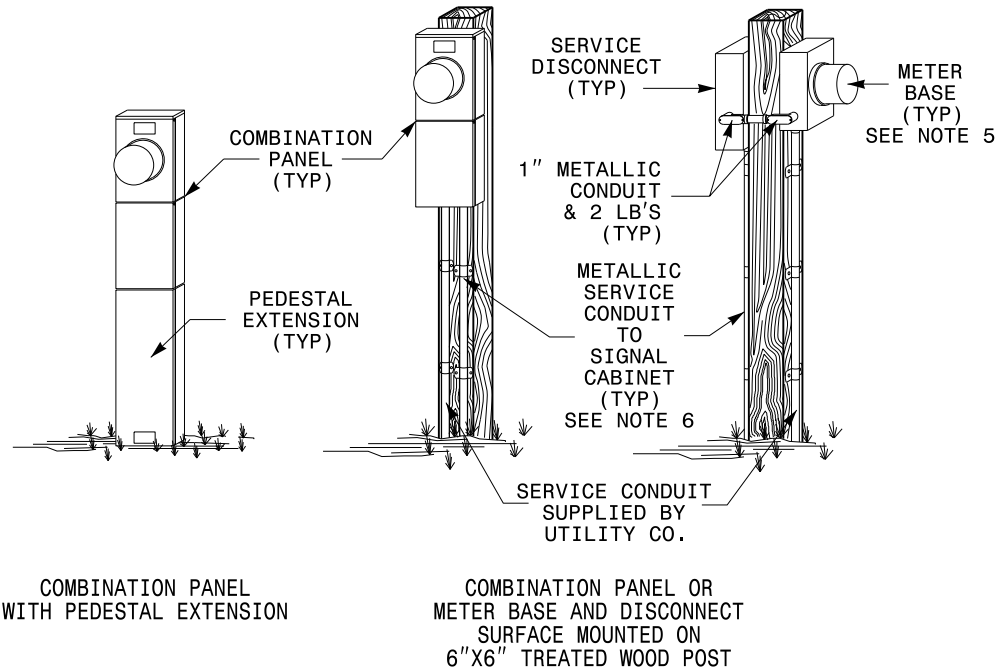


**GROUND MOUNTED SERVICE EQUIPMENT OPTIONS
FOR UNDERGROUND ELECTRICAL SERVICE**



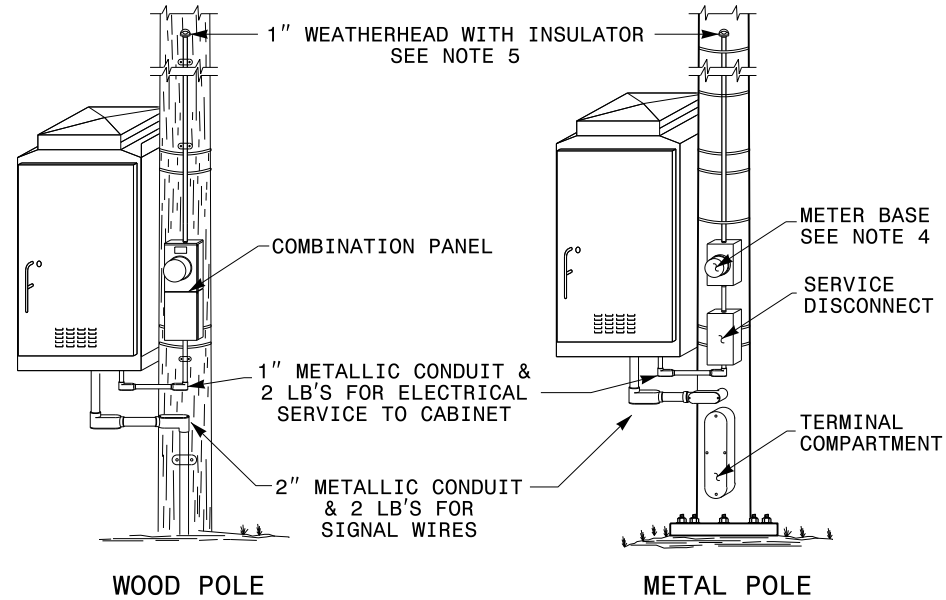
COMBINATION PANEL WITH PEDESTAL EXTENSION

COMBINATION PANEL OR METER BASE AND DISCONNECT SURFACE MOUNTED ON 6"X6" TREATED WOOD POST

NOTES

1. LOCATE THE SERVICE EQUIPMENT NEAR THE SIGNAL CABINET IN A MANNER THAT WILL ALLOW EASY ACCESS TO THE SERVICE DISCONNECT. LOCATE SERVICE EQUIPMENT SO AS NOT TO OBSTRUCT SIGHT DISTANCE OF VEHICLES TURNING RIGHT ON RED.
2. FOR GROUND MOUNTED ELECTRICAL SERVICE INSTALLATIONS WHEN POST MOUNTING IS CHOSEN, INSTALL TREATED WOOD POSTS A MINIMUM OF 3 FEET INTO THE GROUND.
3. INSTALL ALL METER BASES MOUNTED IN PEDESTALS AT A HEIGHT NOT TO EXCEED 5 FEET AS MEASURED FROM THE CENTER OF THE METER. INSTALL ALL OTHER METER BASES AT A HEIGHT BETWEEN 4 FEET AND 5 FEET AS MEASURED FROM THE CENTER OF THE METER. SEAL ANY UNUSED MOUNTING HOLES ON COMBINATION PANELS, METER BASES AND SERVICE DISCONNECTS.
4. INSTALL OVERHEAD ELECTRICAL SERVICE ON POLES AS SHOWN WHEN UNDERGROUND SOURCE IS NOT AN OPTION. COMBINATION PANELS, OR METER BASES AND SERVICE DISCONNECTS, MAY BE INSTALLED ON POLES WHEN POLE MOUNTED SIGNAL CABINETS ARE REQUIRED FOR THE INSTALLATION. DO NOT ROUTE UNFUSED OVERHEAD ELECTRICAL SERVICE CONDUCTOR INSIDE OF METAL POLES.
5. TYPICAL POINT OF DELIVERY FOR UNDERGROUND SERVICE IS INSIDE OF METER BASE. TYPICAL POINT OF DELIVERY FOR OVERHEAD SERVICE IS AT THE WEATHERHEAD ENTRANCE AT THE TOP OF THE SERVICE RISER.
6. THE ABOVE GROUND PORTION OF ELECTRICAL SERVICE CONDUIT TO THE SIGNAL CABINET MUST BE METALLIC. THE BELOW GROUND PORTION MAY BE METALLIC OR PVC.

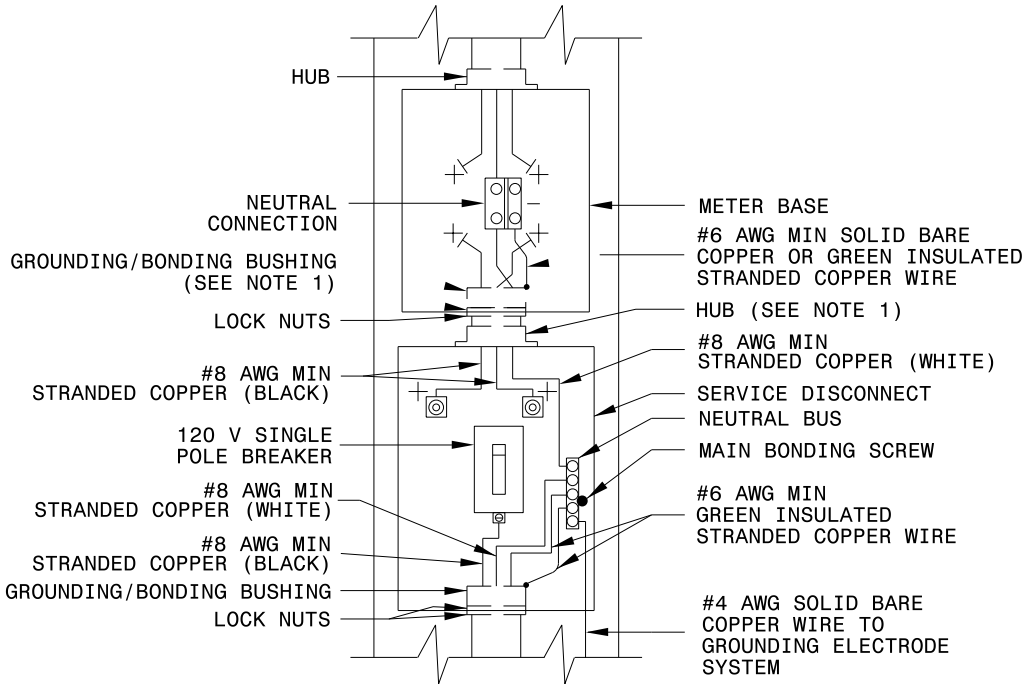
**POLE MOUNTED SERVICE EQUIPMENT OPTIONS FOR
OVERHEAD ELECTRICAL SERVICE**



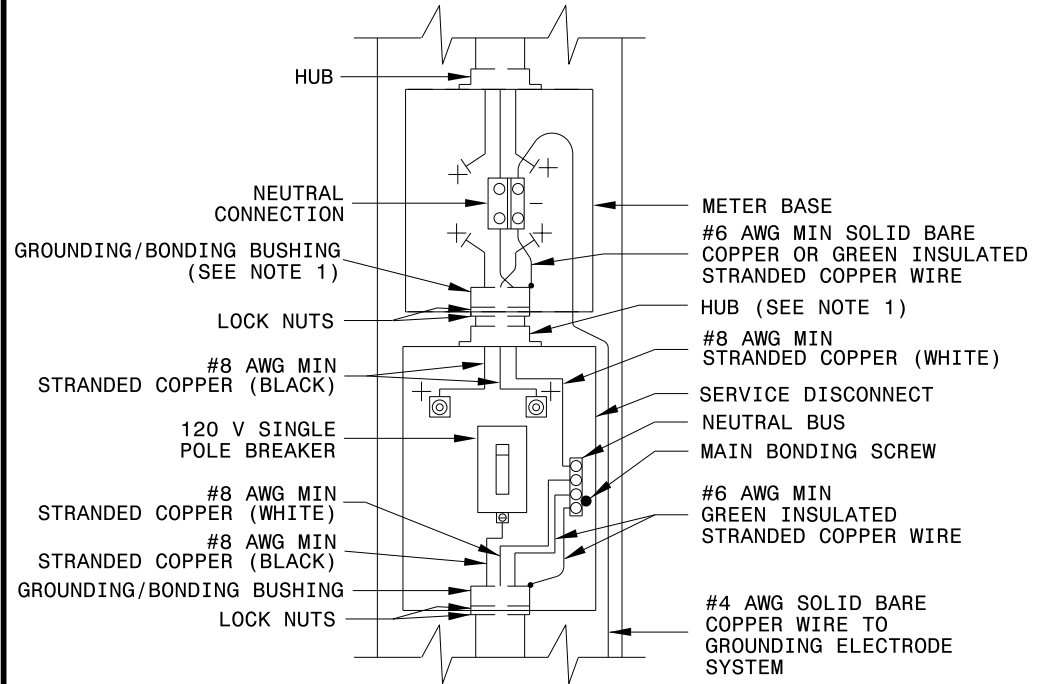
WOOD POLE

METAL POLE

TYPICAL ELECTRICAL CONNECTION DETAIL FOR
OVERHEAD SERVICE INSTALLATION
(SHOWN WITH METER BASE/SERVICE DISCONNECT OPTION AND WITH
GROUNDING ELECTRODE CONDUCTOR TERMINATED IN DISCONNECT)



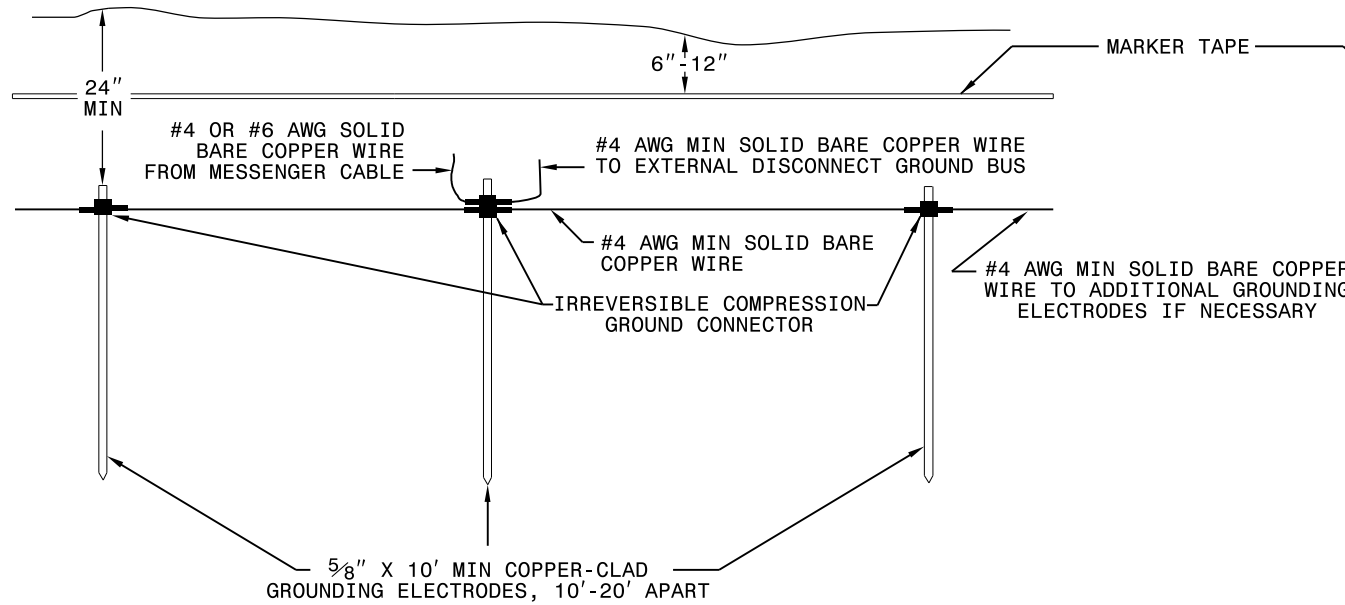
ALTERNATE ELECTRICAL CONNECTION DETAIL FOR
OVERHEAD SERVICE INSTALLATION
(SHOWN WITH METER BASE/SERVICE DISCONNECT OPTION AND WITH
GROUNDING ELECTRODE CONDUCTOR TERMINATED IN METER)



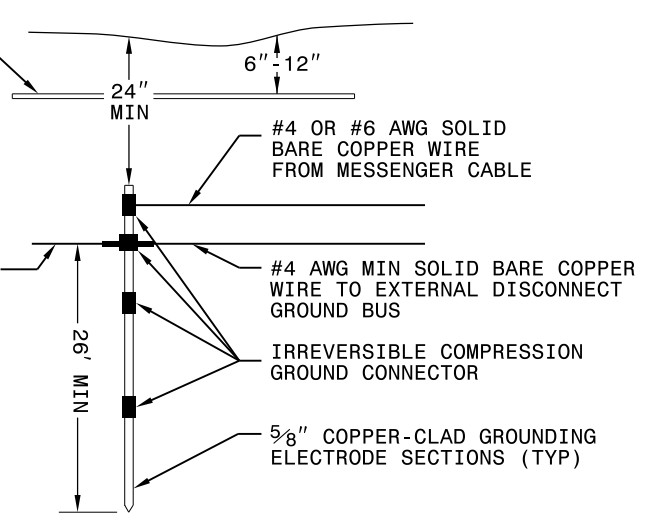
NOTES

1. WHEN USING A HUB LISTED AS A GROUNDING HUB (UL TYPES DWTT AND KDER), THE BONDING BUSHING IN THE METER BASE IS NOT NECESSARY.

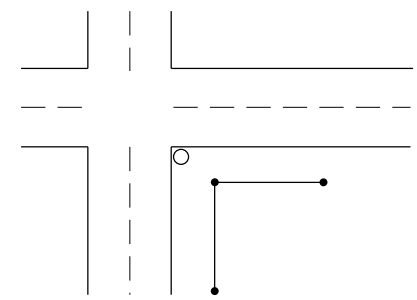
MULTIPLE ELECTRODES



SECTIONAL ELECTRODES

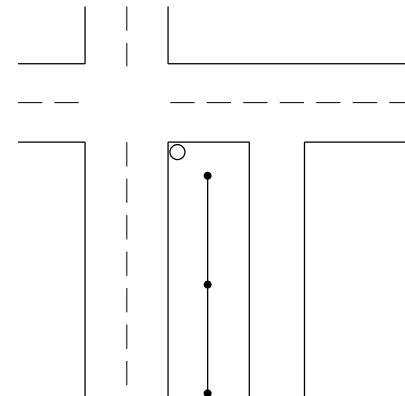


UNRESTRICTED SHOULDER



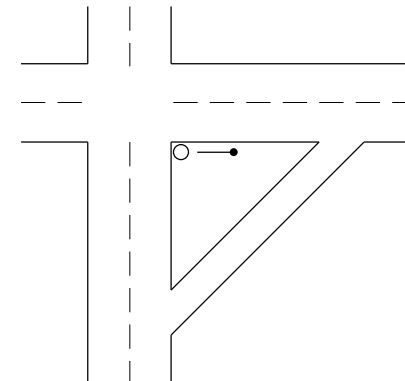
PLACE GROUNDING ELECTRODES AT 90°

LIMITED SHOULDER

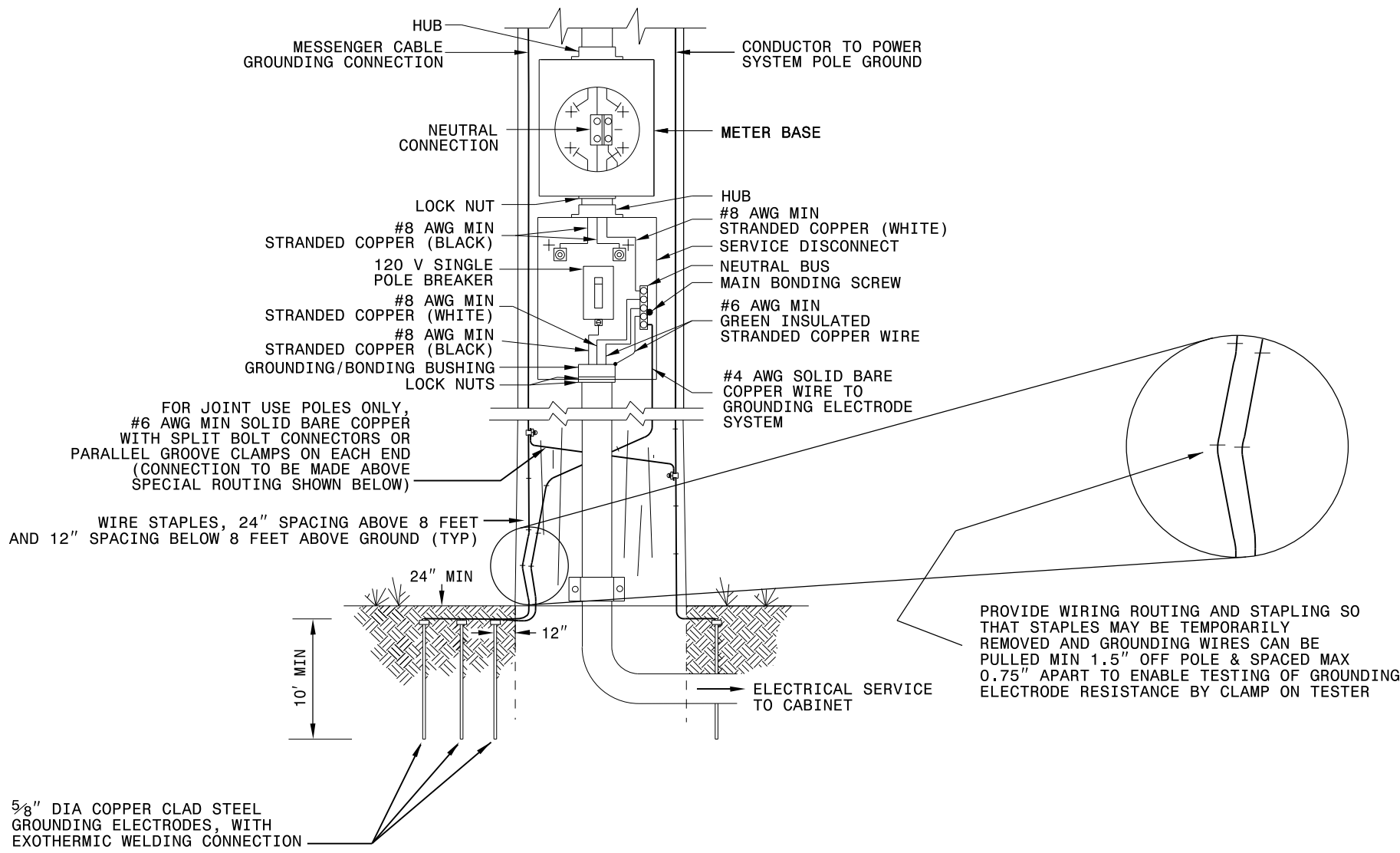


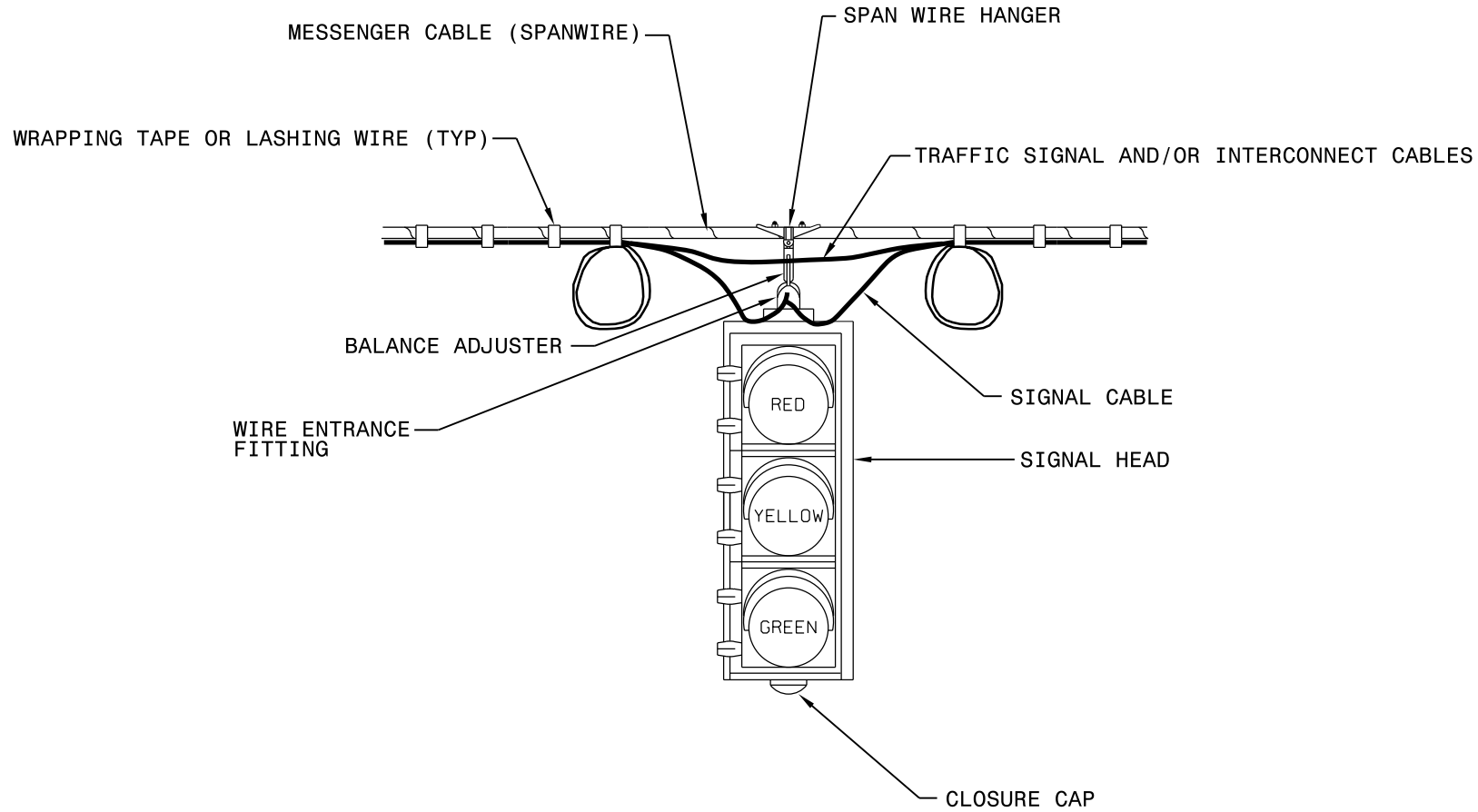
PLACE GROUNDING ELECTRODES IN A STRAIGHT LINE

RESTRICTED SPACE



ROADWAY STANDARD DRAWING FOR
ELECTRICAL SERVICE GROUNDING
GROUNDING AND BONDING - WOOD POLES





1-18

ROADWAY STANDARD DRAWING FOR
SIGNAL HEADS
 VEHICULAR SIGNAL HEADS

1-18

ROADWAY STANDARD DRAWING FOR

SIGNAL HEADS

STANDARD SIGNAL FACE CLEARANCES

		STANDARD SIGNAL FACE CLEARANCES																																		
		TO																																		
RIGHT OF WAY PHASE		G		F		G		R		←		→		G		G		R		F		R		R		WALK		DON'T WALK		OFF		ON				
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	
FROM	G	G	G			G	G	Y	R					G	G	G	G	Y	R			Y	R													
	F			F	F					F	F													Y	R											
	G																																			
	R																																			
	←																																			
	→																																			
	G																																			
	R																																			
	F																																			
	R																																			
	←																																			
	→																																			
	WALK																																			
	DON'T WALK																																			
OFF																																				
ON																																				

← CLEARANCE PHASES

W - WALK
FDW - FLASHING DON'T WALK
DW - DON'T WALK
F - FLASHING YELLOW ARROW

FRONT VIEW

SIDE VIEW

SIDE VIEW

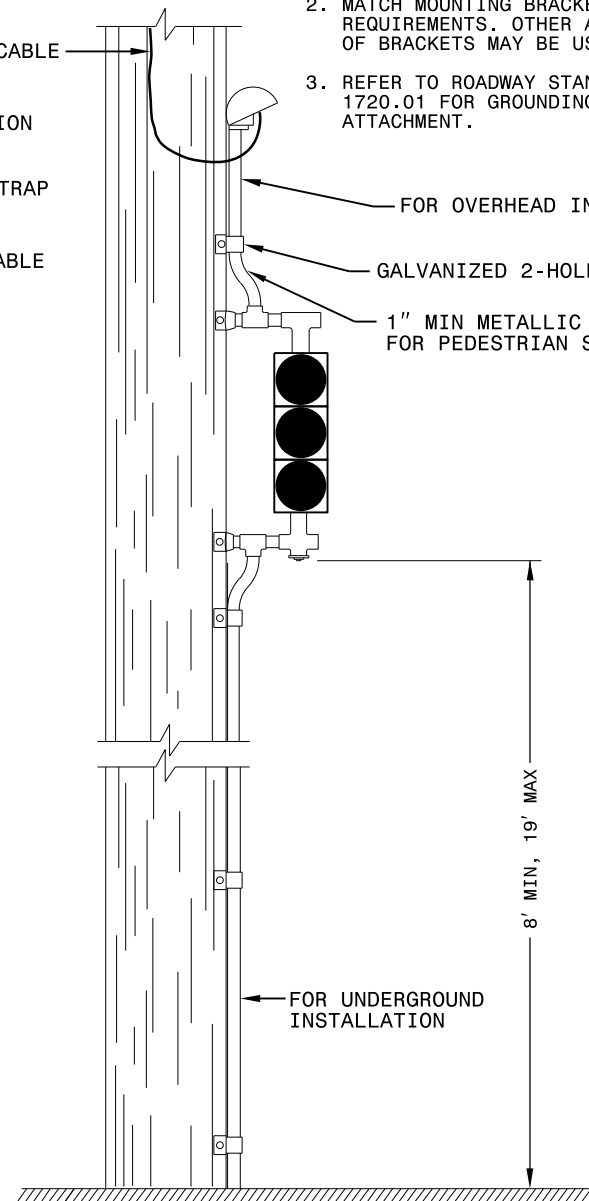
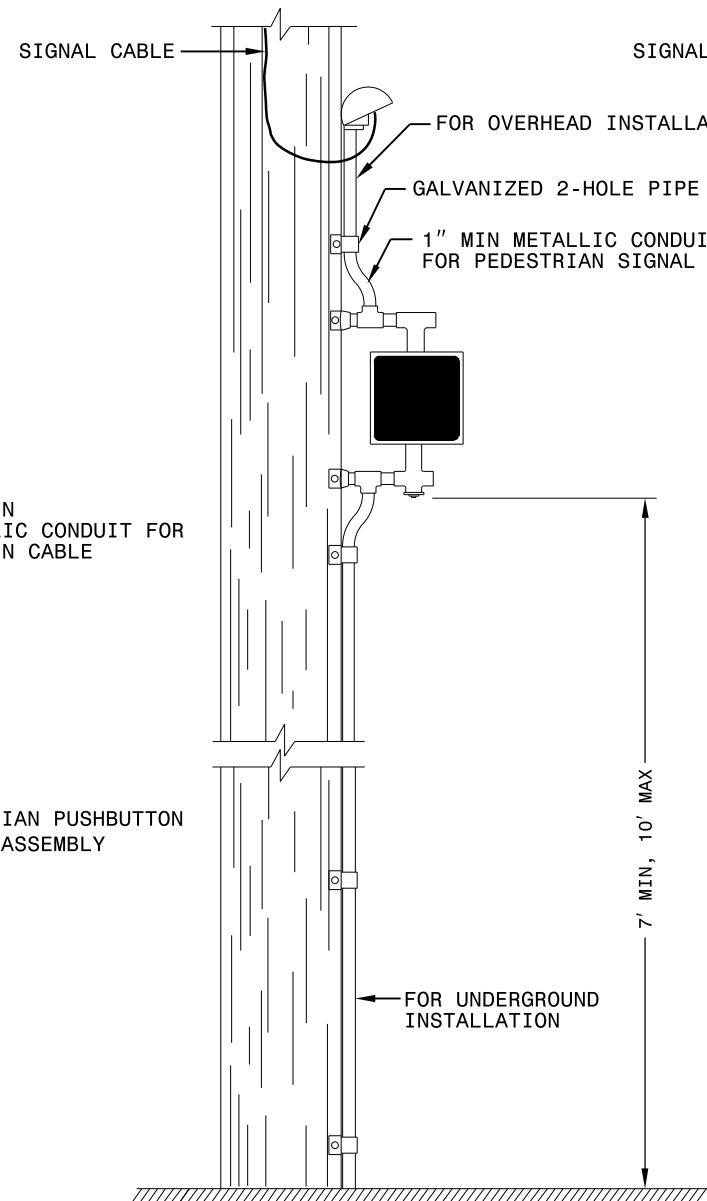
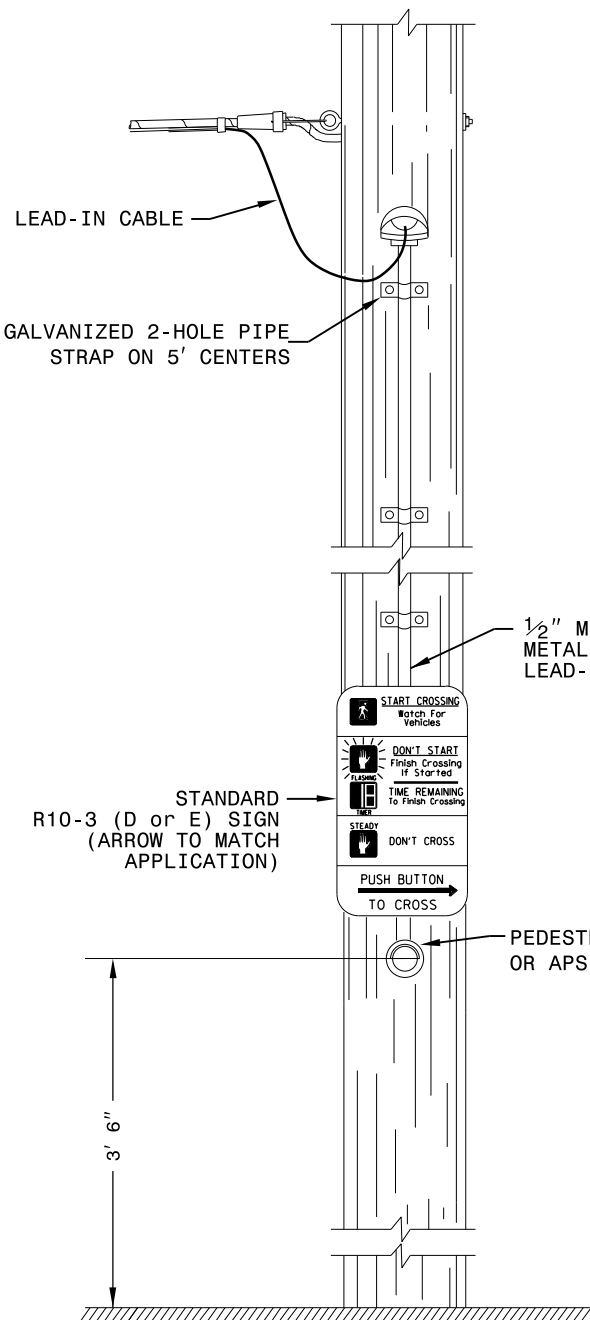
NOTES

1. CONNECT PUSHBUTTON TO CONTROLLER CABINET USING LEAD-IN CABLE. BOND PUSHBUTTON HOUSING AND ALL METAL COMPONENTS TO CABINET GROUND USING CABLE GROUND.
2. MATCH MOUNTING BRACKETS TO MOUNTING REQUIREMENTS. OTHER APPROVED STYLES OF BRACKETS MAY BE USED.
3. REFER TO ROADWAY STANDARD DRAWING 1720.01 FOR GROUNDING AND SPANWIRE ATTACHMENT.

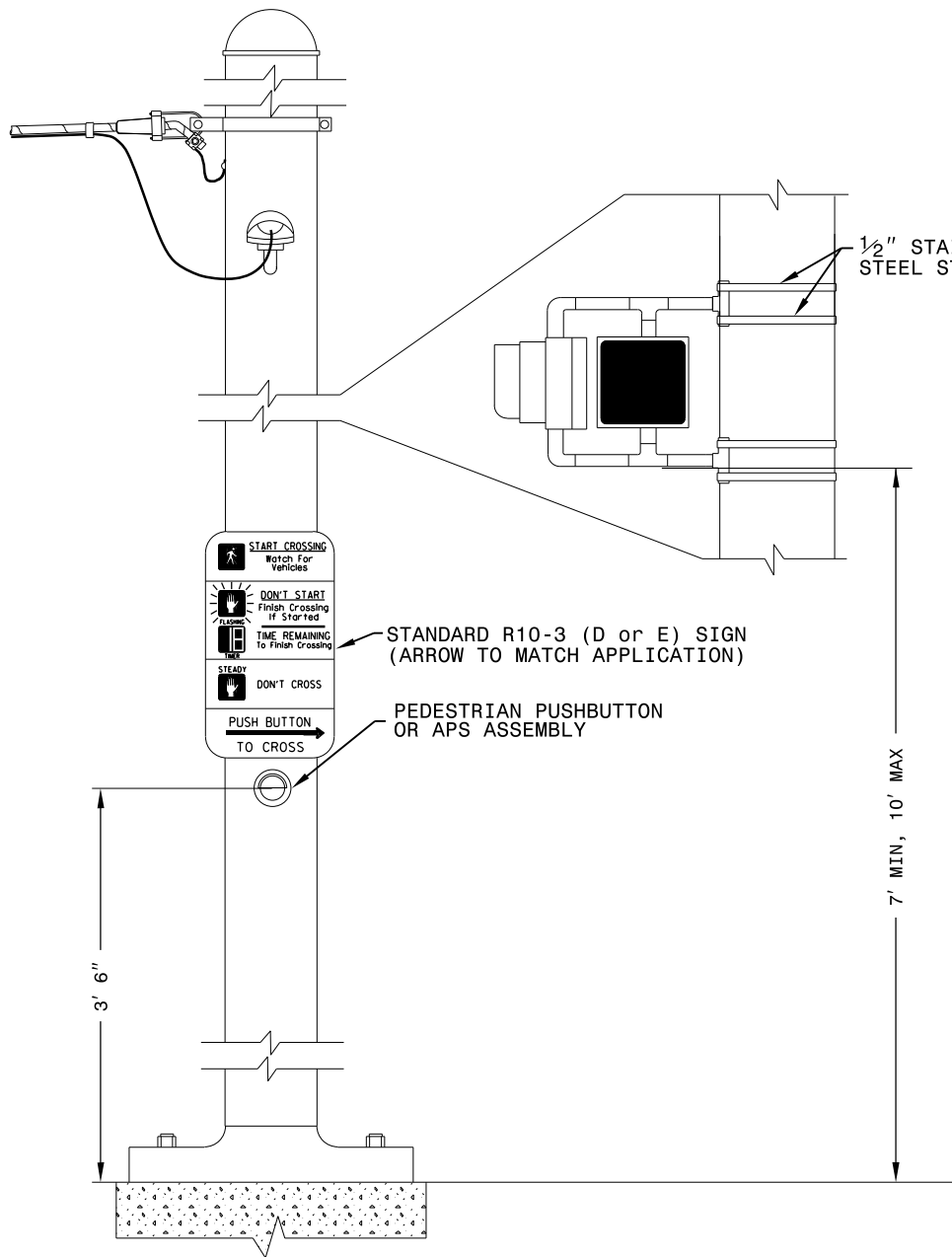
STATE OF
 NORTH CAROLINA
 DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 RALEIGH, N.C.

1-18

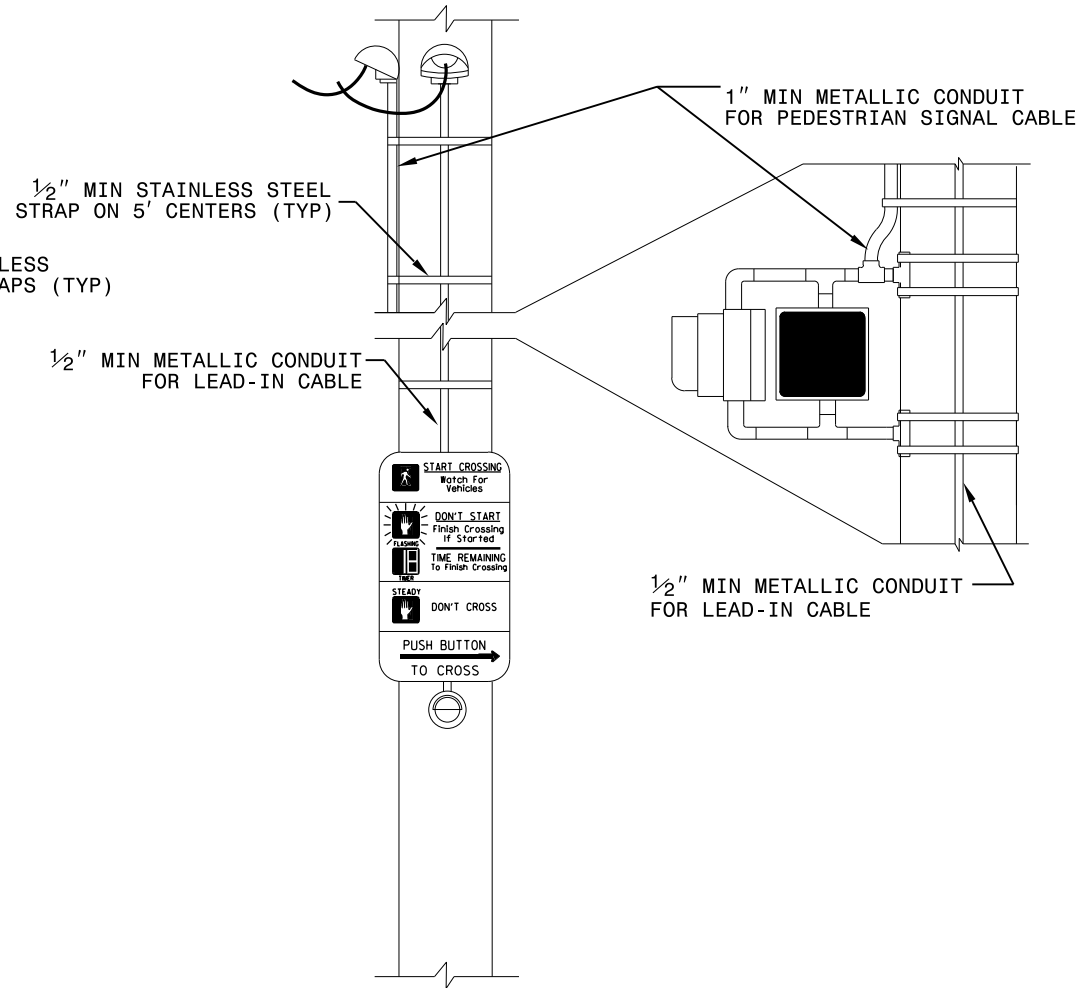
ROADWAY STANDARD DRAWING FOR
SIGNAL HEADS
 WOOD POLE MOUNTING



PREFERRED



ALTERNATE



NOTES

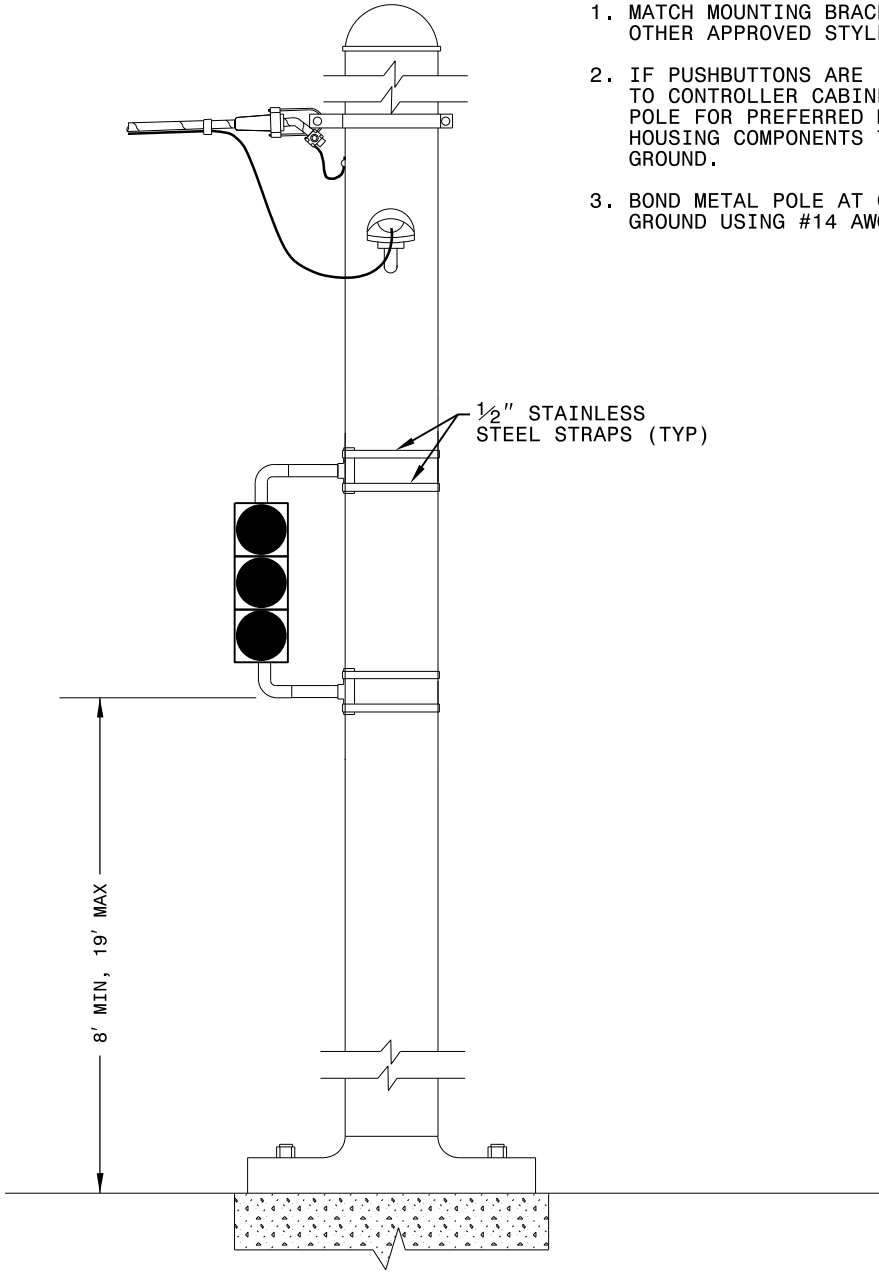
1. CONNECT PUSHBUTTON TO CONTROLLER CABINET USING LEAD-IN CABLE (INSIDE POLE FOR PREFERRED MOUNTING). BOND PUSHBUTTON HOUSING TO CABINET GROUND USING CABLE GROUND.
2. BOND METAL POLE AT CABINET LOCATION TO CABINET GROUND USING #14 AWG TYPE THWN.
3. MATCH MOUNTING BRACKETS TO MOUNTING REQUIREMENTS. OTHER APPROVED STYLES OF BRACKETS MAY BE USED.

PREFERRED

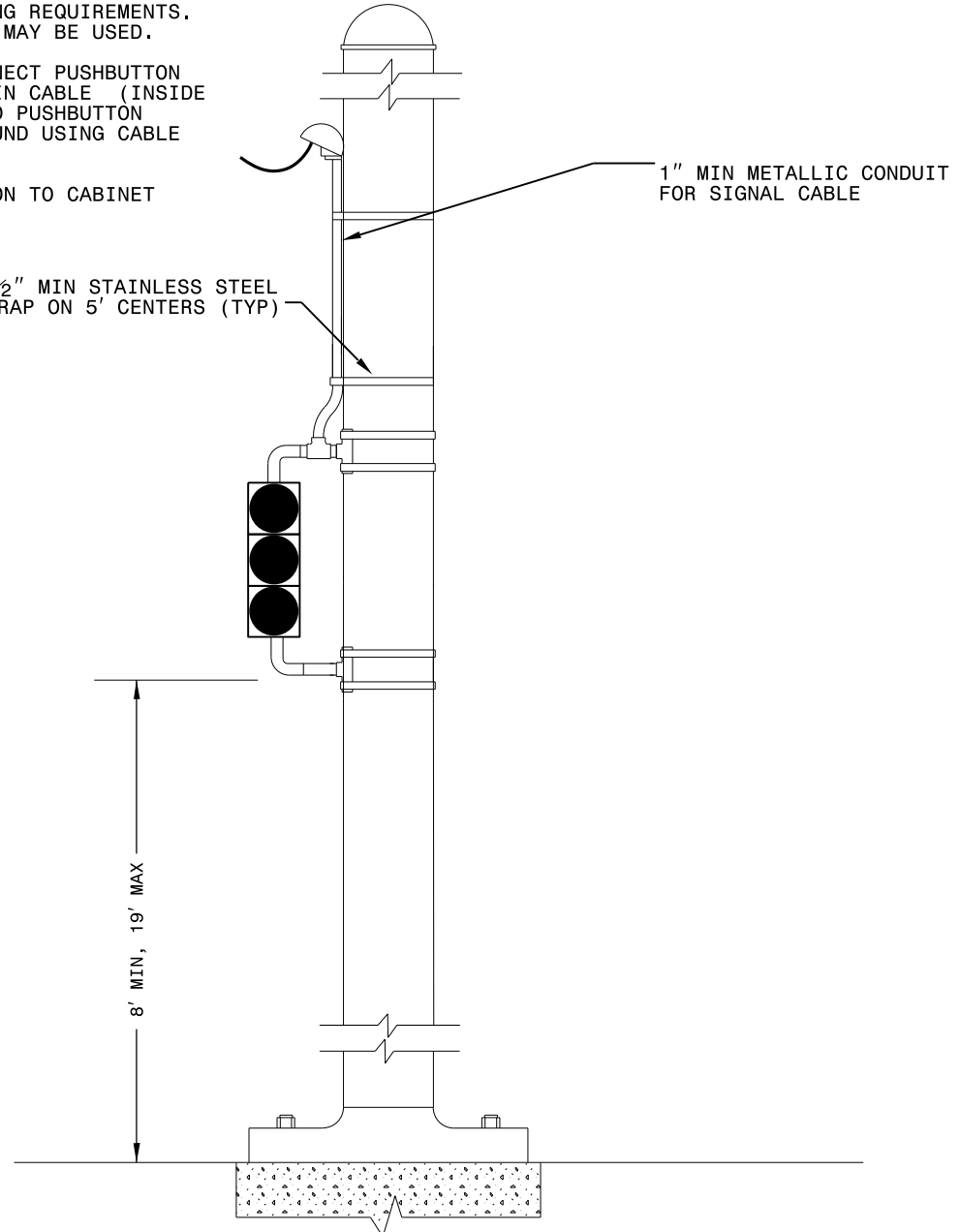
NOTES

ALTERNATE

1. MATCH MOUNTING BRACKETS TO MOUNTING REQUIREMENTS. OTHER APPROVED STYLES OF BRACKETS MAY BE USED.
2. IF PUSHBUTTONS ARE INSTALLED, CONNECT PUSHBUTTON TO CONTROLLER CABINET USING LEAD-IN CABLE (INSIDE POLE FOR PREFERRED MOUNTING). BOND PUSHBUTTON HOUSING COMPONENTS TO CABINET GROUND USING CABLE GROUND.
3. BOND METAL POLE AT CABINET LOCATION TO CABINET GROUND USING #14 AWG TYPE THWN.



1/2" MIN STAINLESS STEEL STRAP ON 5' CENTERS (TYP)

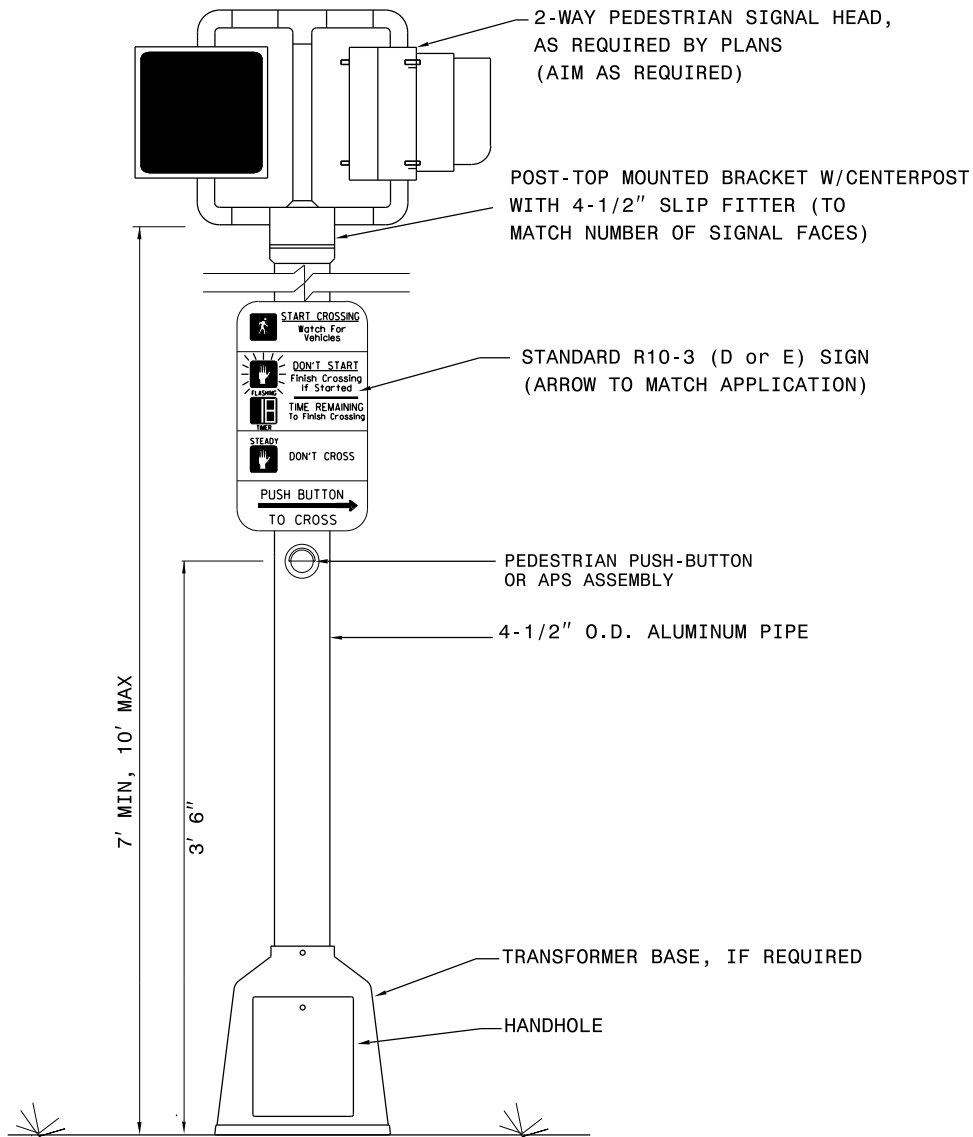


1" MIN METALLIC CONDUIT FOR SIGNAL CABLE

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

1-18

ROADWAY STANDARD DRAWING FOR
SIGNAL HEADS
VEHICLE ASSEMBLIES - STEEL POLE MOUNTING



1-WAY PEDESTRIAN SIGNAL HEAD,
AS REQUIRED BY PLANS
(AIM AS REQUIRED)

POST-TOP 4-1/2" SLIP FITTER

TRANSFORMER BASE, IF REQUIRED

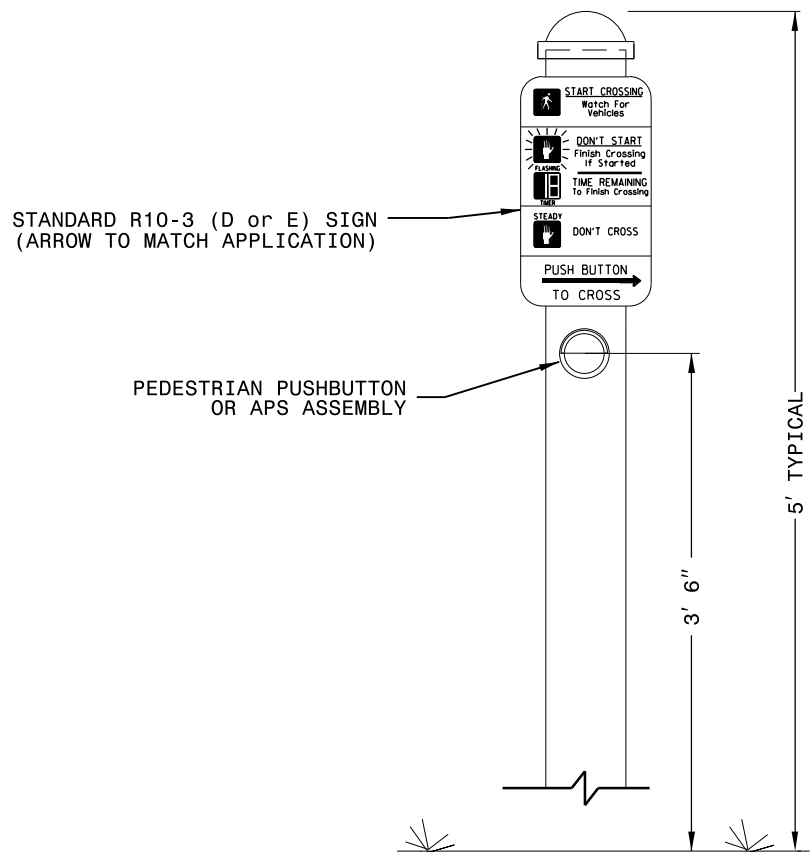
HANDHOLE

7' MIN, 10' MAX

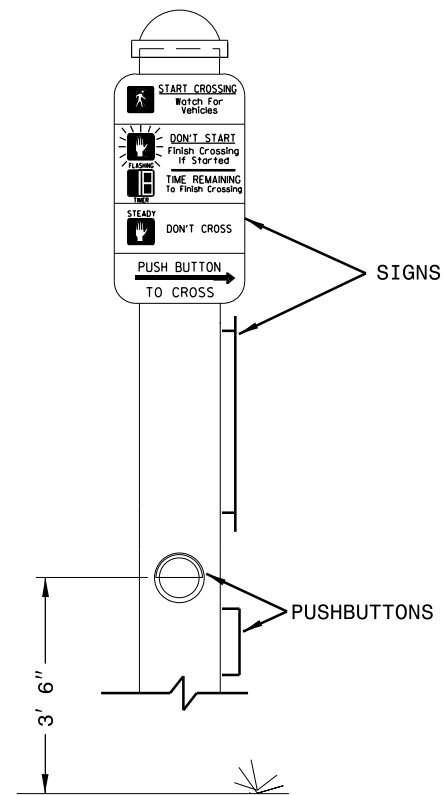
NOTE

1. CONNECT PUSHBUTTON TO CONTROLLER CABINET USING LEAD-IN CABLE. BOND PUSHBUTTON HOUSING AND ALL METAL COMPONENTS TO CABINET GROUND USING CABLE GROUND.
2. BOND PEDESTAL ASSEMBLY TO CABINET GROUND WITH #14 AWG TYPE THWN.
3. REFER TO ROADWAY STANDARD DRAWING 1743 FOR PEDESTAL INFORMATION.

SINGLE PUSHBUTTON



DUAL PUSHBUTTON



NOTES

1. CONNECT PUSHBUTTON TO CONTROLLER CABINET USING LEAD-IN CABLE. BOND PUSHBUTTON HOUSING AND ALL METAL COMPONENTS TO CABINET GROUND USING CABLE GROUND.
2. REFER TO ROADWAY STANDARD DRAWING 1743 FOR PEDESTAL INFORMATION.

ROADWAY STANDARD DRAWING FOR

SIGNAL HEADS

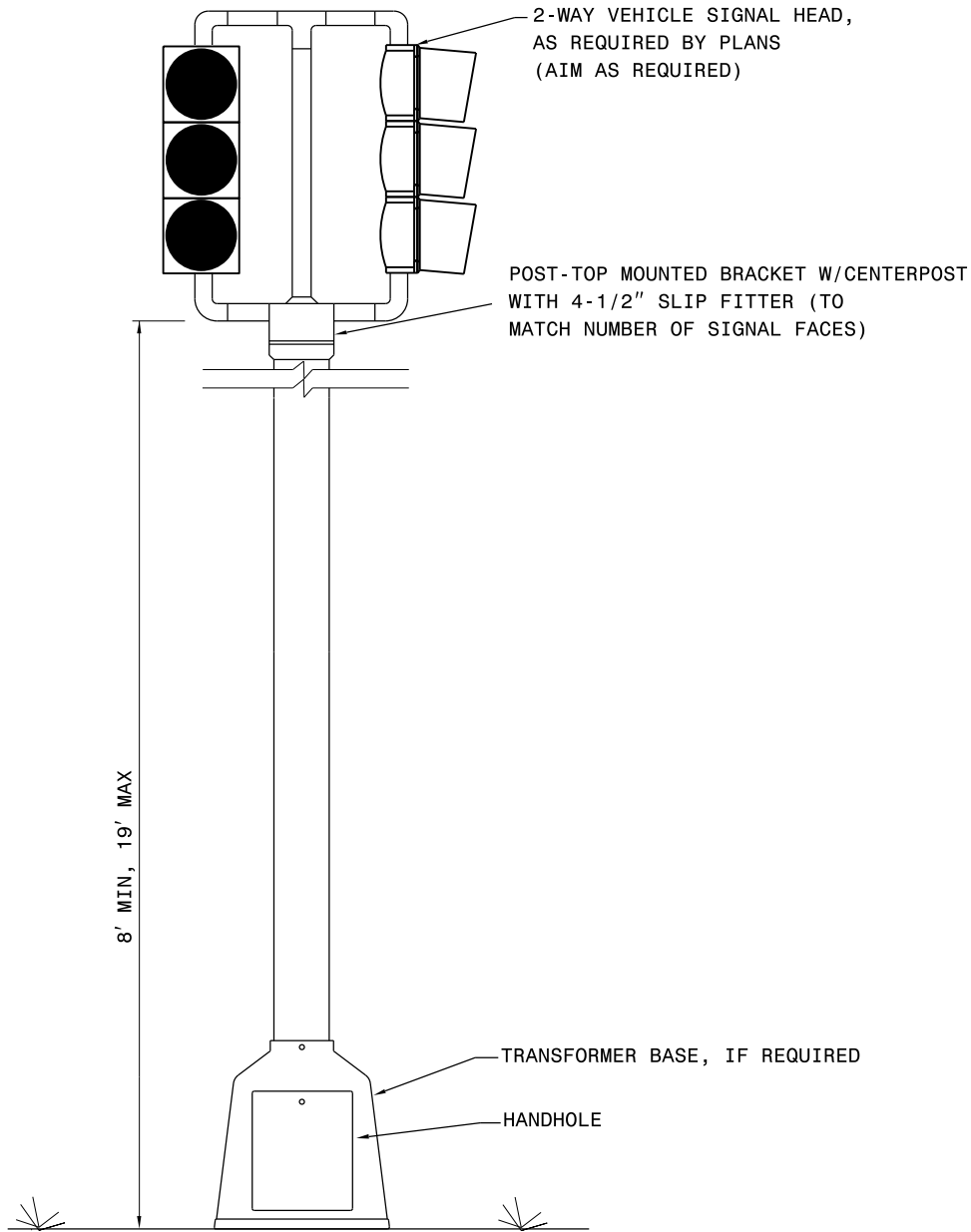
PEDESTRIAN ASSEMBLIES - PUSHBUTTON POST MOUNTING

1-18

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

SHEET 5 OF 6

1705.02



1-WAY VEHICLE SIGNAL HEAD,
AS REQUIRED BY PLANS
(AIM AS REQUIRED)

POST-TOP 4-1/2" SLIP FITTER





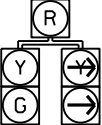
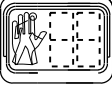














TRANSFORMER BASE, IF REQUIRED

HANDHOLE

8' MIN, 19' MAX

NOTE

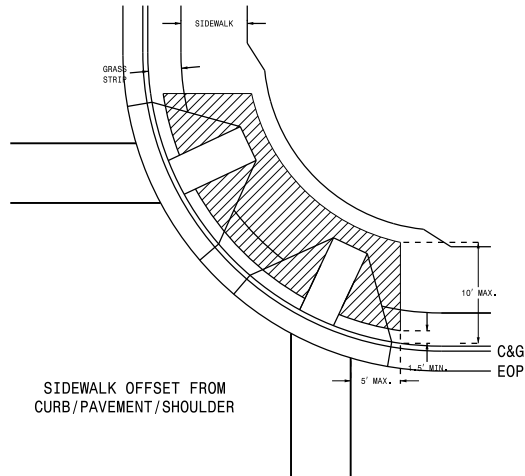
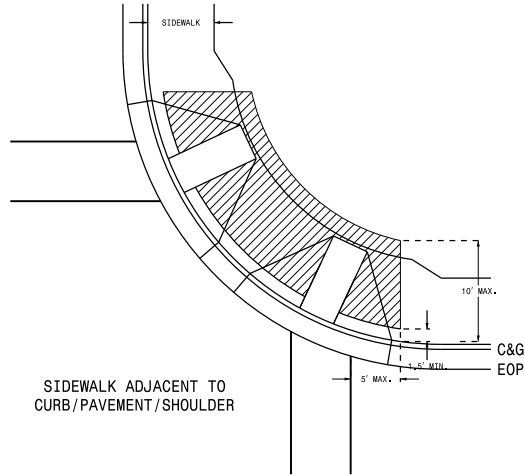
1. IF PUSHBUTTONS ARE INSTALLED, CONNECT PUSHBUTTON TO CONTROLLER CABINET USING LEAD-IN CABLE. BOND PUSHBUTTON HOUSING TO CABINET GROUND USING CABLE GROUND.
2. BOND PEDESTAL ASSEMBLY TO CABINET GROUND WITH #14 AWG TYPE THWN.
3. REFER TO ROADWAY STANDARD DRAWING 1743 FOR PEDESTAL INFORMATION.

INDICATION TYPE/COLOR						
WIRE COLOR	 3-SECTION CIRCULAR	 3-SECTION ARROW	 3-SECTION FYA	 4-SECTION FYA	 5-SECTION	PEDESTRIAN 
RED	R				R	 - DON'T WALK
YELLOW	Y				Y	
GREEN	G				G	 - WALK
RED-BLACK STRIPE						
YELLOW-BLACK STRIPE						
GREEN-BLACK STRIPE						
WHITE	NEUTRAL					

SOLID OR STRIPED COLORS MAY BE USED ON HEADS WITH MIXED INDICATION TYPES. WHERE PRACTICAL, COORDINATE WIRE COLOR WITH INDICATION COLOR. WHERE INSULATION COLOR DOES NOT MATCH THE INDICATION COLOR OF VEHICULAR DISPLAYS, WRAP APPROPRIATELY COLORED TAPE OVER INSULATION NEAR TERMINATION POINTS.

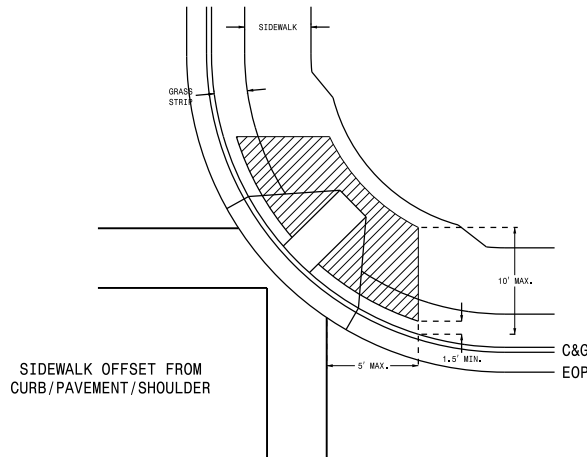
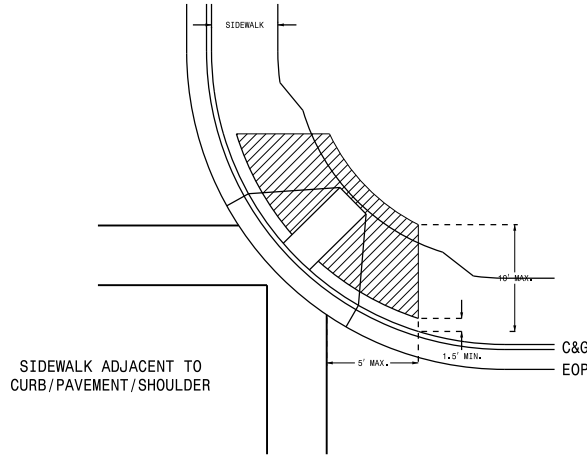
PUSHBUTTON PLACEMENT

SEPARATE CURB RAMPS



PUSHBUTTON PLACEMENT

SHARED CURB RAMP



NOTES

1. Pushbutton pedestals should not be located further than 10 feet from the edge of curb, shoulder, or pavement.
2. The face of the pushbutton should be parallel to the applicable crosswalk.
3. Separate pushbuttons used on the same corner should be separated by a distance of at least 10 feet.
4. Pushbuttons shall be installed adjacent to a level surface with a maximum reach distance of 10 inches.
5. Maintain 4 feet of clearance around pedestal if located in sidewalk.
6. Refer to section 1705 of the 2018 NCDOT Roadway Standard Drawings for Pushbutton Assembly details.
7. Refer to section 1743 of the 2018 NCDOT Roadway Standard Drawings for Pedestal details.
8. Contact Division Traffic Engineer for pushbutton location approval prior to installation.
9. Curb ramps are for symbolic use only and may not reflect actual design or field conditions.

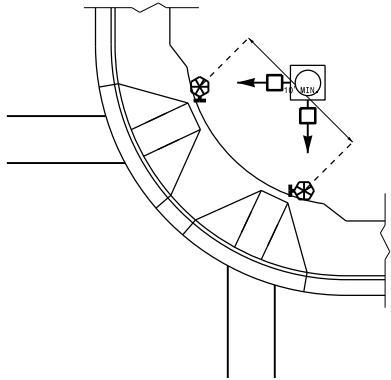
PROPOSED

LEGEND

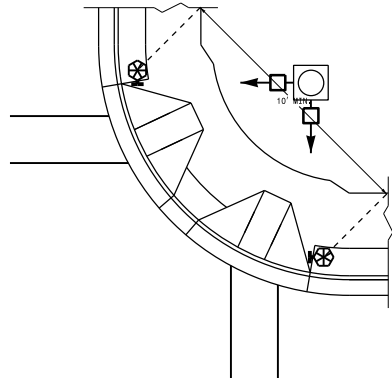
- Signal Pole
- Type I Pushbutton Post
- Type II Signal Pedestal
- Pushbutton & Sign
- Pedestrian Signal Head
- Curb Ramp
- Pushbutton Location Area

TYPICAL PUSHBUTTON LOCATIONS (CASE I)

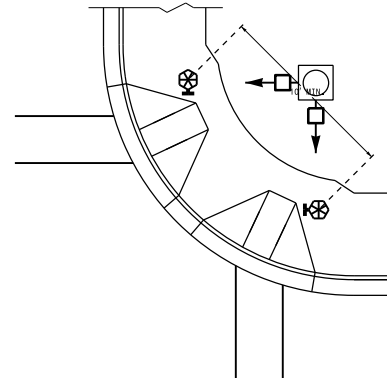
SEPARATE CURB RAMPS W/ TYPE I PEDESTALS



BACK OF SIDEWALK IS WITHIN 10' OF CURB OR PAVEMENT/SHOULDER



GRASS STRIP PLACEMENT IF BACK OF SIDEWALK EXCEEDS 10' FROM CURB OR PAVEMENT/SHOULDER



PUSHBUTTON PLACEMENT IN WIDE SIDEWALK

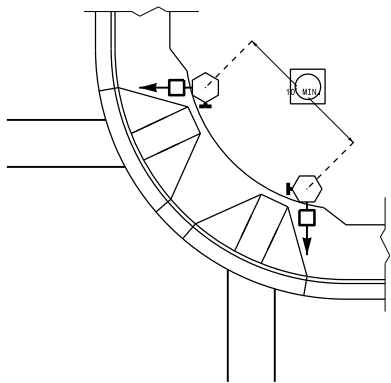
PROPOSED

LEGEND

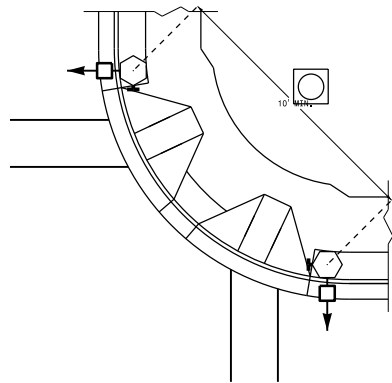
- Signal Pole
- Type I Pushbutton Post
- Type II Signal Pedestal
- Pushbutton & Sign
- Pedestrian Signal Head
- Curb Ramp
- Pushbutton Location Area

TYPICAL PUSHBUTTON LOCATIONS (CASE II)

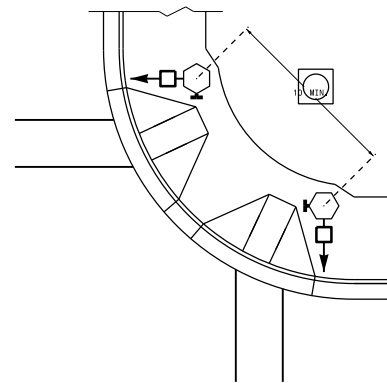
SEPARATE CURB RAMPS W/ TYPE II PEDESTALS



BACK OF SIDEWALK IS WITHIN 10' OF CURB OR PAVEMENT/SHOULDER



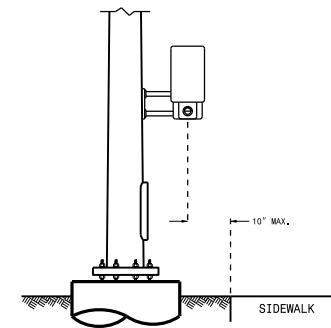
GRASS STRIP PLACEMENT IF BACK OF SIDEWALK EXCEEDS 10' FROM CURB OR PAVEMENT/SHOULDER



PUSHBUTTON PLACEMENT IN WIDE SIDEWALK

OPTIONAL PUSHBUTTON EXTENSION

FACE OF PUSHBUTTON PARALLEL TO APPLICABLE CROSSWALK



ROADWAY STANDARD DRAWING FOR

SIGNAL HEADS

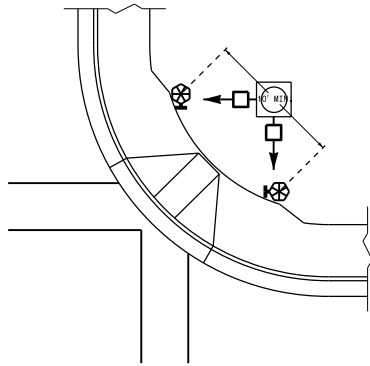
PEDESTRIAN PUSHBUTTON PLACEMENT

1-18

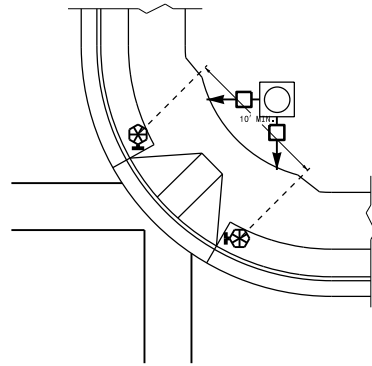
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

TYPICAL PUSHBUTTON LOCATIONS (CASE III)

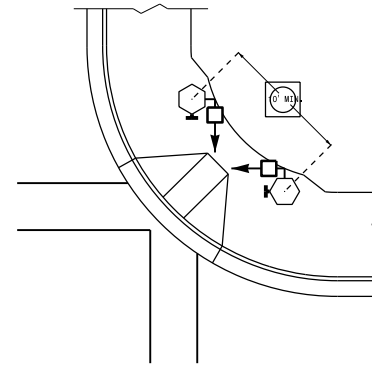
SHARED CURB RAMPS



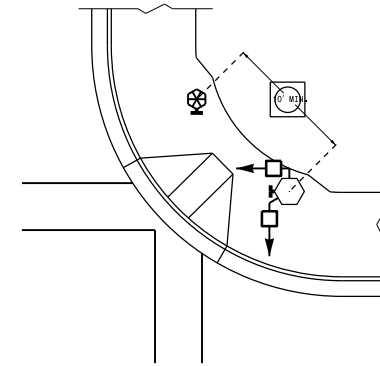
BACK OF SIDEWALK IS WITHIN 10' OF CURB OR PAVEMENT/SHOULDER



GRASS STRIP PLACEMENT IF BACK OF SIDEWALK EXCEEDS 10' FROM CURB OR PAVEMENT/SHOULDER

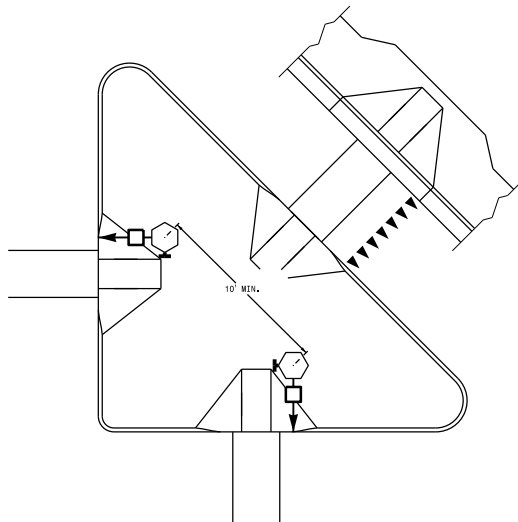


PUSHBUTTON PLACEMENT IN WIDE SIDEWALK (CORRESPONDING PUSHBUTTONS AND SIGNAL HEADS ON DIFFERENT PEDESTALS)

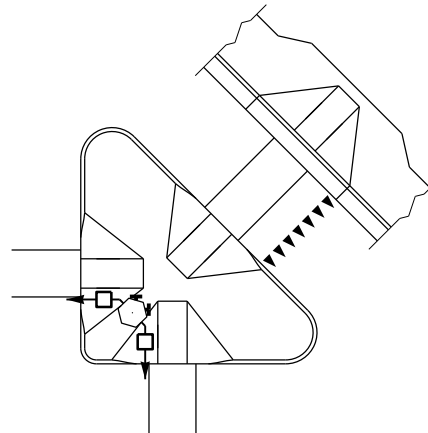


PUSHBUTTON PLACEMENT WITH SHARED TYPE II SIGNAL PEDESTAL AND TYPE I PUSHBUTTON POST

TRAFFIC ISLAND PUSHBUTTON LOCATIONS



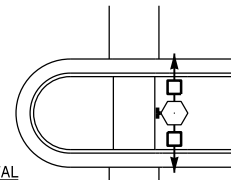
PUSHBUTTON PLACEMENT IN LARGE "PORK CHOP ISLAND" WITH SEPARATE PEDESTALS



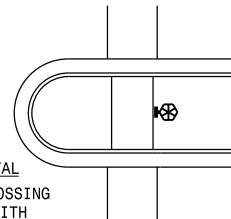
PUSHBUTTON PLACEMENT IN SMALL "PORK CHOP ISLAND" WITH SHARED PEDESTAL

PUSHBUTTON PLACEMENT IN MEDIAN

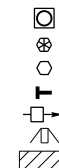
TYPE II PEDESTAL
(FOR STAGED OR MULTI-PHASE CROSSING)



TYPE I PEDESTAL
(FOR COMPLETE CROSSING CURB TO CURB WITH OPTIONAL REFUGE)



PROPOSED



LEGEND

- Signal Pole
- Type I Pushbutton Post
- Type II Signal Pedestal
- Pushbutton & Sign
- Pedestrian Signal Head
- Curb Ramp
- Pushbutton Location Area

1-18

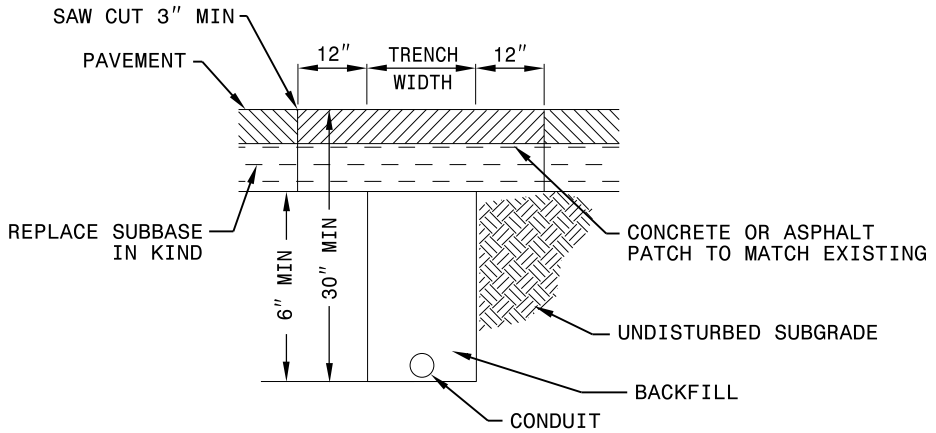
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR

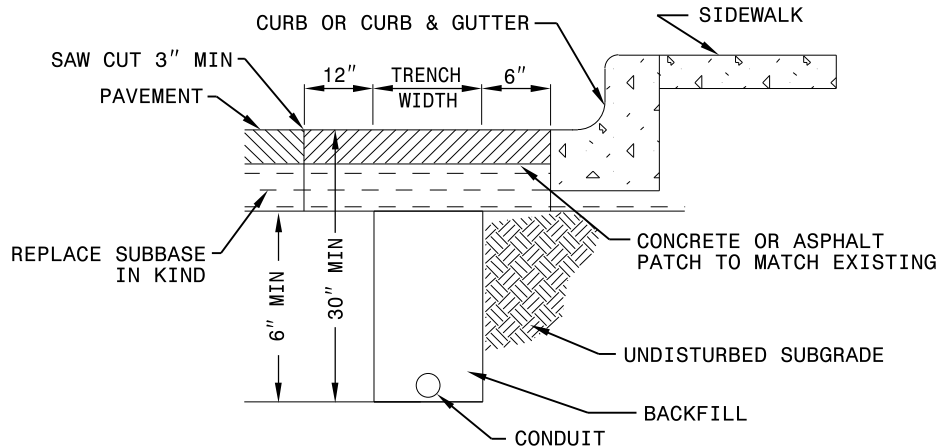
SIGNAL HEADS

PEDESTRIAN PUSHBUTTON PLACEMENT

**IN EXISTING PAVEMENT
(NOT AT GUTTER)**

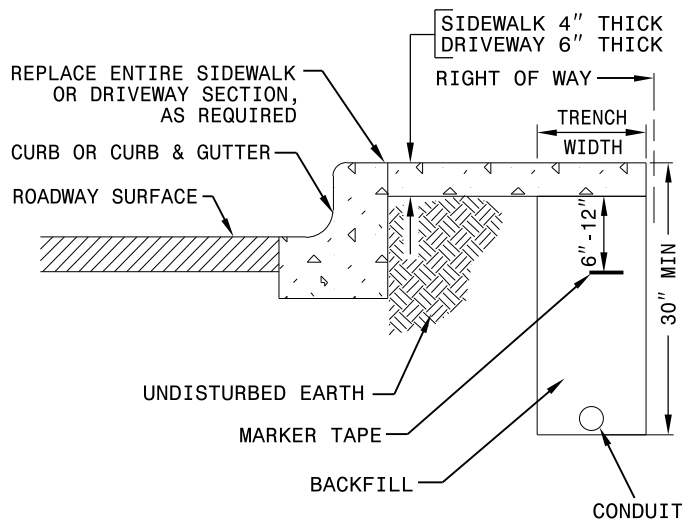


**IN EXISTING PAVEMENT
(AT GUTTER)**

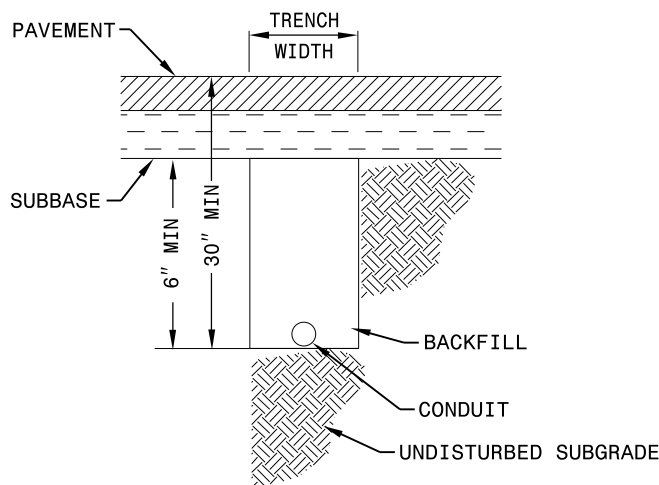


THE REMOVAL OF PAVEMENT BEYOND THE EDGES OF THE TRENCH, AS SHOWN, WILL NOT BE REQUIRED IF SAID EDGES ARE SAW CUT AND MAINTAINED NEATLY WITH NO SHATTER.

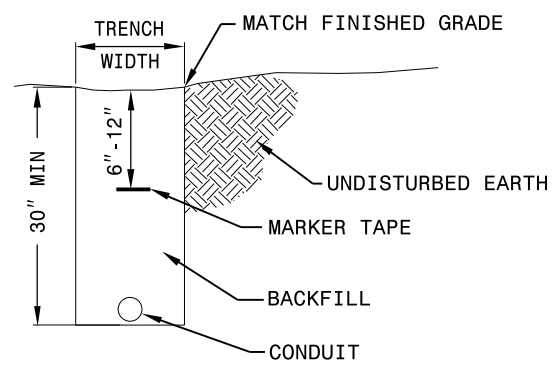
IN SIDEWALK OR DRIVEWAY



IN NEW PAVEMENT



IN EARTH



NOTE

DIG TRENCH WIDE ENOUGH TO ACCEPT THE REQUIRED CONDUITS AND TO PERMIT PROPER COMPACTION.

1-18

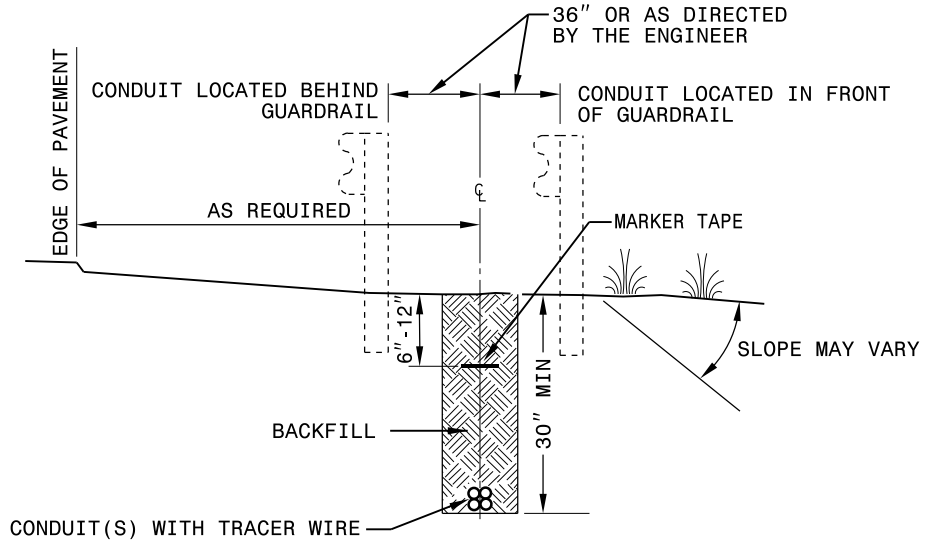
1-18

ROADWAY STANDARD DRAWING FOR
UNDERGROUND CONDUIT - TRENCHING

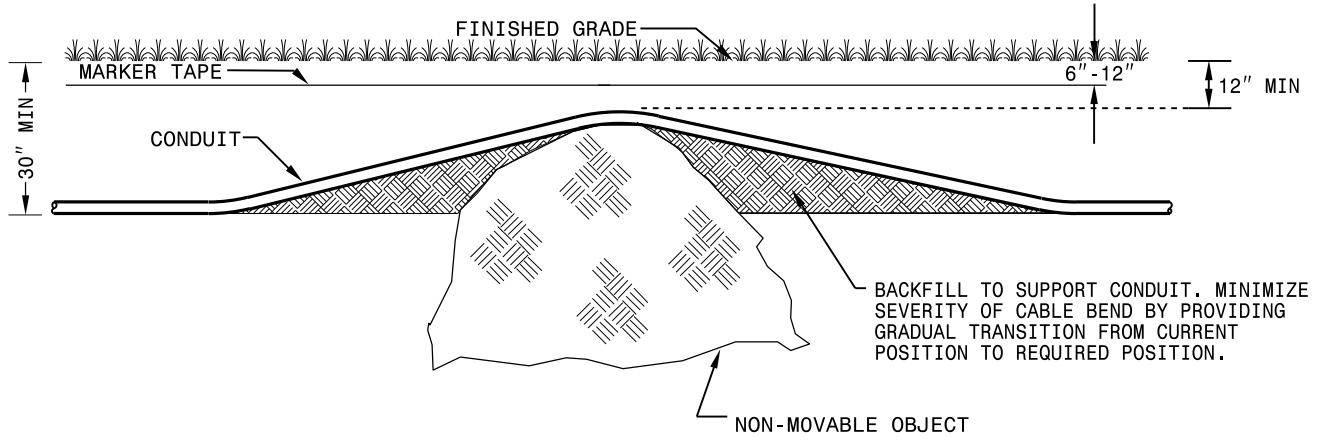
NOTE

THE CONTRACTOR, WITH APPROVAL FROM THE ENGINEER, MAY ADJUST FINAL BURIAL DEPTH OF CONDUIT(S) IN ORDER TO TRAVERSE NON-MOVABLE OBJECTS.

CONDUIT TRENCHING

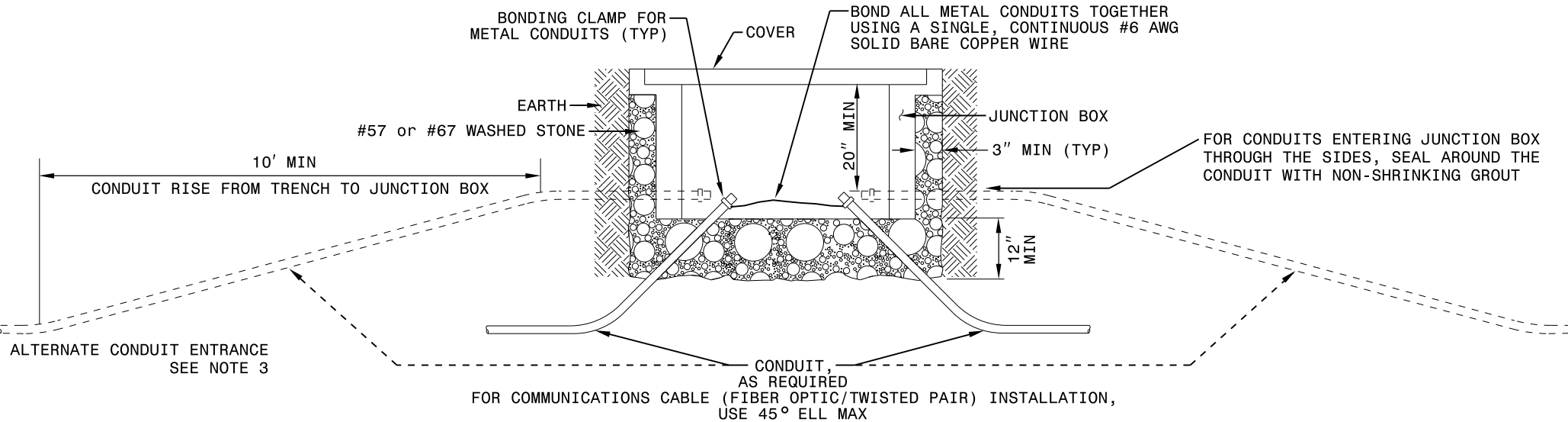


CONDUIT TRENCHING AROUND NON-MOVABLE OBJECT



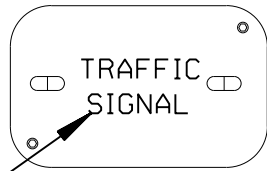
INSTALLATION CROSS-SECTION

JUNCTION BOX OVER-SIZED

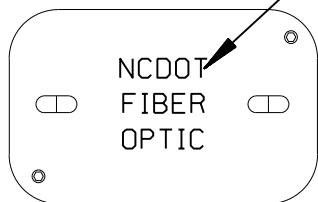


TOP VIEW OF COVER

STANDARD SIZE
JUNCTION BOX



EMBOSS, IMPRESSED, MOLDED
OR ENGRAVED LETTERS
MIN 1/2" HIGH

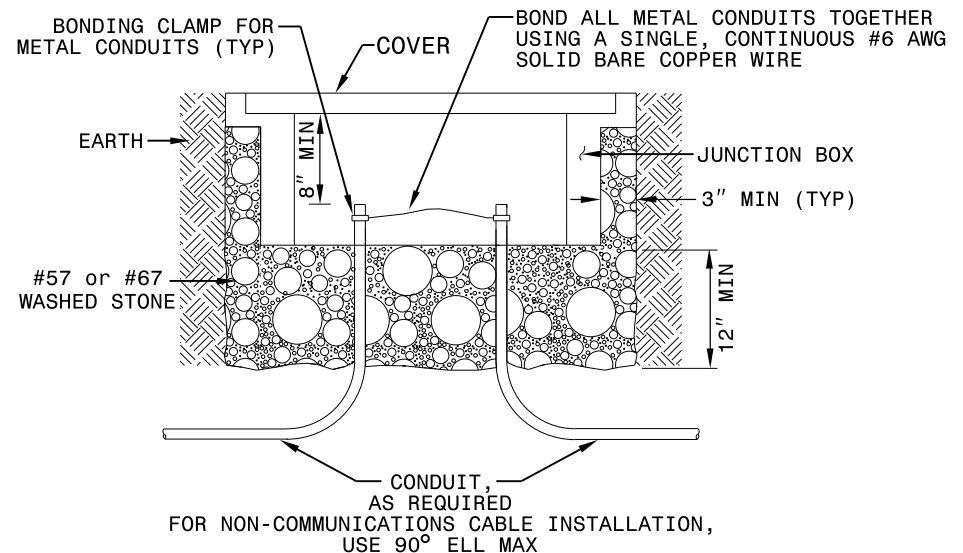


OVER-SIZED
JUNCTION BOX

NOTES

1. OTHER STYLES OF JUNCTION BOXES WILL BE ACCEPTABLE PROVIDED THEY SATISFY REQUIREMENTS OF SECTION 1716 OF THE NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES.
2. SECURE COVER WITH TWO HEX BOLTS.
3. INSTALL CONDUIT THROUGH BOTTOM OF JUNCTION BOX. AS AN ALTERNATIVE, CONDUIT MAY ENTER THROUGH "MOUSE HOLE" INTO SIDE OF JUNCTION BOX.
4. FOR CURB AND GUTTER SECTIONS, LOCATE JUNCTION BOXES A MINIMUM OF 6" BEHIND BACK OF CURB AND FOR PAVEMENT SECTIONS A MINIMUM OF 2' FROM PAVEMENT EDGE OR WITHIN RIGHT OF WAY.
5. COIL AND STORE 10' OF TRACER WIRE IN ALL JUNCTION BOXES WITH FIBER OPTIC CABLE.

JUNCTION BOX STANDARD SIZE



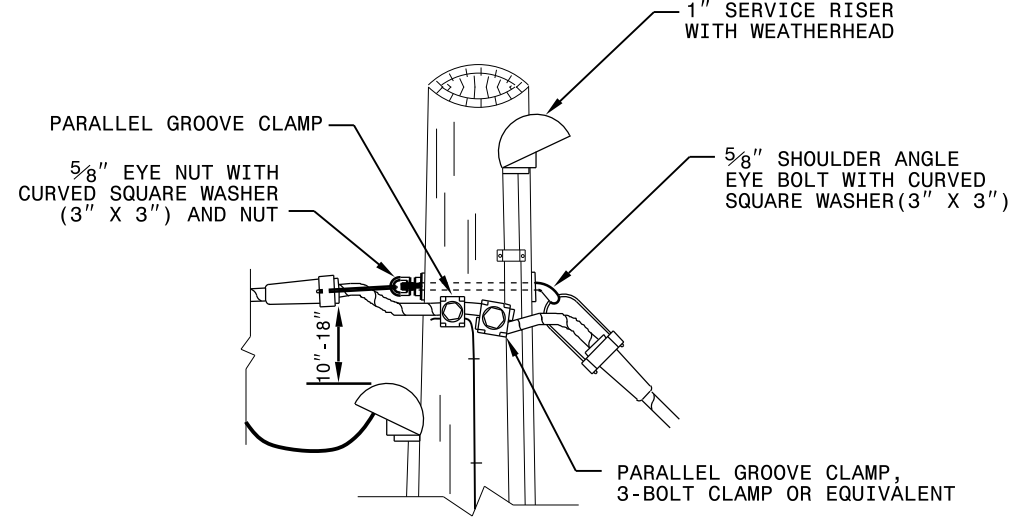
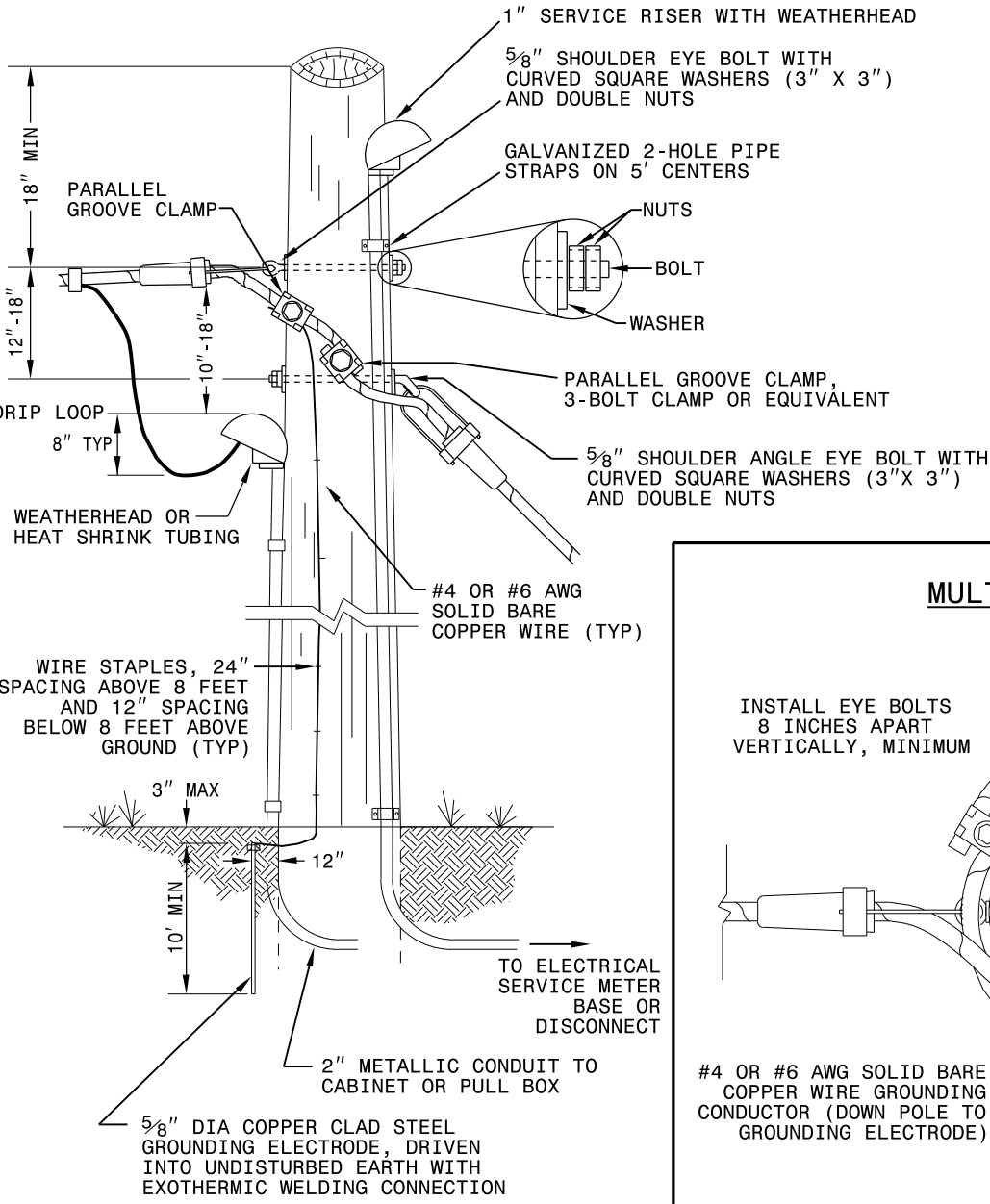
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-18

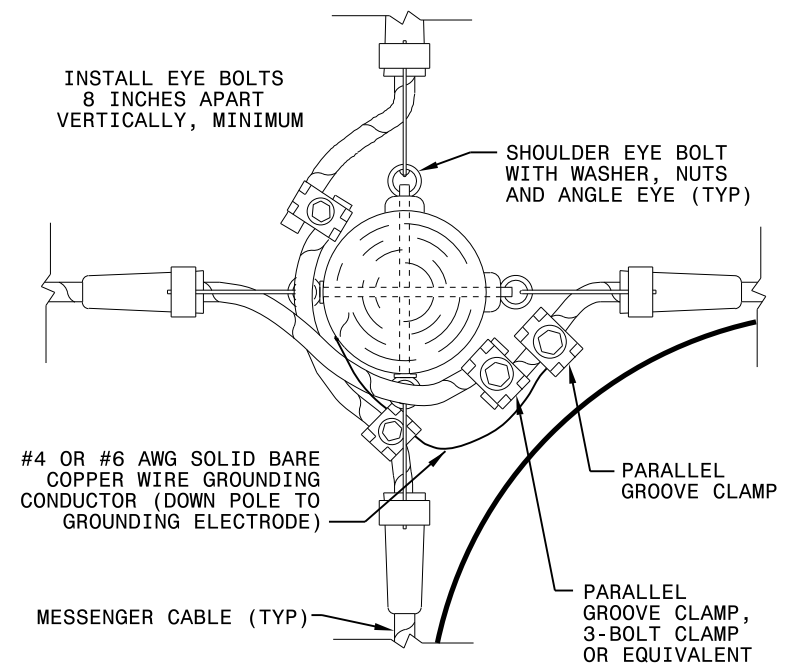
ROADWAY STANDARD DRAWING FOR
JUNCTION BOXES

TWO-BOLT METHOD (PREFERRED)

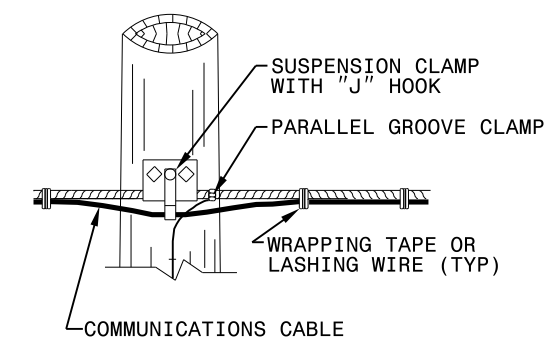
ONE-BOLT METHOD



MULTIPLE SPANS



COMMUNICATIONS CABLE AT INTERMEDIATE POLE

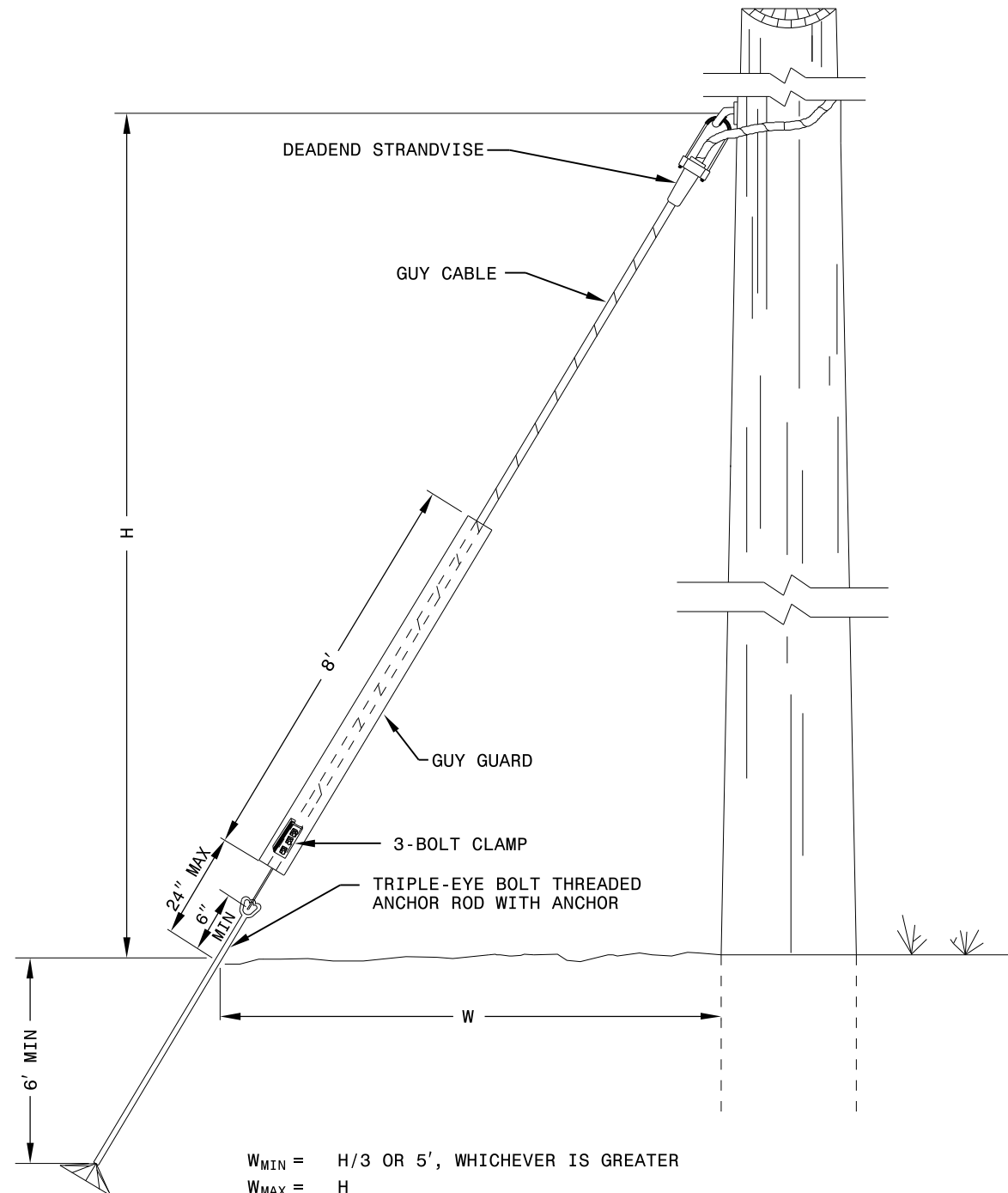


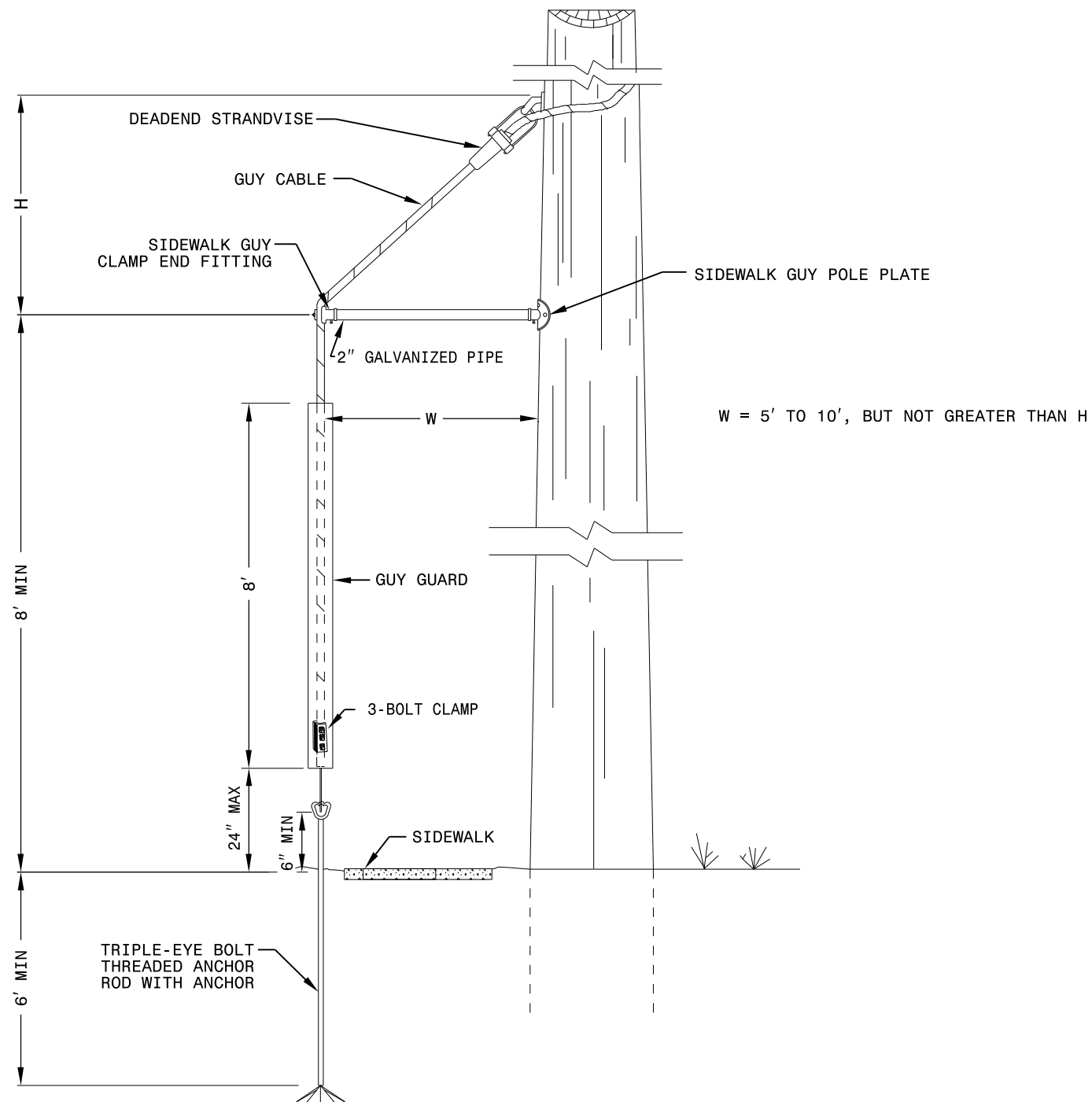
NOTE

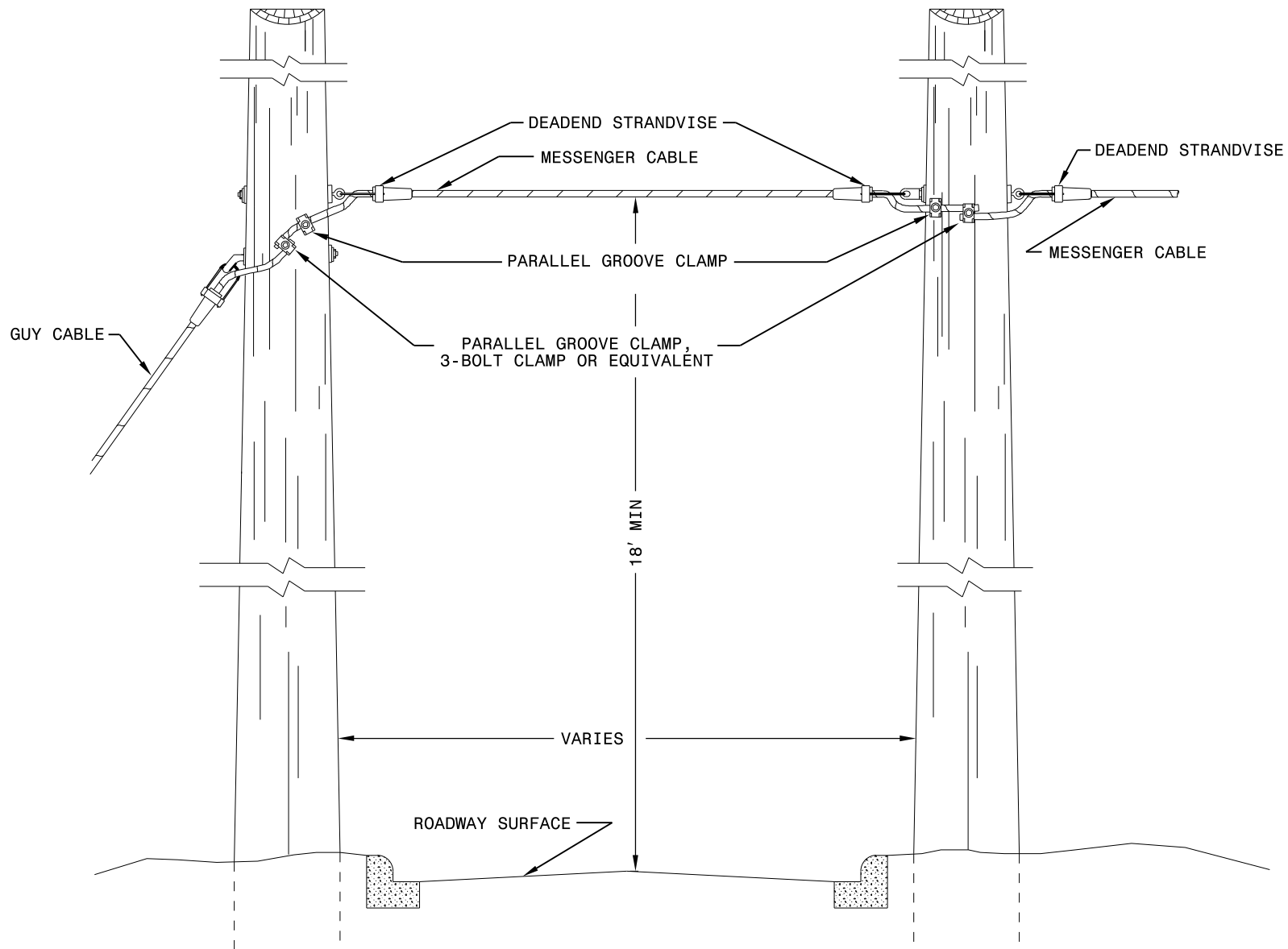
FOR CONNECTING MESSENGER TO MESSENGER, USE PARALLEL GROOVE CLAMP, 3-BOLT CLAMP OR EQUIVALENT. FOR CONNECTING COPPER WIRE TO MESSENGER, USE PARALLEL GROOVE CLAMP.

GENERAL NOTES

1. GUY EACH SPAN SEPARATELY.
2. USE EYE HARDWARE (EYE BOLTS, EYE NUTS, ANGLE EYES, EYES, TRIPLE-EYE BOLT ANCHOR RODS) WITH ROUNDED GROOVES IN THE EYES. PROVIDE A SEPARATE GROOVE FOR EACH CABLE TO BE TERMINATED.
3. SEE ROADWAY STANDARD DRAWING 1720 FOR METHODS OF ATTACHMENT AND GROUNDING.







1-18

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

ROADWAY STANDARD DRAWING FOR
GUY ASSEMBLIES
 AERIAL (BACK) GUYS

SHEET 3 OF 3

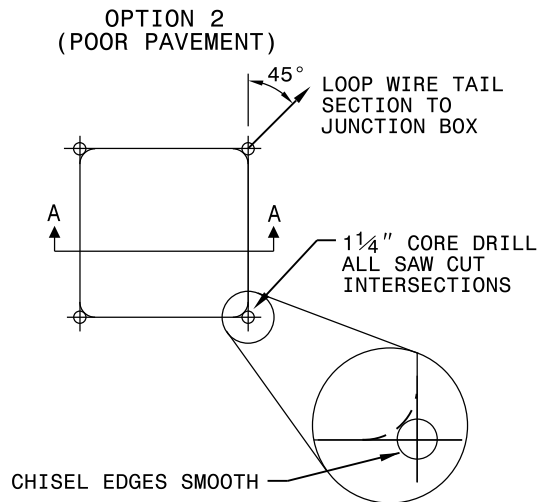
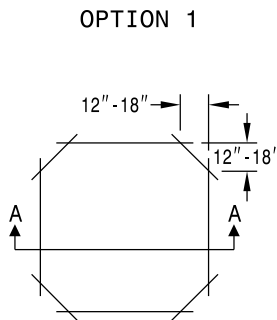
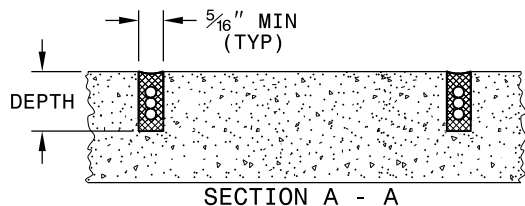
1721.01

CONVENTIONAL 4-SIDED LOOP

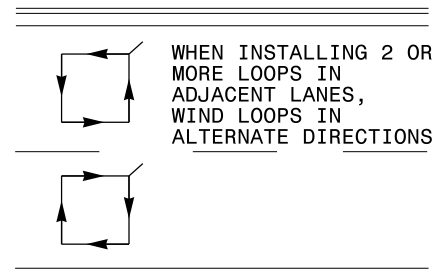
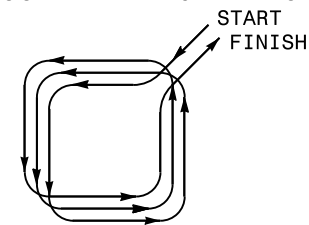
SAW CUT OPTIONS

SAW SLOT DEPTH CHART

DEPTH (IN)	NO. OF WIRE TURNS				
	2	3	4	5	6
CONCRETE	2.0	2.0	2.5	2.5	3.0
ASPHALT	2.0	2.5	3.0	3.0	3.0



LOOP WINDING METHOD



LOOP WIRE TWISTING METHOD

INCORRECT WAY TO TWIST WIRE



CORRECT WAY TO TWIST WIRE

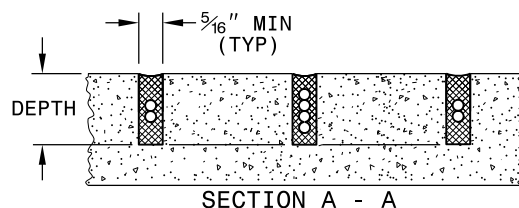
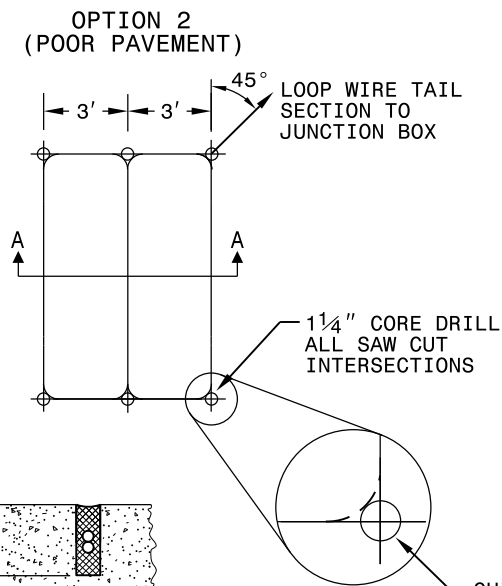
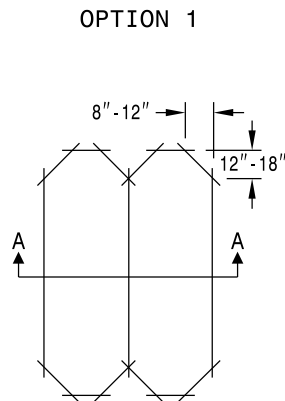


NOTES

- OVERLAP SAW CUTS AT CORNERS AND INTERSECTION POINTS TO ENSURE UNIFORM SAW SLOT DEPTH.
- MAINTAIN 12" SPACING BETWEEN LOOP WIRE TAIL SECTIONS.
- WIRE LOOPS CONNECTED TO THE SAME DETECTOR CHANNEL IN SERIES.
- LOCATE LOOPS IN CENTER OF LANES UNLESS OTHERWISE SHOWN ON PLANS OR APPROVED BY ENGINEER.

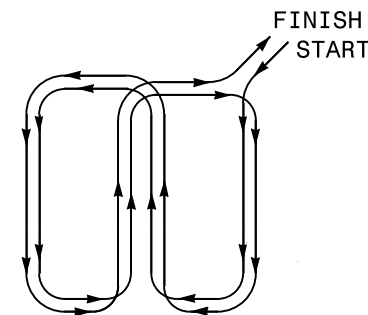
QUADRUPOLE LOOP

SAW CUT OPTIONS



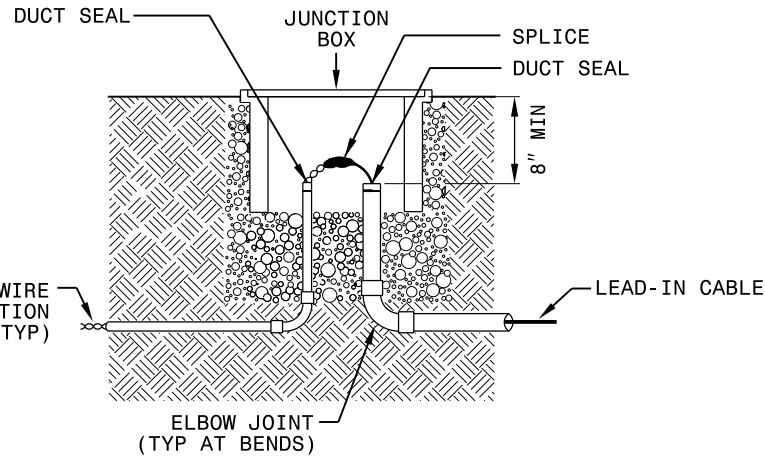
DEPTH IS 2.5" FOR CONCRETE AND 3.0" FOR ASPHALT

LOOP WINDING METHOD

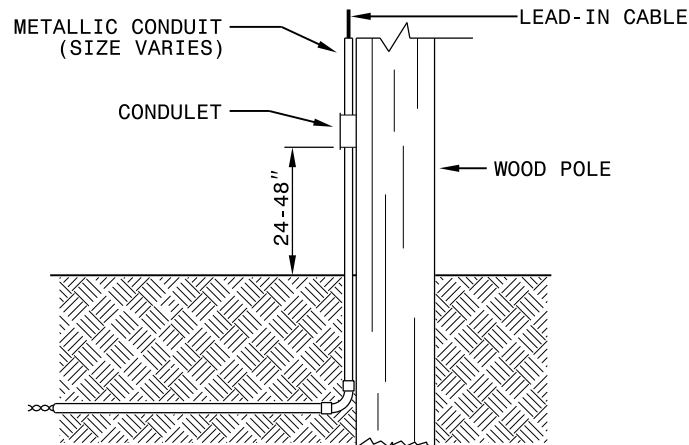


LOOP WIRE SPLICE POINT DETAILS

LOOP WIRE AT JUNCTION BOX



LOOP WIRE AT POLE

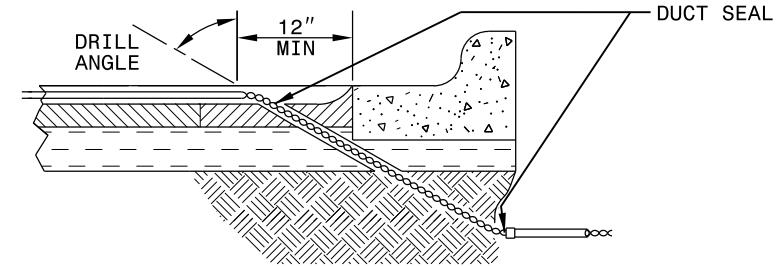


NOTE

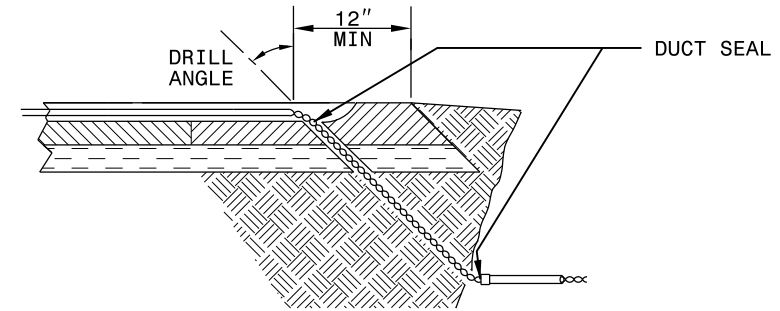
SPLICE ALL LOOP WIRE TAIL SECTIONS/LEAD-IN CABLE IN JUNCTION BOXES OR APPROVED CONDULETS.

LOOP WIRE PAVEMENT EDGE DETAILS

LOOP WIRE AT CURB & GUTTER SECTION



LOOP WIRE AT PAVEMENT SECTION



NOTES

- DO NOT EXCAVATE UNDER CURB AND GUTTER SECTIONS FOR CONDUIT INSTALLATION.
- TWIST LOOP WIRE TAIL SECTIONS FROM WHERE LOOP WIRE TAIL LEAVES SAW CUT TO JUNCTION BOX, INCLUDING THROUGH CONDUIT.
- BEFORE SEALING LOOPS, INSTALL DUCT SEAL WHERE LOOP WIRE TAIL SECTION LEAVES SAW CUT IN PAVEMENT AND AT ENTRANCE OF CONDUIT TO JUNCTION BOX.

1-18

ROADWAY STANDARD DRAWING FOR

INDUCTIVE DETECTION LOOPS

LOOP WIRE DETAILS

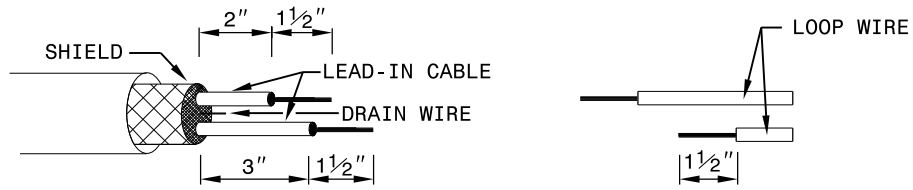
STATE OF

NORTH CAROLINA

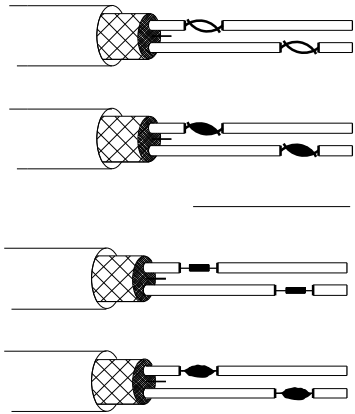
DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS
RALEIGH, N.C.

STEP 1. STRIP LOOP WIRE AND LEAD-IN CABLE



STEP 2. CONNECT AND SOLDER



TWIST BARE CONDUCTORS TOGETHER AND SOLDER WITH RESIN CORE SOLDER

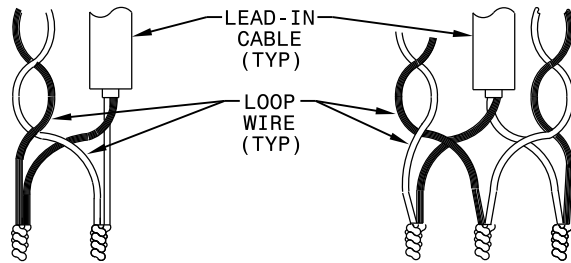
OR

CRIMP BARE CONDUCTORS TOGETHER WITH AN UNINSULATED BUTT CONNECTOR AND SOLDER WITH RESIN CORE SOLDER

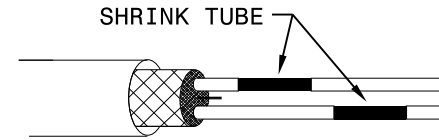
BOND SHIELD DRAIN WIRE AT SPLICE SECTIONS (DO NOT GROUND)

LOOP WIRE AND LEAD-IN CABLE CONNECTION DETAILS

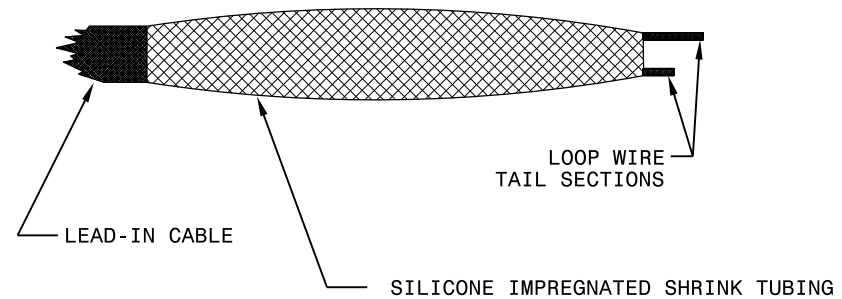
SINGLE CONNECTION SERIES CONNECTION



STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY

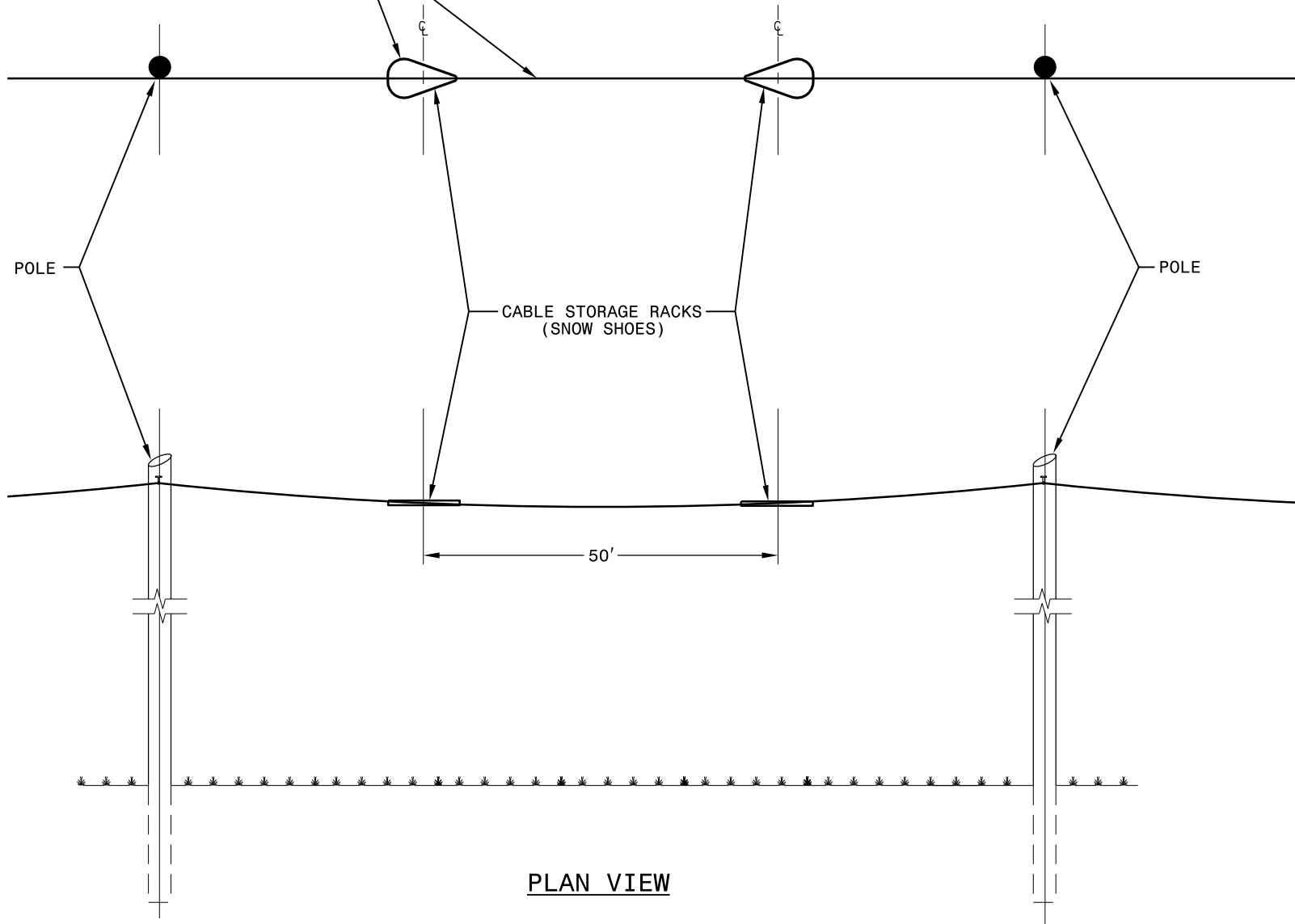


STEP 4. ENVIRONMENTALLY PROTECT SPLICE



TOP VIEW

ATTACH CABLE TO AND BETWEEN
EACH STORAGE RACK (SNOW SHOE)



PLAN VIEW

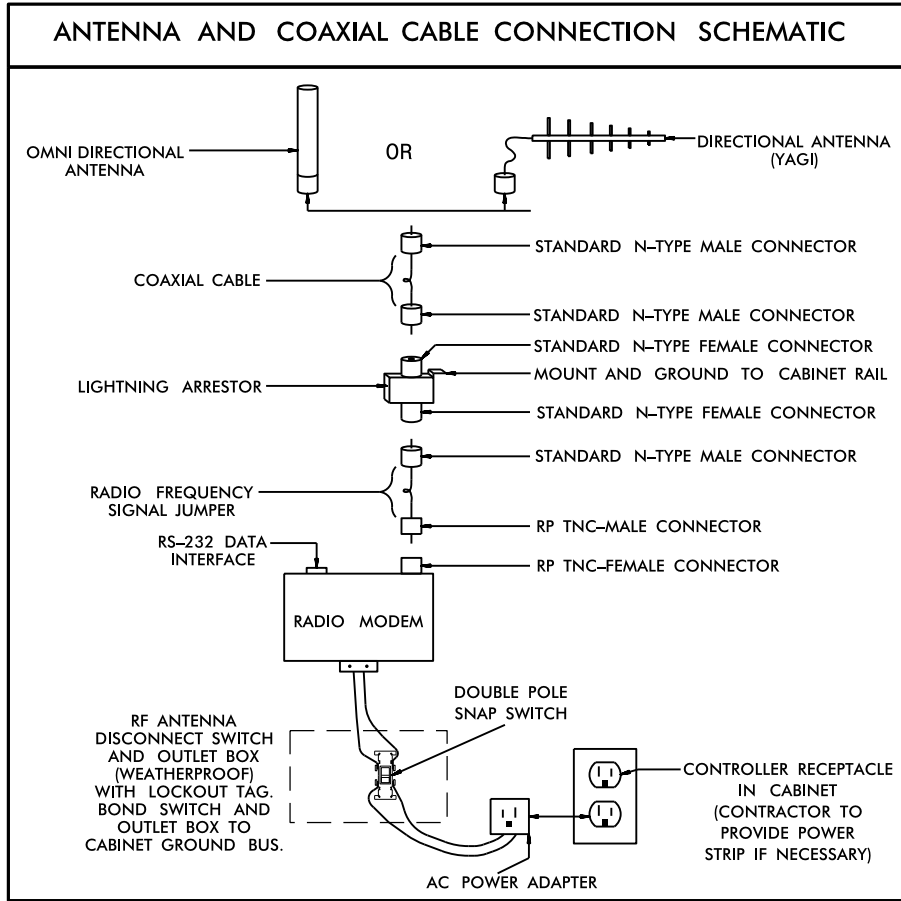
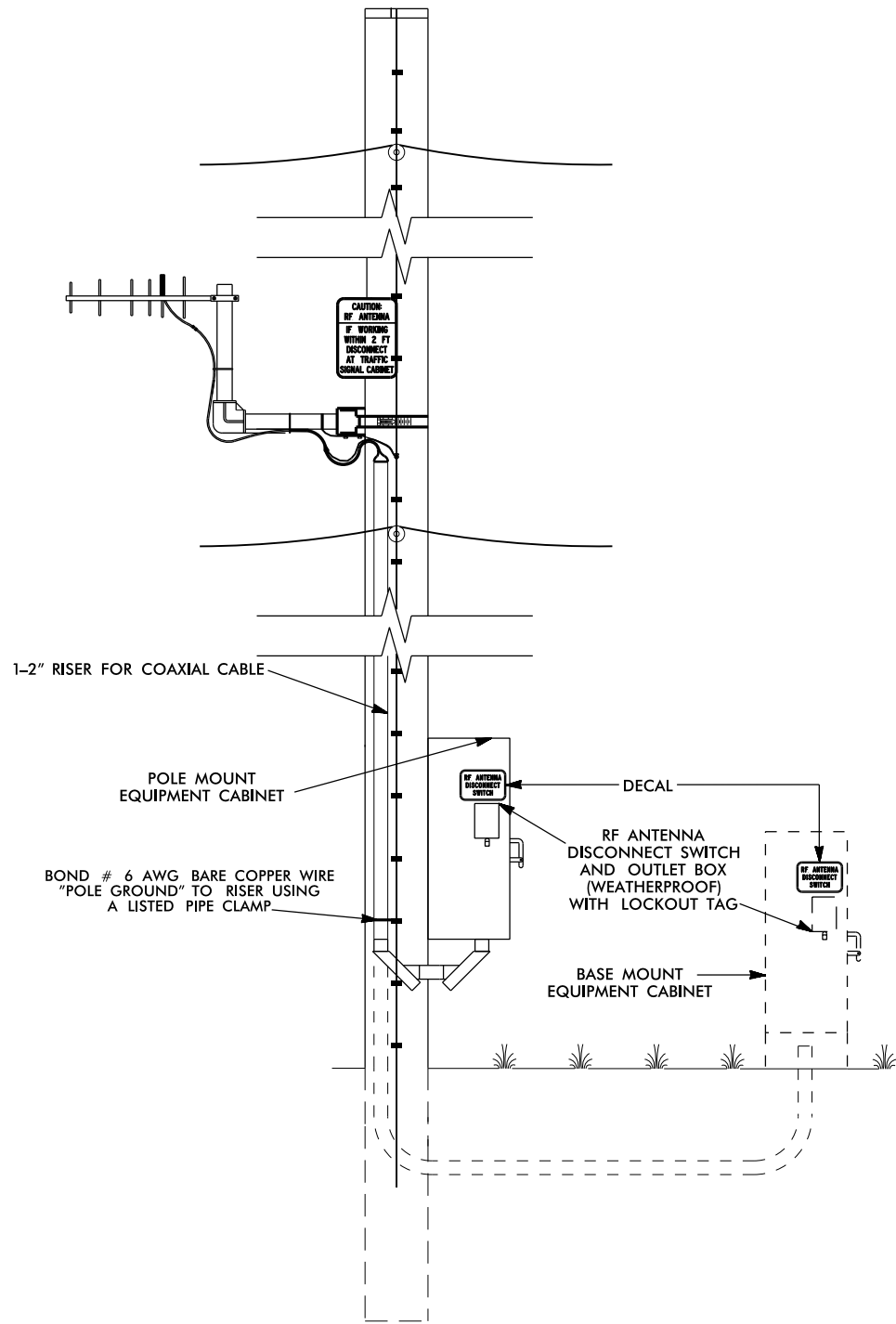
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
FIBER-OPTIC CABLE
SPARE CABLE STORAGE

SHEET 1 OF 1

1730.01



1-18

NOTES

1. WOOD POLE — BOND # 6 AWG SOLID BARE COPPER WIRE TO ANTENNA SUPPORT USING LISTED PIPE CLAMP. BOND OTHER END OF # 6 AWG SOLID BARE COPPER WIRE TO THE POLE GROUND USING A SPLIT BOLT CONNECTOR. BOND SHIELD OF COAXIAL CABLE WITH AN APPROVED GROUNDING SYSTEM (USING #6 AWG STRANDED COPPER WIRE) BONDED TO THE POLE GROUND. WEATHERPROOF THE CONNECTION ONCE THE GROUNDING SYSTEM IS INSTALLED. ENSURE "POLE GROUND" IS IN PLACE.

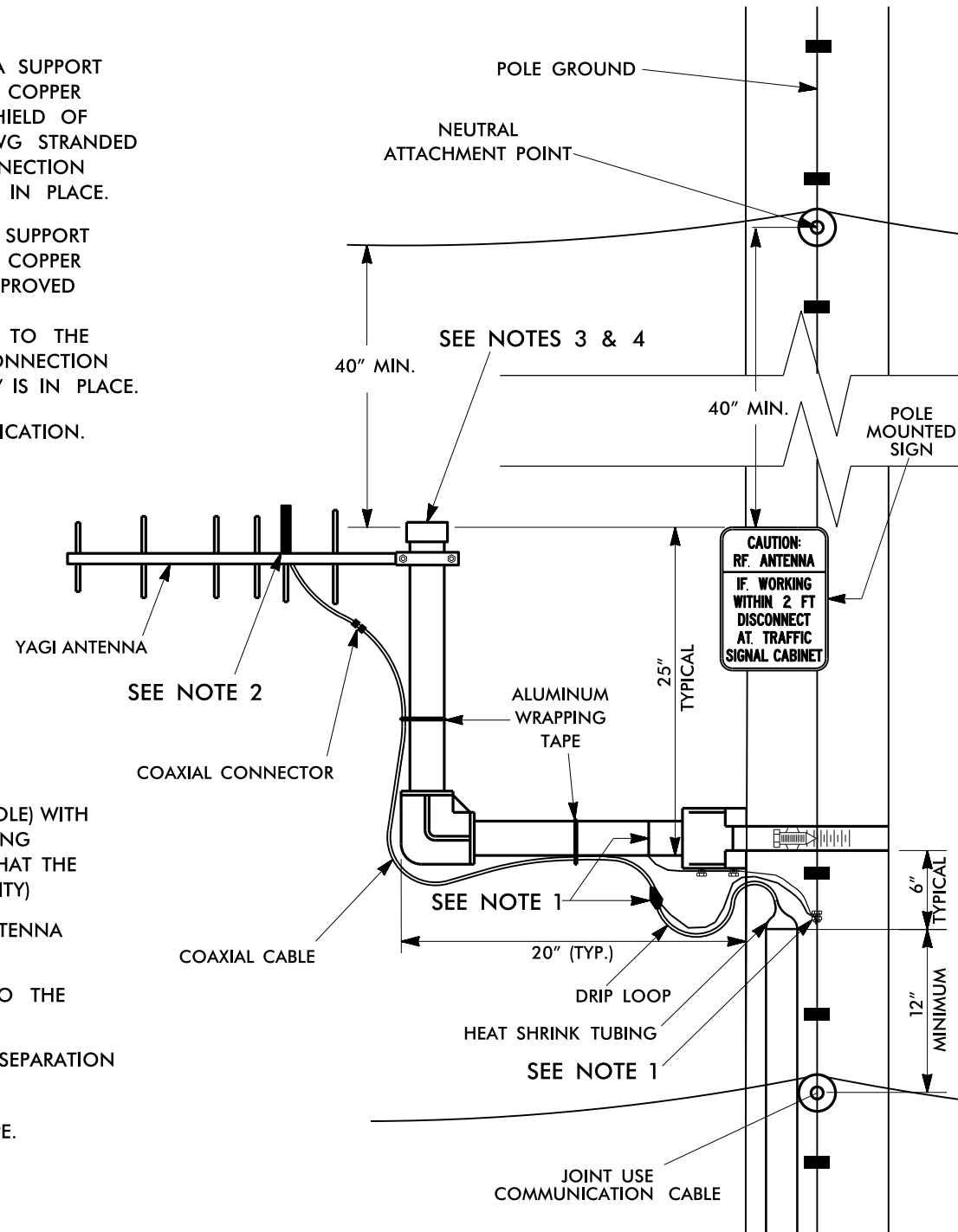
METAL POLE — BOND # 6 AWG SOLID BARE COPPER WIRE TO ANTENNA SUPPORT USING LISTED PIPE CLAMP. BOND OTHER END OF # 6 AWG SOLID BARE COPPER WIRE TO THE POLE OR EXISTING SYSTEM GROUND USING A METHOD APPROVED BY THE ENGINEER. BOND SHIELD OF COAXIAL CABLE WITH AN APPROVED GROUNDING SYSTEM (USING #6 AWG STRANDED COPPER WIRE) BONDED TO THE POLE BY A METHOD APPROVED BY THE ENGINEER. WEATHERPROOF THE CONNECTION ONCE THE GROUNDING SYSTEM IS INSTALLED. ENSURE "SYSTEM GROUND" IS IN PLACE.

2. YAGI ANTENNA SHOWN IN VERTICAL POLARIZATION POSITION FOR CLARIFICATION. TYPICALLY INSTALL ANTENNA IN HORIZONTAL POLARIZATION POSITION.

3. TO CONSERVE VERTICAL SPACING ON THE POLE (JOINT-USE OR SIGNAL POLE) WITH REGARDS TO THE SURROUNDING UTILITIES, INSTALL THE ANTENNA MOUNTING HARDWARE USING ONE OF THE TWO METHODS LISTED BELOW: (ENSURE THAT THE MOUNTING METHOD DOES NOT DEGRADE THE ANTENNA'S SIGNAL INTEGRITY)

- A) ROTATE THE VERTICAL SUPPORT ARM 90 DEGREES SUCH THAT THE ANTENNA IS AT THE SAME HEIGHT AS THE HORIZONTAL SUPPORT ARM.
- B) ELIMINATE THE VERTICAL SUPPORT ARM AND MOUNT THE ANTENNA TO THE HORIZONTAL SUPPORT ARM.
- C) ANTENNA, ANTENNA SUPPORT ARM, AND SIGN TO MAINTAIN A 40" SEPARATION FROM NEUTRAL /POWER AND 12" FROM OTHER UTILITIES.

4. INSTALL AN END CAP TO SEAL THE EXPOSED END OF THE MOUNTING PIPE.



DECAL

SIGN NUMBER: SP05224
 TYPE: DECAL
 QUANTITY:
 SIGN WIDTH: 0'-9"
 HEIGHT: 0'-6"
 TOTAL AREA: 0.4 Sq.Ft.
 BORDER TYPE: FLUSH
 RECESS: 0"
 WIDTH: 0.25"
 RADII: 1"
 NO. Z BARS:
 LENGTH:

BACKG COLOR: Yellow
 COPY COLOR: Black

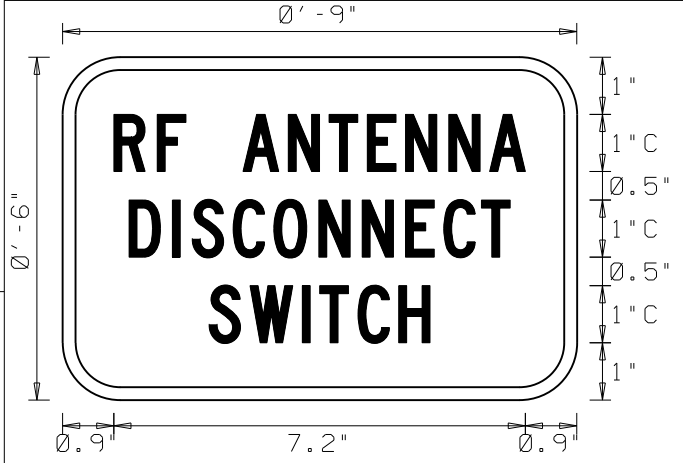
SYMBOL	X	Y	WID	HT

MAT'L: 0.063" (1.6 mm) ALUMINUM

USE NOTES:

- 1. Legend and border shall be direct applied non-reflective sheeting.
- 2. Background shall be Grade C reflective sheeting.

DESIGN BY: S PIOTROWSKI DATE: Revised M.Manriquez 5/23/2017
 PROJECT ID: ID DIV: INTELLIGENT TRANSPORTATION SYSTEM
 CHECKED BY: SUSAN B. KUNZ



BORDER
 R = 1"
 TH = 0.25"

NOTE:
 THIS
 SIGN
 SHALL
 BE
 PRODUCED
 AS
 A
DECAL

LETTER POSITIONS

Letter spacings are to start of next letter													Series/Size Text Length	
	R	F		A	N	T	E	N	N	A				C1
0.9	0.8	0.5	1	0.8	0.7	0.7	0.7	0.8	0.7	0.6	0.9			7.2
	D	I	S	C	O	N	N	E	C	T				C1
1.2	0.8	0.3	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.5	1.2			6.7
	S	W	I	T	C	H								C1
2.6	0.7	0.9	0.3	0.7	0.7	0.5	2.6							3.9

Spacing Factor is 1 unless specified otherwise

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

ROADWAY STANDARD DRAWING FOR
SPREAD SPECTRUM RADIO
 RF ANTENNA DISCONNECT DECAL

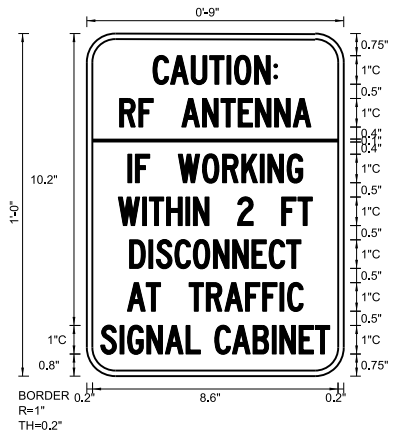
POLE MOUNTED SIGN

SIGN NUMBER: SP05223
 TYPE: D
 QUANTITY:
 SIGN WIDTH: 0'-9"
 HEIGHT: 1'-0"
 TOTAL AREA: 0.8 Sq.Ft.
 BORDER TYPE: FLUSH
 RECESS: 0"
 WIDTH: 0.2"
 RADII: 1"
 NO. Z BARS:
 LENGTH:

BACKG COLOR: Yellow
 COPY COLOR: Black

SYMBOL	X	Y	WID	HT
BAR	0.2	8.2	8.6	1.0

DESIGN BY: M. TRACEY
 PROJECT ID:
 DATE: Revised M.Manriquez 5/23/2017
 DIV: INTELLIGNET TRANSPORTATION SYSTEMS
 CHECKED BY: SUSAN KUNZ



0.60 SPACING FACTOR

USE NOTES:
 1. Legend and border shall be direct applied non-reflective sheeting.
 2. Background shall be Grade C reflective sheeting.

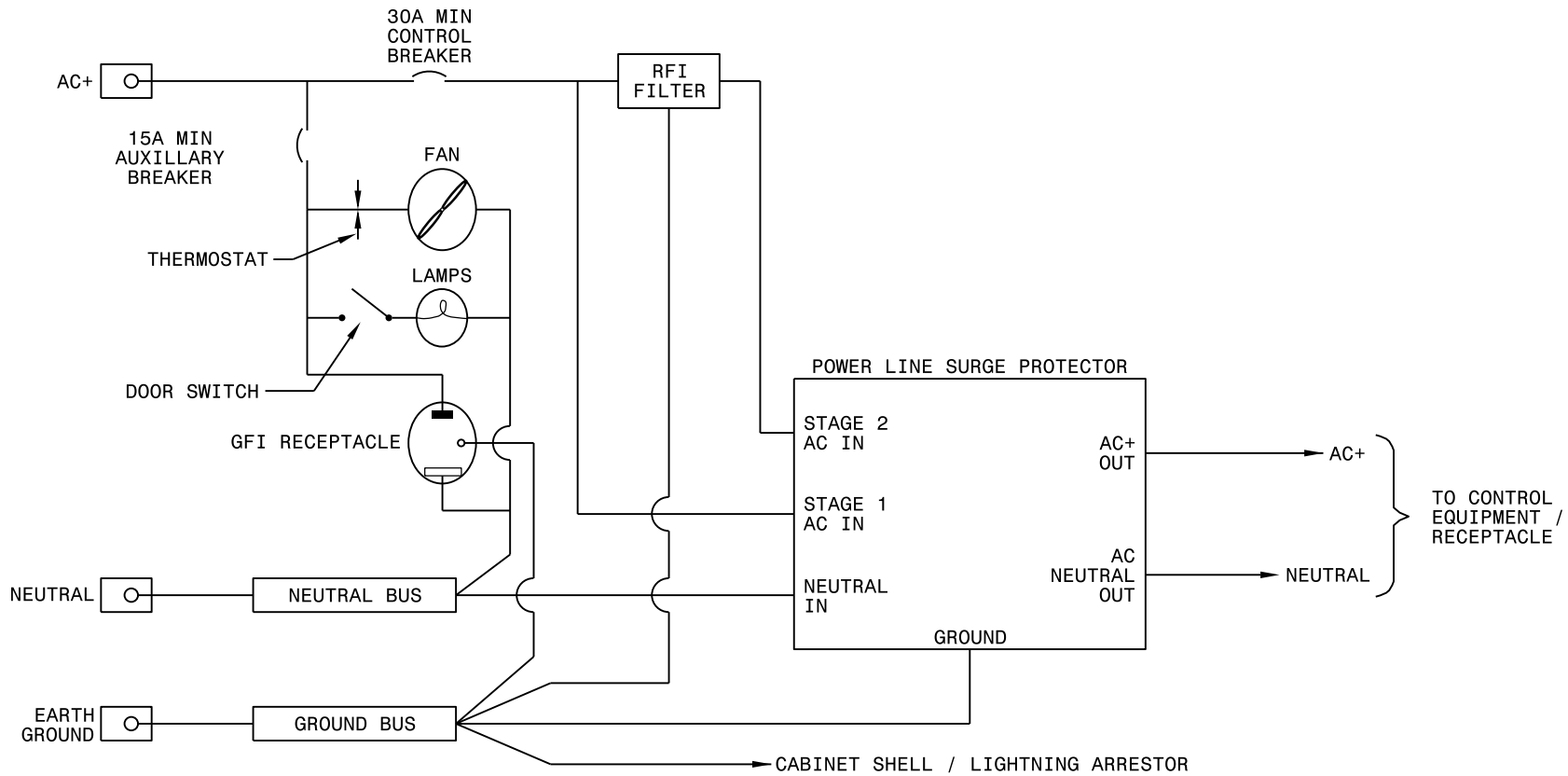
LETTER POSITIONS

Letter spacings are to start of next letter															Series/Size		
	C	A	U	T	I	O	N	:							Text Length		
	2.3	0.6	0.7	0.6	0.6	0.3	0.7	0.7	0.1	2.3					C		
															4.4		
		R	F		A	N	T	E	N	N	A				C		
	1.1	0.7	0.5	1	0.7	0.6	0.6	0.6	0.7	0.6	0.6	1.1			6.7		
															C		
	1.4	0.3	0.5	1	0.8	0.7	0.7	0.6	0.3	0.7	0.5	1.4			6.1		
															C		
	1.1	0.9	0.2	0.6	0.7	0.3	0.5	1	0.5	1	0.6	0.5	1.1		6.8		
															C		
	1.5	0.7	0.3	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.5	1.5			6		
															C		
	1.4	0.7	0.5	1	0.6	0.6	0.7	0.6	0.6	0.3	0.6	1.4			6.2		
															C		
	0.5	0.7	0.3	0.7	0.6	0.7	0.5	0.4	0.6	0.7	0.7	0.3	0.7	0.6	0.5	0.5	7.9

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

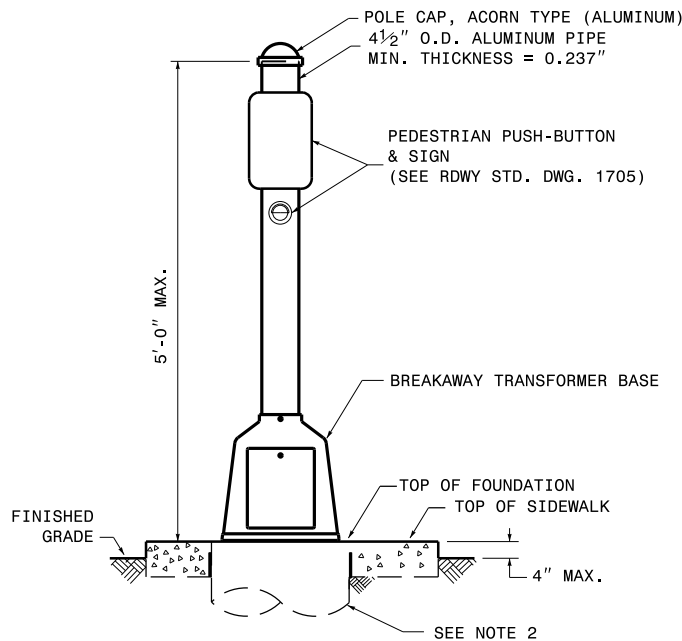
1-18

ROADWAY STANDARD DRAWING FOR
SPREAD SPECTRUM RADIO
 RF ANTENNA WARNING SIGN

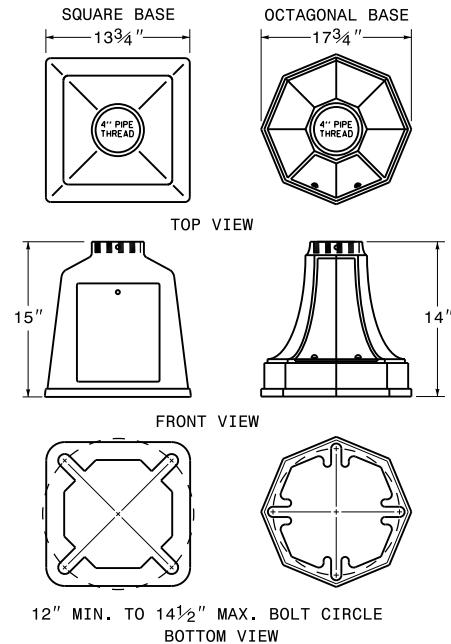


1-18 STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

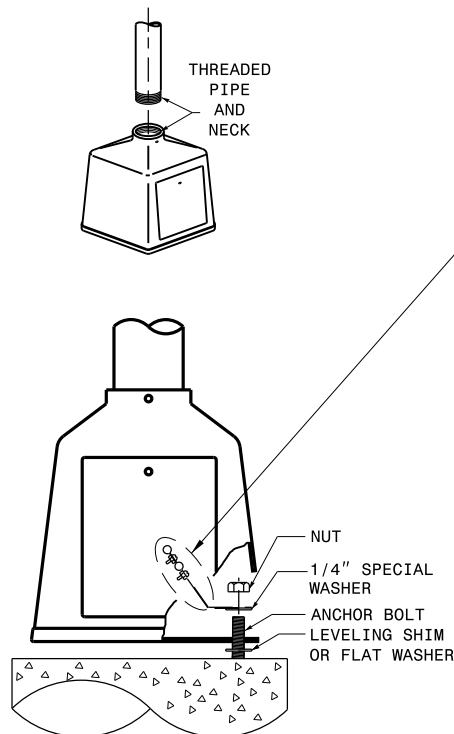
ROADWAY STANDARD DRAWING FOR **SPREAD SPECTRUM RADIO**
 POWER, GROUND AND AUXILIARY POWER SYSTEMS FOR STANDALONE REPEATER CABINET



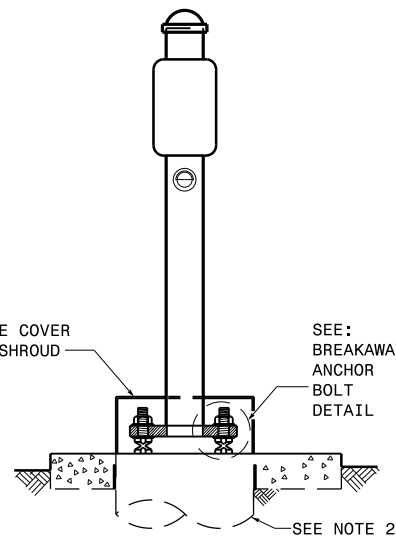
**PUSHBUTTON POST ON
BREAKAWAY TRANSFORMER BASE**



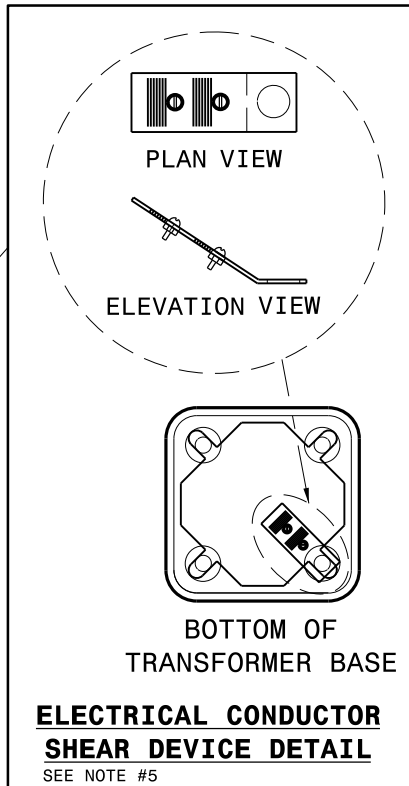
**NORMAL DUTY
TRANSFORMER BASE STYLES**



TRANSFORMER BASE ANCHORING DETAIL



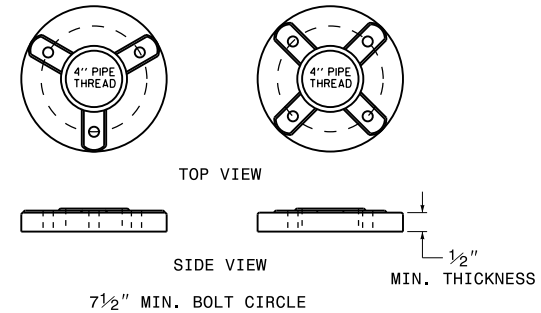
**PUSHBUTTON POST ON FLANGE BASE WITH
BREAKAWAY ANCHOR BOLTS**



**ELECTRICAL CONDUCTOR
SHEAR DEVICE DETAIL**
SEE NOTE #5

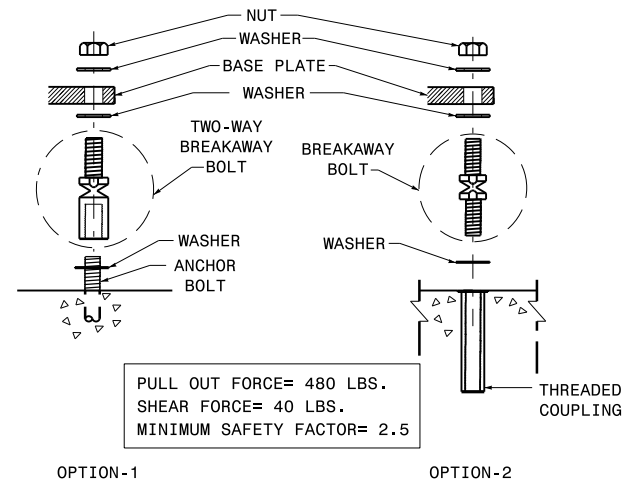
NOTES:

1. CONSTRUCT POSTS ON FHWA APPROVED BREAKAWAY BASES OR ANCHORS.
2. CONSTRUCT POST FOUNDATIONS IN ACCORDANCE WITH STANDARD DRAWING 1743.04.
3. PUSHBUTTON POSTS ARE DESIGNED FOR USE IN ALL WIND ZONE REGIONS.
PEDESTAL BASE REACTIONS USING 4 1/2" OD SCHEDULE 40 ALUMINUM PIPE ARE:
AXIAL LOAD: 60 LBS
SHEAR LOAD: 120 LBS
MOMENT LOAD: 435 FT-LBS
4. BASE REACTIONS ARE BASED ON A DESIGN LOADING FOR 2 PUSHBUTTONS AND 2 PEDESTRIAN SIGNS. DO NOT EXCEED THE DESIGN LOADING WITHOUT APPROVAL.
5. ALL ELECTRICAL CONDUCTORS INSIDE OF BREAKAWAY SUPPORTS SHOULD SHEAR OR BECOME DISCONNECTED AS CLOSE TO THE FOUNDATION BASE AS POSSIBLE DURING A KNOCKDOWN. REFER TO ELECTRICAL CONDUCTOR SHEAR DEVICE DETAIL. IF ALTERNATIVES ARE AVAILABLE THEY CAN BE USED PER APPROVAL OF THE ENGINEER.



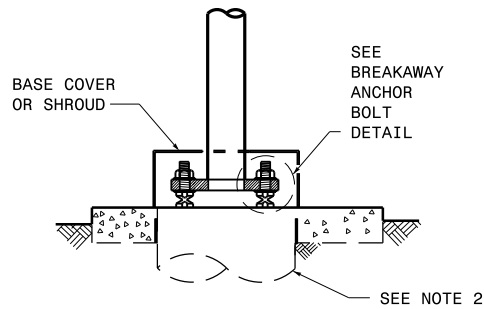
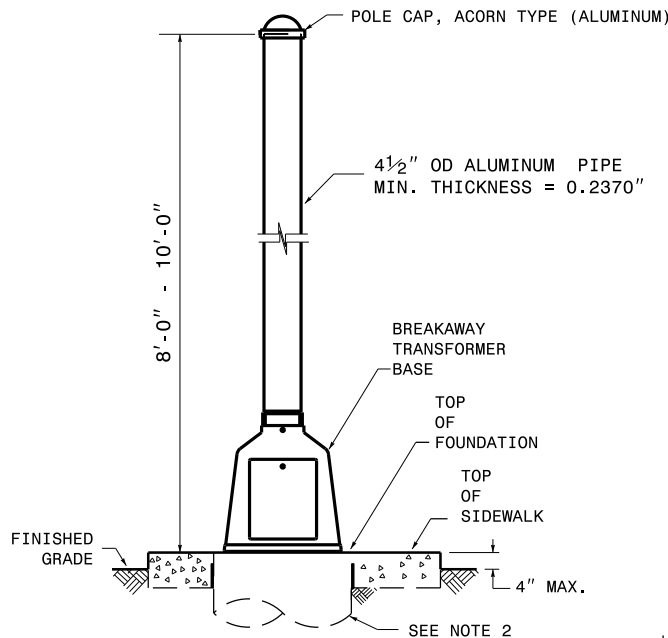
THREADED FLANGE BASE STYLES

TO BE USED WITH BREAKAWAY ANCHORS ONLY



BREAKAWAY ANCHOR BOLT DETAIL

TO BE USED WITH THREADED FLANGE BASES ONLY

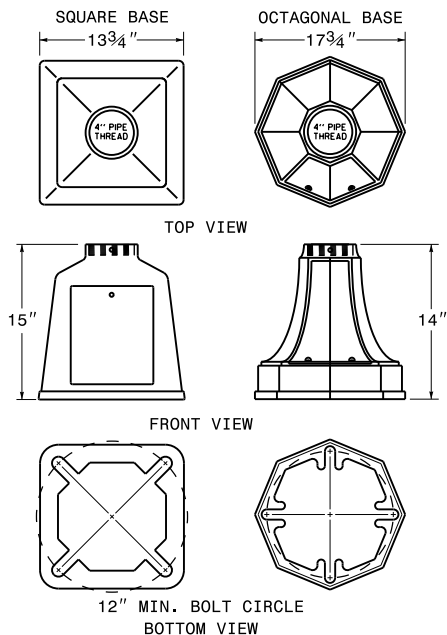


**NORMAL DUTY PEDESTAL ON
FLANGE BASE WITH
BREAKAWAY ANCHOR BOLTS**

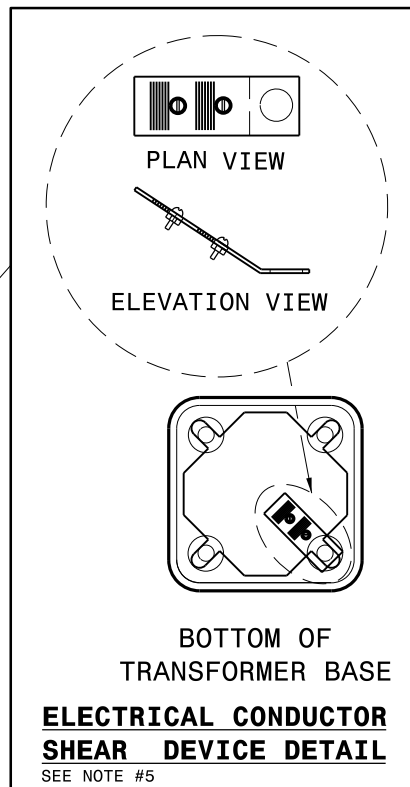
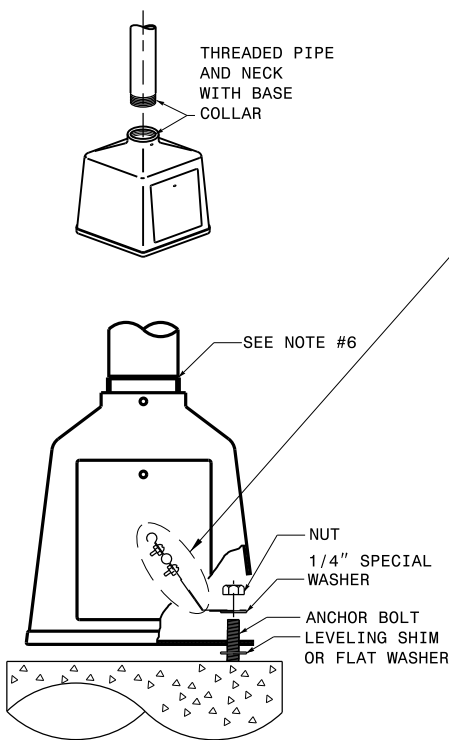
NOTES:

1. CONSTRUCT PEDESTALS ON FHWA APPROVED BREAKAWAY BASES OR ANCHORS.
2. CONSTRUCT PEDESTAL FOUNDATIONS IN ACCORDANCE WITH STANDARD DRAWING 1743.04.
3. NORMAL DUTY PEDESTALS ARE DESIGNED FOR USE IN ALL WIND ZONE REGIONS. PEDESTAL BASE REACTIONS USING 4 1/2" OD SCHEDULE 40 ALUMINUM PIPE ARE:
AXIAL LOAD: 270 LBS
SHEAR LOAD: 370 LBS
MOMENT LOAD: 2,580 FT-LBS
4. BASE REACTIONS ARE BASED ON A DESIGN LOADING FOR 2 - 3 SECTION SIGNAL HEADS, 2 - PEDESTRIAN SIGNALS, 2 PUSHBUTTONS AND 2 PEDESTRIAN SIGNS. DO NOT EXCEED DESIGN LOADING WITHOUT APPROVAL.
5. ALL ELECTRICAL CONDUCTORS INSIDE OF BREAKAWAY SUPPORTS SHOULD SHEAR OR BECOME DISCONNECTED AS CLOSE TO THE FOUNDATION BASE AS POSSIBLE DURING A KNOCKDOWN. REFER TO ELECTRICAL CONDUCTOR SHEAR DEVICE DETAIL. IF ALTERNATIVES ARE AVAILABLE THEY CAN BE USED PER APPROVAL OF THE ENGINEER.
6. PROVIDE POLE AND BASE COLLAR ASSEMBLY.

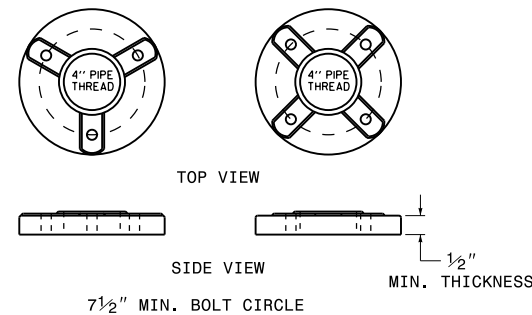
**NORMAL DUTY PEDESTAL ON
BREAKAWAY TRANSFORMER BASE**



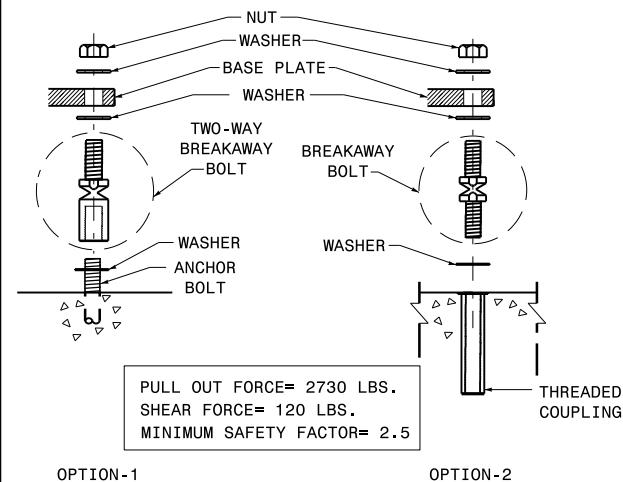
**NORMAL DUTY
TRANSFORMER BASE STYLES**



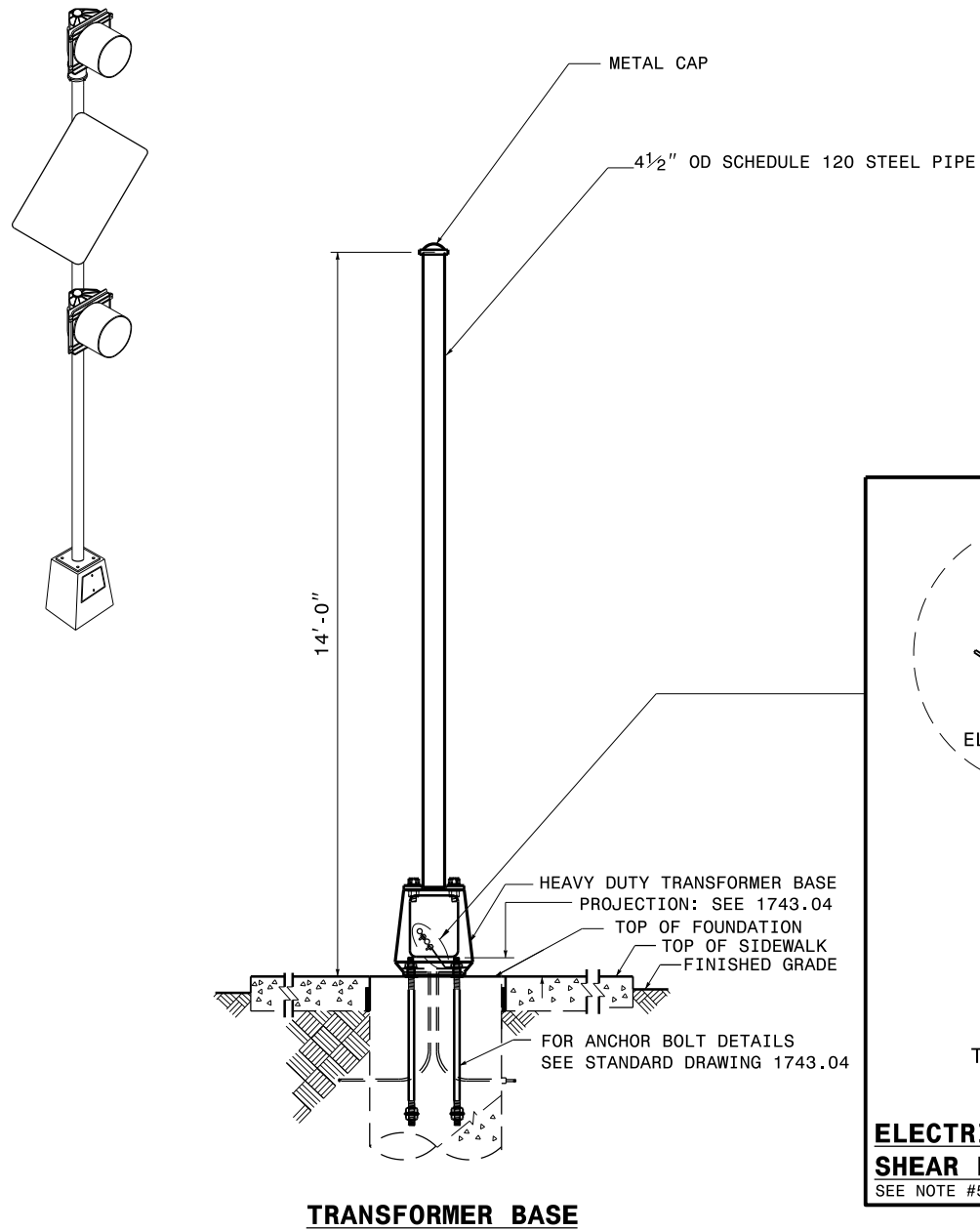
**BOTTOM OF
TRANSFORMER BASE
ELECTRICAL CONDUCTOR
SHEAR DEVICE DETAIL**
SEE NOTE #5



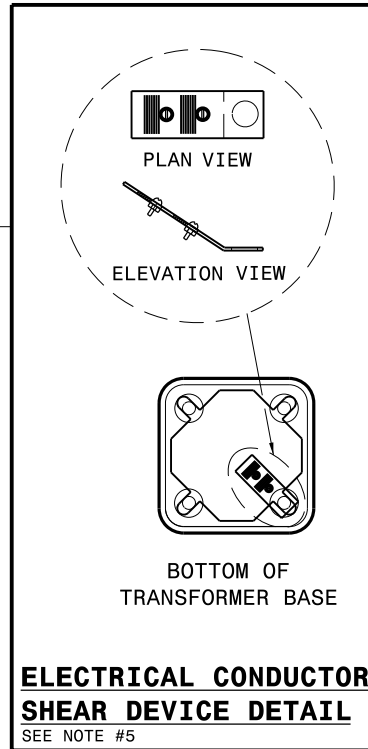
THREADED FLANGE BASE STYLES
TO BE USED WITH BREAKAWAY ANCHORS ONLY



BREAKAWAY ANCHOR BOLT DETAIL
TO BE USED WITH THREADED FLANGE BASES ONLY

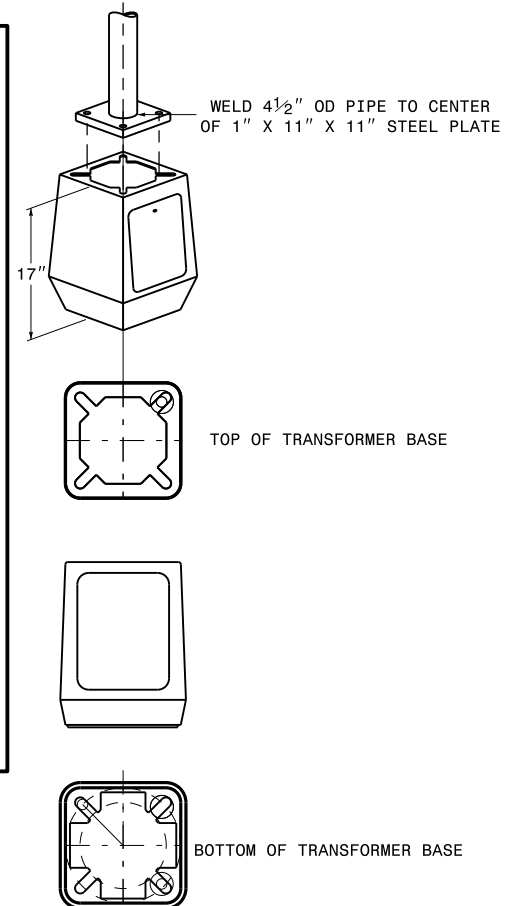


TRANSFORMER BASE



NOTES:

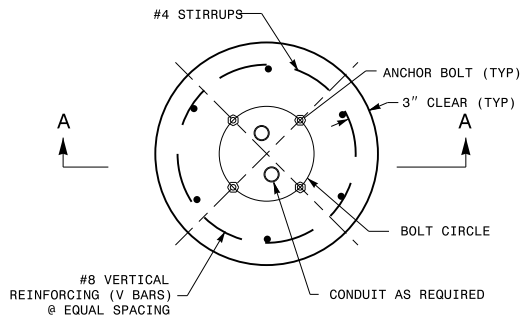
1. CONSTRUCT PEDESTALS ON FHWA APPROVED BREAKAWAY BASES OR ANCHORS.
2. CONSTRUCT PEDESTAL FOUNDATIONS IN ACCORDANCE WITH STANDARD DRAWING 1743.04.
3. HEAVY DUTY PEDESTALS ARE DESIGNED FOR USE IN ALL WIND ZONE REGIONS.
PEDESTAL BASE REACTIONS USING 4 1/2" OD SCHEDULE 120 GALVANIZED STEEL PIPE ARE:
AXIAL LOAD: 600 LBS
SHEAR LOAD: 1,500 LBS
MOMENT LOAD: 14,500 FT-LBS
4. BASE REACTIONS ARE BASED ON A DESIGN LOADING FOR 2 - 12" SIGNALS AND A 48" X 48" SIGN. DO NOT EXCEED DESIGN LOADING WITHOUT APPROVAL.
5. ALL ELECTRICAL CONDUCTORS INSIDE OF BREAKAWAY SUPPORTS SHOULD SHEAR OR BECOME DISCONNECTED AS CLOSE TO THE FOUNDATION BASE AS POSSIBLE DURING A KNOCKDOWN. REFER TO ELECTRICAL CONDUCTOR SHEAR DEVICE DETAIL. IF ALTERNATIVES ARE AVAILABLE THEY CAN BE USED PER APPROVAL OF THE ENGINEER.
6. DO NOT USE BREAKAWAY ANCHOR BOLTS WITH THIS TYPE OF PEDESTAL.



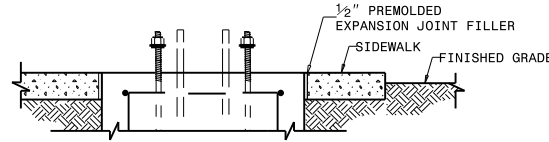
STATE OF
 NORTH CAROLINA
 DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 RALEIGH, N.C.

1-18

ROADWAY STANDARD DRAWING FOR
PEDESTALS
 HEAVY DUTY (TYPE III)



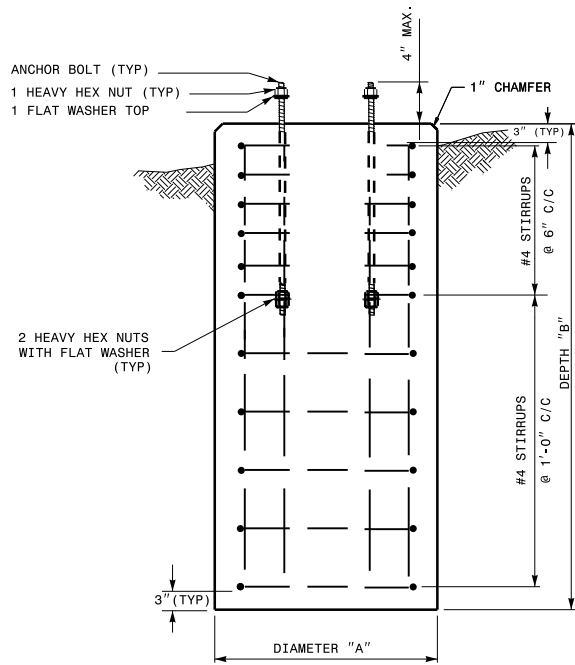
PEDESTAL FOUNDATION - PLAN VIEW



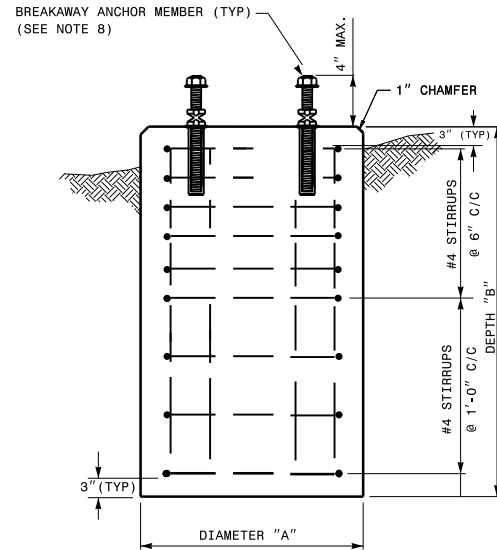
PEDESTAL FOUNDATION DETAILS FOR SIDEWALK

NOTES:

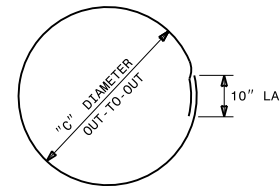
1. CAST FOUNDATION AGAINST UNDISTURBED SOIL WHEREVER CONDITIONS PERMIT. IN UNSTABLE SOIL, CAST-IN-PLACE TUBE FORMS ARE ALLOWED WITH APPROVAL.
2. COMPLY WITH APPLICABLE PROVISIONS OF SECTION 825 FOR CONCRETE CONSTRUCTION.
3. USE CLASS "A" CONCRETE THAT MEETS THE REQUIREMENTS OF SECTION 1000 WITH A COMPRESSION STRENGTH AT 28 DAYS OF $f'c = 3000$ PSI (MIN.).
4. USE ASTM GRADE 60 DEFORMED BARS FOR ALL REINFORCING STEEL.
5. GRADE IS ASSUMED TO BE (8H:1V) OR FLATTER. FOUNDATION SIZE AND DEPTHS ARE BASED ON THE FOLLOWING SOIL DESIGN PARAMETERS:
 - A. SANDY TYPE SOIL
 - B. NO GROUND WATER WITHIN 5'-0" OF SURFACE ELEVATION
 - C. WIND SPEED NOT TO EXCEED 140 MPH
 IF ACTUAL CONDITIONS VARY SUBSTANTIALLY FROM THOSE ASSUMED, THE FOUNDATION DEPTH MAY BE ADJUSTED. IN THIS CASE, CONTACT THE ENGINEER.
6. MAINTAIN AT LEAST 3" COVER ON ALL REINFORCEMENT.
7. ORIENT CONDUIT AS REQUIRED BY THE DESIGN OR AS DICTATED BY FIELD CONDITIONS.
8. USE ADHESIVE ANCHOR FOR THREADED COUPLING INSERT. FOR TYPE I MINIMUM DEPTH NECESSARY IS 0'-4 $\frac{1}{2}$ " AND FOR TYPE II MINIMUM DEPTH NECESSARY IS 0'-6 $\frac{5}{8}$ ". FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS.



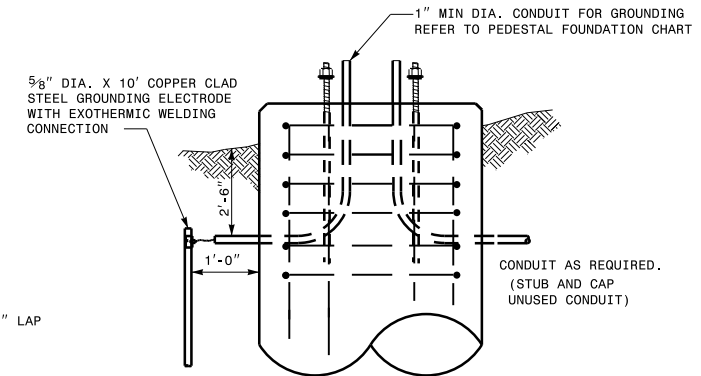
**TYPES I, II & III
SECTION A-A**



**TYPES I & II ONLY
SECTION A-A**



CLOSED HOOPS



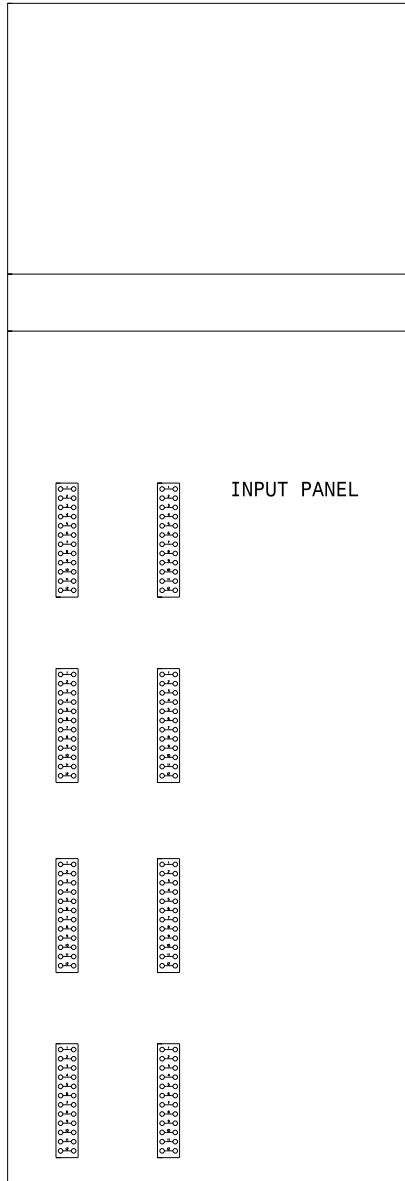
GROUNDING & CONDUIT DETAIL

PEDESTAL FOUNDATION TYPE AND SIZE							
TYPE	PEDESTAL DESCRIPTION	SIZE			ANCHOR BOLT		INSTALL GROUNDING SYSTEM (YES/NO)
		DIAMETER "A" FT	DEPTH "B" FT	CONCRETE VOLUME CY	DIAMETER (MIN.) IN	LENGTH FT-IN	
I	PEDESTRIAN PUSHBUTTON	2'-0"	3'-6"	.41	1/2	1'-6"	NO
II	NORMAL-DUTY	2'-0"	5'-0"	.58	3/4	2'-0"	YES
III	HEAVY-DUTY	2'-6"	7'-0"	1.27	1	4'-0"	YES

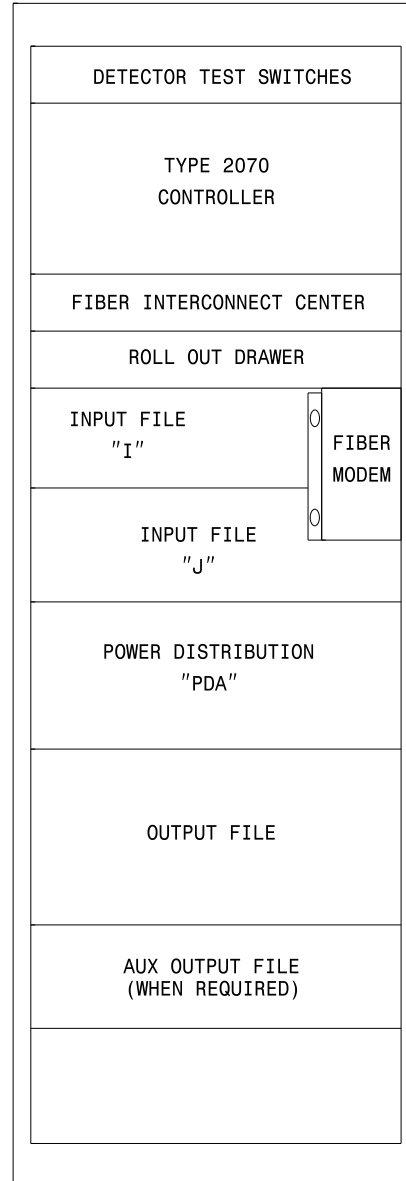
REINFORCING STEEL SCHEDULE													
TYPE	V-BAR				STIRRUP								
	SIZE #	QTY	LENGTH	WEIGHT LBS	SIZE #	QUANTITY			LENGTH	DIAMETER "C" FT	OVERLAP MIN.	WEIGHT LBS	TOTAL STEEL WEIGHT LBS
						ON 6" CENTERS	ON 12" CENTERS	TOTAL					
I	8	6	3'-0"	56	4	0	4	4	5'-7"	1'-6"	0'-10"	15	71
II	8	6	4'-6"	86	4	5	3	8	5'-7"	1'-6"	0'-10"	30	116
III	8	6	6'-6"	122	4	7	4	11	7'-2"	2'-0"	0'-10"	53	175

NOTE

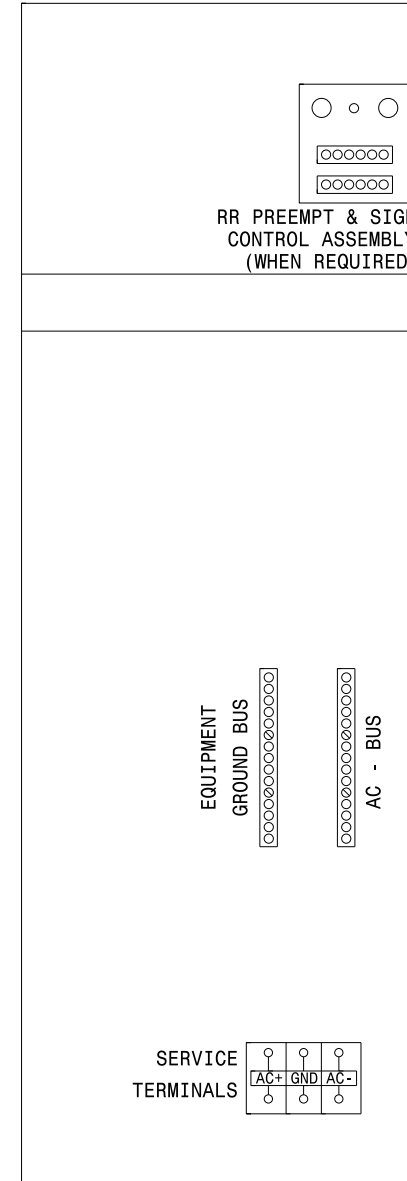
PROVIDE 2" SPACE BETWEEN CONTROLLER AND ROLL OUT DRAWER TO ACCOMMODATE FIBER INTERCONNECT CENTER.



332 CABINET
LEFT SIDE
REAR VIEW



332 CABINET
REAR VIEW



332 CABINET
RIGHT SIDE
REAR VIEW

1-18

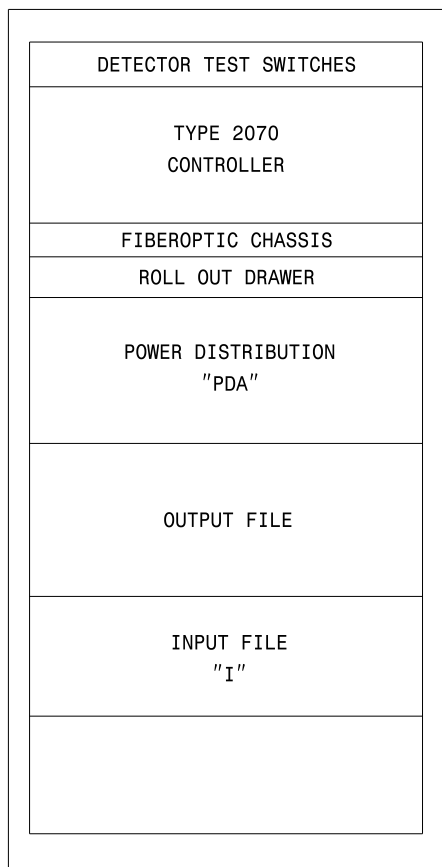
ROADWAY STANDARD DRAWING FOR

CONTROLLERS AND CABINETS

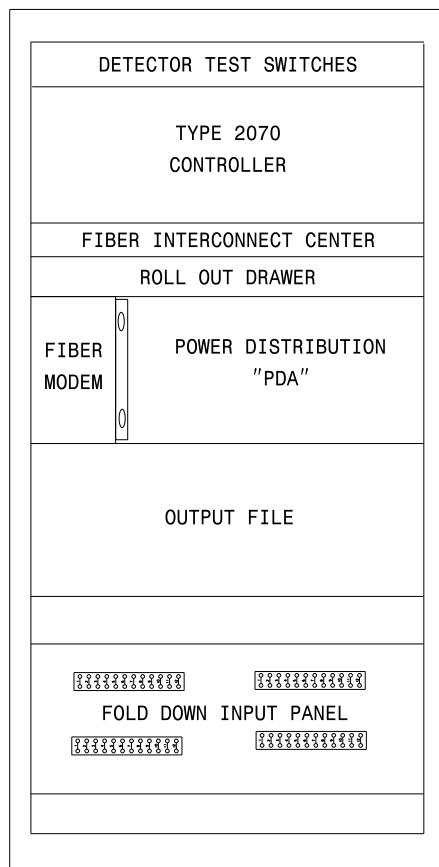
CABINET COMPONENT LAYOUT (BASEMOUNT)

170 CABINET MODEL 332 WITH 2070 CONTROLLER

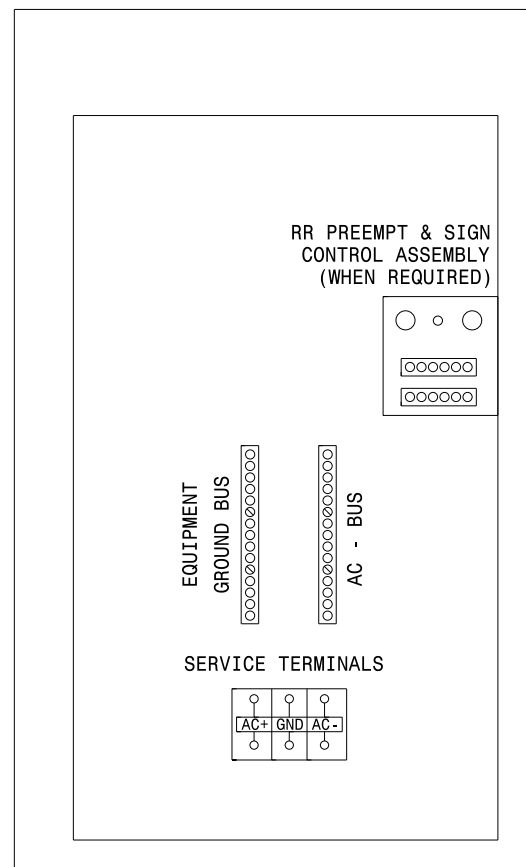
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.



336S CABINET
FRONT VIEW



336S CABINET
REAR VIEW



336S CABINET
RIGHT SIDE
REAR VIEW

NOTE

PROVIDE 2" SPACE BETWEEN
CONTROLLER AND ROLL OUT
DRAWER TO ACCOMMODATE
FIBER INTERCONNECT CENTER.

1-18

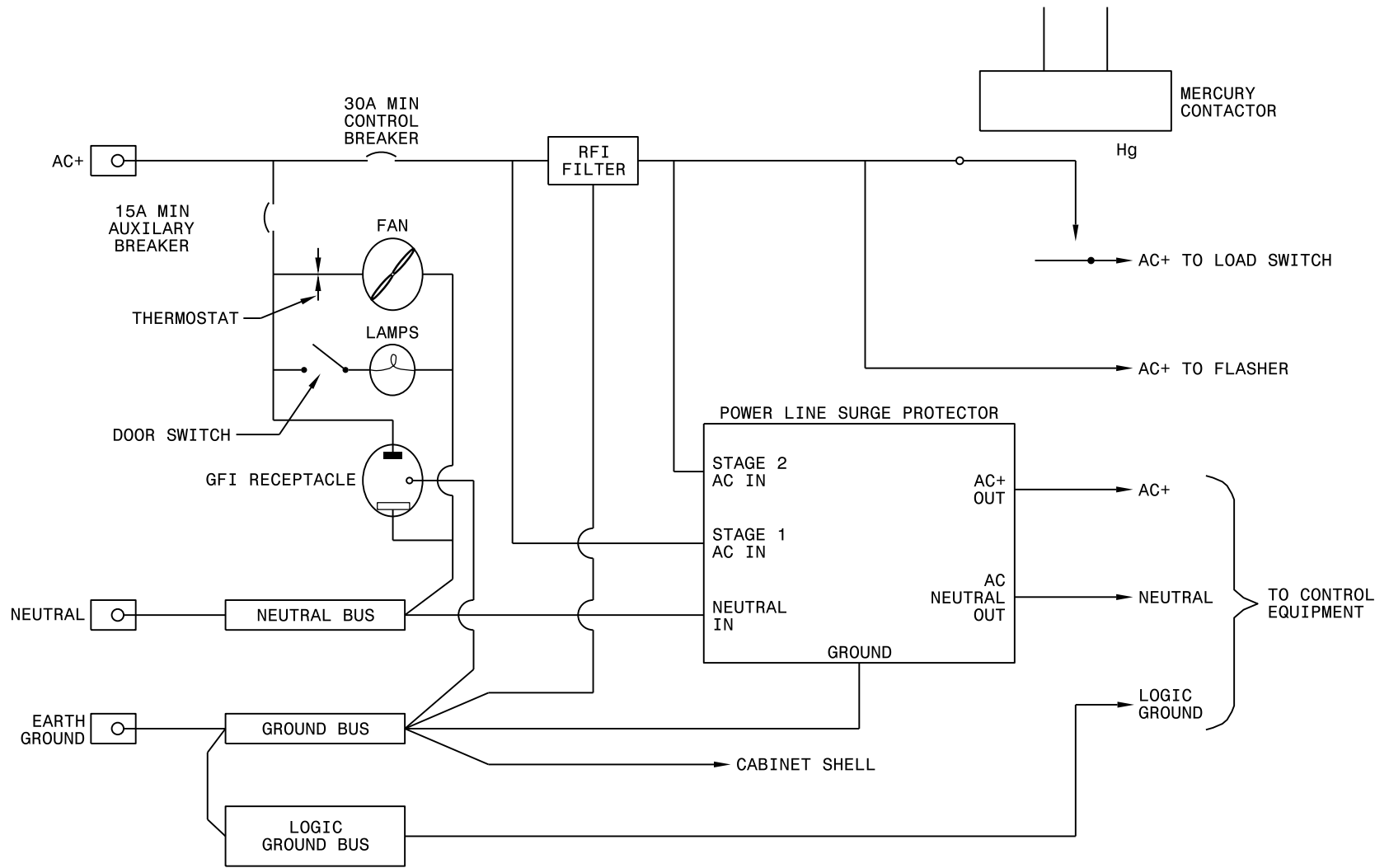
ROADWAY STANDARD DRAWING FOR

CONTROLLERS AND CABINETS

CABINET COMPONENT LAYOUT (POLE MOUNT)

170 CABINET MODEL 336S WITH 2070 CONTROLLER

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



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

1-18

ROADWAY STANDARD DRAWING FOR
CONTROLLERS AND CABINETS
POWER, GROUND, AND AUXILIARY POWER SYSTEMS
NEMA TS-2

SHEET 1 OF 1

1751.02