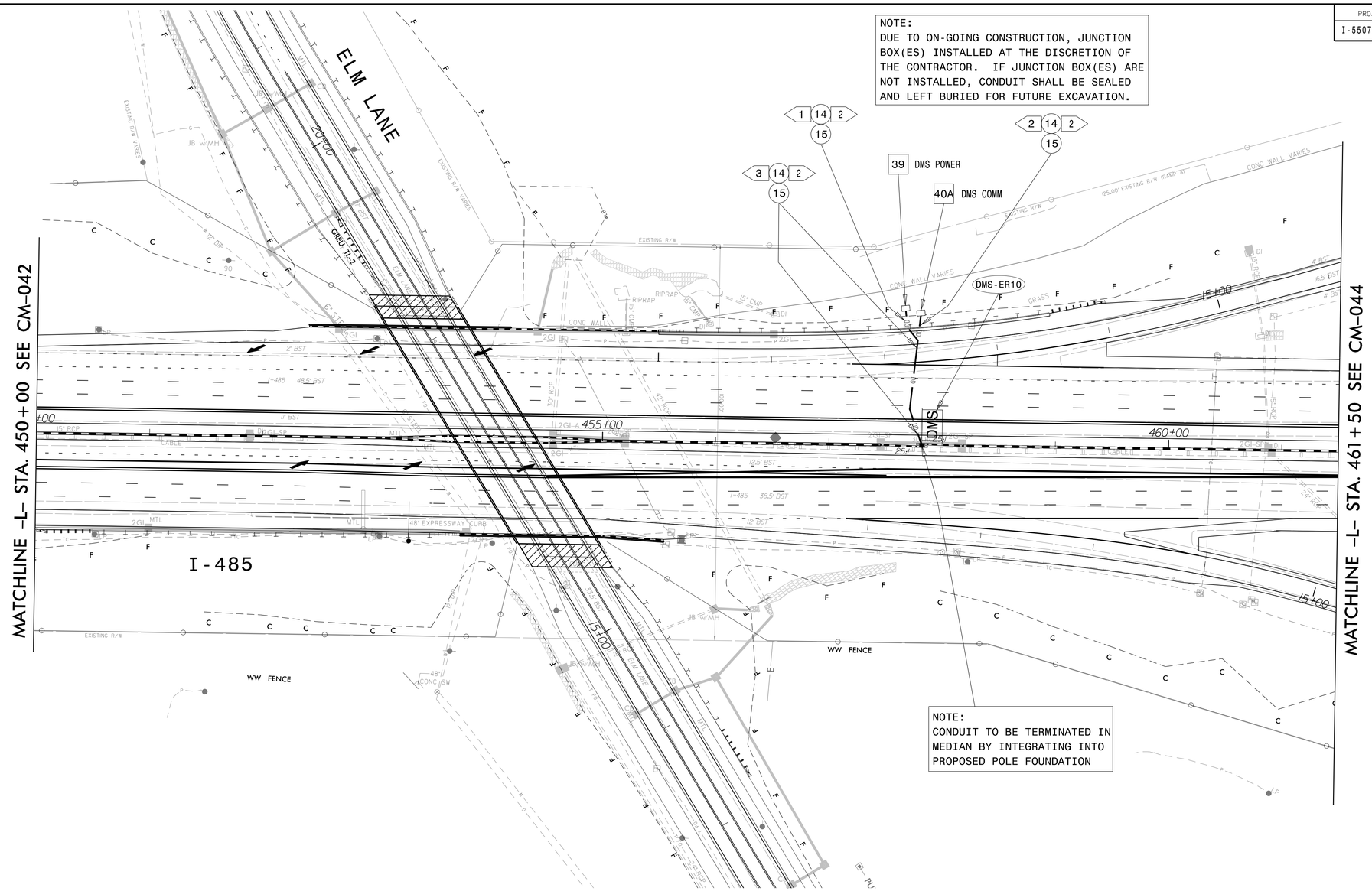
PROJECT REFERENCE NO.	SHEET NO.
I-5507/R-0211EC/U4714AB	CM-043



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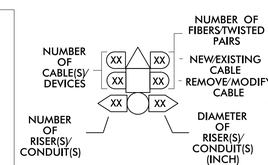

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Intelligent Transportation Systems Section
750 N. Greenfield Pkwy., Garner, NC 27529

I-485 ITS Cable Routing Plans

Division 10 Mecklenburg County Charlotte

PLAN DATE:	Sept 2019	REVIEWED BY:	LM Moon
PREPARED BY:	DJ White	REVIEWED BY:	N DeVito

REVISIONS	INIT.	DATE

SCALE 0 50 1" = 50'

SEAL
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DATE

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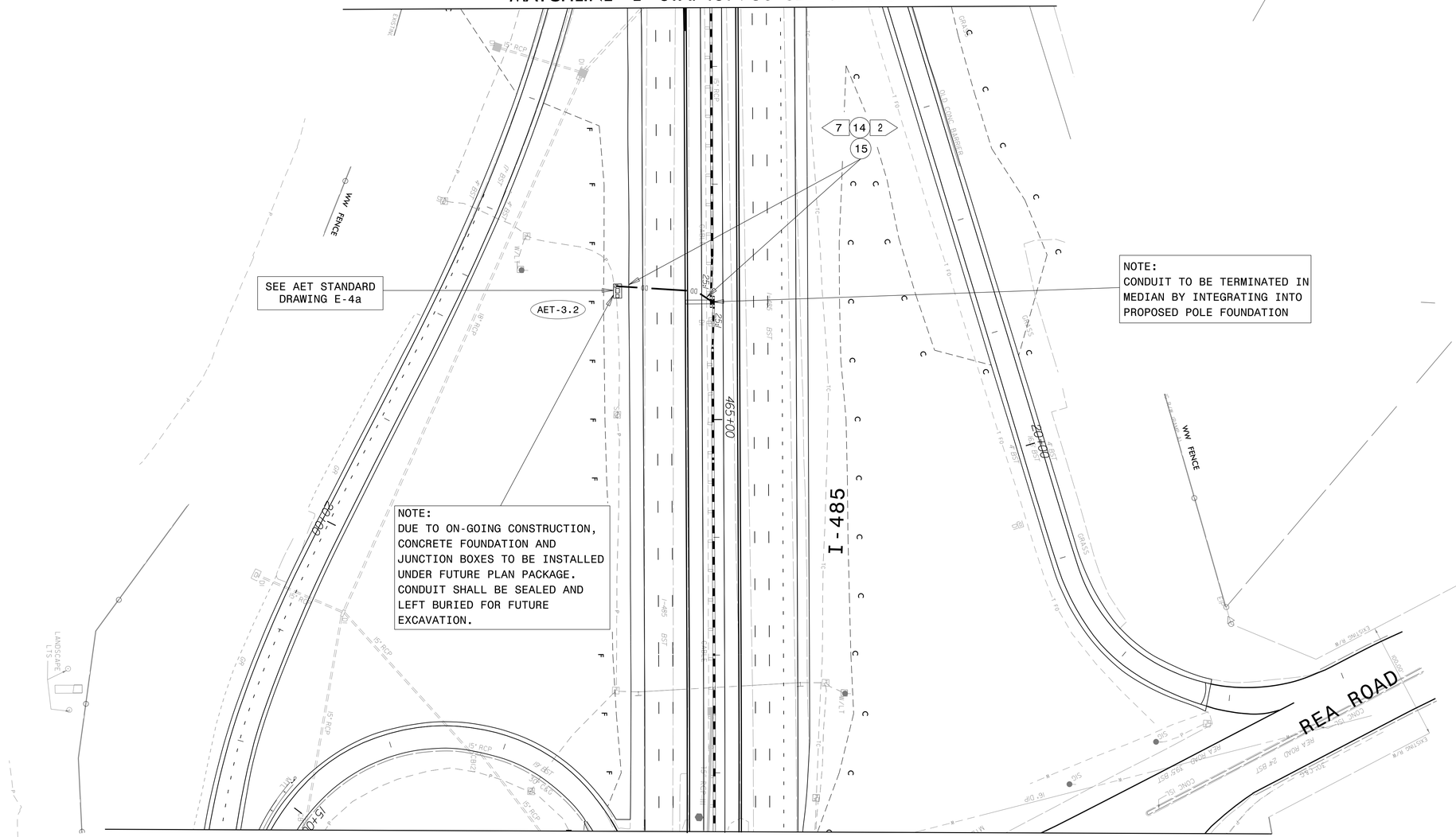
PROJECT REFERENCE NO.	SHEET NO.
I-5507/R-0211EC/U4714AB	CM-044

MATCHLINE –L– STA. 461+50 SEE CM–043



MATCHLINE –L– STA. 468+50 SEE CM–045

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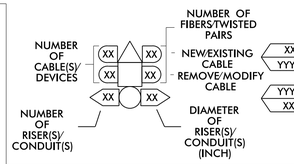

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Transportation Mobility and Safety Division
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I-485 ITS
Cable Routing Plans

Division 10 Mecklenburg County Charlotte

PLAN DATE:	Sept 2019	REVIEWED BY:	LM Moon
PREPARED BY:	DJ White	REVIEWED BY:	N DeVito

SCALE 0 50 1" = 50'

REVISIONS	INIT.	DATE

SEAL

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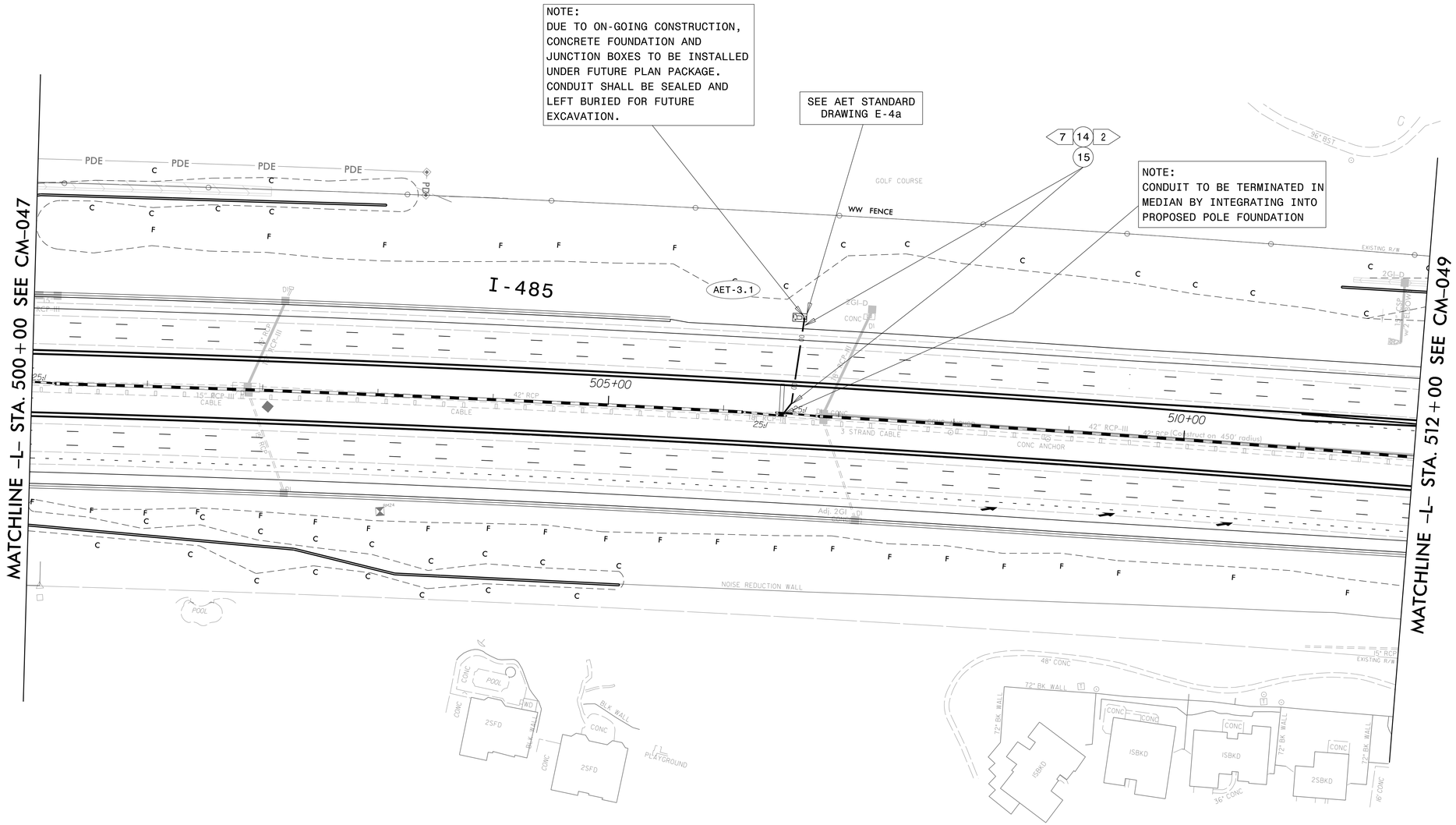
PROJECT REFERENCE NO.	SHEET NO.
I-5507/R-0211EC/U4714AB	CM-048



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NUMBER OF CABLE(S)/ DEVICES
NEW/EXISTING CABLE
REMOVE/MODIFY CABLE
NUMBER OF RISER(S)/ CONDUIT(S)
DIAMETER OF RISER(S)/ CONDUIT(S) (INCH)
ATTACHMENT POINT
XX" YYYY — DISTANCE ABOVE (IN) REFERENCE POINT
YYYY XX" — REFERENCE POINT DISTANCE BELOW (IN)

Plans Prepared By:
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Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Intelligent Transportation Systems Section
750 N. Greenfield Pkwy., Garner, NC 27529

I-485 ITS Cable Routing Plans

Division 10 Mecklenburg County Charlotte

PLAN DATE:	Sept 2019	REVIEWED BY:	LM Moon
PREPARED BY:	DJ White	REVIEWED BY:	N DeVito

SCALE 0 50 1" = 50'

REVISIONS	INIT.	DATE

SEAL
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
DATE
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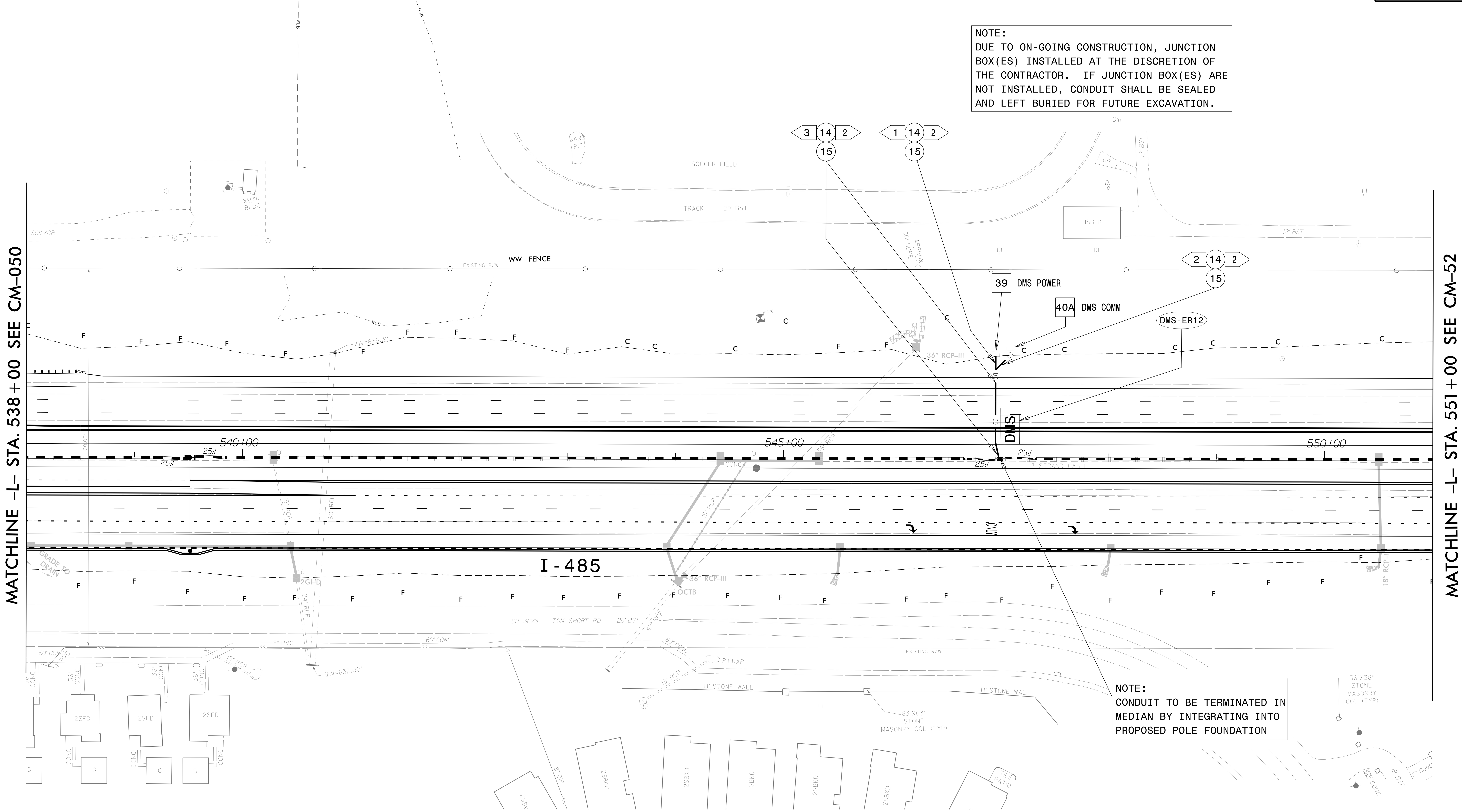
PROJECT REFERENCE NO.	SHEET NO.
I-5507/R-0211EC/U4714AB	CM-051



NOTES:
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- 1 INSTALL ELECTRICAL SERVICE WIRE (BY TYPE)
- 2 INSTALL COMPOSITE CABLE
- 2A INSTALL SPECIAL COMPOSITE CABLE
- 2B INSTALL WRONG WAY SIGN AND DETECTION CABLES
- 3 INSTALL ETHERNET CABLE
- 4 INSTALL SMFO CABLE
- 5 INSTALL DMS COMM AND POWER
- 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 FIBER OPTIC CABLE SEAL
- 14 INSTALL POLYETHYLENE CONDUIT
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- 16 BORE AND JACK CONDUIT
- 17 INSTALL CABLE(S) IN EXISTING CONDUIT
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- 24 INSTALL NEW CONDUIT INTO POLE MOUNTED CABINET
- 25 INSTALL NEW RISER INTO POLE MOUNTED CABINET
- 26 MODIFY EXISTING INTERCONNECT CENTER /SPLICE ENCLOSURE
- 27 INSTALL NCDOT PROVIDED FIBER OPTIC EDGE SWITCH
- 28 INSTALL & INTEGRATE PRETERMINATED PATCH PANEL AND JUMPERS IN CABINET
- 29 INSTALL UNDERGROUND SPLICE ENCLOSURE
- 30 INSTALL AERIAL SPLICE ENCLOSURE
- 31A INSTALL INDUSTRIAL GRADE UPS WITH DMS CABINET
- 31B INSTALL CCTV CABINET
- 31C INSTALL WRONG WAY DETECTION SYSTEM CABINET
- 31D INSTALL MVDS CABINET
- 31E INSTALL POLE MOUNTED MVDS SLAVE CABINET
- 32A INSTALL BASE MOUNTED HUB CABINET
- 32B MODIFY EXISTING HUB CABINET/BUILDING
- 33A REMOVE EXISTING CABINET
- 33B REMOVE EXISTING CABINET AND FOUNDATION
- 34A INSTALL CABINET FOUNDATION
- 34B INSTALL TECHNICIAN PAD
- 35A INSTALL TYPE A DMS
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- 36A INSTALL CCTV CAMERA ASSEMBLY
- 36B INSTALL MICROWAVE VEHICLE DETECTION SYSTEM
- 37 INSTALL CCTV METAL POLE AND FOUNDATION WITH LOWERING DEVICE
- 38A INSTALL CCTV METAL POLE AND FOUNDATION
- 38B INSTALL MVDS METAL POLE AND FOUNDATION
- 39 INSTALL STANDARD JUNCTION BOX
- 40A INSTALL OVERSIZED JUNCTION BOX (30" x 15" x 24")
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- 43 REMOVE EXISTING WOOD POLE
- 44 INSTALL AERIAL GUY ASSEMBLY
- 45 INSTALL STANDARD GUY ASSEMBLY
- 46 INSTALL SIDEWALK GUY ASSEMBLY
- 47 INSTALL MESSENGER CABLE
- 48 REMOVE EXISTING COMMUNICATIONS CABLE
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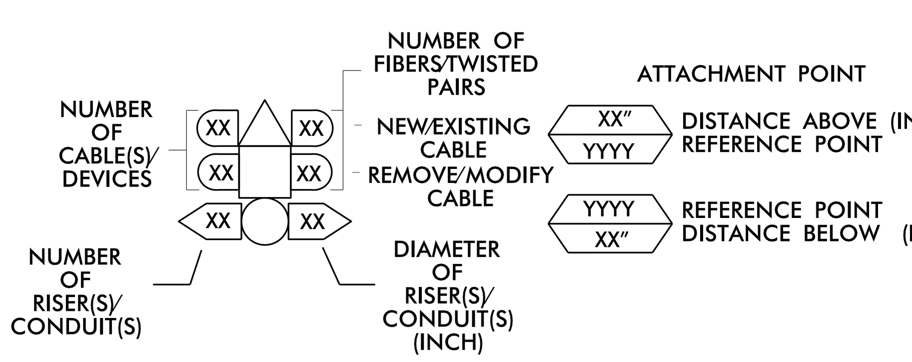
- 56 LASH CABLE(S) TO NEW MESSENGER CABLE
- 57 MODIFY EXISTING ELECTRICAL SERVICE
- 58A INSTALL NEW ELECTRICAL SERVICE (METER AND DISCONNECT)
- 58B INSTALL NEW DISCONNECT
- 59 INSTALL UPS IN CABINET
- 60 BOND TRACER WIRE TO EQUIPMENT GROUND BUS
- 61 DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS
- 62 REMOVE EXISTING MVDS ASSEMBLY
- 63 INSTALL TYPE III PEDESTAL POLE WITH FOUNDATION
- 64 INSTALL WRONG WAY DETECTION SIGN AND ASSEMBLY



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I-485 ITS
Cable Routing Plans

Division 10 Mecklenburg County Charlotte

PLAN DATE:	Sept 2019	REVIEWED BY:	LM Moon
PREPARED BY:	DJ White	REVIEWED BY:	N DeVito

SCALE 0 50 1" = 50'

REVISIONS	INIT.	DATE

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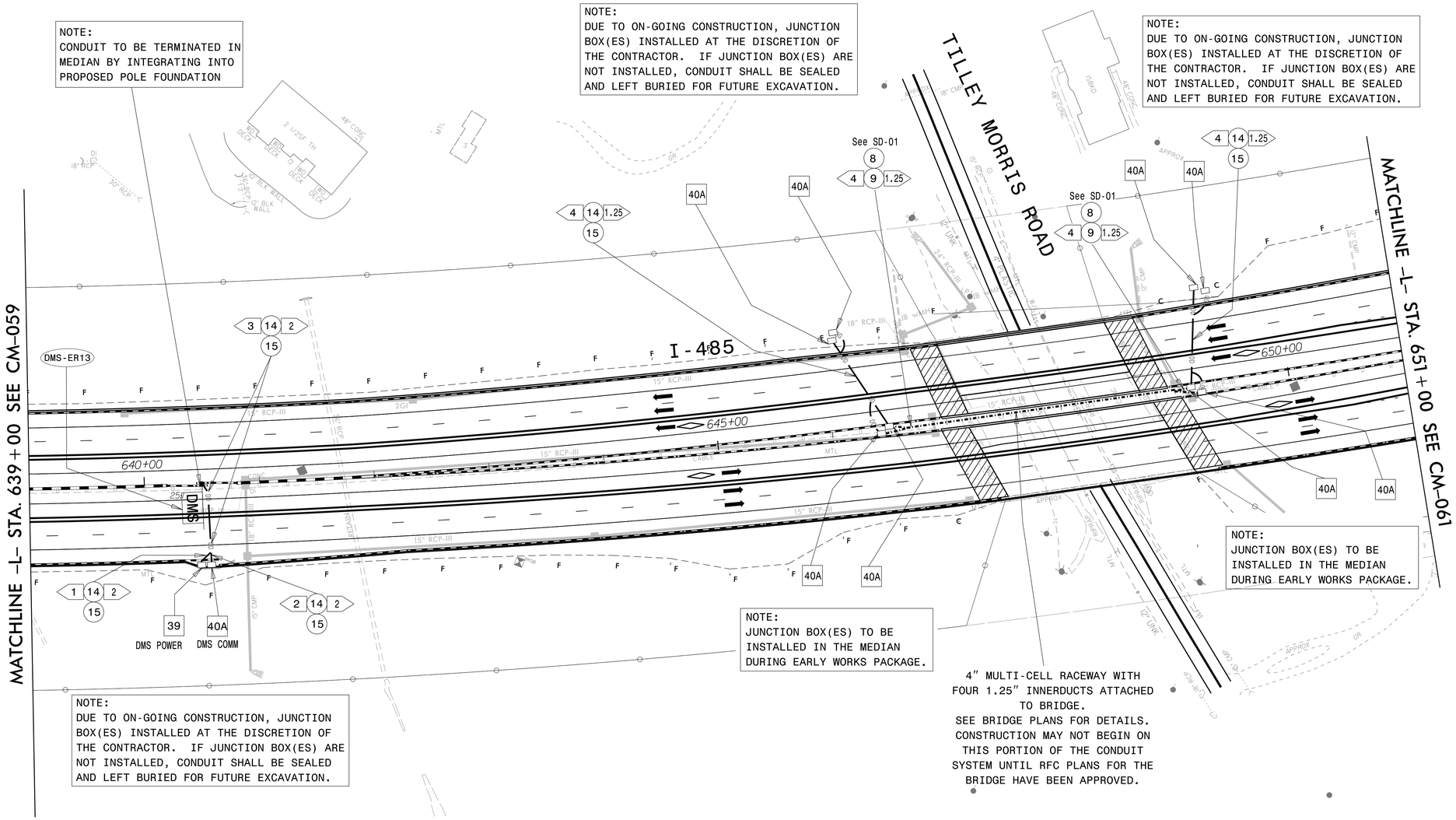
PROJECT REFERENCE NO.	SHEET NO.
I-5507/R-0211EC/U4714AB	CM-060



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3	INSTALL ETHERNET CABLE	19	INSTALL CABLE(S) IN EXISTING RISER	31E	INSTALL POLE MOUNTED MVDS SLAVE CABINET	40B	INSTALL SPECIAL-SIZED JUNCTION BOX (36" x 24" x 24")
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6	INSTALL FIBER OPTIC DROP CABLE	22	INSTALL NEW CONDUIT INTO CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)	33A	REMOVE EXISTING CABINET	43	REMOVE EXISTING WOOD POLE
7	INSTALL TRACER WIRE	23	INSTALL NEW RISER INTO CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)	33B	REMOVE EXISTING CABINET AND FOUNDATION	44	INSTALL AERIAL GUY ASSEMBLY
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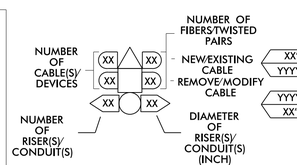

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I-485 ITS Cable Routing Plans

Division 10 Mecklenburg County Charlotte

PLAN DATE:	Sept 2019	REVIEWED BY:	LM Moon
PREPARED BY:	DJ White	REVIEWED BY:	N DeVito

SCALE 0 50 1" = 50'

REVISIONS	INIT.	DATE

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PROJECT REFERENCE NO.	SHEET NO.
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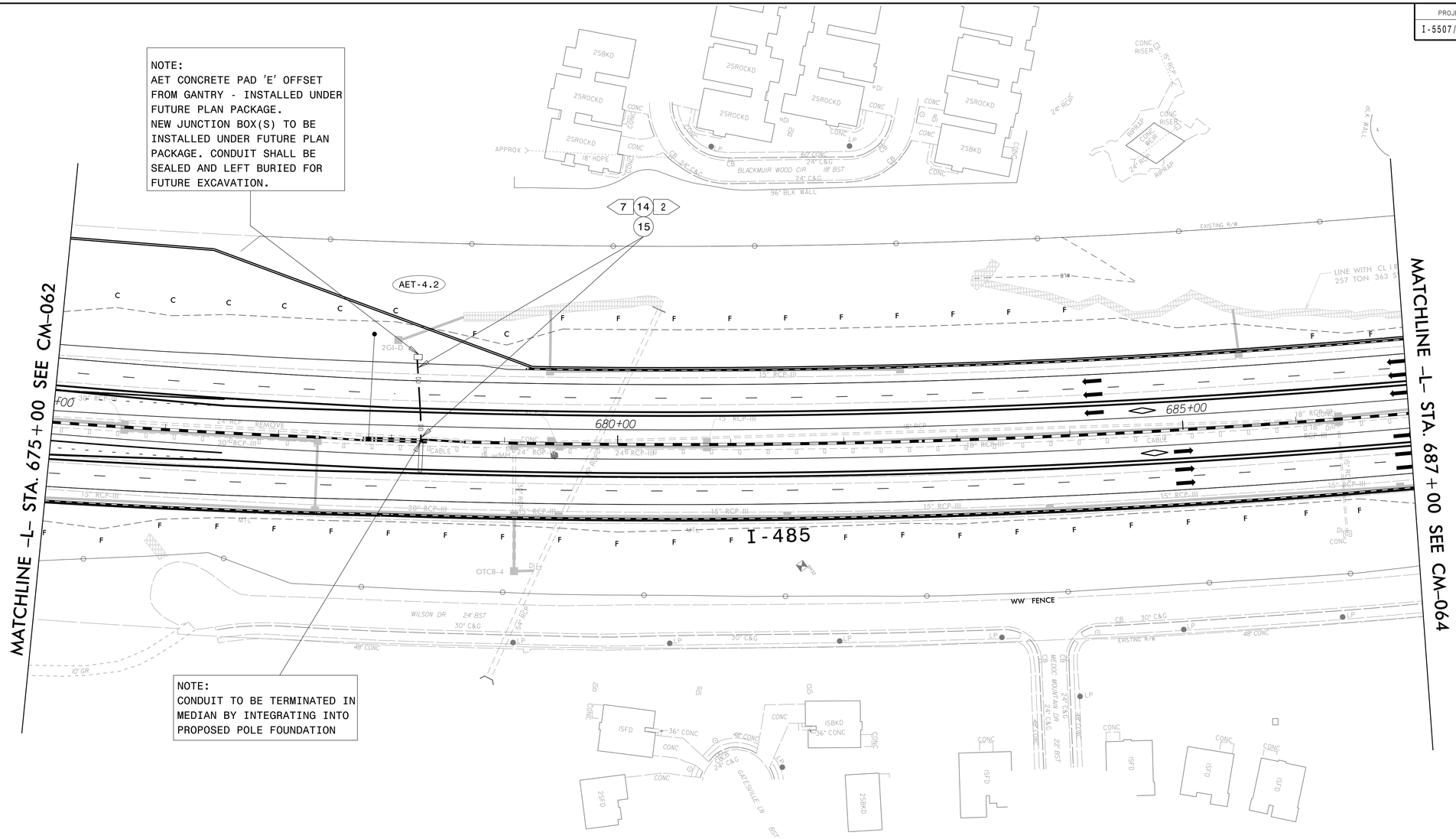

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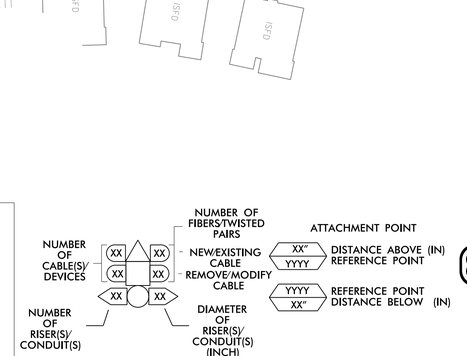

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Division 10 Mecklenburg County Charlotte

PLAN DATE:	Sept 2019	REVIEWED BY:	LM Moon
PREPARED BY:	DJ White	REVIEWED BY:	N DeVito

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1" = 50'

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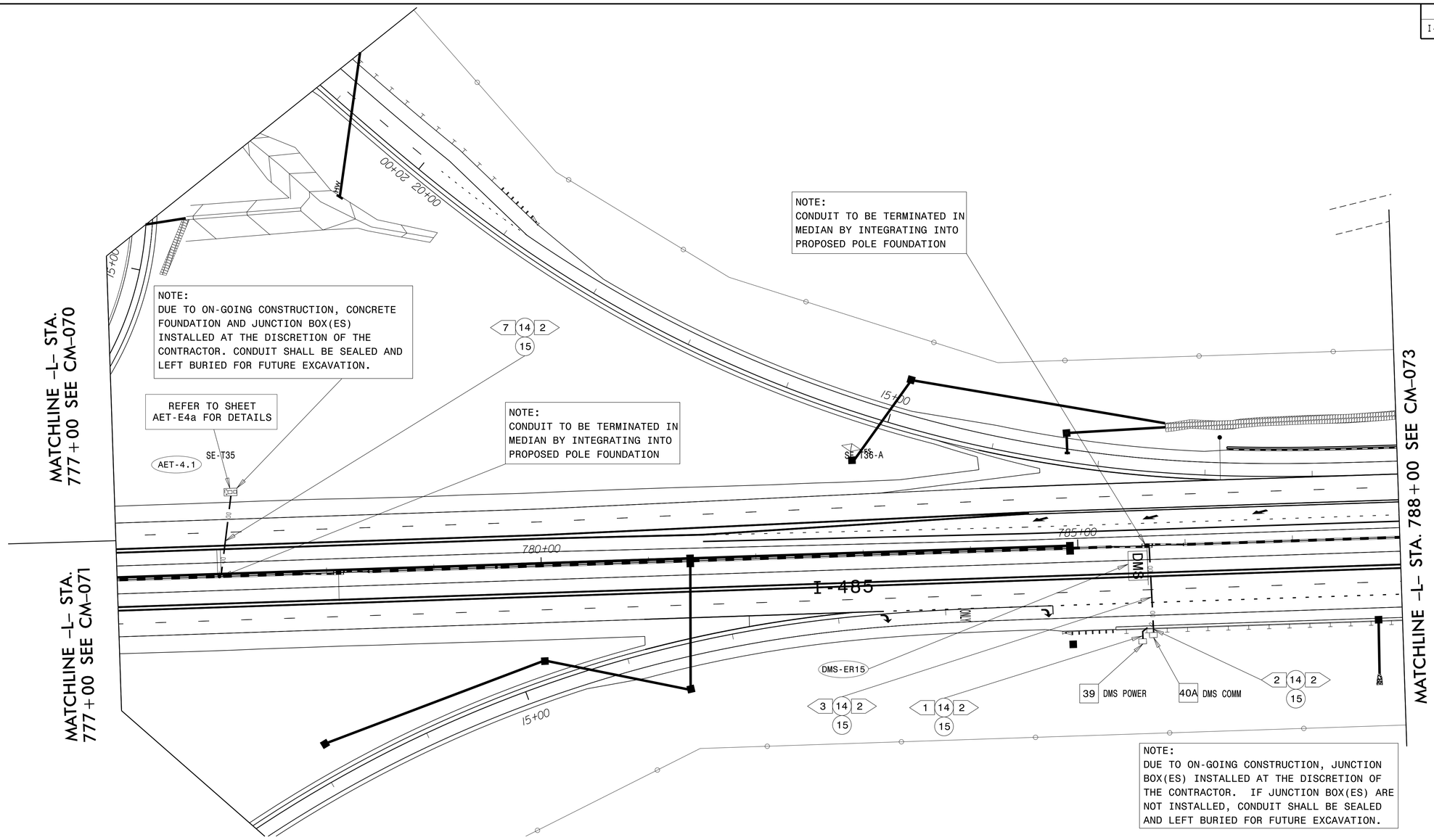
I-5507/R-0211EC/U4714AB	CM-072



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Plans Prepared By:

wsp | BLYTHE

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I-485 ITS Cable Routing Plans

Division 10 Mecklenburg County Charlotte

PLAN DATE:	August 2019	REVIEWED BY:	D Johnson
PREPARED BY:	R Dahiya	REVIEWED BY:	

SCALE 0 50 1" = 50'

REVISIONS	INIT.	DATE

SEAL

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DATE

CADD Filename:

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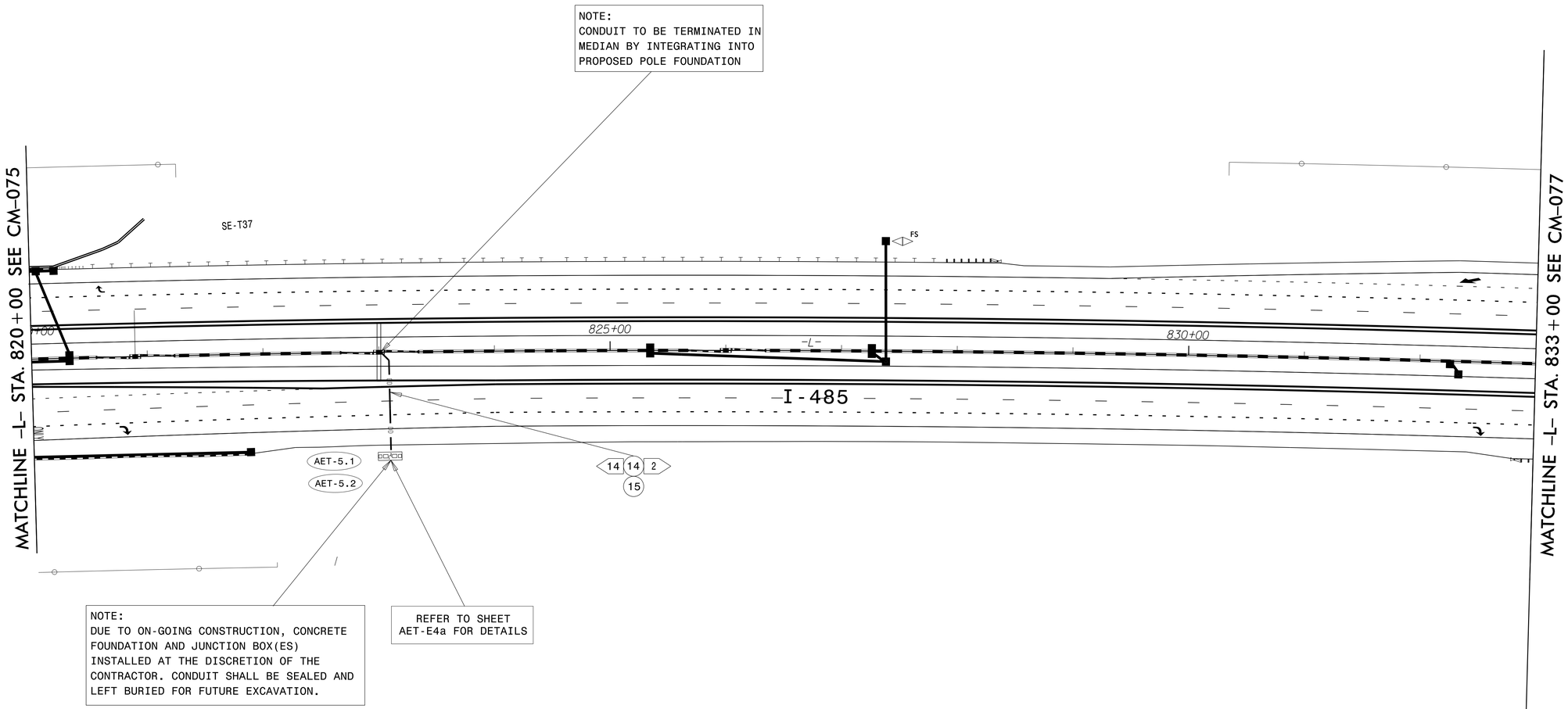
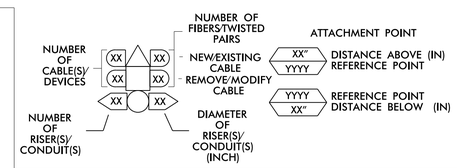
ave-dhariya
AT PROPWLIC502

PROJECT REFERENCE NO.	SHEET NO.
I-5507/R-0211EC/U4714AB	CM-076



NOTES:
1. SEAL ALL CONDUIT ENDS WITH DUCT AND CONDUIT SEALER, AT ALL JUNCTION BOX/CABINET ENTRANCES.
2. WHEN A JUNCTION BOX IS USED TO CHANGE INSTALLATION METHOD ONLY, THE JUNCTION BOX CAN BE ELIMINATED WITH THE APPROVAL OF THE ENGINEER.

1	INSTALL ELECTRICAL SERVICE WIRE (BY TYPE)	15	DIRECTIONAL DRILL CONDUIT	31A	INSTALL INDUSTRIAL GRADE UPS WITH DMS CABINET	38A	INSTALL CCTV METAL POLE AND FOUNDATION	52A	INSTALL DELINEATOR MARKER
2	INSTALL COMPOSITE CABLE	16	BORE AND JACK CONDUIT	31B	INSTALL CCTV CABINET	38B	INSTALL MVDS METAL POLE AND FOUNDATION	52B	INSTALL JUNCTION BOX MARKER
2A	INSTALL SPECIAL COMPOSITE CABLE	17	INSTALL CABLE(S) IN EXISTING CONDUIT	31C	INSTALL WRONG WAY DETECTION SYSTEM CABINET	39	INSTALL STANDARD JUNCTION BOX	53A	STORE 50 FEET OF EACH COMMUNICATIONS CABLE
2B	INSTALL WRONG WAY SIGN AND DETECTION CABLES	18	INSTALL CABLE(S) IN NEW CONDUIT	31D	INSTALL MVDS CABINET	40A	INSTALL OVERSIZED JUNCTION BOX (30" x 15" x 24")	53B	STORE 100 FEET OF EACH COMMUNICATIONS CABLE
3	INSTALL ETHERNET CABLE	19	INSTALL CABLE(S) IN EXISTING RISER	31E	INSTALL POLE MOUNTED MVDS SLAVE CABINET	40B	INSTALL SPECIAL-SIZED JUNCTION BOX (36" x 24" x 24")	54	INSTALL TRAFFIC BEARING JUNCTION BOX
4	INSTALL SMFO CABLE	20	INSTALL CABLE(S) IN NEW RISER	32A	INSTALL BASE MOUNTED HUB CABINET	41	REMOVE EXISTING JUNCTION BOX	55	LASH CABLE(S) TO EXISTING MESSENGER CABLE
5	INSTALL DMS COMM AND POWER	21	INSTALL CABLE(S) IN EXISTING CONDUIT STUBOUTS	32B	MODIFY EXISTING HUB CABINET/BUILDING	42	INSTALL WOOD POLE	56	LASH CABLE(S) TO NEW MESSENGER CABLE
6	INSTALL FIBER OPTIC DROP CABLE	22	INSTALL NEW CONDUIT INTO CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)	33A	REMOVE EXISTING CABINET	43	REMOVE EXISTING WOOD POLE	57	MODIFY EXISTING ELECTRICAL SERVICE
7	INSTALL TRACER WIRE	23	INSTALL NEW RISER INTO CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)	33B	REMOVE EXISTING CABINET AND FOUNDATION	44	INSTALL AERIAL GUY ASSEMBLY	58A	INSTALL NEW ELECTRICAL SERVICE (METER AND DISCONNECT)
8	TRENCH	24	INSTALL NEW CONDUIT INTO POLE MOUNTED CABINET	34A	INSTALL CABINET FOUNDATION	45	INSTALL STANDARD GUY ASSEMBLY	58B	INSTALL NEW DISCONNECT
9	INSTALL PVC CONDUIT	25	INSTALL NEW RISER INTO POLE MOUNTED CABINET	34B	INSTALL TECHNICIAN PAD	46	INSTALL SIDEWALK GUY ASSEMBLY	59	INSTALL UPS IN CABINET
10	INSTALL RIGID, GALVANIZED STEEL CONDUIT	26	MODIFY EXISTING INTERCONNECT CENTER /SPLICE ENCLOSURE	35A	INSTALL TYPE A DMS	47	INSTALL MESSENGER CABLE	60	BOND TRACER WIRE TO EQUIPMENT GROUND BUS
11	INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD	27	INSTALL NCDOT PROVIDED FIBER OPTIC EDGE SWITCH	35B	INSTALL TYPE B DMS	48	REMOVE EXISTING COMMUNICATIONS CABLE	61	DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS
12	INSTALL RIGID, GALVANIZED STEEL RISER WITH FIBER OPTIC CABLE SEAL	28	INSTALL & INTEGRATE PRETERMINATED PATCH PANEL AND JUMPERS IN CABINET	36A	INSTALL CCTV CAMERA ASSEMBLY	49	PULL BACK EXISTING COMMUNICATIONS CABLE	62	REMOVE EXISTING MVDS ASSEMBLY
13	INSTALL FIBER OPTIC CABLE SEAL	29	INSTALL UNDERGROUND SPLICE ENCLOSURE	36B	INSTALL MICROWAVE VEHICLE DETECTION SYSTEM	50	INTERCEPT EXISTING CONDUIT RUN	63	INSTALL TYPE III PEDESTAL POLE WITH FOUNDATION
14	INSTALL POLYETHYLENE CONDUIT	30	INSTALL AERIAL SPLICE ENCLOSURE	37	INSTALL CCTV METAL POLE AND FOUNDATION WITH LOWERING DEVICE	51	INSTALL CONCRETE PAD TYPICAL 'E' WITH JUNCTION BOXES & CONDUIT PER AET STANDARD DRAWING E-4a	64	INSTALL WRONG WAY DETECTION SIGN AND ASSEMBLY



Plans Prepared By:

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for the Offices of:

750 N. Greenfield Pkwy., Garner, NC 27529

I-485 ITS
Cable Routing Plans

Division 10 Mecklenburg County Charlotte

PLAN DATE:	August 2019	REVIEWED BY:	D Johnson
PREPARED BY:	R Dahiya	REVIEWED BY:	

SCALE 0 50 1" = 50'

REVISIONS	INIT.	DATE

SEAL

PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION

DATE

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PROJECT REFERENCE NO.	SHEET NO.
I-5507/R-0211EC/U4714AB	CM-082

NOTE:
DUE TO ON-GOING CONSTRUCTION, JUNCTION BOX(ES) INSTALLED AT THE DISCRETION OF THE CONTRACTOR. IF JUNCTION BOX(ES) ARE NOT INSTALLED, CONDUIT SHALL BE SEALED AND LEFT BURIED FOR FUTURE EXCAVATION.

NOTE:
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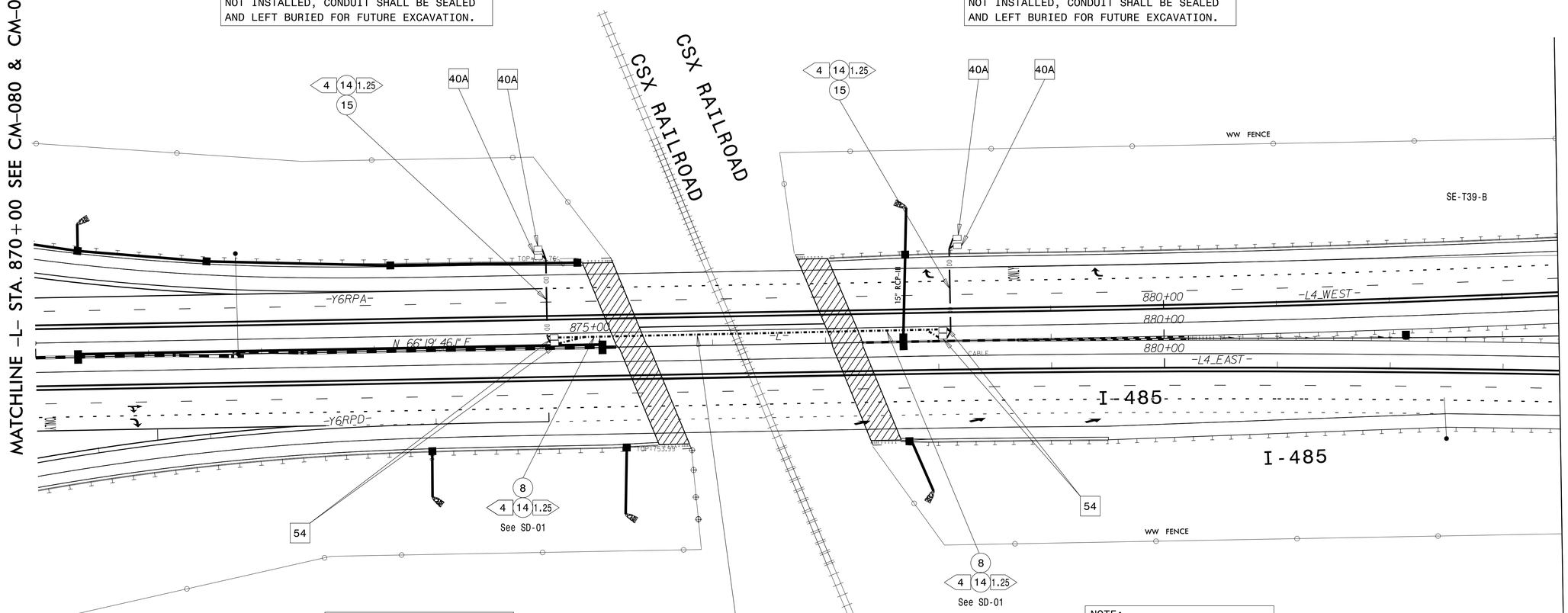

NOTE:
JUNCTION BOX(ES) TO BE INSTALLED IN THE MEDIAN DURING EARLY WORKS PACKAGE.

4" MULTI-CELL RACEWAY WITH FOUR 1.25" INNERDUCTS ATTACHED TO BRIDGE.
SEE BRIDGE PLANS FOR DETAILS.
CONSTRUCTION MAY NOT BEGIN ON THIS PORTION OF THE CONDUIT SYSTEM UNTIL RFC PLANS FOR THE BRIDGE HAVE BEEN APPROVED.

NOTE:
JUNCTION BOX(ES) TO BE INSTALLED IN THE MEDIAN DURING EARLY WORKS PACKAGE.

NOTES:
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Plans Prepared By:

WSP | BLYTHE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for the Offices of:

750 N. Greenfield Pkwy., Garner, NC 27529

I-485 ITS
Cable Routing Plans

Division 10 Mecklenburg County Charlotte

PLAN DATE:	August 2019	REVIEWED BY:	D Johnson
PREPARED BY:	R Dahiya	REVIEWED BY:	

SCALE 0 50 1" = 50'

REVISIONS	INIT.	DATE

SEAL

PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION

DATE

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Appendix I

AET Site Locations

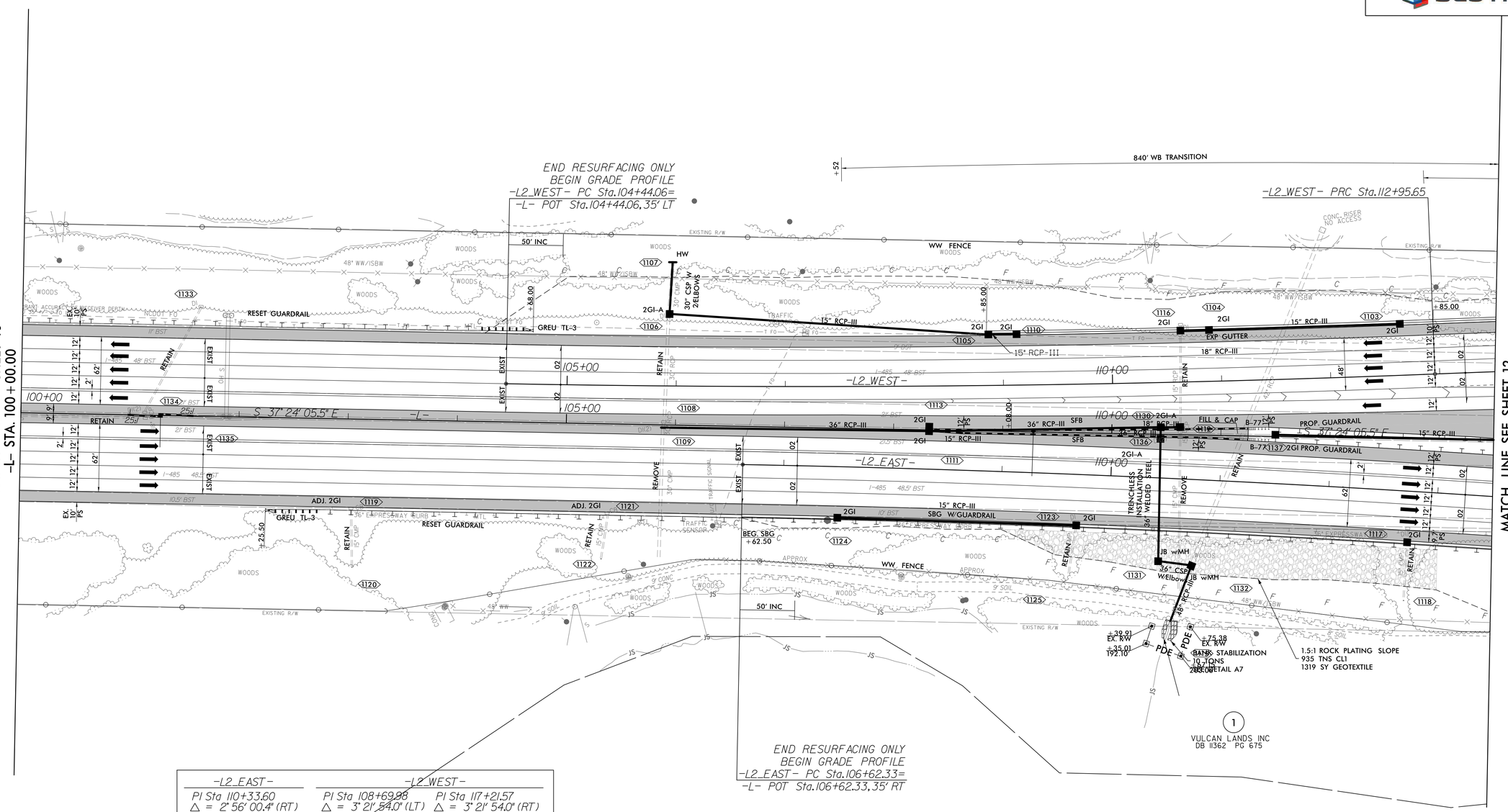
wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

PROJECT REFERENCE NO.	SHEET NO.
I-5507	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BLYTHE

NAD 83/2011



-L2_EAST-	-L2_WEST-	
PI Sta 110+33.60	PI Sta 108+69.88	PI Sta 117+21.57
△ = 2° 56' 00.4" (RT)	△ = 3° 21' 54.0" (LT)	△ = 3° 21' 54.0" (RT)
D = 0° 23' 42.5"	D = 0° 23' 42.5"	D = 0° 23' 42.5"
L = 742.37'	L = 851.59'	L = 851.59'
T = 371.27'	T = 425.92'	T = 425.92'
R = 14,500.00'	R = 14,500.00'	R = 14,500.00'
SE = NC	SE = NC	SE = NC
DS = 70 MPH	DS = 70 MPH	DS = 70 MPH

SEE SHEET 126 FOR -L2_WEST- PROFILE
SEE SHEET 128 FOR -L2_EAST- PROFILE

REVISIONS

8/17/99

9/4/2019
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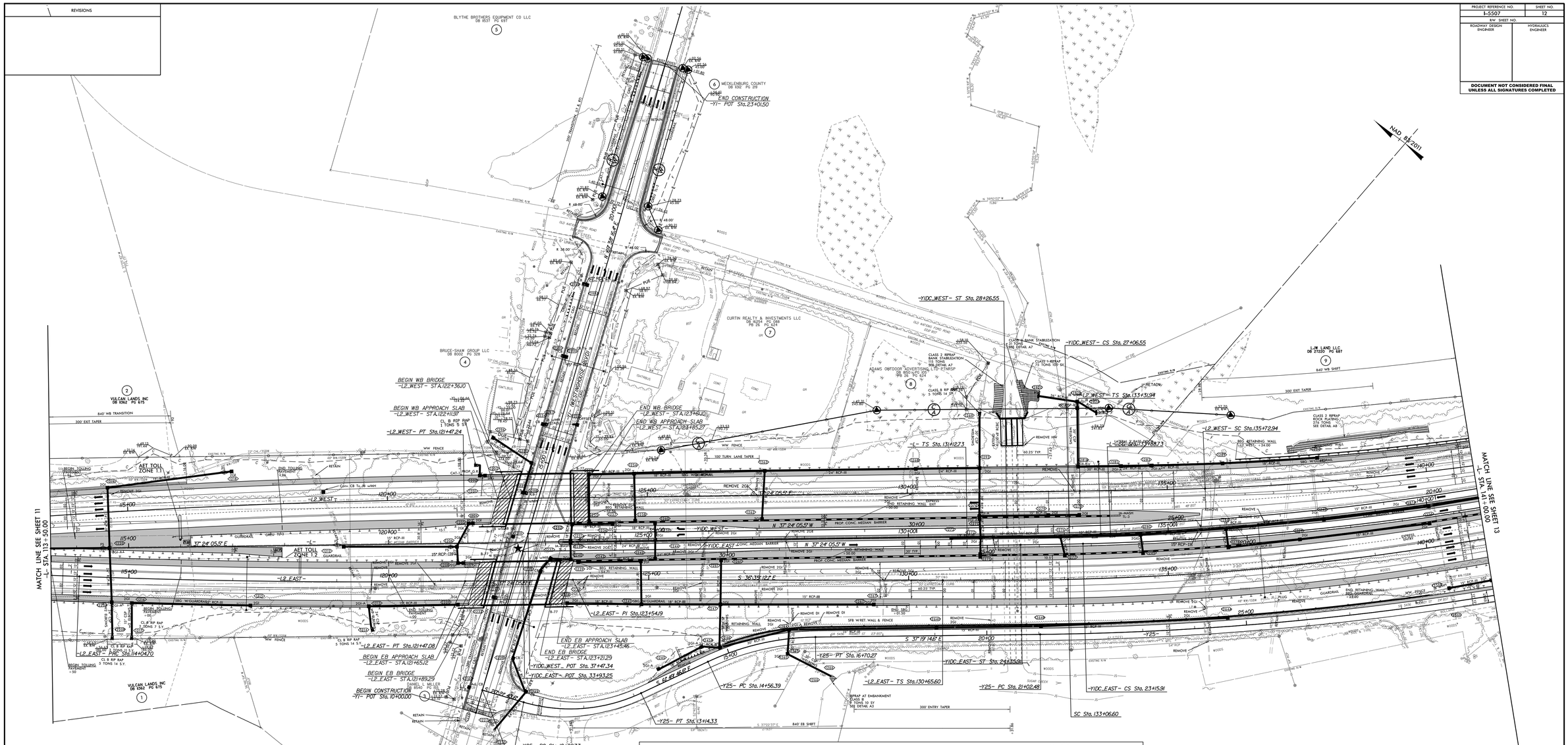
REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
I-5507	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



SEE SHEET 126, 127 FOR -L2 WEST- PROFILE
SEE SHEET 128, 129 FOR -L2 EAST- PROFILE
SEE SHEET 130 FOR -Y1DC WEST- PROFILE
SEE SHEET 131 FOR -Y1DC EAST- PROFILE
SEE SHEET 132 FOR -Y1- PROFILE

GRAPHIC SCALE
50 25 0 50 100
PLANS

LOCATION: I-485 AT WESTINGHOUSE BLVD.	
TIP NO: I-5507	COUNTY: MECKLENBURG
DESIGNED BY: WSP	
CHECKED BY: D. GOURLEY	DATE: 5-31-19

wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

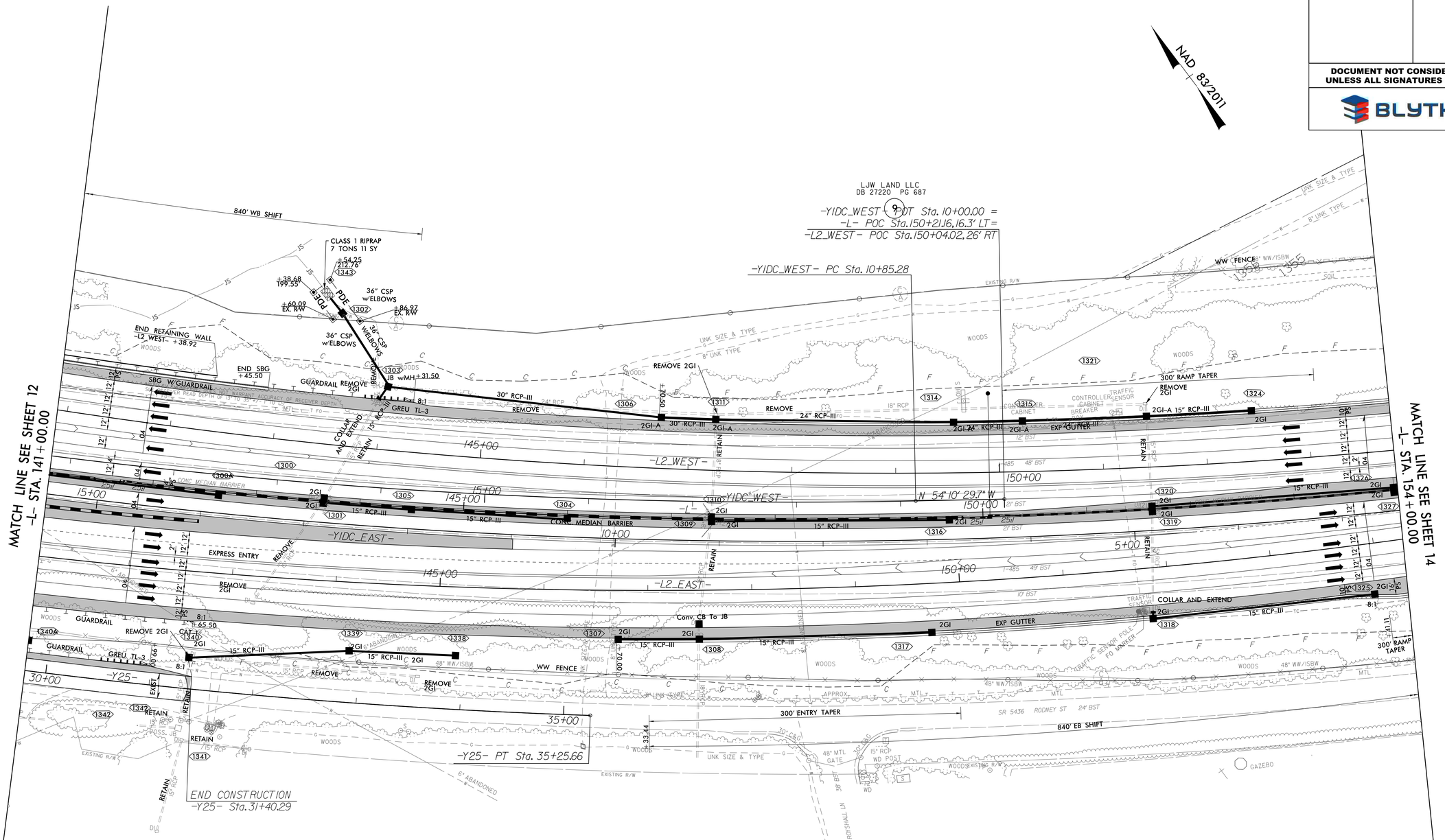
PROJECT REFERENCE NO.	SHEET NO.
I-5507	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BLYTHE

8/17/99

REVISIONS



-L-	-L2_EAST-	-L2_WEST-	-YIDC_EAST-	-YIDC_WEST-	-Y25-
PI Sta 145+68.13	PI Sta 144+37.91	PI Sta 146+64.90	PI Sta 19+01.34	PI Sta 28+17.51	PI Sta 28+17.51
△ = 23° 08' 36.8" (LT)	△ = 24° 05' 54.6" (LT)	△ = 23° 17' 01.1" (LT)	△ = 21° 01' 27.3" (RT)	△ = 16° 10' 29.2" (RT)	△ = 13° 46' 26.5" (LT)
D = 0° 59' 41.0"	D = 1° 04' 51.8"	D = 1° 04' 51.8"	D = 1° 00' 27.0"	D = 0° 59' 51.6"	D = 0° 58' 04.2"
L = 2,326.64'	L = 2,229.17'	L = 2,153.79'	L = 2,086.80'	L = 1,621.27'	L = 1,423.18'
T = 1,179.40'	T = 1,131.31'	T = 1,091.97'	T = 1,055.27'	T = 816.06'	T = 715.04'
R = 5,760.00'	R = 5,300.00'	R = 5,300.00'	R = 5,687.00'	R = 5,743.00'	R = 5,920.00'
DS = 70 MPH	SE = 0.04	SE = 0.04	SE = 0.04	SE = 0.04	SE = EXIST
	DS = 70 MPH	DS = 70 MPH	DS = 60 MPH	DS = 70 MPH	DS = EXIST

SEE SHEET 127 FOR -L2_WEST- PROFILE
SEE SHEET 129 FOR -L2_EAST- PROFILE
SEE SHEET 130 FOR -YIDC_WEST- PROFILE
SEE SHEET 131 FOR -YIDC_EAST- PROFILE

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wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

PROJECT REFERENCE NO.	SHEET NO.
I-5507	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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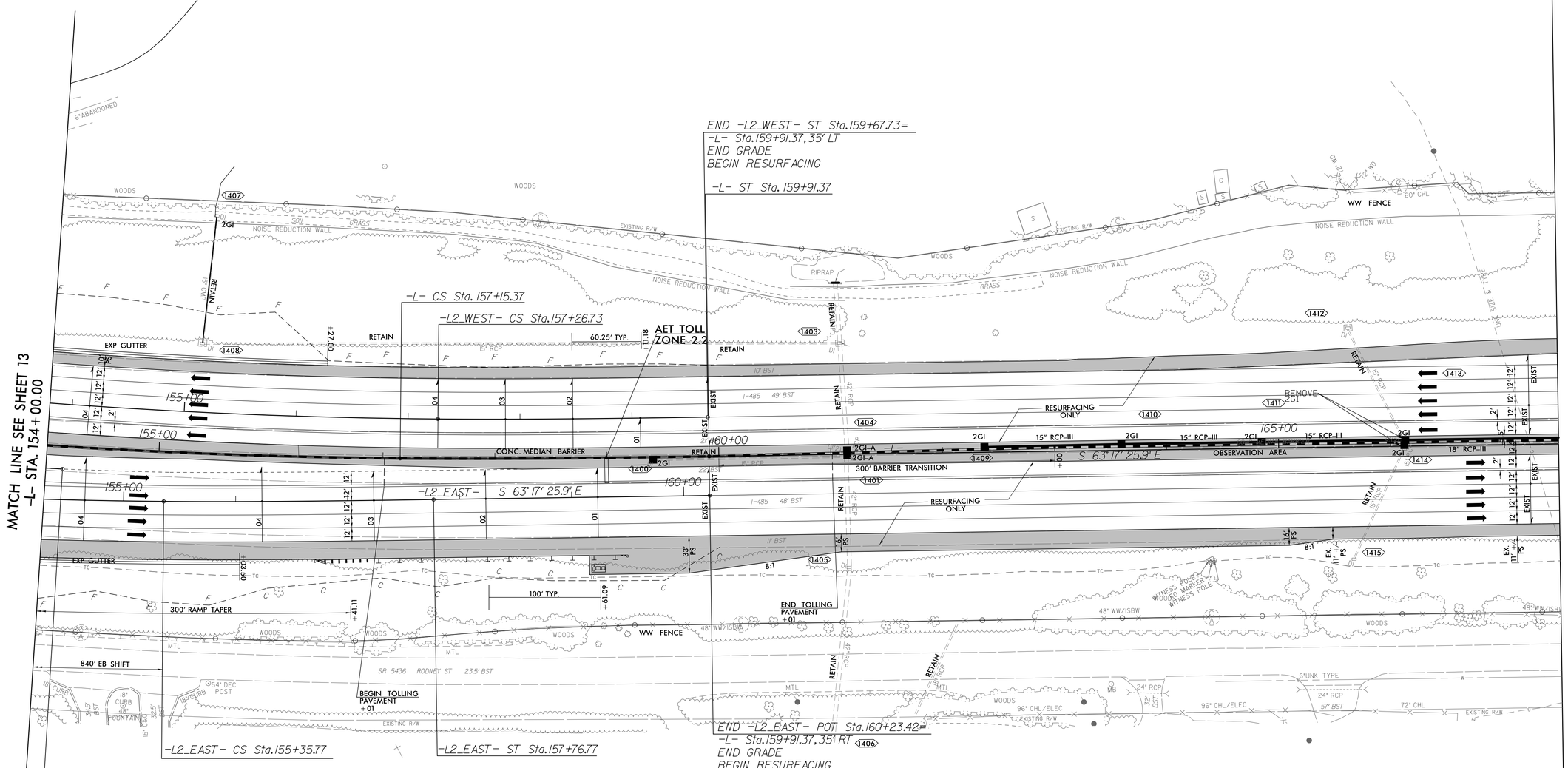
8/17/99

REVISIONS

NAD 83/2011



-L-		-L2_EAST-		-L2_WEST-	
PI Sta 145+68.13	PIs Sta 158+07.38	PI Sta 144+37.91	PIs Sta 156+16.11	PI Sta 146+64.90	PIs Sta 158+07.07
Δ = 23° 08' 36.8" (LT)	Θs = 1° 22' 21.8"	Δ = 24° 05' 54.6" (LT)	Θs = 1° 18' 09.6"	Δ = 23° 17' 01.1" (LT)	Θs = 1° 18' 09.6"
D = 0° 59' 41.0"	Ls = 276.00'	D = 1° 04' 51.8"	Ls = 241.00'	D = 1° 04' 51.8"	Ls = 241.00'
L = 2,326.64'	LT = 184.01'	L = 2,229.17'	LT = 160.67'	L = 2,153.79'	LT = 160.67'
T = 1,179.40'	ST = 92.01'	T = 1,131.31'	ST = 80.34'	T = 1,091.97'	ST = 80.34'
R = 5,760.00'		R = 5,300.00'		R = 5,300.00'	
DS = 70 MPH		SE = 0.04		SE = 0.04	
		DS = 70 MPH		DS = 70 MPH	

SEE SHEET 127 FOR -L2_WEST- PROFILE
SEE SHEET 129 FOR -L2_EAST- PROFILE

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8/17/99

REVISIONS

wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

PROJECT REFERENCE NO.	SHEET NO.
I-5507	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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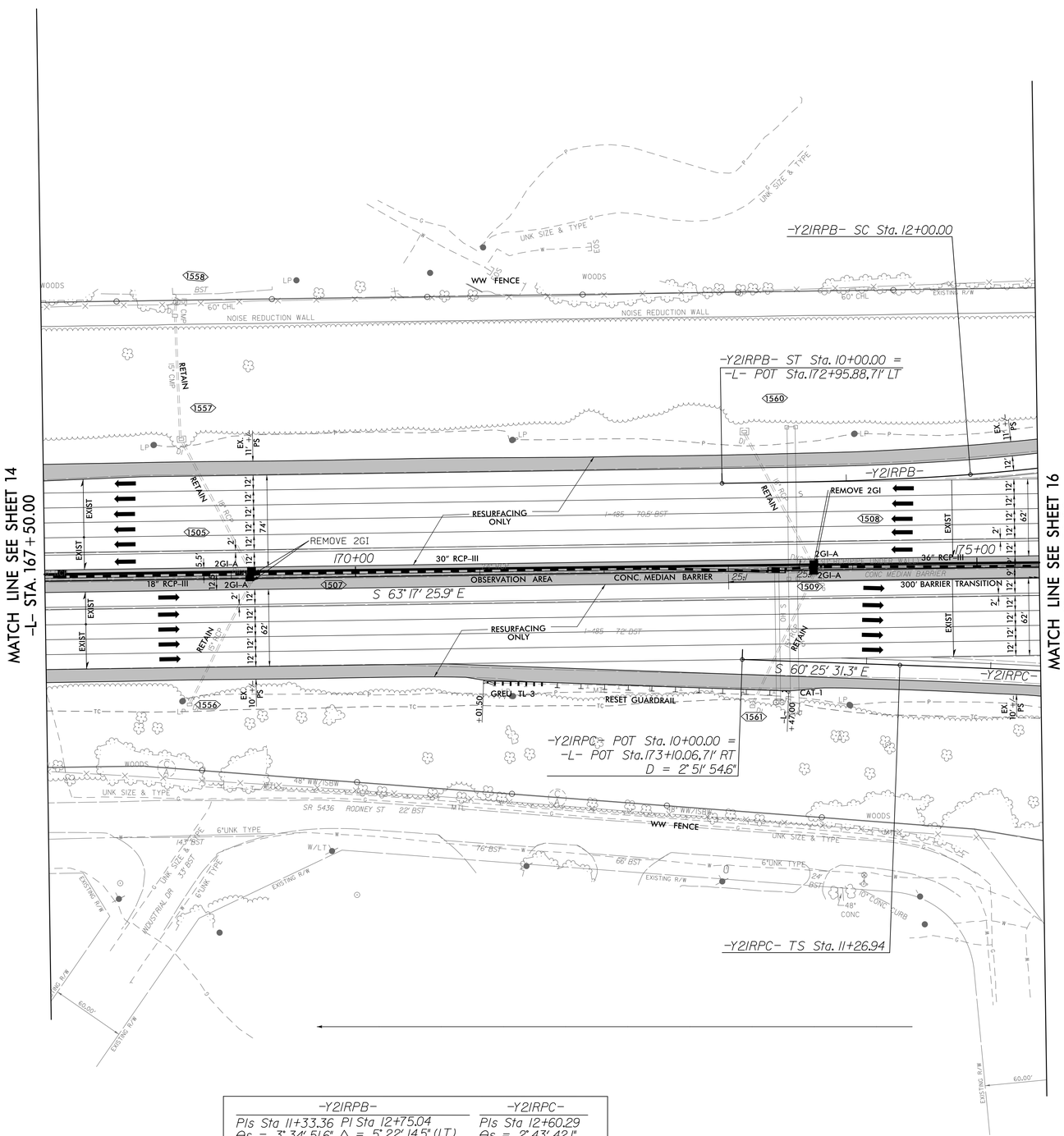

-Y2IRPB-		-Y2IRPC-
PIs Sta 11+33.36	PI Sta 12+75.04	PIs Sta 12+60.29
Θs = 3° 34' 51.6"	Δ = 5° 22' 14.5" (LT)	Θs = 2° 43' 42.1"
Ls = 200.00'	D = 3° 34' 51.6"	Ls = 200.00'
LT = 133.36'	L = 149.98'	LT = 133.35'
ST = 66.69'	T = 75.04'	ST = 66.68'
	R = 1,600.00'	
	SE = EXIST	
	DS = EXIST	

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1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

PROJECT REFERENCE NO.	SHEET NO.
I-5507	22
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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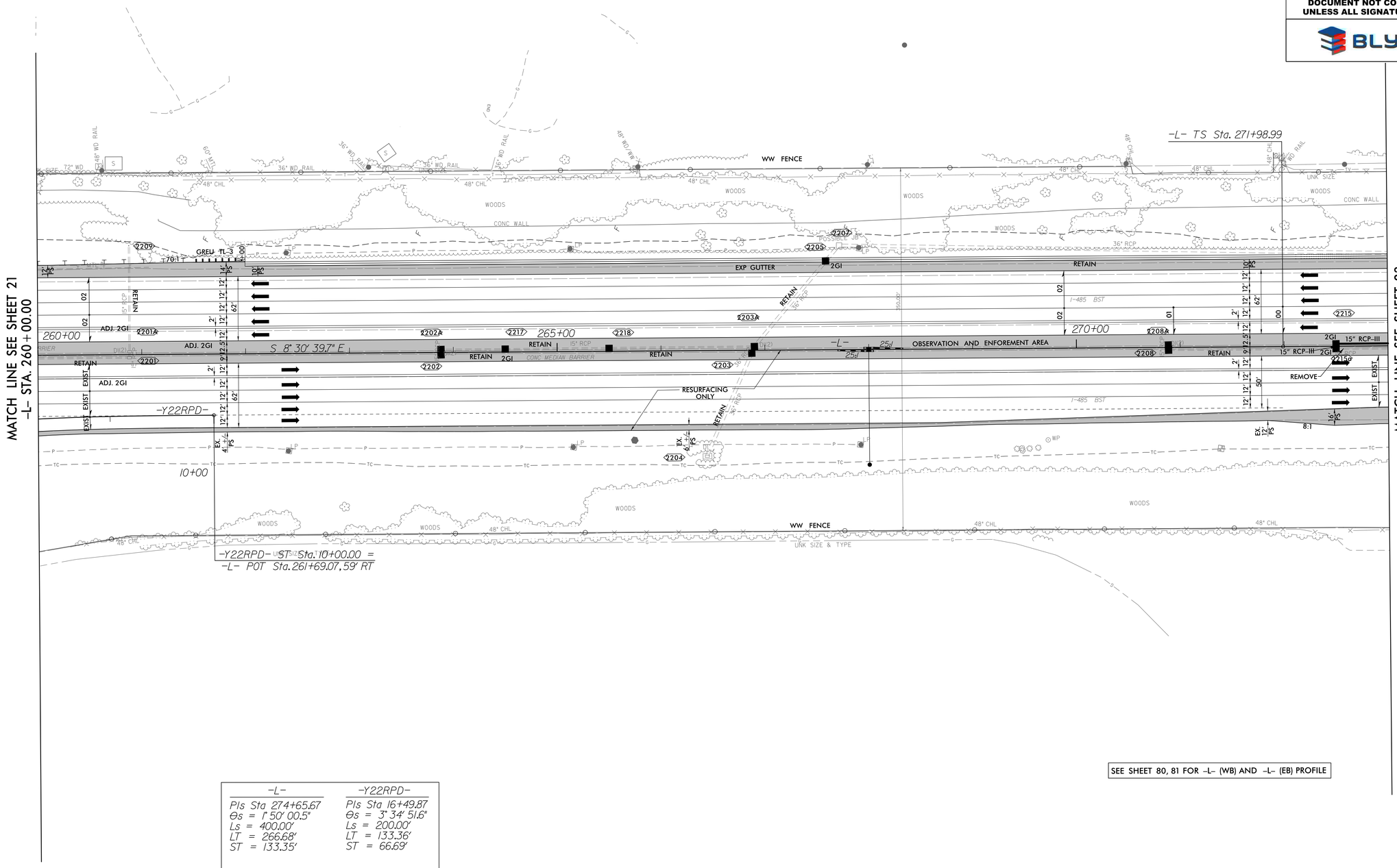

-L-	-Y22RPD-
PIs Sta 274+65.67	PIs Sta 16+49.87
Θs = 1° 50' 00.5"	Θs = 3° 34' 51.6"
Ls = 400.00'	Ls = 200.00'
LT = 266.68'	LT = 133.36'
ST = 133.35'	ST = 66.69'

SEE SHEET 80, 81 FOR -L- (WB) AND -L- (EB) PROFILE

REVISIONS

8/17/99

9/4/2019
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wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

PROJECT REFERENCE NO.	SHEET NO.
I-5507	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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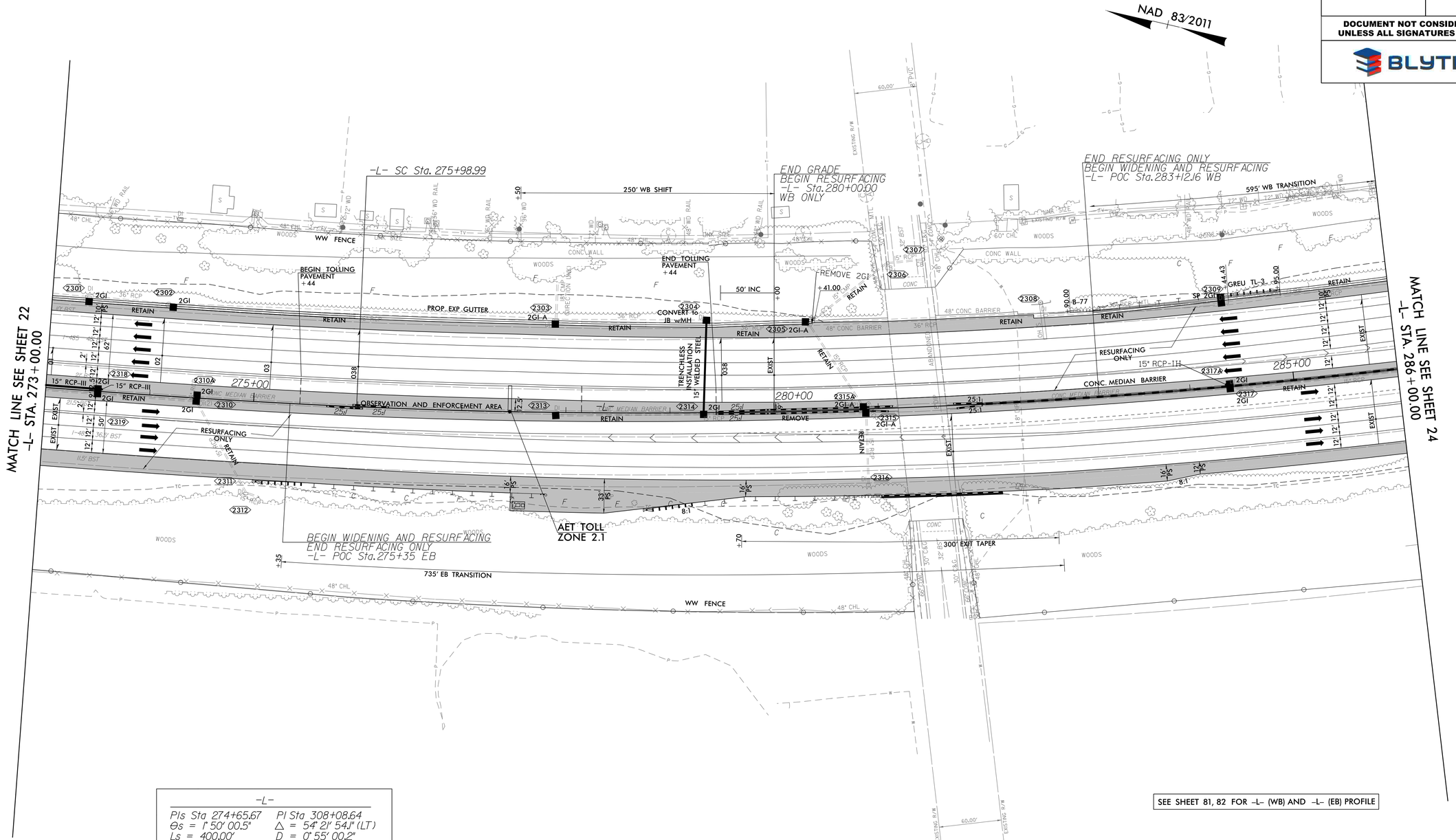

-L-	
PIs Sta 274+65.67	PI Sta 308+08.64
Θs = 1° 50' 00.5"	Δ = 54° 21' 54.1" (LT)
Ls = 400.00'	D = 0° 55' 00.2"
LT = 266.68'	L = 5,930.30'
ST = 133.35'	T = 3,209.65'
	R = 6,250.00'
	SE = EXIST
	DS = 70 MPH

SEE SHEET 81, 82 FOR -L- (WB) AND -L- (EB) PROFILE

REVISIONS

8/17/99

9/4/2019
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mpowell5@wsp

wsp
1001 Morehead Square Dr.
Suite 610
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NC LIC NO. F-0165

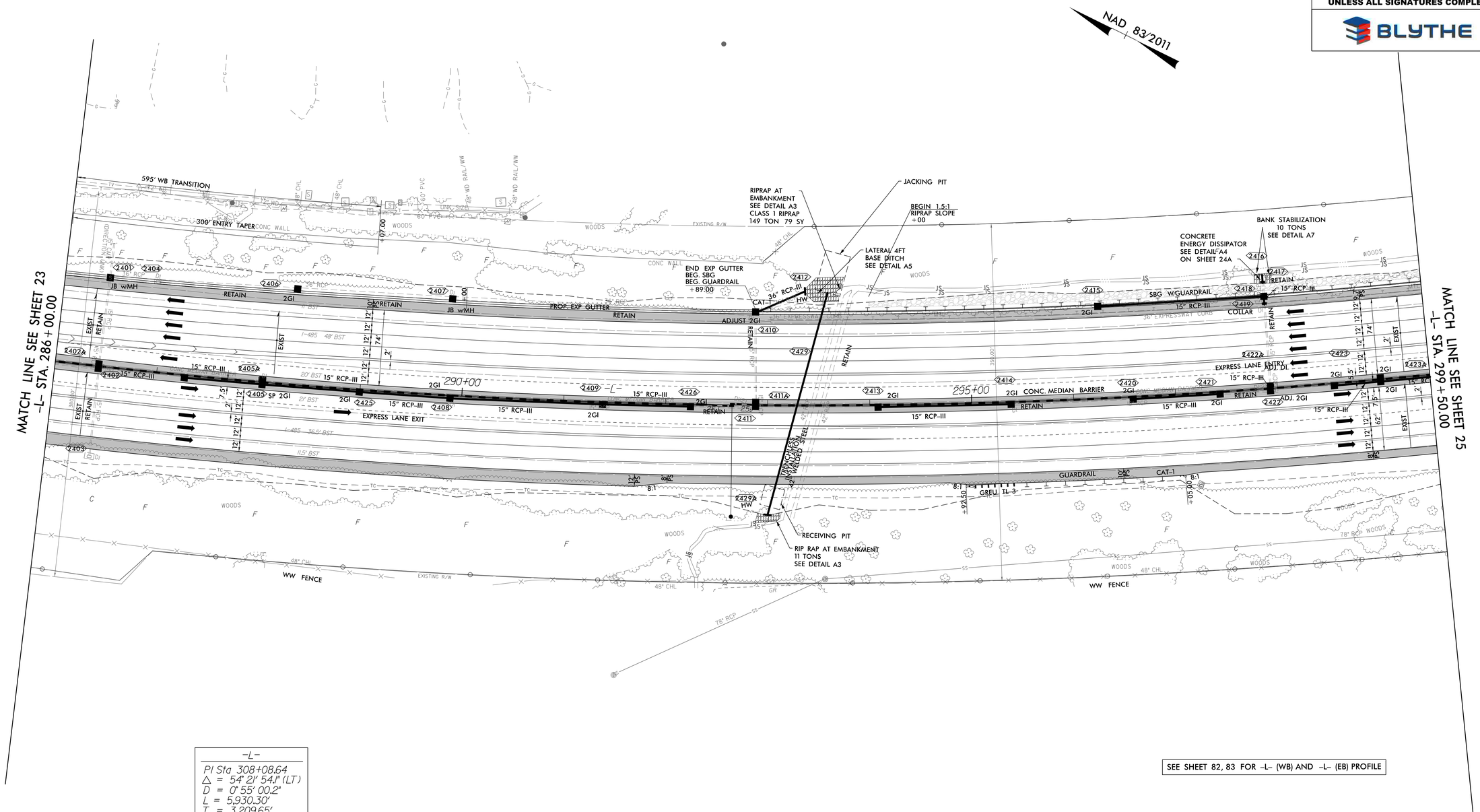
PROJECT REFERENCE NO.	SHEET NO.
I-5507	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BLYTHE

8/17/99

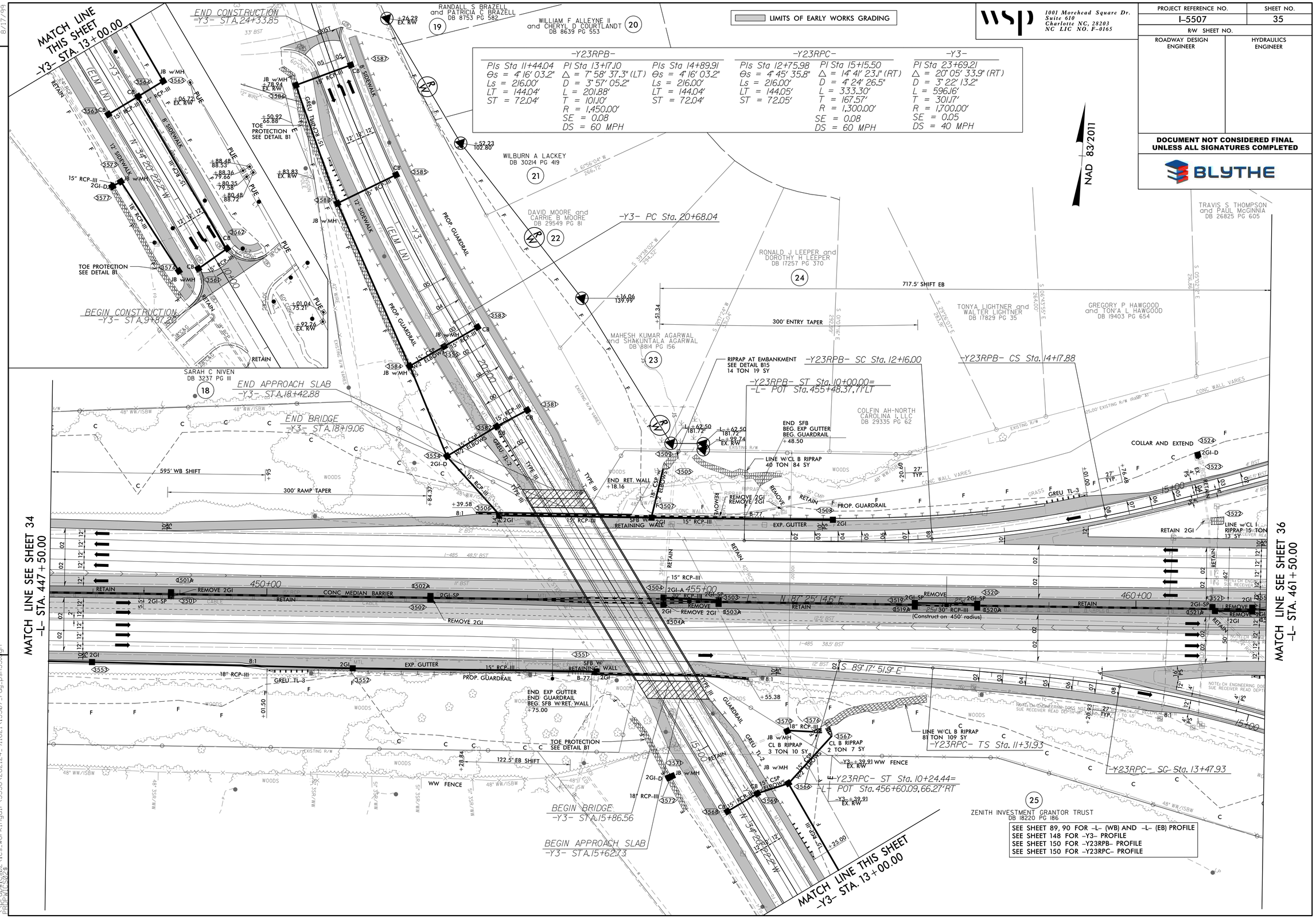
REVISIONS



-L-
PI Sta 308+08.64
△ = 54° 21' 54.1" (LT)
D = 0° 55' 00.2"
L = 5,930.30'
T = 3,209.65'
R = 6,250.00'
SE = EXIST
DS = 70 MPH

SEE SHEET 82, 83 FOR -L- (WB) AND -L- (EB) PROFILE

9/4/2019
pdpw1cs02s
pdpw1cs02\ics_workingdir\3558\282124.911610\i5507_rdy_psh24.dgn



wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

PROJECT REFERENCE NO.	SHEET NO.
I-5507	35
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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REVISIONS

8/17/99

9/4/2019
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PROFWTCS02$

wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

PROJECT REFERENCE NO.	SHEET NO.
I-5507	36
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 032689 ENGINEER DAVID B. GOURLEY

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 033452 ENGINEER KARL R. DAUBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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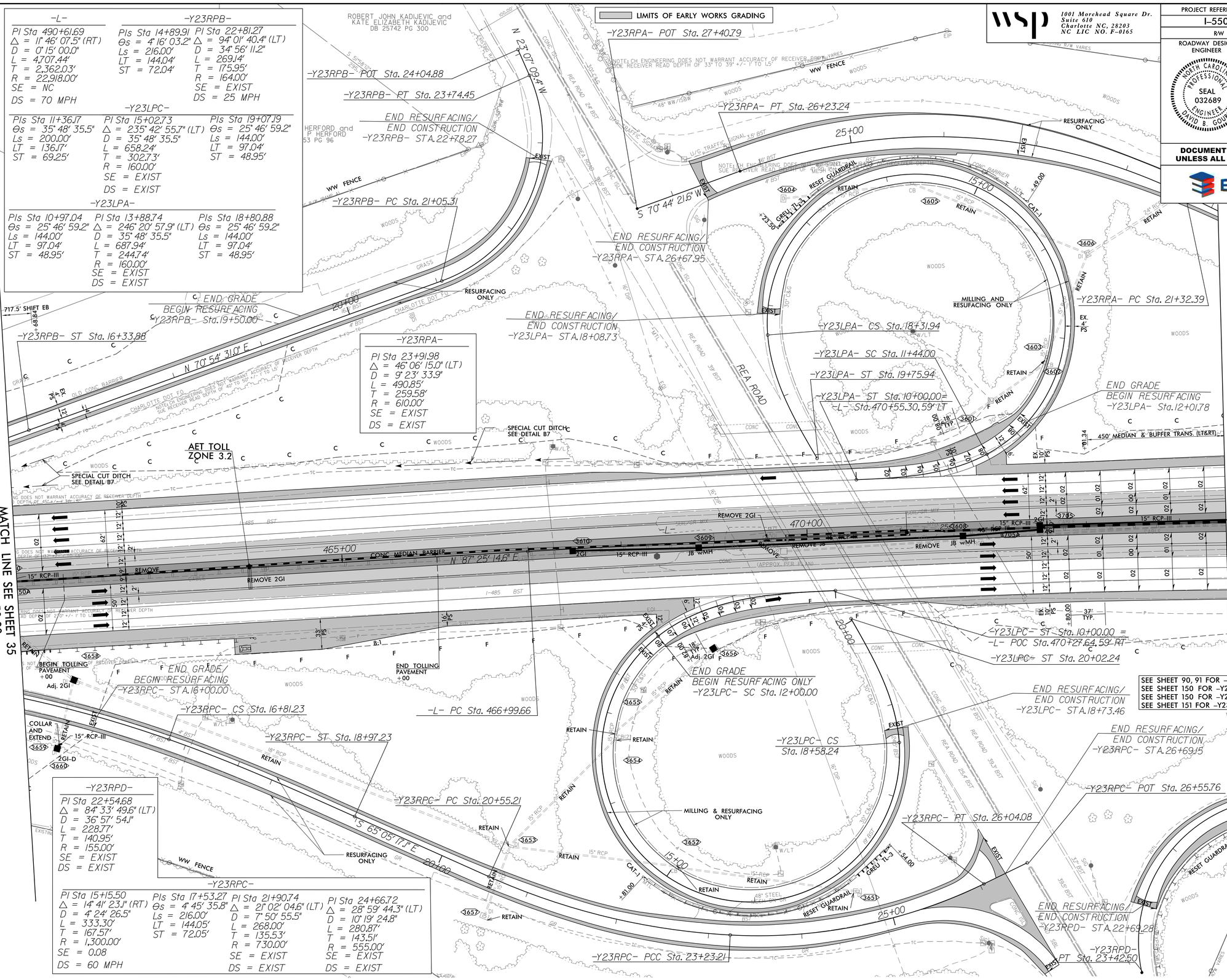

8/17/99

REVISIONS

9/4/2019
n:\pe\projects02\ncs_workingdir\3558\282124_911622\15507_rdy_psh36.dgn
NCDOT V8 CONNECT

wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

PROJECT REFERENCE NO.	SHEET NO.
I-5507	38
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 032689 ENGINEER DAVID B. GOURLEY

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 033452 ENGINEER KARL R. DAUBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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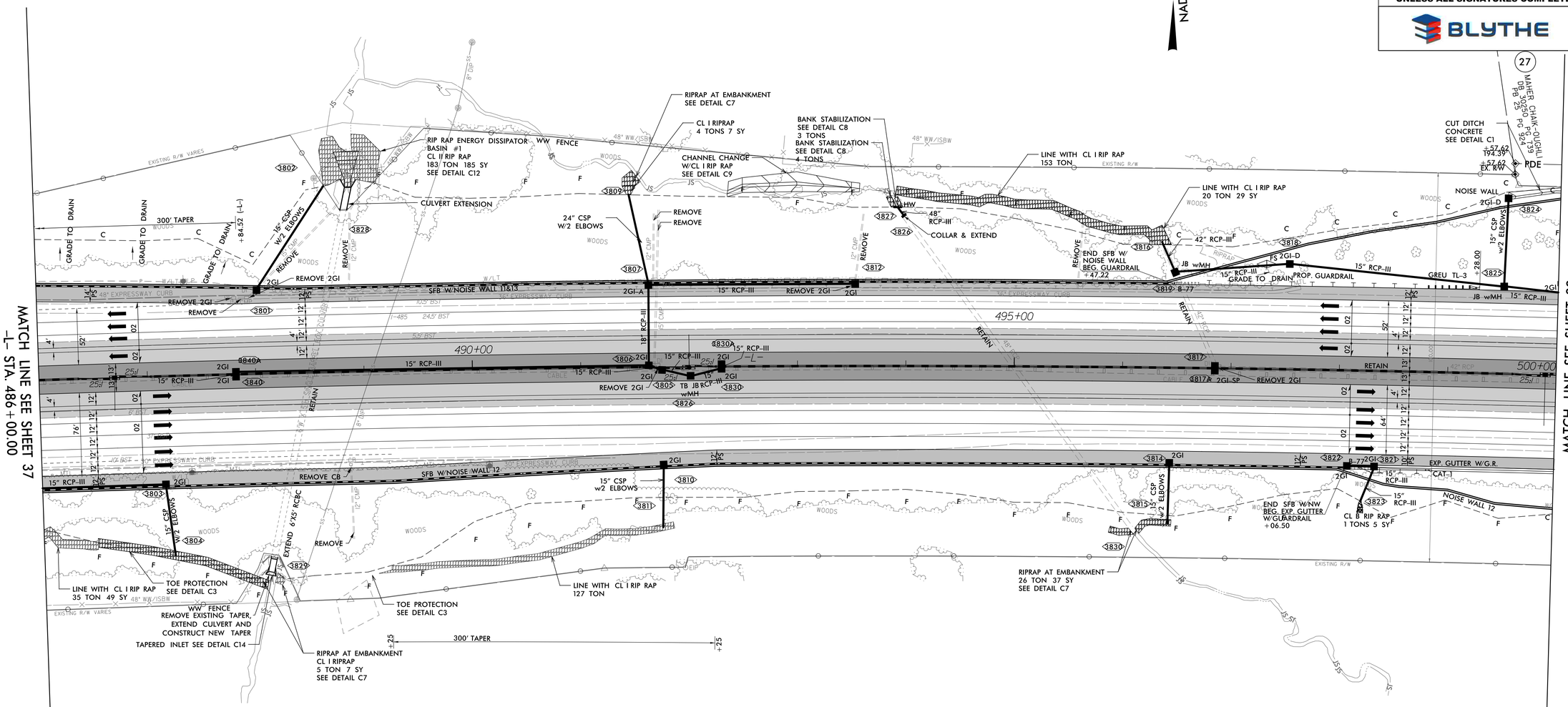
NAD 83/2011



SEE SHEET 92, 93 FOR -L- (WB) AND -L- (EB) PROFILE
SEE SHEET 2N-11&13W(1), 2N-11&13W(2), 2N-11&13W(3) FOR -NW11&13W-
SEE SHEET 2N-12(1), 2N-12(2) FOR -NW12-

-L-

PI Sta 490+61.69
△ = 11° 46' 07.5" (RT)
D = 0° 15' 00.0"
L = 4,707.44'
T = 2,362.03'
R = 22,918.00'
SE = NC
DS = 75 MPH

REVISIONS

8/17/99

9/4/2019
n:\Projects02\ncs_workingdir\3558\282124_911624\I5507_rdy_psh38.dgn
PROFILE

wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

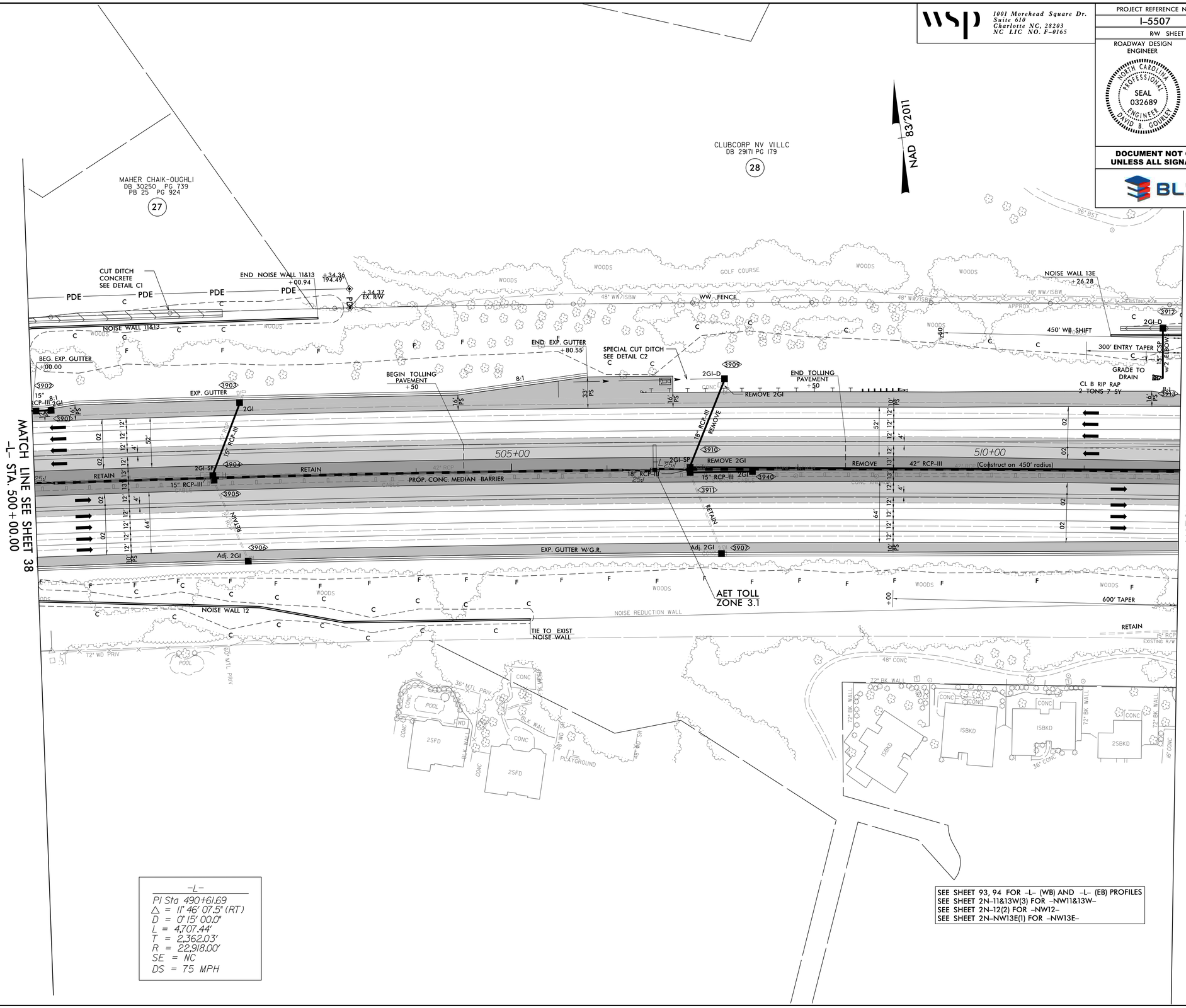
PROJECT REFERENCE NO.	SHEET NO.
I-5507	39
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 032689 ENGINEER DAVID B. GOURLEY

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 033452 ENGINEER KARL R. DAUBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BLYTHE



-L-
PI Sta 490+61.69
△ = 11° 46' 07.5" (RT)
D = 0° 15' 00.0"
L = 4,707.44'
T = 2,362.03'
R = 22,918.00'
SE = NC
DS = 75 MPH

SEE SHEET 93, 94 FOR -L- (WB) AND -L- (EB) PROFILES
SEE SHEET 2N-11&13W(3) FOR -NW11&13W-
SEE SHEET 2N-12(2) FOR -NW12-
SEE SHEET 2N-NW13E(1) FOR -NW13E-

REVISIONS

8/17/99

9/4/2019
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DGN: ICS02$

wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

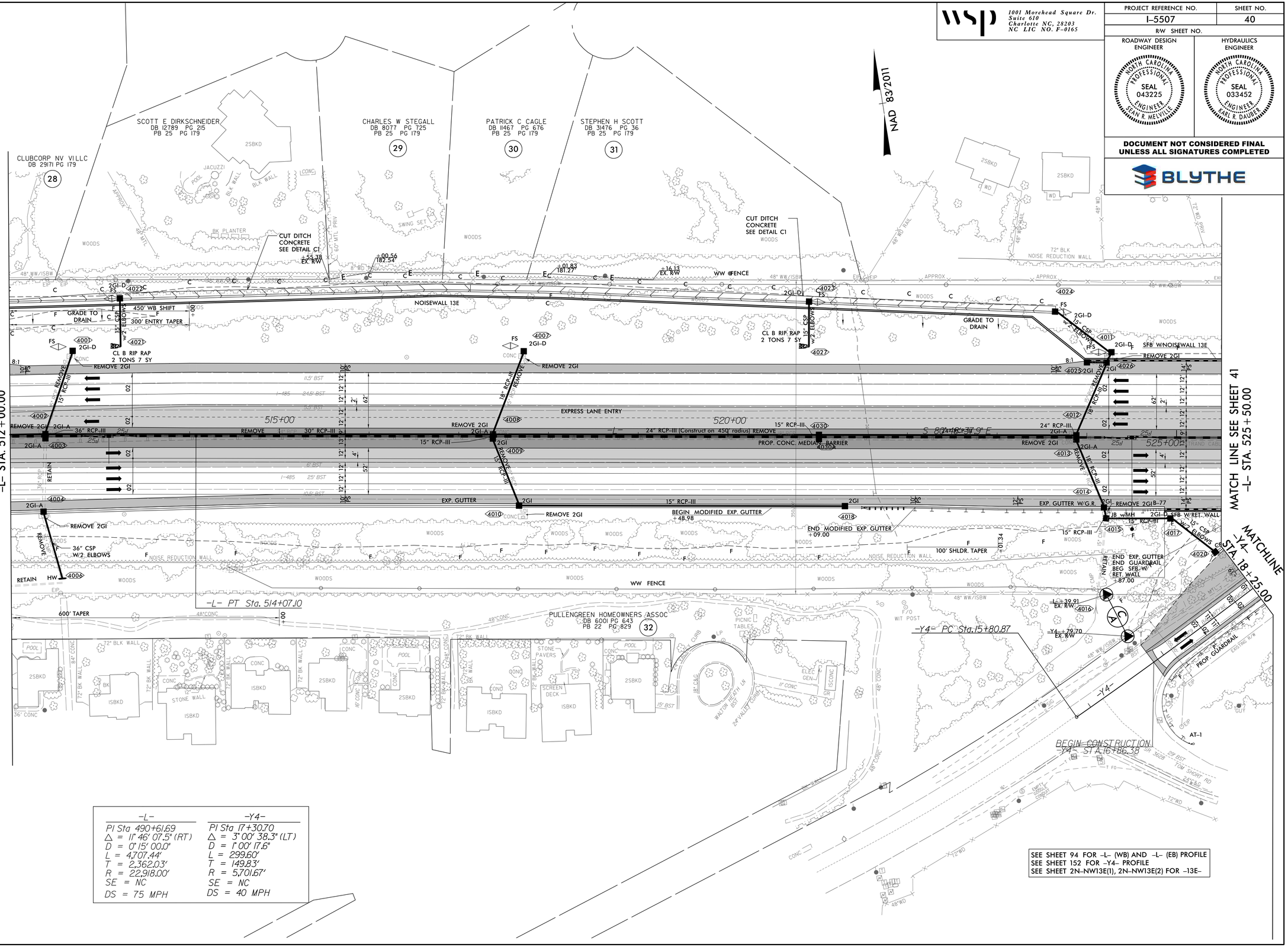
PROJECT REFERENCE NO.	SHEET NO.
I-5507	40
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 043225 ENGINEER KEVIN R. MELVILLE

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 033452 ENGINEER KARL R. DAUBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BLYTHE



-L-	-Y4-
PI Sta 490+61.69	PI Sta 17+30.70
Δ = 11° 46' 07.5" (RT)	Δ = 3° 00' 38.3" (LT)
D = 0° 15' 00.0"	D = 1° 00' 17.6"
L = 4,707.44'	L = 299.60'
T = 2,362.03'	T = 149.83'
R = 22,918.00'	R = 5,701.67'
SE = NC	SE = NC
DS = 75 MPH	DS = 40 MPH

REVISIONS

8/17/99

9/4/2019
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PRP-WI-02.8

wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

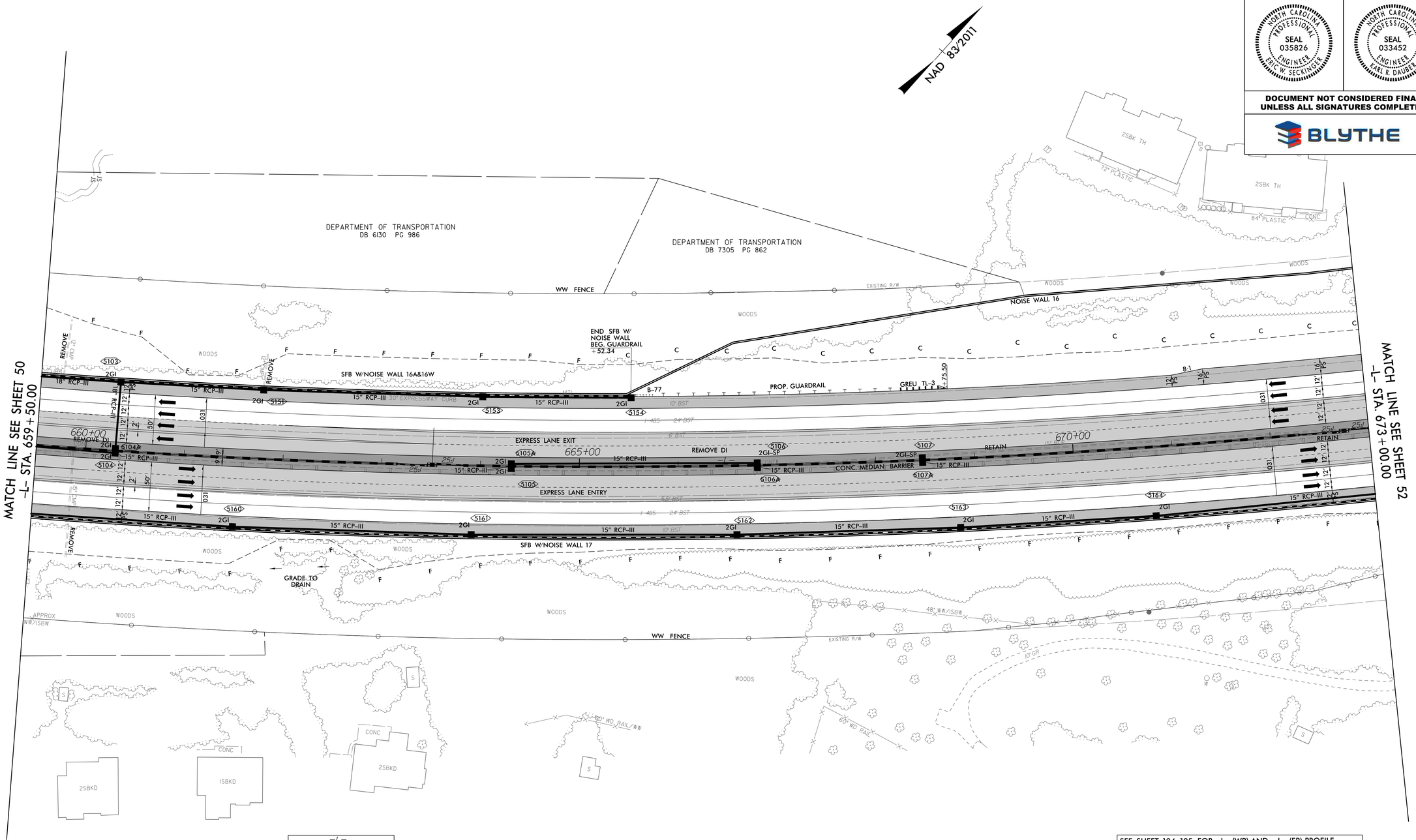
PROJECT REFERENCE NO.	SHEET NO.
I-5507	51
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 035826 ENGINEER ERIC W SECKINGER

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 033452 ENGINEER KARL R DAUBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BLYTHE



-L-
PI Sta 649+39.49
△ = 67° 32' 49.1" (LT)
D = 0° 44' 59.4"
L = 9,008.10'
T = 5,110.08'
R = 7,641.00'
SE = 0.031
DS = 75 MPH

SEE SHEET 104, 105 FOR -L- (WB) AND -L- (EB) PROFILE
SEE SHEET 2N-16A&16W(3), 2N-16A&16W(4) FOR -NW16A&16W-
SEE SHEET 2N-17(3), 2N-17(4) FOR -NW17-

REVISIONS

8/17/99

9/4/2019
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DGN: WK502$

wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

PROJECT REFERENCE NO.	SHEET NO.
I-5507	52
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 035826 ENGINEER ERIC W. SECKINGER

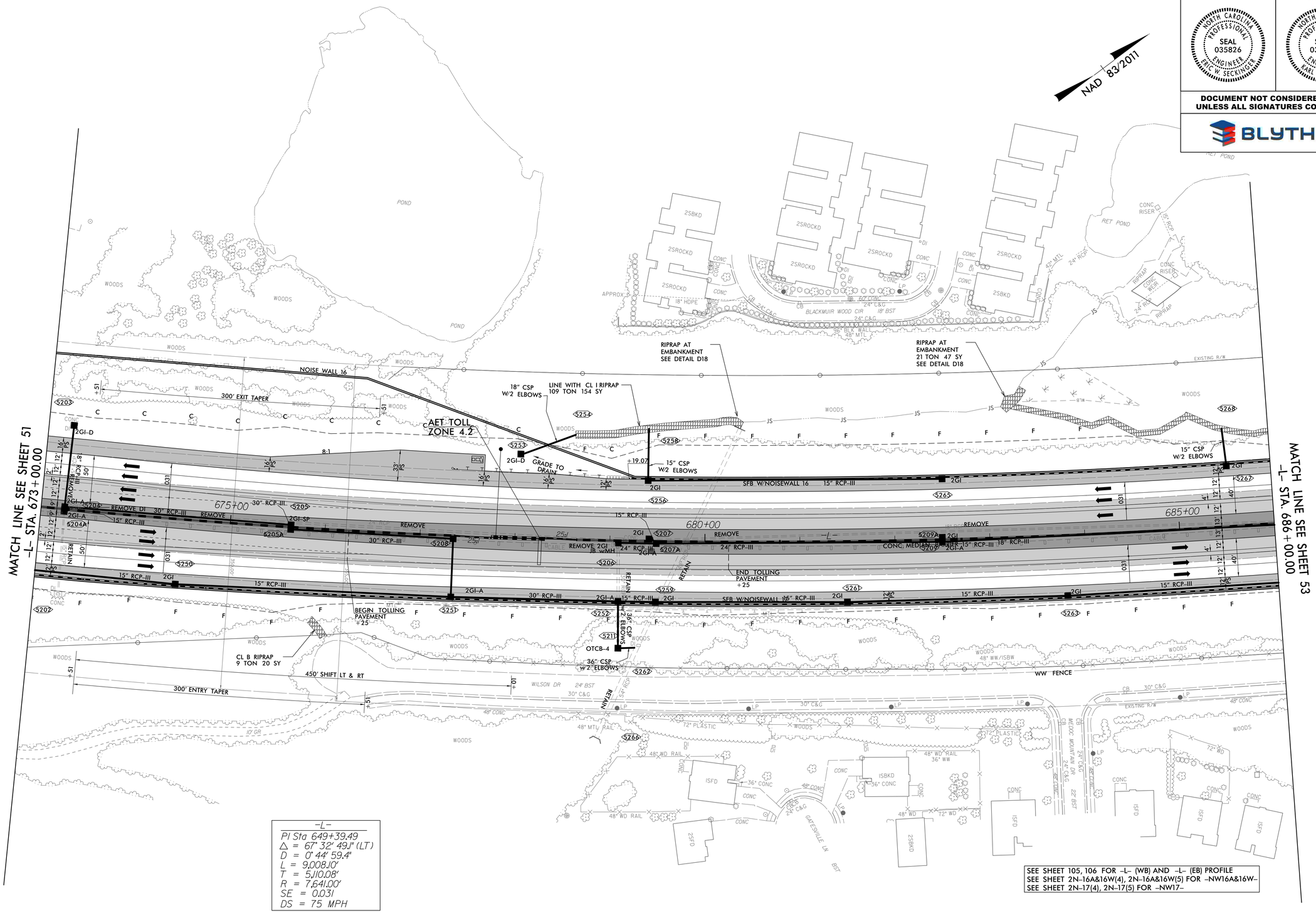
HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 033452 ENGINEER KARL R. DAUBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BLYTHE

8/17/99

REVISIONS



SEE SHEET 105, 106 FOR -L- (WB) AND -L- (EB) PROFILE
SEE SHEET 2N-16A&16W(4), 2N-16A&16W(5) FOR -NW16A&16W-
SEE SHEET 2N-17(4), 2N-17(5) FOR -NW17-

9/4/2019
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RDWY_SHEETS

8/17/99

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1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

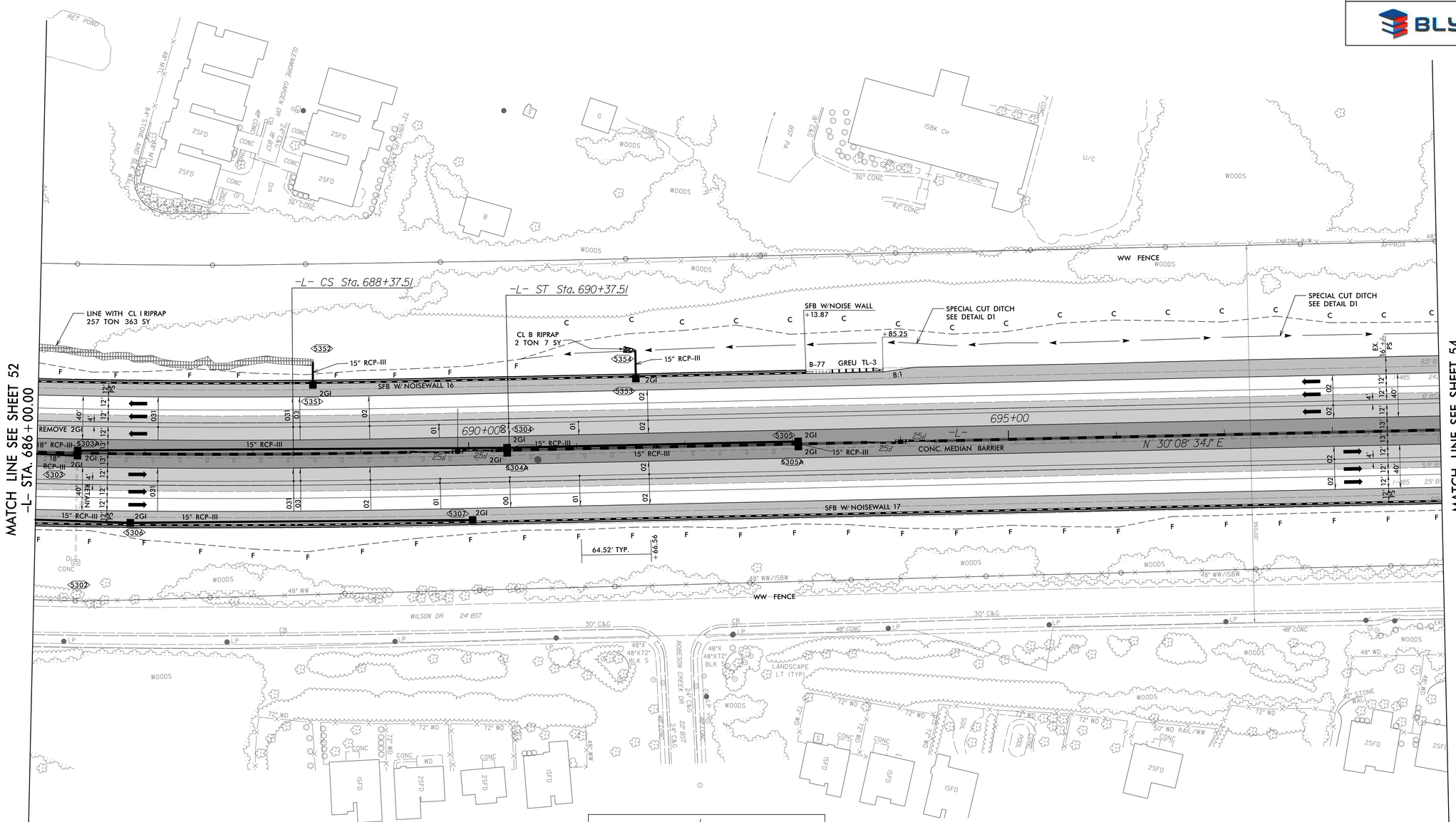
PROJECT REFERENCE NO.	SHEET NO.
I-5507	53
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 035826 ENGINEER ERIC W. SECKINGER

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 033452 ENGINEER KARL R. DAUBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BLYTHE



-L-	
PI Sta 649+39.49	PIs Sta 689+04.18
Δ = 67° 32' 49.1" (LT)	Θs = 0° 44' 59.4"
D = 0° 44' 59.4"	Ls = 200.00'
L = 9,008.10'	LT = 133.33'
T = 5,110.08'	ST = 66.67'
R = 7,641.00'	
SE = 0.031	
DS = 75 MPH	

SEE SHEET 106, 107 FOR -L- (WB) AND -L- (EB) PROFILE
SEE SHEET 2N-16A&16W(5) FOR -NW16A&16W-
SEE SHEET 2N-17(5), 2N-17(6) FOR -NW17-

9/4/2019
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PDP/KCS02$

8/17/99

REVISIONS

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1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

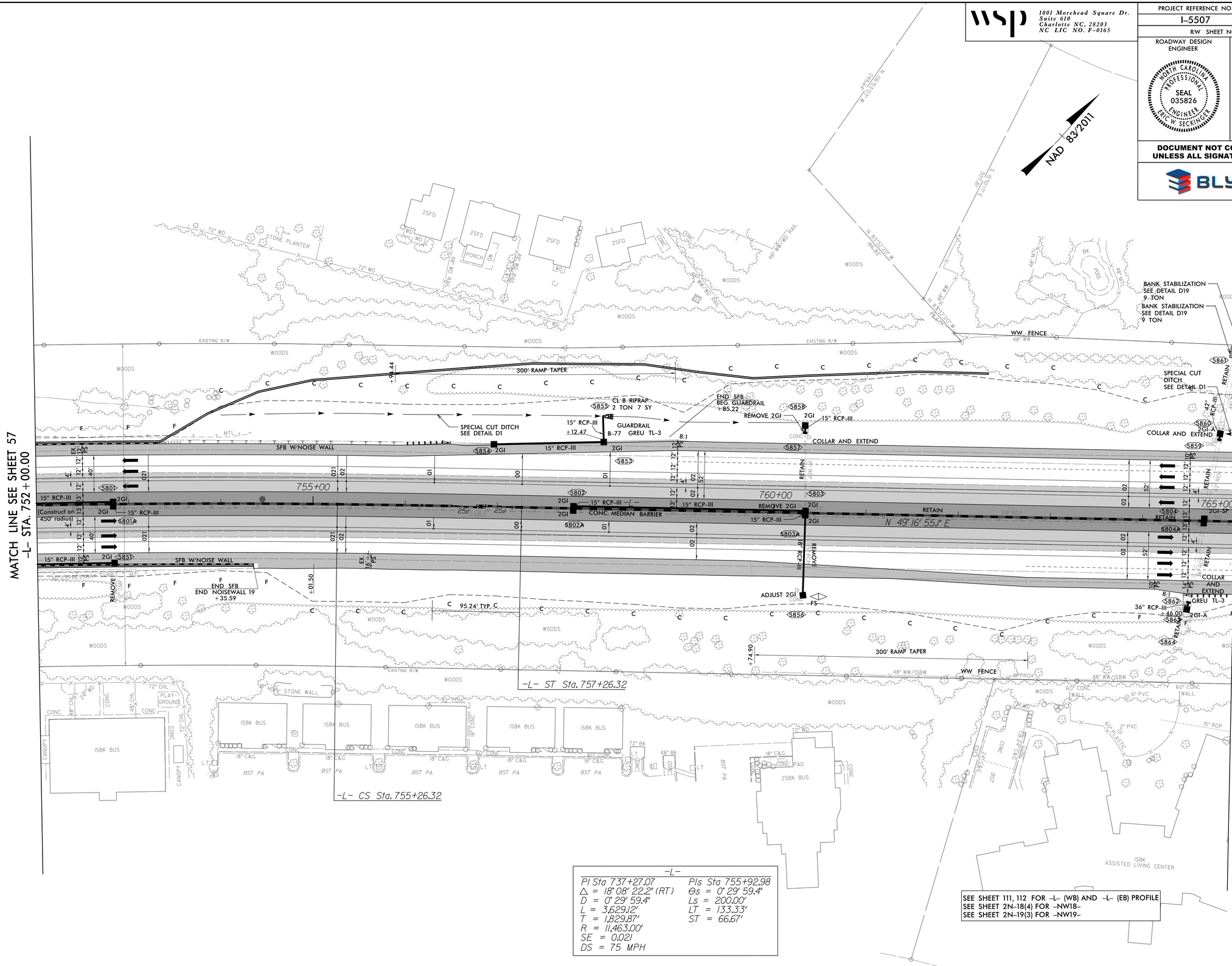
PROJECT REFERENCE NO.	SHEET NO.
I-5507	58
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 035826 ENGINEER ERIC W. SECKINGER

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 033452 ENGINEER KARL R. DAUBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BLYTHE



-L-

PI Sta 737+27.07	PIs Sta 755+92.98
Δ = 18° 08' 22.2" (RT)	Θs = 0° 29' 59.4"
D = 0° 29' 59.4"	Ls = 200.00'
L = 3,629.12'	LT = 133.33'
T = 1,829.87'	ST = 66.67'
R = 11,463.00'	
SE = 0.021	
DS = 75 MPH	

9/4/2019
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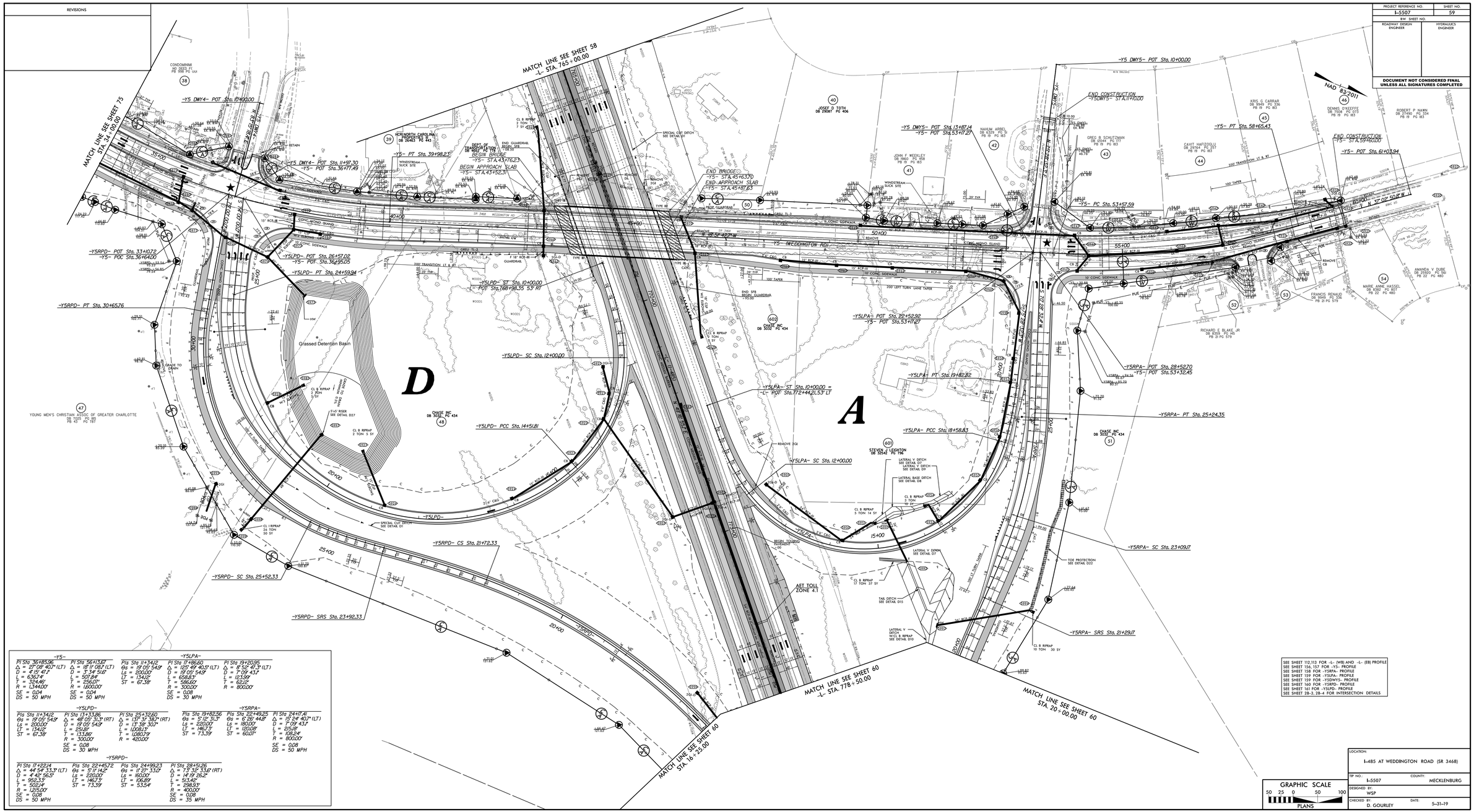
REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
I-5507	59
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



-Y5-

PI Sta 36+85.56	PI Sta 56+13.67	PI Sta 11+34.12	PI Sta 19+20.95
Δ = 27° 08' 40.7" (LT)	Δ = 16° 11' 08.1" (LT)	Δ = 19° 05' 54.9"	Δ = 52° 41.3" (LT)
D = 4° 15' 47.1"	D = 3° 34' 51.6"	D = 19° 05' 54.9"	D = 7° 09' 43.1"
L = 636.24'	L = 507.84'	L = 134.12'	L = 123.39'
T = 324.46'	T = 256.07'	T = 68.60'	T = 62.12'
R = 1,344.00'	R = 1,800.00'	R = 300.00'	R = 800.00'
SE = 0.04	SE = 0.04	SE = 0.08	
DS = 50 MPH	DS = 50 MPH	DS = 30 MPH	

-Y5LPA-

PI Sta 17+86.60	PI Sta 19+20.95		
Δ = 125° 49' 40.5" (LT)	Δ = 52° 41.3" (LT)		
D = 19° 05' 54.9"	D = 7° 09' 43.1"		
L = 658.83'	L = 123.39'		
T = 586.60'	T = 62.12'		
R = 300.00'	R = 800.00'		
SE = 0.08			
DS = 30 MPH			

-Y5LPD-

Pls Sta 11+34.12	Pl Sta 13+33.86	Pl Sta 25+32.60	
Θs = 19° 05' 54.9"	Δ = 48° 05' 31.3" (RT)	Δ = 13° 39' 38.2" (RT)	
Ls = 200.00'	D = 19° 05' 54.9"	D = 13° 39' 30.1"	
LT = 134.12'	L = 251.81'	L = 1,008.13'	
ST = 67.38'	T = 133.86'	T = 1,080.73'	
	R = 300.00'	R = 420.00'	
	SE = 0.08		
	DS = 30 MPH		

-Y5RPA-

Pls Sta 19+82.56	Pls Sta 22+49.25	Pl Sta 24+17.41
Θs = 5° 26' 31.3"	Θs = 6° 28' 44.8"	Δ = 15° 24' 40.7" (LT)
Ls = 220.00'	Ls = 180.00'	D = 7° 09' 43.1"
LT = 147.73'	LT = 120.08'	L = 215.18'
ST = 73.39'	ST = 60.07'	T = 108.24'
		R = 800.00'
		SE = 0.08
		DS = 50 MPH

-Y5RPD-

Pl Sta 17+22.14	Pls Sta 22+45.72	Pls Sta 24+99.23	Pl Sta 28+51.26
Δ = 44° 54' 33.3" (LT)	Θs = 5° 17' 14.2"	Θs = 11° 21' 33.0"	Δ = 73° 32' 33.6" (RT)
D = 4° 42' 56.5"	Ls = 220.00'	Ls = 160.00'	D = 14° 19' 26.2"
L = 952.33'	LT = 147.73'	LT = 106.89'	L = 513.42'
T = 502.14'	ST = 73.39'	ST = 53.54'	T = 298.93'
R = 1,215.00'			R = 400.00'
SE = 0.08			SE = 0.08
DS = 50 MPH			DS = 35 MPH

LOCATION: I-485 AT WEDDINGTON ROAD (SR 3468)	
TIP NO. I-5507	COUNTY: MECKLENBURG
DESIGNED BY: WSP	
CHECKED BY: D. GOURLEY	DATE: 5-31-19

GRAPHIC SCALE
50 25 0 50 100
PLANS

-Y5RPA-		-Y5RPD-	
PIs Sta 11+46.73	PI Sta 15+74.21	PIs Sta 19+82.56	PI Sta 17+22.14
Θs = 5° 12' 31.3"	Δ = 32° 38' 00.1" (RT)	Θs = 5° 12' 31.3"	Δ = 44° 54' 33.3" (LT)
Ls = 220.00'	D = 4° 44' 06.7"	Ls = 220.00'	D = 4° 42' 56.5"
LT = 146.73'	L = 689.17'	LT = 146.73'	L = 952.33'
ST = 73.39'	T = 354.21'	ST = 73.39'	T = 502.14'
	R = 1,210.00'		R = 1,215.00'
	SE = 0.08		SE = 0.08
	DS = 60 MPH		DS = 60 MPH

LIMITS OF EARLY WORKS GRADING

wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

PROJECT REFERENCE NO.	SHEET NO.
I-5507	60
R/W SHEET NO.	

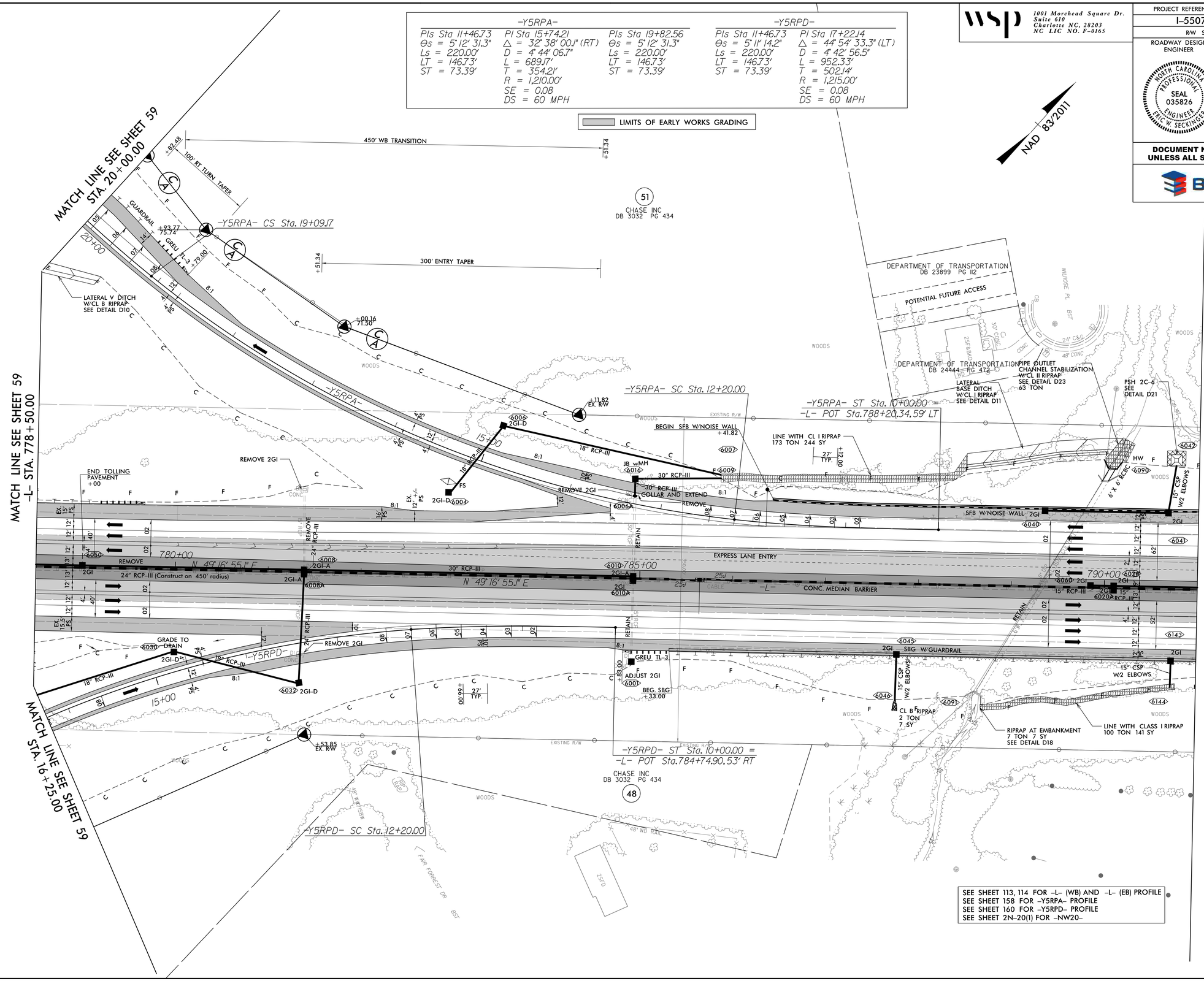
ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 035826 ENGINEER ERIC W. SECKINGER

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 033452 ENGINEER KARL R. DAUBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BLYTHE

NAD 83/2011



SEE SHEET 113, 114 FOR -L- (WB) AND -L- (EB) PROFILE
SEE SHEET 158 FOR -Y5RPA- PROFILE
SEE SHEET 160 FOR -Y5RPD- PROFILE
SEE SHEET 2N-20(1) FOR -NW20-

REVISIONS

8/17/99

9/4/2019
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PROFILE

8/17/99

REVISIONS

wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

PROJECT REFERENCE NO.	SHEET NO.
I-5507	61
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 035826 ENGINEER ERIC W. SECKINGER

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 033452 ENGINEER KARL R. DAUBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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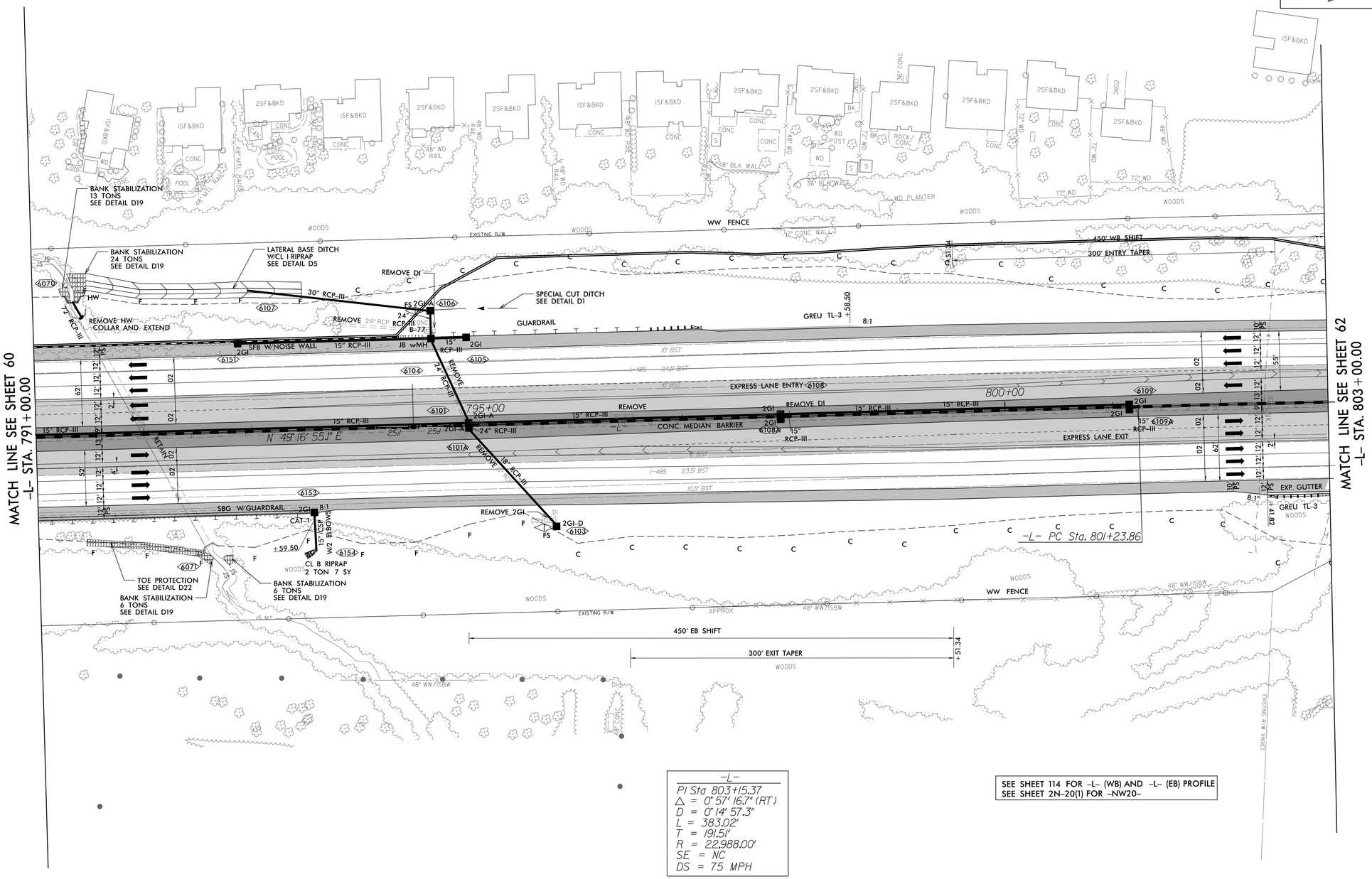
NAD 83/2011



-L-
PI Sta 803+15.37
△ = 0° 57' 16.7" (RT)
D = 0° 14' 57.3"
L = 383.02'
T = 191.51'
R = 22,988.00'
SE = NC
DS = 75 MPH

SEE SHEET 114 FOR -L- (WB) AND -L- (EB) PROFILE
SEE SHEET 2N-20(1) FOR -NW20-

9/4/2019
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PWP WILSON8

wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

PROJECT REFERENCE NO.	SHEET NO.
I-5507	62
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 035826 ENGINEER ERIC W. SECKINGER

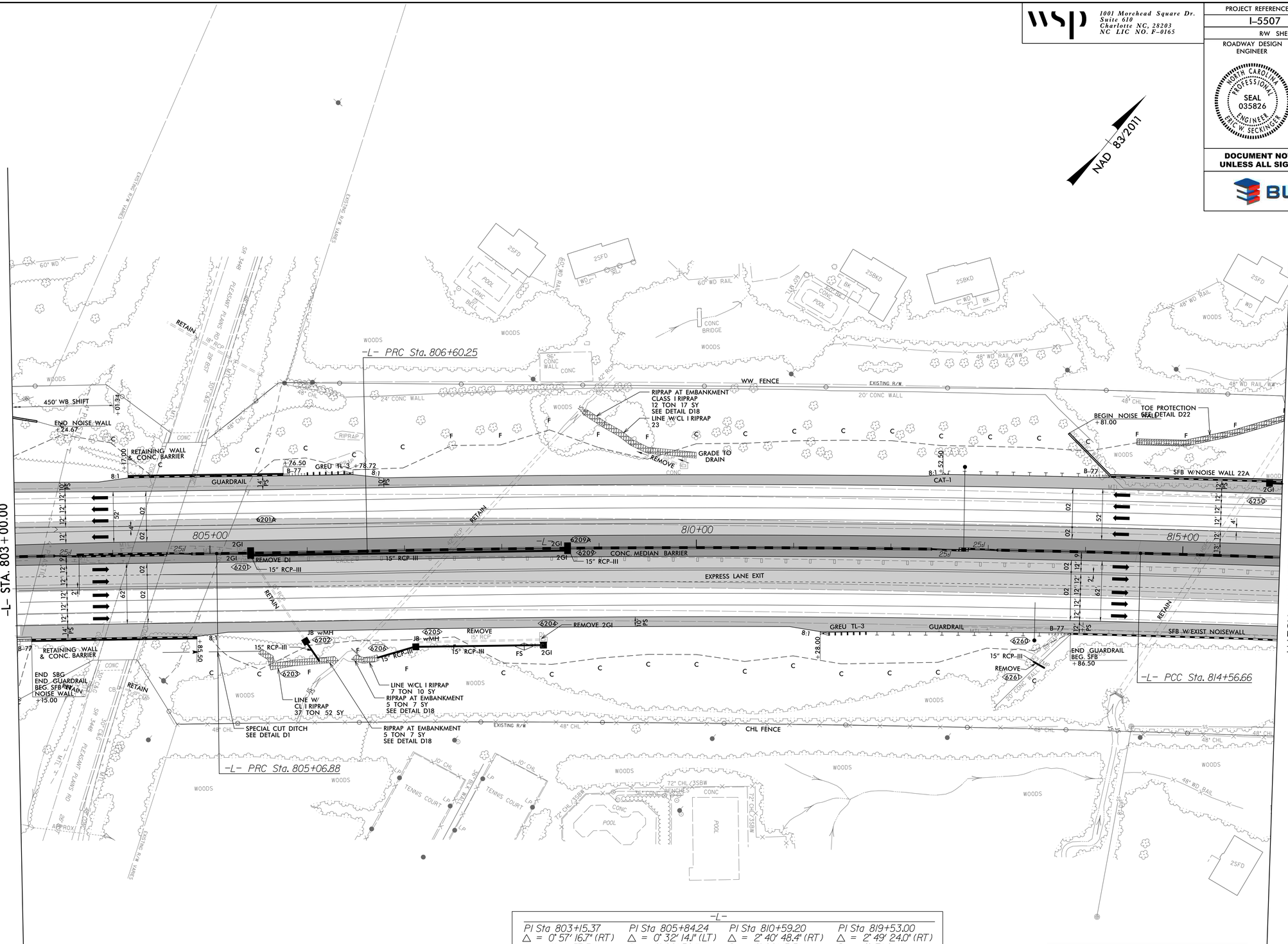
HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 033452 ENGINEER KARL R. DAUBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BLYTHE

8/17/99

REVISIONS



-L-			
PI Sta 803+15.37	PI Sta 805+84.24	PI Sta 810+59.20	PI Sta 819+53.00
△ = 0° 57' 16.7" (RT)	△ = 0° 32' 14.1" (LT)	△ = 2° 40' 48.4" (RT)	△ = 2° 49' 24.0" (RT)
D = 0° 14' 57.3"	D = 0° 20' 50.1"	D = 0° 20' 13.5"	D = 0° 17' 04.1"
L = 383.02'	L = 154.72'	L = 795.07'	L = 992.47'
T = 191.51'	T = 77.36'	T = 397.61'	T = 496.34'
R = 22,988.00'	R = 16,500.00'	R = 16,997.00'	R = 20,141.00'
SE = NC	SE = NC	SE = NC	SE = NC
DS = 75 MPH	DS = 75 MPH	DS = 75 MPH	DS = 75 MPH

SEE SHEET 115 FOR -L- (WB) AND -L- (EB) PROFILE
SEE SHEET 2N-22A(1) FOR -NW22A-
RETAINING WALL SHEET TO BE PROVIDED

9/4/2019
n:\pcdrawings02\ncs_workingdir\3558\282124_911648\15507_rdy_psh62.dgn
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1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

PROJECT REFERENCE NO.	SHEET NO.
I-5507	63
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 035826 ENGINEER ERIC W SECKINGER

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 033452 ENGINEER KARL R DAUBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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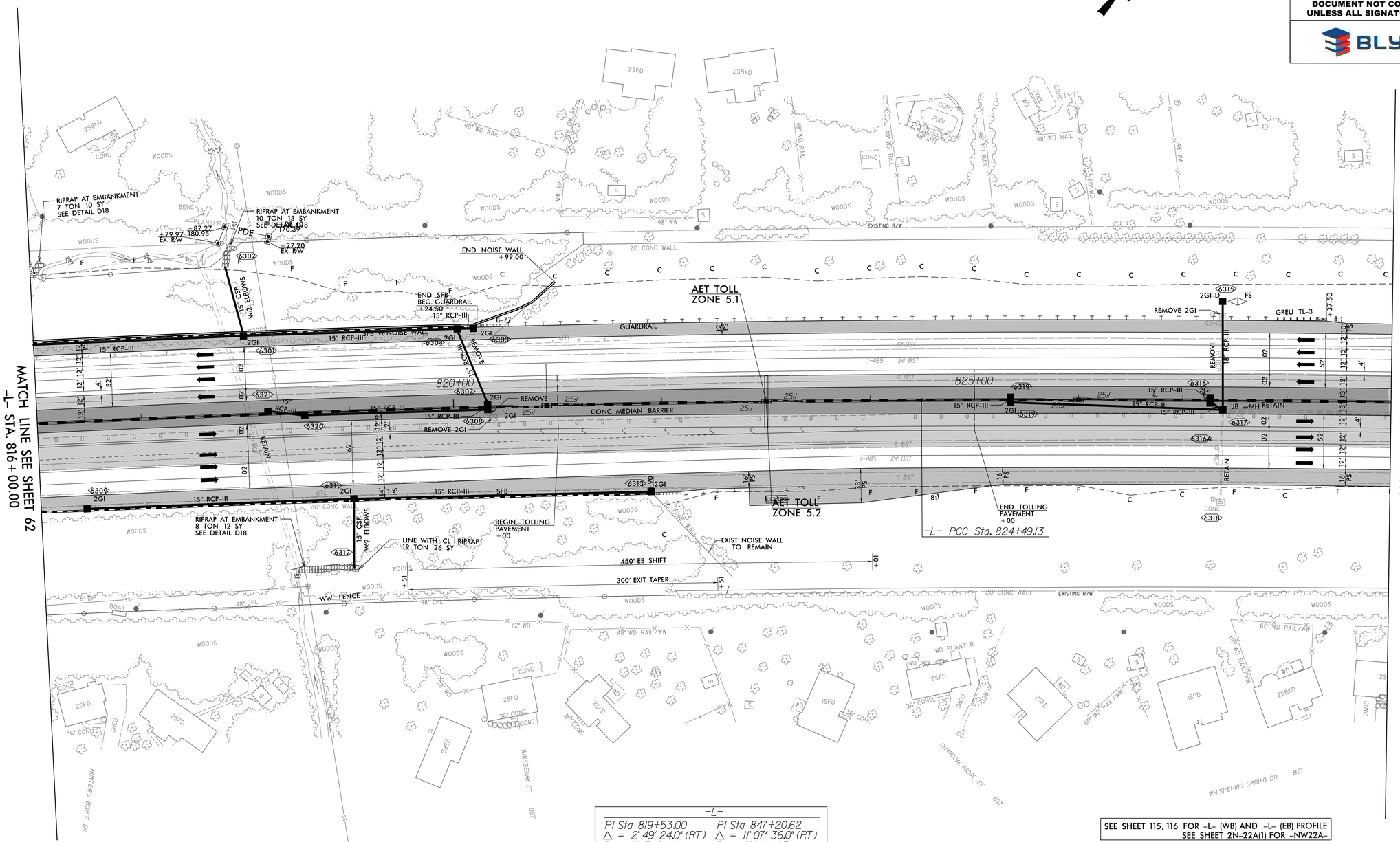
NAD 83/2011



-L-	
PI Sta 819+53.00	PI Sta 847+20.62
Δ = 2° 49' 24.0" (RT)	Δ = 11° 07' 36.0" (RT)
D = 0° 17' 04.1"	D = 0° 14' 44.5"
L = 992.47'	L = 4,528.68'
T = 496.34'	T = 2,271.48'
R = 20,141.00'	R = 23,320.00'
SE = NC	SE = NC
DS = 75 MPH	DS = 75 MPH

SEE SHEET 115, 116 FOR -L- (WB) AND -L- (EB) PROFILE
SEE SHEET 2N-22A(1) FOR -NW22A-

9/4/2019
n:\pcdwtcs02\tcs_workingdir\3558\28124.91649\i5507_rdy_psh63.dgn
PROFILE: NONE

8/17/99

REVISIONS

wsp
1001 Morehead Square Dr.
Suite 610
Charlotte NC, 28203
NC LIC NO. F-0165

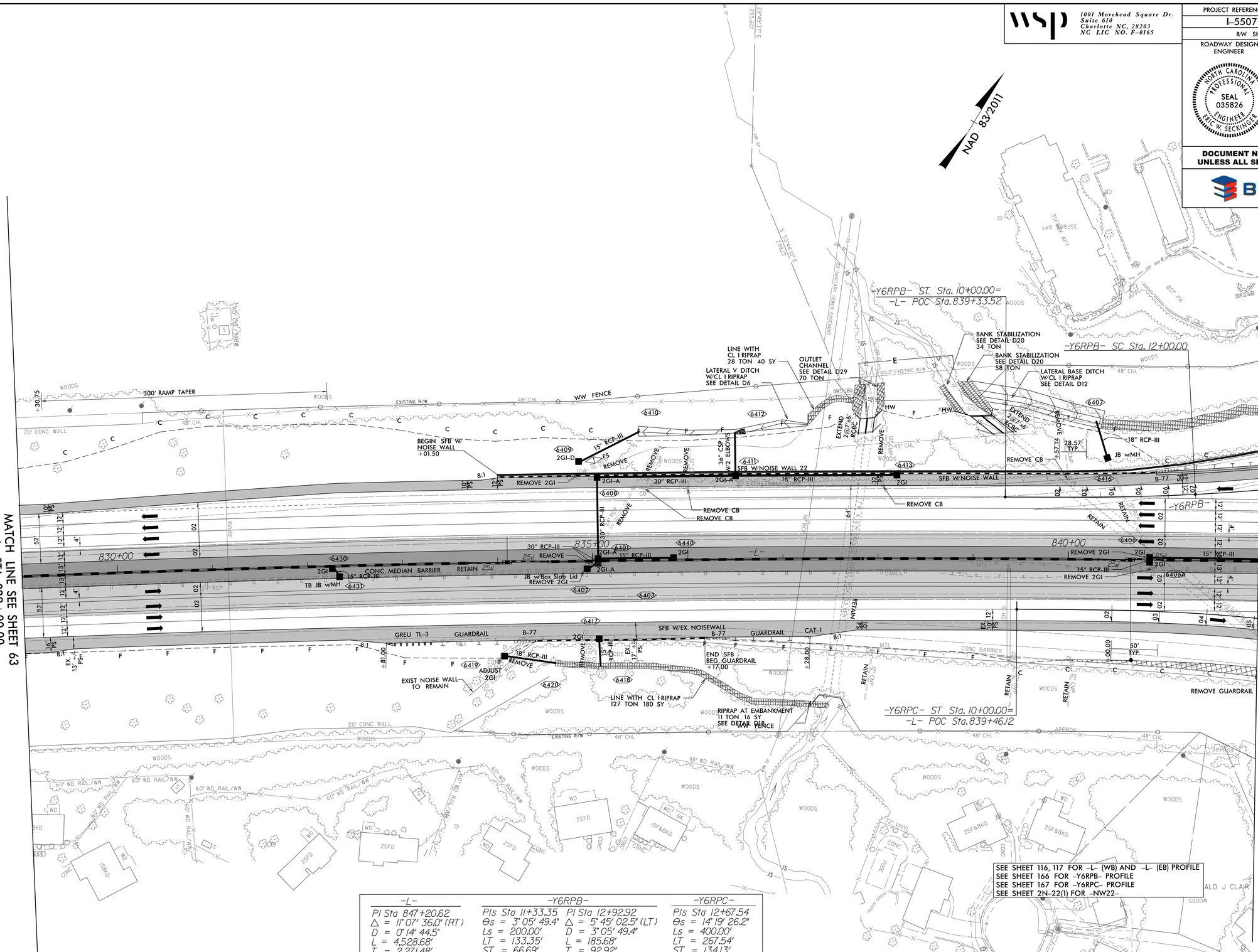
PROJECT REFERENCE NO.	SHEET NO.
I-5507	64
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 035826 ENGINEER ERIC W. SECKINGER

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 033452 ENGINEER KARL R. DAUBER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BLYTHE



-L-	-Y6RPB-		-Y6RPC-
PI Sta 847+20.62	PIs Sta 11+33.35	PI Sta 12+92.92	PIs Sta 12+67.54
Δ = 11° 07' 36.0" (RT)	Θs = 3° 05' 49.4"	Δ = 5° 45' 02.5" (LT)	Θs = 14° 19' 26.2"
D = 0° 14' 44.5"	Ls = 200.00'	D = 3° 05' 49.4"	Ls = 400.00'
L = 4,528.68'	LT = 133.35'	L = 185.68'	LT = 267.54'
T = 2,271.48'	ST = 66.69'	T = 92.92'	ST = 134.13'
R = 23,320.00'		R = 1,850.00'	
SE = NC		SE = 0.07	
DS = 75 MPH		DS = 60 MPH	

9/4/2019
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PROPWTCS02$

Appendix J

NCTA ITS Standard Details

NORTH CAROLINA TURNPIKE AUTHORITY
ITS STANDARD DETAILS

List of Sheets

V-1	CCTV - Block Diagram
V-2	CCTV - Steel Pole
V-3	CCTV - Pole Grounding
V-4	CCTV - Pole-Mounted Cabinet
V-5	CCTV - Camera Lowering Device
V-6	CCTV - Cabinet Layout
D-1	DMS - Block Diagram
D-2A	DMS - Typical Mounting - AET Gantry Structure
D-2B	DMS - Typical Mounting - On-site DMS Not at Toll Zone
D-2C	DMS - Typical Mounting - Off-site DMS
D-3	DMS - Electrical Service and Grounding
D-4	DMS - Cabinet Layout
R-1	RWIS - Block Diagram
R-2	RWIS - Elevation View
R-3	RWIS - Grounding
M-1	Microwave Detection - Block Diagram
M-2	Microwave Detection - Elevation View
M-3A	Microwave Detection - Cabinet Layout
M-3B	Microwave Detection - Cabinet Layout with CCTV Equipment
M-4	Microwave Detection - Grounding
M-5A	Microwave Detection - Pole Placement
M-5B	Microwave Detection - Pole Placement with CCTV Equipment
M-6	Microwave Detection - Sensor Mounting
M-7	Microwave Detection - Placement Schematic
P-1	Power Service Detail - Ground-Mounted Cabinet
P-2	Power Service Detail - Pole-Mounted Cabinet

Abbreviations

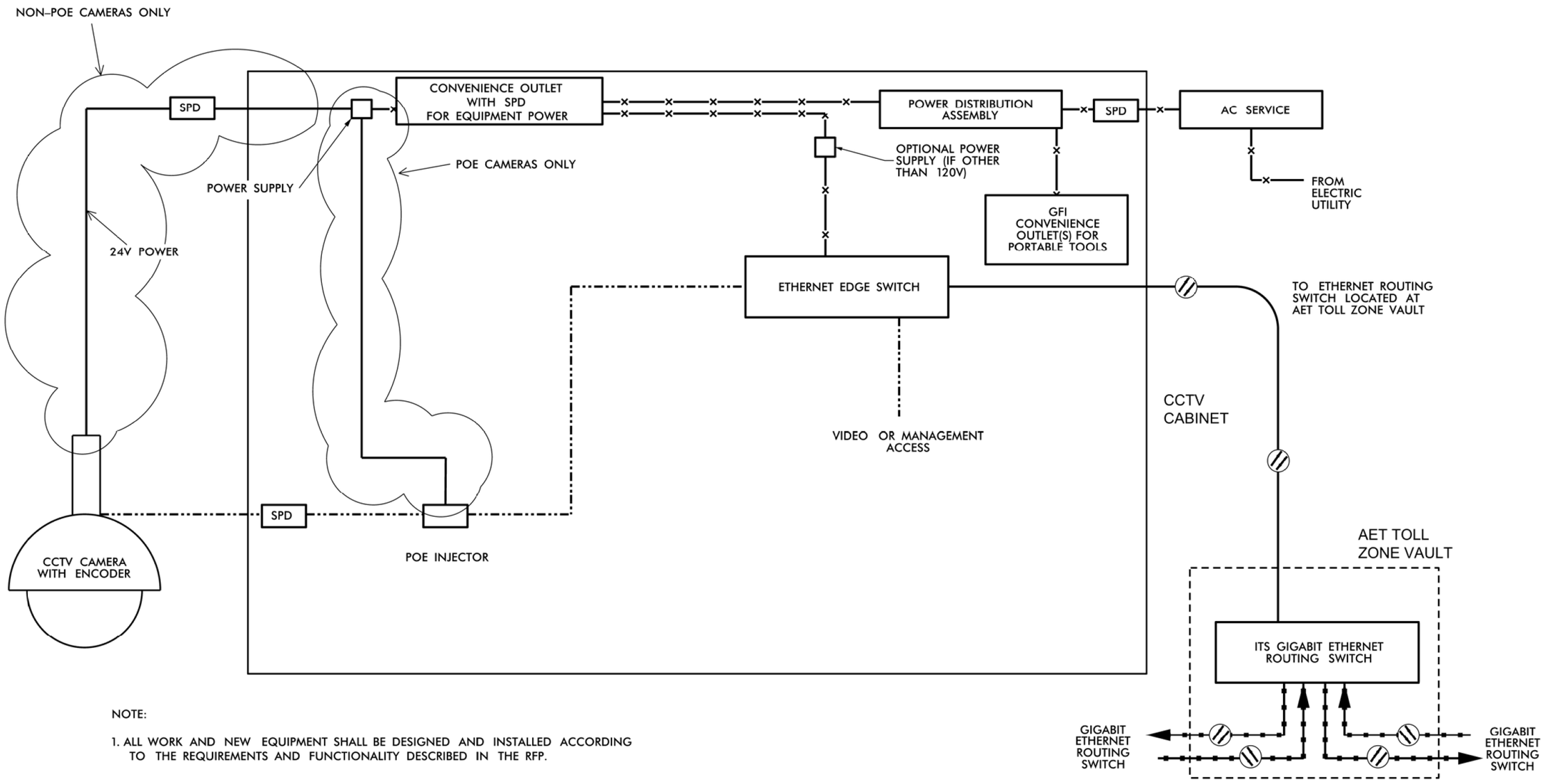
AET - All-Electronic Tolling
CCTV - Closed-Circuit Television
C/L - Centerline
DMS - Dynamic Message Sign
EOP - Edge of Pavement
EQ - Equal Distance
FON - Fiber Optic Network
(includes conduit, fiber, boxes, etc.)
GFI - Ground Fault Interrupter
ITS - Intelligent Transportation Systems
LD - Lowering Device
LPS - Lightning Protection System
MVD - Microwave Vehicle Detector
NEC - National Electrical Code
NEMA - National Electrical Manufacturers Association
RFP - Request for Proposals
R/W - Right-of-Way
RWIS - Roadside Weather Information System
SOW - Scope of Work
SPD - Surge Protection Device
TYP - Typical
UL - Underwriters Laboratories
UPS - Uninterruptable Power Supply

NORTH CAROLINA
Turnpike Authority

All design and installation shall conform to the latest published edition/version of the NCDOT Standard Specifications, Roadway Standard Drawings, and, as applicable, the NFPA 70 (NEC) and UL standards.

REVISION DATE - 02/01/2018

NORTH CAROLINA
Turnpike Authority



NOTE:

1. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

LEGEND

- 1000 BASE TX ETHERNET
- 100 BASE TX ETHERNET
- 120 VAC POWER
- 100 BASE FX ETHERNET (FIBER)
- 1000 BASE FX ETHERNET (FIBER)
- RS-232/422/485
- EXISTING DEVICE
- EXISTING FIBER CABLE

REVISED 10 /21 /2011

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only
2	DLJ	8/4/17	Changed to all-digital video

ATKINS
5200 77 Center Drive, Suite 50
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

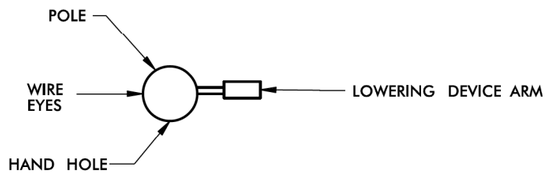
ITS STANDARD DETAILS

CCTV
BLOCK DIAGRAM

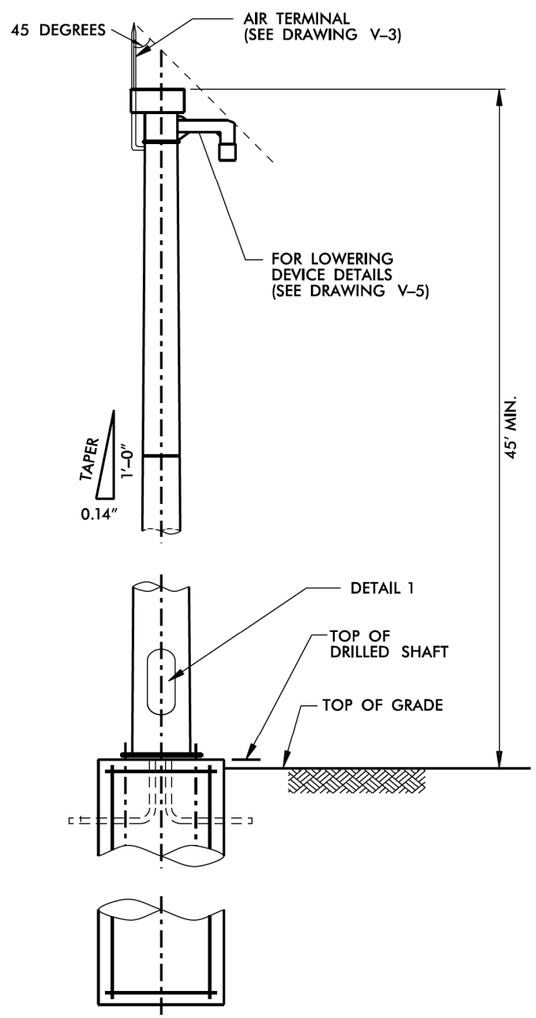
SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.
DATE: August, 2011		V-1
DWG. BY: B. Slocum		
DESIGN BY: A. Badgett / D. Jones		
APPROVED: A. Lelewski		

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority

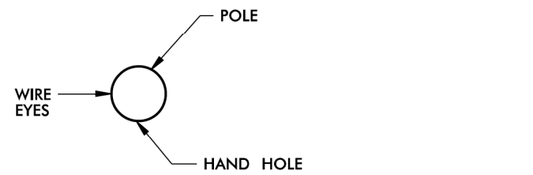


ORIENTATION VIEW

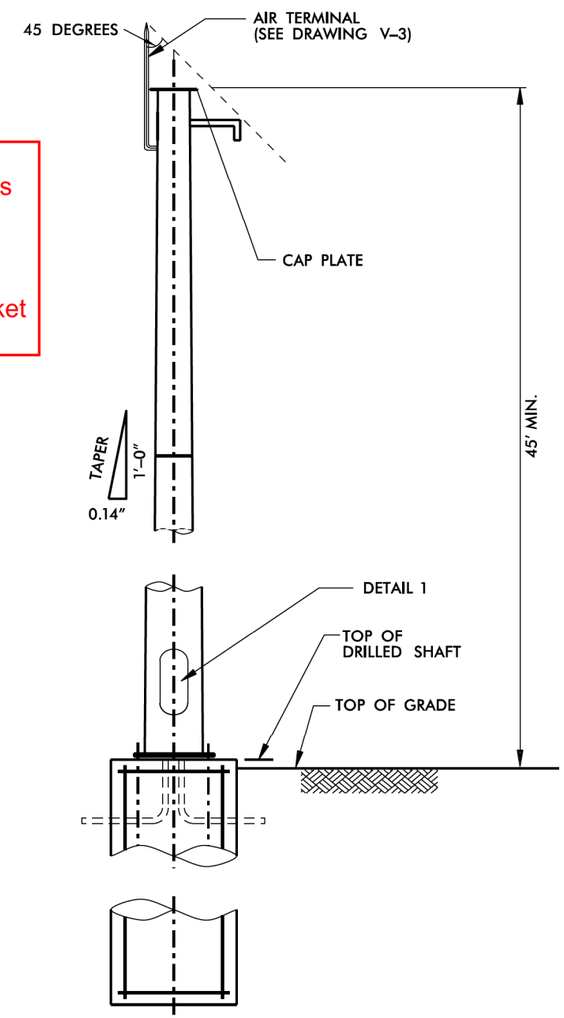


WITH LOWERING DEVICE ELEVATION

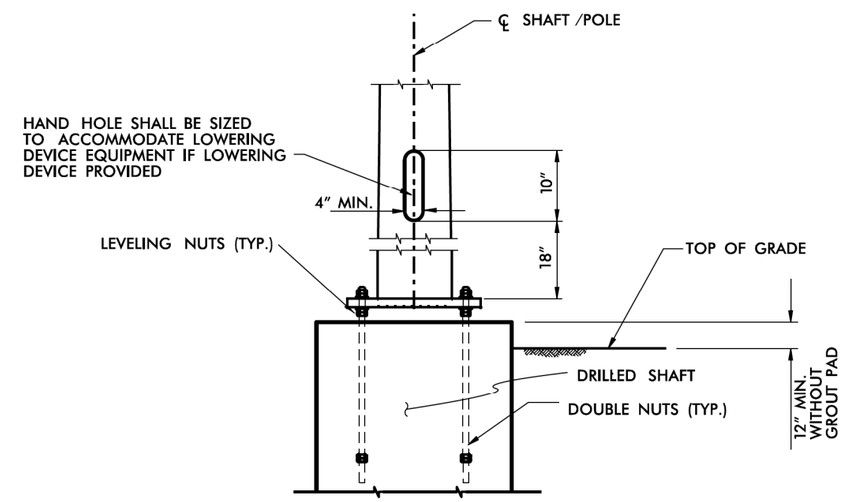
4/18/18:
Lowering devices are not required unless camera unable to be serviced by bucket truck.



ORIENTATION VIEW



WITHOUT LOWERING DEVICE ELEVATION



DETAIL 1

NOTE

1. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.
2. BANDING TO ATTACH CABINET AND ANY CONDUITS SHALL NOT INTERFERE WITH THE HAND HOLE.

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only

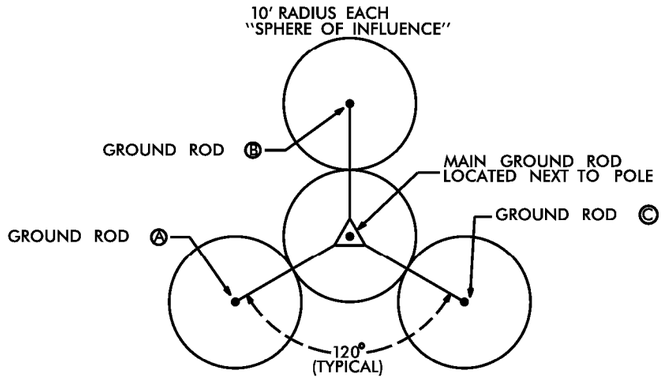
ATKINS 5200 77 Center Drive, Suite 50
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

ITS STANDARD DETAILS
CCTV
STEEL POLE

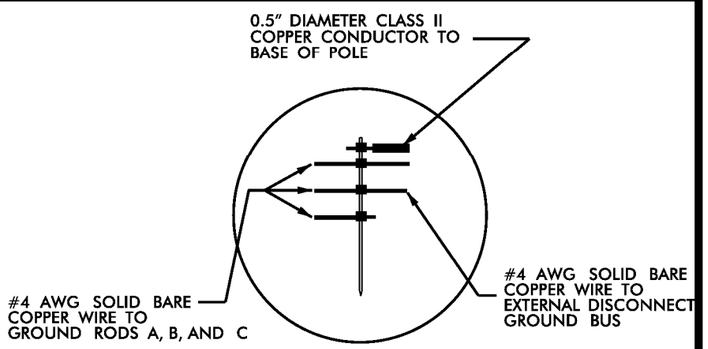
SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.
DATE: August, 2011		V-2
DWG. BY: B. Slocum		
DESIGN BY: A. Badgett / D. Jones		
APPROVED: A. Lelewski		

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

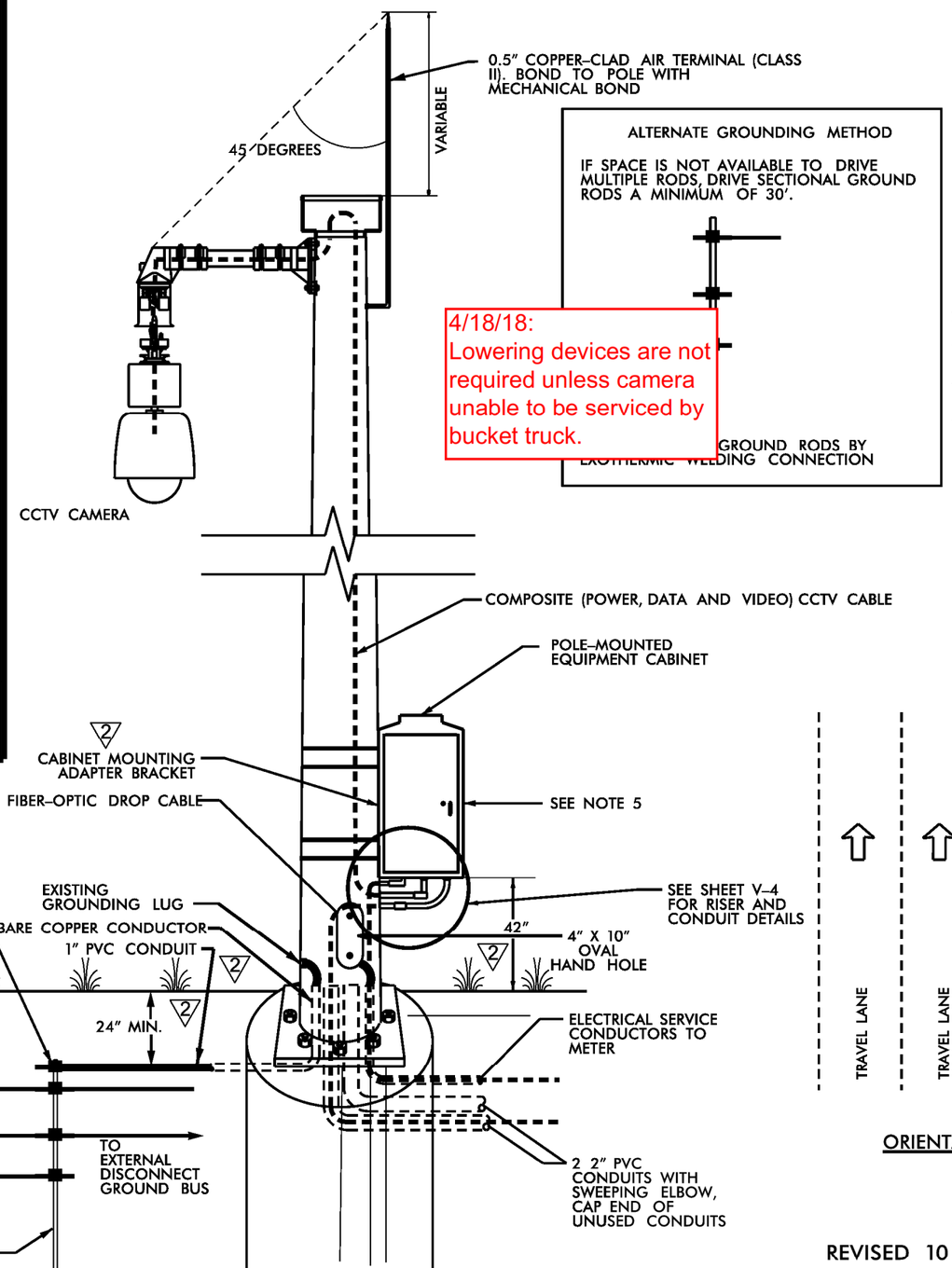
NORTH CAROLINA
Turnpike Authority



GROUND ROD PLACEMENT DETAIL
(TYPICAL EACH POLE)



INSET `A'



ALTERNATE GROUNDING METHOD

IF SPACE IS NOT AVAILABLE TO DRIVE MULTIPLE RODS, DRIVE SECTIONAL GROUND RODS A MINIMUM OF 30'.

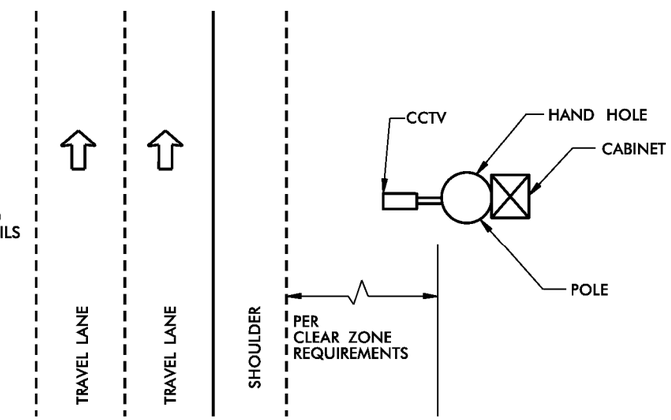
GROUND RODS BY
EXOTHERMIC WELDING CONNECTION

4/18/18:
Lowering devices are not required unless camera unable to be serviced by bucket truck.

4/18/18:
Replace references to "exothermic weld" to "irreversible compression connector"

NOTES

1. BOND 0.5" DIAMETER, 28 STRAND (MINIMUM) CLASS II COPPER CONDUCTOR TO THE MAIN GROUND ROD BY AN EXOTHERMIC WELD METHOD.
2. EXOTHERMICALLY WELD ALL CONNECTIONS TO GROUND RODS.
3. BOND #4 AWG SOLID BARE COPPER WIRE TO REBAR CAGE AND THE MAIN GROUND ROD BY AN EXOTHERMIC WELD METHOD.
4. ENSURE CAMERA HOUSING, CAMERA, AND PAN-TILT UNIT ARE BONDED TO POLE.
5. REMOVE BONDING JUMPER BETWEEN EQUIPMENT CABINET GROUND BUS AND NEUTRAL BUS.
6. THE CONTRACTOR MAY, UPON APPROVAL OF THE ENGINEER, INSTALL A 30-FOOT SECTIONAL GROUND ROD WHEN CONDITIONS WILL NOT ALLOW FOR THE INSTALLATION OF THE 3 – RADIAL GROUND RODS.
7. INSTALL MARKER TAPE DIRECTLY ABOVE ALL GROUNDING ELECTRODES AND CONDUCTORS AT A DEPTH OF 12".
8. AIR TERMINAL LENGTH DEPENDS ON LENGTH OF LOWERING DEVICE ARM.
9. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.



ORIENTATION OF DEVICES ON POLE
2

REVISED 10 /21 /2011

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only
2	DLJ	8/31/16	See Notes

ATKINS
5200 77 Center Drive, Suite 50
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

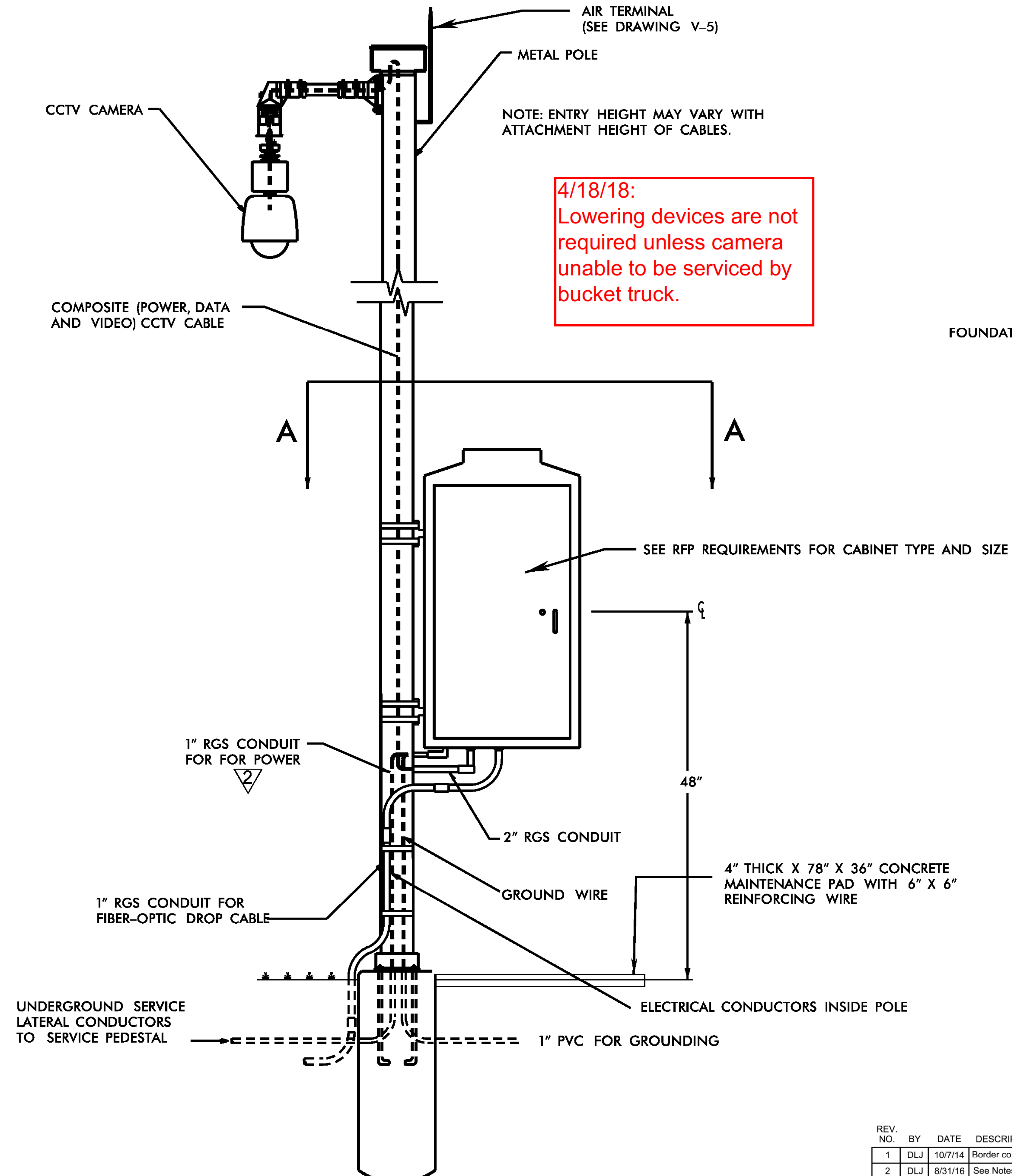
ITS STANDARD DETAILS
CCTV
POLE GROUNDING

SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.
DATE: August, 2011		V-3
DWG. BY: B. Slocum		
DESIGN BY: A. Badgett / D. Jones		
APPROVED: A. Lelewski		

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

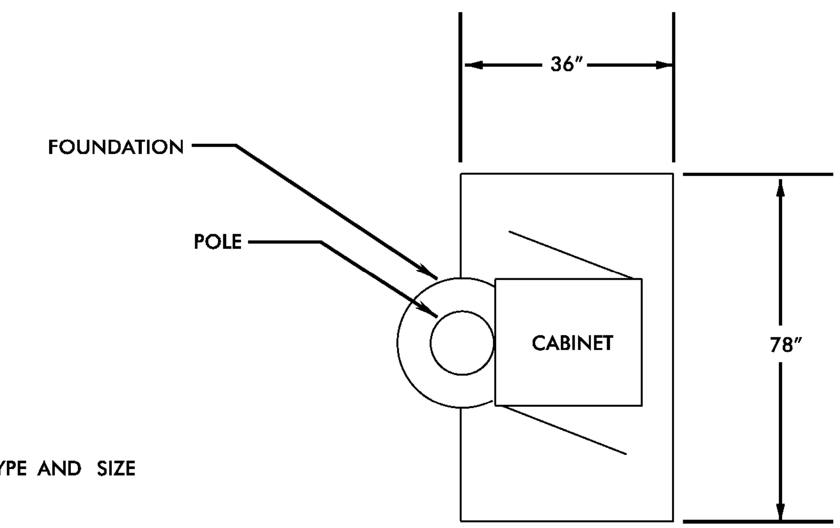
NORTH CAROLINA
Turnpike Authority

POLE-MOUNTED CCTV CABINET DETAIL



4/18/18:
Lowering devices are not required unless camera unable to be serviced by bucket truck.

SECTION A-A



NOTES

1. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.
2. ENSURE CONDUITS STRAPS DO NOT OBSTRUCT ACCESS TO HANDHOLES.
3. DO NOT INSTALL MAINTENANCE PAD ON EXCESSIVE SLOPE (GREATER THAN 3:1)

REVISED 8 / 24 / 11

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only
2	DLJ	8/31/16	See Notes

5200 77 Center Drive, Suite 50
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

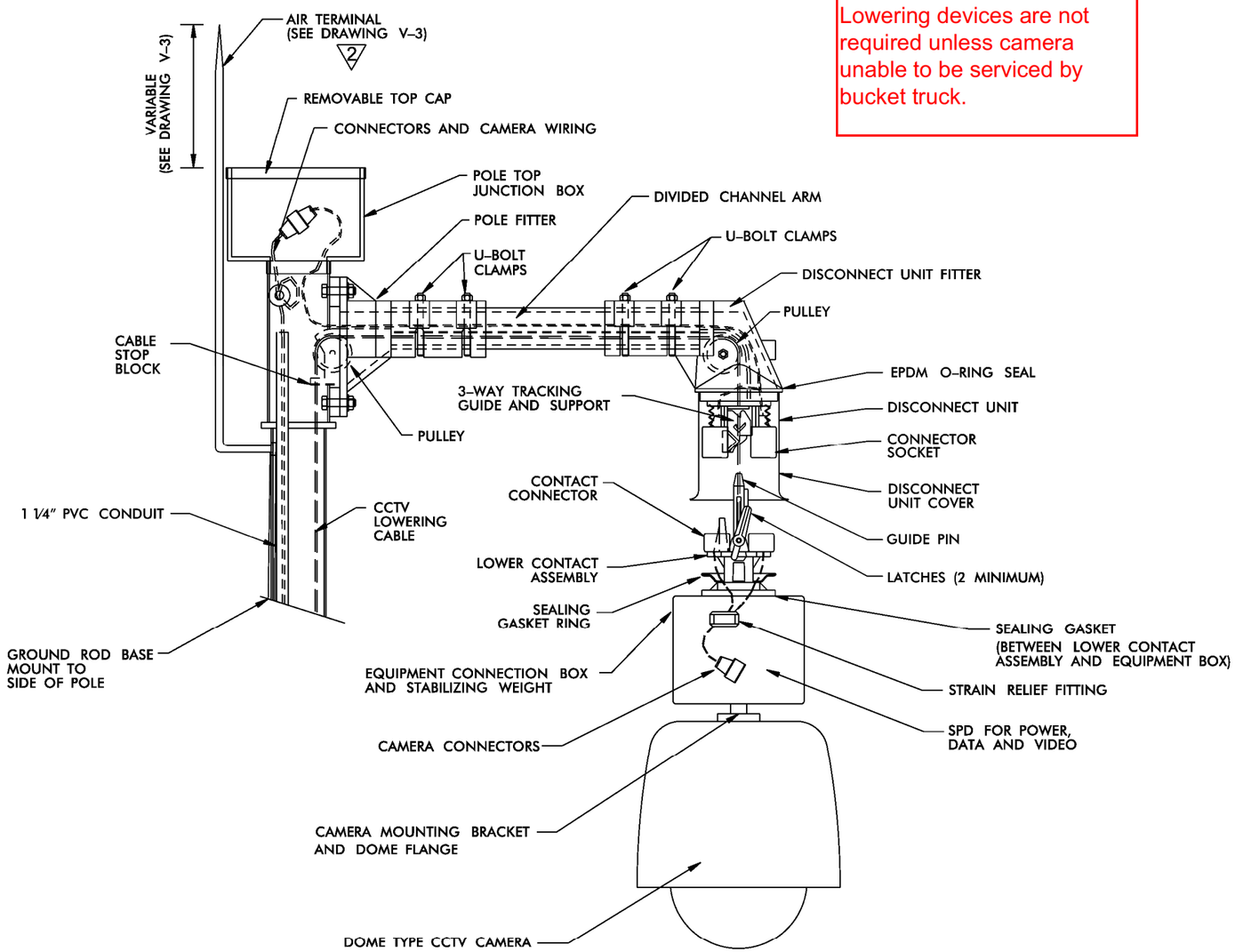
ITS STANDARD DETAILS
CCTV
POLE-MOUNTED CABINET

SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO. V-4
DATE: August, 2011		
DWG. BY: B. Slocum		
DESIGN BY: A. Badgett / D. Jones		
APPROVED: A. Lelewski		

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority

4/18/18:
Lowering devices are not required unless camera unable to be serviced by bucket truck.



GENERAL NOTES:

1. LOWERING DEVICE TO BE SHIPPED READY FOR POLE ATTACHMENT TO INCLUDE 100 FT. OF COMPOSITE POWER AND SIGNAL CABLE PREWIRED TO LOWERING DEVICE AT THE FACTORY.
2. THE LOWERING DEVICE MANUFACTURER SHALL SUPPLY BOTH A PORTABLE LOWERING TOOL WITH A MANUAL HAND CRANK AND A PORTABLE ELECTRIC DRILL MOTOR WITH CUSTOM CLUTCH ADAPTER. ONE LOWERING TOOL PER EVERY 10 LOWERING DEVICES IS REQUIRED.
3. THE LOWERING DEVICE MANUFACTURER SHALL PROVIDE AN ON-SITE INSTALLATION INSPECTION AND OPERATOR INSTRUCTION AND CERTIFICATION. THIS ENSURES THE PRODUCT IS ASSEMBLED CORRECTLY AND, MORE IMPORTANTLY, THAT ALL NECESSARY PERSONS ARE TRAINED IN THE PROPER, SAFE OPERATION OF THE SYSTEM. BEFORE ERECTING THE FIRST POLE THE CONTRACTOR MUST CONTACT THE LOWERING DEVICE SUPPLIER AND SCHEDULE A FACTORY REPRESENTATIVE TO BE ON-SITE.
4. LOWERING DEVICE CONNECTION TO TOP OF POLE SHALL BE CAPABLE OF SERVICE TENSION AND SHEAR OF 1 KIP MINIMUM. THE CONTRACTOR SHALL PROVIDE PRODUCT CUT SHEET AND CAPACITY DATA FOR THE ENGINEER'S REVIEW AND APPROVAL PRIOR TO INSTALLATION.
5. CAMERA TO BE MOUNTED TO CAMERA JUNCTION BOX AND STABILIZING WEIGHT VIA 1 1/2" STANDARD NPT PIPE THREAD.
6. USE AIR TERMINAL EXTENSION WHEN THE POLE TOP JUNCTION BOX IS WIDER THAN TOP OF POLE.
7. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

REVISED 10 /21 /2011

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only
2	DLJ	8/31/16	See Notes

ATKINS 5200 77 Center Drive, Suite 50
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

ITS STANDARD DETAILS

CCTV
CAMERA LOWERING DEVICE

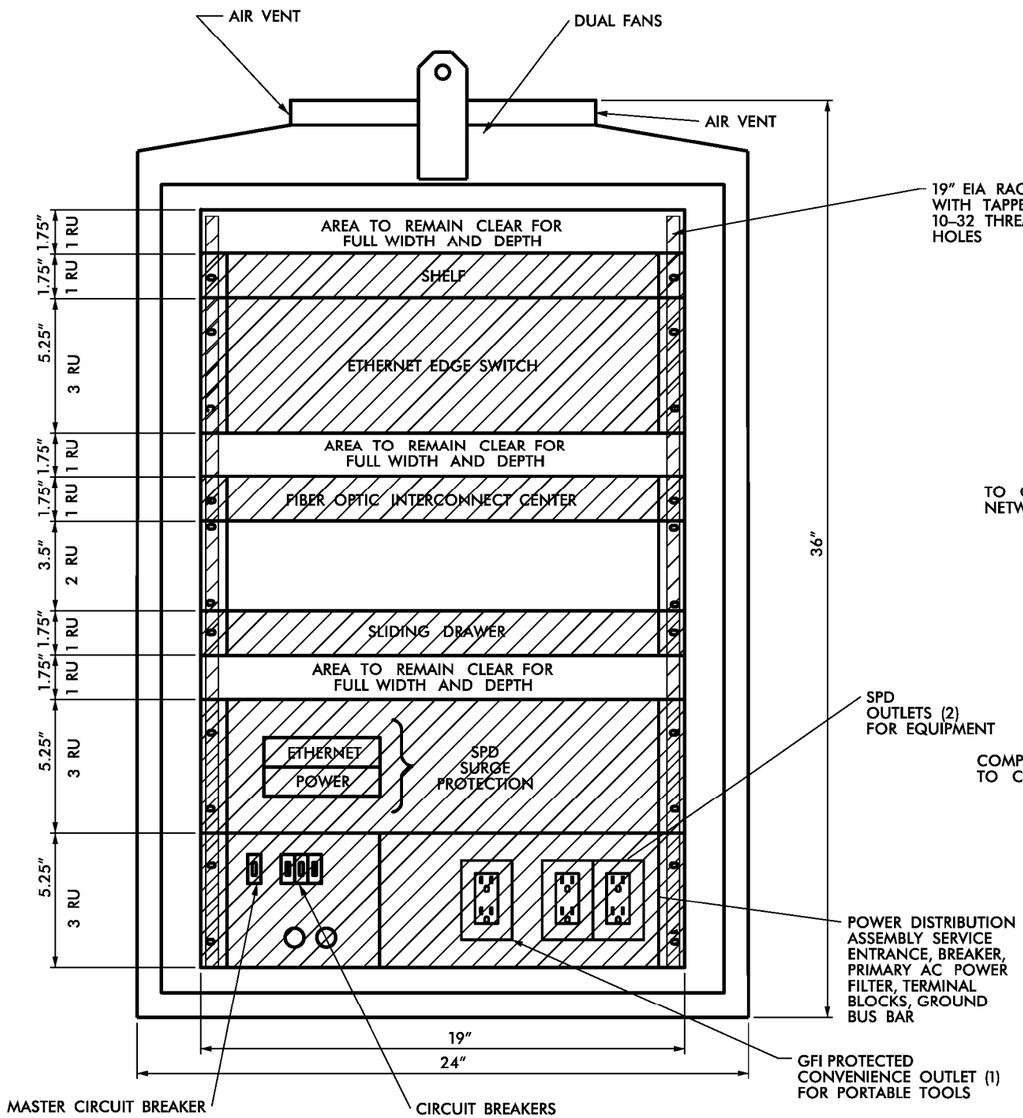
SCALE:	N.T.S.
DATE:	August, 2011
DWG. BY:	B. Slocum
DESIGN BY:	A. Badgett / D. Jones
APPROVED:	A. Lelewski

NORTH CAROLINA TURNPIKE AUTHORITY

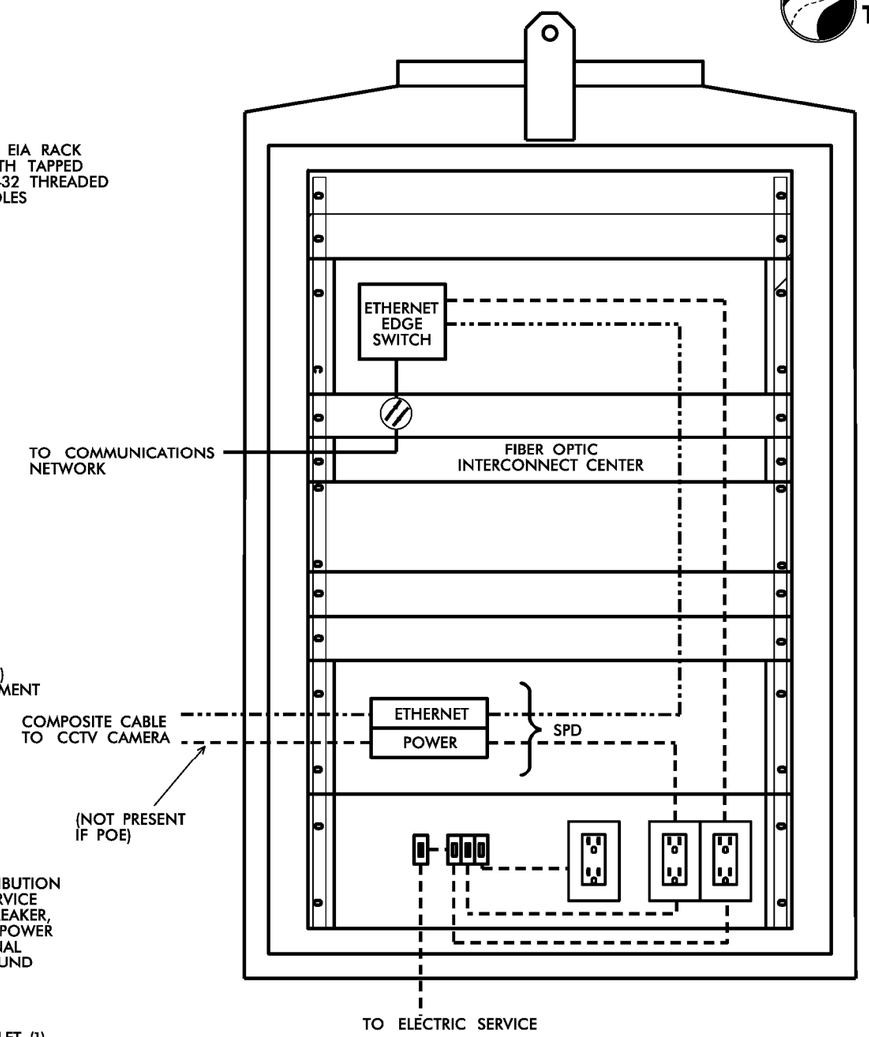
SHEET NO.
V-5

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority



FRONT VIEW



CABINET WIRING VIEW

NOTES

1. SEE RFP REQUIREMENTS FOR CABINET TYPE.
2. ALL DIMENSIONS AND SCALE ARE APPROXIMATE.
3. THE MINIMUM CCTV CABINET DIMENSIONS SHALL BE 36"H X 24"W X 22"D.
4. CONDUIT ENTRANCES ARE IN BOTTOM OF CABINET.
5. MINIMUM NUMBER OF OUTLETS IS THREE: (2) SPD AND (1) GFI PROTECTED.
6. THERE SHALL BE FRONT AND REAR DOORS. BOTH DOORS SHALL HAVE THE HINGE SIDE NEXT TO THE POLE WHEN POLE MOUNTED.
7. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

CONNECTION LEGEND

- 100 BASE FX ETHERNET (FIBER)
- 100 BASE TX ETHERNET
- ELECTRICAL POWER
- RS–232/422/485

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only
2	DLJ	8/4/17	Changed to all-digital video

ATKINS 5200 77 Center Drive, Suite 50
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

ITS STANDARD DETAILS

CCTV
CABINET LAYOUT

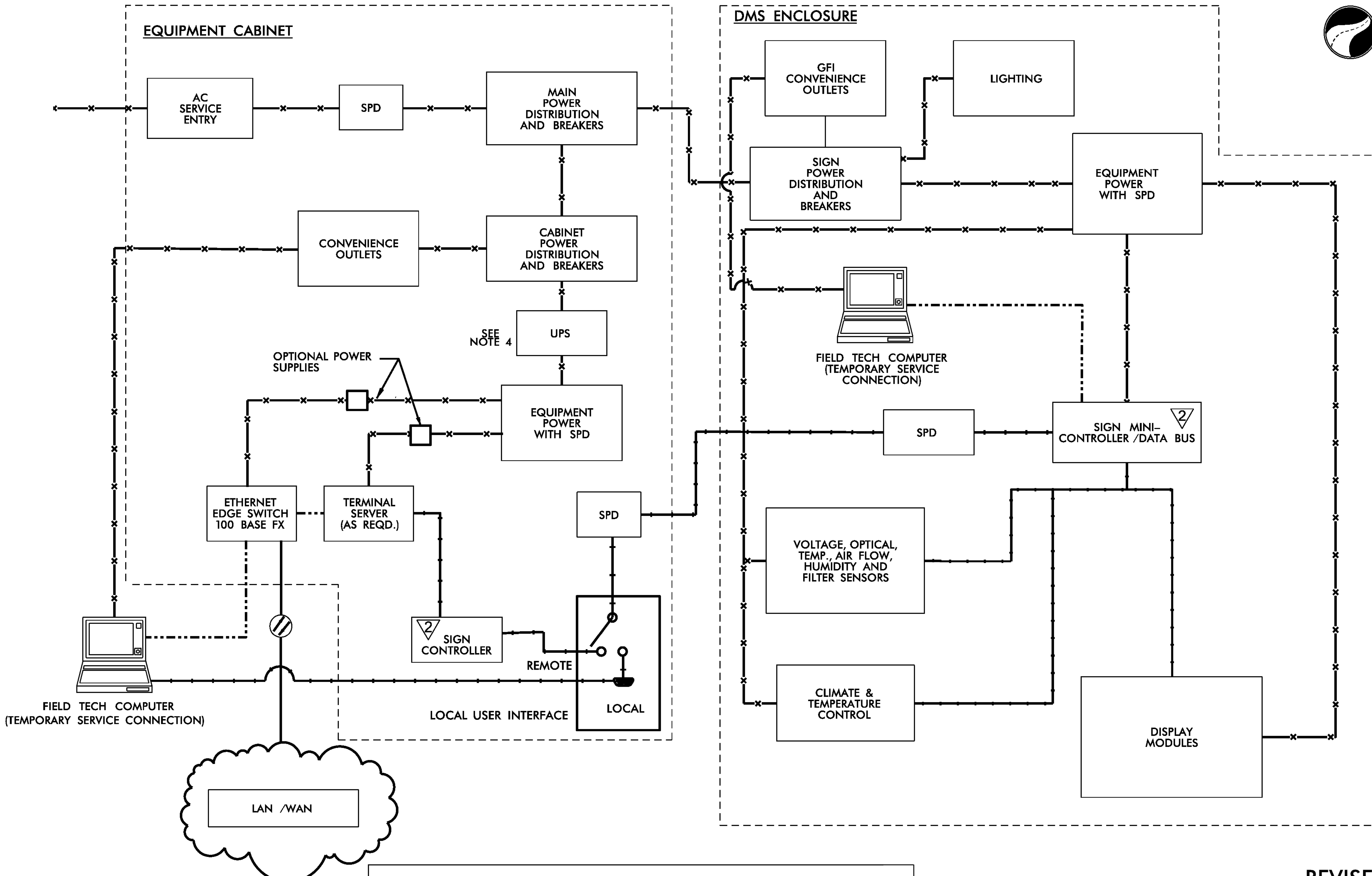
SCALE:	N.T.S.
DATE:	August, 2011
DWG. BY:	B. Slocum
DESIGN BY:	A. Badgett / D. Jones
APPROVED:	A. Lelewski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
V-6

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority



LEGEND

- 1000 BASE TX ETHERNET
- 100 BASE TX ETHERNET
- ANALOG VIDEO
- 120 VAC POWER
- LOW VOLTAGE POWER
- 100 BASE FX ETHERNET (FIBER)
- 1000 BASE FX ETHERNET (FIBER)
- RS–232/422/485
- EXISTING DEVICE
- EXISTING FIBER CABLE

GENERAL NOTES:

1. AC WIRED CABINET SHALL BE EQUIPPED WITH A SURGE PROTECTOR WITH AN ALARM FEATURE.
2. (NOTE DELETED) (revision 1)
3. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN RFP.
4. SIGNS AT AET VAULT LOCATIONS SHALL USE UPS FOR AET VAULT.

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

REVISED 10 /21 /2011

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling; see revision marks
2	DLJ	8/31/16	See Notes

ATKINS
5200 77 Center Drive, Suite 50
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

ITS STANDARD DETAILS

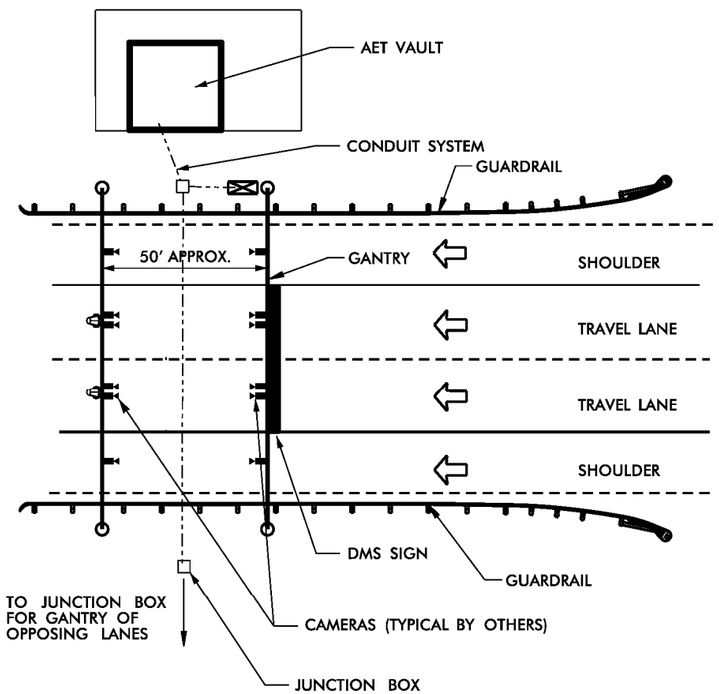
DMS
BLOCK DIAGRAM

SCALE: N.T.S.
DATE: August, 2011
DWG. BY: B. Slocum
DESIGN BY: A. Badgett / D. Jones
APPROVED: A. Lelewski

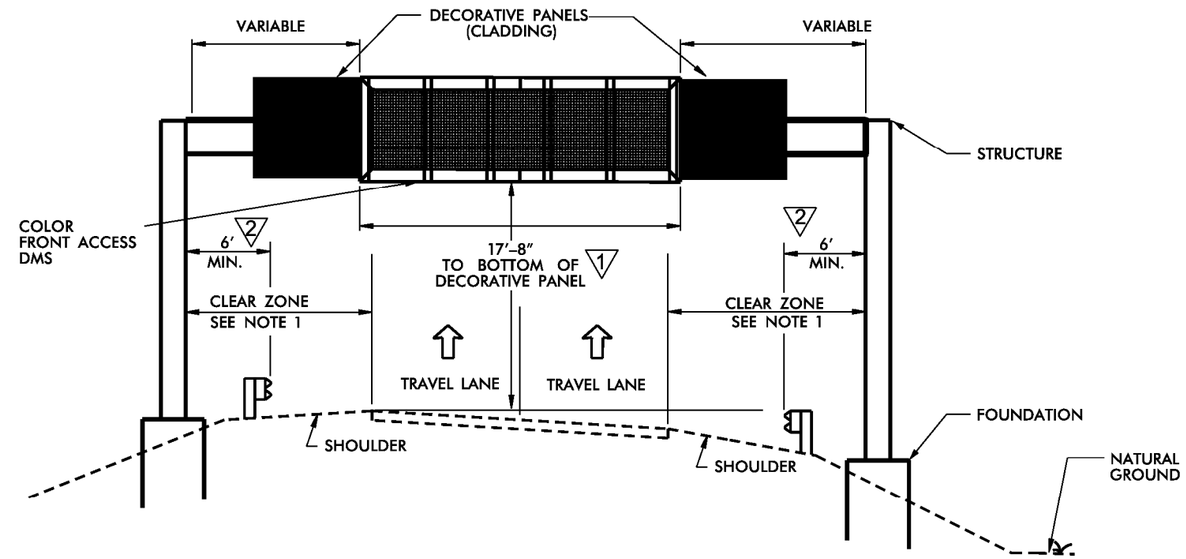
NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
D-1

NORTH CAROLINA
Turnpike Authority



TYPICAL PLAN VIEW
ON-SITE DMS AT AET GANTRY STRUCTURE



TYPICAL ELEVATION VIEW
ON-SITE DMS AT AET GANTRY STRUCTURE

GENERAL NOTES:

1. DESIGN COLUMNS IN ACCORDANCE WITH NCTA AESTHETIC DESIGN GUIDELINES AS REQUIRED BY RFP.
2. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.
3. CONDUCTORS SHALL BE CONNECTED TO STEEL FRAMEWORK THAT HAVE BEEN CLEANED TO BASE METAL, BY USE OF BONDING PLATES HAVING CONTACT AREA OF NOT LESS THAN 8 SQUARE INCHES OR BY WELDING OR BRAZING. DRILLING AND TAPPING THE STEEL STRUCTURE TO ACCEPT A THREADED CONNECTOR IS ALSO AN ACCEPTABLE METHOD.
4. IF STEEL FRAMEWORK IS TO BE DRILLED AND TAPPED TO ACCEPT THREADED CONNECTOR, THE THREADED CONNECTOR SHALL HAVE AT LEAST 5 THREADS FULLY ENGAGED AND SECURED WITH A JAM NUT TO THE STEEL FRAMEWORK.
5. BENDS IN THE CONDUIT WITH DMS COMMUNICATIONS CABLE (6-COUNT SINGLE MODE FIBER-OPTIC CABLE) SHALL NOT EXCEED THE MANUFACTURER'S MINIMUM RADIUS FOR THE FIBER-OPTIC CABLE.
5. CONDUITS ON STRUCTURE OR COLUMNS SHALL BE HIDDEN FROM VIEW OF APPROACHING TRAFFIC BY PLACING THEM ON DOWNSTREAM SIDE OR WITHIN STRUCTURAL MEMBERS OR COLUMNS.

1 6. (NOTE DELETED)

1 7. ALL DATA AND POWER CABLES FOR THE DMS SHALL BE COMPLETELY CONCEALED FROM ONCOMING TRAFFIC.

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling; see revision marks
2	DLJ	8/31/16	See Notes

REVISED 10 /21 /2011

ATKINS 5200 77 Center Drive, Suite 50
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

ITS STANDARD DETAILS

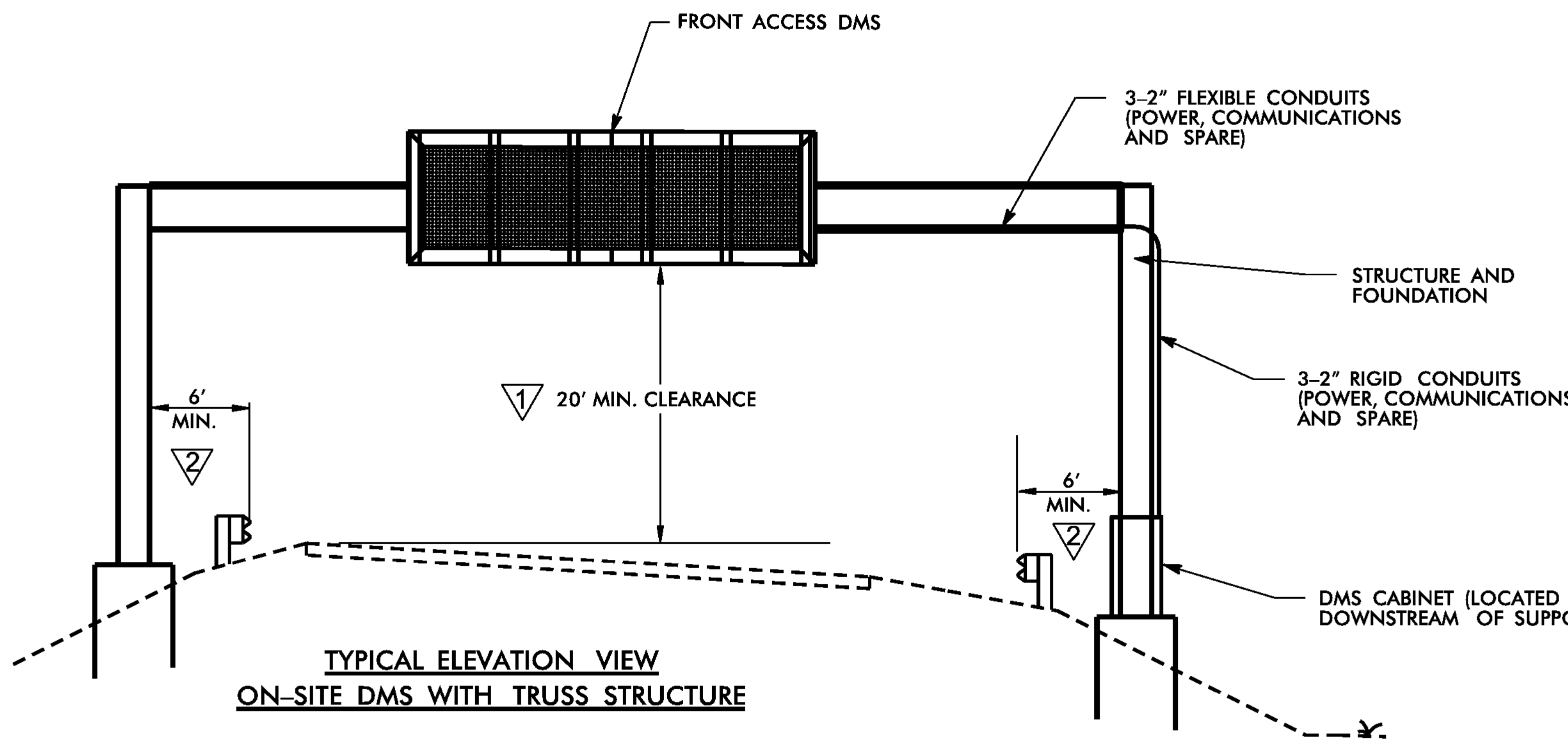
DMS - TYPICAL MOUNTING
AET GANTRY STRUCTURE

SCALE:	N.T.S.
DATE:	August, 2011
DWG. BY:	B. Slocum
DESIGN BY:	A. Badgett / D. Jones
APPROVED:	A. Lelewski

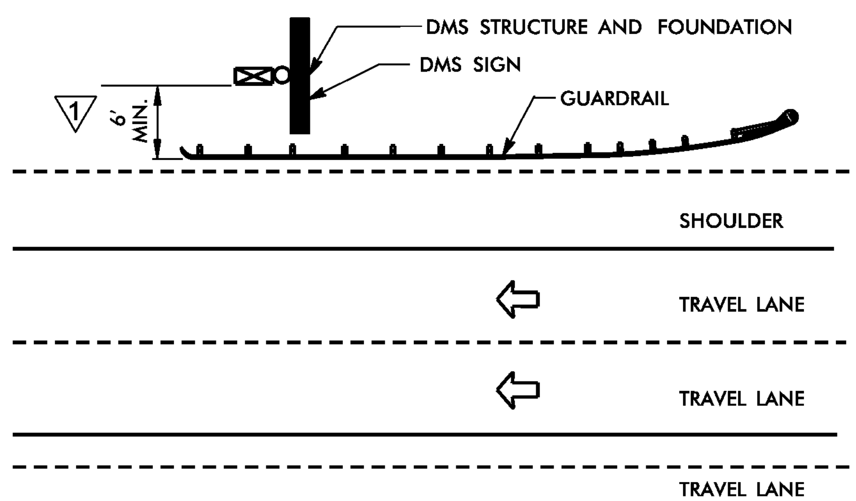
NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
D-2A

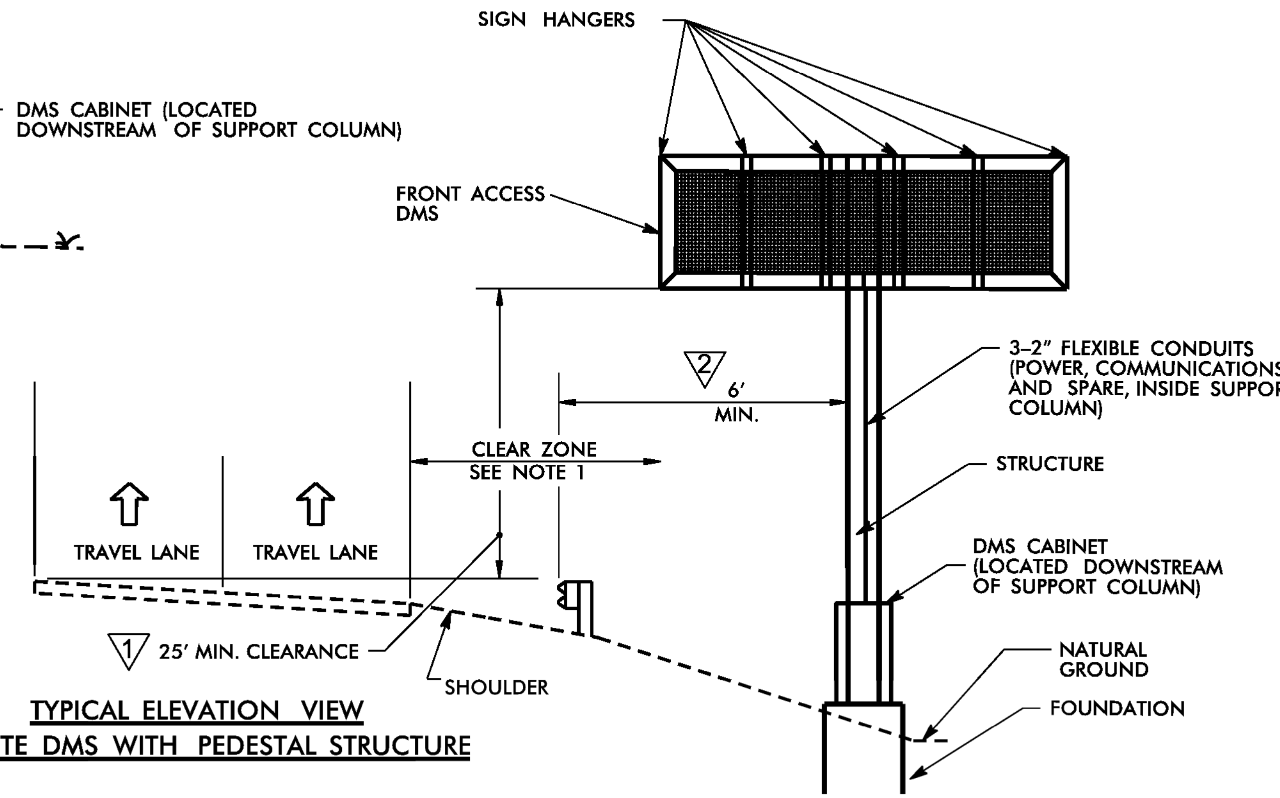
$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$



TYPICAL ELEVATION VIEW
ON-SITE DMS WITH TRUSS STRUCTURE



TYPICAL PLAN VIEW
ON-SITE DMS CANTILEVER STRUCTURE



TYPICAL ELEVATION VIEW
ON-SITE DMS WITH PEDESTAL STRUCTURE

NORTH CAROLINA Turnpike Authority

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling; see revision marks
2	DLJ	8/31/16	See Notes

GENERAL NOTES:

1. CONDUCTORS SHALL BE CONNECTED TO STEEL FRAMEWORK THAT HAVE BEEN CLEANED TO BASE METAL, BY USE OF BONDING PLATES HAVING CONTACT AREA OF NOT LESS THAN 8 SQUARE INCHES OR BY WELDING OR BRAZING. DRILLING AND TAPPING THE STEEL STRUCTURE TO ACCEPT A THREADED CONNECTOR IS ALSO AN ACCEPTABLE METHOD.
2. IF STEEL FRAMEWORK IS TO BE DRILLED AND TAPPED TO ACCEPT THREADED CONNECTOR, THE THREADED CONNECTOR SHALL HAVE AT LEAST 5 THREADS FULLY ENGAGED AND SECURED WITH A JAM NUT TO THE STEEL FRAMEWORK.
3. BENDS IN THE CONDUIT WITH DMS COMMUNICATIONS CABLE (6-COUNT SINGLE MODE FIBER-OPTIC CABLE) SHALL NOT EXCEED THE MANUFACTURER'S MINIMUM RADIUS FOR THE FIBER-OPTIC CABLE.
4. CONDUITS ON STRUCTURE OR COLUMNS SHALL BE HIDDEN FROM VIEW OF APPROACHING TRAFFIC BY PLACING THEM ON DOWNSTREAM SIDE OR WITHIN STRUCTURAL MEMBERS OR COLUMNS.
5. (1) ALL DATA AND POWER CABLES FOR THE DMS SHALL BE COMPLETELY CONCEALED.
6. (1) (NOTE DELETED)
7. (1) DMS CABINETS SHALL BE GROUND MOUNTED OR MOUNTED ON STRUCTURE, AS DIRECTED BY THE ENGINEER.
8. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.
9. TRUSS DETAIL ONLY APPLIES IF TRUSS IS NOT AT AN AET TOLL ZONE. FOR CONDUIT DETAILS FOR TRUSSES AT AET TOLL ZONES, SEE AET STANDARD DRAWINGS.
10. IF NO GUARDRAIL OR BARRIER WALL EXISTS, STRUCTURE SHALL BE OUTSIDE CLEAR ZONE. CLEAR ZONE SHALL BE MEASURED TO EDGE OF DRILLED SHAFT IF DRILLED SHAFT IS MORE THAN 4" ABOVE ADJACENT GRADE.
11. DESIGN COLUMNS IN ACCORDANCE WITH NCTA AESTHETIC DESIGN GUIDELINES AS REQUIRED BY RFP.

REVISED 10 /21 /2011

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ITS STANDARD DETAILS

DMS - TYPICAL MOUNTING
ON-SITE DMS NOT AT TOLL ZONE

SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.
DATE: August, 2011		D-2B
DWG. BY: B. Slocum		
DESIGN BY: A. Badgett / D. Jones		
APPROVED: A. Lelewski		

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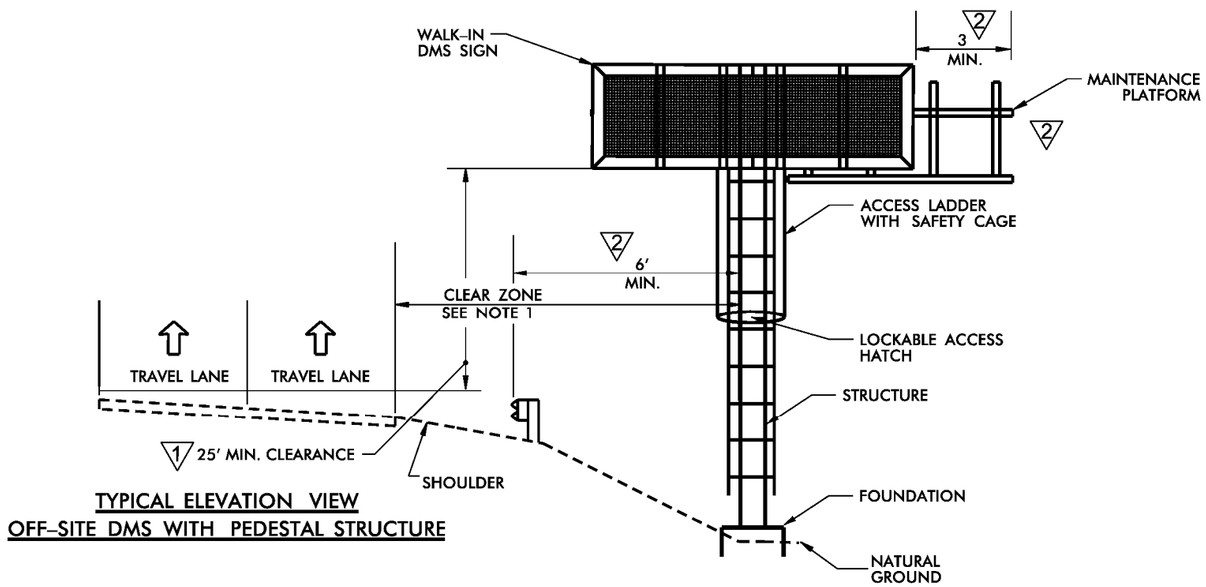
$$$$USERNAME$$$$

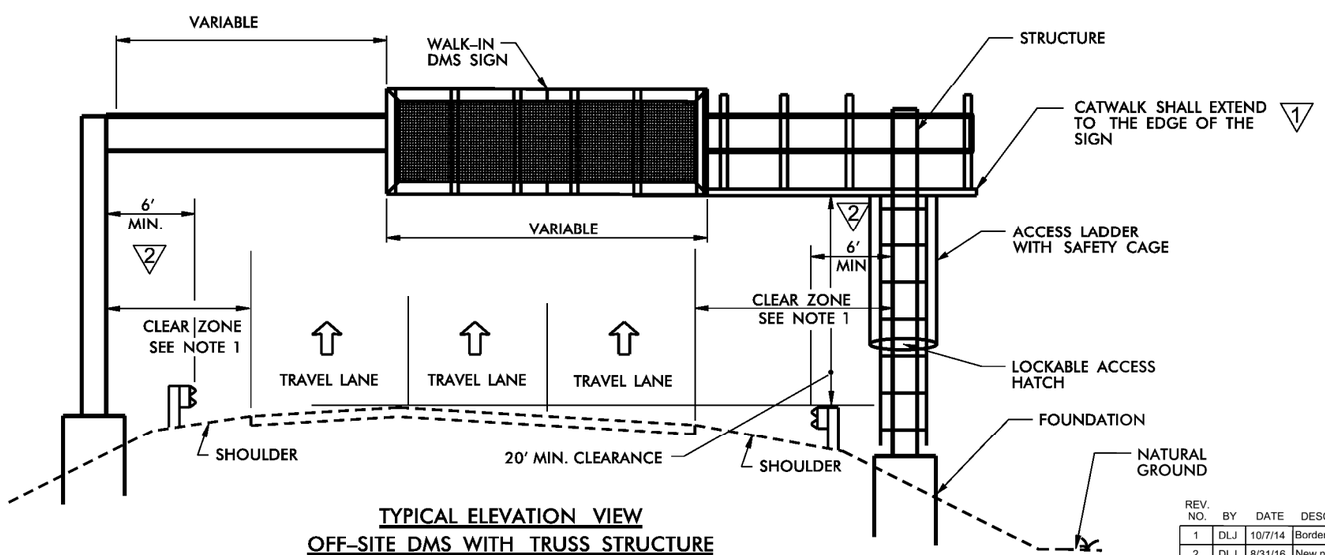
NORTH CAROLINA
Turnpike Authority



TYPICAL ELEVATION VIEW
OFF–SITE DMS WITH PEDESTAL STRUCTURE

GENERAL NOTES:

1. IF NO GUARDRAIL OR BARRIER WALL EXISTS, STRUCTURE SHALL BE OUTSIDE CLEAR ZONE. CLEAR ZONE SHALL BE MEASURED TO EDGE OF DRILLED SHAFT IF DRILLED SHAFT IS MORE THAN 4" ABOVE GRADE.
2. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.
3. CONTRACTOR IS RESPONSIBLE FOR FURNISHING DMS ELEVATIONS FOR ENGINEER'S APPROVAL.
4. USE THE ACTUAL DIMENSIONS AND WEIGHT OF THE DMS PROVIDED BY THE DMS FABRICATOR TO COMPLETE THE DESIGN OF THE DMS STRUCTURE.
5. FIELD VERIFY ALL FOOTING ELEVATIONS AND GROUND SLOPES AT THE FOOTINGS USING THE LATEST NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES.
6. ENSURE THAT THE TOP OF THE FOOTING EXTENDS AT LEAST 6 INCHES AND NOT MORE THAN 24 INCHES ABOVE THE HIGHEST POINT OF THE GROUND SURFACE AT THE FOOTING.
7. DESIGN AND CONSTRUCT THE PEDESTAL STRUCTURE AND DMS ENCLOSURE TO WITHSTAND WIND VELOCITIES OF 90 MPH.
8. VERIFY ALL UNDERGROUND UTILITY LOCATIONS BEFORE BEGINNING ANY UNDERGROUND WORK. DO NOT DAMAGE ANY EXISTING UTILITIES OR NCDOT COMMUNICATIONS CABLE DURING CONSTRUCTION.
9. PROVIDE A FIXED LADDER LEADING TO THE ACCESS PLATFORM. EQUIP THE LADDER WITH A SECURITY COVER (LADDER GUARD). START THE FIRST LADDER RUNG NO MORE THAN 18 INCHES ABOVE A CONCRETE LANDING PAD. DESIGN RUNGS ON 12 INCH CENTER–TO–CENTER TYPICAL SPACING.
10. INSTALL A CONCRETE LANDING PAD MEASURING A MINIMUM 4 INCHES DEEP, 24 INCHES WIDE, AND 36 INCHES LONG DIRECTLY BENEATH THE LADDER.
11. SEE ROADWAY PLANS FOR GUARDRAIL DETAILS.
12. BENDS IN THE CONDUIT WITH DMS COMMUNICATIONS CABLE (6–COUNT SINGLE MODE FIBER–OPTIC CABLE) SHALL NOT EXCEED THE MANUFACTURER'S MINIMUM RADIUS FOR THE FIBER–OPTIC CABLE.
13. DMS CABINETS SHALL BE EITHER BE GROUND–MOUNTED OR MOUNTED ON STRUCTURE, AS DIRECTED BY THE ENGINEER.



TYPICAL ELEVATION VIEW
OFF–SITE DMS WITH TRUSS STRUCTURE

REVISED 10 /21 /2011

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling; see revision marks
2	DLJ	8/31/16	New notes

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ITS STANDARD DETAILS

DMS - TYPICAL MOUNTING
OFF-SITE DMS

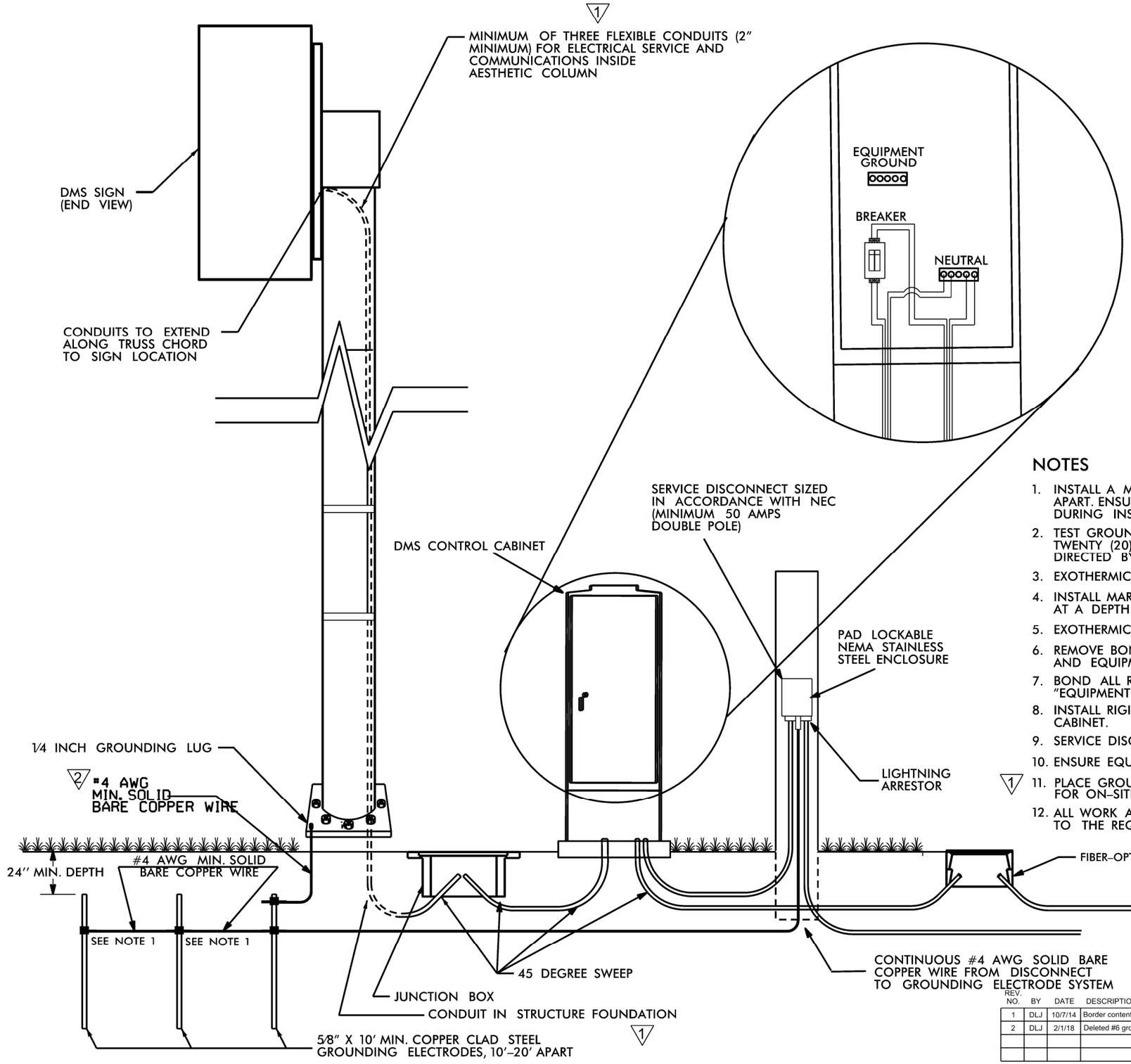
SCALE:	N.T.S.
DATE:	August, 2011
DWG. BY:	B. Slocum
DESIGN BY:	A. Badgett / D. Jones
APPROVED:	A. Lelewski

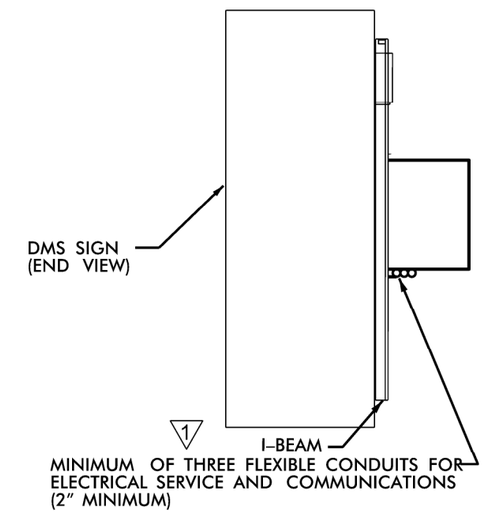
NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
D-2C

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority





NOTES

1. INSTALL A MINIMUM OF THREE (3) GROUND RODS SPACED A MINIMUM OF 10 FEET APART. ENSURE THAT EXISTING UNDERGROUND FACILITIES ARE NOT DAMAGED DURING INSTALLATION.
2. TEST GROUNDING SYSTEM USING AN APPROVED METHOD. SYSTEM SHALL MEASURE TWENTY (20) OHMS OR LESS. ADDITIONAL GROUND RODS SHALL BE INSTALLED AS DIRECTED BY THE ENGINEER TO MEET THIS REQUIREMENT.
3. EXOTHERMICALLY WELD ALL CONNECTIONS TO GROUND RODS.
4. INSTALL MARKER [illegible] UNDING ELECTRODES AND CONDUCTORS AT A DEPTH OF [illegible]
5. EXOTHERMICALLY [illegible] UND WIRE TO THE GROUND ROD SYSTEM.
6. REMOVE BONDI[illegible] INET IF INSTALLED BETWEEN AC NEUTRAL AND EQUIPMEN[illegible]
7. BOND ALL RIGI[illegible] ENTERING THE CABINET TO "EQUIPMENT GROUND".
8. INSTALL RIGID GALVANIZED STEEL CONDUIT (MINIMUM 2'') BETWEEN DISCONNECT AND CABINET.
9. SERVICE DISCONNECT NEUTRAL BUS BAR SHALL PROVIDE FOR 2 #4 AWG CONNECTIONS.
10. ENSURE EQUIPMENT GROUND IS ELECTRICALLY BONDED TO CABINET.
11. PLACE GROUND MOUNTED DMS CABINET DOWNSTREAM AND BEHIND SUPPORT COLUMN FOR ON-SITE INSTALLATIONS; OTHERWISE PLACE AS DIRECTED BY ENGINEER.
12. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

4/18/18:
Replace references to "exothermic weld" to "irreversible compression connector"

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling; see revision marks
2	DLJ	2/1/18	Deleted #6 ground wire

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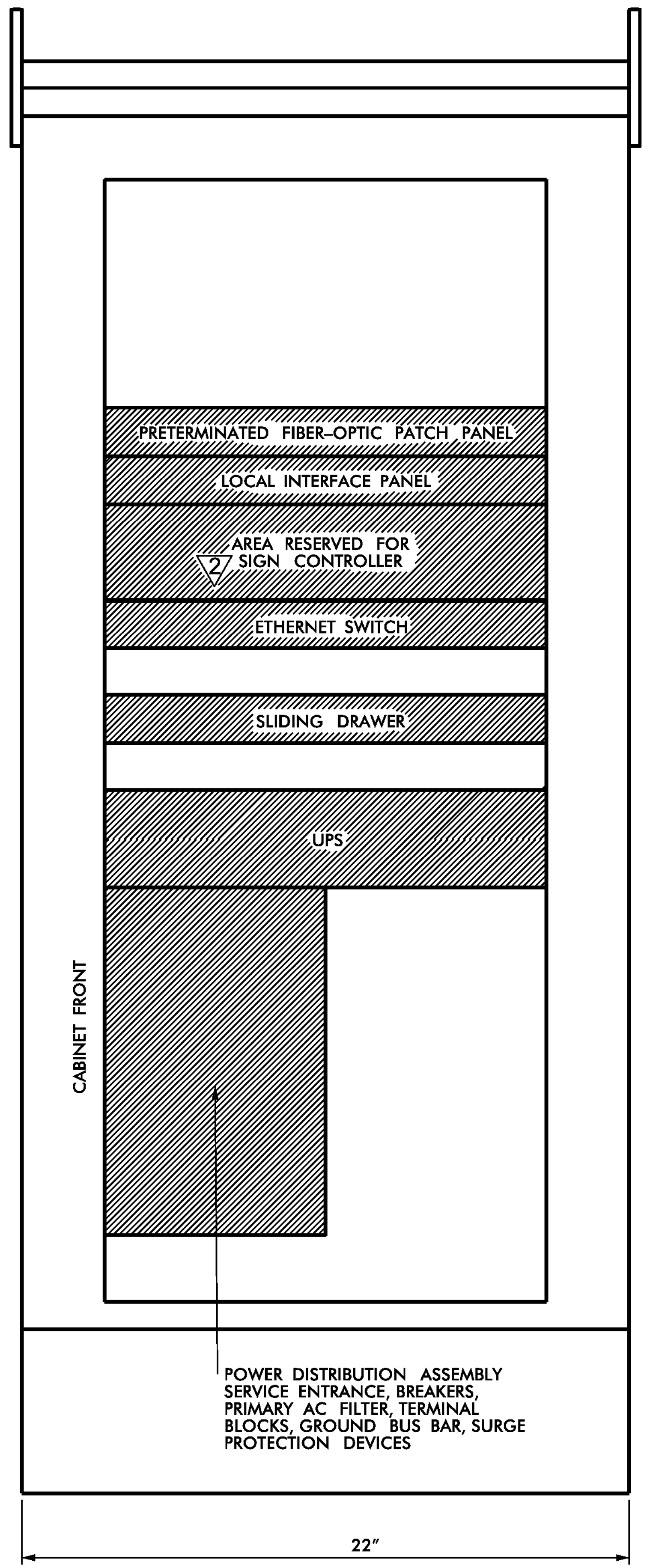
ITS STANDARD DETAILS
DMS
ELECTRICAL SERVICE AND GROUNDING

SCALE:	N.T.S.
DATE:	August, 2011
DWG. BY:	B. Slocum
DESIGN BY:	A. Badgett / D. Jones
APPROVED:	A. Lelewski

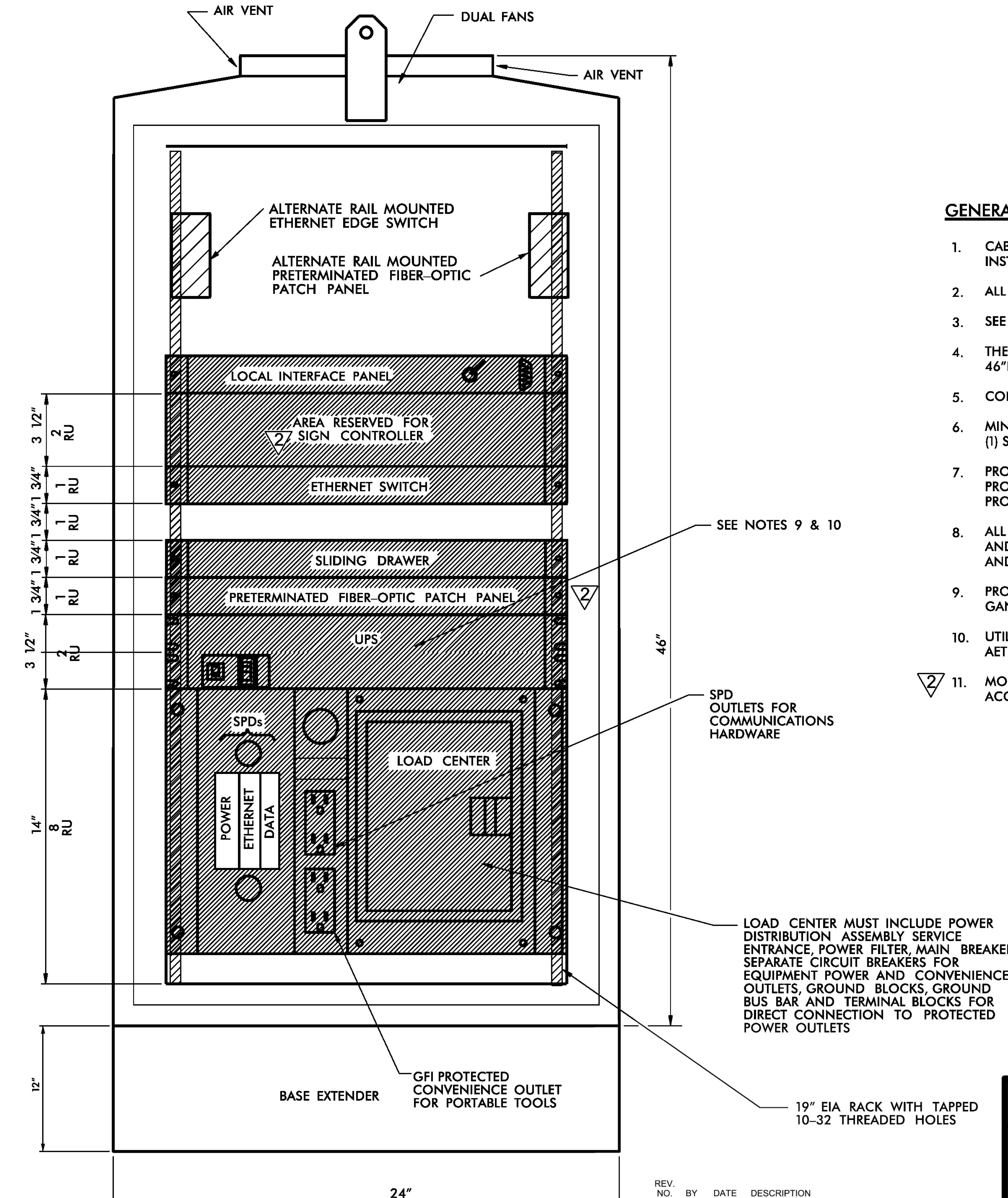
NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
D-3

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$



SIDE VIEW



FRONT VIEW

NORTH CAROLINA
Turnpike Authority

GENERAL NOTES:

1. CABINET LAYOUT IS FOR BASE–MOUNTED INSTALLATIONS.
2. ALL DIMENSIONS ARE APPROXIMATE.
3. SEE RFP REQUIREMENTS FOR CABINET TYPE AND SIZE.
4. THE MINIMUM DMS CABINET DIMENSIONS SHALL BE 46″H X 24″W X 22″D.
5. CONDUIT ENTRANCES ARE AT BOTTOM OF CABINET.
6. MINIMUM NUMBER OF DUPLEX OUTLETS IS TWO, (1) SPD AND (1) GFI PROTECTED.
7. PROVIDE SIGN CONTROLLER IN GROUND CABINET TO PROVIDE FULL ACCESS TO DMS SIGN FOR CONTROL, PROGRAMMING AND TROUBLESHOOTING.
8. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.
9. PROVIDE UPS FOR ALL DMS NOT LOCATED AT AET GANTRY STRUCTURES.
10. UTILIZE UPS IN AET VAULT FOR ALL DMS LOCATED AT AET GANTRY STRUCTURE LOCATIONS.
11. (2) MOUNT PATCH PANEL AS LOW AS POSSIBLE FOR EASY ACCESS AND MAINTENANCE.

REVISED 10 /21 /2011

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only
2	DLJ	8/31/16	See edits

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ITS STANDARD DETAILS

DMS
CABINET LAYOUT

SCALE: N.T.S.
DATE: August, 2011
DWG. BY: B. Slocum
DESIGN BY: A. Badgett / D. Jones
APPROVED: A. Lelewski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO. D-4

$$$$$SYSTIME$$$$$
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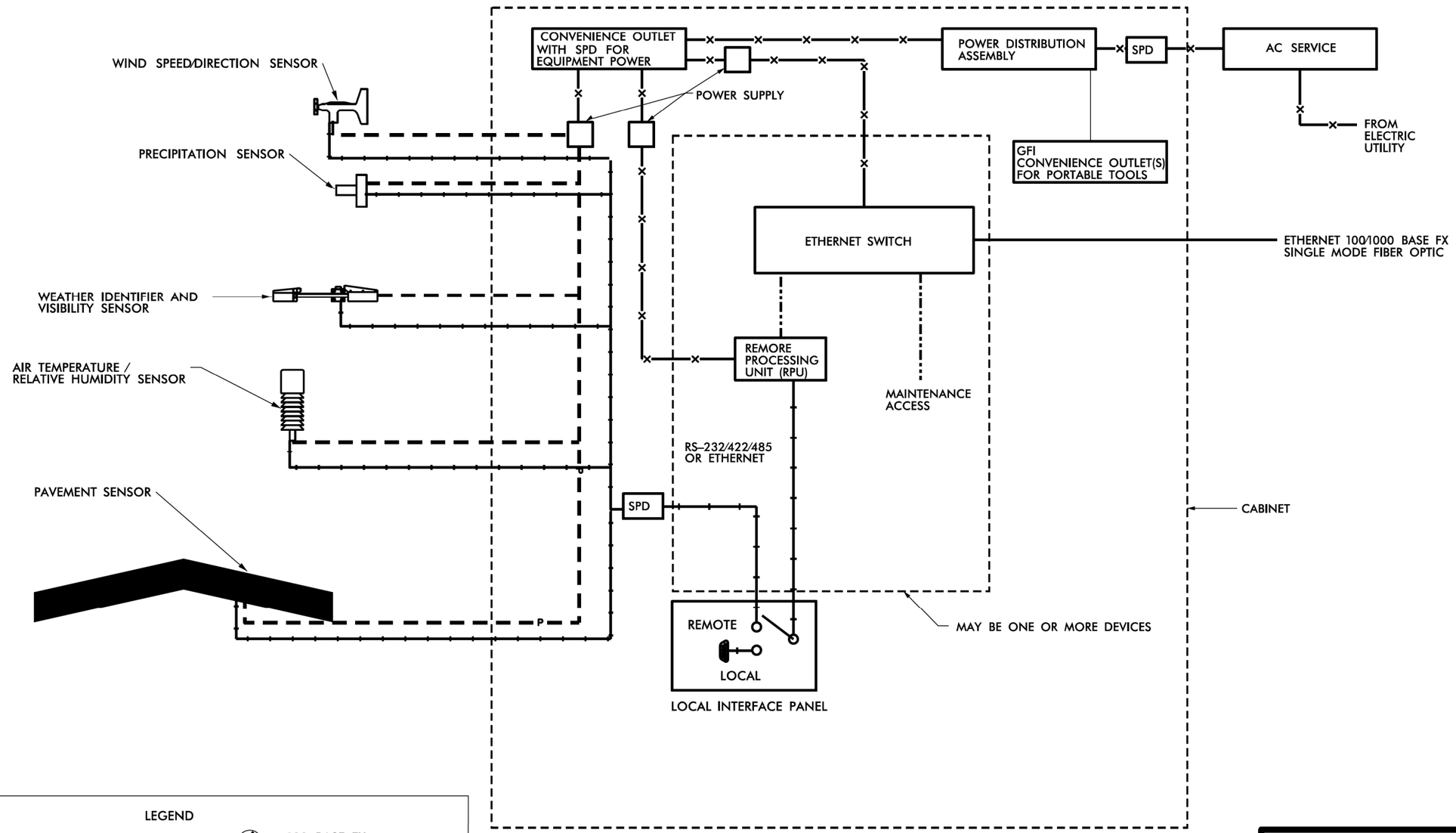
$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority



LEGEND

- 1000 BASE TX ETHERNET
- 100 BASE TX ETHERNET
- ANALOG VIDEO
- 120 VAC POWER
- LOW VOLTAGE POWER
- 100 BASE FX ETHERNET (FIBER)
- 1000 BASE FX ETHERNET (FIBER)
- RS–232/422/485
- EXISTING DEVICE
- EXISTING FIBER CABLE

NOTES

1. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only

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ITS STANDARD DETAILS

RWIS
BLOCK DIAGRAM

SCALE:	N.T.S.
DATE:	August, 2011
DWG. BY:	B. Slocum
DESIGN BY:	A. Badgett / D. Jones
APPROVED:	A. Lelewski

NORTH CAROLINA TURNPIKE AUTHORITY

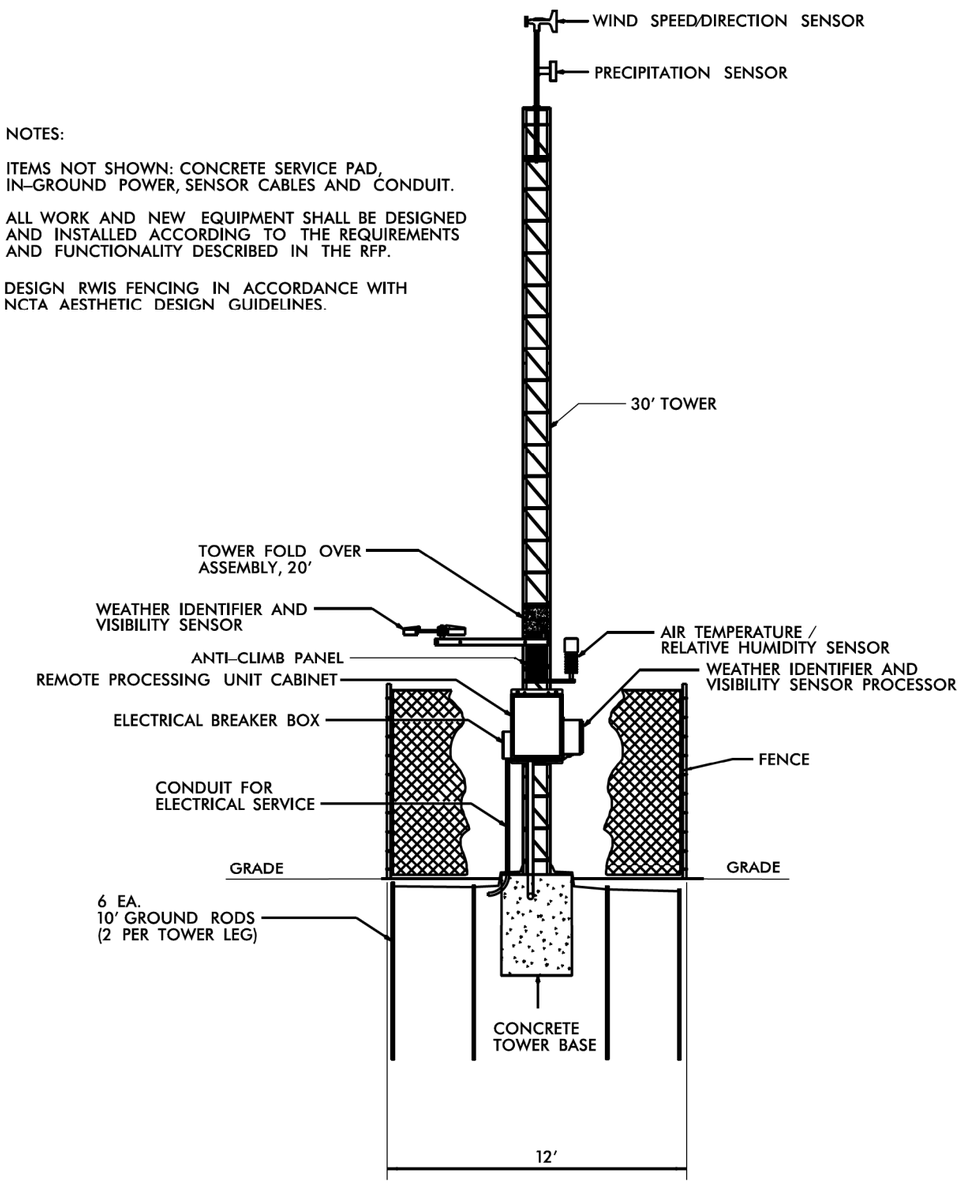
SHEET NO.
R-1

$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$

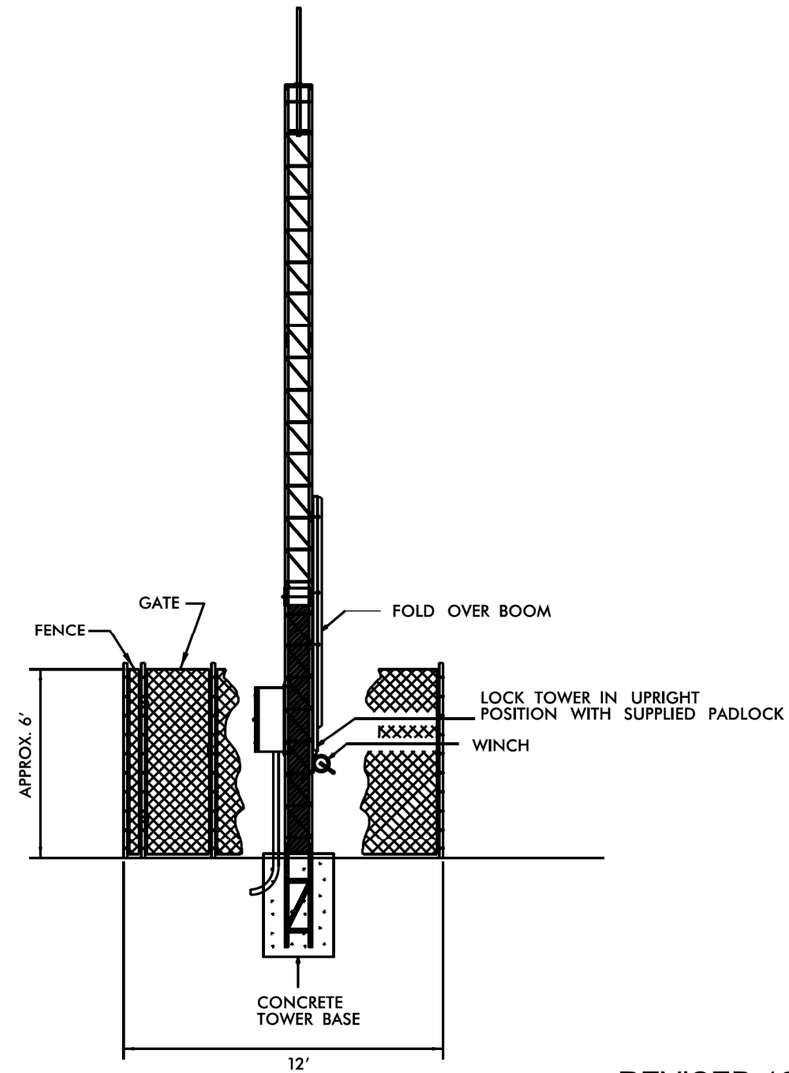
NORTH CAROLINA
Turnpike Authority

NOTES:

1. ITEMS NOT SHOWN: CONCRETE SERVICE PAD, IN–GROUND POWER, SENSOR CABLES AND CONDUIT.
2. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.
3. DESIGN RWIS FENCING IN ACCORDANCE WITH NCTA AESTHETIC DESIGN GUIDELINES.



FRONT VIEW



SIDE VIEW
(SENSORS AND OTHER ITEMS NOT SHOWN FOR CLARITY)

REVISED 10/21/2011

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only

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ITS STANDARD DETAILS

RWIS
ELEVATION VIEW

SCALE:	N.T.S.
DATE:	August, 2011
DWG. BY:	B. Slocum
DESIGN BY:	A. Badgett / D. Jones
APPROVED:	A. Lelewski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
R-2

$$$$$$$SYSTIME$$$$$
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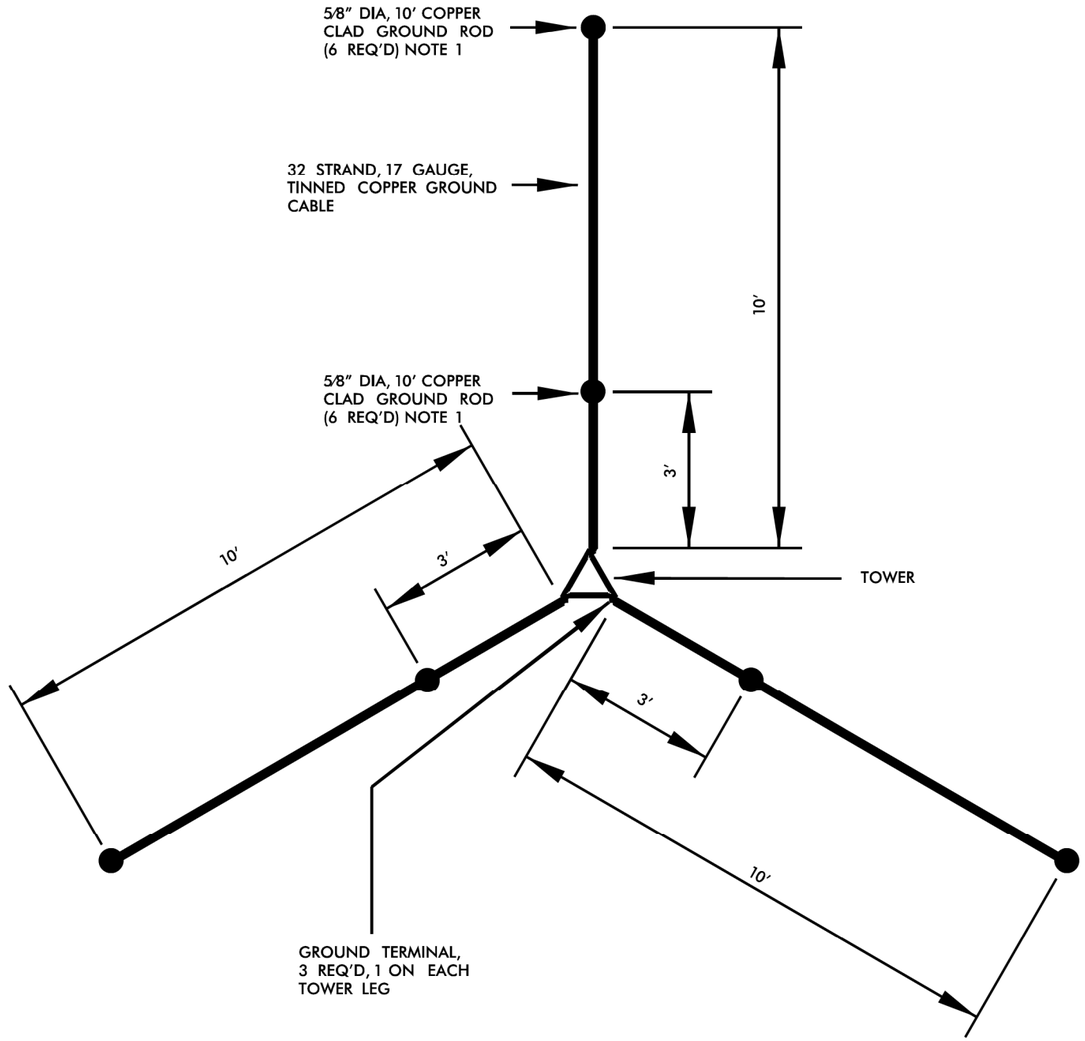
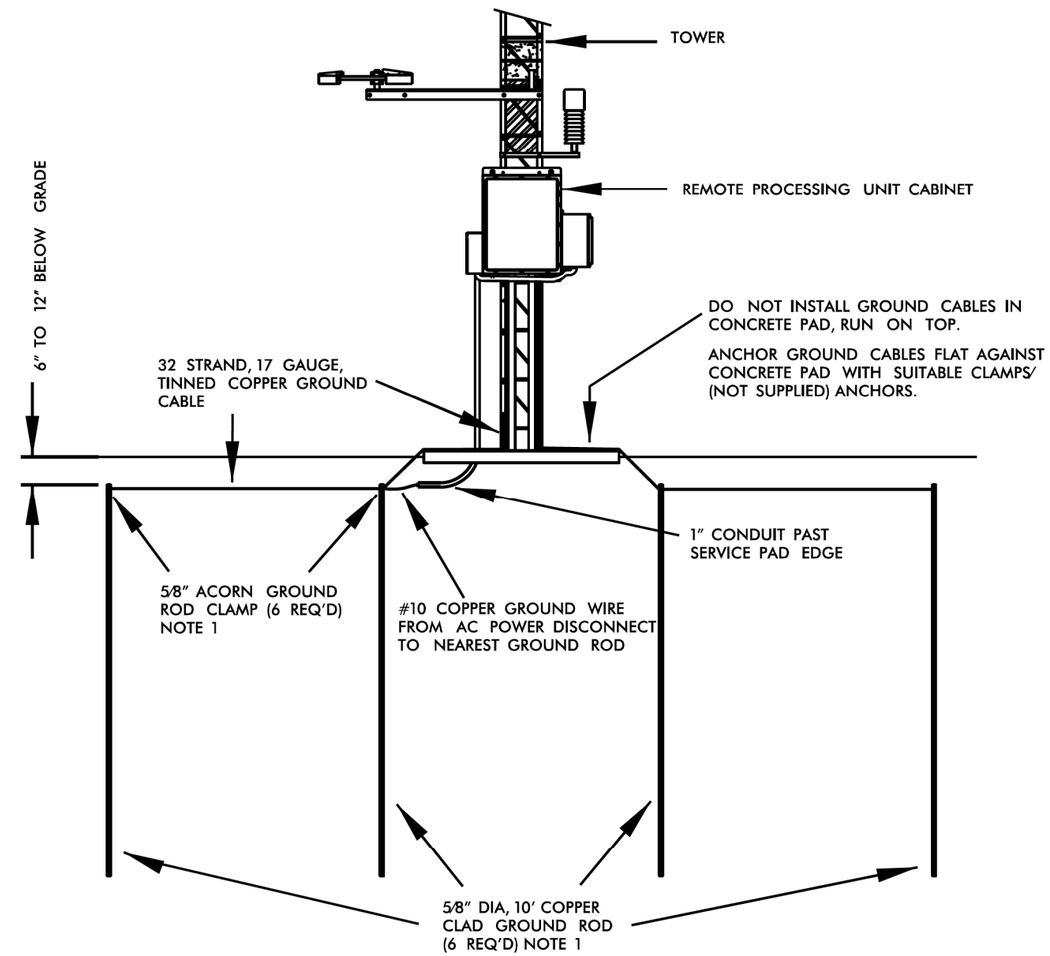
$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority





NOTES:

1. 6 EA. 5/8" DIA, 10' COPPER CLAD GROUND RODS AND 5/8" ACORN GROUND ROD CLAMPS ARE NOT SUPPLIED. INSTALLATION CONTRACTOR RESPONSIBLE FOR PROVIDING.
2. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labelling only

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ITS STANDARD DETAILS

RWIS
GROUNDING

SCALE:	N.T.S.
DATE:	August, 2011
DWG. BY:	B. Slocum
DESIGN BY:	A. Badgett / D. Jones
APPROVED:	A. Lelewski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
R-3

$$$$$$$SYSTIME$$$$$
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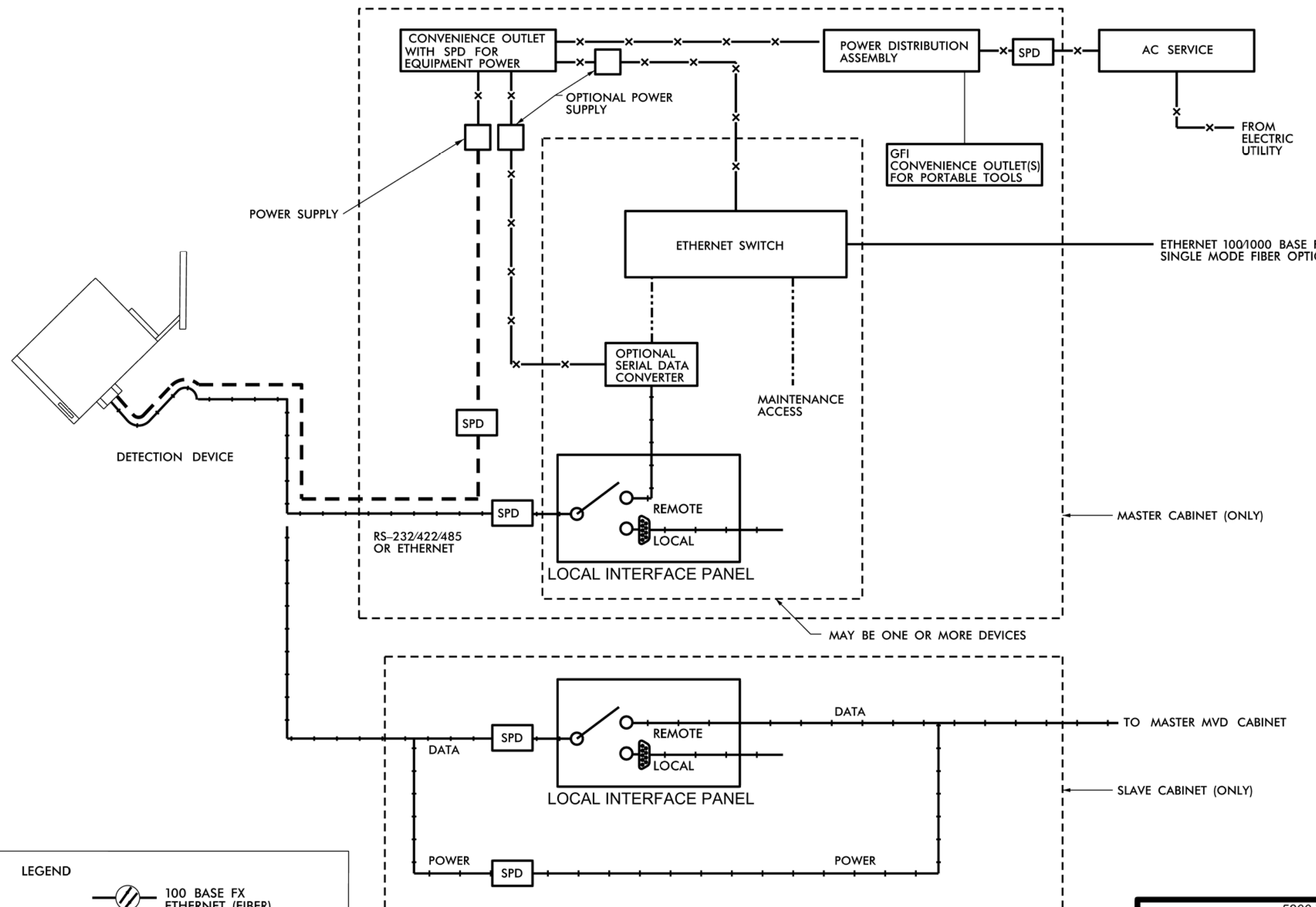
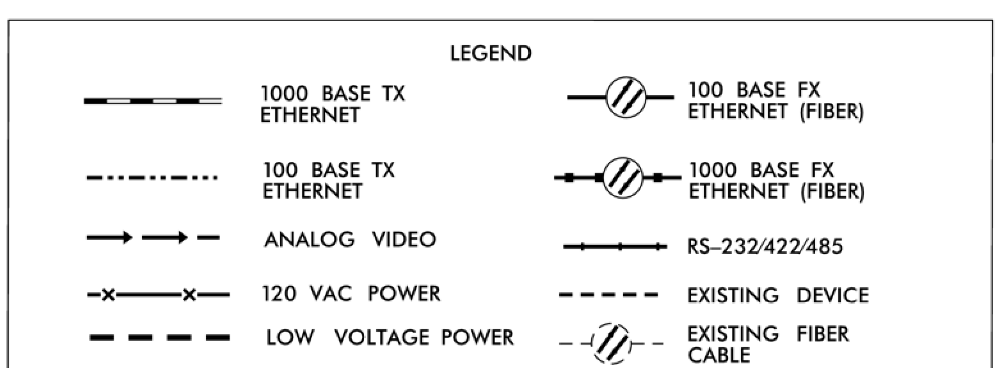
$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority





NOTES

1. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only
2	DLJ	8/7/17	Added separate detail for slave cabinet

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ITS STANDARD DETAILS

MICROWAVE DETECTION BLOCK DIAGRAM

SCALE: N.T.S.
DATE: August, 2011
DWG. BY: B. Slocum
DESIGN BY: A. Badgett / D. Jones
APPROVED: A. Lelewski

NORTH CAROLINA TURNPIKE AUTHORITY

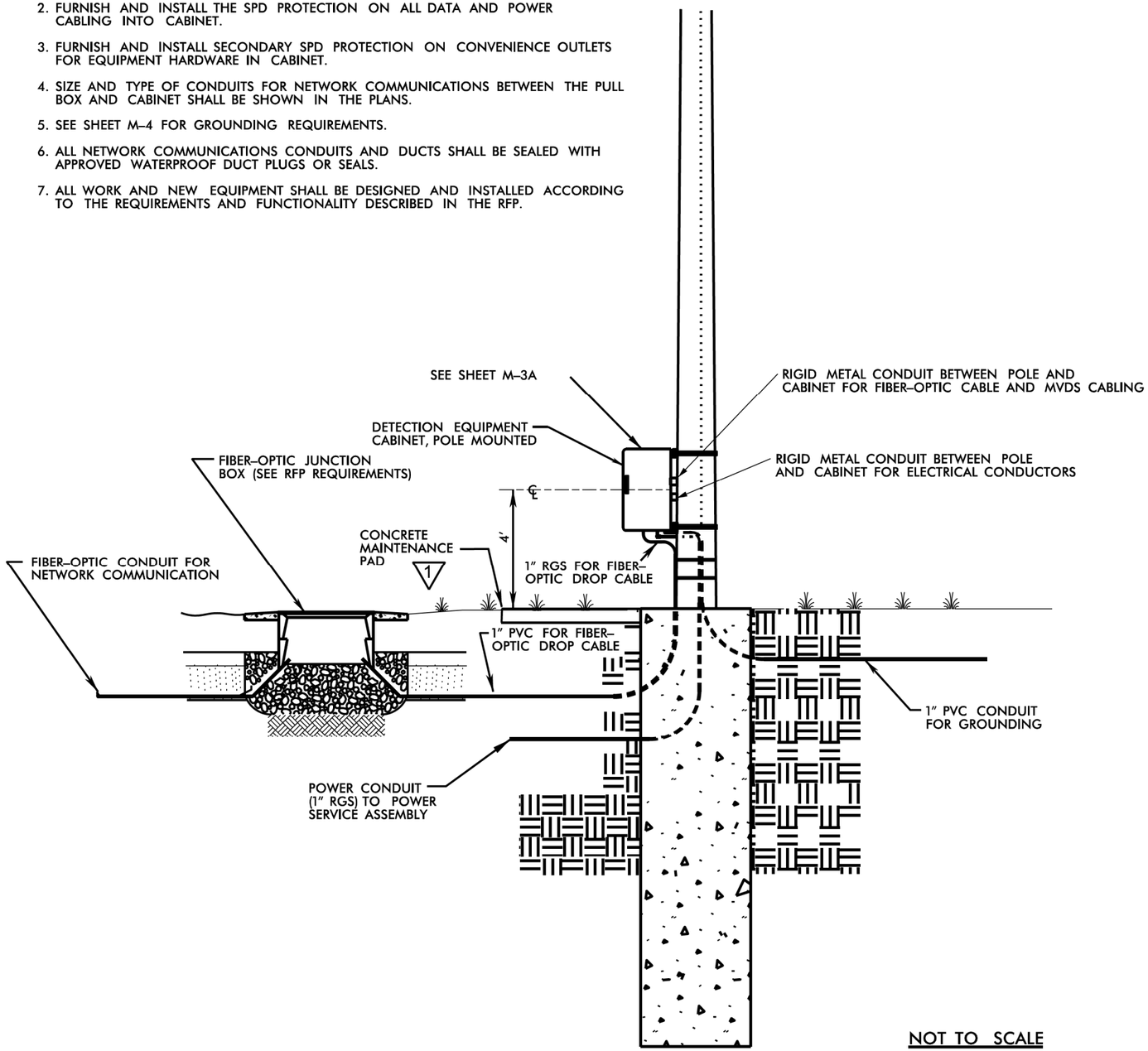
SHEET NO. M-1

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority

NOTES:

1. CONTRACTOR SHALL TERMINATE FIBER–OPTIC CABLES IN CABINET WITH PRETERMINATED PATCH PANEL.
2. FURNISH AND INSTALL THE SPD PROTECTION ON ALL DATA AND POWER CABLING INTO CABINET.
3. FURNISH AND INSTALL SECONDARY SPD PROTECTION ON CONVENIENCE OUTLETS FOR EQUIPMENT HARDWARE IN CABINET.
4. SIZE AND TYPE OF CONDUITS FOR NETWORK COMMUNICATIONS BETWEEN THE PULL BOX AND CABINET SHALL BE SHOWN IN THE PLANS.
5. SEE SHEET M–4 FOR GROUNDING REQUIREMENTS.
6. ALL NETWORK COMMUNICATIONS CONDUITS AND DUCTS SHALL BE SEALED WITH APPROVED WATERPROOF DUCT PLUGS OR SEALS.
7. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.



NOT TO SCALE

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content/labelling; drew maint. pad

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ITS STANDARD DETAILS

MICROWAVE DETECTION ELEVATION VIEW

SCALE:	N.T.S.
DATE:	August, 2011
DWG. BY:	B. Slocum
DESIGN BY:	A. Badgett / D. Jones
APPROVED:	A. Lelewski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
M-2

$$$$$$$SYSTIME$$$$$$
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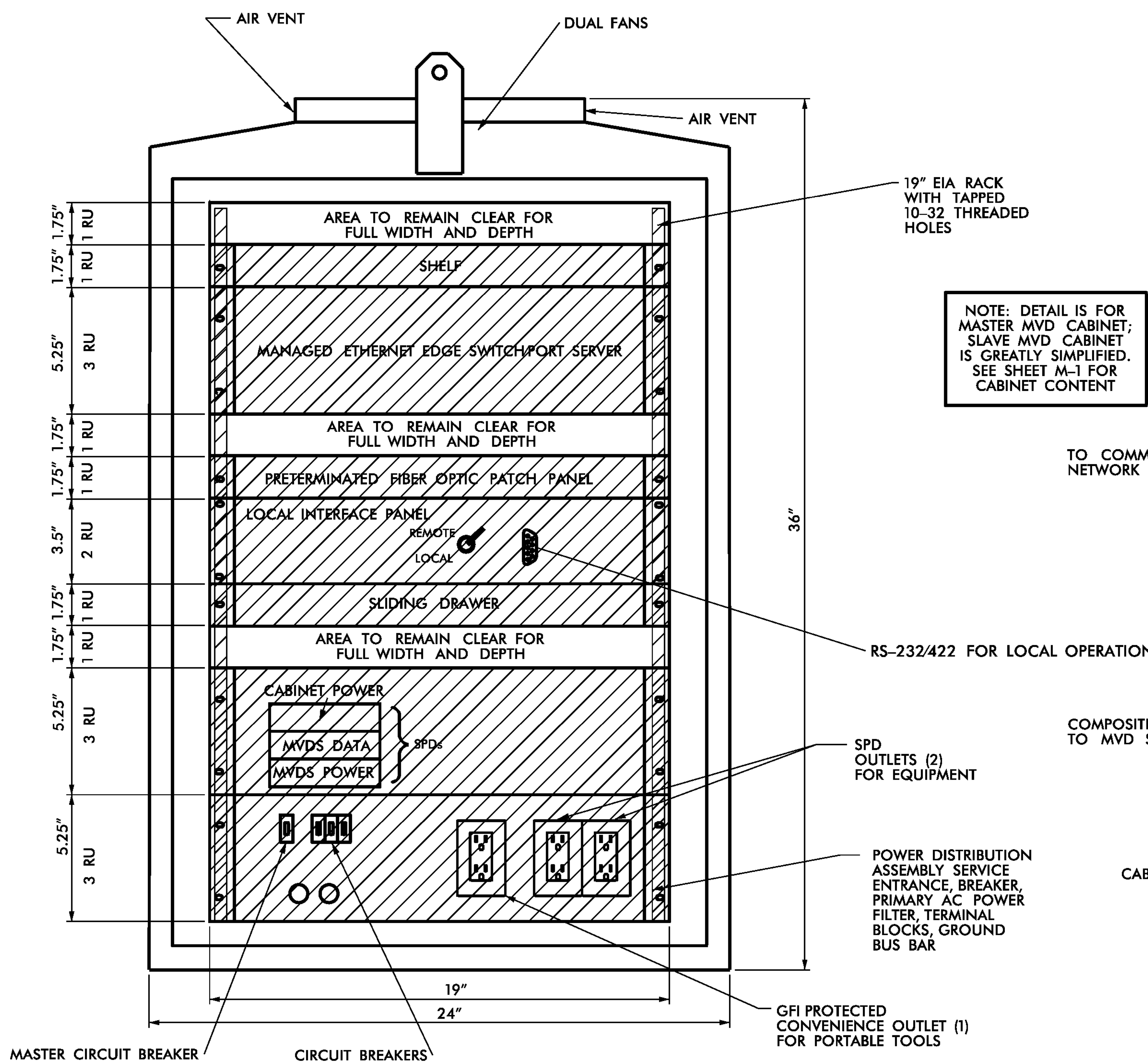
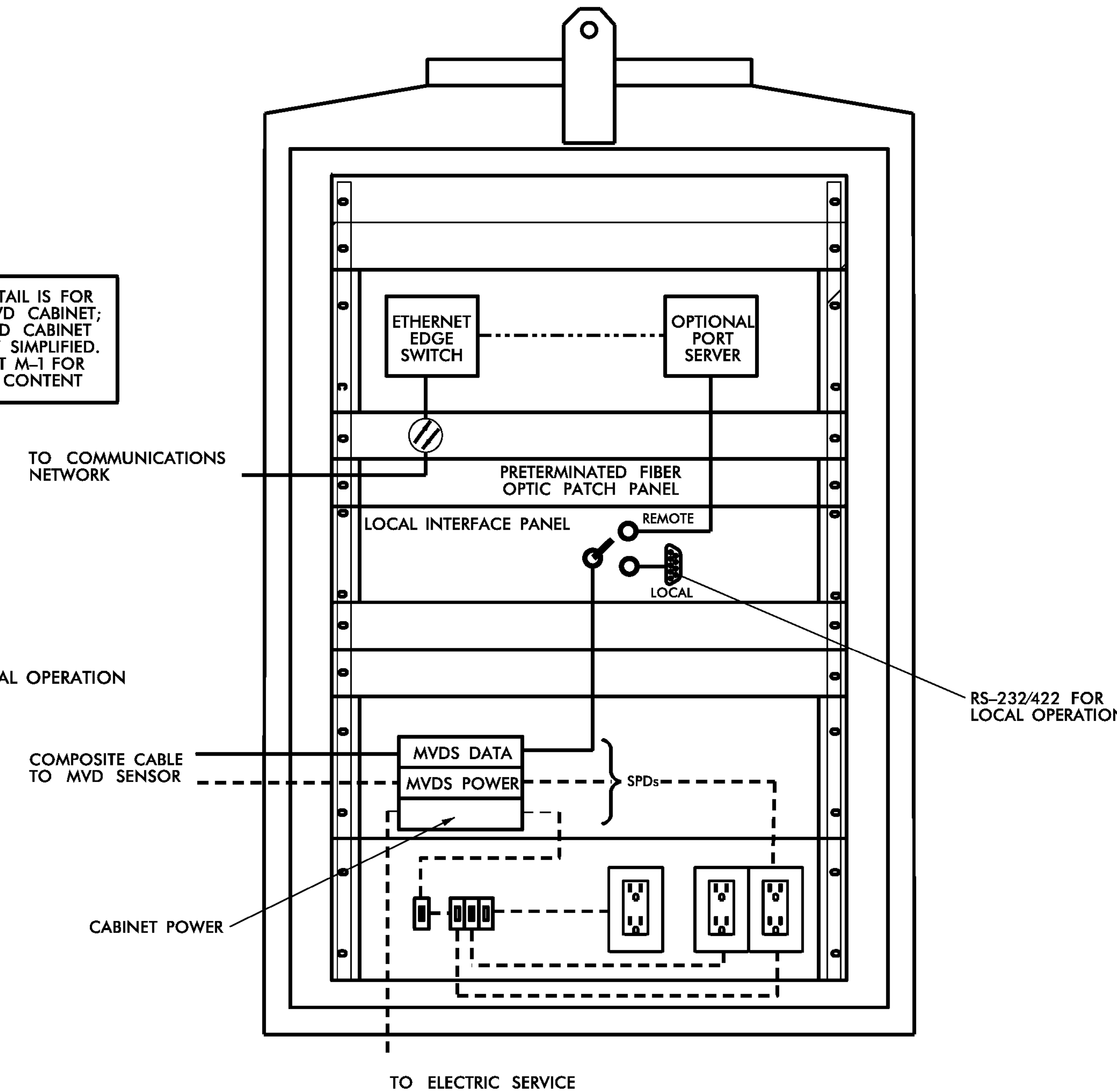


FRONT VIEW

NOTE: DETAIL IS FOR MASTER MVD CABINET; SLAVE MVD CABINET IS GREATLY SIMPLIFIED. SEE SHEET M–1 FOR CABINET CONTENT



CABINET WIRING VIEW

NOTES

1. ALL DIMENSIONS AND SCALE ARE APPROXIMATE.
2. ALL EQUIPMENT RACKS SHALL HAVE A MINIMUM OF ONE RACK UNIT SPACE IN BETWEEN THEM FOR VENTILATION
3. SEE RFP REQUIREMENTS FOR CABINET SIZE AND TYPE.
4. CONDUIT ENTRANCES ARE IN BOTTOM OF CABINET.
5. MINIMUM NUMBER OF OUTLETS IS THREE, (2) SPD AND (1) GFI PROTECTED.
6. SPD SHALL FULLY PROTECT ALL DATA COMMUNICATIONS BETWEEN DETECTOR AND CABINET.
7. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

CONNECTION LEGEND

- 100 BASE FX ETHERNET (FIBER)
- 100 BASE TX ETHERNET
- ANALOG VIDEO
- ELECTRICAL POWER
- RS–232/422/485

2 DLJ 8/7/17 Added note about slave cabinet

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only
2	DLJ	8/7/17	Added note about slave cabinet

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ITS STANDARD DETAILS

MICROWAVE DETECTION CABINET LAYOUT

SCALE: N.T.S.
DATE: August, 2011
DWG. BY: B. Slocum
DESIGN BY: A. Badgett / D. Jones
APPROVED: A. Lelewski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO. M-3A

NORTH CAROLINA Turnpike Authority

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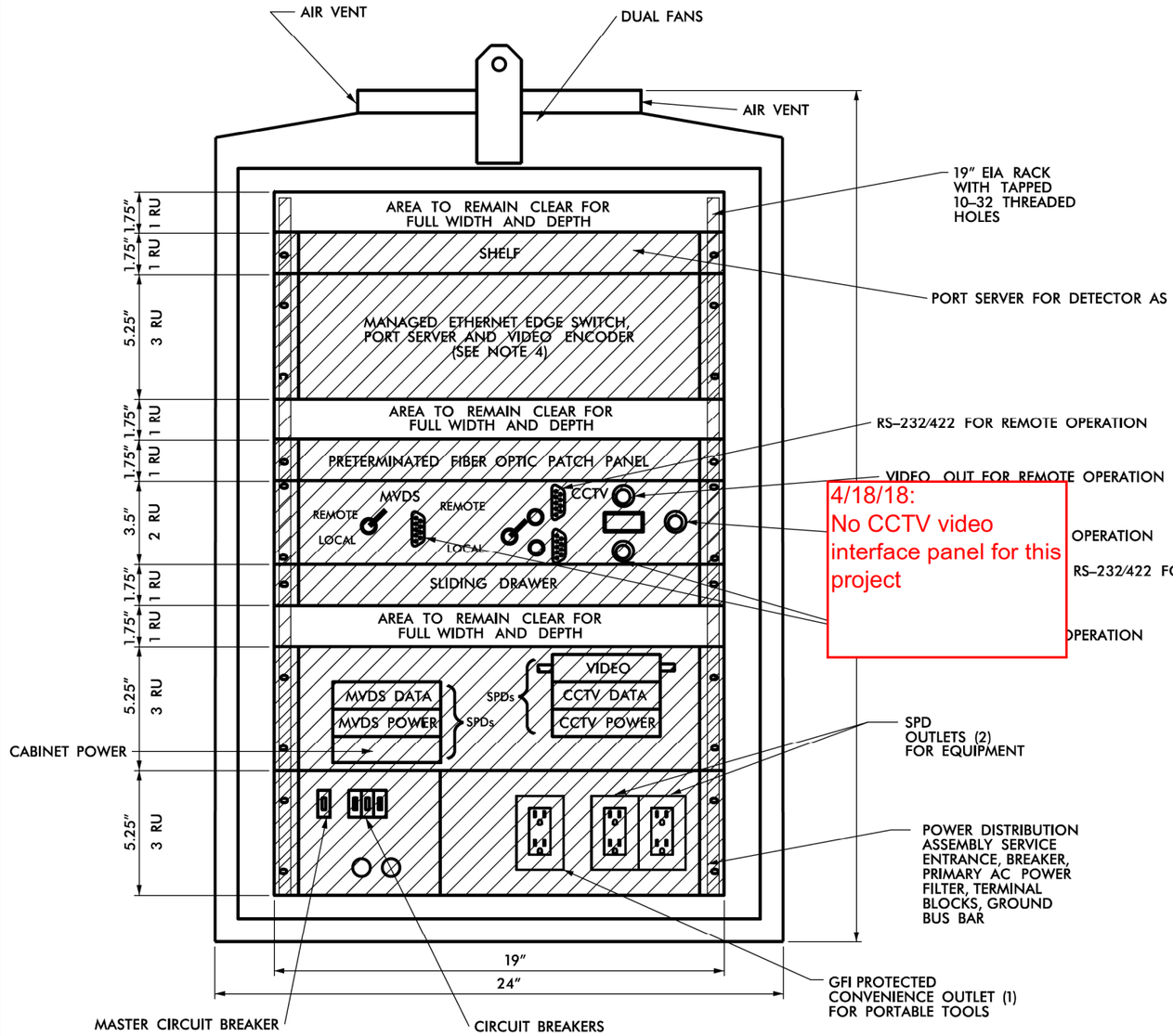
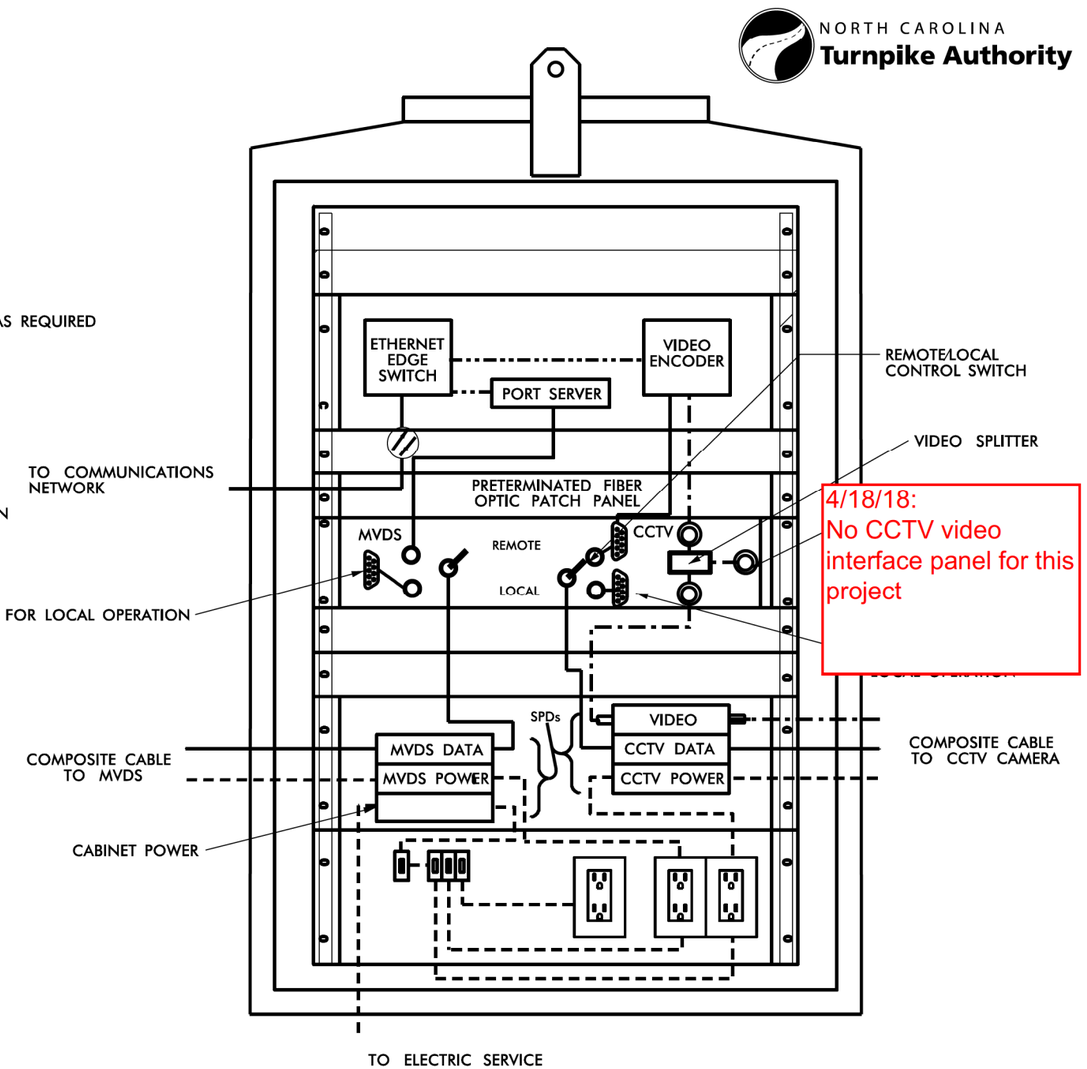
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$



FRONT VIEW



CABINET WIRING VIEW

4/18/18:
No CCTV video interface panel for this project

4/18/18:
No CCTV video interface panel for this project

NOTES

1. ALL DIMENSIONS AND SCALE ARE APPROXIMATE.
2. ALL EQUIPMENT RACKS SHALL HAVE A MINIMUM OF ONE RACK UNIT SPACE IN BETWEEN THEM FOR VENTILATION
3. SEE RFP REQUIREMENTS FOR CABINET SIZE AND TYPE.
4. CONDUIT ENTRANCES ARE IN BOTTOM OF CABINET.
5. MINIMUM NUMBER OF OUTLETS IS THREE, (2) SPD AND (1) GFI PROTECTED.
6. SPD SHALL FULLY PROTECT ALL DATA COMMUNICATIONS BETWEEN DETECTOR AND CABINET.
7. THERE SHALL BE FRONT AND REAR DOORS. BOTH DOORS SHALL HAVE THE HINGE SIDE NEXT TO THE POLE WHEN POLE MOUNTED.
8. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

CONNECTION LEGEND

- 100 BASE FX ETHERNET (FIBER)
- 100 BASE TX ETHERNET
- ANALOG VIDEO
- ELECTRICAL POWER
- RS–232/422/485

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only

ATKINS
5200 77 Center Drive, Suite 50
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

ITS STANDARD DETAILS

MICROWAVE DETECTION CABINET LAYOUT WITH CCTV EQUIPMENT

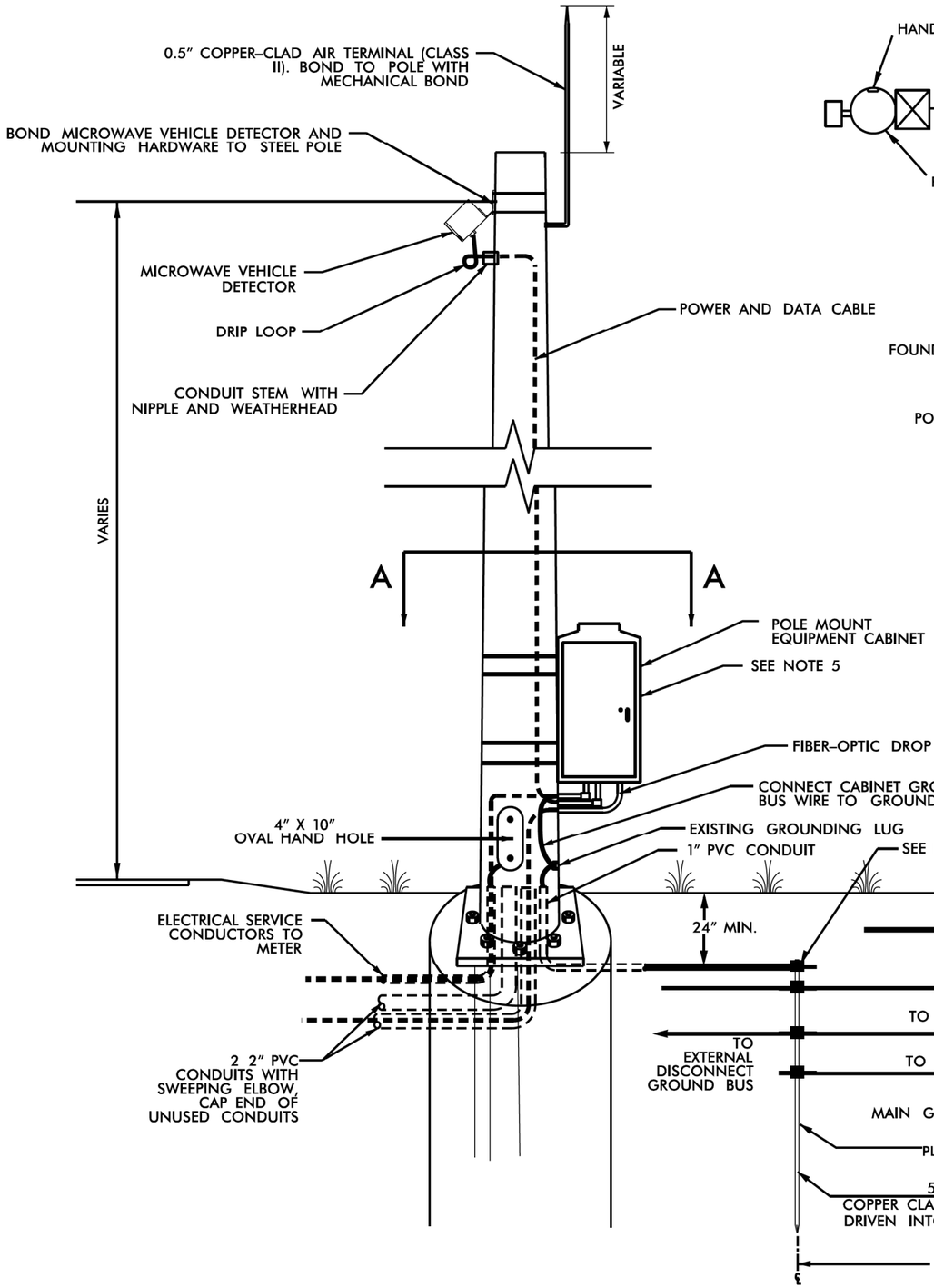
SCALE:	N.T.S.
DATE:	August, 2011
DWG. BY:	B. Slocum
DESIGN BY:	A. Badgett / D. Jones
APPROVED:	A. Lelewski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO. M-3B

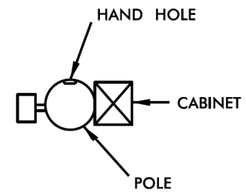
$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority

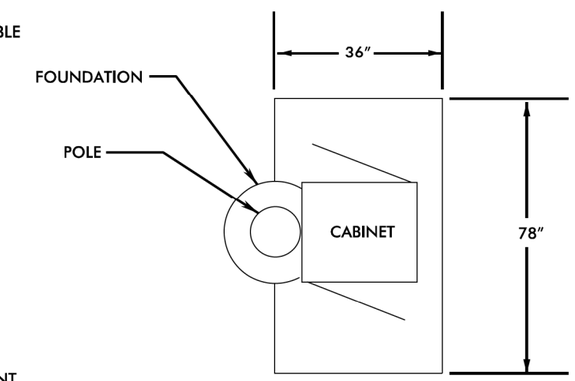


4/18/18:
Replace references to "exothermic weld" to "irreversible compression connector"

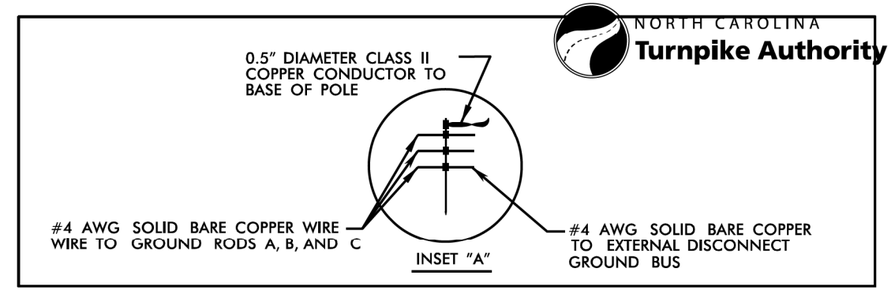
ORIENTATION OF DEVICES ON POLE

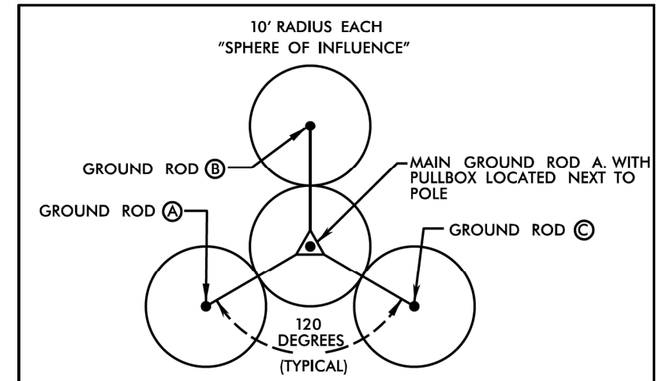


SECTION A–A



DO NOT INSTALL MAINTENANCE PAD ON EXCESSIVE SLOPE (GREATER THAN 3:1)





GROUND ROD PLACEMENT DETAIL
(TYPICAL EACH POLE)

GROUNDING NOTES

1. BOND 0.5" DIAMETER, 28 STRAND (MINIMUM) CLASS II COPPER CONDUCTOR TO THE MAIN GROUND ROD BY AN EXOTHERMIC WELD METHOD.
2. EXOTHERMICALLY WELD ALL CONNECTORS TO GROUND RODS.
3. BOND #4 AWG SOLID BARE COPPER WIRE TO THE REBAR CAGE AND THE MAIN GROUND ROD BY AN EXOTHERMIC WELD METHOD.
4. ENSURE MICROWAVE VEHICLE DETECTOR UNIT IS BONDED TO POLE.
5. REMOVE BONDING JUMPER BETWEEN EQUIPMENT CABINET GROUND BUS AND NEUTRAL BUS.
6. THE CONTRACTOR MAY, UPON APPROVAL OF THE ENGINEER, INSTALL A 30–FOOT SECTIONAL GROUND ROD WHEN CONDITIONS WILL NOT ALLOW FOR THE INSTALLATION OF THE 3 – RADIAL GROUND RODS.
7. INSTALL MARKER TAPE DIRECTLY ABOVE ALL GROUNDING ELECTRODES AND CONDUCTORS AT A DEPTH OF 12".
8. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

REVISED 10 / 21 / 11

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only

ATKINS
5200 77 Center Drive, Suite 50
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

ITS STANDARD DETAILS

MICROWAVE DETECTION GROUNDING

SCALE:	N.T.S.
DATE:	August, 2011
DWG. BY:	B. Slocum
DESIGN BY:	A. Badgett / D. Jones
APPROVED:	A. Lelewski

NORTH CAROLINA TURNPIKE AUTHORITY

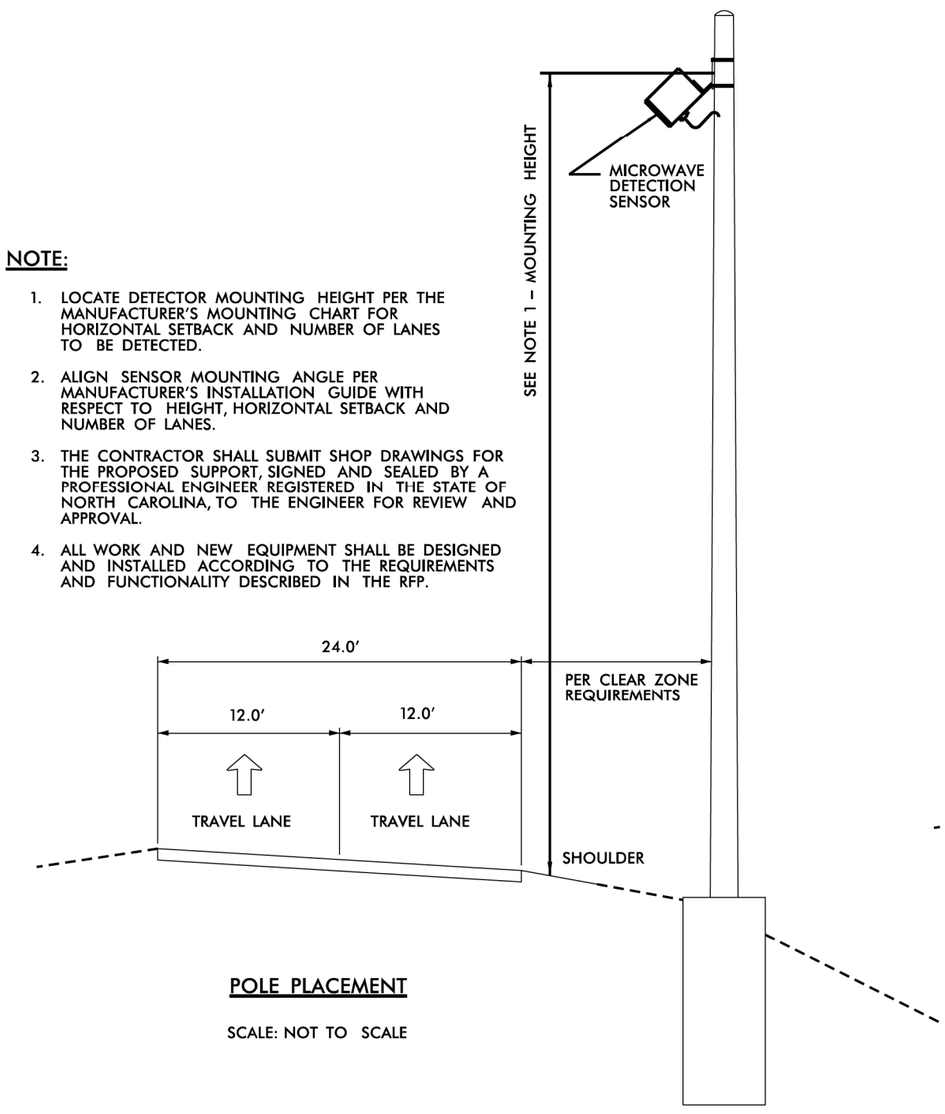
SHEET NO.
M-4

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority

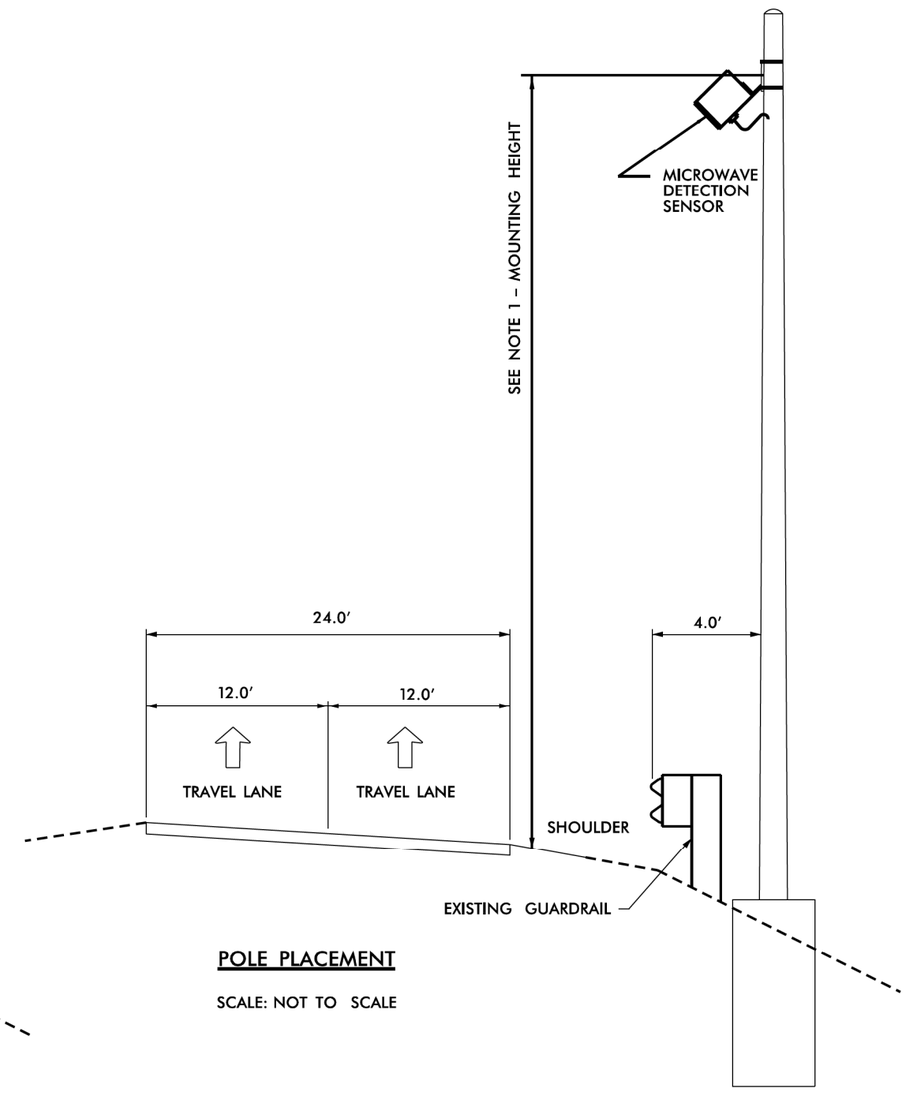
NOTE:

1. LOCATE DETECTOR MOUNTING HEIGHT PER THE MANUFACTURER'S MOUNTING CHART FOR HORIZONTAL SETBACK AND NUMBER OF LANES TO BE DETECTED.
2. ALIGN SENSOR MOUNTING ANGLE PER MANUFACTURER'S INSTALLATION GUIDE WITH RESPECT TO HEIGHT, HORIZONTAL SETBACK AND NUMBER OF LANES.
3. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR THE PROPOSED SUPPORT, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NORTH CAROLINA, TO THE ENGINEER FOR REVIEW AND APPROVAL.
4. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.



POLE PLACEMENT

SCALE: NOT TO SCALE



POLE PLACEMENT

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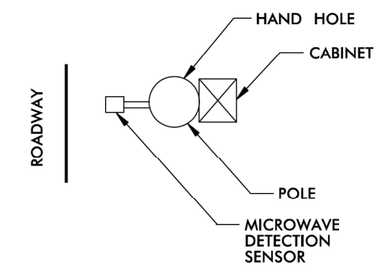

TOP VIEW OF DEVICES ON POLE

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only

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(704) 522-7275 NCBEES #F-0326

ITS STANDARD DETAILS

MICROWAVE DETECTION POLE PLACEMENT

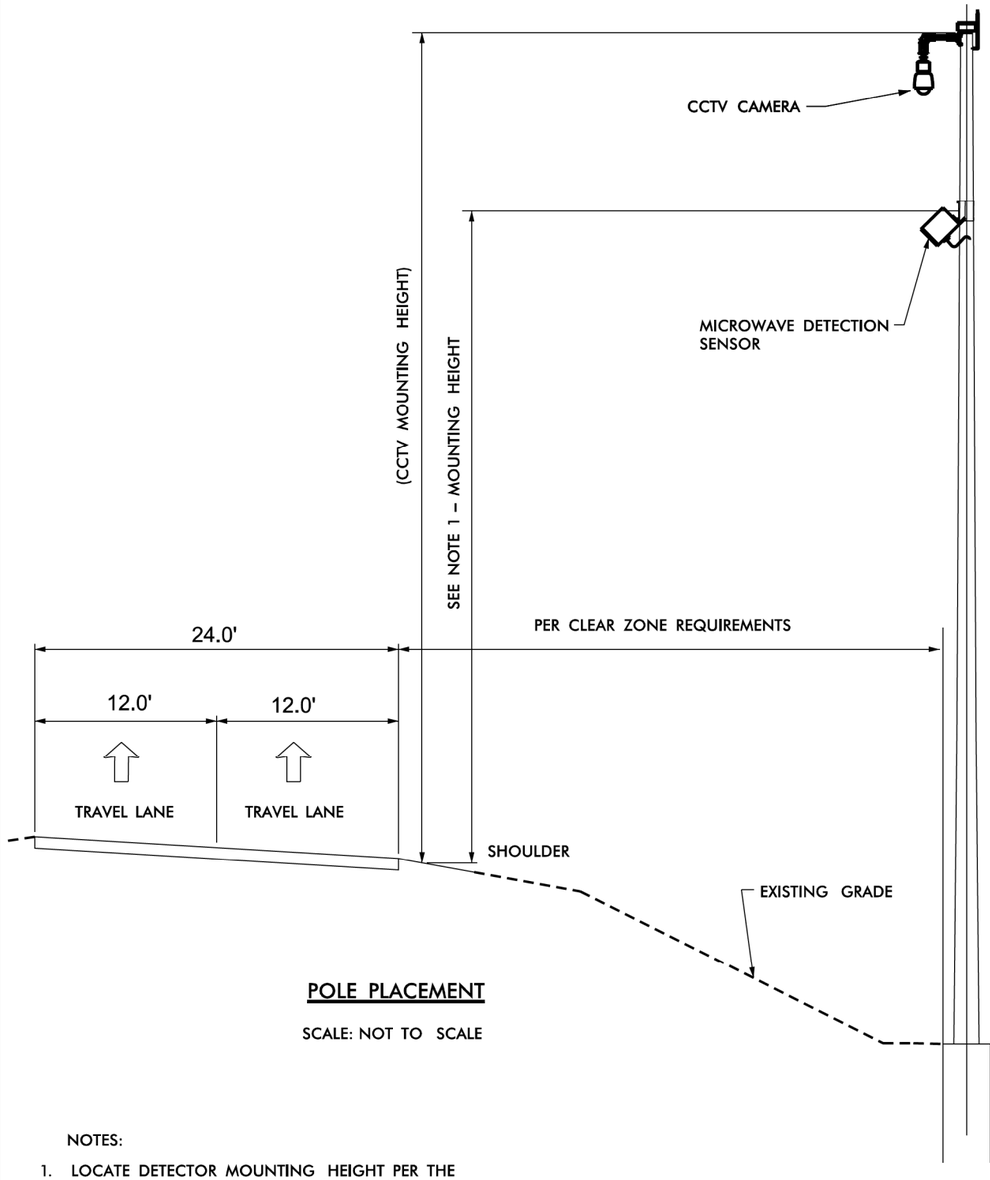
SCALE:	N.T.S.
DATE:	August, 2011
DWG. BY:	B. Slocum
DESIGN BY:	A. Badgett / D. Jones
APPROVED:	A. Lelewski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
M-5A

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority



POLE PLACEMENT

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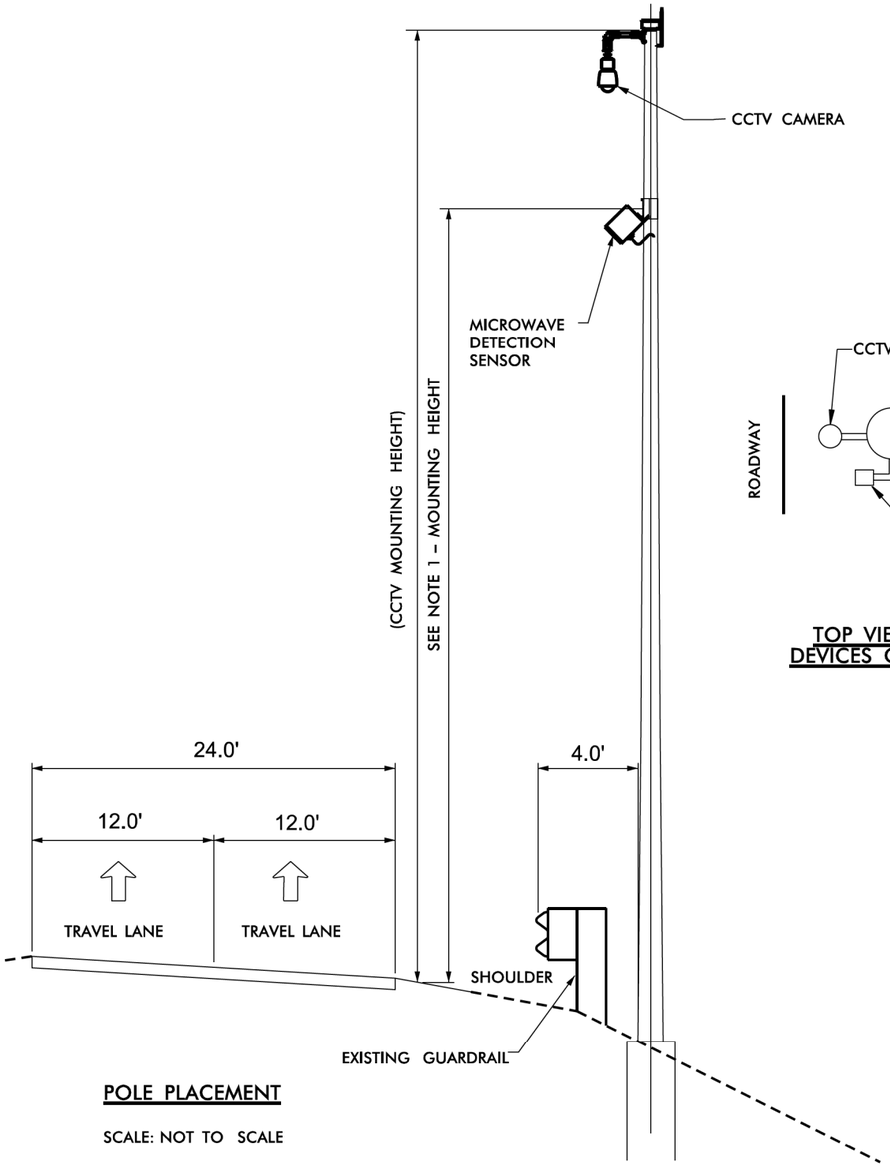

POLE PLACEMENT

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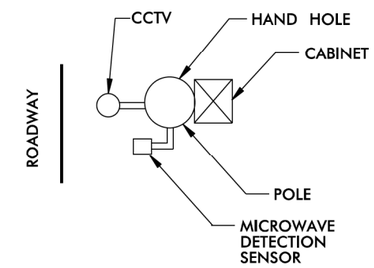

TOP VIEW OF DEVICES ON POLE

NOTES:

1. LOCATE DETECTOR MOUNTING HEIGHT PER THE MANUFACTURER'S MOUNTING CHART FOR HORIZONTAL SETBACK AND NUMBER OF LANES TO BE DETECTED.
2. ALIGN SENSOR MOUNTING ANGLE PER MANUFACTURER'S INSTALLATION GUIDE WITH RESPECT TO HEIGHT, HORIZONTAL SETBACK AND NUMBER OF LANES.
3. MOUNT DETECTOR ON SIDE OF POLE, 90 DEGREES TO CAMERA ARM SO THE DETECTOR DOESN'T INTERFERE WITH CAMERA LOWERING DEVICE.
4. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only

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ITS STANDARD DETAILS

MICROWAVE DETECTION POLE PLACEMENT WITH CCTV EQUIPMENT

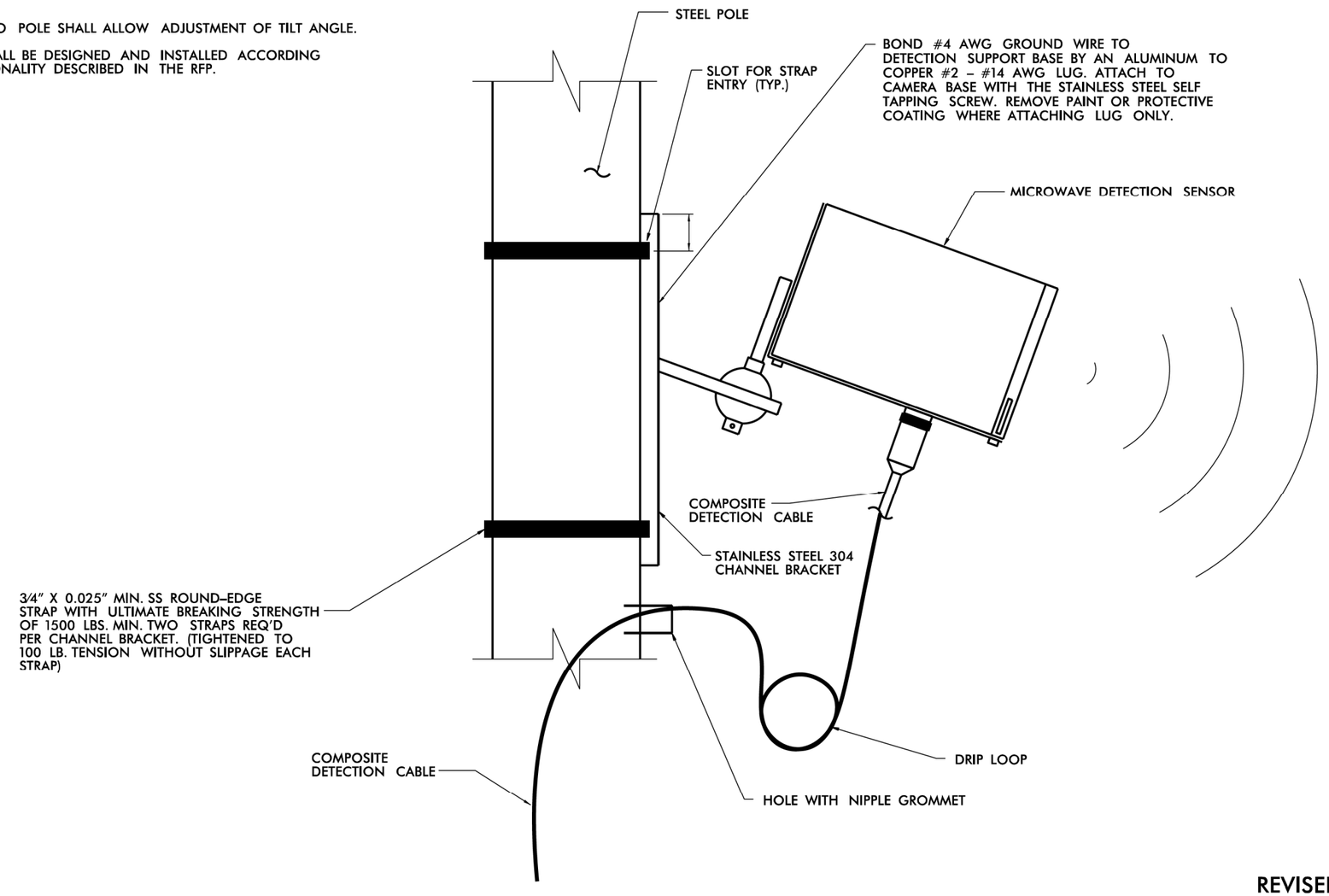
SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.
DATE: August, 2011		M-5B
DWG. BY: B. Slocum		
DESIGN BY: A. Badgett / D. Jones		
APPROVED: A. Lelewski		

$$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$DGNV8$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority

NOTES:

1. NO FIELD WELDING SHALL BE PERMITTED.
2. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR THE PROPOSED SUPPORT, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NORTH CAROLINA, TO THE ENGINEER FOR REVIEW AND APPROVAL.
3. MOUNTING BRACKET CONNECTION TO POLE SHALL ALLOW ADJUSTMENT OF TILT ANGLE.
4. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.



REVISED 10 /21 /2011

MICROWAVE DETECTION SENSOR ELEVATION VIEW

NOT TO SCALE

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Border content and labeling only

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Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

ITS STANDARD DETAILS

MICROWAVE DETECTION SENSOR MOUNTING

SCALE:	N.T.S.
DATE:	August, 2011
DWG. BY:	B. Slocum
DESIGN BY:	A. Badgett / D. Jones
APPROVED:	A. Lelewski

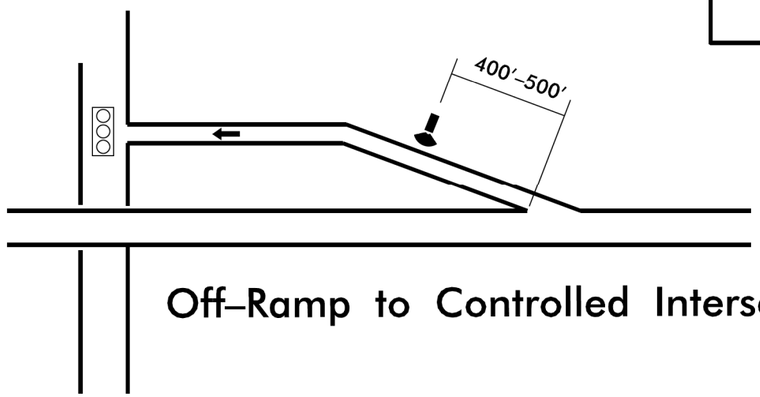
NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
M-6

$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

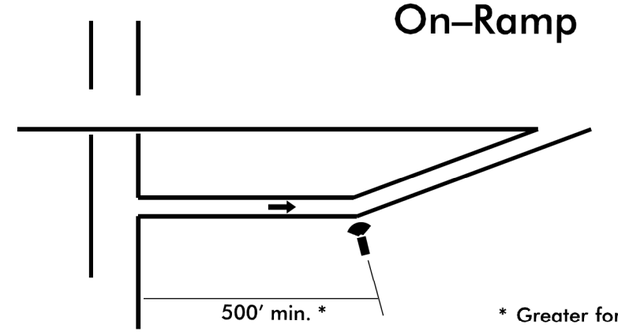
NORTH CAROLINA
Turnpike Authority

Ramp Detector Location

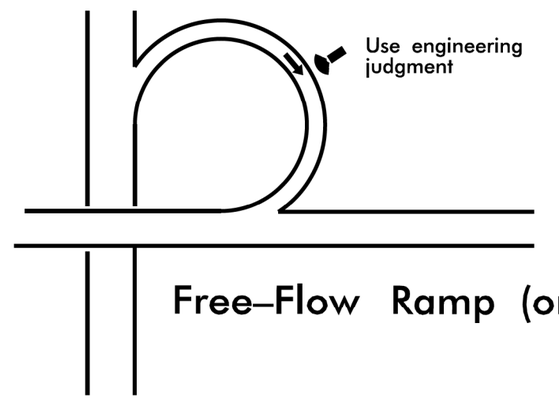


Off–Ramp to Controlled Intersection

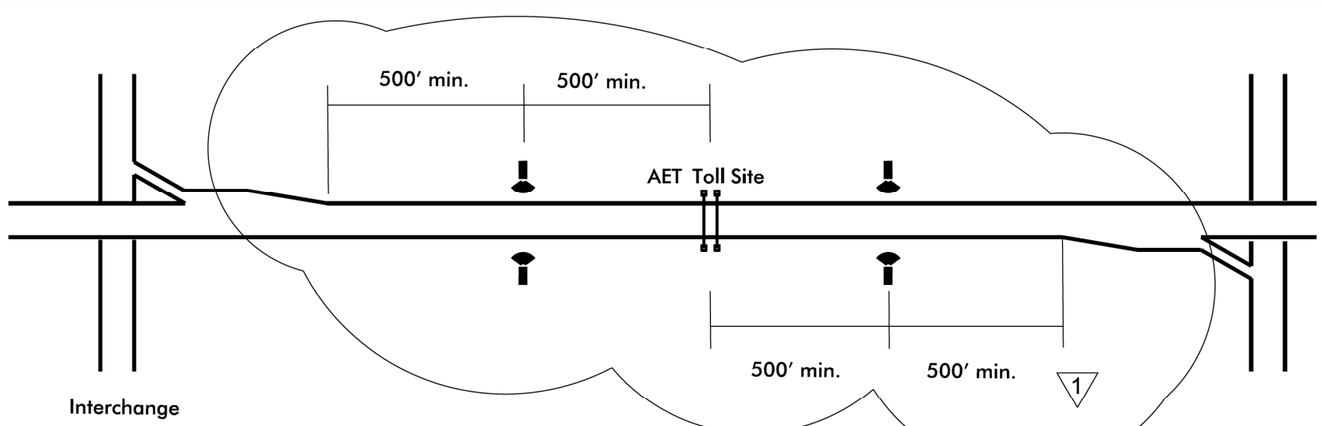
On–Ramp



* Greater for steep grades



Free–Flow Ramp (on– or off–ramp)



Mainline Detector Location

NOTES:

1. One or 2 detectors per site may be required; see Scope of Work.
2. Locate detector sites roughly half way between toll site and on/off ramp, if possible.

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Revised mainline spacing, border changes

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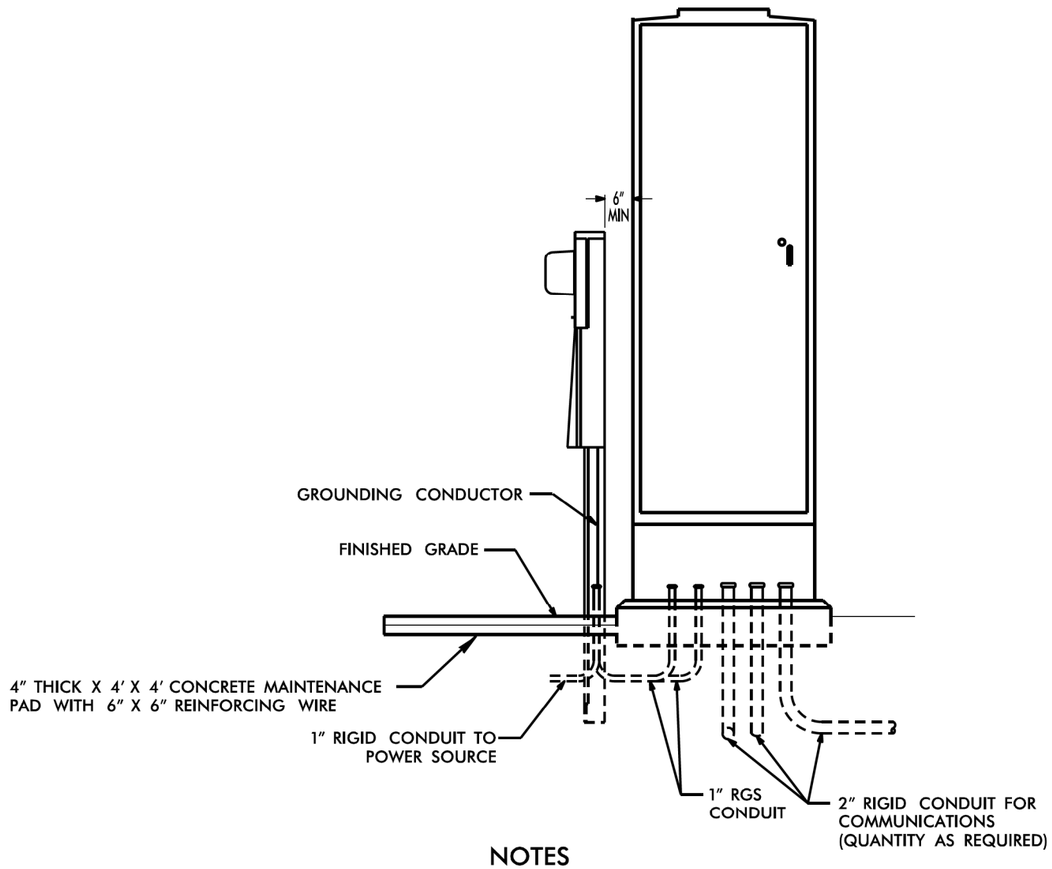
ITS STANDARD DETAILS

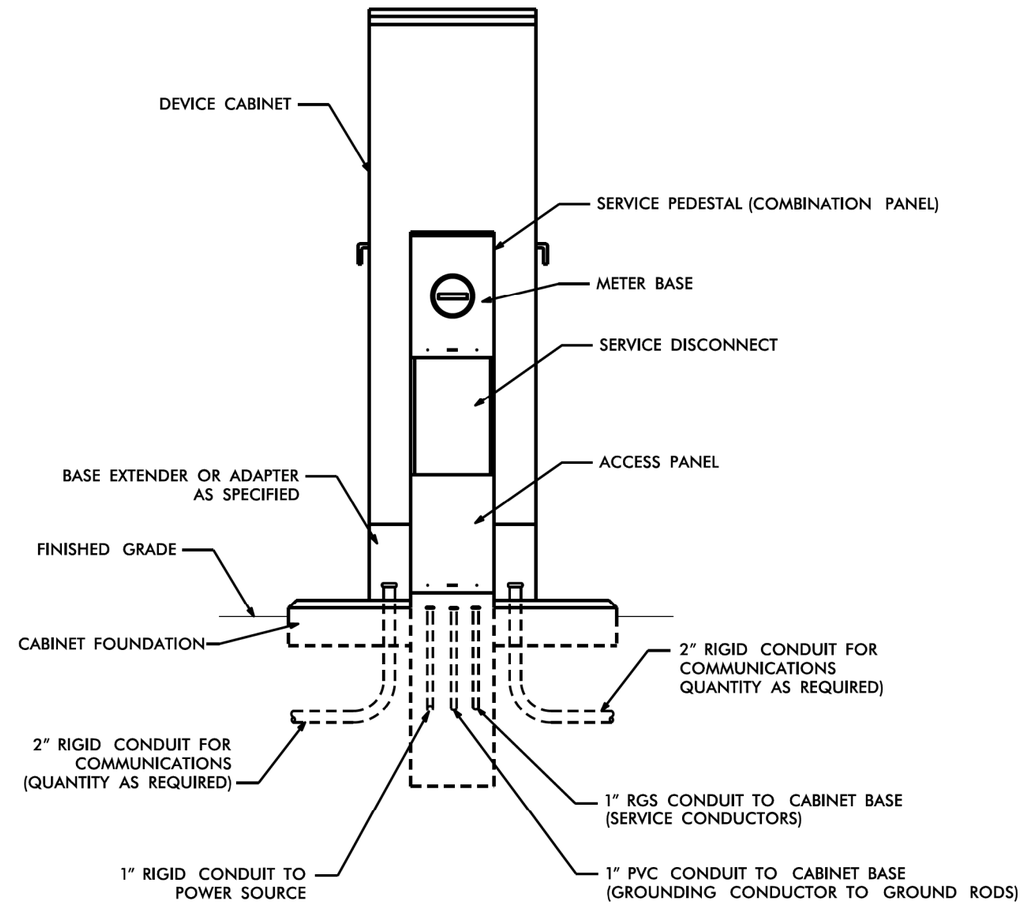
MICROWAVE DETECTION
PLACEMENT SCHEMATIC

SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.
DATE: August, 2011		M-7
DWG. BY: B. Slocum		
DESIGN BY: A. Badgett / D. Jones		
APPROVED: A. Lelewski		

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority





NOTES

1. TEST GROUNDING SYSTEM USING AN APPROVED METHOD IN ACCORDANCE WITH SPECIAL PROVISIONS. INSTALL GROUND RODS AS DIRECTED BY THE ENGINEER TO MEET THIS REQUIREMENT.
2. REMOVE ANY EXISTING GROUND RODS IN CONCRETE CABINET FOUNDATION BY CUTTING OFF FLUSH WITH FOUNDATION SURFACE.
3. REMOVE BONDING JUMPER IN EQUIPMENT CABINET IF INSTALLED BETWEEN AC NEUTRAL AND EQUIPMENT GROUND.
4. BOND ALL RIGID GALVANIZED STEEL CONDUITS ENTERING THE CABINET TO EQUIPMENT GROUND.
5. INSTALL RIGID GALVANIZED STEEL CONDUIT (MINIMUM 1") BETWEEN DISCONNECT AND CABINET.
6. SERVICE DISCONNECT GROUND BUS BAR SHALL PROVIDE FOR 2 #4 AWG CONNECTIONS.
7. IF CONDITIONS REQUIRE SERVICE PEDESTAL TO BE INSTALLED IN FRONT OR REAR OF CABINET, MAINTAIN SUFFICIENT CLEARANCE FOR DOOR TO FULLY OPEN.
8. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.
9. COMBINATION PANELS NOT ADJACENT TO CABINETS DO NOT REQUIRE MAINTENANCE PADS. 1

REVISED 08 /24 /2011

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Meter pad, border content

ATKINS 5200 77 Center Drive, Suite 50
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

ITS STANDARD DETAILS

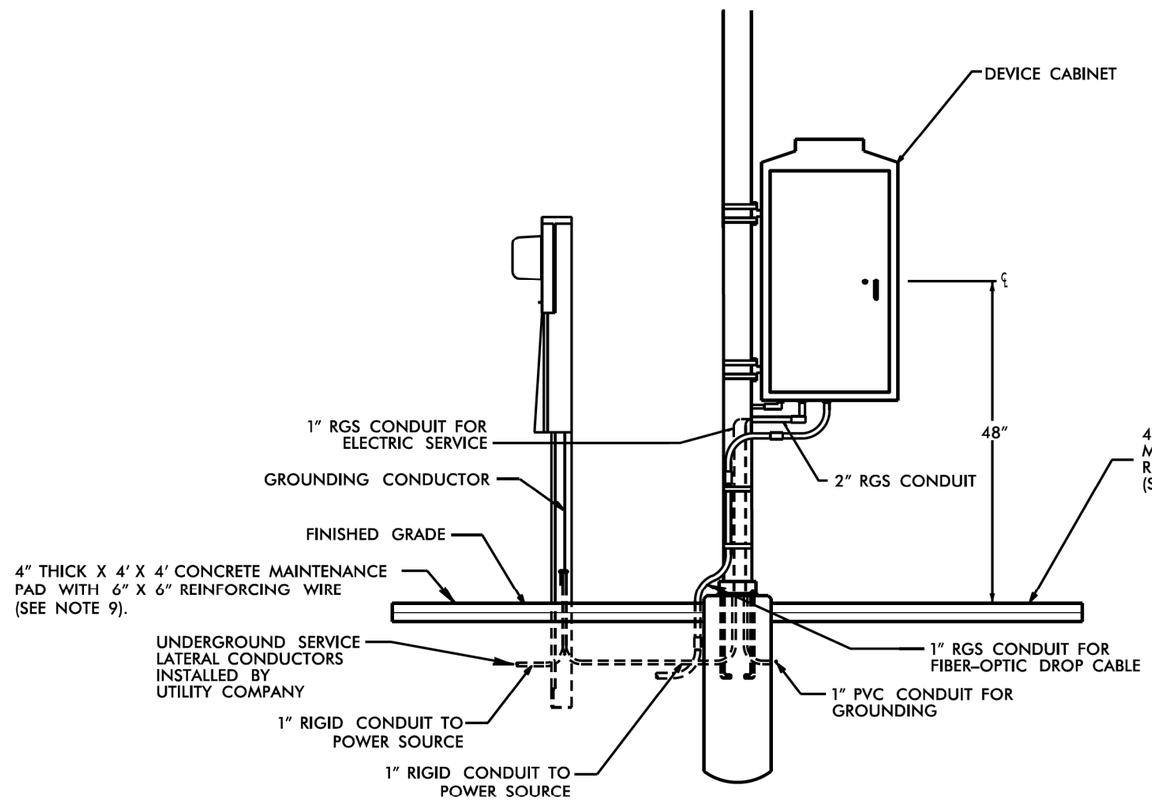
POWER SERVICE DETAIL GROUND-MOUNTED CABINET

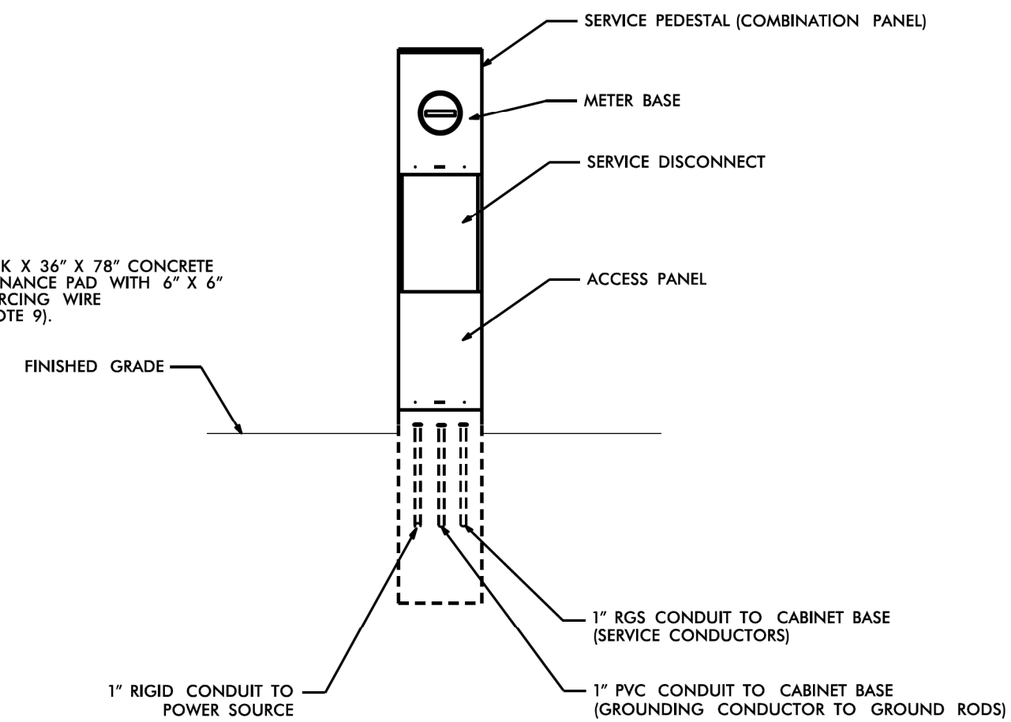
SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.
DATE: August, 2011		P-1
DWG. BY: B. Slocum		
DESIGN BY: A. Badgett / D. Jones		
APPROVED: A. Lelewski		

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

NORTH CAROLINA
Turnpike Authority

DO NOT INSTALL MAINTENANCE PAD ON EXCESSIVE SLOPE (GREATER THAN 3:1)





NOTES

1. TEST GROUNDING SYSTEM USING AN APPROVED METHOD IN ACCORDANCE WITH SPECIAL PROVISIONS. INSTALL GROUND RODS AS DIRECTED BY THE ENGINEER TO MEET THIS REQUIREMENT.
2. REMOVE ANY EXISTING GROUND RODS IN CONCRETE CABINET FOUNDATION BY CUTTING OFF FLUSH WITH FOUNDATION SURFACE.
3. REMOVE BONDING JUMPER IN EQUIPMENT CABINET IF INSTALLED BETWEEN AC NEUTRAL AND EQUIPMENT GROUND.
4. BOND ALL RIGID GALVANIZED STEEL CONDUITS ENTERING THE CABINET TO "EQUIPMENT GROUND".
5. INSTALL RIGID GALVANIZED STEEL CONDUIT (MINIMUM 1") BETWEEN DISCONNECT AND CABINET.
6. SERVICE DISCONNECT GROUND BUS BAR SHALL PROVIDE FOR 2 #4 AWG CONNECTIONS.
7. IF CONDITIONS REQUIRE SERVICE PEDESTAL TO BE INSTALLED IN FRONT OR REAR OF CABINET, MAINTAIN SUFFICIENT CLEARANCE FOR DOOR TO FULLY OPEN.
8. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.
9. CONCRETE PADS FOR SERVICE PEDESTAL AND CABINET SHALL BE COMBINED INTO A SINGLE PAD, IF PEDESTAL IS PRESENT NEXT TO POLE. COMBINATION PANELS NOT ADJACENT TO CABINETS DO NOT REQUIRE A MAINTENANCE PAD. 1

REVISED 8 / 24 / 11

REV. NO.	BY	DATE	DESCRIPTION
1	DLJ	10/7/14	Meter pad, border content

ATKINS 5200 77 Center Drive, Suite 50
Charlotte, North Carolina 28217
(704) 522-7275 NCBEES #F-0326

ITS STANDARD DETAILS

POWER SERVICE DETAIL
POLE-MOUNTED CABINET

SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.
DATE: August, 2011		P-2
DWG. BY: B. Slocum		
DESIGN BY: A. Badgett / D. Jones		
APPROVED: A. Lelewski		

$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

Appendix K

NCTA Express Lane
Pavement Marking Standards

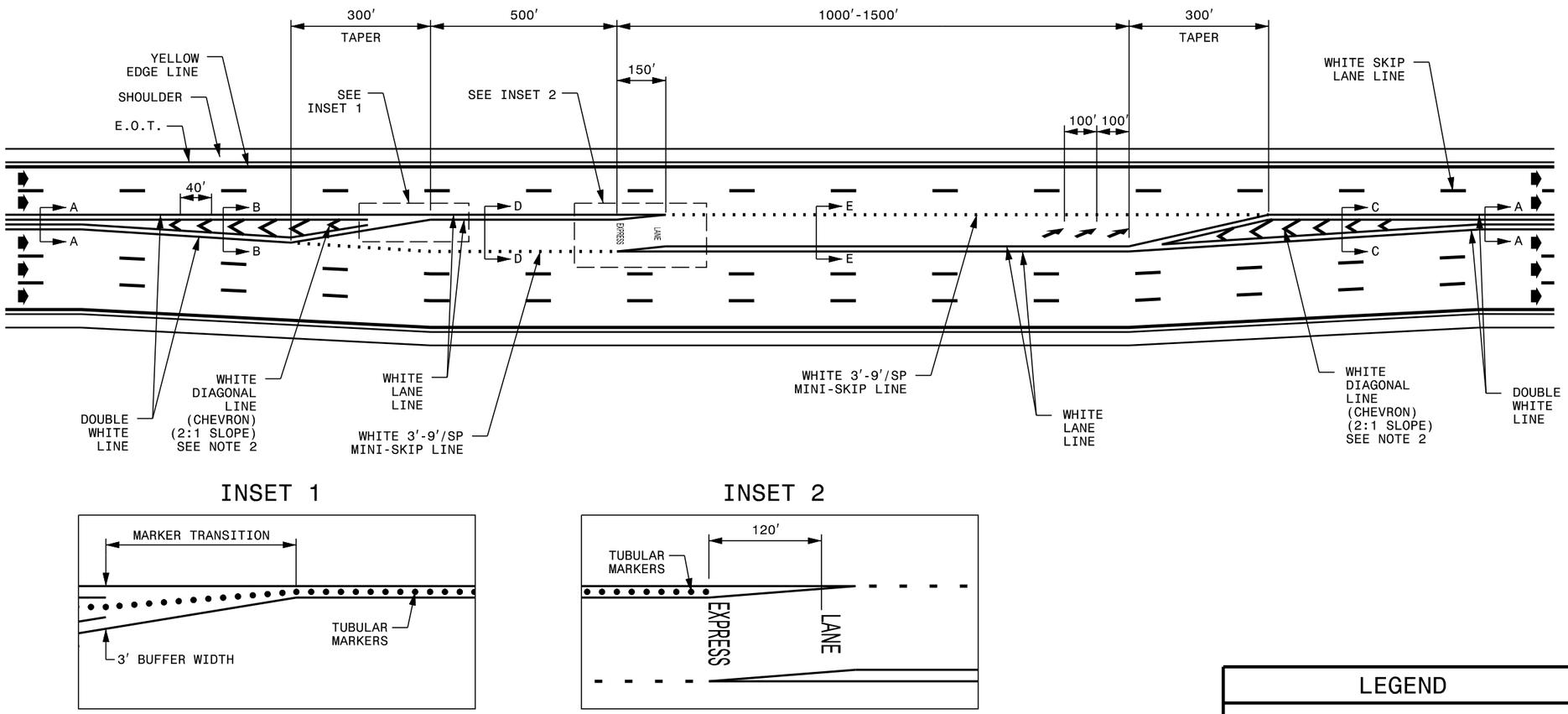
2-18

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

ENGLISH STANDARD DRAWING FOR

TOLL PAVEMENT MARKINGS

EXPRESS LANE INTERMEDIATE INGRESS TRANSITION



NOTES:
1. SEE SHEET 5 OF 7 AND SHEET 6 OF 7 FOR SECTION DETAILS.
2. ADD 12″ WHITE DIAGONAL LINES (CHEVRONS) AT 40′ SPACING WHEN THE BUFFER WIDTH IS 8′ OR GREATER.
3. FOR SECTION C-C, TUBULAR MARKERS SHALL BEGIN WHEN BUFFER WIDTH IS 3′.

SHEET 2 OF 7

2-18

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

ENGLISH STANDARD DRAWING FOR

TOLL PAVEMENT MARKINGS

EXPRESS LANE INTERMEDIATE INGRESS TRANSITION

SHEET 2 OF 7

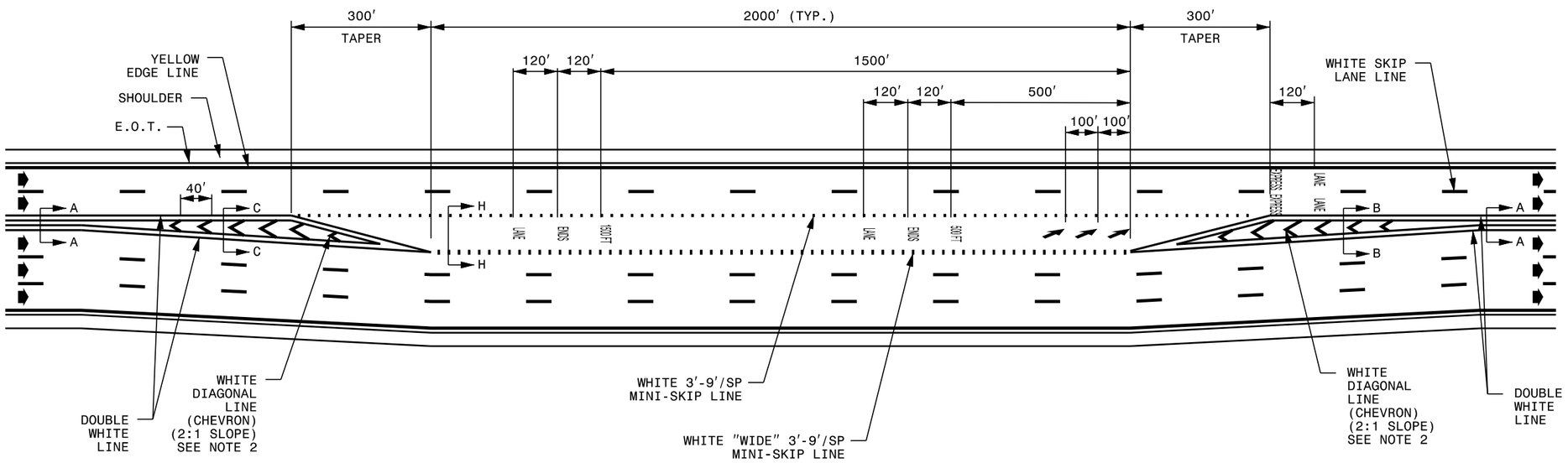
2-18

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

ENGLISH STANDARD DRAWING FOR

TOLL PAVEMENT MARKINGS

EXPRESS LANE INTERMEDIATE INGRESS
AND EGRESS (WEAVE) TRANSITION



LEGEND

⬅ ➡	DIRECTION OF TRAFFIC FLOW
↑ LANE	PAVEMENT WORD MARKINGS AND ARROWS

NOTES:
1. SEE SHEET 5 OF 7 AND SHEET 6 OF 7 FOR SECTION DETAILS.
2. ADD 12″ WHITE DIAGONAL LINES (CHEVRONS) AT 40′ SPACING WHEN THE BUFFER WIDTH IS 8′ OR GREATER.
3. FOR SECTION C-C, TUBULAR MARKERS SHALL END WHEN BUFFER WIDTH IS 3′.
4. FOR SECTION B-B, TUBULAR MARKERS SHALL BEGIN WHEN BUFFER WIDTH IS 3′.

2-18

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

ENGLISH STANDARD DRAWING FOR

TOLL PAVEMENT MARKINGS

EXPRESS LANE INTERMEDIATE INGRESS
AND EGRESS (WEAVE) TRANSITION

SHEET 3 OF 7

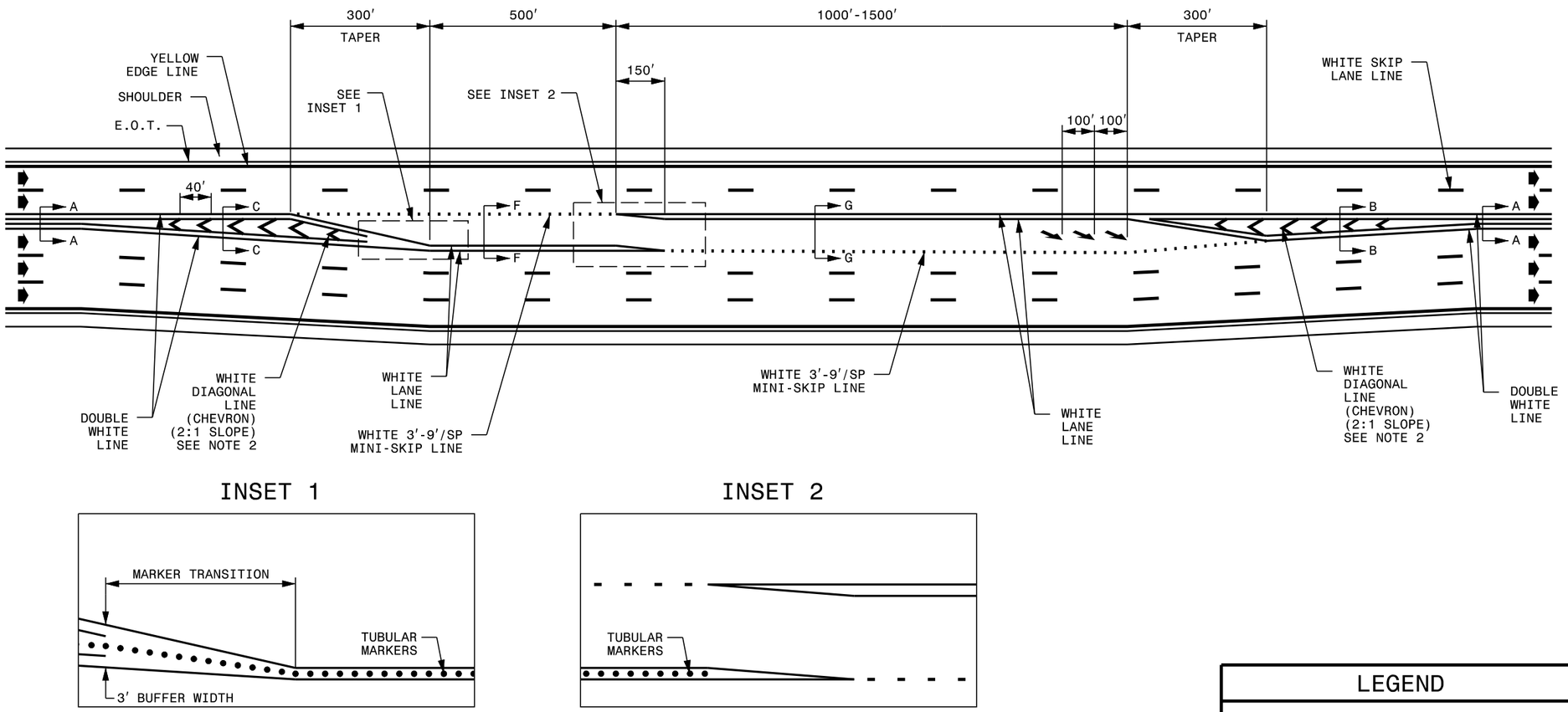
2-18

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

ENGLISH STANDARD DRAWING FOR

TOLL PAVEMENT MARKINGS

EXPRESS LANE INTERMEDIATE EGRESS TRANSITION



LEGEND

DIRECTION OF TRAFFIC FLOW

PAVEMENT ARROWS

NOTES:
1. SEE SHEET 5 OF 7 AND SHEET 6 OF 7 FOR SECTION DETAILS.
2. ADD 12″ WHITE DIAGONAL LINES (CHEVRONS) AT 40′ SPACING WHEN THE BUFFER WIDTH IS 8′ OR GREATER.
3. FOR SECTION B-B, TUBULAR MARKERS SHALL BEGIN WHEN BUFFER WIDTH IS 3′.

SHEET 4 OF 7

2-18

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

ENGLISH STANDARD DRAWING FOR

TOLL PAVEMENT MARKINGS

EXPRESS LANE INTERMEDIATE EGRESS TRANSITION

SHEET 4 OF 7

2-18

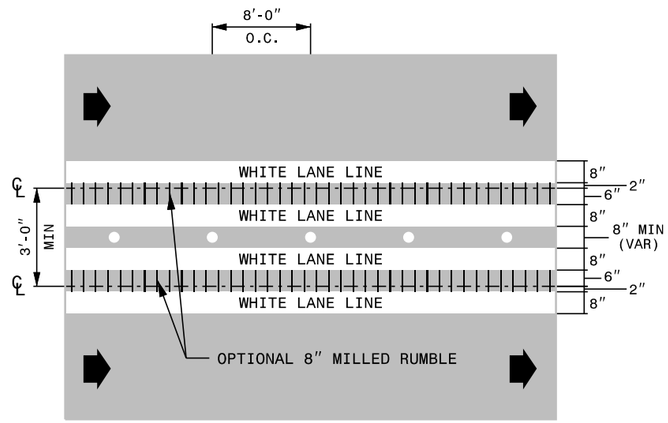
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR

TOLL PAVEMENT MARKINGS

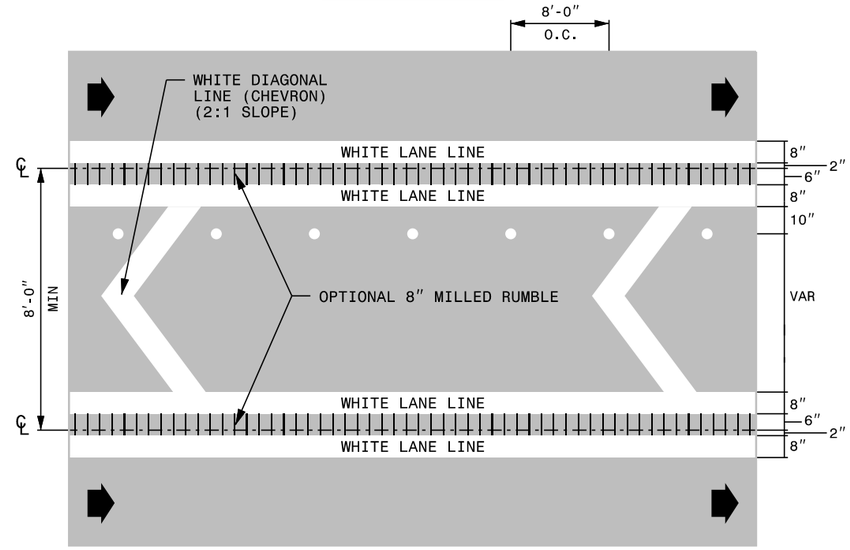
EXPRESS LANE BUFFER SECTION DETAILS

SECTION A-A

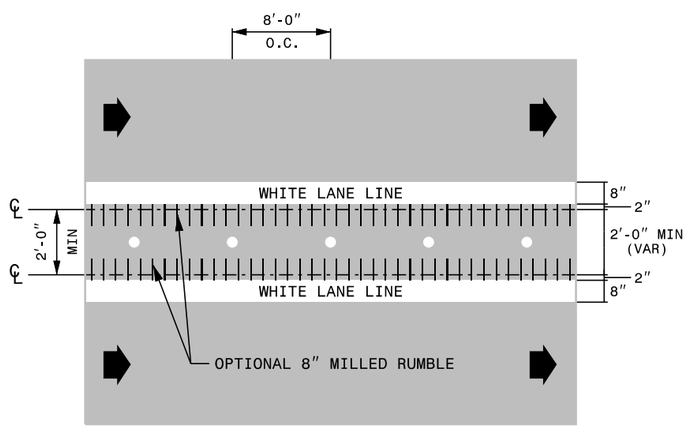


3' - 8' BUFFER

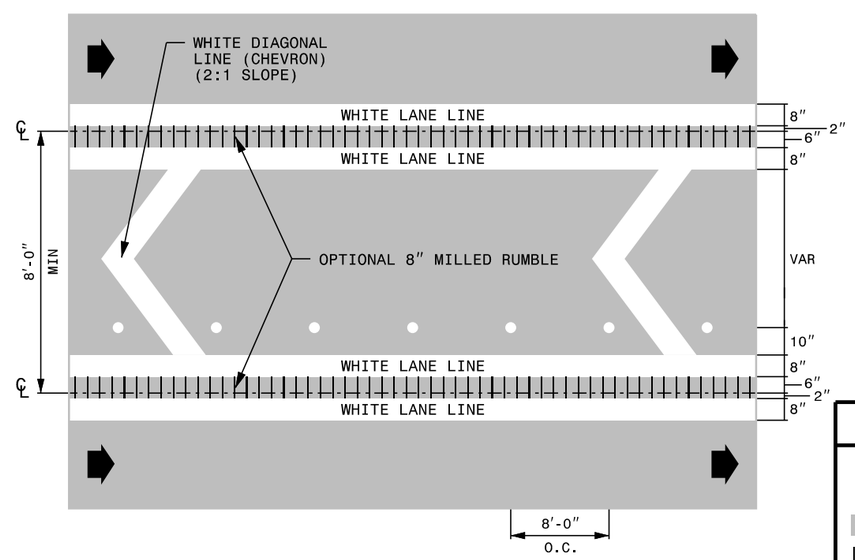
SECTION B-B



SECTION C-C



< 3' BUFFER



LEGEND

- DIRECTION OF TRAFFIC FLOW
- TUBULAR MARKERS
- MILLED RUMBLE
- ℄ LANE LINE FROM ROADWAY PLANS

NOTES:
1. LONGITUDINAL LINES SHALL BE 2" MINIMUM FROM LONGITUDINAL JOINTS IN CONCRETE AND ASPHALT SURFACES.
2. IN BUFFER AREAS UP TO 4' WIDE, CENTER TUBULAR MARKERS WITHIN BUFFER.
3. IN TRANSITION AREAS GREATER THAN 4' WIDE, OFFSET THE CENTER OF THE TUBULAR MARKERS 10" FROM THE LANE LINE.
4. TUBULAR MARKER SPACING IN BUFFERS AND THROUGH TRANSITION AREAS SHALL NOT EXCEED 8'.
5. SEE SHEET 7 OF 7 FOR MILLED RUMBLE DETAILS.

2-18

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

ENGLISH STANDARD DRAWING FOR

TOLL PAVEMENT MARKINGS

EXPRESS LANE BUFFER SECTION DETAILS

2-18

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

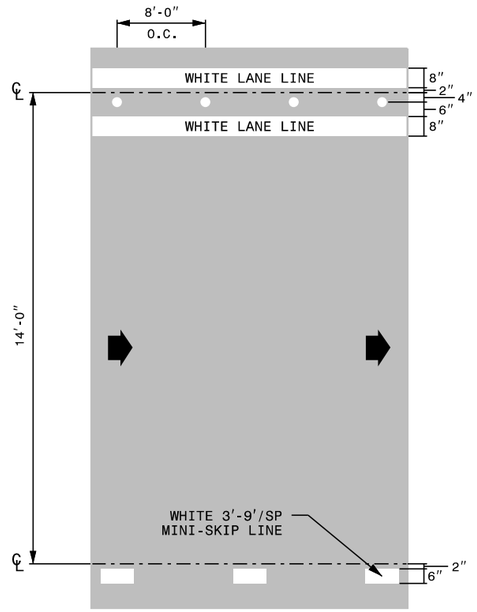
ENGLISH STANDARD DRAWING FOR

TOLL PAVEMENT MARKINGS

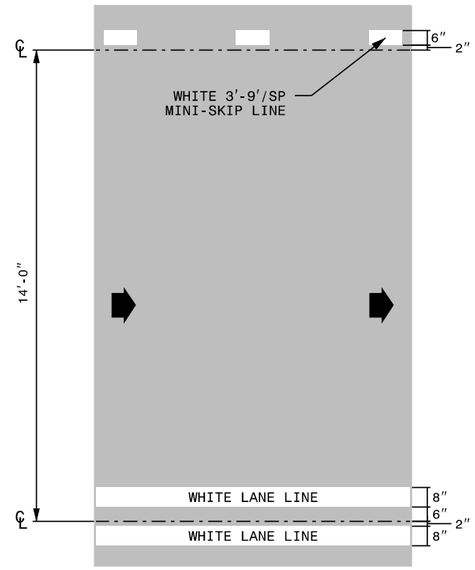
EXPRESS LANE TRANSITION SECTION DETAILS

SHEET 6 OF 7

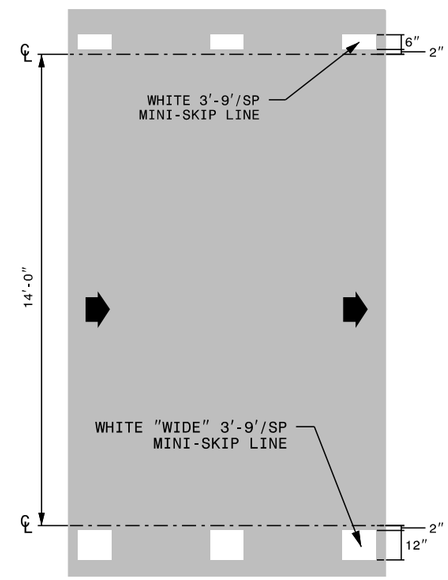
SECTION D-D



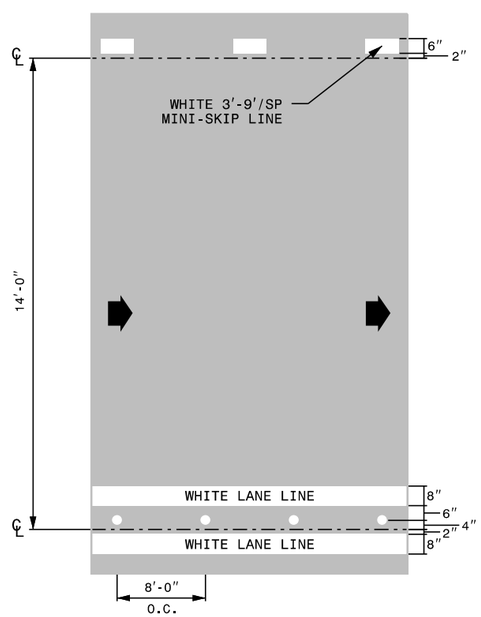
SECTION E-E



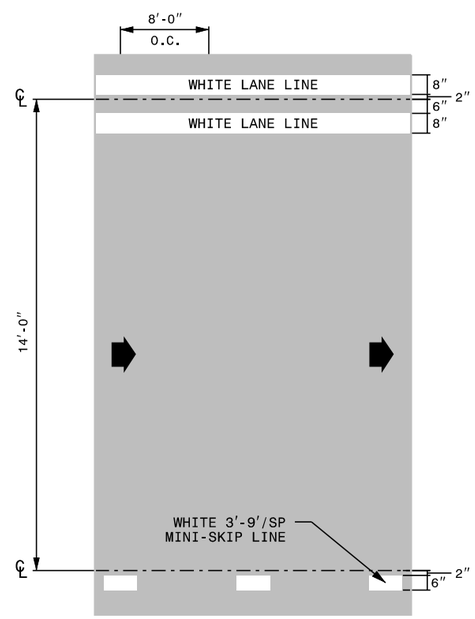
SECTION H-H



SECTION F-F



SECTION G-G



LEGEND

- DIRECTION OF TRAFFIC FLOW
- TUBULAR MARKERS
- LANE LINE FROM ROADWAY PLANS

NOTES:
1. LONGITUDINAL LINES SHALL BE 2" MINIMUM FROM LONGITUDINAL JOINTS IN CONCRETE AND ASPHALT SURFACES.
2. TUBULAR MARKER SPACING THROUGH TRANSITION AREAS SHALL NOT EXCEED 8'.

2-18

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

ENGLISH STANDARD DRAWING FOR

TOLL PAVEMENT MARKINGS

EXPRESS LANE TRANSITION SECTION DETAILS

SHEET 6 OF 7

2-18

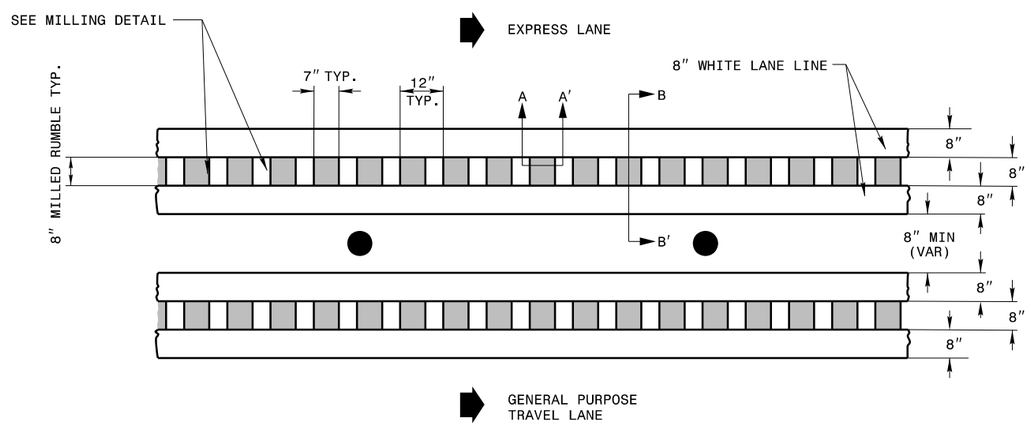
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH STANDARD DRAWING FOR

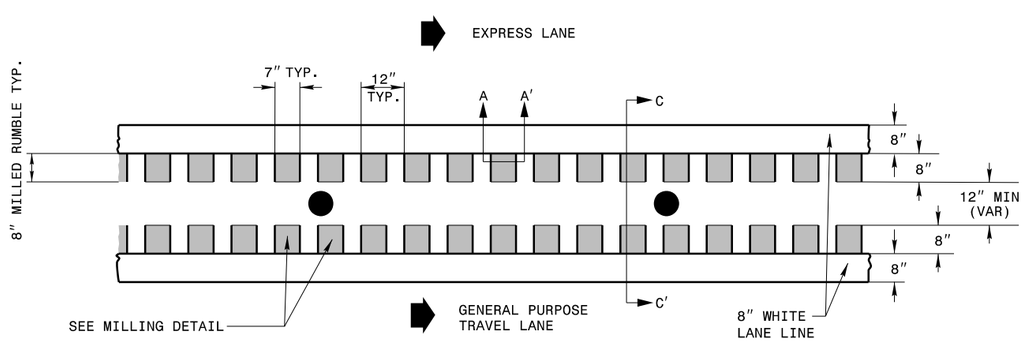
TOLL PAVEMENT MARKINGS

EXPRESS LANE BUFFER
MILLED RUMBLE DETAILS

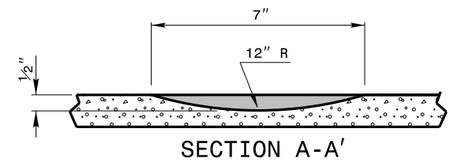
3′ - 8′ BUFFER



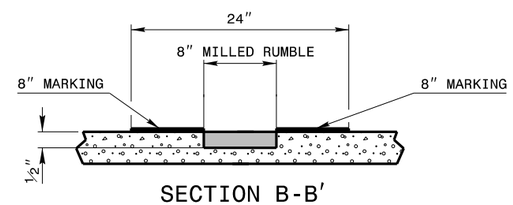
< 3′ BUFFER



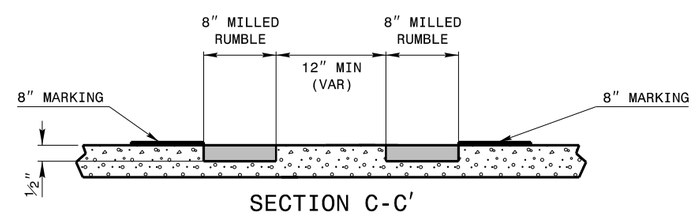
MILLING/MARKING DETAILS



SECTION A-A′



SECTION B-B′



SECTION C-C′

LEGEND

- DIRECTION OF TRAFFIC FLOW
- MILLED RUMBLE
- TUBULAR MARKER

NOTES:
1. USING A VACUUM IN THE SAME OPERATION, REMOVE ALL DEBRIS FROM THE MILLINGS JUST PRIOR TO PLACING ANY PAVEMENT MARKINGS.
2. SEE SHEET 5 OF 7 AND SHEET 6 OF 7 FOR TUBULAR MARKER PLACEMENT DETAILS.

2-18

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

ENGLISH STANDARD DRAWING FOR

TOLL PAVEMENT MARKINGS

EXPRESS LANE BUFFER
MILLED RUMBLE DETAILS

SHEET 7 OF 7

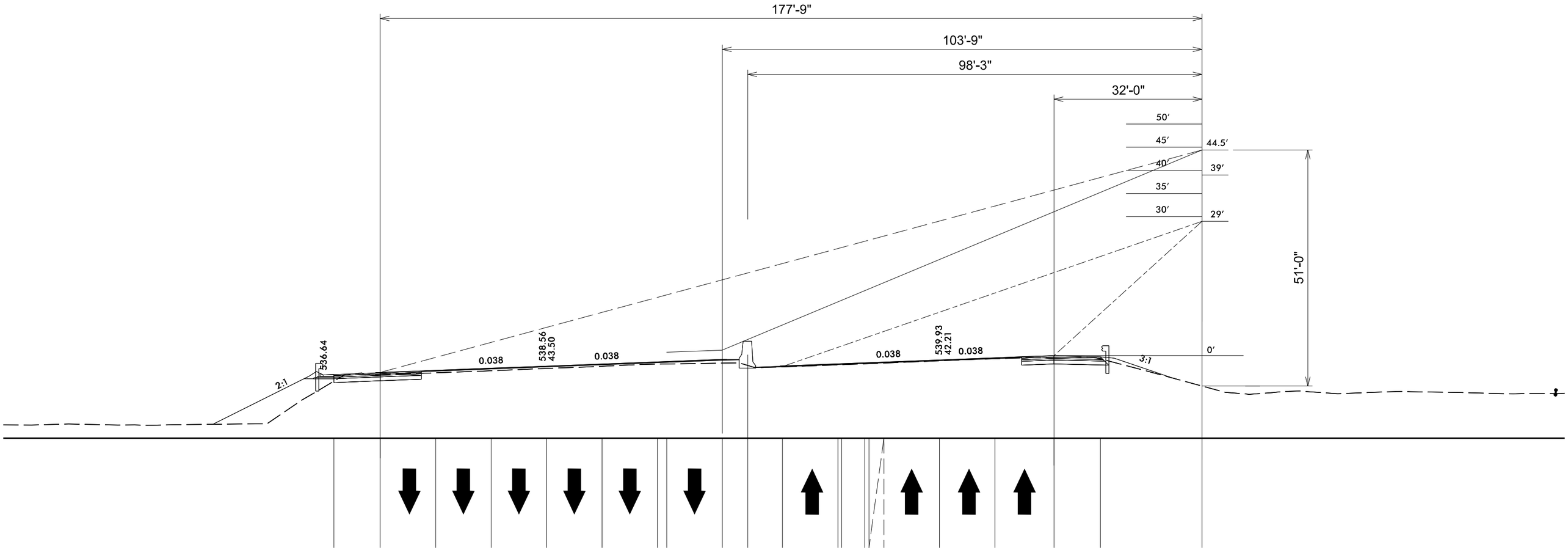
Appendix L

Sample MVD Sensor Locations

95'-7"
50'
45'
40'
39'
35'
30'
25'
20'
does this need to go any higher to see over trucks?
use 25' pole
8'-1"
23'-10"
0'
-L2 WEST-
137+93.72
593.322594
-Y1-DCWB-
22+17.60
595.275912
-Y1-DCEB-
18+49.74
594.951724
-L2 EAST-
138+08.84
597.219230
591.34
0.040
0.040
0.027
0.040
0.040
0.040
0.040
2:1
569.25
EOP
EOT
EOT
EOT
EOP
MVD 5A

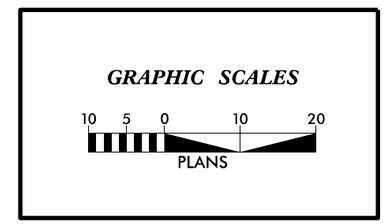
-L- 138+00.00

GRAPHIC SCALES
10 5 0 10 20
PLANS



STA -L- 304+85.00

XSC used -L- 305+00.00



Appendix M

Existing Traffic Information

Figure 4-8: I-485 Inner (WB) Loop Average Weekday Hourly Volumes, November 2018

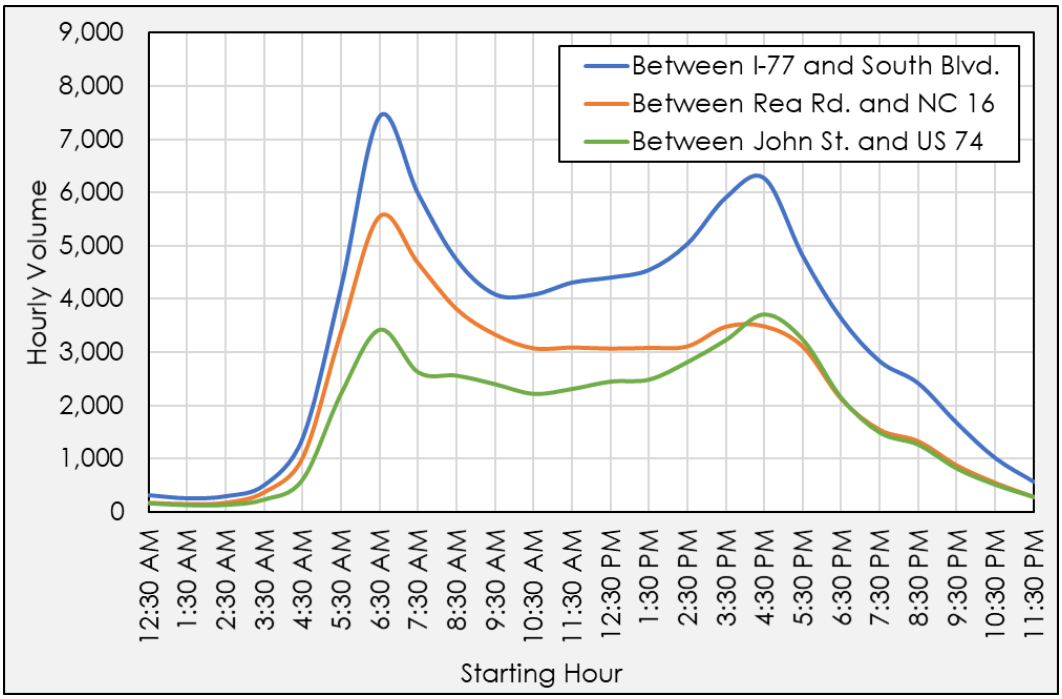
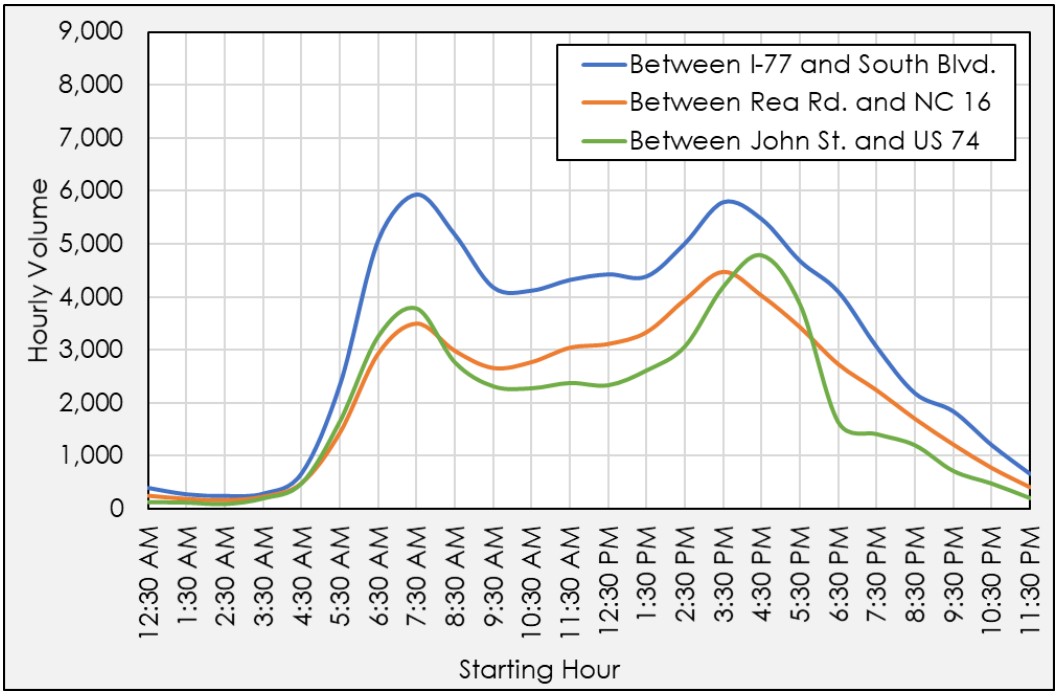
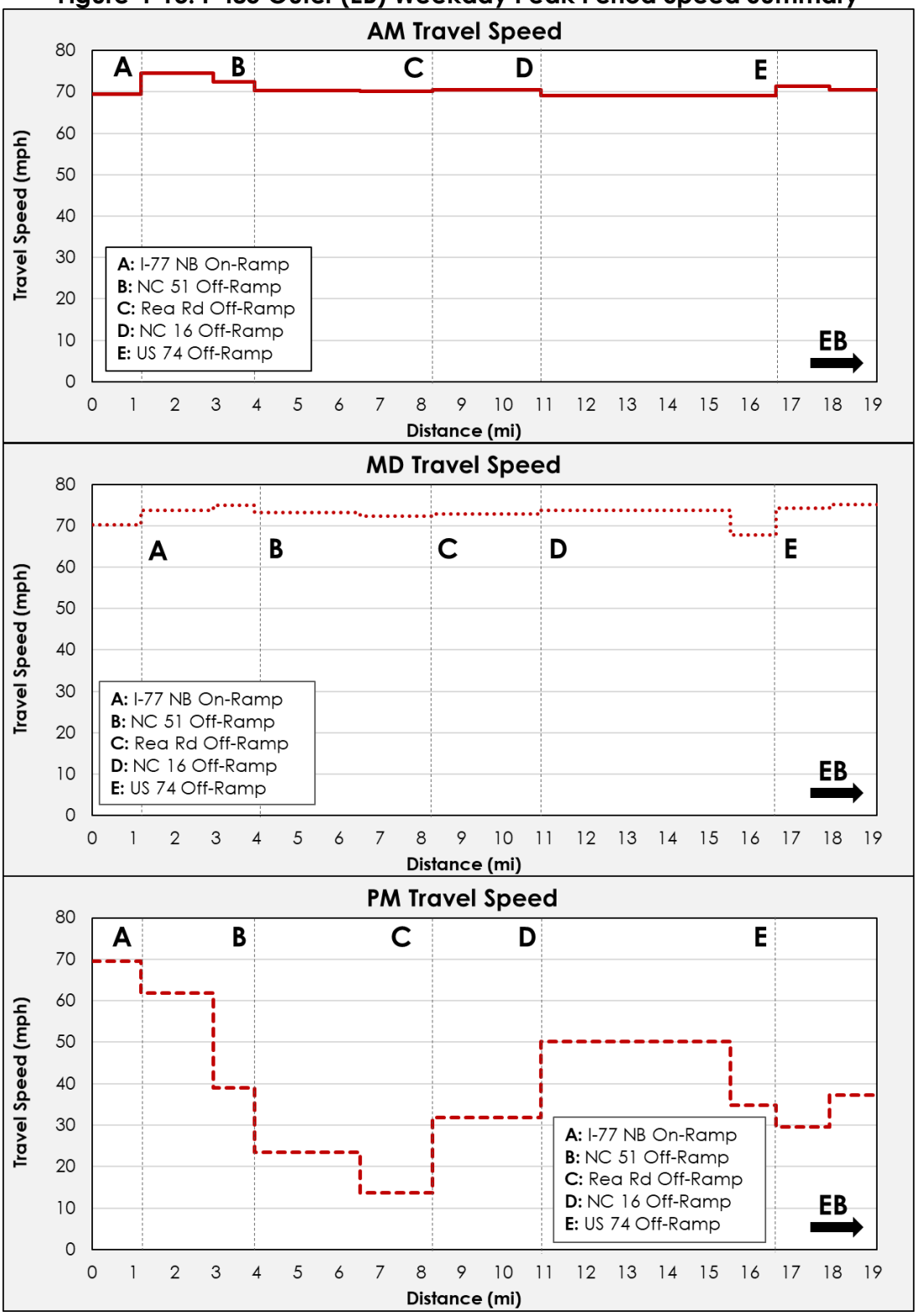


Figure 4-9: I-485 Outer (EB) Loop Average Weekday Hourly Volumes, November 2018



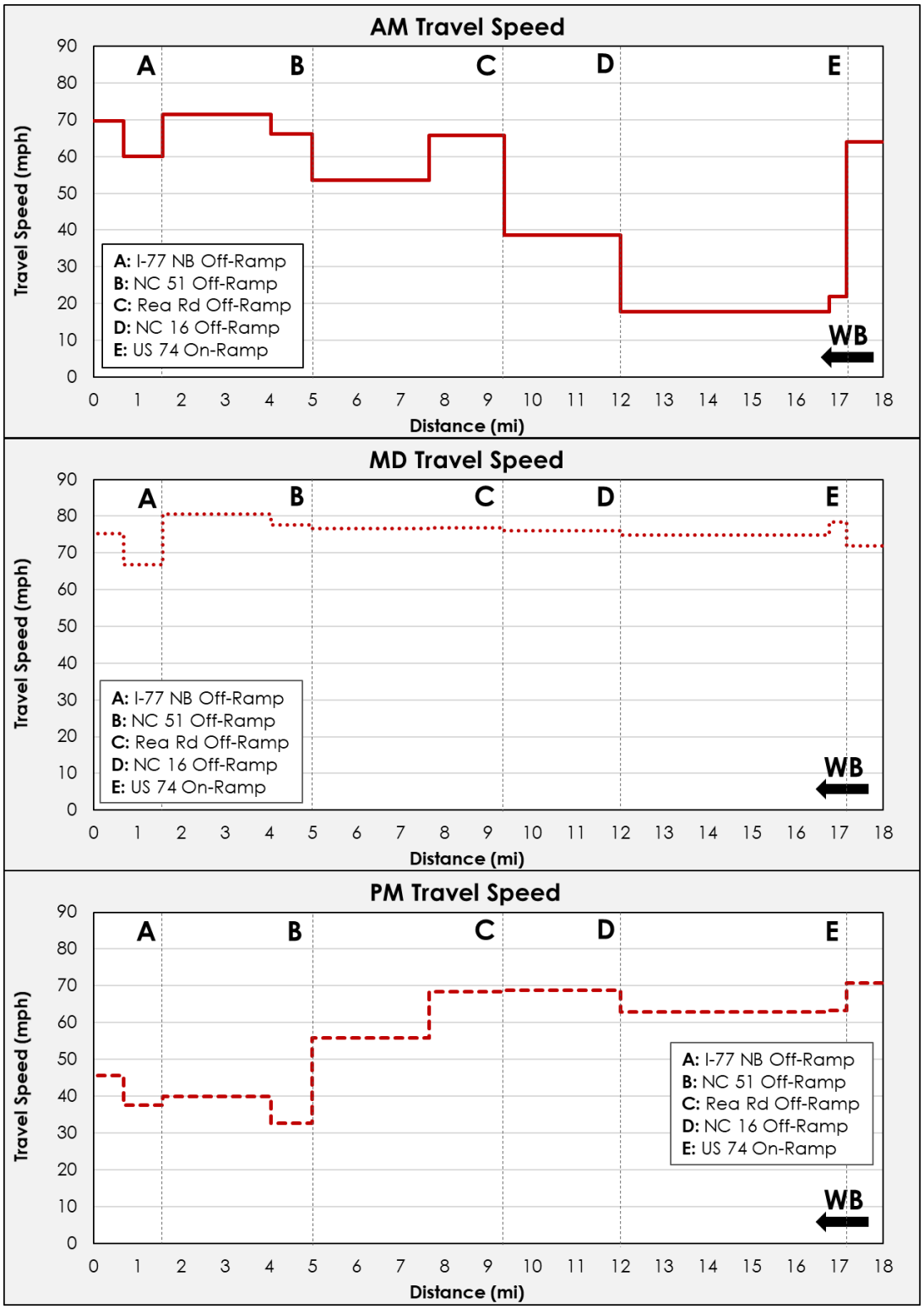
Source: Stantec 2018 Data Collection Program.

Figure 4-13: I-485 Outer (EB) Weekday Peak Period Speed Summary



Source: Stantec 2018 Data Collection Program.

Figure 4-14: I-485 Inner (WB) Weekday Peak Period Speed Summary



Source: Stantec 2018 Data Collection Program.