Attachment 15
Monroe ITS Special and Standard Details

09/08/99

TIP PROJECT: R-3329/R-2559

CONTRACT: C202587

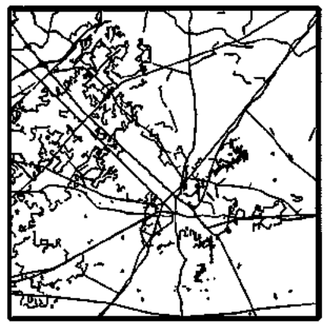
$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$$

NORTH CAROLINA
TURNPIKE AUTHORITY

MECKLENBURG and UNION COUNTIES

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.			

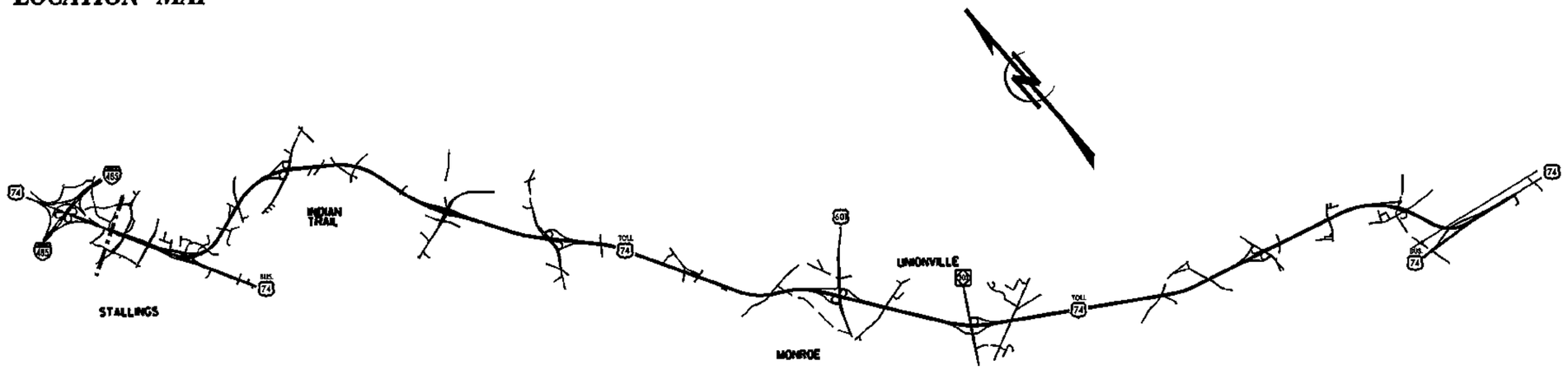
STATE FEDERAL	R.W. FEDERAL	DESCRIPTION



LOCATION MAP

LOCATION:
MONROE CONNECTOR/BYPASS

TYPE OF WORK: ITS DEVICES AND COMMUNICATIONS



September 20, 2010

ITS Special and Standard Details

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NORTH CAROLINA Turnpike Authority

ROADWAY STANDARD DRAWINGS

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARDS DRAWINGS" ROADWAY UNITS - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH N.C. DATED JULY 2006 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS.

STD. NO.	TITLE
1700.01	ELECTRICAL SERVICE GROUNDING
1700.02	ELECTRICAL SERVICE DETAILS
1715.01	UNDERGROUND CONDUIT
1716.01	JUNCTION BOXES
1730.01	FIBER OPTIC CABLE SPARE CABLE STORAGE

INDEX OF PLANS

PBS&J
PBS&J
1616 E. Millbrook Road, Suite 310
Raleigh, North Carolina 27609

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:

PROJECT ENGINEER

PROJECT DESIGN ENGINEER

PROJECT LENGTH

PROJECT LENGTH = 19.7 MI

SEAL

SIGNATURE DATE

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

LEGEND

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

NOTE
1. ALL EXISTING EQUIPMENT IS NCDOT/NCTA OWNED UNLESS OTHERWISE NOTED.
2. PROPOSED EQUIPMENT AND CONNECTIONS SHOWN IN HEAVIER LINES.
3. EXISTING EQUIPMENT SHOWN IN DASHED LINE.
4. ALL ITS EQUIPMENT SHALL BE INSTALLED ON ITS LAN.
5. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.
6. SEE COMMUNICATIONS LAYOUT SHEETS FOR PRELIMINARY CONFIGURATION OF ORT FACILITIES.

NCTA EXECUTIVE OFFICES
GIGABIT ETHERNET ROUTING SWITCH
FIREWALL
CABLE MODEM
BY OTHERS
STOC VIA INTERNET (BY OTHERS)

1 NOTE: NO PROJECT WORK AT NCTA EXECUTIVE OFFICES

ITS DEVICE

TOLLS PATCH PANEL
TOLLS SWITCH
ORT RAMP FACILITY (MAY BE BUILDING OR CABINET)

ITS PATCH PANEL
TOLLS PATCH PANEL
GIGABIT ETHERNET ROUTING SWITCH
TOLLS SWITCH
DS-3 ROUTER (BY OTHERS)
TERMINAL ORT MAINLINE BUILDING

ORT MAINLINE BUILDING

ORT MAINLINE OR RAMP BUILDING W/O ROUTING SWITCH (MAY BE MORE THAN ONE)

There are no longer Ramp toll sites on the project

There are no longer Ramp toll sites on the project

JOINT FORCES STOC
ITS PATCH PANEL
4 STRANDS
GIGABIT ETHERNET CORE SWITCH
ETHERNET SWITCHES (2)
MODEM
BY OTHERS

Point of operation control will be changed from JF STOC in Raleigh to MRTMC in Charlotte

TWO LEASED CIRCUITS (BY OTHERS)

BY OTHERS
MRTMC

NCTA CUSTOMER SERVICE CENTER
2 x DS-3 ROUTER (BY OTHERS)
GIGABIT ETHERNET ROUTING SWITCH
ITS PATCH PANEL
2 x DS-3 ROUTER (BY OTHERS)
TOLLS BACK OFFICE ETHERNET SWITCH
TOLLS PATCH PANEL

1 NOTE: NO PROJECT WORK AT NCTA CUSTOMER SERVICE CENTER

1 REVISED 8/4/10

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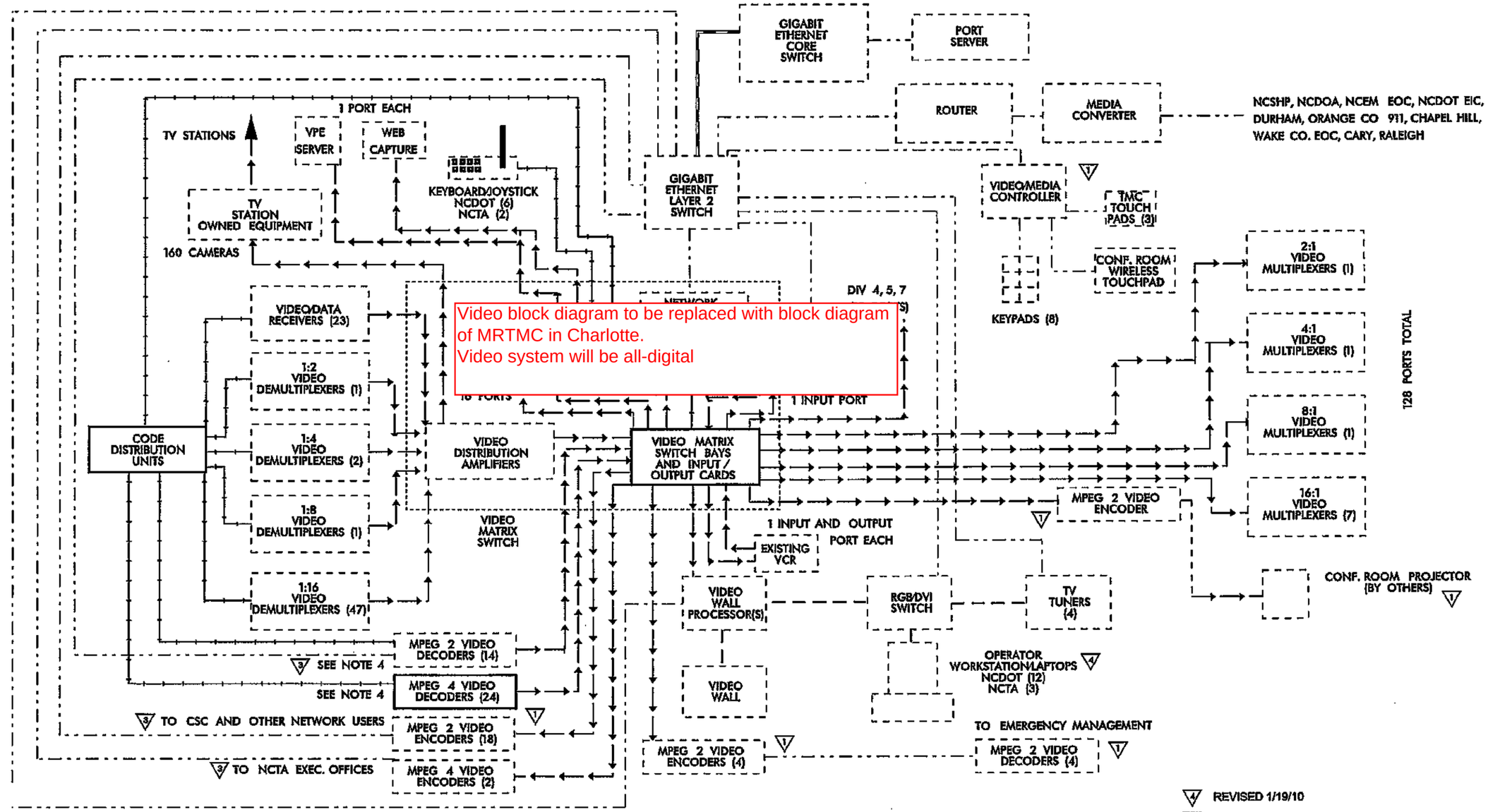
1616 E. Millbrook Rd Suite 310
Raleigh, North Carolina 27609
(919) 876-6888

SPECIAL DETAILS
COMMUNICATIONS SCHEMATIC

SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	D. Cockman
DESIGN BY:	A. Badgett / B. Hayes
APPROVED:	A. Lalewicz

NORTH CAROLINA TURNPIKE AUTHORITY

10-AUG-2010 14:03
G:\NCTA\DOT\NCTA\Monroe\Concept Plans\Standard Details\DETAILS 01 Schematic.dgn
12054



Video block diagram to be replaced with block diagram of MRTMC in Charlotte.
Video system will be all-digital

LEGEND

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

NOTE
1. ALL EXISTING EQUIPMENT IS NCDOT/NCTA OWNED UNLESS OTHERWISE NOTED.
2. PROPOSED EQUIPMENT AND CONNECTIONS SHOWN IN HEAVIER LINES.
3. EXISTING EQUIPMENT SHOWN IN DASHED LINE.
4. FURNISH AND INSTALL ONE VIDEO DECODER PER NCTA CAMERA.
4. ALL ITS EQUIPMENT SHALL BE INSTALLED ON ITS LAN.
5. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

4 REVISED 1/19/10
1 REVISED 10/14/09

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Raleigh, North Carolina 27609
(919) 876-6888

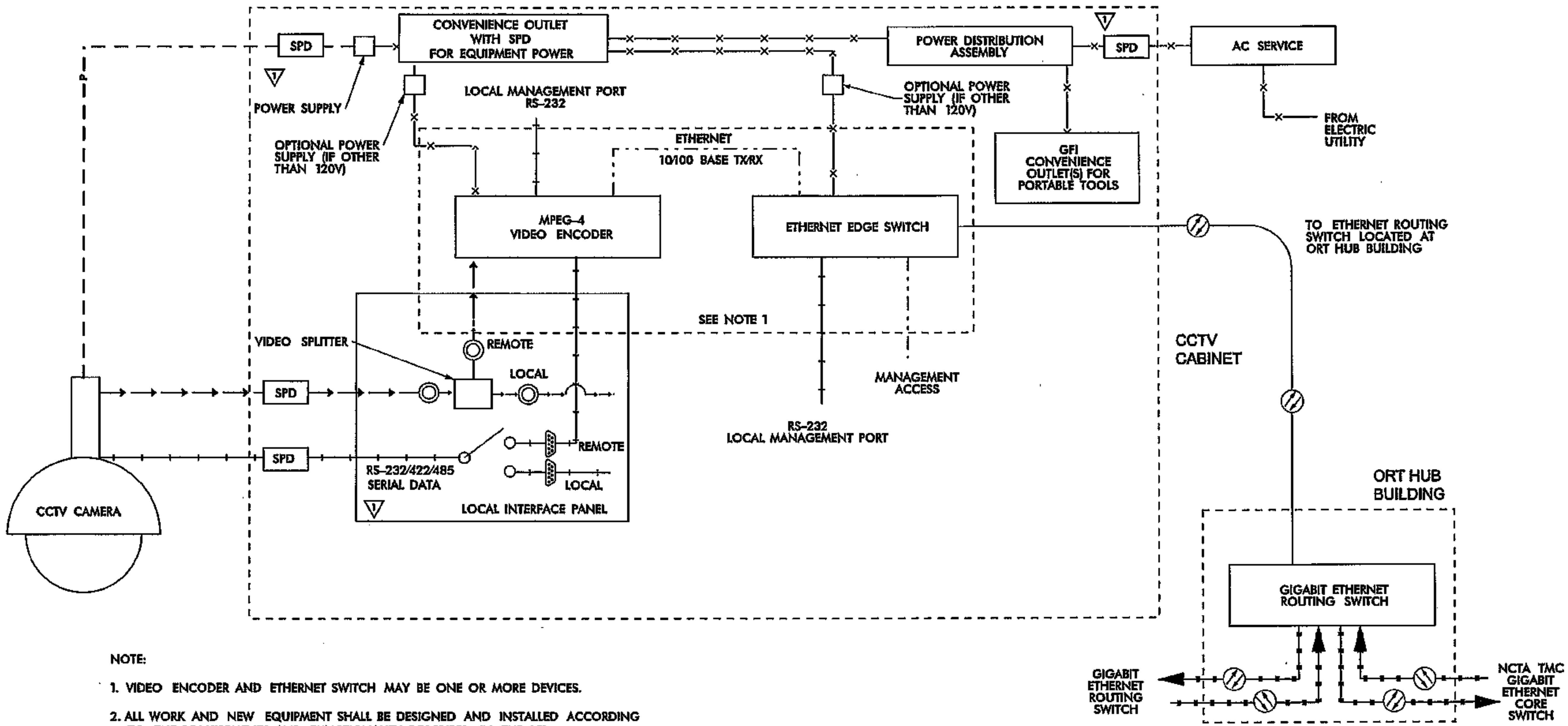
SPECIAL DETAILS

VIDEO BLOCK DIAGRAM
JOINT FORCES STOC/NCDOT TRTMC

SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	D. Cookman
DESIGN BY:	A. Rodgers / S. Kayne
APPROVED:	A. Lidmski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO. 2 of 26



NOTE:

1. VIDEO ENCODER AND ETHERNET SWITCH MAY BE ONE OR MORE DEVICES.

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

REVISED 10/14/09

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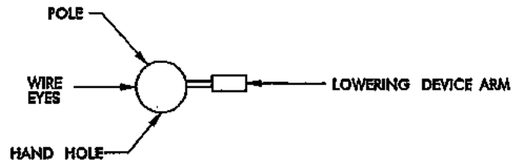
Raleigh, North Carolina 27609
(919) 876-6888

STANDARD DETAILS
BLOCK DIAGRAM
CCTV

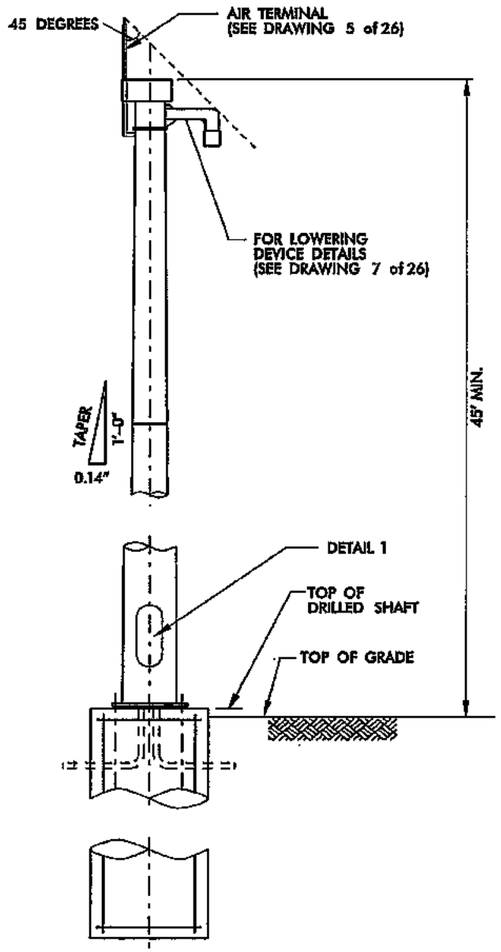
SCALE: N.T.S.
DATE: November 7, 2008
DWG. BY: D. Cockman
DESIGN BY: A. Badgett / B. Haynie
APPROVED: A. Lelewski

NORTH CAROLINA TURNPIKE AUTHORITY

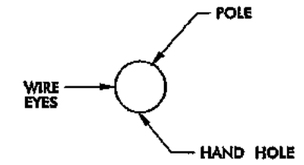
SHEET NO.



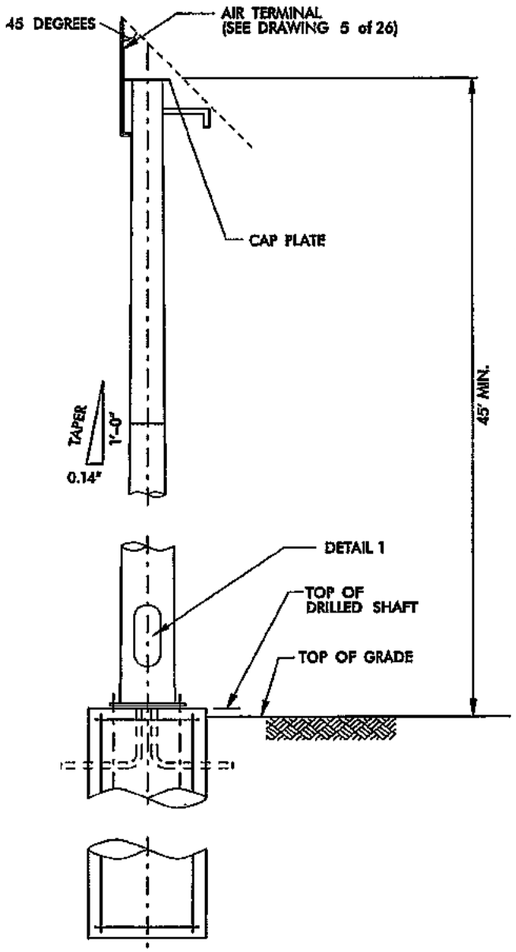
ORIENTATION VIEW



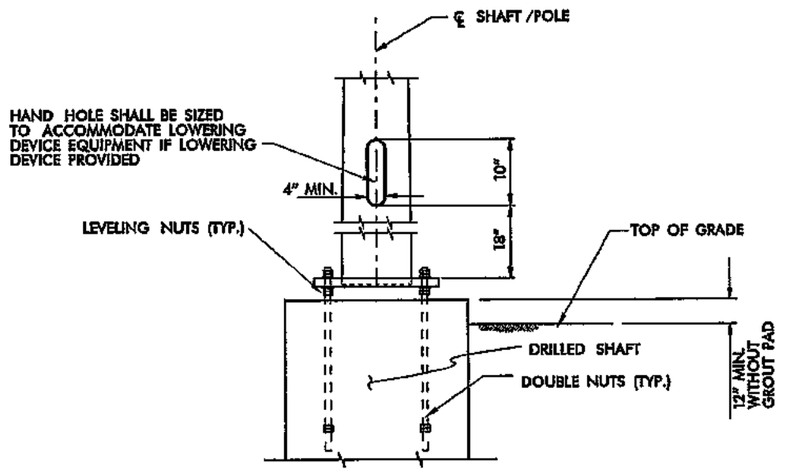
WITH LOWERING DEVICE
ELEVATION



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.

NOT TO SCALE

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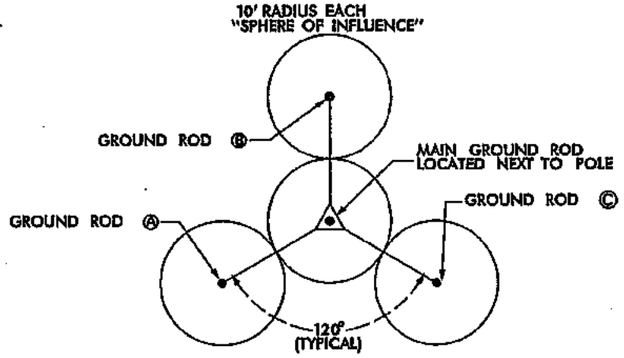
1616 E. Millbrook Rd Suite 310
Raleigh, North Carolina 27609
(919) 876-6888

STANDARD DETAILS
CCTV
STEEL POLE

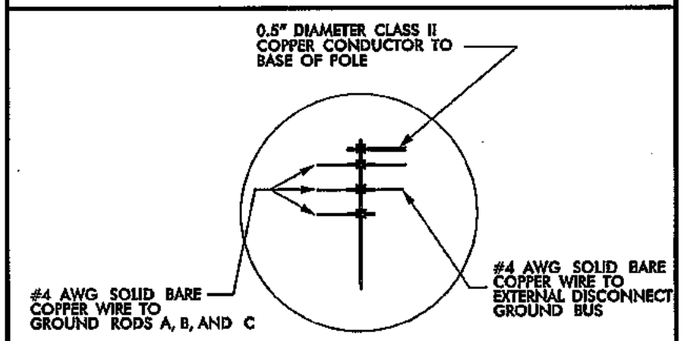
SCALE:	N.T.S.
DATE:	November 7, 2006
DWG. BY:	D. Cookman
DESIGN BY:	A. Sedgatt / S. Hayes
APPROVED:	A. Lalowski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
4 of 26



GROUND ROD PLACEMENT DETAIL
(TYPICAL EACH POLE)



INSET 'A'

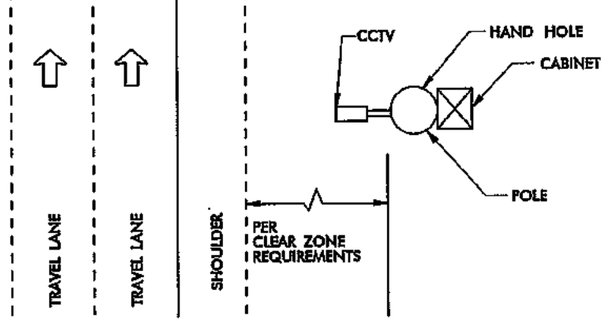
ALTERNATE GROUNDING METHOD

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

JOIN SECTIONAL GROUND RODS BY EXOTHERMIC WELDING CONNECTION

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 CONDUITS AND DEVICES ON POLE

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1616 E. Millbrook Rd Suite 310
Raleigh, North Carolina 27609
(919) 876-6888

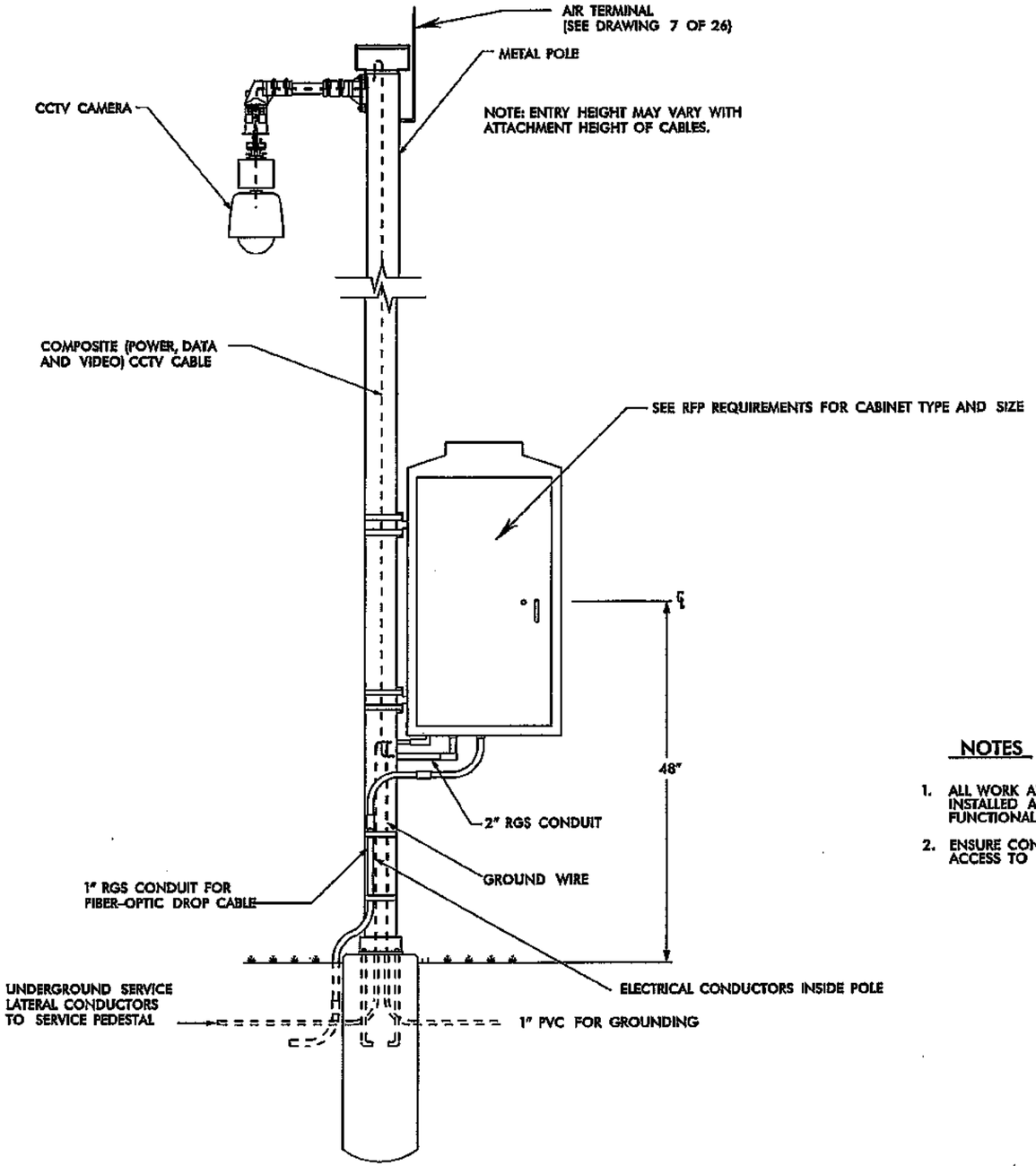
STANDARD DETAILS
CCTV
POLE GROUNDING

SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	B. Cockman
DESIGN BY:	A. Sedgwick/B. Haynie
APPROVED:	A. Lalwani

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
5 of 26

POLE MOUNTED CCTV CABINET DETAIL



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.

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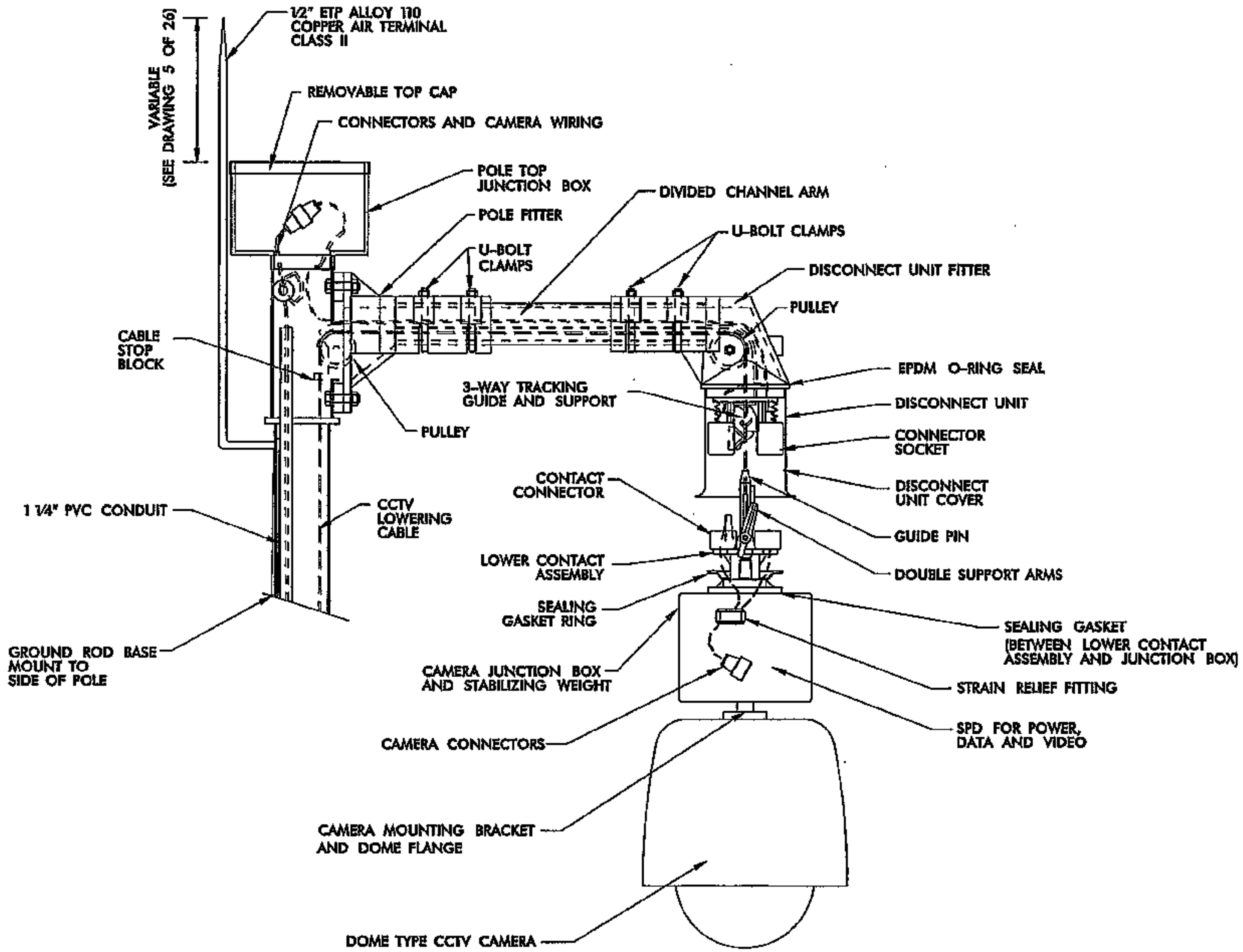
1616 E. Millbrook Rd Suite 310
Raleigh, North Carolina 27609
(919) 876-6888

STANDARD DETAILS
CCTV
POLE MOUNTED CABINET

SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO. 6 of 26
DATE: November 7, 2006		
DWG. BY: D. Cookman		
DESIGN BY: A. Blodgett / S. Haynie		
APPROVED: A. Lolowski		



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.

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Raleigh, North Carolina 27609
(919) 876-6888

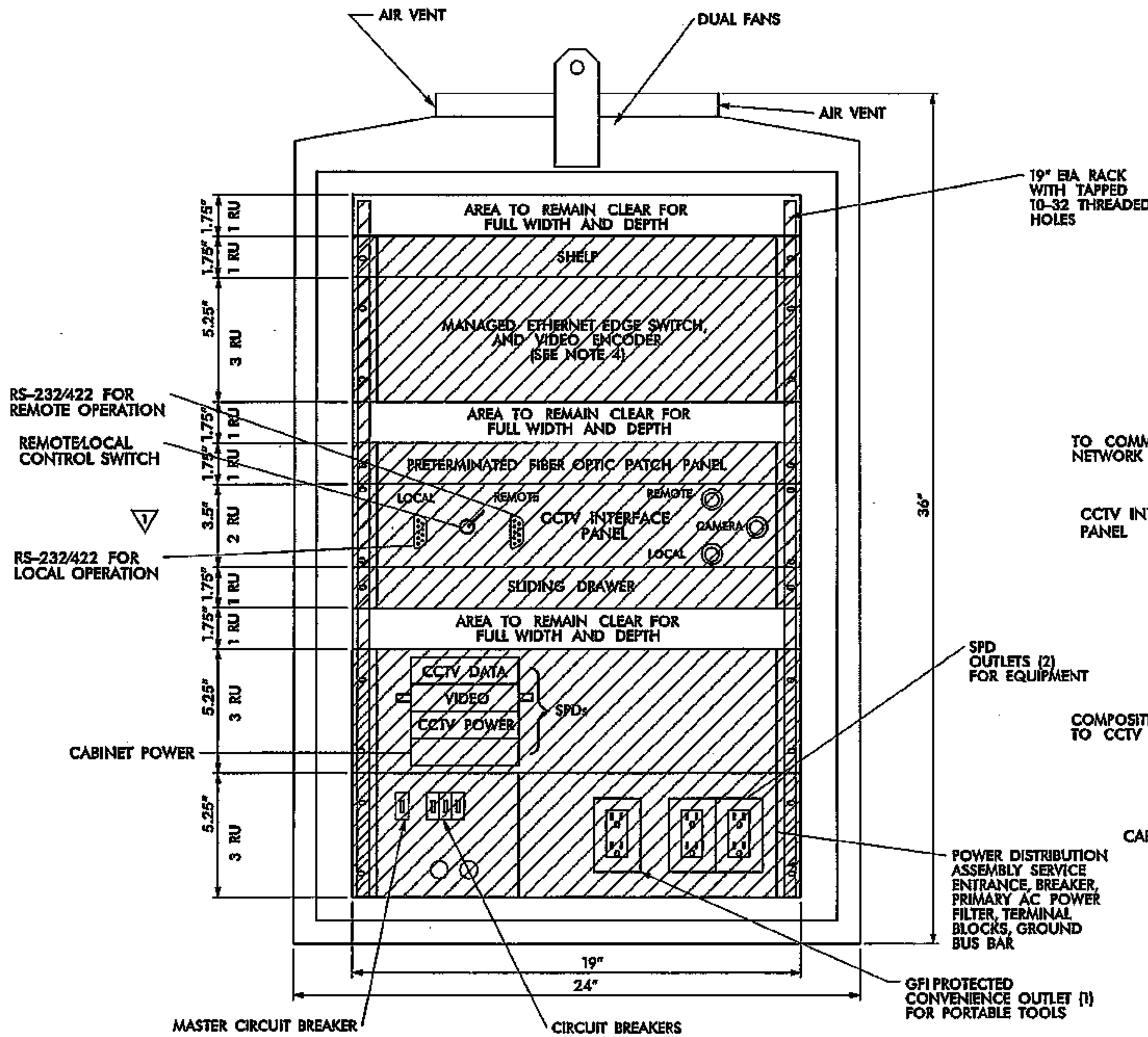
STANDARD DETAILS

CCTV CAMERA LOWERING DEVICE

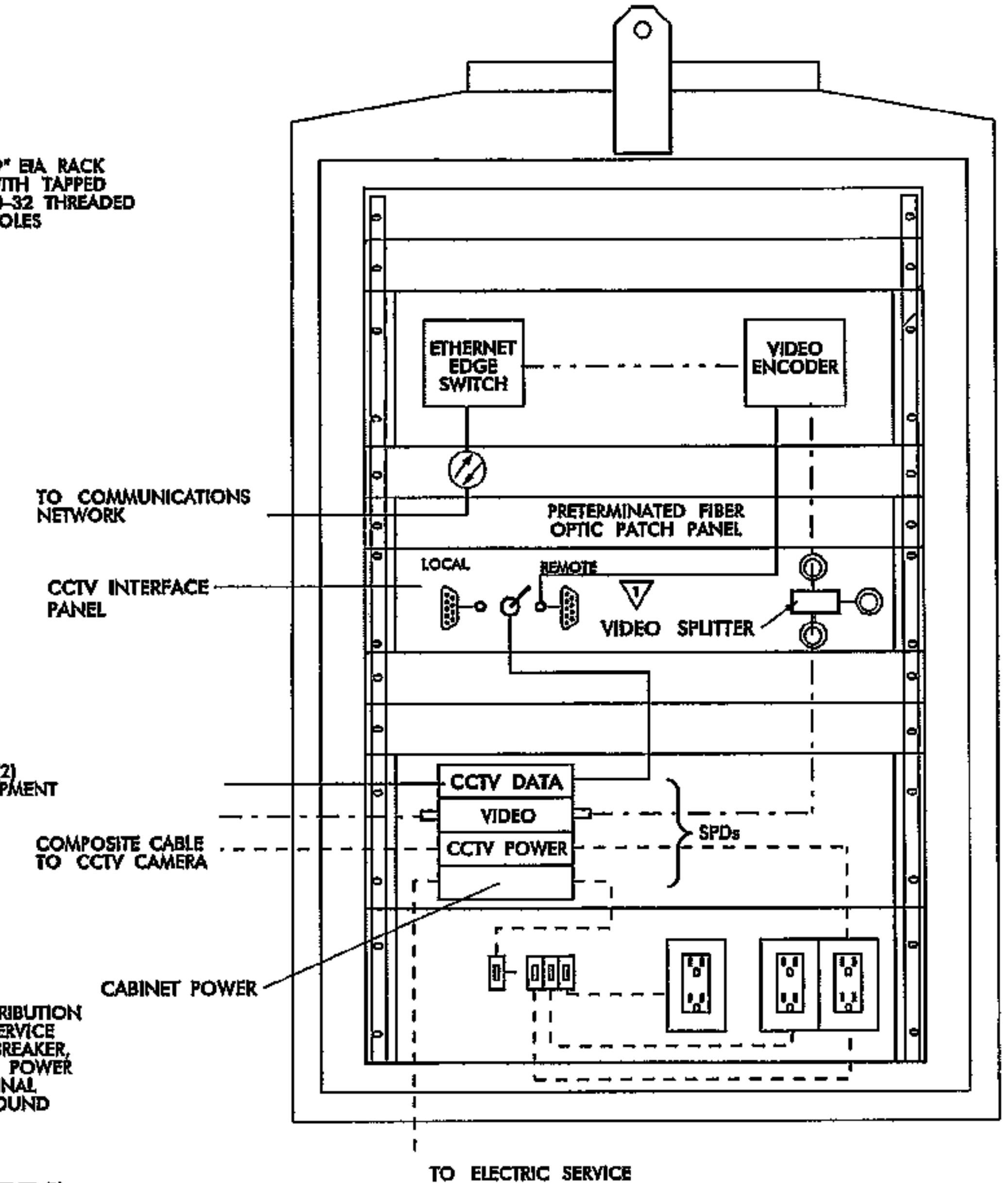
SCALE: N.T.S.
DATE: November 7, 2008
DWG. BY: D. Doolomas
DESIGN BY: A. Badgett / B. Hayris
APPROVED: A. Lolowski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.



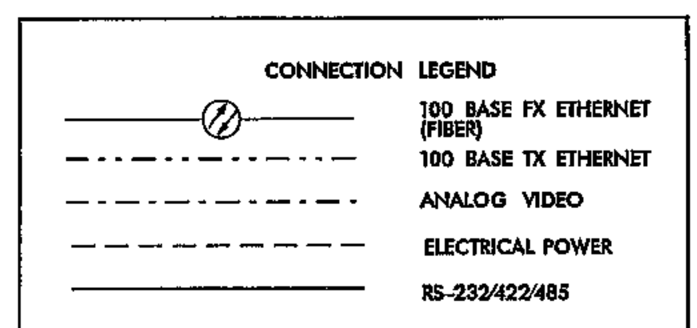
FRONT VIEW



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.



1 REVISED 10/14/09

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1616 E. Millbrook Rd Suite 310
Raleigh, North Carolina 27609
(919) 876-6888

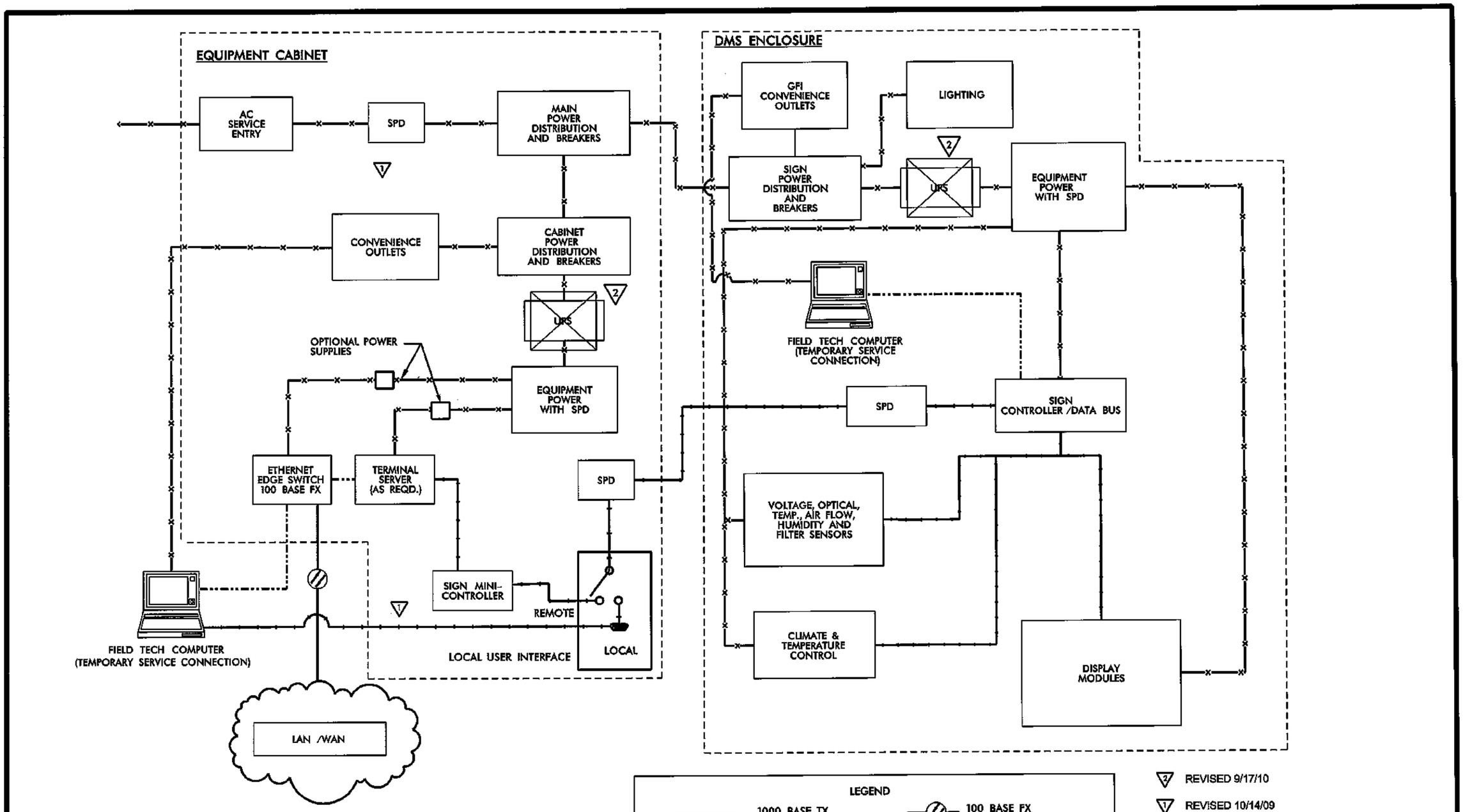
STANDARD DETAILS
CCTV
CABINET LAYOUT

SCALE: N.T.S.
DATE: November 7, 2005
DWG. BY: D. Cookman
DESIGN BY: A. Badgett / G. Haynie
APPROVED: A. Lalowski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.

10-AUG-2010 14:03
...Plans\Standard Details\DETAILS 08 CCTV Cabinet Layout.DGN
12054



GENERAL NOTES:

1. AC WIRED CABINET SHALL BE EQUIPPED WITH A SURGE PROTECTOR WITH AN ALARM FEATURE.
2. DMS CABINET SHALL BE GROUND-MOUNTED AND LOCATED DOWNSTREAM OF DMS SUPPORT COLUMN.
3. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN RFP.

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

2 REVISED 9/17/10

1 REVISED 10/14/09

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1616 E. Millbrook Rd Suite 310
Raleigh, North Carolina 27609
(919) 876-6888

STANDARD DETAILS

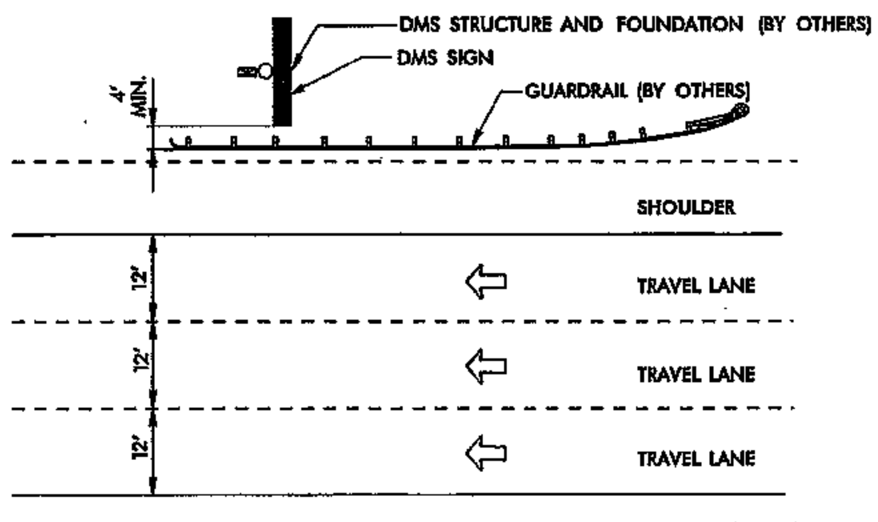
DMS

WIRING AND BLOCK DIAGRAM

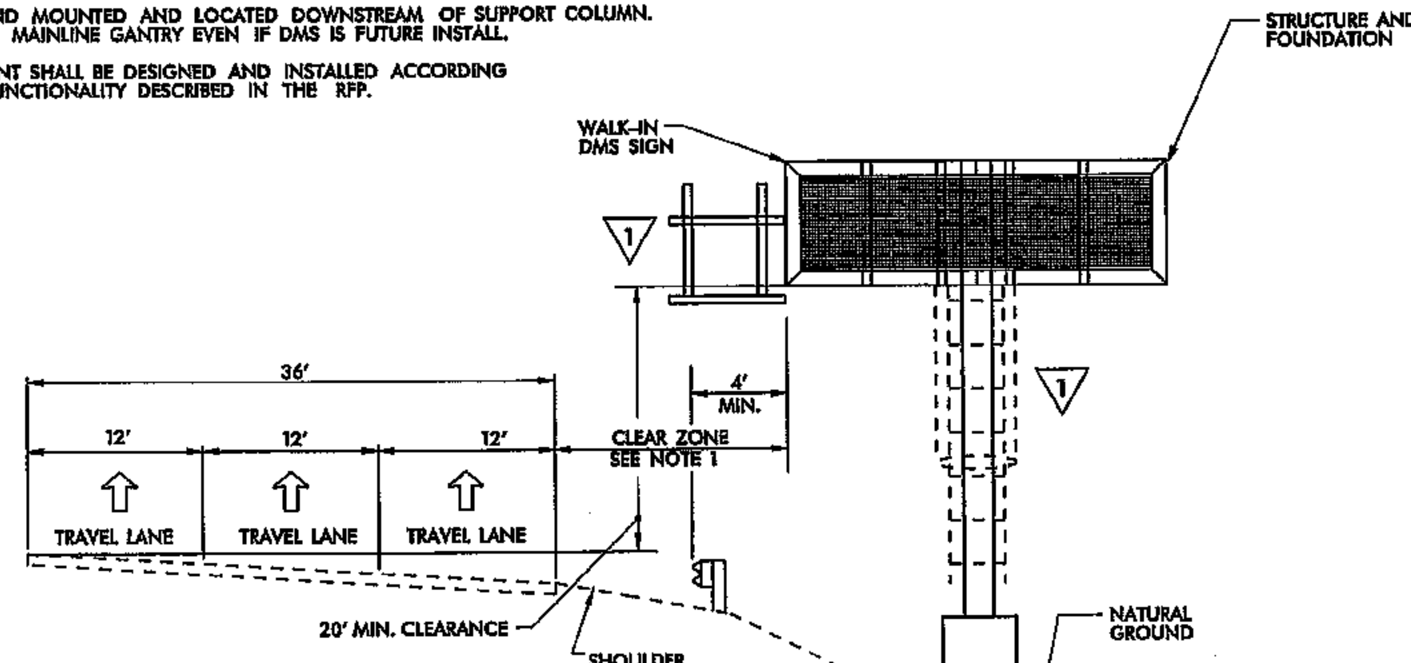
SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY
DATE: November 7, 2009	SHEET NO. 9 of 26
DWG. BY: D. Cockman	
DESIGN BY: A. Badgett / S. Haynie	
APPROVED: A. Lelewski	

GENERAL NOTES:

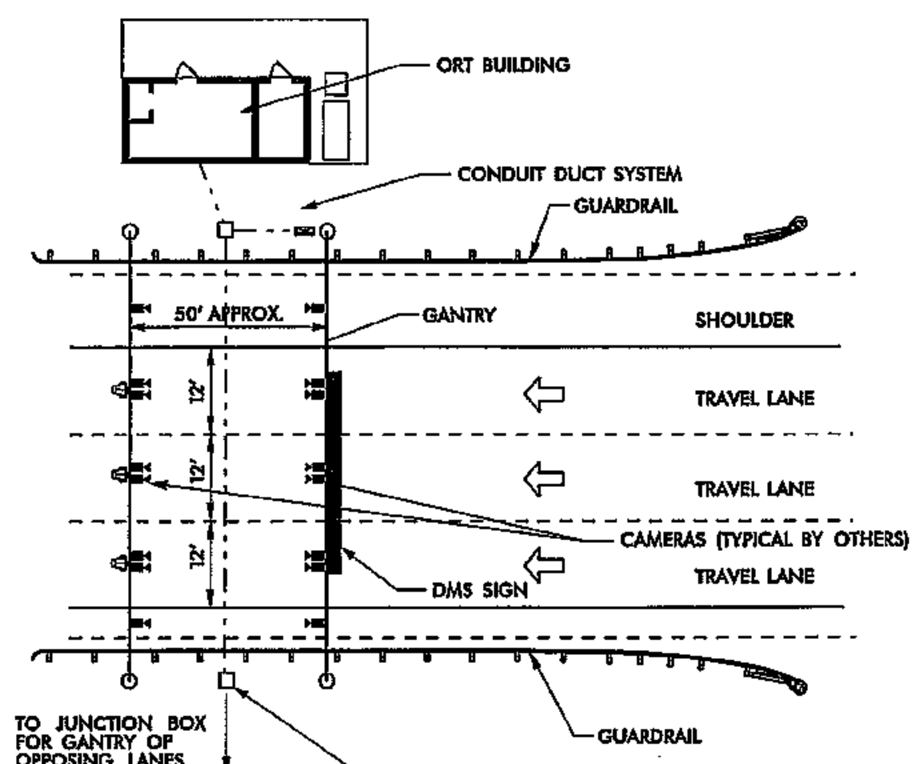
1. IF NO GUARDRAIL OR BARRIER WALL EXISTS, STRUCTURE SHALL BE OUTSIDE CLEAR ZONE. CLEAR ZONE SHALL BE MEASURED TO EDGE OF DRILLED SHAFT IF DRILLED SHAFT IS MORE THAN 4" ABOVE ADJACENT GRADE.
2. CATWALK NOT REQUIRED FOR FRONT ACCESS SIGNS ON TOLL GANTRIES.
3. CATWALK SHALL EXTEND TO OUTER EDGE OF PAVED SHOULDER.
4. DESIGN COLUMNS IN ACCORDANCE WITH NCTA AESTHETIC DESIGN GUIDELINES.
5. DMS CABINETS SHALL BE GROUND MOUNTED AND LOCATED DOWNSTREAM OF SUPPORT COLUMN. PROVIDE DMS CABINET AT EACH MAINLINE GANTRY EVEN IF DMS IS FUTURE INSTALL.
6. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.



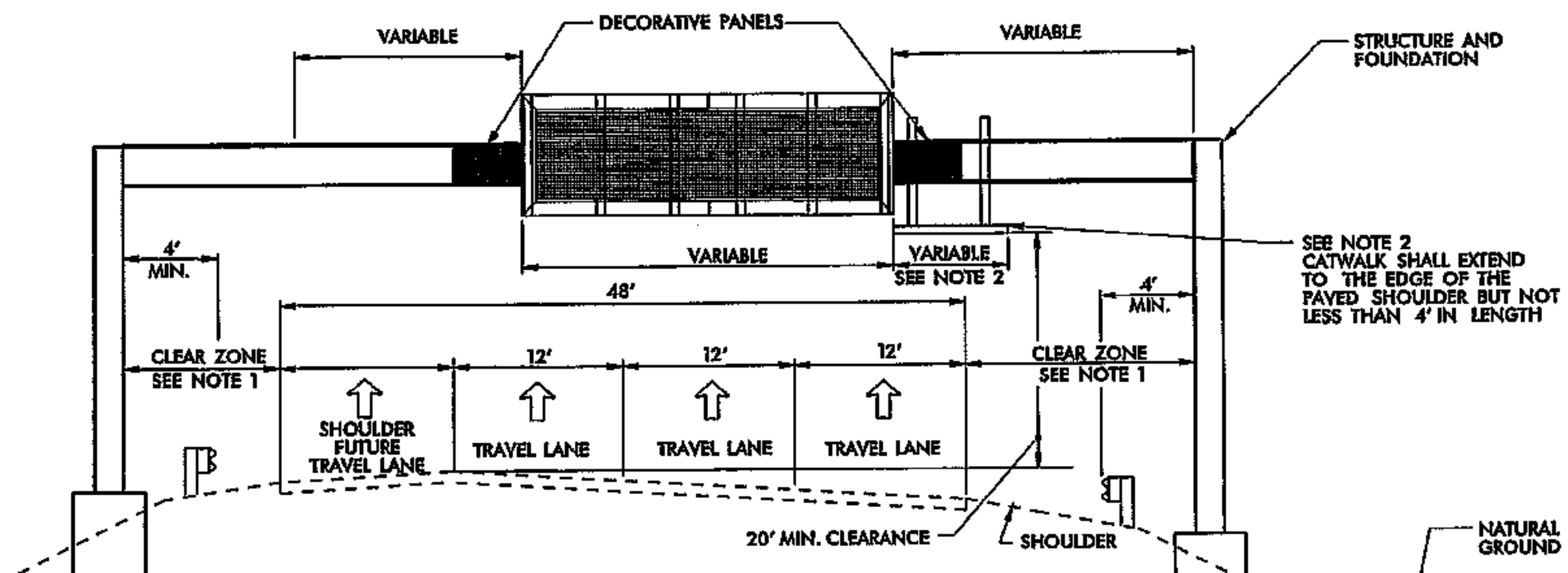
TYPICAL PLAN VIEW
DMS CANTILEVER STRUCTURE



TYPICAL ELEVATION VIEW
DMS WITH PEDESTAL STRUCTURE



TYPICAL PLAN VIEW
DMS GANTRY STRUCTURE



TYPICAL ELEVATION VIEW
DMS WITH TRUSS STRUCTURE

1 REVISED 8/4/10

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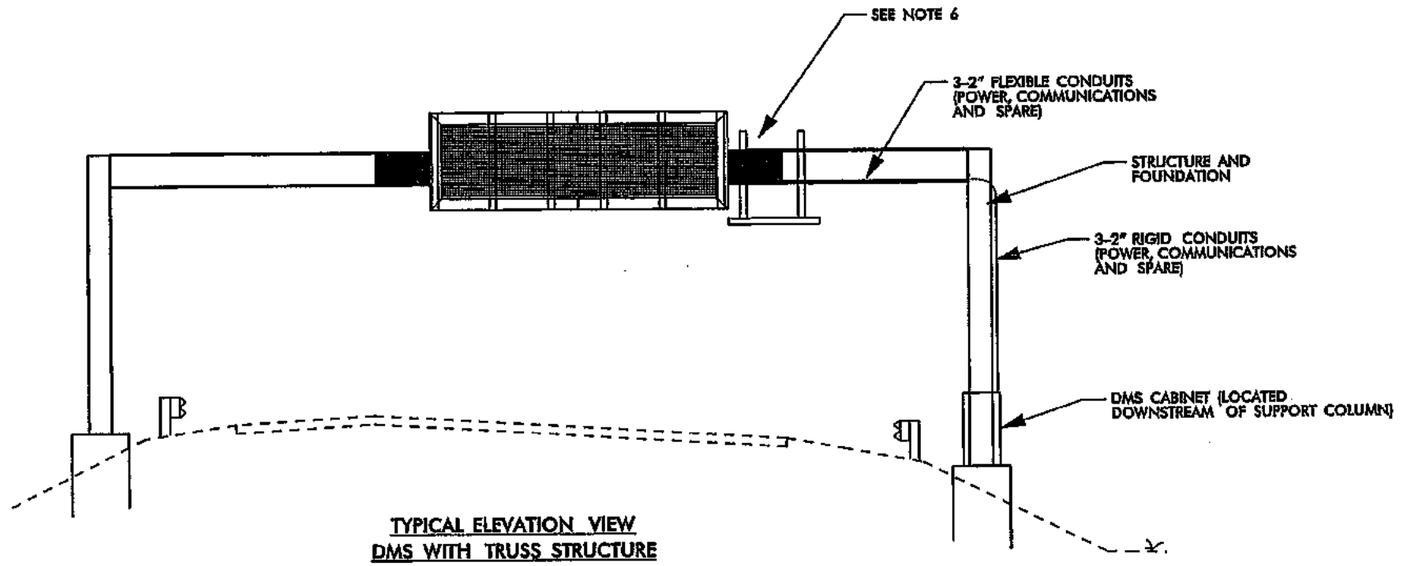
1616 E. Millbrook Rd Suite 310
Raleigh, North Carolina 27609
(919) 876-6888

STANDARD DETAILS
DMS
TYPICAL MOUNTING (1 OF 2)

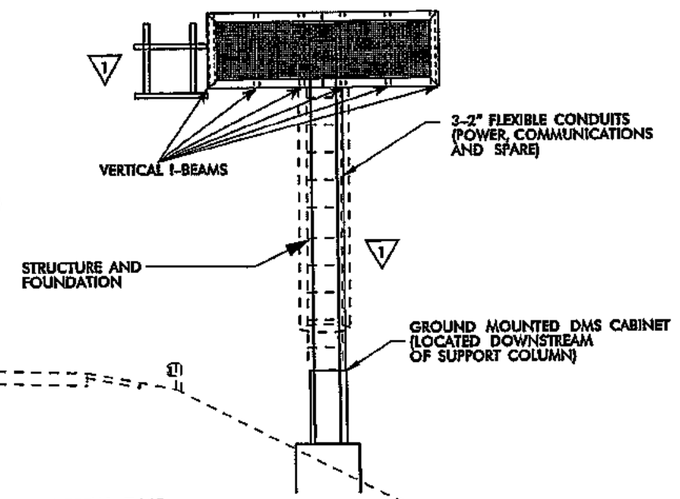
SCALE:	N.T.S.
DATE:	November 7, 2006
DWG. BY:	D. Cookman
DESIGN BY:	A. Bedgell / S. Haynie
APPROVED:	A. Lefewski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
10 of 26



TYPICAL ELEVATION VIEW
DMS WITH TRUSS STRUCTURE



TRUSS DMS

PEDESTAL DMS

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 OF STRUCTURAL MEMBERS OR COLUMNS.
5. CATWALK AND HANDRAIL DESIGN AND INSTALLATION SHALL COMPLY WITH AISC AND AASHTO REQUIREMENTS AS APPLICABLE.
6. CATWALK NOT REQUIRED ON FRONT ACCESS DMS SIGN.
7. ALL DATA, COAXIAL AND POWER CABLE FOR THE DMS SHALL BE COMPLETELY CONCEALED.
8. STRUCTURAL ATTACHMENT OF DMS SIGN TO STRUCTURE IS RESPONSIBILITY OF CONTRACTOR.
9. DMS CABINETS SHALL BE GROUND MOUNTED AND LOCATED DOWNSTREAM OF SUPPORT COLUMN.
10. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

1 REVISED 8/4/10

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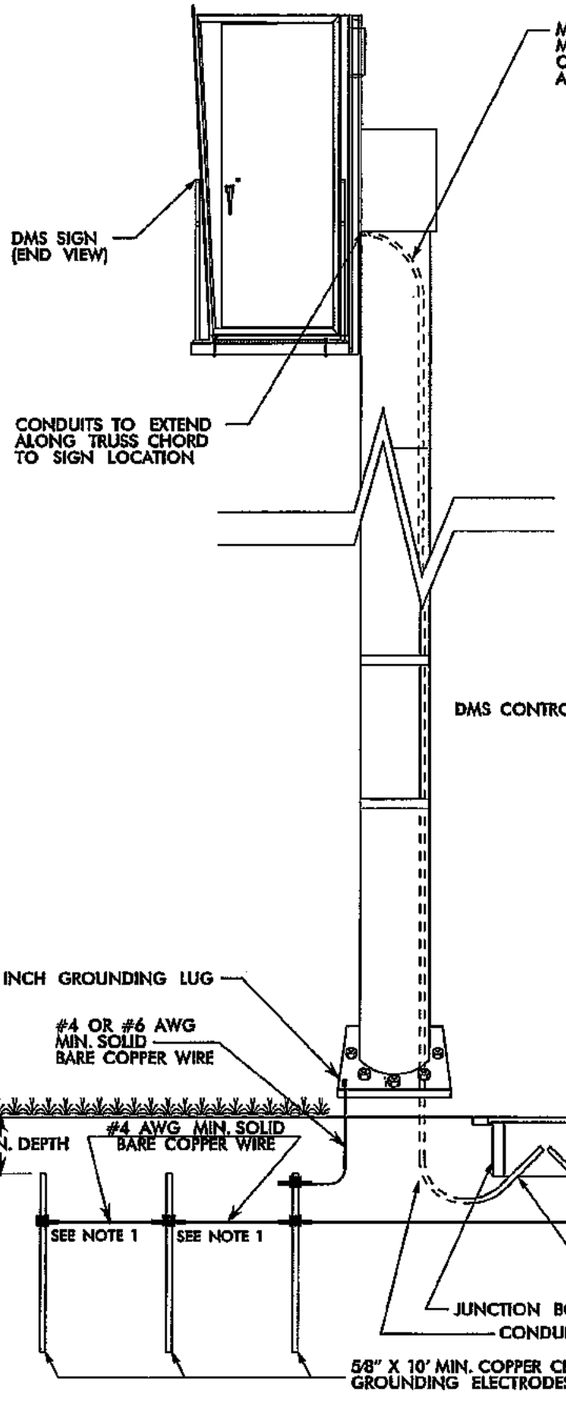
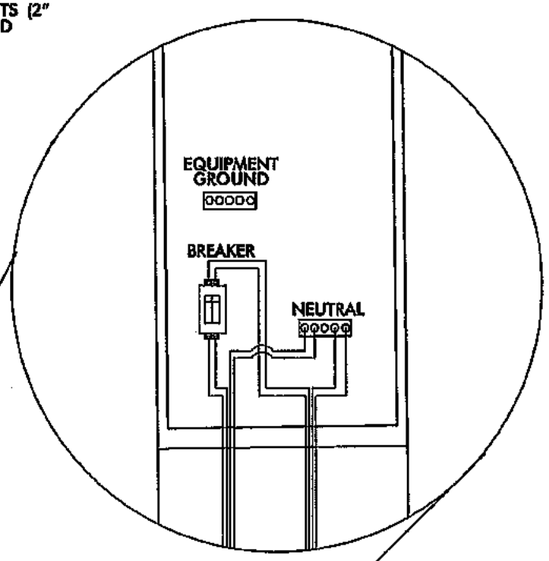
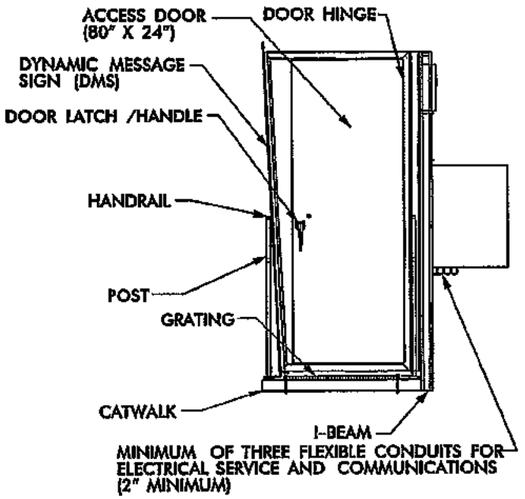
STANDARD DETAILS
DMS
TYPICAL MOUNTING (2 OF 2)

SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO.	11 of 26
DATE: November 7, 2008			
DWG. BY: D. Cockman			
DESIGN BY: A. Badger / S. Hayes			
APPROVED: A. Lalwani			







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 TAPE DIRECTLY ABOVE ALL GROUNDING ELECTRODES AND CONDUCTORS AT A DEPTH OF 12".
5. EXOTHERMICALLY WELD THE SERVICE POLE GROUND WIRE TO THE GROUND ROD SYSTEM.
6. REMOVE BONDING JUMPER IN EQUIPMENT CABINET IF INSTALLED BETWEEN AC NEUTRAL AND EQUIPMENT GROUND.
7. BOND ALL RIGID GALVANIZED STEEL CONDUITS 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.
12. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

1 REVISED 8/4/10

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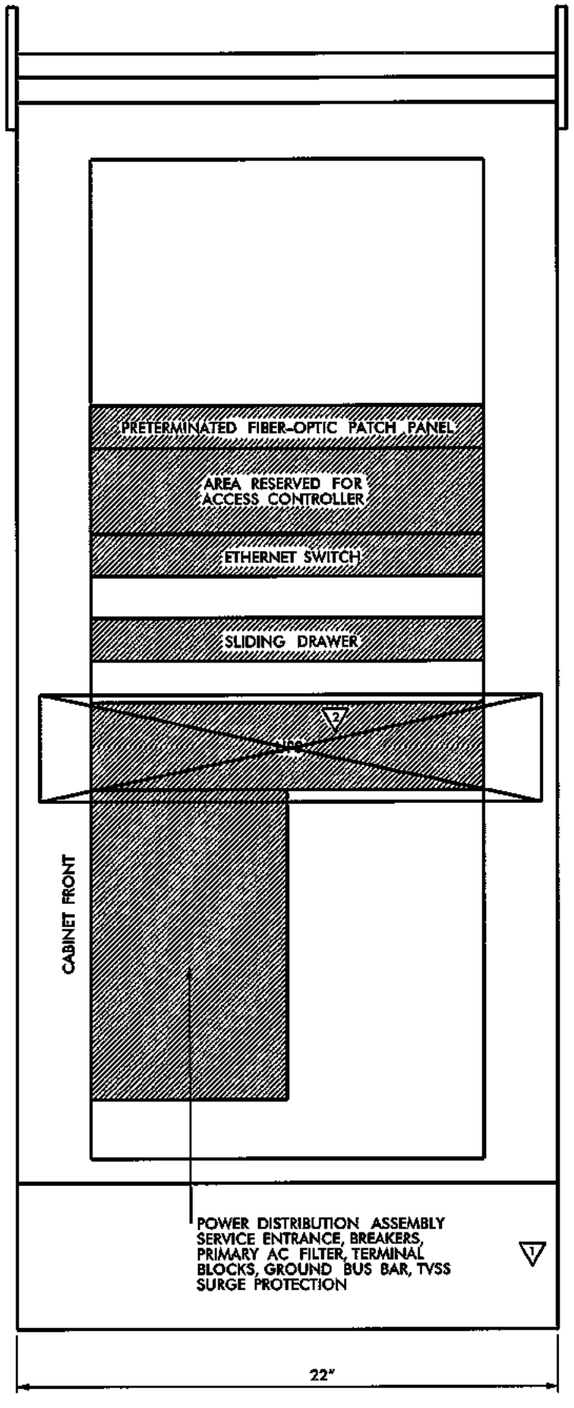
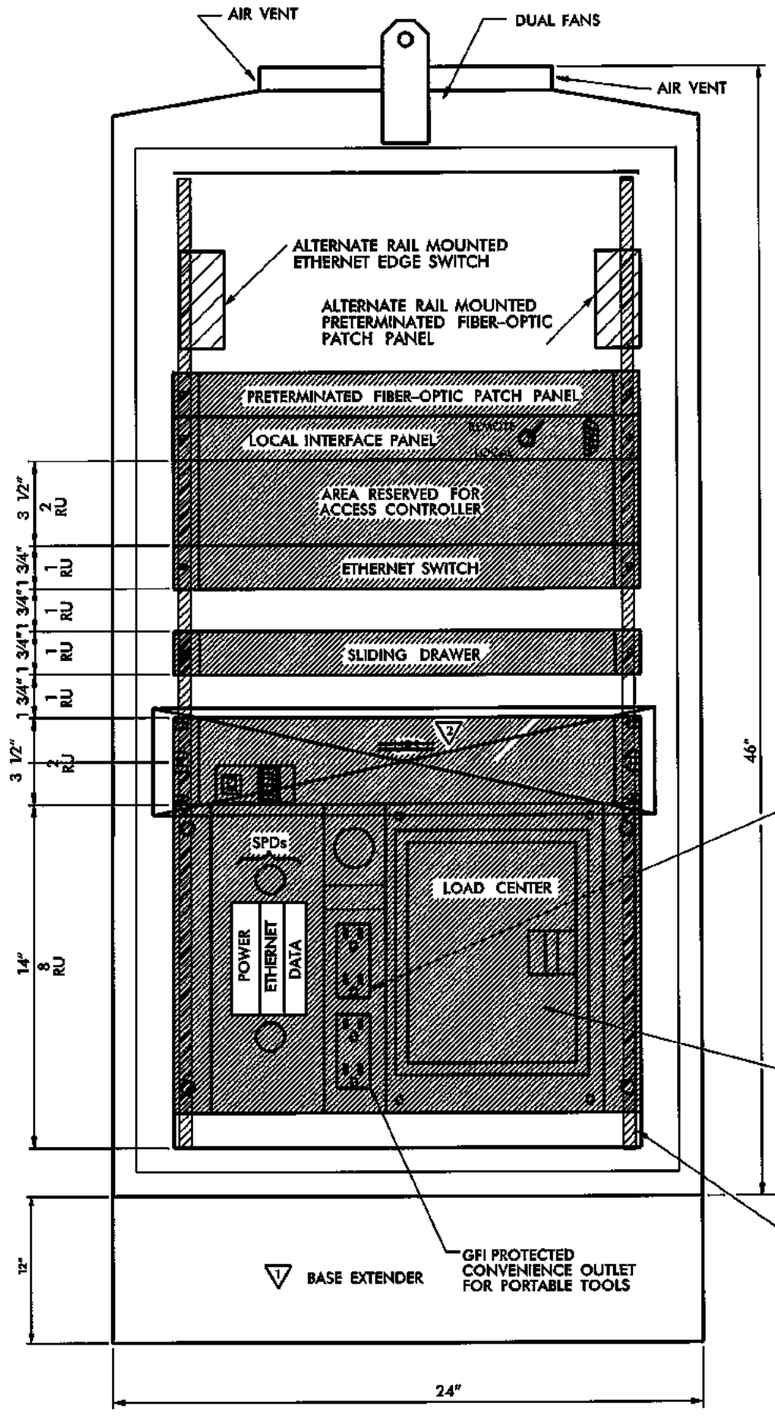
STANDARD DETAILS
DMS
ELECTRICAL SERVICE AND GROUNDING

SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY	SHEET NO. 12 of 26
DATE: November 7, 2006		
DWG. BY: D. Cookman		
DESIGN BY: A. Bidgoli / B. Hayne		
APPROVED: A. Lalawat		



SIDE VIEW



FRONT VIEW

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.

▽2 REVISED 9/17/10

▽1 REVISED 10/14/09

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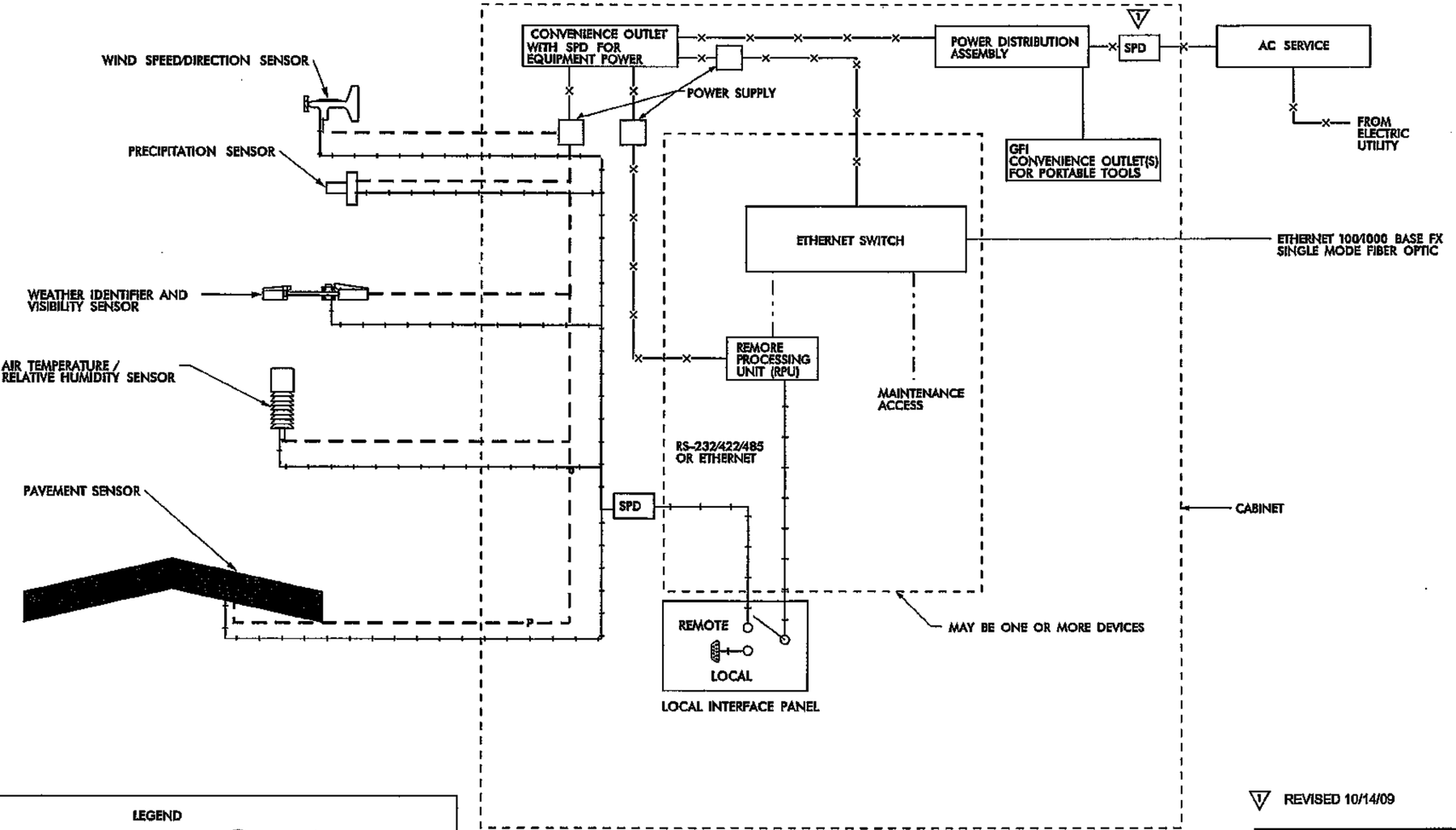
(919) 876-6888

STANDARD DETAILS
DMS
CABINET LAYOUT

SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	D. Cookman
DESIGN BY:	A. Badgett / S. Heynie
APPROVED:	A. Lebowski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
13 of 26



NOTES

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

1 REVISED 10/14/09

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STANDARD DETAILS

RWIS

BLOCK DIAGRAM

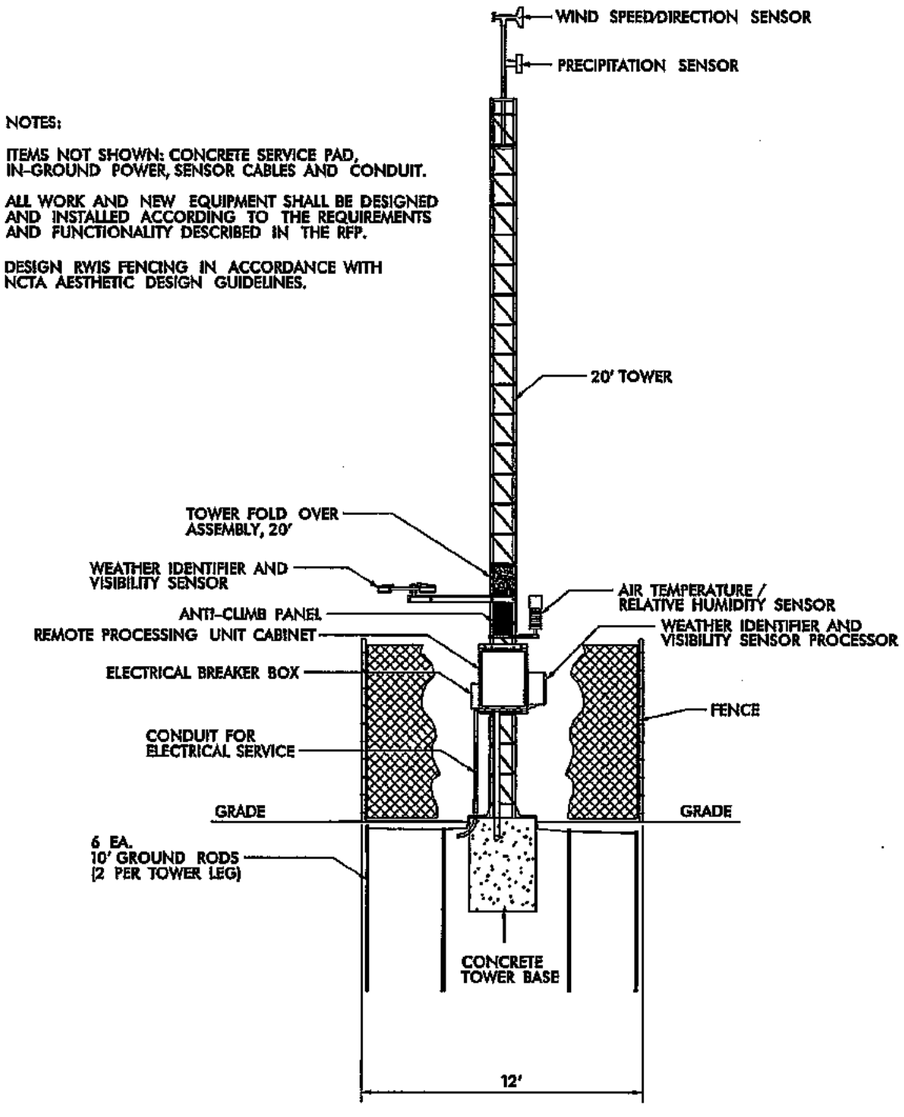
SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	D. Dockman
DESIGN BY:	A. Padgett / G. Haynie
APPROVED:	A. Lakewald

NORTH CAROLINA TURNPIKE AUTHORITY

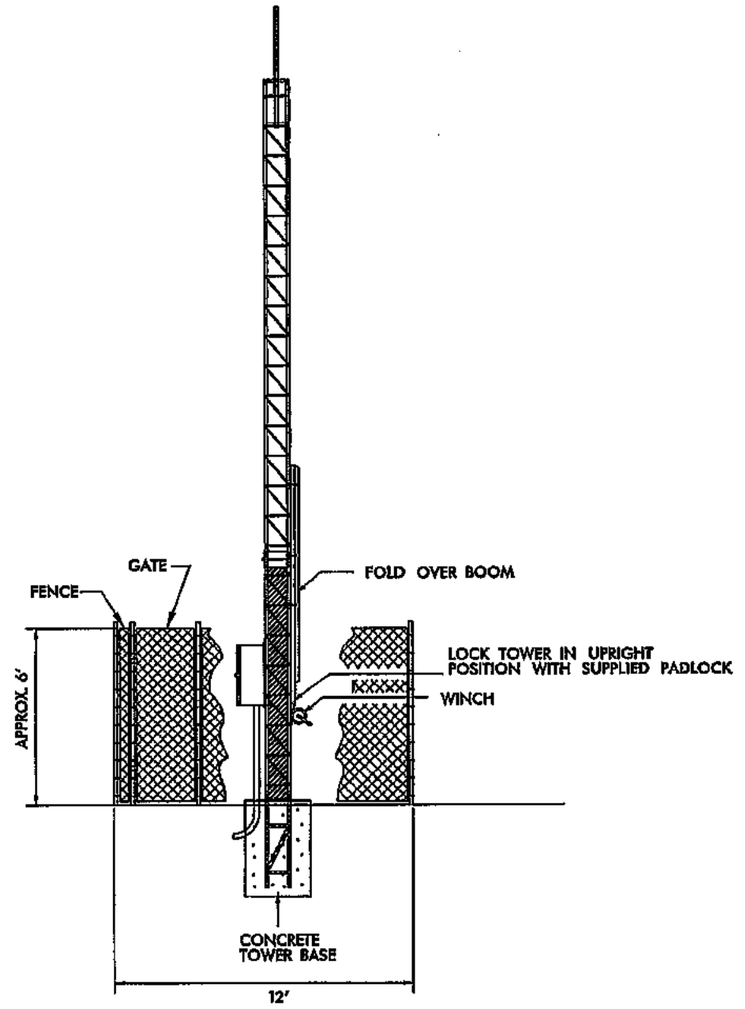
SHEET NO.
14 of 26

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)

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(919) 876-6686

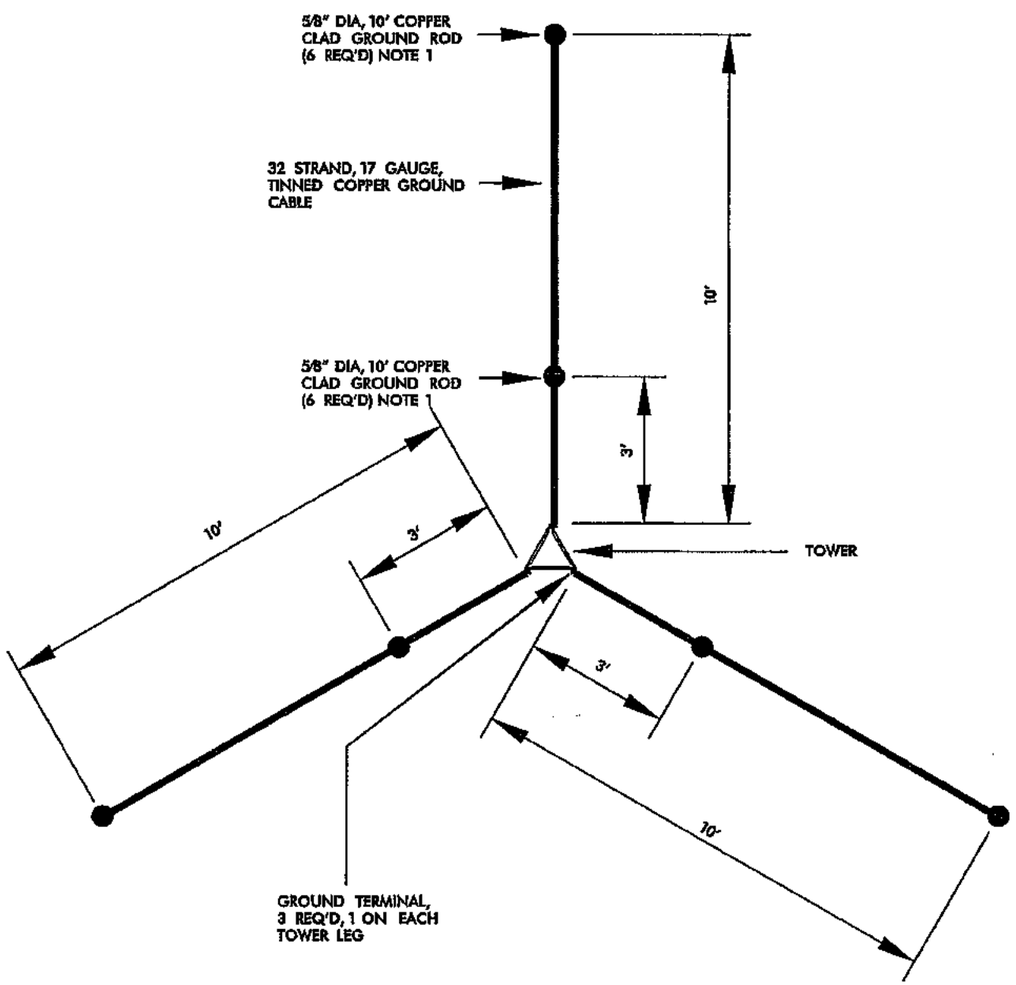
STANDARD DETAILS

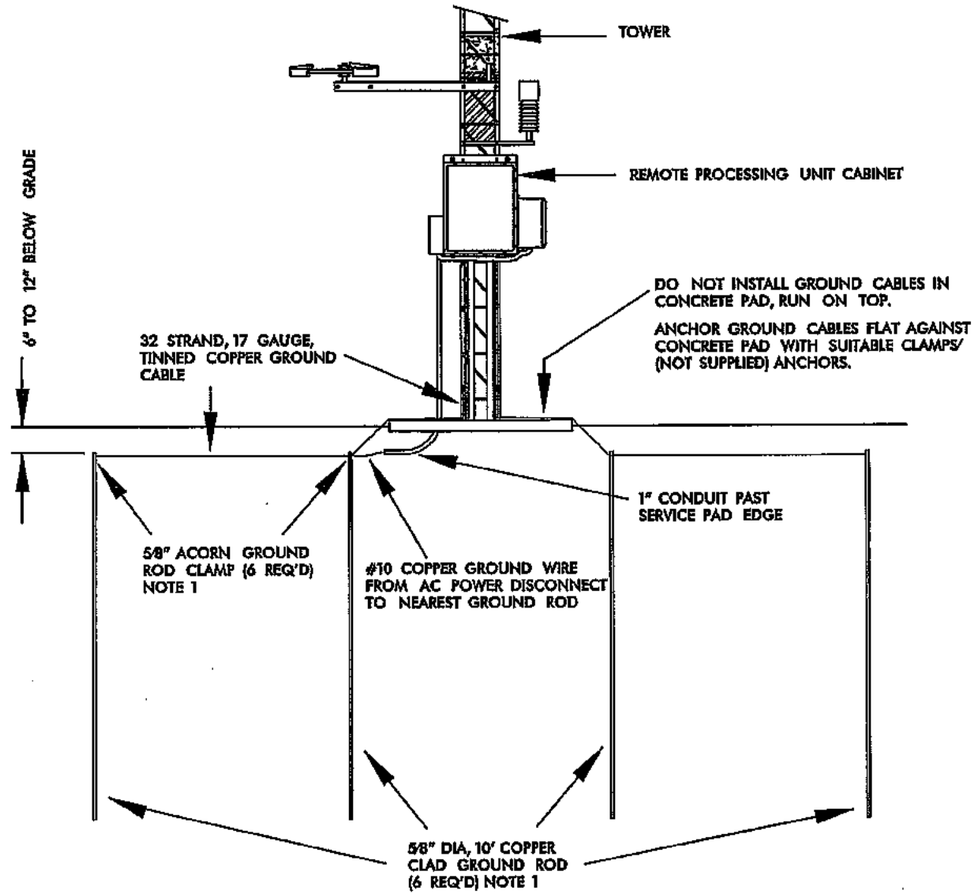
RWIS
ELEVATION VIEW

SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	D. Cushwa
DESIGN BY:	A. Badgett / S. Haynie
APPROVED:	A. Lidwald

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
15 of 26





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.

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STANDARD DETAILS

RWIS GROUNDING

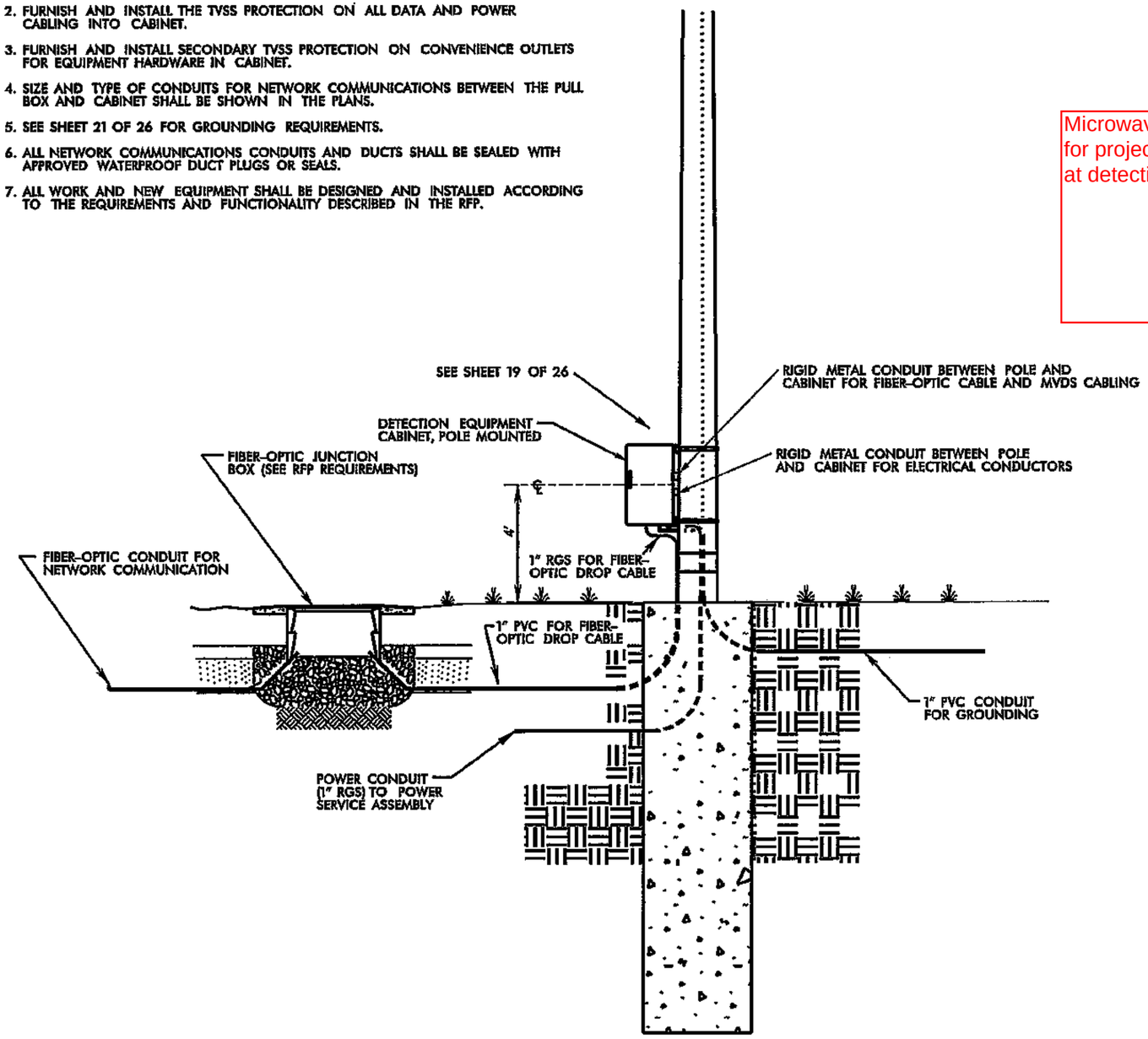
SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	D. Cookson
DESIGN BY:	A. Blodgett / G. Hoyle
APPROVED:	A. Lokuadd

NORTH CAROLINA TURNPIKE AUTHORITY

NOTES:

1. CONTRACTOR SHALL TERMINATE FIBER-OPTIC CABLES IN CABINET WITH PRETERMINATED PATCH PANEL.
2. FURNISH AND INSTALL THE TVSS PROTECTION ON ALL DATA AND POWER CABLING INTO CABINET.
3. FURNISH AND INSTALL SECONDARY TVSS 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 21 OF 26 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.

Microwave Detection is no longer being deployed for project. Project will now have inductive loops at detection locations



NOT TO SCALE

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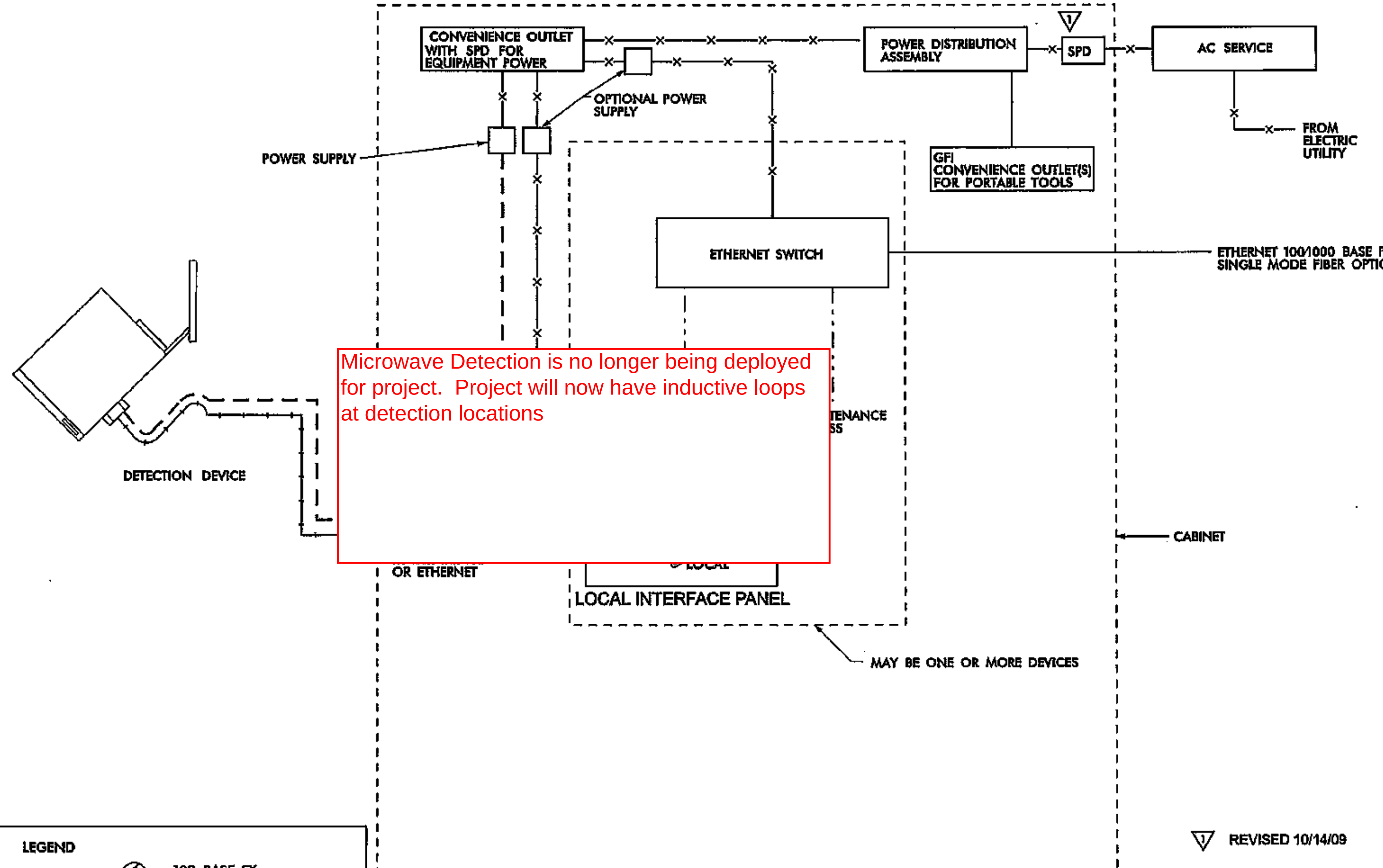
STANDARD DETAILS

MICROWAVE DETECTION CABINET LAYOUT

SCALE: N.T.S.	NORTH CAROLINA TURNPIKE AUTHORITY
DATE: November 7, 2008	SHEET NO. 17 of 26
DWG. BY: D. Coolman	
DESIGN BY: A. Badgett / S. Haynie	
APPROVED: A. Lakowski	



Microwave Detection is no longer being deployed for project. Project will now have inductive loops at detection locations

△1 REVISED 10/14/09

LEGEND

(solid heavy line)	1000 BASE TX ETHERNET	(line with circled slash)	100 BASE FX ETHERNET (FIBER)
(dash-dot line)	100 BASE TX ETHERNET	(heavy line with circled slash)	1000 BASE FX ETHERNET (FIBER)
(line with arrows)	ANALOG VIDEO	(line with ticks)	RS-232/422/485
(line with x marks)	120 VAC POWER	(short dashed line)	EXISTING DEVICE
(long dashed line)	LOW VOLTAGE POWER	(dashed line with circled slash)	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.

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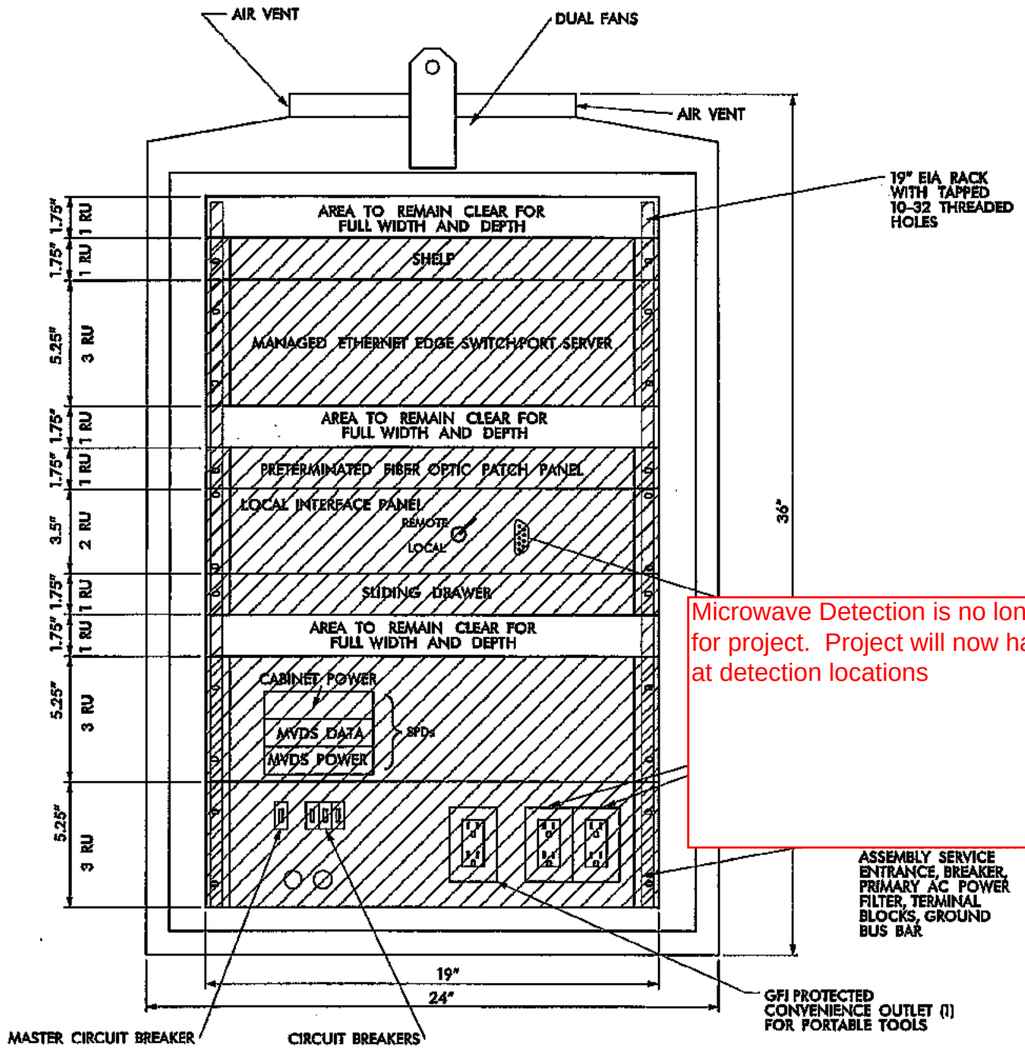
STANDARD DETAILS

MICROWAVE DETECTION BLOCK DIAGRAM

SCALE: N.T.S.
DATE: November 7, 2008
DWG. BY: D. Coolman
DESIGN BY: A. Badgett / B. Haynie
APPROVED: A. Lelewski

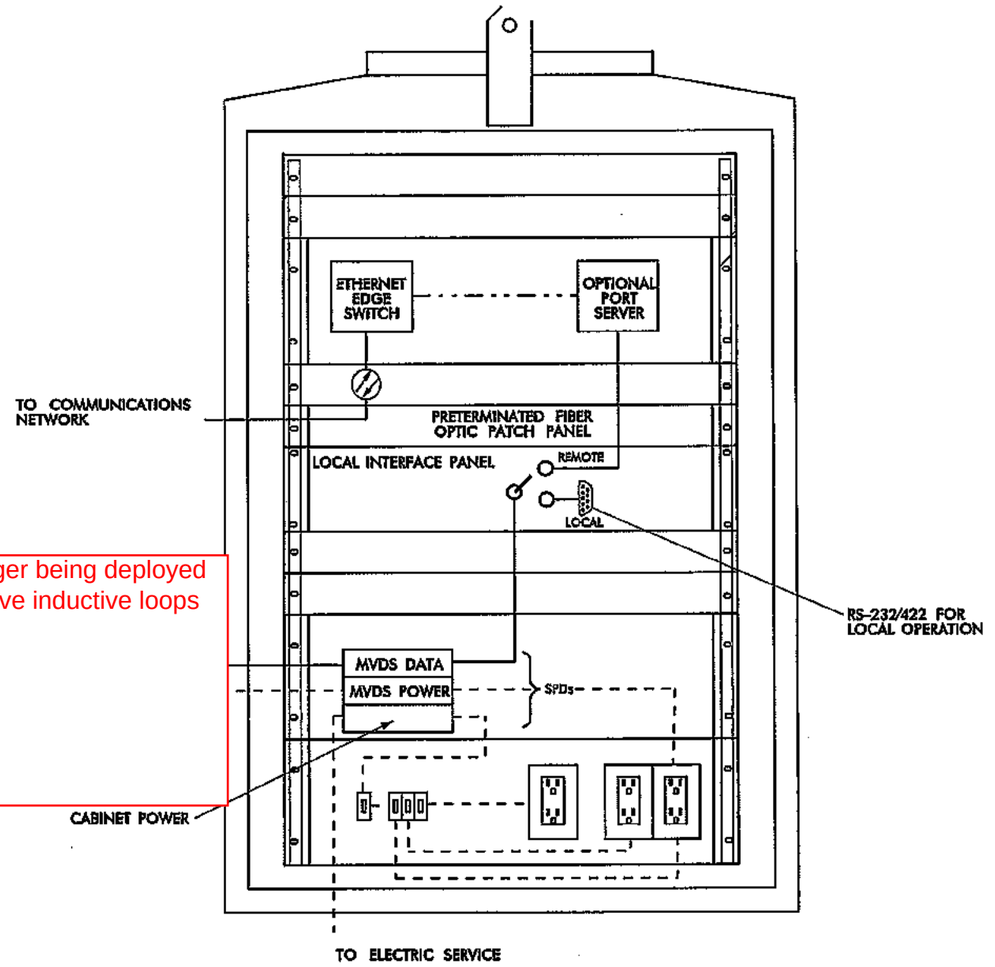
NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.



FRONT VIEW

Microwave Detection is no longer being deployed for project. Project will now have inductive loops at detection locations



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

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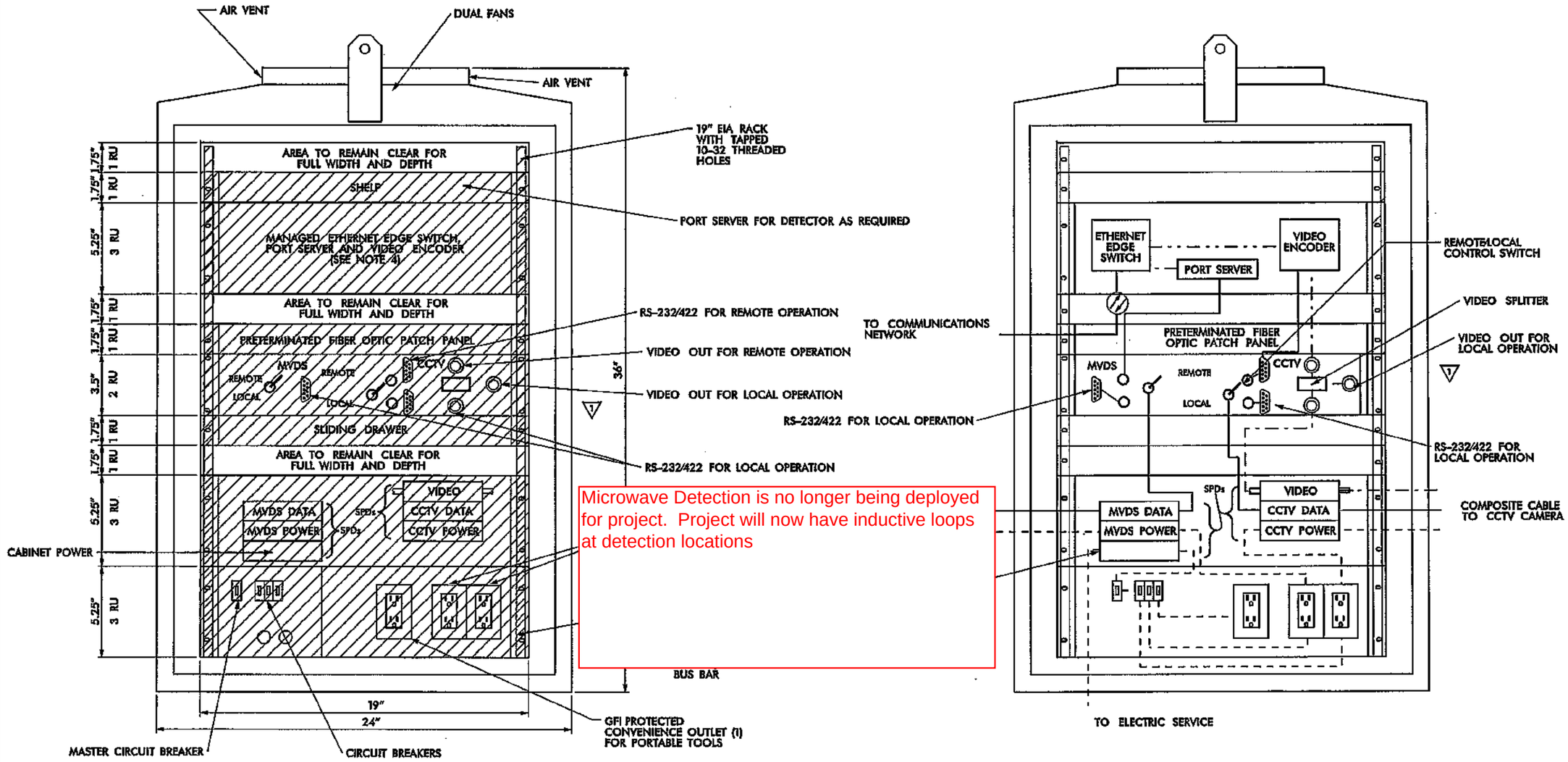
STANDARD DETAILS

MICROWAVE DETECTION CABINET LAYOUT

SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	S. Cochran
DESIGN BY:	A. Raleigh / G. Hayes
APPROVED:	A. Lakewold

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO. 19 of 26



Microwave Detection is no longer being deployed for project. Project will now have inductive loops at detection locations

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

▽ REVISED 10/14/09

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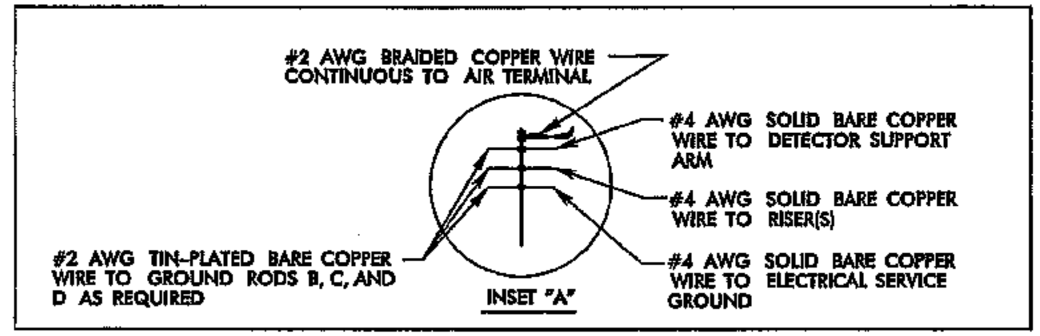
STANDARD DETAILS

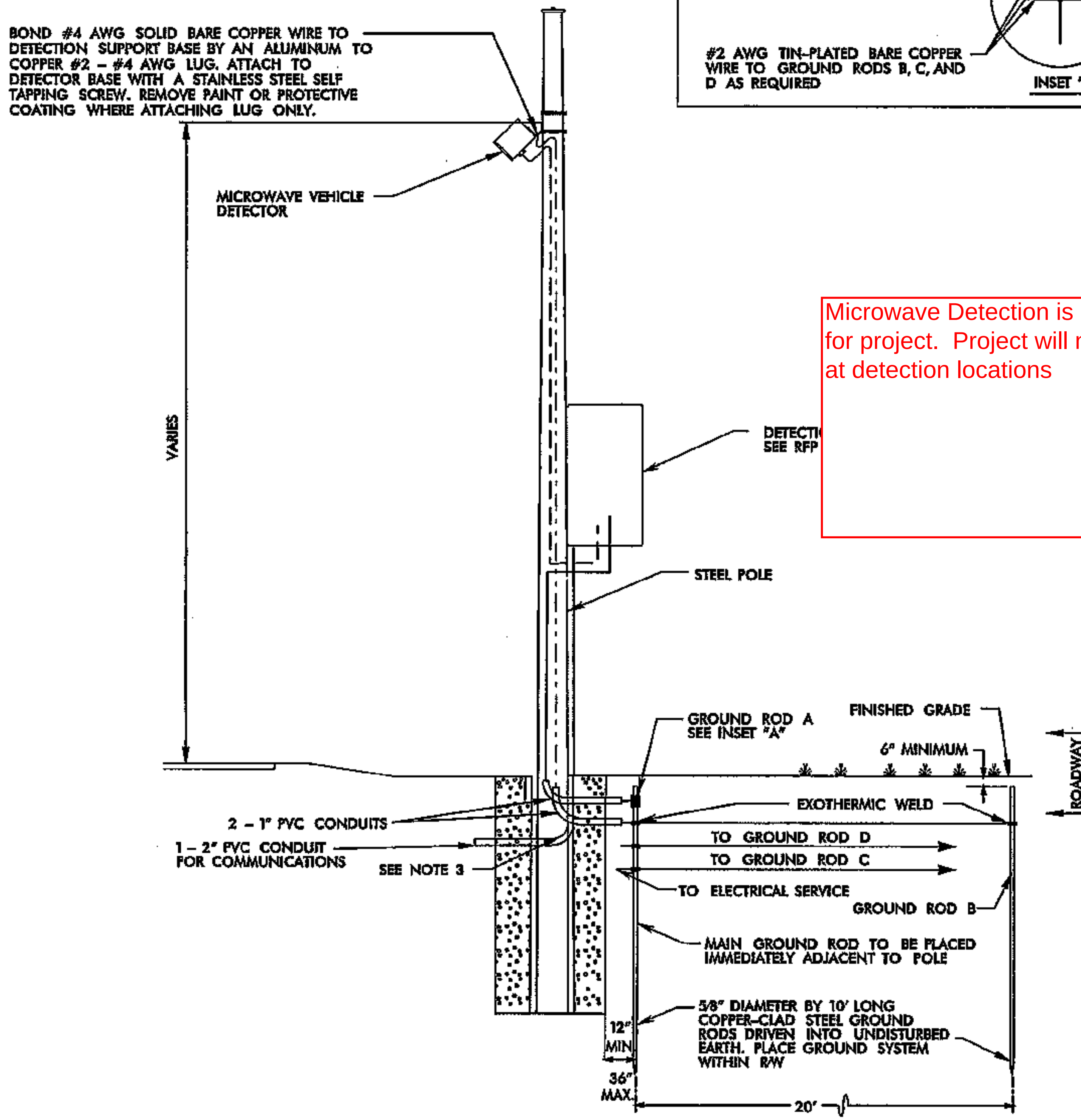
MICROWAVE DETECTION CABINET LAYOUT WITH CCTV EQUIPMENT

SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	S. Cockson
DESIGN BY:	A. Bodziak/S. Haynie
APPROVED:	A. Lalonald

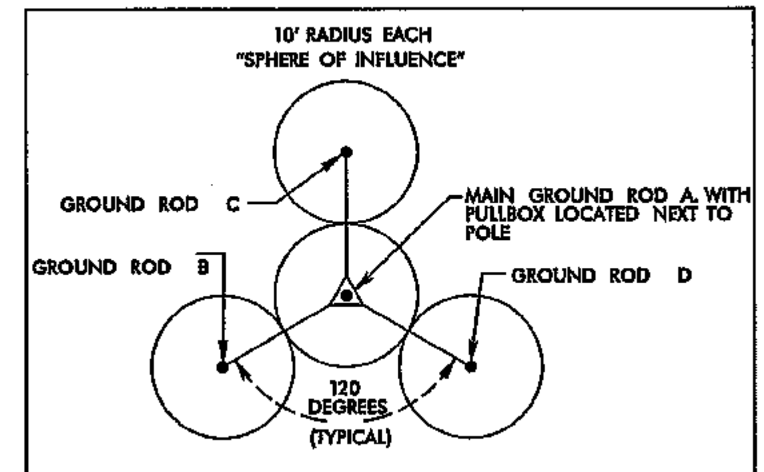
NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO. 20 of 26



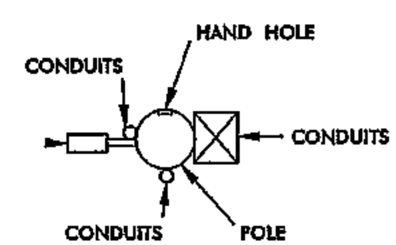


Microwave Detection is no longer being deployed for project. Project will now have inductive loops at detection locations



GROUND ROD PLACEMENT DETAIL
(TYPICAL EACH POLE)

ORIENTATION OF CONDUITS AND DEVICES ON POLE



GROUNDING NOTES

1. ALL GROUNDING MATERIALS SHALL MEET THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.
2. EXOTHERMICALLY WELD ALL CONNECTIONS TO GROUND RODS.
3. BOND #4 AWG SOLID BARE COPPER WIRE TO THE RIGID GALVANIZED STEEL RISERS.
4. INSTALL MARKER TAPE DIRECTLY ABOVE ALL GROUNDING ELECTRODES AND CONDUCTORS AT A DEPTH OF 6".
5. ALL CABLES TO THE DETECTOR SHALL BE COMPLETELY CONCEALED.
6. GROUND ROD A IS REQUIRED. GROUND RODS B, C AND D WILL BE REQUIRED AS NECESSARY TO MEET THE GROUND RESISTANCE REQUIREMENTS IN THE CONTRACT DOCUMENTS.
7. ALL WORK AND NEW EQUIPMENT SHALL BE DESIGNED AND INSTALLED ACCORDING TO THE REQUIREMENTS AND FUNCTIONALITY DESCRIBED IN THE RFP.

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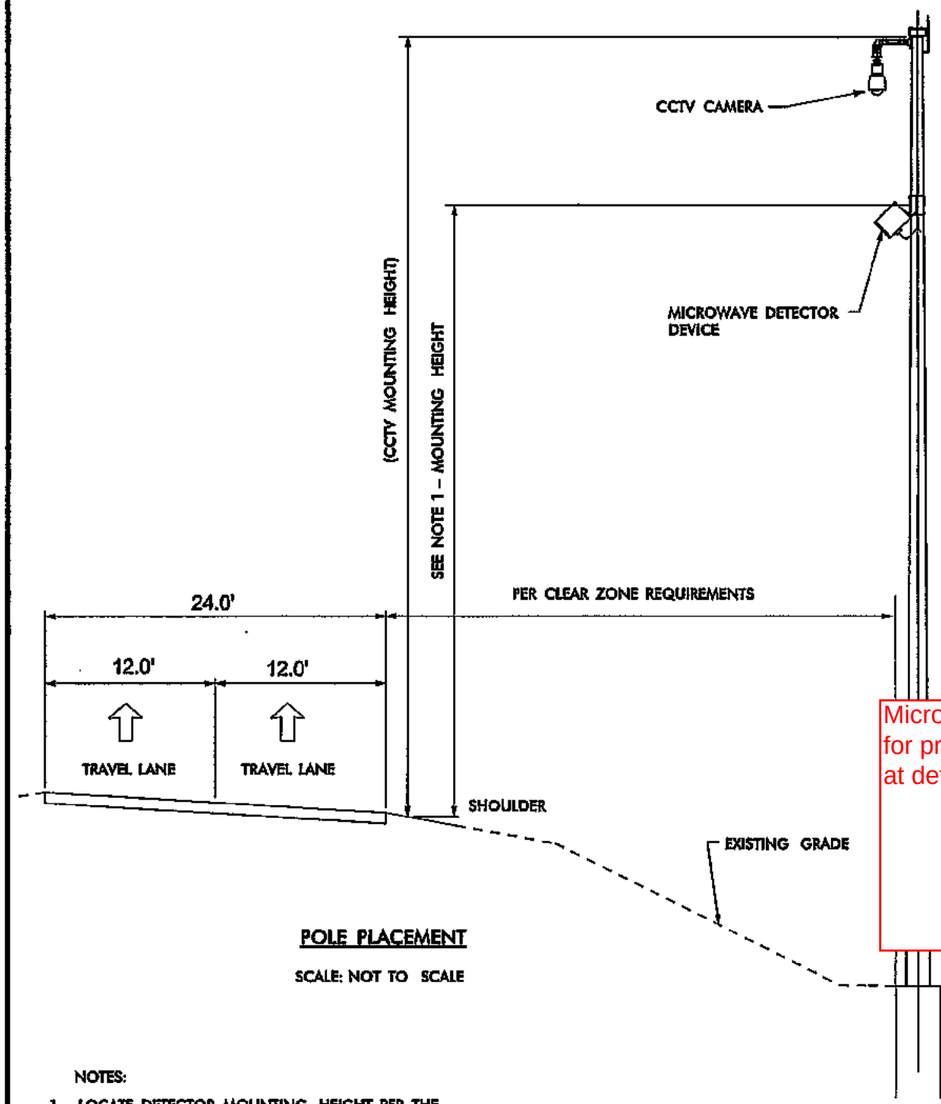
STANDARD DETAILS
MICROWAVE DETECTION GROUNDING

SCALE: N.T.S.
DATE: November 7, 2008
DWG. BY: D. Cockman
DESIGN BY: A. Badgett / B. Haynie
APPROVED: A. Lakowski

NORTH CAROLINA TURNPIKE AUTHORITY

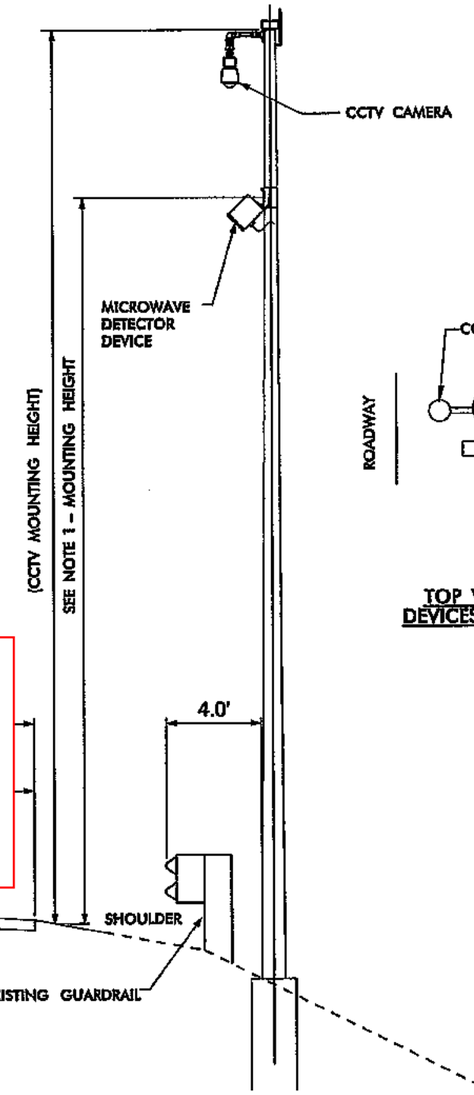
SHEET NO.



POLE PLACEMENT

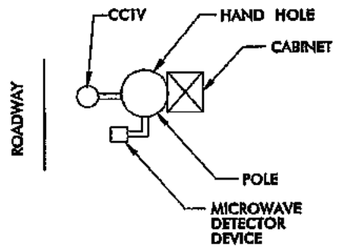
SCALE: NOT TO SCALE

Microwave Detection is no longer being deployed for project. Project will now have inductive loops at detection locations



POLE PLACEMENT

SCALE: NOT TO SCALE



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.

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STANDARD DETAILS

MICROWAVE DETECTION POLE PLACEMENT (1 OF 2)

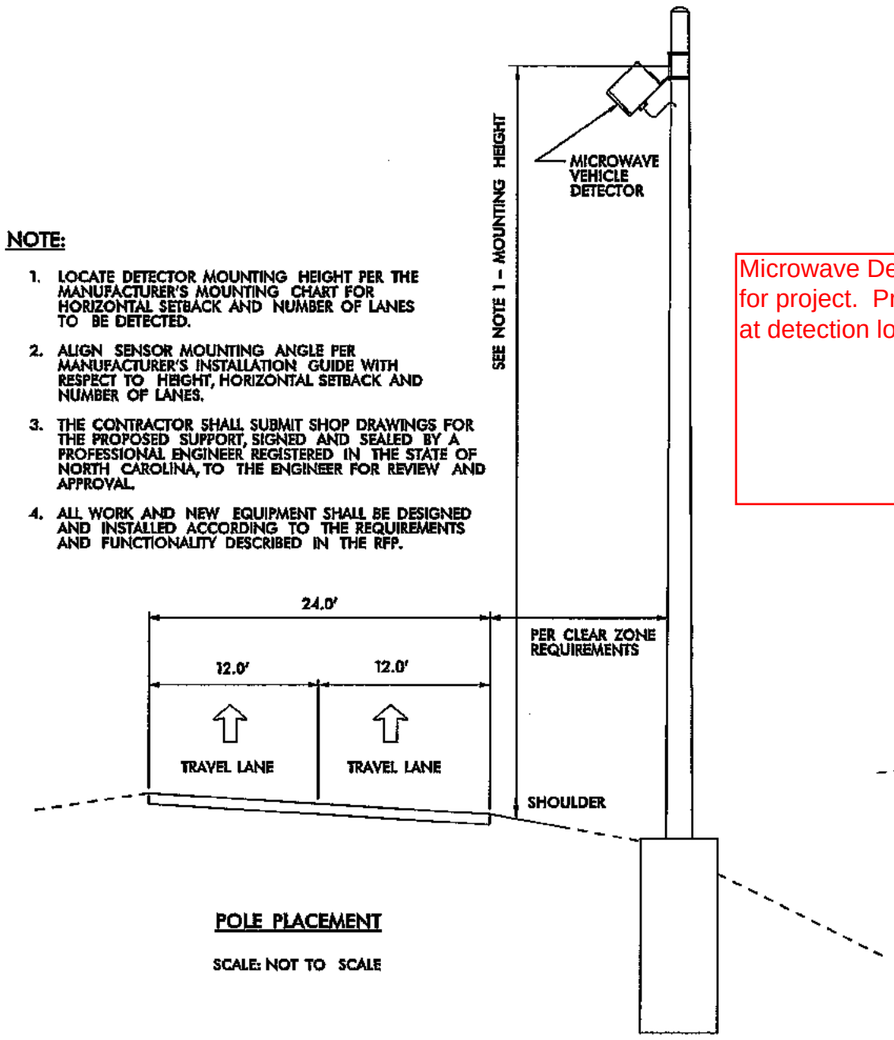
SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	D. Dedmon
DESIGN BY:	A. Badgett / B. Hayes
APPROVED:	A. Lukowski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
22 of 26

NOTE:

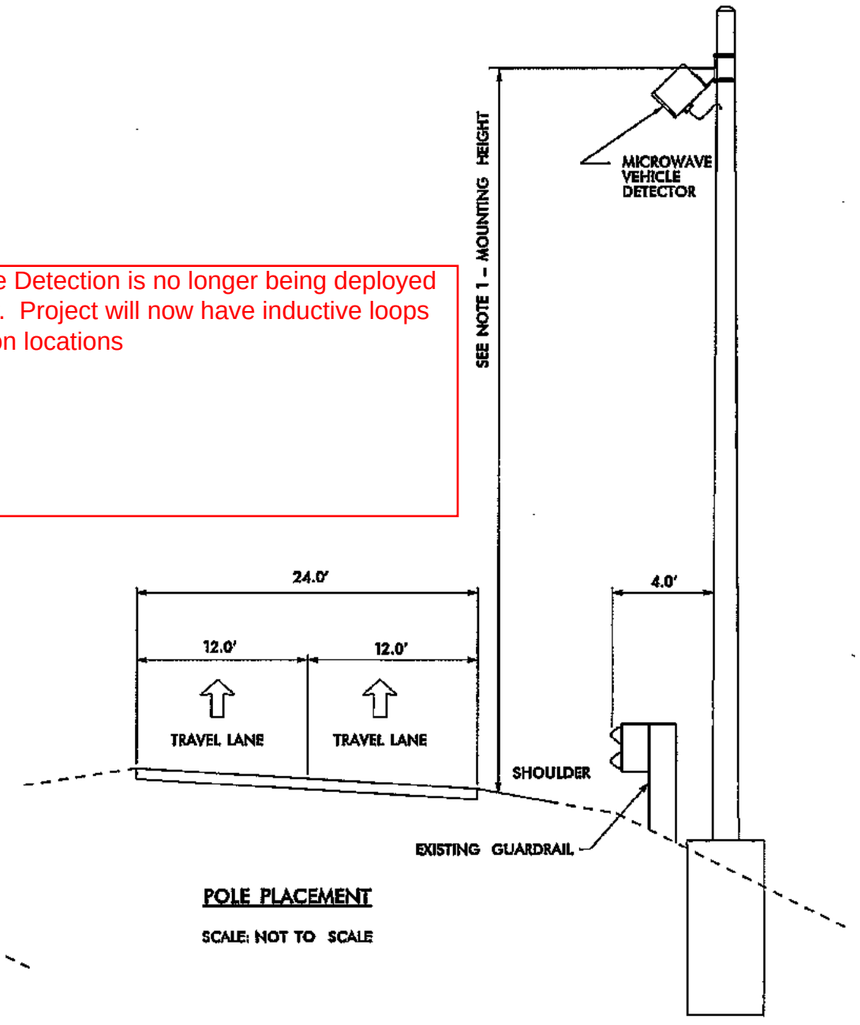
1. LOCATE DETECTOR MOUNTING HEIGHT PER THE MANUFACTURER'S MOUNTING CHART FOR HORIZONTAL SETBACK AND NUMBER OF LANES TO BE DETECTED.
2. ALIGN SENSOR MOUNTING ANGLE PER MANUFACTURER'S INSTALLATION GUIDE WITH RESPECT TO HEIGHT, HORIZONTAL SETBACK AND NUMBER OF LANES.
3. THE CONTRACTOR SHALL SUBMIT SHOP 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

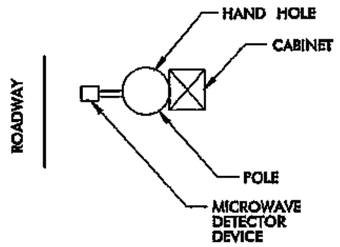
SCALE: NOT TO SCALE

Microwave Detection is no longer being deployed for project. Project will now have inductive loops at detection locations



POLE PLACEMENT

SCALE: NOT TO SCALE



TOP VIEW OF DEVICES ON POLE

PBSJ
1616 E. Millbrook Rd Suite 310
Raleigh, North Carolina 27609
(919) 876-6888

STANDARD DETAILS

MICROWAVE DETECTION POLE PLACEMENT (2 OF 2)

SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	D. Coleman
DESIGN BY:	A. Badgett / S. Hayes
APPROVED:	A. Lalowski

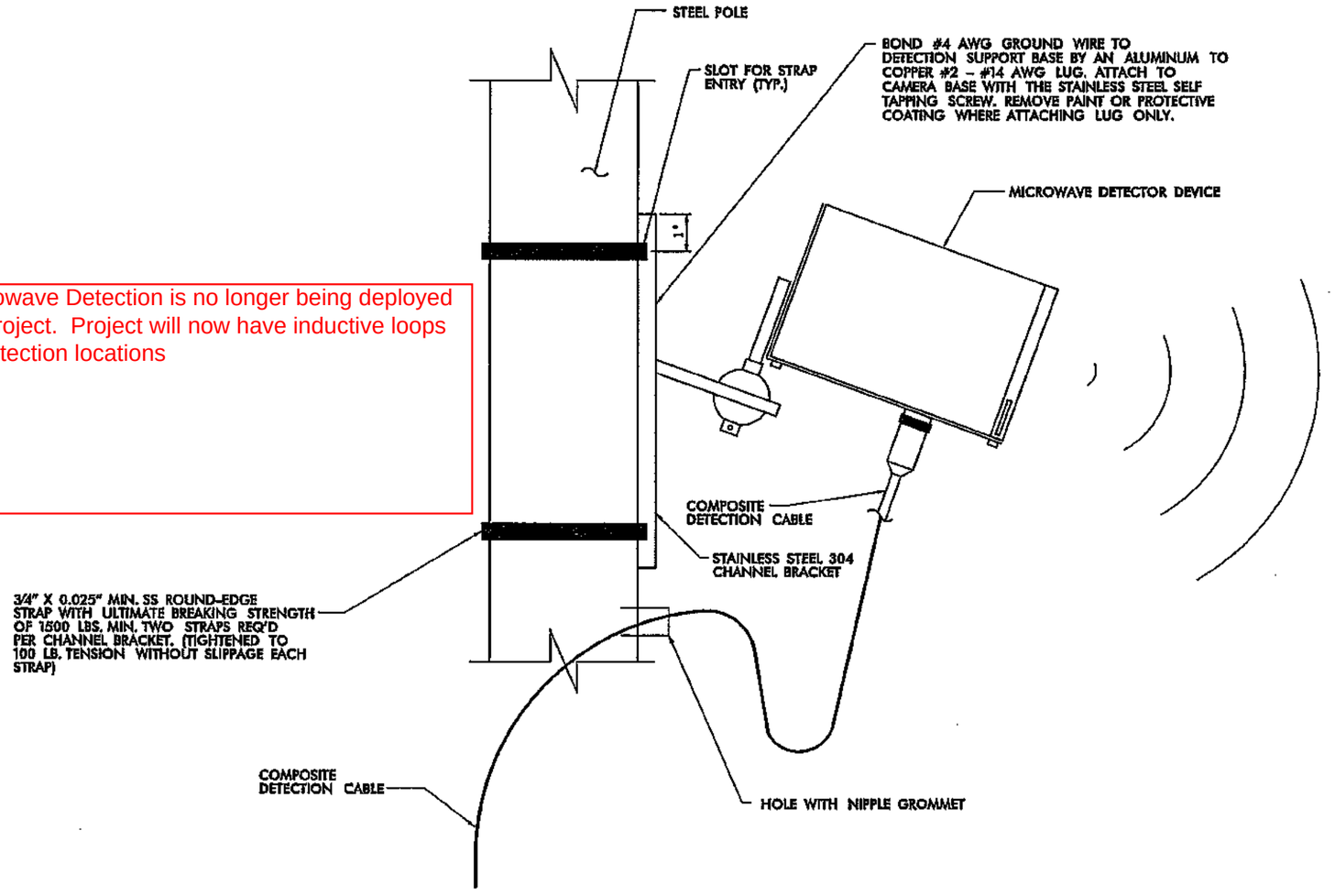
NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO. 23 of 26

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.

Microwave Detection is no longer being deployed for project. Project will now have inductive loops at detection locations



MICROWAVE DETECTOR HOUSING ELEVATION VIEW

NOT TO SCALE

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Raleigh, North Carolina 27609
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STANDARD DETAILS

MICROWAVE DETECTION MOUNTING

SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	D. Cookson
DESIGN BY:	A. Bolgiel / S. Haynie
APPROVED:	A. Lakowski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
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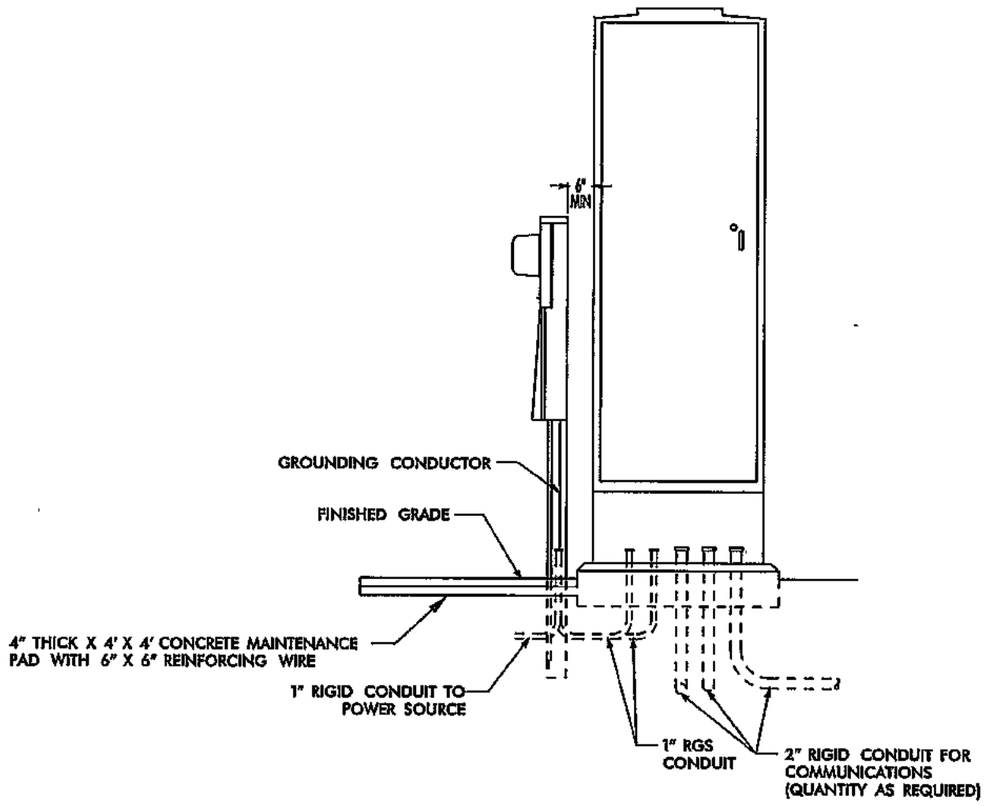

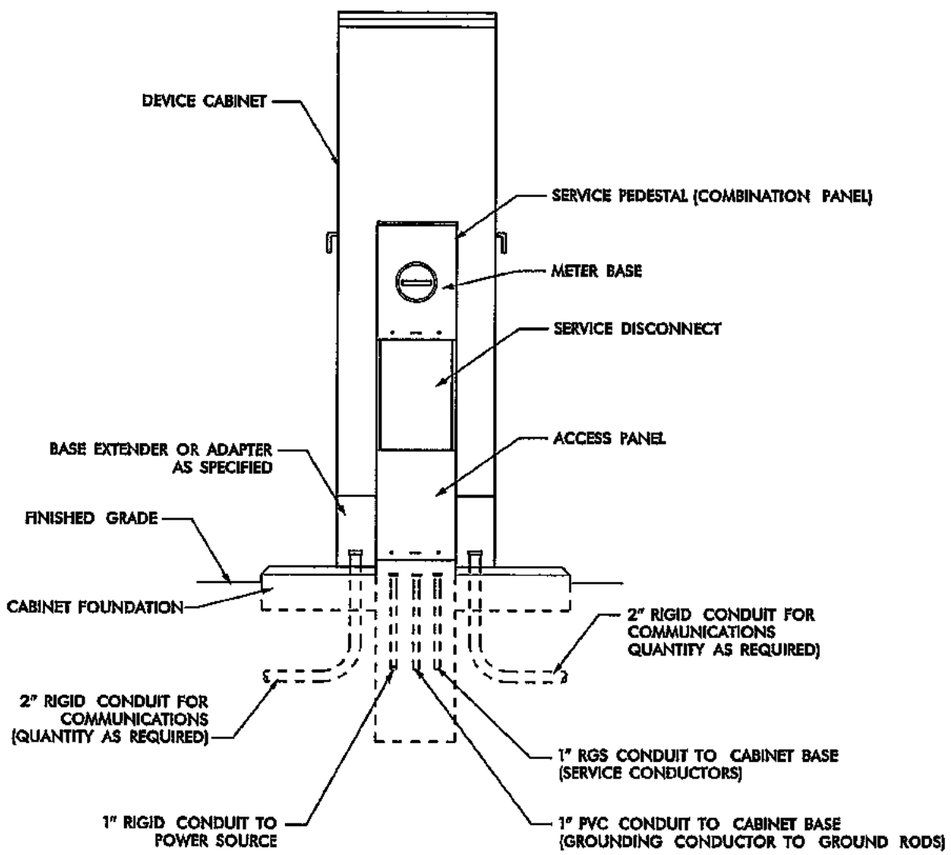

NOTES

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.

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STANDARD DETAILS
POWER SERVICE DETAILS
GROUND MOUNT CABINET

SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	D. Cookman
DESIGN BY:	A. Badgett / S. Hayne
APPROVED:	A. Lotowski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
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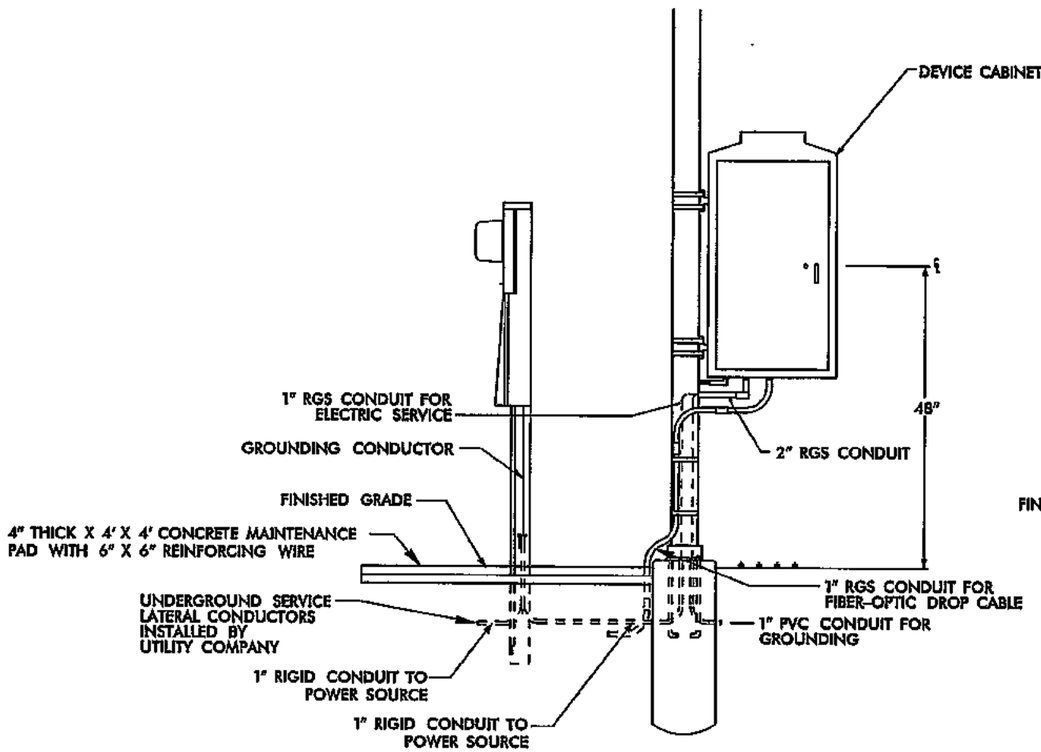

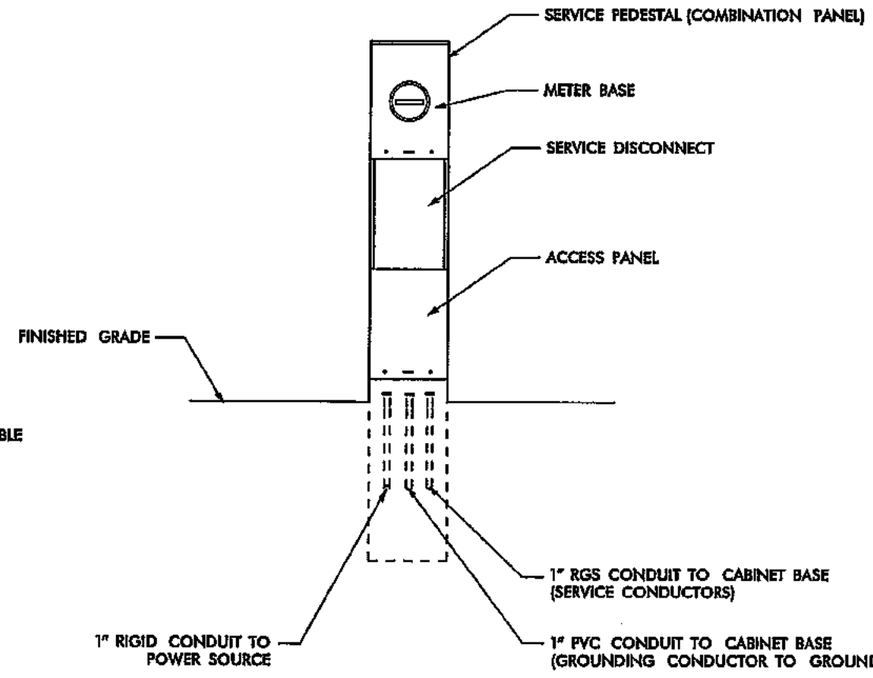

NOTES

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.

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STANDARD DETAILS
POWER SERVICE DETAIL POLE MOUNT CABINET

SCALE:	N.T.S.
DATE:	November 7, 2008
DWG. BY:	D. Cookman
DESIGN BY:	A. Bodgett / S. Hayrie
APPROVED:	A. Lokerski

NORTH CAROLINA TURNPIKE AUTHORITY

SHEET NO.
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