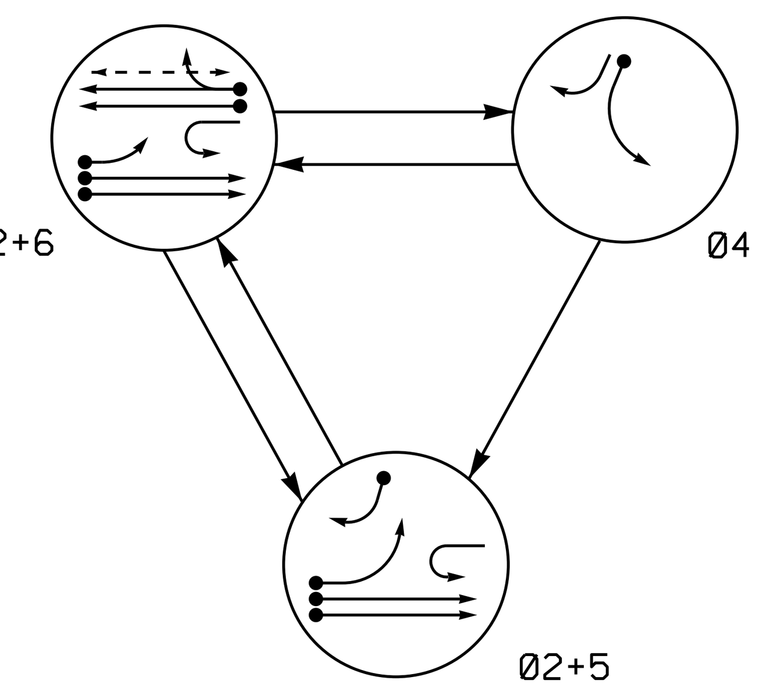
PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	PHASE Ø2+6	PHASE Ø4	FLASH
21, 22	G	G	R	Y
41	R	R	G	R
42	R / →	R	G	R
51	←	← FY	← R	← Y
61	↶ FY	↶ FY	↶ R	↶ Y
62, 63	R	G	R	Y
P61, P62	DW	W	DW	DRK

W - Walk
DW - Don't Walk
DRK - Dark

SE-PAC 2070 LOOP & DETECTOR UNIT INSTALLATION CHART

INDUCTIVE LOOPS: LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	DETECTOR PROGRAMMING: ASSIGNED PHASE	TIMING: DELAY	TIMING: EXTEND (STRETCH)	OPERATION MODE 0: VEHICLE	1: PEDESTRIAN	2: 1 CALL	3: STOP A	4: STOP B	5: PROT/PER LEFT	6: PROT/PER THROUGH	7: AND	SWITCH	SYSTEM LOOPS	STATUS: NEW	STATUS: EXISTING
2A	6X6	5	300	X	-	2	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
2B	6X6	5	300	X	-	2	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
4A	6X40	2-4-2	0	X	-	4	3 SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
5A	6X40	2-4-2	0	X	-	5	15 SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
						2	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
5B	6X40	2-4-2	0	X	-	5	15 SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
6A	6X6	5	300	X	-	6	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-
6B	6X6	5	300	X	-	6	- SEC.	- SEC.	X	-	-	-	-	-	-	-	-	-	X	-

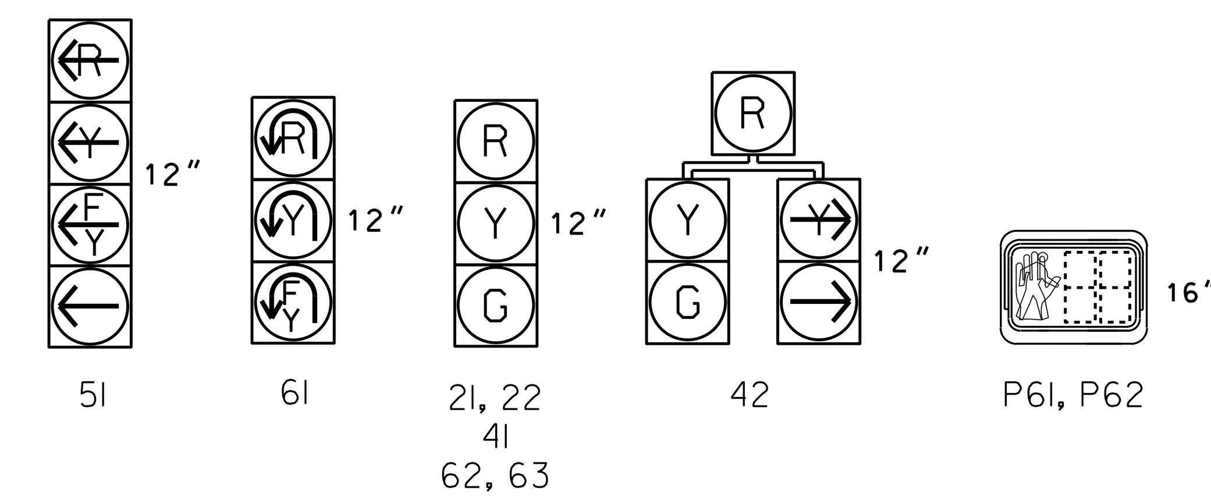
3 Phase
Fully Actuated
(Raleigh Signal System)

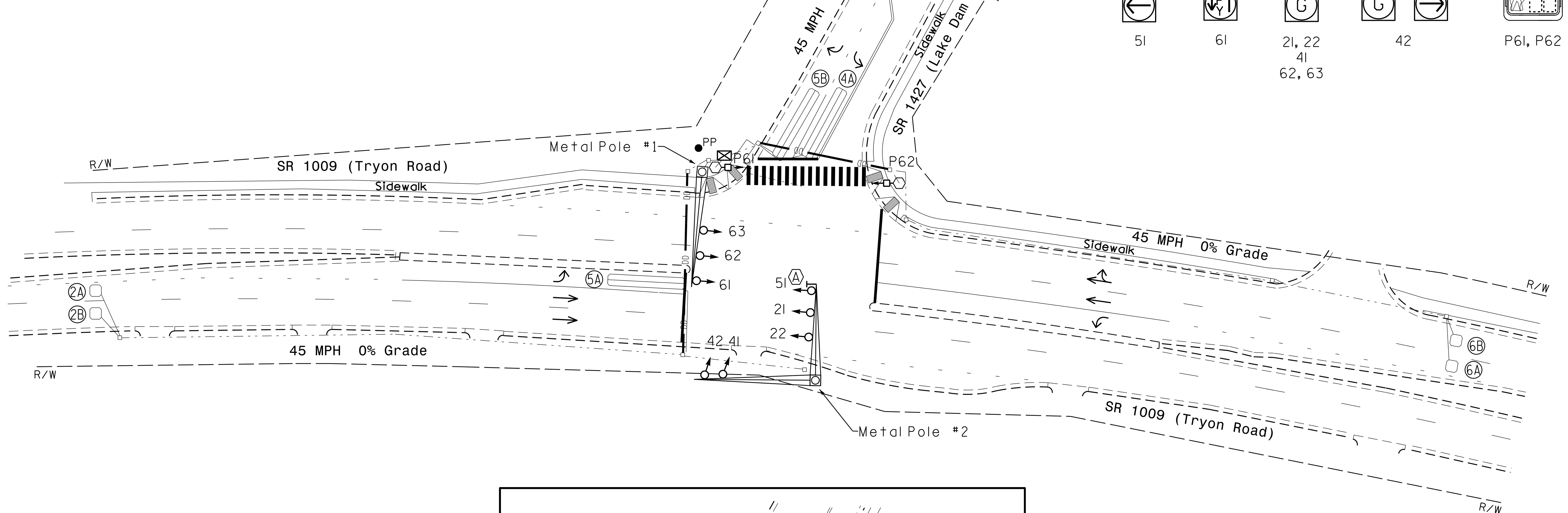
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Pedestrian pedestals are conceptual and shown for reference only. See sheets P1-P3 for pushbutton location details.
9. Pavement markings are existing unless otherwise shown.
10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

SIGNAL FACE I.D.

All Heads L.E.D.





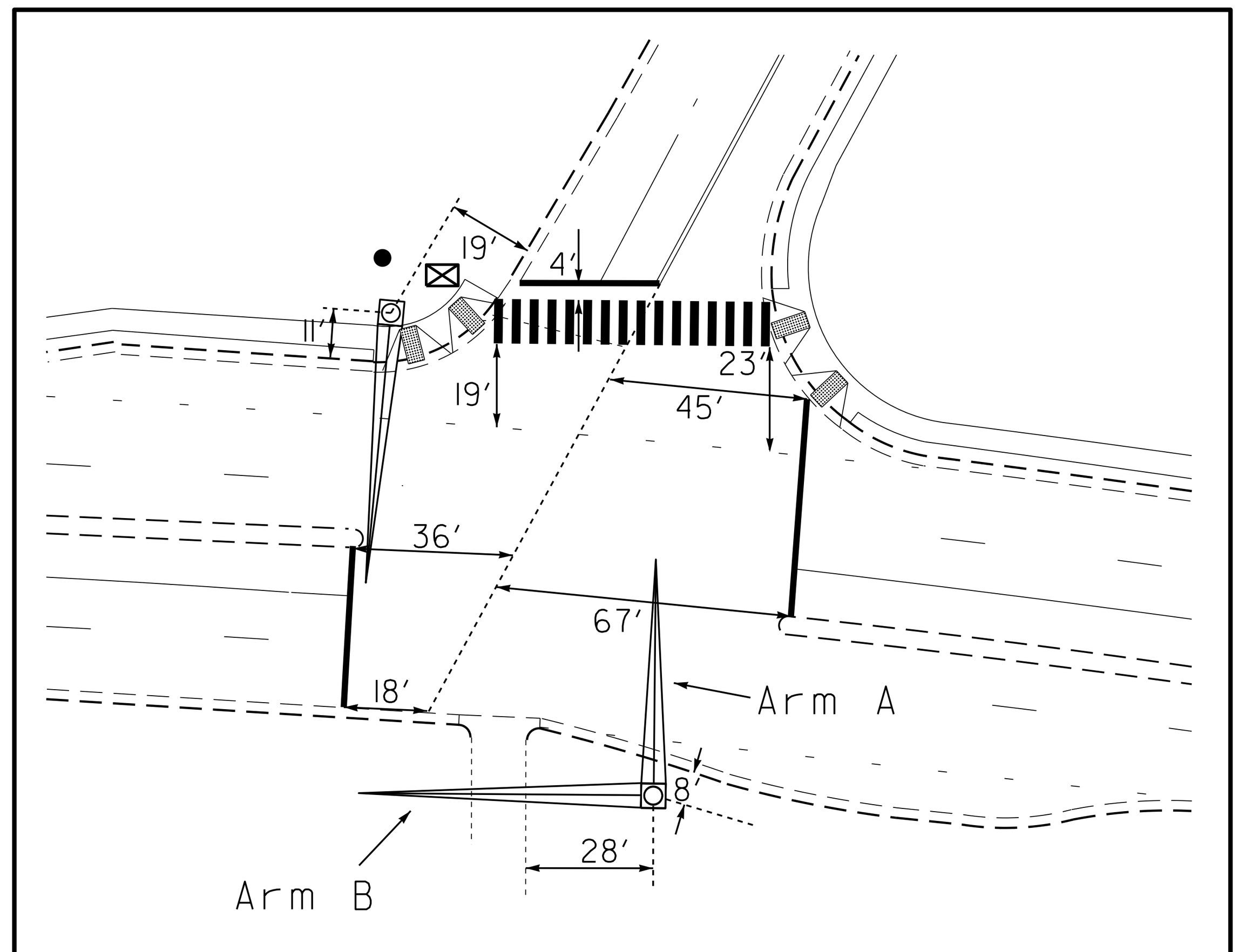
LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Directional Drill	N/A
N/A	Right of Way	
	Directional Arrow	
	Type II Signal Pedestal	
N/A	Curb Ramp	
	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	

SE-PAC 2070 TIMING CHART

FEATURE	PHASE 2	4	5	6
Min Green *	12	7	7	12
Passage Gap *	6.0	2.0	2.0	6.0
Maximum Green *	90	30	15	90
Yellow Change	4.5	3.0	3.0	4.5
Red Clear	1.8	3.3	2.9	1.8
Walk *	-	-	-	7
Pedestrian Clear	-	-	-	15
Added Initial *	1.5	-	-	1.5
Maximum Initial *	34	-	-	34
Time Before Reduction *	15	-	-	15
Time To Reduce *	30	-	-	30
Minimum Gap	3.0	-	-	3.0
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	LOCK	NON-LOCK	NON-LOCK	LOCK
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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



Proposed Pole, Crosswalk, & Stopbar Locations

New Installation

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 40 1"=40'

SR 1009 (Tryon Road) at SR 1427 (Lake Dam Road)

Division 5 Wake County Raleigh

PLAN DATE:	October 2016	REVIEWED BY:
PREPARED BY:	Z. O'Keffe	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 430320FAA2654C3... 11/21/2016 DATE

SIG. INVENTORY NO. 05-0718

12-DEC-2016 12:26
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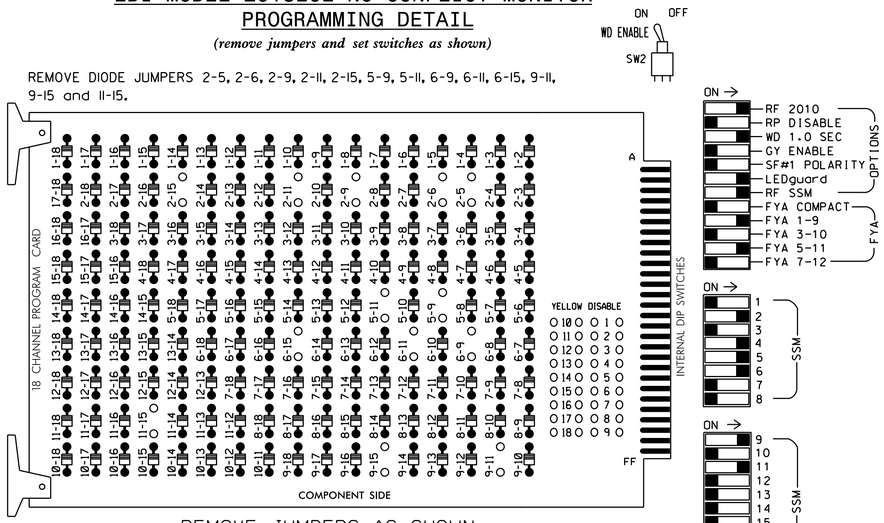
PROJECT REFERENCE NO.	SHEET NO.
W-5601FB	Sig. 2

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 2-5, 2-6, 2-9, 2-11, 2-15, 5-9, 5-11, 6-9, 6-11, 6-15, 9-11, 9-15 and 11-15.



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program controller to start up in phases 2 and 6 green.
3. Enable simultaneous gap-out feature, on controller unit, for all phases.
4. Program phases 2 and 6, on controller unit, for volume density operation.
5. The cabinet and controller are part of the Raleigh City Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 W/ AUX
SOFTWARE.....SE-PAC2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S2,S5,S7,S8,S9,AUX S1, AUX S4
PHASES USED.....2,4,5,6,6 PED
OVERLAP "A".....*
OVERLAP "B".....NOT USED
OVERLAP "C".....*
OVERLAP "D".....NOT USED

* See sheet 2 for Overlap and Protected & Permissive Phases programming.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7		S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5		6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5		6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	42	51 ★	62,63	P61, P62	NU	NU	NU	61 ★	NU	NU	51 ★	NU	NU
RED		128			101		*		134										
YELLOW		129			102				135										
GREEN		130			103				136										
RED ARROW														A121			A114		
YELLOW ARROW							132							A122			A115		
FLASHING YELLOW ARROW														A123			A116		
GREEN ARROW							133	133											
✋										119									
🚶										121									

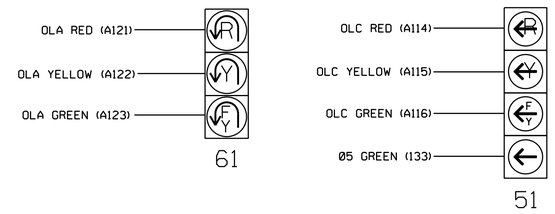
NU = Not Used

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

★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	Ø2 2A	SLOT EMPTY	WIRED INPUT ⊗	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L		Ø2 2B				NOT USED							NOT USED	ST DC ISOLATOR
FILE "J"	U	Ø5 5A	Ø5 5B	Ø6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	NOT USED	Ø6 6B											

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	DELAY TIME	EXTEND (STRETCH) TIME
2A	TB2-5,6	I2U	39	3	2		
2B	TB2-7,8	I2L	43	4	2		
4A	TB4-9,10	I6U	41	11	4	3	
5A[1]	TB3-1,2	J1U	55	19	5	15	
	-	I4U	47	7	2		
5B	TB3-5,6	J2U	40	21	5	15	
6A	TB3-9,10	J3U	64	23	6		
6B	TB3-11,12	J3L	77	24	6		
PED PUSH BUTTONS							
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED		

NOTE:
INSTALL DC ISOLATOR CARD IN INPUT FILE SLOT I13.

[1] Add jumper from J1-W to I4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)

PHASE 5 RED FIELD TERMINAL (131)

AC-

NOTE: The purpose of this resistor is to load the channel red monitor input in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0718
DESIGNED: October 2016
SEALED: 11/21/2016
REVISED:

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering Branch
Signals Management Section
750 N.Greenfield Pkwy.Garner,NC 27529

SR 1009 (Tryon Road)
at
SR 1427 (Lake Dam Road)

Division 5 | Wake County | Raleigh

PLAN DATE: November 2016 | REVIEWED BY: T. Joyce
PREPARED BY: C. Strickland | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 030530 ENGINEER ZACHARY M. LITTLE

DocuSigned by: Zachary M. Little 11/29/2016
DC21EFD94F5341F... DATE

SIG. INVENTORY NO. 05-0718

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INIT & N.A. RESP PROGRAMMING DETAIL

(program controller as shown below)

From Main Menu, press '3' (Phase Data)

SE-PAC PHASE DATA — PRESS # DESIRED

1-VEHICLE TIMES	6-N.LOCK & MISC
2-DENSITY TIMES	7-SPEC. SEQUENCE
3-PEDEST. TIMES	8-SPEC. DETECTOR
4-INIT & N.A. RESP	9-PHASE COPY
5-V & P RECALLS	0-MISC PED OPTIONS

F-PRIOR MENU

Note Phase 1 NOT used! →

PHASE	1	2	3	4	5	6	7	8
INITIAL	0	4	0	1	1	4	0	0
NA RESP	0	1	0	2	0	1	0	0

CODES	0	1	2	3	4	5
INITIAL	NONE	INACT	RED	YEL	GRN	DRK
NA RESP	NONE	NA1	NA2	BOTH	---	---

A-UP B-DN C-LT D-RT E-ENTER F-PRIOR MENU

INIT & N.A. RESP programming complete.

PROTECTED & PERMISSIVE PHASES for FLASHING YELLOW ARROW

(program controller as shown below)

FROM MAIN MENU PRESS 4 (UNIT DATA)

SE-PAC UNIT DATA — PRESS # DESIRED

1-STARTUP & MISC	6-ALT SEQUENCES
2-REMOTE FLASH	7-PORT 1 DATA
3-OVERLAP STANDARD	8-I/O MISC
4-OVERLAP SPECIAL	9-SIG DRV OUT
5-RING STRUCTURE	

F-PRIOR MENU

SE-PAC OVLP	A	B	C	D	E	F	G	H
TR GRN	0	0	0	0	0	0	0	0
YEL/10	40	40	40	40	40	40	40	40
RED/10	20	20	20	20	20	20	20	20
-G/Y	1	0	5	0	0	0	0	0
+GRN	2	0	6	0	0	0	0	0

← PROTECTED PHASES (-G/Y)

← PERMISSIVE PHASES (+GRN)

(-) #-PH G/Y KILLS OVLP= (+) #-PH G STRT

A-UP B-DN C-LT D-RT E-ENTER F-PRIOR MENU

PPLT DEFINITION PROGRAMMING COMPLETE

PRESS 'F' TO RETURN TO UNIT DATA

NOTE: THIS PROGRAMMING IS REQUIRED FOR SIGNAL HEAD 51 SO THAT THE SOLID GREEN ARROW TURNS ON EXCLUSIVELY DURING THE PROTECTED GREEN INTERVAL PHASE 5. THE FLASHING YELLOW ARROW FOR SIGNAL HEADS 51 AND 61 FLASHES ONLY DURING PERMITTED GREEN PHASES 2 & 6.

FLASHING YELLOW ARROW PROTECTED/PERMISSIVE SEQUENCE for OVERLAPS "A" & "C"

(program controller as shown below)

FROM MAIN MENU PRESS 4 (UNIT DATA)

SE-PAC UNIT DATA — PRESS # DESIRED

1-STARTUP & MISC	6-ALT SEQUENCES
2-REMOTE FLASH	7-PORT 1 DATA
3-OVERLAP STANDARD	8-I/O MISC
4-OVERLAP SPECIAL	9-SIG DRV OUT
5-RING STRUCTURE	

F-PRIOR MENU

SE-PAC OVERLAP - A (0-NO/1-YES)

DO NOT enter any OVL PHASES! →

OVL PHASES:	000000000	0000000	
PHS/CHN:	123456789	0123456789	01234
OVL CHN(S):	000000000	0001000000	00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

HIT "B" TWICE

SE-PAC OVERLAP - C (0-NO/1-YES)

DO NOT enter any OVL PHASES! →

OVL PHASES:	000000000	0000000	
PHS/CHN:	123456789	0123456789	01234
OVL CHN(S):	000000000	0000010000	00000

A-UP B-DN D-DspChn E-EDIT F-PRIOR MENU

OVERLAP PROGRAMMING COMPLETE

PRESS 'F' TO RETURN TO UNIT DATA

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0718
DESIGNED: October 2016
SEALED: 11/21/2016
REVISED:

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1009 (Tryon Road) at SR 1427 (Lake Dam Road)

Prepared in the Offices of: Transportation Mobility and Safety Division, Signals Management Section, State of North Carolina Department of Transportation
750 N.Greenfield Pkwy,Garner,NC 27529

Division 5 — Wake County — Raleigh

PLAN DATE:	November 2016	REVIEWED BY:	T. Joyce
PREPARED BY:	C. Strickland	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 030530 ENGINEER ZACHARY M. LITTLE

DocuSigned by: Zachary M. Little 11/29/2016
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DATE

SIG. INVENTORY NO. 05-0718

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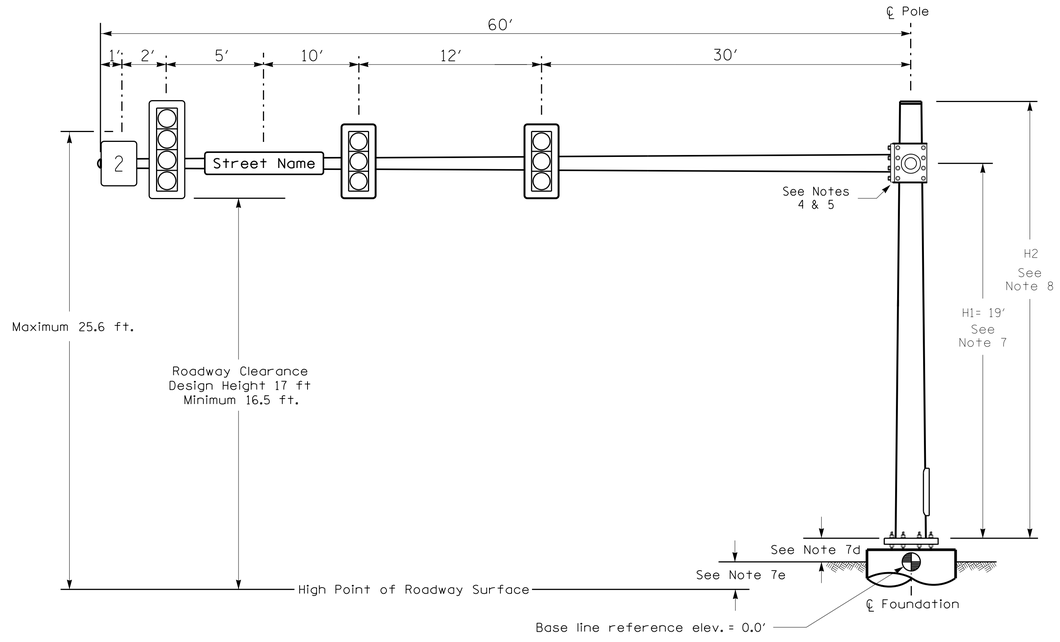
METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
W-5601FB	Sig. 4

Design Loading for METAL POLE NO. 1



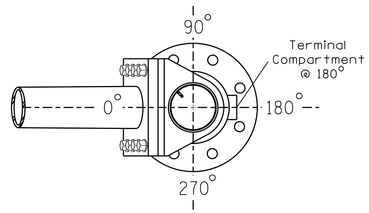
Elevation View

SPECIAL NOTE

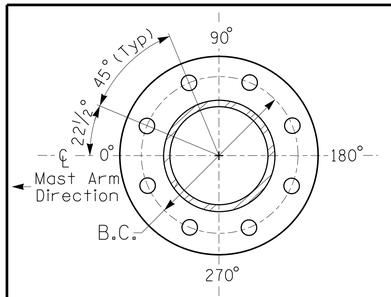
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	N/A
Baseline reference point at ⊕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-0.12 ft.	N/A
Elevation difference at Edge of travelway or face of curb	-0.12 ft.	N/A

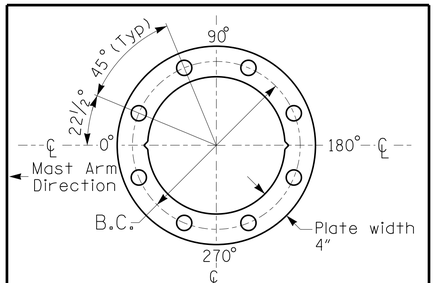


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5"W X 66.0"L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0"W X 36.0"L	14 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2012 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2012 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
9. If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
10. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SR 1009 (Tryon Road)
at
SR 1427 (Lake Dam Road)

Division 5

PLAN DATE:	October 2016	REVIEWED BY:	
PREPARED BY:	Z. O'Keefe	REVIEWED BY:	

SCALE: 0 N/A — N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

Docusigned by: Ryan W. Hough 12/12/2016
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SIG. INVENTORY NO. 05-0718

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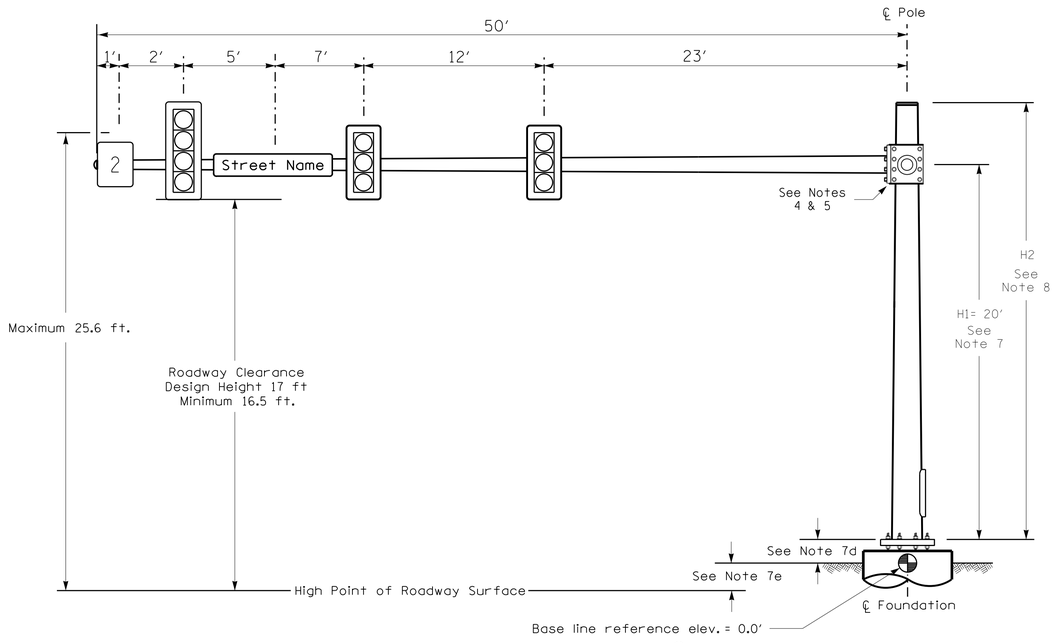
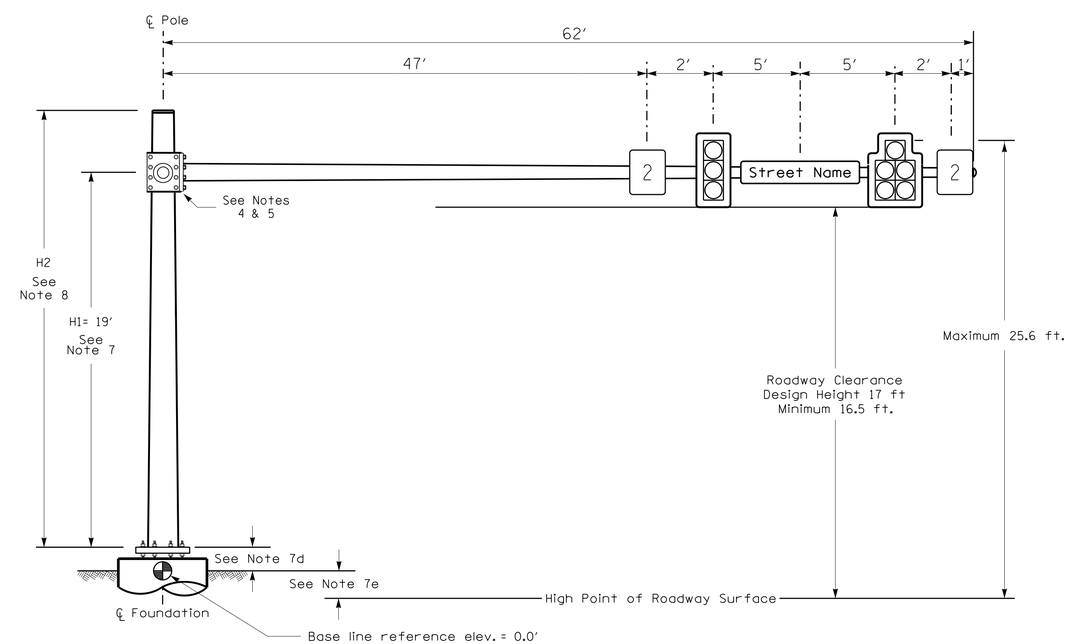
rwhough

Design Loading for METAL POLE NO. 2, MAST ARM A



Elevation View @ 270°

Design Loading for METAL POLE NO. 2, MAST ARM B



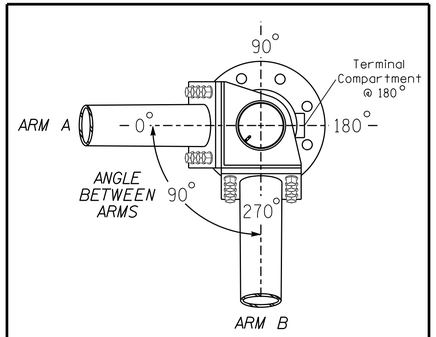
Elevation View @ 0°

SPECIAL NOTE

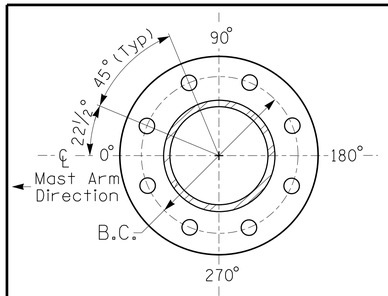
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Arm A	N/A
Baseline reference point at ⊕ ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.93 ft.	N/A
Elevation difference at Edge of travelway or face of curb	-0.61 ft.	N/A

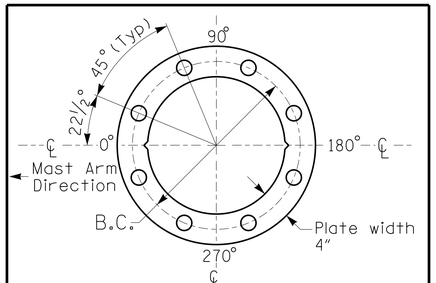


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12″-5 SECTION-WITH BACKPLATE	16.3 S.F.	42.0″W X 56.0″L	103 LBS
	RIGID MOUNTED SIGNAL HEAD 12″-4 SECTION-WITH BACKPLATE	11.5 S.F.	25.5″W X 66.0″L	74 LBS
	RIGID MOUNTED SIGNAL HEAD 12″-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5″W X 52.5″L	60 LBS
2	SIGN RIGID MOUNTED	7.5 S.F.	30.0″W X 36.0″L	14 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0″W X 96.0″L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2012 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2012 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

DESIGN REQUIREMENTS

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

NCDOT Wind Zone 4 (90 mph)

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

SR 1009 (Tryon Road) at SR 1427 (Lake Dam Road)

Division 5 Wake County Raleigh

PLAN DATE: October 2016 REVIEWED BY:

PREPARED BY: Z. O'Keefe REVIEWED BY:

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 12/12/2016
SIGNATURE DATE

SIG. INVENTORY NO. 05-0718

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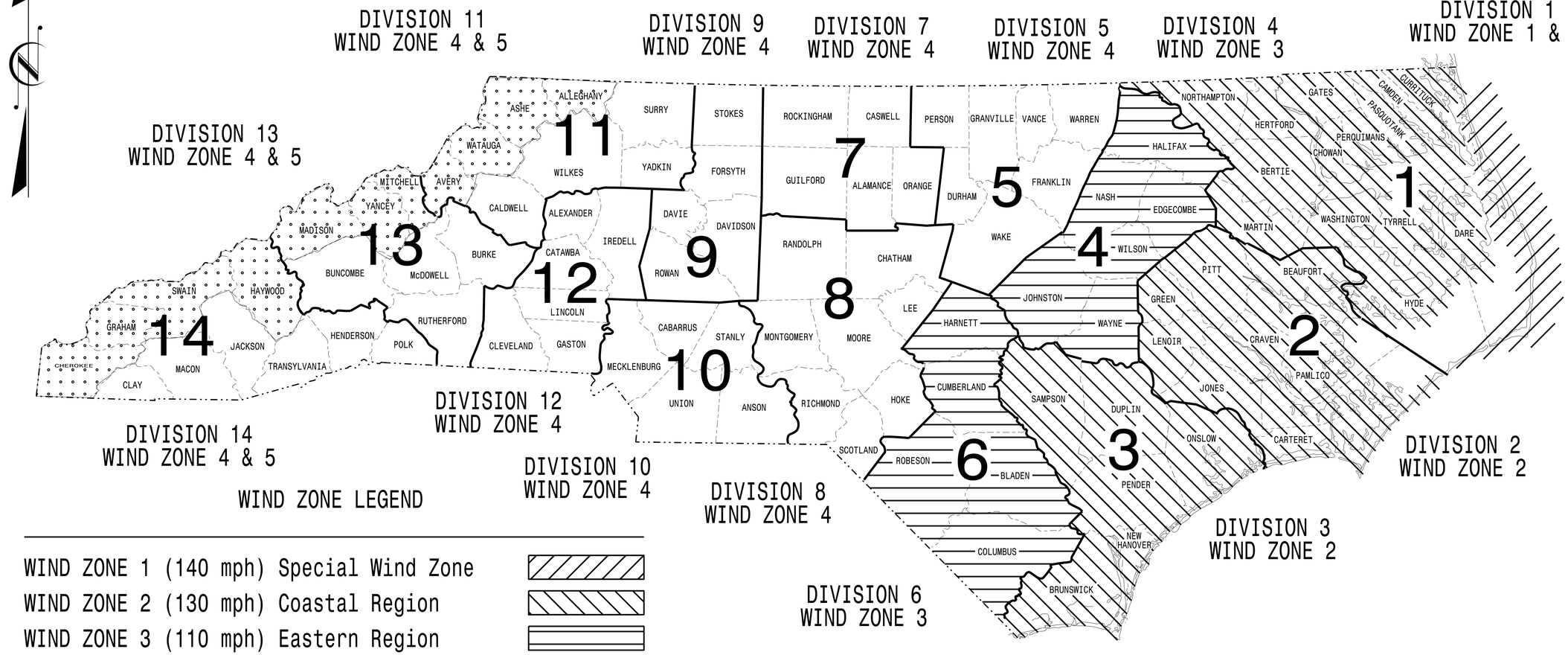
PROJECT I.D. NO.	SHEET NO.
W-5601FB	Sig.M1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STANDARD DRAWINGS FOR ALL METAL POLES

POLE STANDARDS

NCDOT METAL P



WIND ZONE LEGEND

WIND ZONE 1 (140 mph) Special Wind Zone	
WIND ZONE 2 (130 mph) Coastal Region	
WIND ZONE 3 (110 mph) Eastern Region	
WIND ZONE 4 (90 mph) Central & Mtn. Region	
WIND ZONE 5 (120 mph) Special Wind Zone	

https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

Prepared In the Offices of:

Transportation Mobility and Safety Division
Signal Design Section
STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

750 N.Greenfield Pkwy.
Garner,NC 27529

Designed in conformance with the latest 2015 Interim to the 6th Edition 2013

AASHTO

Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals

INDEX OF PLANS

NCDOT CONTACTS:

MOBILITY AND SAFETY DIVISION – ITS AND SIGNALS UNIT

G. A. FULLER, P.E. – STATE ITS AND SIGNALS ENGINEER

G. G. MURR, JR., P.E. – STATE SIGNALS ENGINEER

D.C. SARKAR, P.E. – ITS AND SIGNALS SENIOR STRUCTURAL ENGINEER

C.F. ANDREWS – ITS AND SIGNALS JOURNEY STRUCTURAL ENGINEER

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

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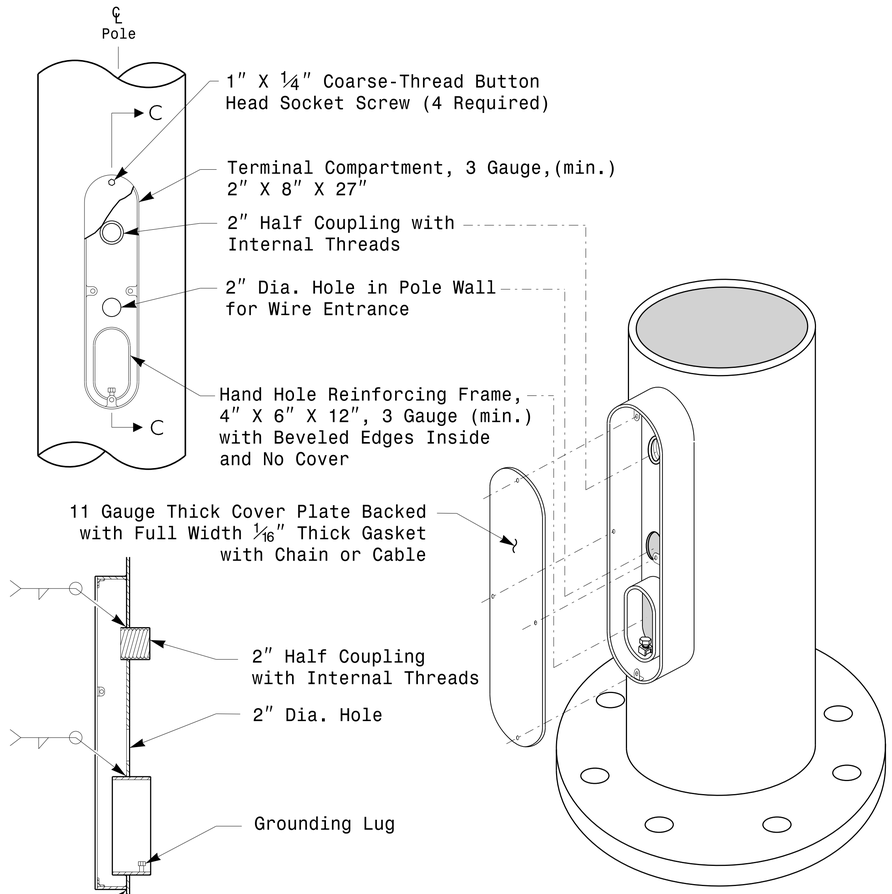
SIGNATURE

2/17/2016
DATE



Section C-C

Note: Unless otherwise specified, locate Terminal Compartment 1 foot above the pole base plate at 180 degrees on the pole's radial index.

Terminal Compartment Detail

MFG _____ MFG. DATE: MM/YY
SHAFT D/T/L/Y ----/----/----/----
ARM-A D/T/L/Y ----/----/----/----
----/----/----/----
ARM-B D/T/L/Y ----/----/----/----
----/----/----/----
A.B. DIA./B.C./L/Y ----/----/----/----
NCDOT SIG. INV. NO. _ _ _ _ _ _ _ _
NCDOT POLE NO. _ _ _ _ _ _ _ _

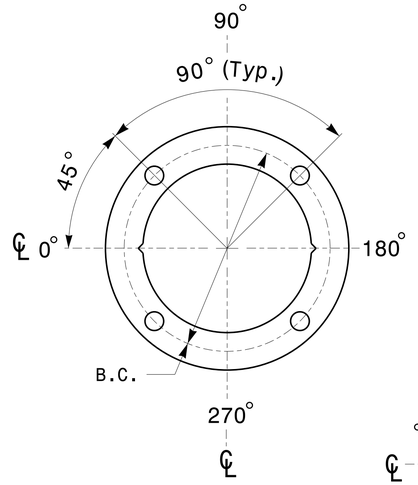
Shaft I.D. Tag
(Provide on Shaft of Strain Poles and Mast Arm Poles Shaft)

MFG _____ MFG. DATE: MM/YY
SECTION D/T/L/Y ----/----/----/----
NCDOT SIG. INV. NO. _ _ _ _ _ _ _ _
NCDOT POLE NO. _ _ _ _ _ _ _ _

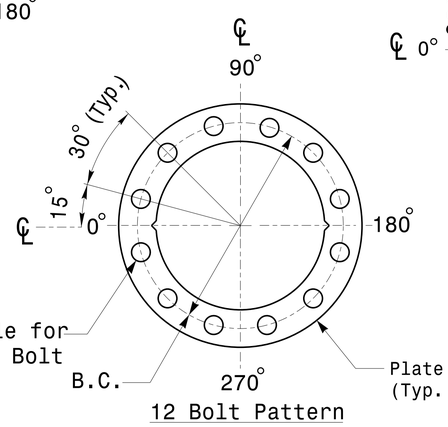
Arm I.D. Tag
(Provide on each section of a multi-section mast arm.)

Notes:
1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
2) A.B. = Anchor Bolt
3) B.C. = Bolt Circle of Anchor Bolts
4) If Custom Design, use "NCDOT STANDARD" line for Signal Inv. Number and pole I.D. number
5) See drawing M3 and M4 for mounting positions of I.D. tags.

Identification Tag Details

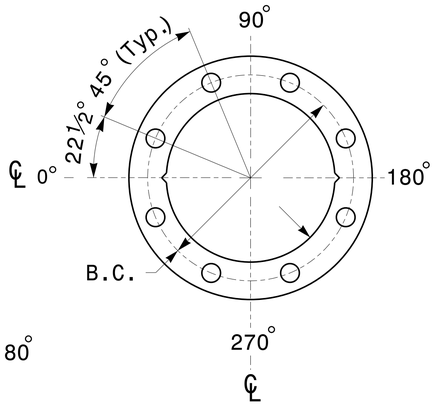


4 Bolt Pattern



2¼"" dia. hole for 2"dia. Anchor Bolt

12 Bolt Pattern

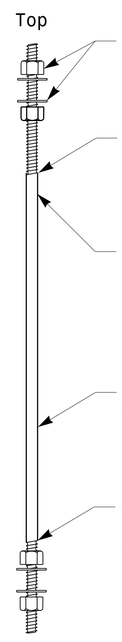


8 Bolt Pattern

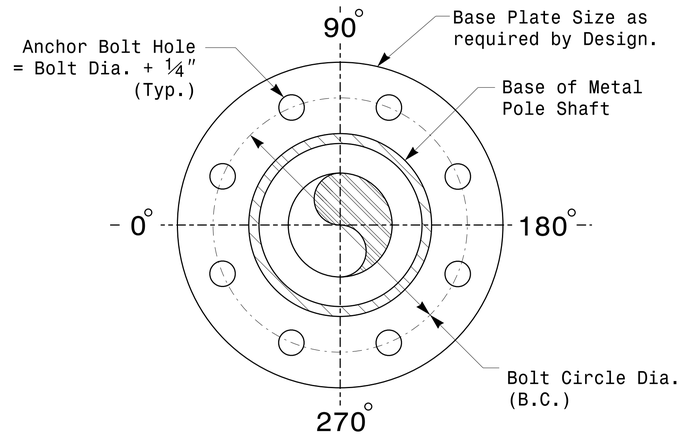
Plate Width = 4" min. (Typ. for all plates)

Construct Templates and Plates from ¼" min. thick Steel. Galvanizing is not required.

Base Plate Template and Anchor Bolt Lock Plate Details



Anchor Bolt Detail



Note: Base plate may be circular,octagonal,square or rectangular in shape.

Typical Base Plate Detail

Fabrication Details – All Metal Poles

PROJECT ID. NO.	SHEET NO.
W-5601FB	Sig.M2

Prepared in the Offices of: Transportation Mobility and Safety Division, North Carolina Department of Transportation, Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 NA NONE

Typical Fabrication Details For All Metal Poles

PLAN DATE: FEBRUARY 2016	DESIGNED BY: C.F.ANDREWS
PREPARED BY: N. BITTING	REVIEWED BY: D.C. SARKAR

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

DocuSigned by: Debesh C. Sarkar
SIGNATURE 44E8E32E147E4C4...
2/17/2016 DATE

17-FEB-2016 16:02
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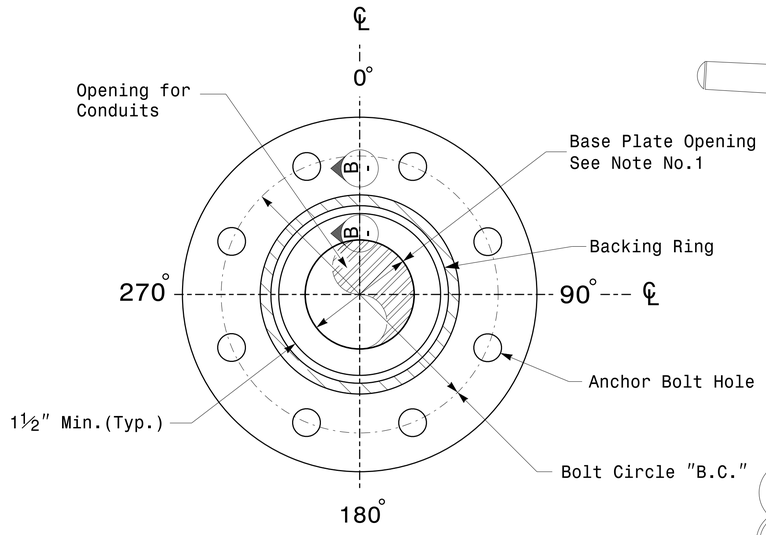
jgallaway

PROJECT ID. NO.	SHEET NO.
W-5601FB	Sig.M4

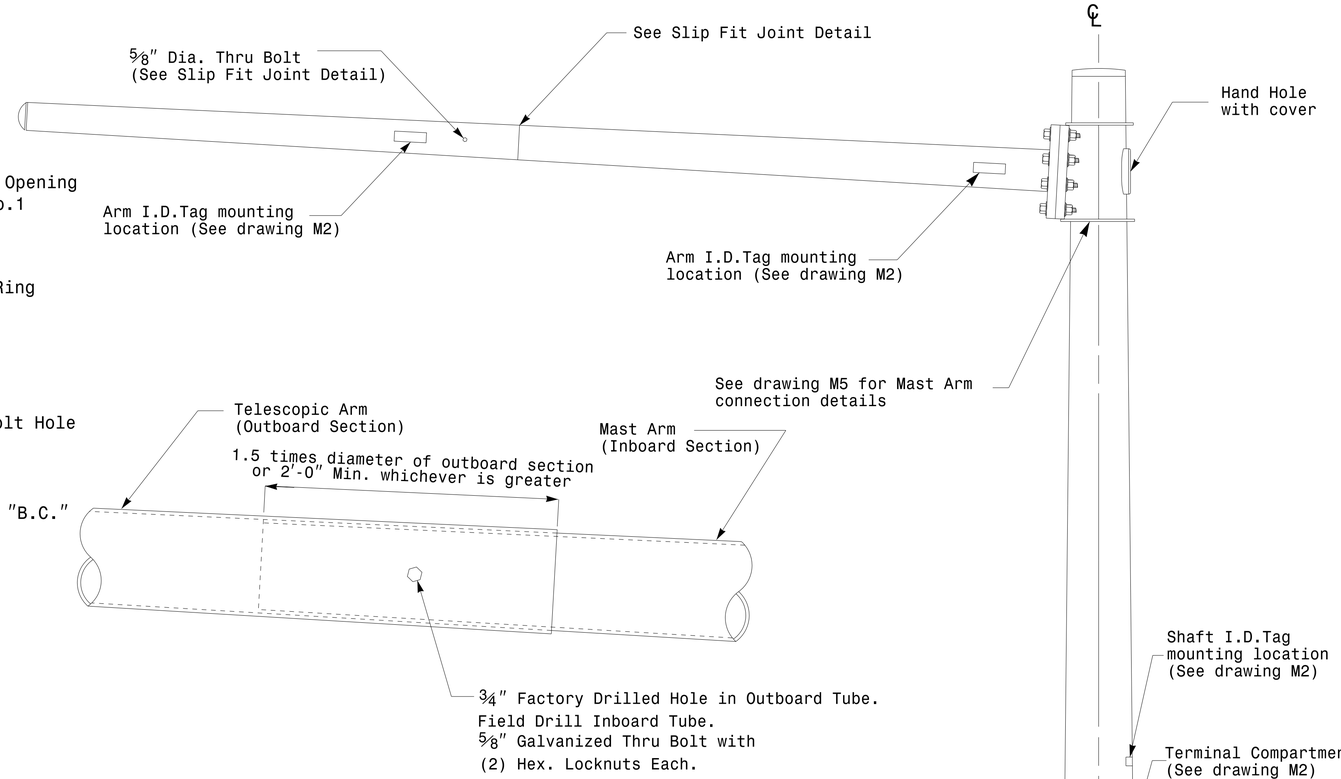
Fabrication Details – Mast Arm Poles

Note:
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3½" but shall not be less than 8½".

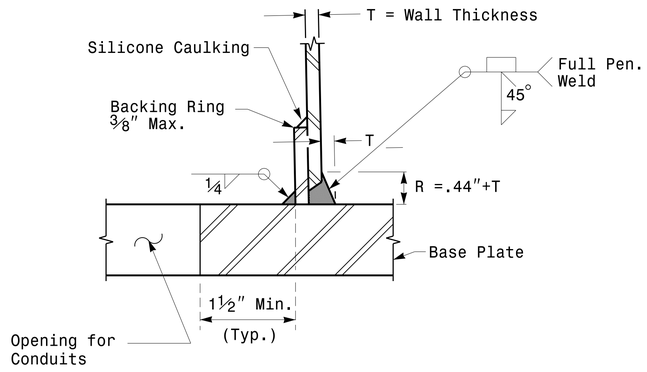


Section A-A

Pole Base Plate Details



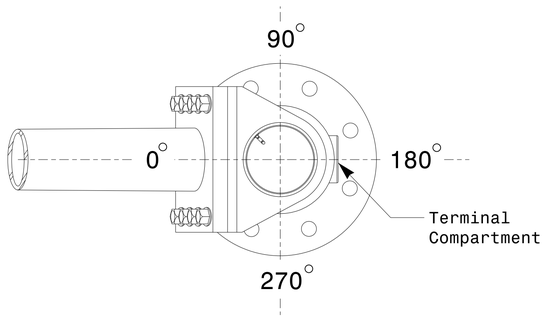
Slip Fit Joint Detail for Mast Arm



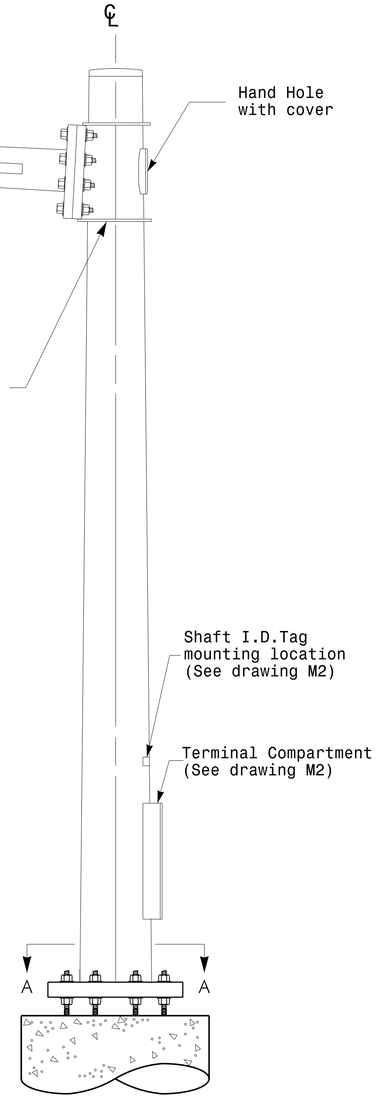
Section B-B

(Pole Attachment to Base Plate)

Full-Penetration Groove Weld Detail



Mast Arm Radial Orientation



Mast Arm Pole

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

SCALE: 0 NA NONE

Typical Fabrication Details For Mast Arm Poles

PLAN DATE:	FEBRUARY 2016	DESIGNED BY:	K.C.DURIGON
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

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2/17/2016
DATE

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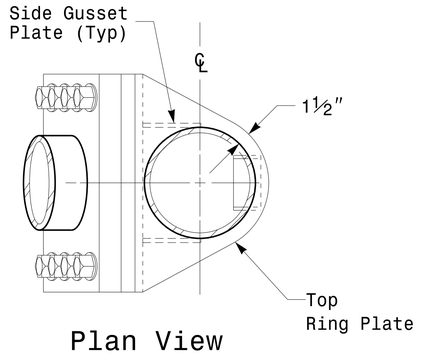
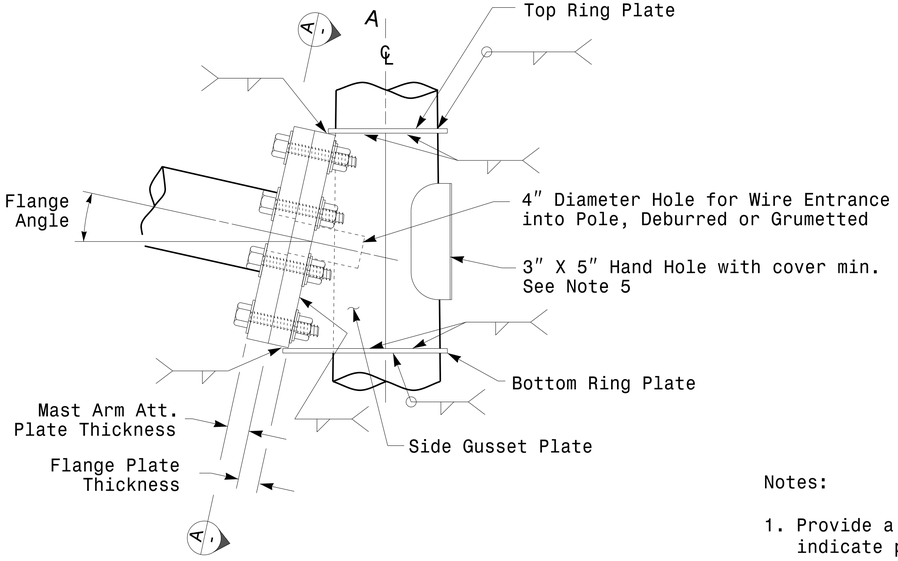
Welded Ring Stiffened Mast Arm Connection

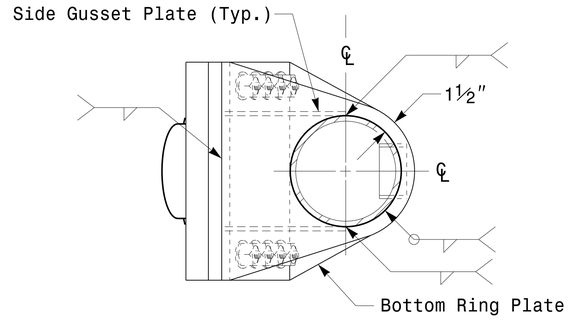
PROJECT ID. NO.	SHEET NO.
W-5601FB	Sig.M5



Plan View



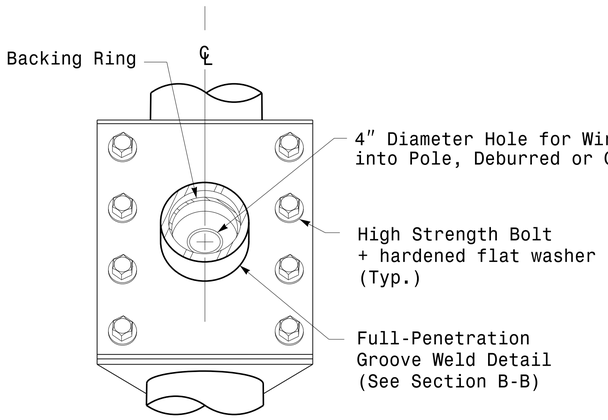
Side Elevation View



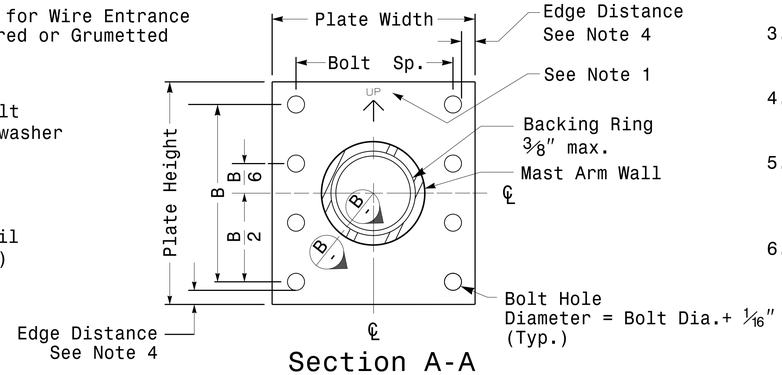
Bottom View

Notes:

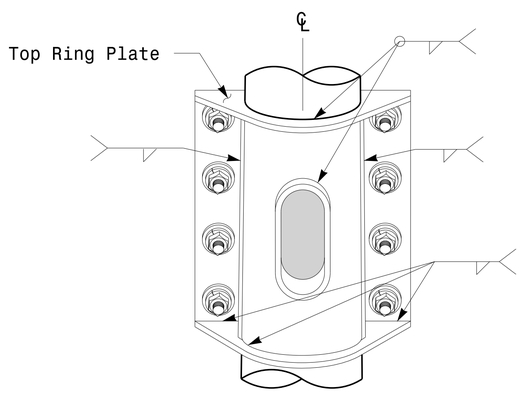
1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
3. Fabricator is responsible for providing appropriate holes at drainage points to drain galvanizing materials.
4. For minimum edge distance follow AISC Table J3.4 and J3.5. For nominal bolt hole size use Table J3.3.
5. Provide upper handhole as necessary when shaft extensions are reguired for luminaire arms or camera. For poles without luminaires/camera, wiring can be done through the top of pole.
6. Allowable range of flange tilt angle will vary from 0° to as required.



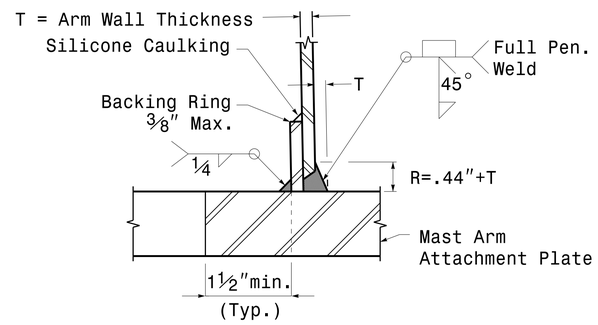
Front Elevation View



Section A-A
Mast Arm Attachment Plate



Back Elevation View



Section B-B
Full-Penetration Groove Weld Detail

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

Typical Fabrication Details For Mast Arm Connection To Pole

PLAN DATE:	FEBRUARY 2016	DESIGNED BY:	C.F.ANDREWS
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

SCALE: 0 NA — NONE

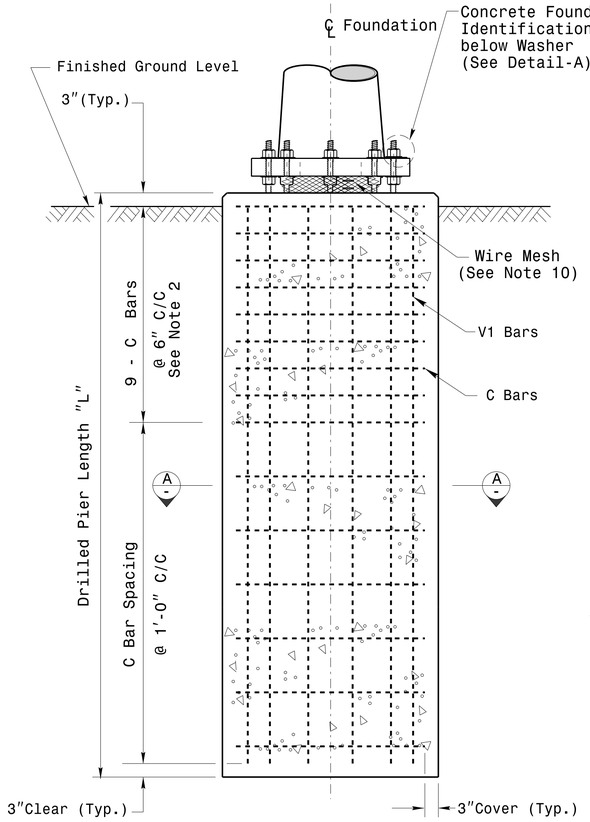
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

DocuSigned by: Debesh C. Sarkar
SIGNATURE 44E8E32E147E4C4...
2/17/2016
DATE

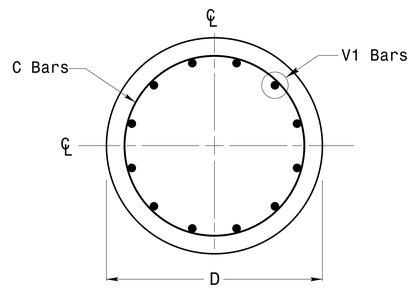
Fabrication Details — Mast Arm Connection

PROJECT ID. NO.	SHEET NO.
W-5601FB	Sig.M7

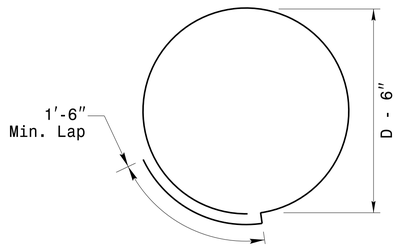
Construction Details – Foundations



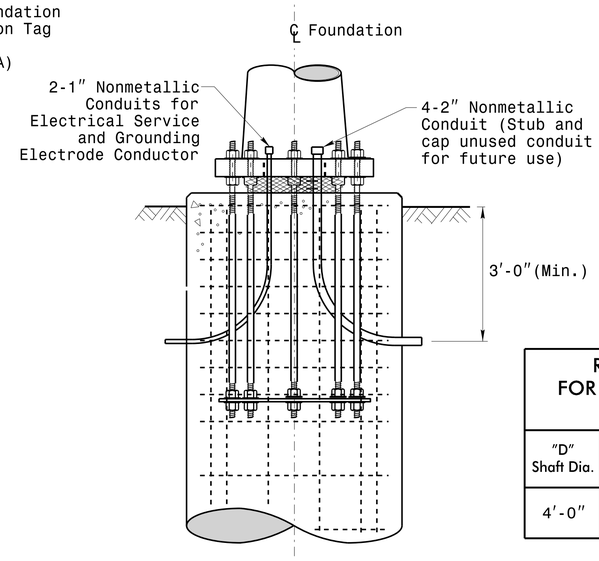
Concrete Shaft Elevation



Section A-A



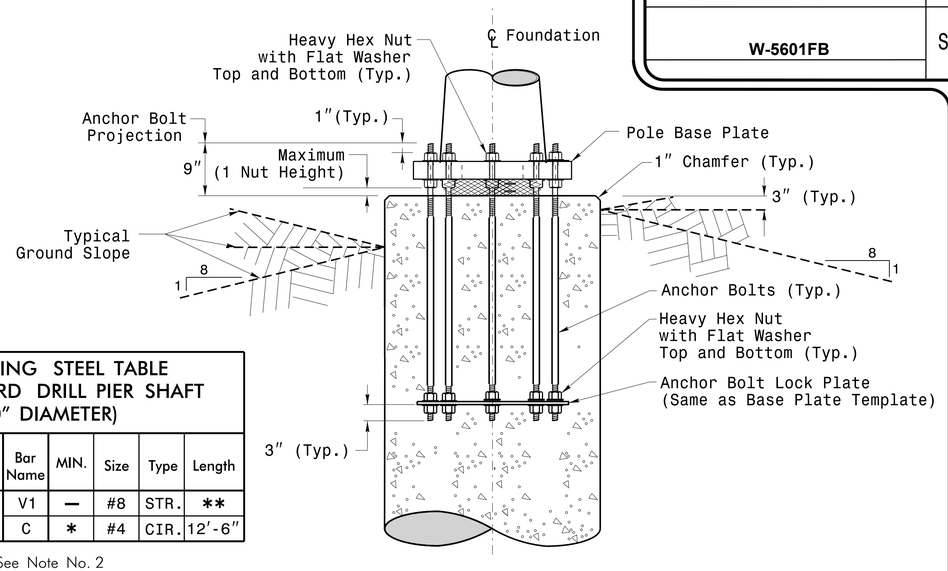
Typical "C" Bar Detail



Typical Foundation Conduit Details

REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (4′–0″ DIAMETER)						
"D" Shaft Dia.	Conc. Volume (cu. yds.)	Bar Name	MIN.	Size	Type	Length
4′-0″	.465 x L	V1	—	#8	STR.	**
		C	*	#4	CIR.	12′-6″

* See Note No. 2
** See Note No. 3



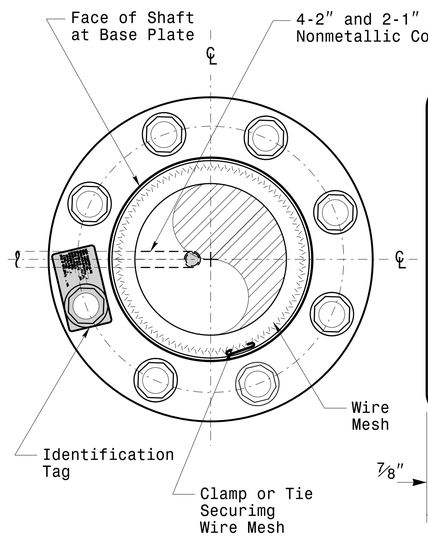
Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)

General Notes:

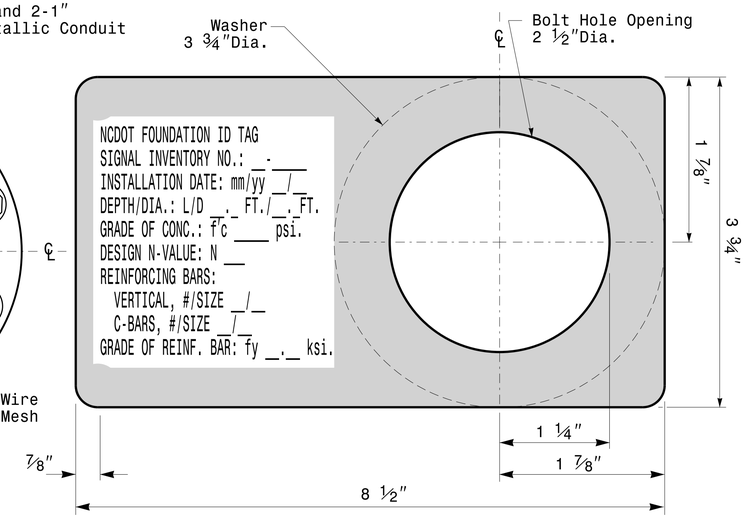
1. If actual subsurface conditions differ significantly from boring data contact the Engineer before excavating or placing concrete.
2. Circular tie reinforcing rings may be vertically adjusted by +/-3″ at a depth between 2′-0″ and 3′-0″ to facilitate the installation of electrical conduit entering in the cage.
3. For standard foundations, see sheet Sig. M8 for details. Vertical reinforcing bars (V1) may be horizontally adjusted by +/-3″ to facilitate the installation of electrical conduit entering into the cage.
4. Provide 2″ to 5″ foundation projection above ground level depending on the ground slope.
5. Unless otherwise shown, foundation designs are based on non-sloping level ground surfaces with slope ratios of 8:1 (H:V) or flatter. If actual ground line slopes are steeper contact the Engineer before excavating or placing concrete.
6. Construct foundations in accordance with NCDOT Standard Provisions SP09 R005- Foundations and Anchor Rod Assemblies for Metal Poles. All applicable 2012 NCDOT Standard Specifications are referenced in this provision. Refer to the NCDOT Resources/Specifications page located on the Connect NCDOT website.

   https://connect.ncdot.gov/resources/Specifications and Special Provisions.aspx
7. Use air entrained AA concrete mix with a compression strength of f′c=4500 psi.(min.) after 28 days.
8. Use ASTM A615 grade 60 deformed bars for all reinforcing steel. Maintain at least 3″ cover on all reinforcement.
9. Locate the Identification Tag on the top of the base plate, directly above the conduit's entry point.
10. Provide two layers of galvanized welded 23 gauge (0.25) 6″ wide 4 mesh wire around pipes under the base plate and secure it with ties if necessary.
11. Preferred location for the I.D. Tag is as shown in Detail-A; directly above the conduit entering the foundation.



D = Diameter
L = Length/Depth
mm = Month
yy = Year

Detail-A



Concrete Foundation Identification Tag Details

Prepared in the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering Branch
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

Construction Details For Foundations

PLAN DATE:	FEBRUARY 2016	DESIGNED BY:	C.B.COGDELL
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REV. NO.	COMMENTS	INIT.	DATE
1	Revised Foundation Tag Details	N.B.	5/11/2015

SCALE
0 NA
NONE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

DocuSigned by:
Debesh C. Sarkar
SIGNATURE
44E8E32E147E4C4...

2/17/2016
DATE

17-FEB-2016 16:10
S:\ITS&SU\ITS Signals\Signal Design Section\Eastern Region\MU Sheets\2016\2014 Sig.M7 Std. Construction Details-Strain Poles.dgn
jsullowa2

PROJECT NO.	SHEET NO.
W-5601FB	Sig. P1

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

06-14

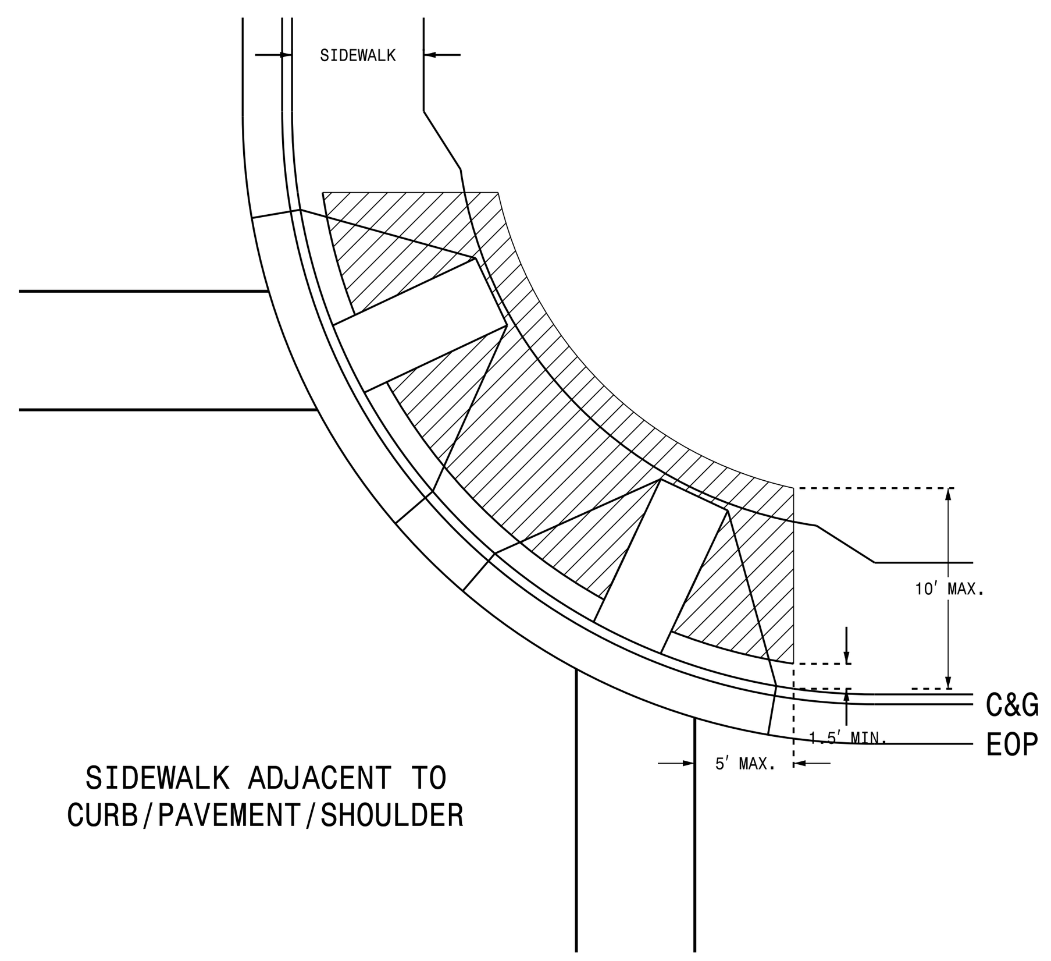
ENGLISH DETAIL DRAWING FOR

PEDESTRIAN PUSHBUTTON LOCATIONS

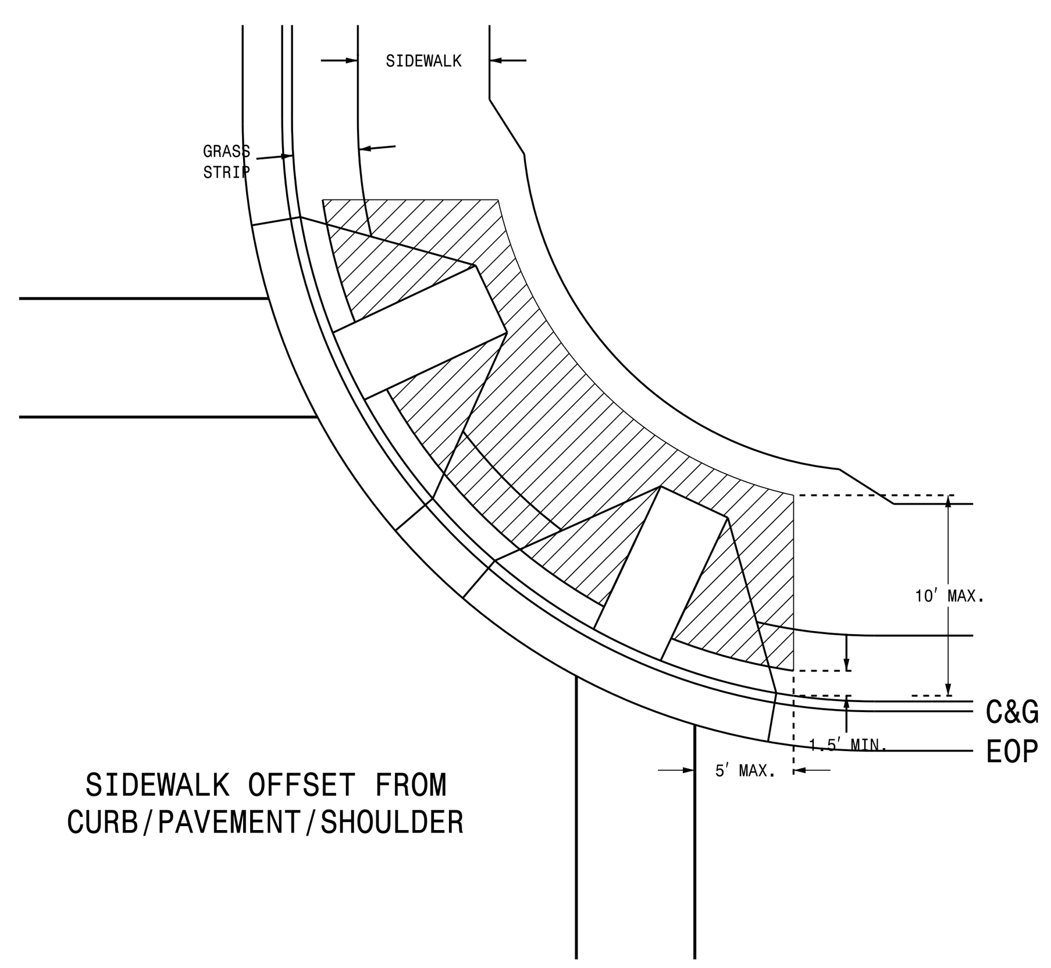
PLACEMENT DETAIL

PUSHBUTTON PLACEMENT

SEPARATE CURB RAMPS



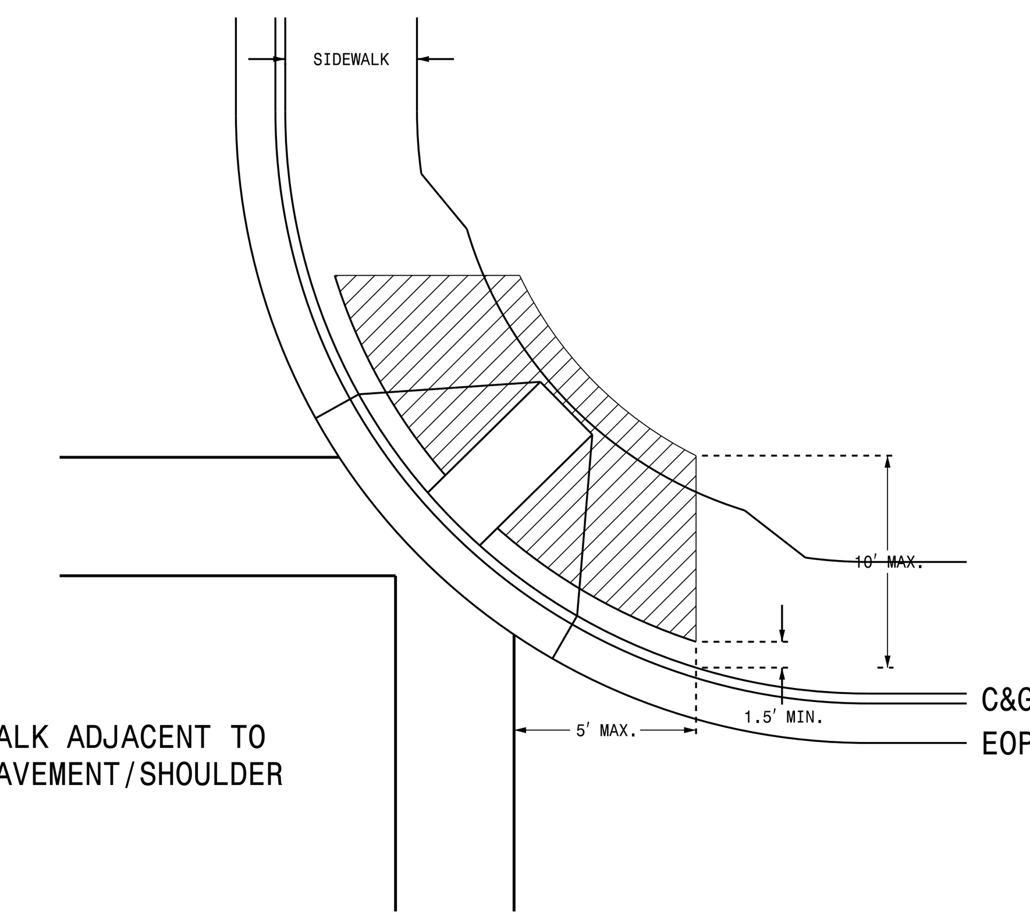
SIDEWALK ADJACENT TO CURB/PAVEMENT/SHOULDER



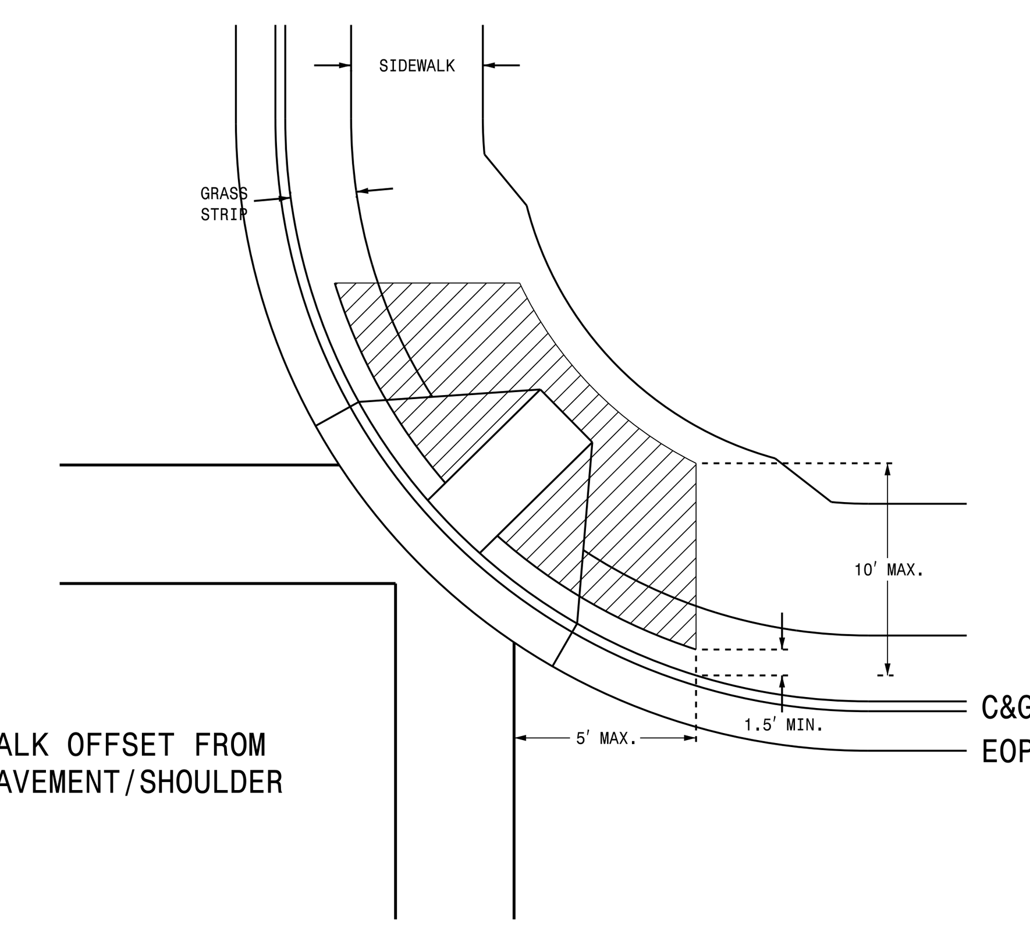
SIDEWALK OFFSET FROM CURB/PAVEMENT/SHOULDER

PUSHBUTTON PLACEMENT

SHARED CURB RAMP



SIDEWALK ADJACENT TO CURB/PAVEMENT/SHOULDER



SIDEWALK OFFSET FROM CURB/PAVEMENT/SHOULDER

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 2012 NCDOT Roadway Standard Drawings for Pushbutton Assembly details.
7. Refer to section 1743 of the 2012 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.

LEGEND

PROPOSED

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

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

06-14

ENGLISH DETAIL DRAWING FOR
PEDESTRIAN PUSHBUTTON LOCATIONS
PLACEMENT DETAIL

SHEET 1 OF 3

1705D01

SHEET 1 OF 3

1705D01

See Plate for Title

Prepared in the Offices of:

Transportation Mobility and Safety Division
Signal Design Section

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 026486
ROBERT J. ZIEMBA

SIGNATURE | DATE 6/17/2014

PROJECT NO.	SHEET NO.
W-5601FB	Sig. P2

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

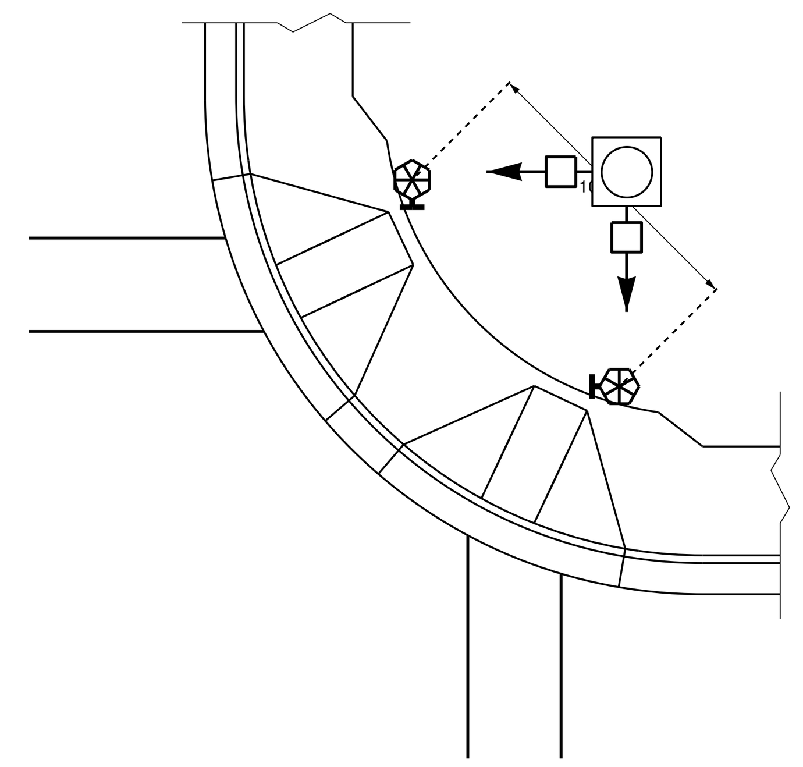
06-14

ENGLISH DETAIL DRAWING FOR
PEDESTRIAN PUSHBUTTON LOCATIONS
PLACEMENT DETAIL

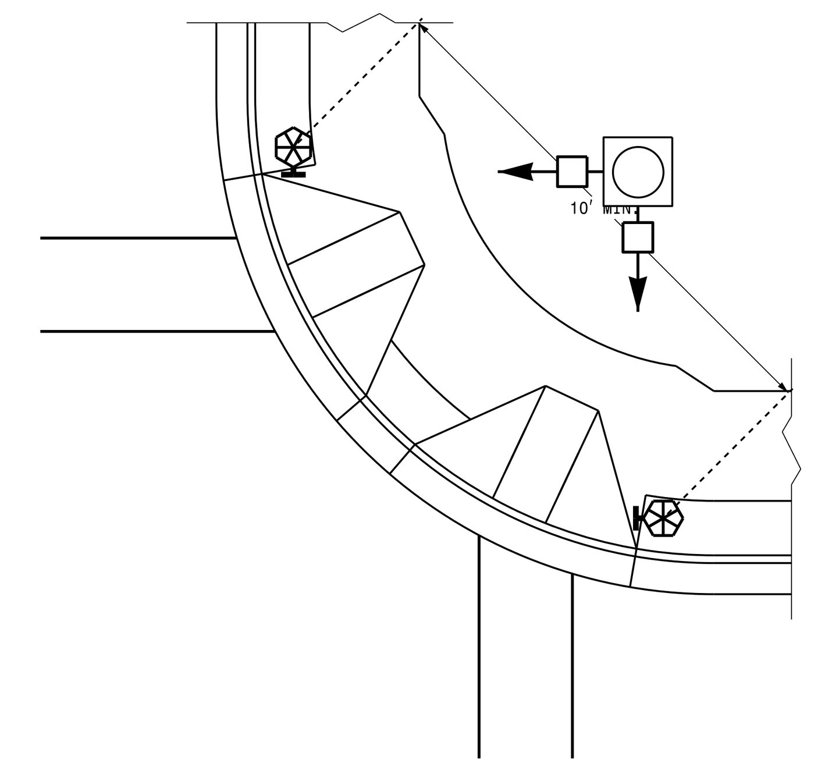
SHEET 2 OF 3
1705D01

TYPICAL PUSHBUTTON LOCATIONS (CASE I)

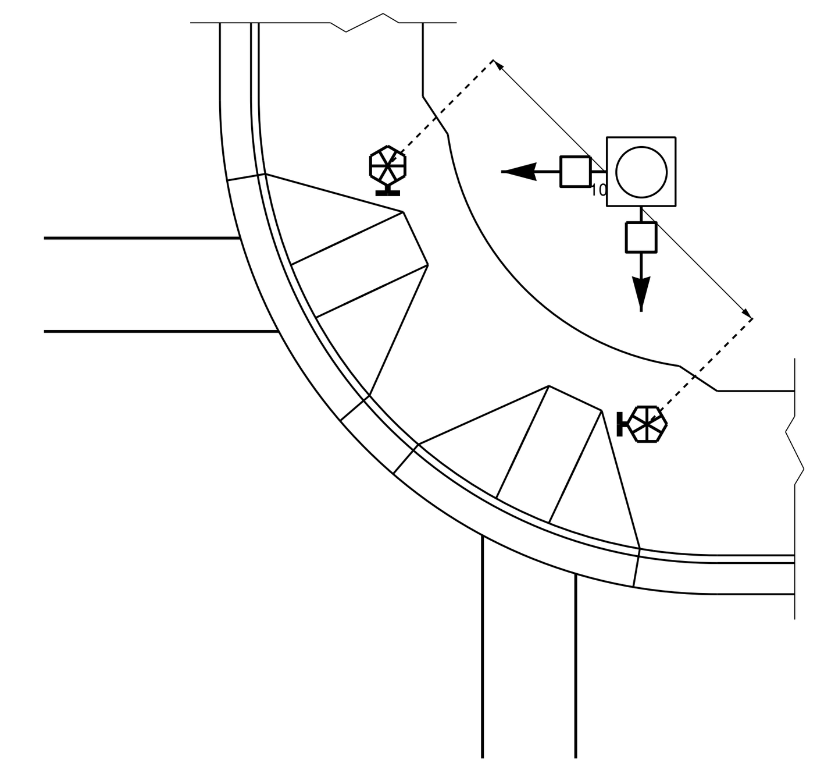
SEPARATE CURB RAMPS W/ TYPE I PEDESTALS



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

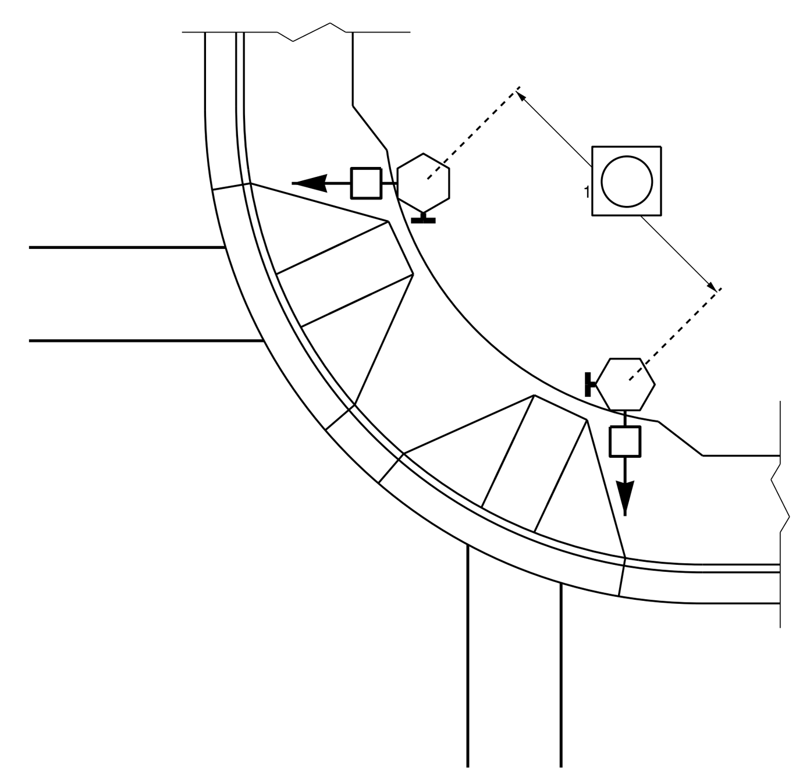
LEGEND

PROPOSED

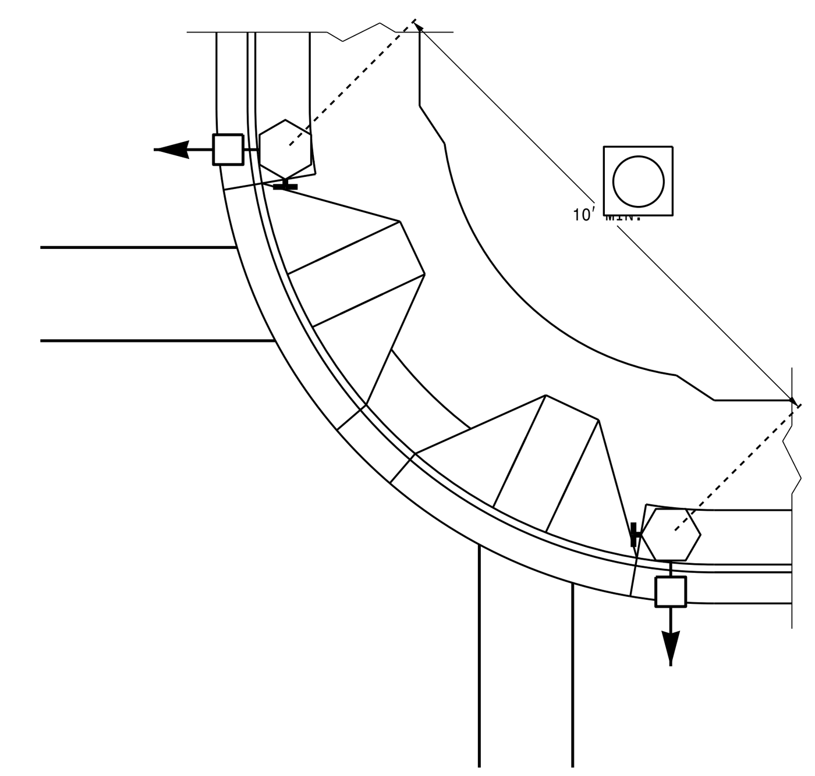
- Signal Pole
- Type I Pushbutton Post
- Type II Signal Pedestal
- Pushbutton & Sign
- Pedestrian Signal Head
- Curb Ramp
- Pushbutton Location Area

TYPICAL PUSHBUTTON LOCATIONS (CASE II)

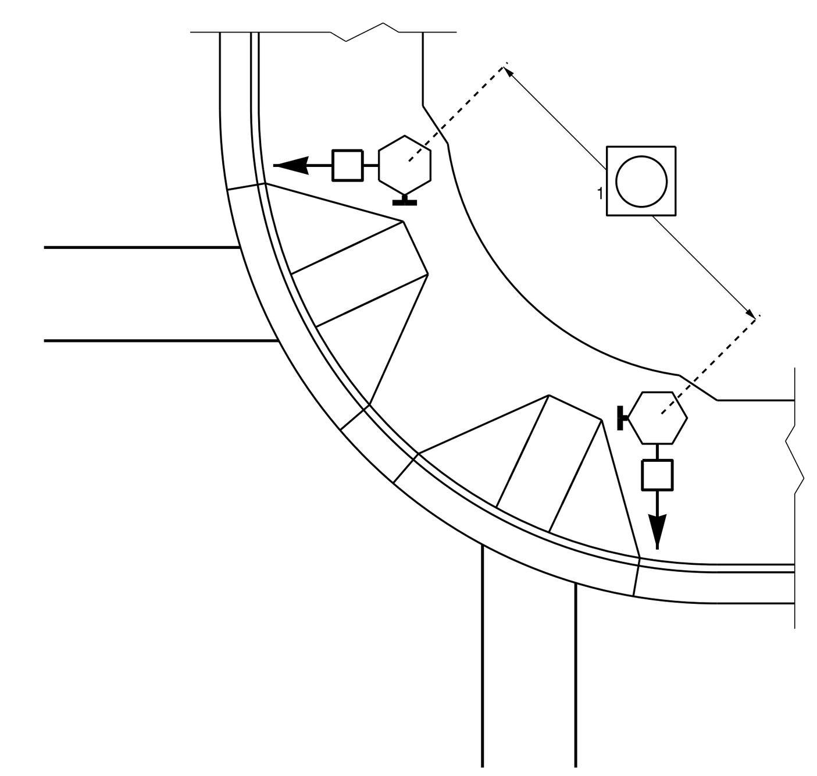
SEPARATE CURB RAMPS W/ TYPE II PEDESTALS



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



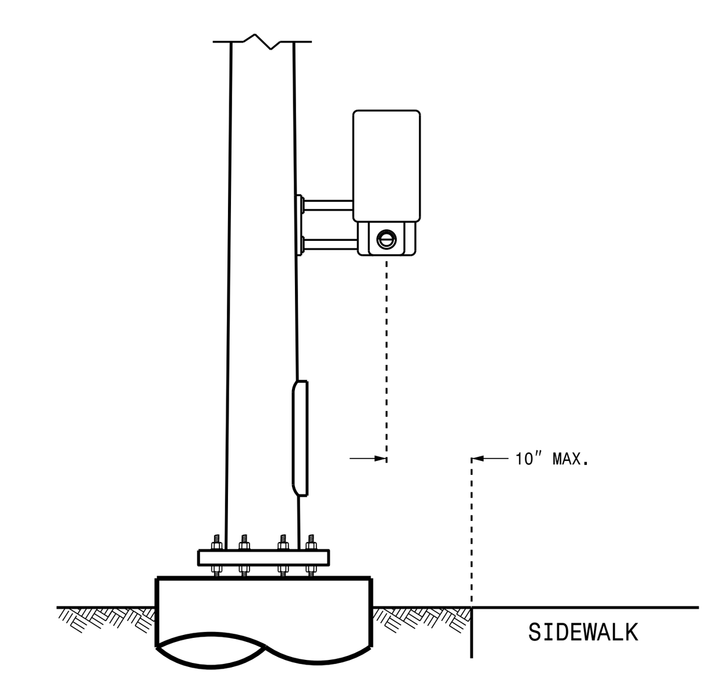
GRASS STRIP PLACEMENT IF BACK
OF SIDEWALK EXCEEDS 10' FROM
CURB OR PAVEMENT/SHOULDER



PUSHBUTTON PLACEMENT
IN WIDE SIDEWALK

OPTIONAL PUSHBUTTON EXTENSION

FACE OF PUSHBUTTON PARALLEL TO
APPLICABLE CROSSWALK



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

06-14

ENGLISH DETAIL DRAWING FOR
PEDESTRIAN PUSHBUTTON LOCATIONS
PLACEMENT DETAIL

SHEET 2 OF 3
1705D01

See Plate for Title

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N. Greenfield Parkway
Garner, NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 026486
ROBERT J. ZIEMBA

DocuSigned by:

SIGNATURE	DATE
	6/17/2014

PROJECT NO.	SHEET NO.
W-5601FB	Sig. P3

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

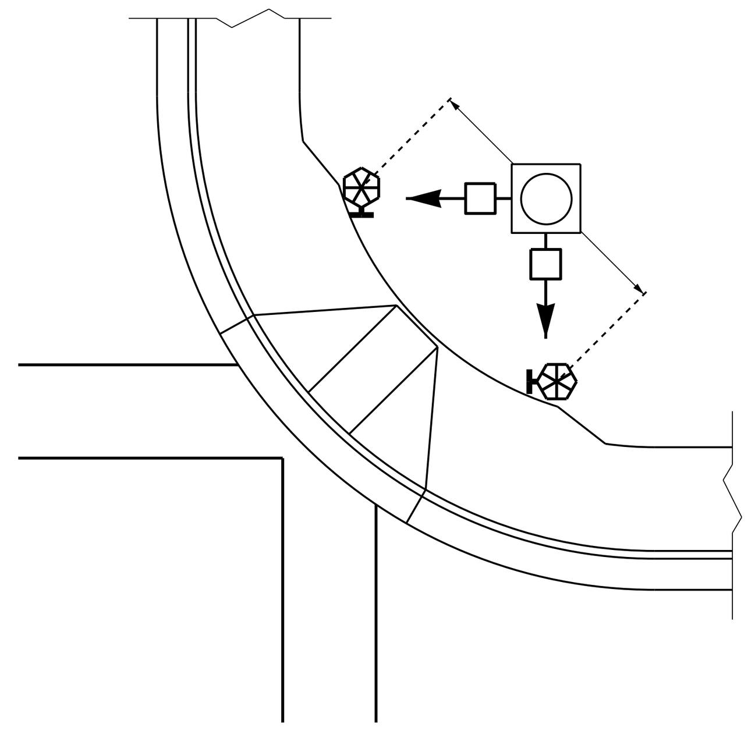
06-14

ENGLISH DETAIL DRAWING FOR
PEDESTRIAN PUSHBUTTON LOCATIONS
PLACEMENT DETAIL

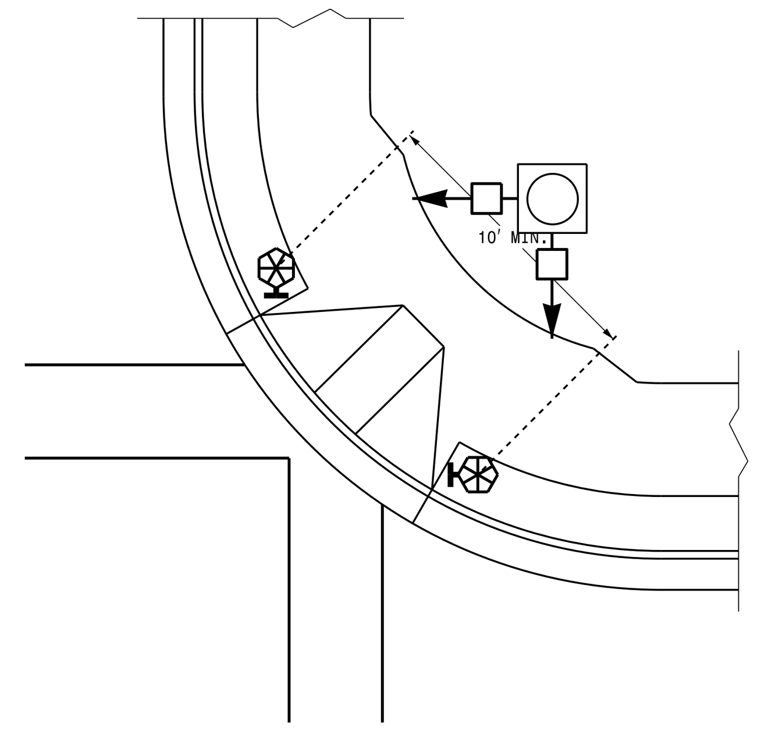
SHEET 3 OF 3
1705D01

TYPICAL PUSHBUTTON LOCATIONS (CASE III)

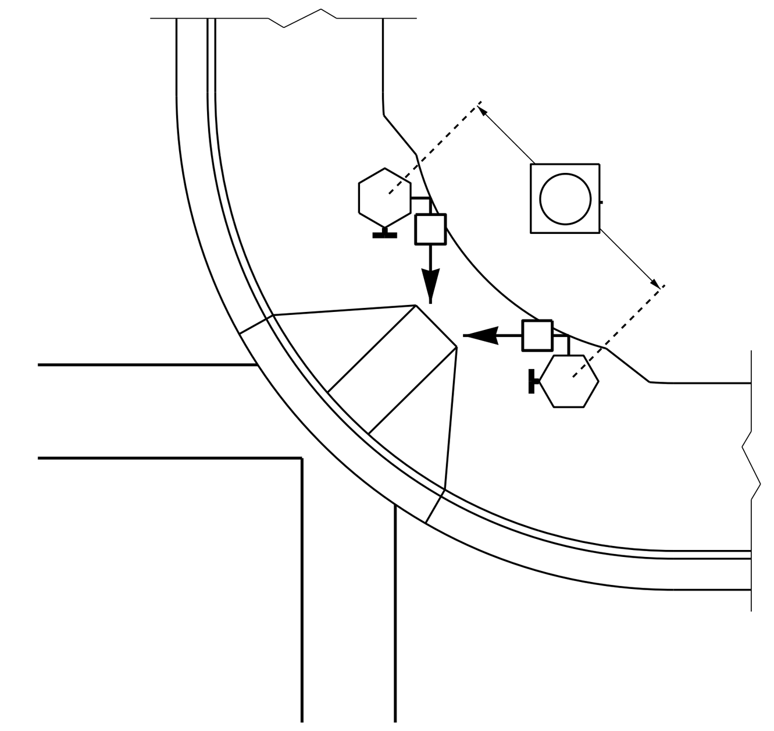
SHARED CURB RAMPS



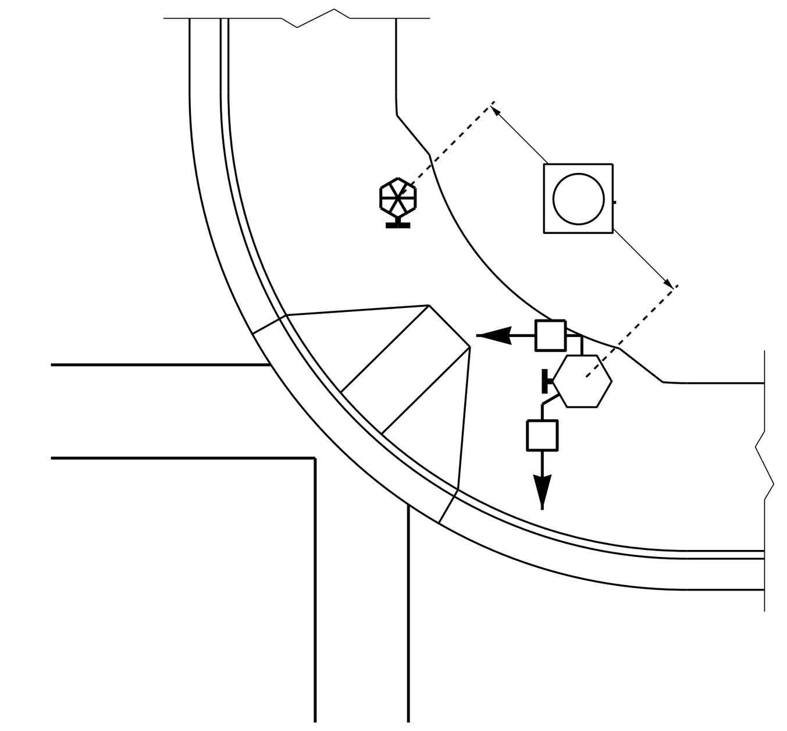
BACK OF SIDEWALK IS WITHIN 10' OF CURB OR PAVEMENT/SHOULDER



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

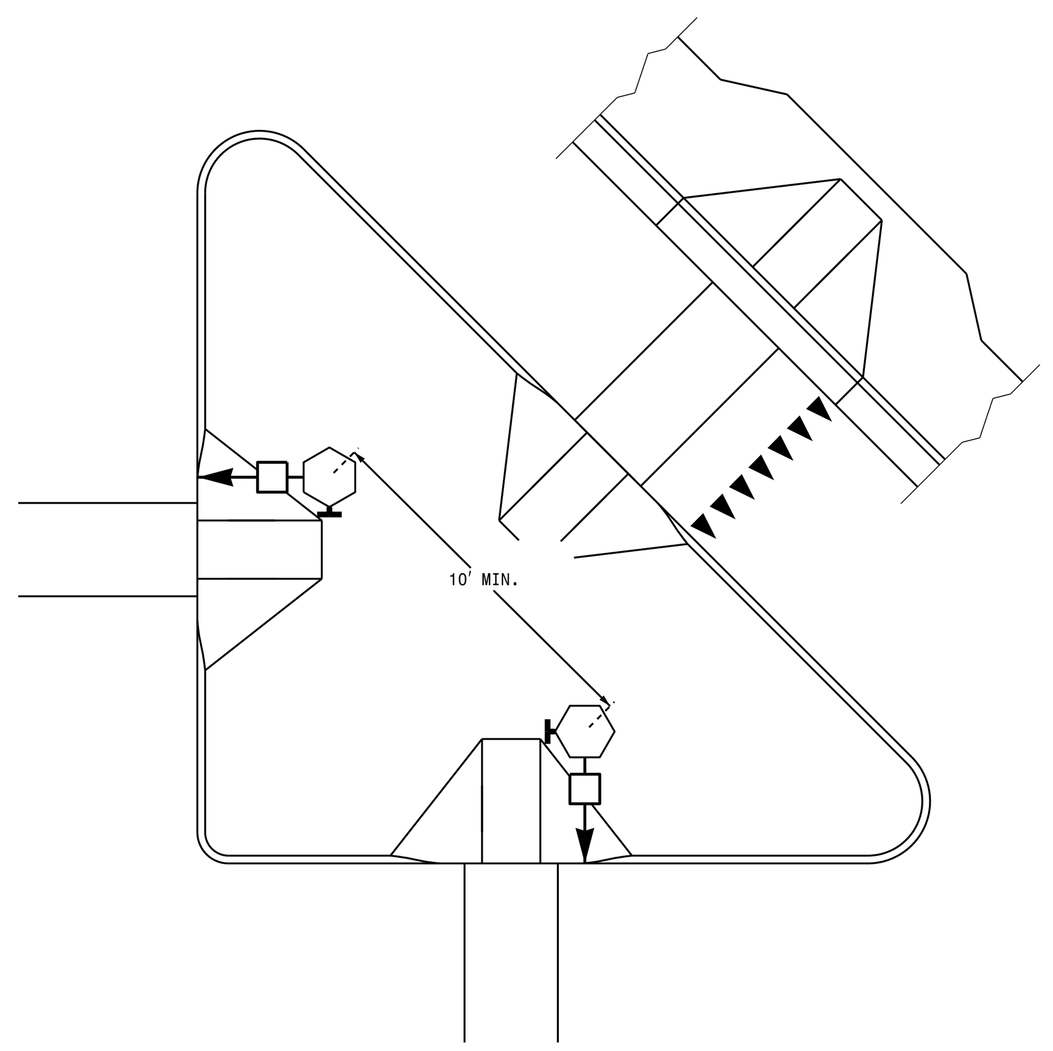


PUSHBUTTON PLACEMENT IN WIDE SIDEWALK (CORRESPONDING PUSHBUTTONS AND SIGNAL HEADS ON DIFFERENT PEDESTALS)

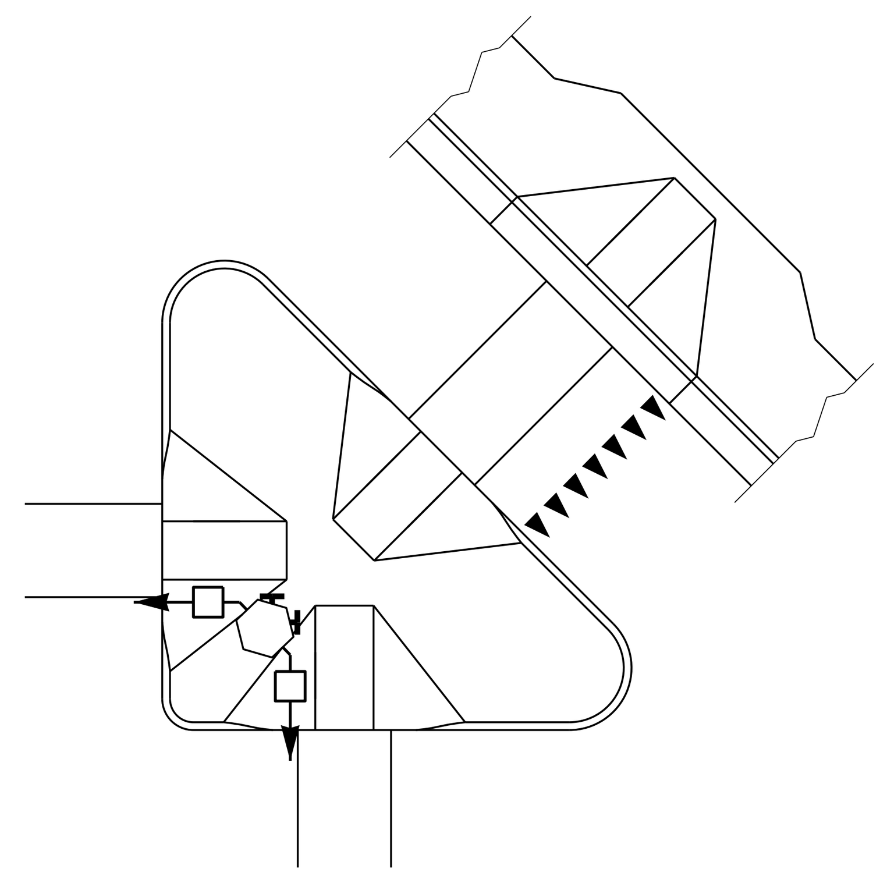


PUSHBUTTON PLACEMENT WITH SHARED TYPE II SIGNAL PEDESTAL AND TYPE I PUSHBUTTON POST

TRAFFIC ISLAND PUSHBUTTON LOCATIONS

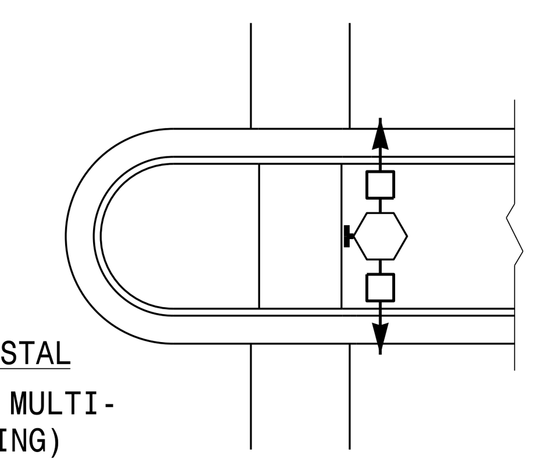


PUSHBUTTON PLACEMENT IN LARGE "PORK CHOP ISLAND" WITH SEPARATE PEDESTALS

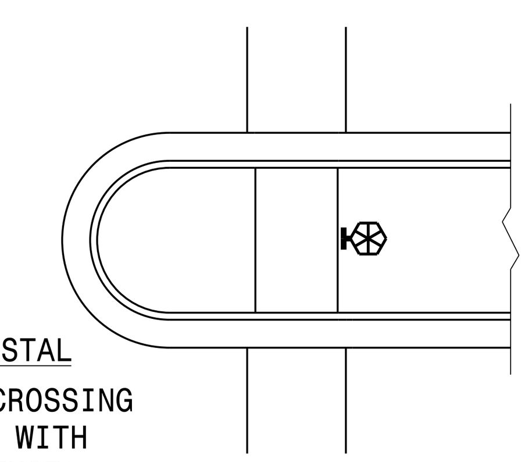


PUSHBUTTON PLACEMENT IN SMALL "PORK CHOP ISLAND" WITH SHARED PEDESTAL

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)

LEGEND

PROPOSED

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

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

06-14

ENGLISH DETAIL DRAWING FOR
PEDESTRIAN PUSHBUTTON LOCATIONS
PLACEMENT DETAIL

SHEET 3 OF 3
1705D01

See Plate for Title

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N. Greenfield Parkway
Garner, NC 27529

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

6/17/2014

SIGNATURE | DATE

PROJECT REFERENCE NO.	SHEET NO.
W-5601FB	SCP 1

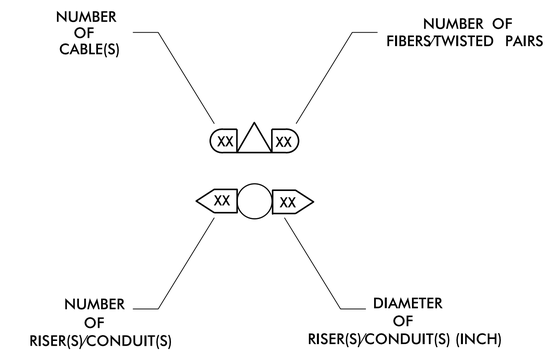
1. INSTALL REA, PE – 22, SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
2. INSTALL REA, PE – 38, (FIGURE 8) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
3. INSTALL REA, PE – 39, (UNDERGROUND) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
4. INSTALL SMFO CABLE
5. INSTALL MMFO CABLE
6. INSTALL FIBER OPTIC DROP CABLE
7. INSTALL TRACER WIRE
8. TRENCH
9. INSTALL PVC CONDUIT
10. INSTALL RIGID, GALVANIZED STEEL CONDUIT
11. INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
12. INSTALL RIGID, GALVANIZED STEEL RISER WITH FIBER OPTIC CABLE SEAL
13. INSTALL OUTER–DUCT POLYETHYLENE CONDUIT
14. INSTALL POLYETHYLENE CONDUIT
15. DIRECTIONAL DRILL CONDUIT
16. BORE AND JACK CONDUIT
17. INSTALL CABLE(S) IN EXISTING CONDUIT
18. INSTALL CABLE(S) IN NEW CONDUIT
19. INSTALL CABLE(S) IN EXISTING RISER
20. INSTALL CABLE(S) IN NEW RISER
21. INSTALL CABLE(S) IN EXISTING CONDUIT STUB–OUTS
22. INSTALL NEW CONDUIT INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB–OUTS WHEN AVAILABLE)
23. INSTALL NEW RISER INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB–OUTS WHEN AVAILABLE)
24. INSTALL NEW CONDUIT INTO EXISTING POLE MOUNTED CABINET
25. INSTALL NEW RISER INTO EXISTING POLE MOUNTED CABINET
26. TERMINATE COMMUNICATIONS CABLE ON EXISTING TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
27. INSTALL NEW TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
28. INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS AND FUSION SPLICE CABLE IN CABINET
29. INSTALL UNDERGROUND SPLICE ENCLOSURE
30. INSTALL AERIAL SPLICE ENCLOSURE
31. INSTALL POLE MOUNTED SPLICE CABINET
32. INSTALL BASE MOUNTED SPLICE CABINET
33. REMOVE EXISTING SPLICE CABINET
34. INSTALL CABINET FOUNDATION
35. REMOVE EXISTING CABINET FOUNDATION
36. INSTALL CCTV CAMERA ASSEMBLY
37. INSTALL CCTV CAMERA WOOD POLE
38. INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
39. INSTALL JUNCTION BOX
40. INSTALL OVERSIZED JUNCTION BOX
41. REMOVE EXISTING JUNCTION BOX
42. INSTALL WOOD POLE
43. REMOVE EXISTING WOOD POLE
44. INSTALL AERIAL GUY ASSEMBLY
45. INSTALL STANDARD GUY ASSEMBLY
46. INSTALL SIDEWALK GUY ASSEMBLY
47. INSTALL MESSENGER CABLE
48. REMOVE EXISTING COMMUNICATIONS AND MESSENGER CABLE
49. REMOVE EXISTING MESSENGER CABLE
50. INSTALL TELEPHONE SERVICE
51. INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
52. INSTALL DELINEATOR MARKER
53. STORE 20 FEET OF COMMUNICATIONS CABLE
54. LASH CABLE(S) TO EXISTING SIGNAL/COMMUNICATIONS CABLE
55. LASH CABLE(S) TO EXISTING MESSENGER CABLE
56. LASH CABLE(S) TO NEW MESSENGER CABLE
57. MODIFY EXISTING ELECTRICAL SERVICE
58. INSTALL NEW ELECTRICAL SERVICE
59. INSTALL ETHERNET SWITCH

LEGEND

- FO — NEW FIBER OPTIC COMMUNICATIONS CABLE
- TWIST PR — NEW TWISTED PAIR COMMUNICATIONS CABLE
- EXI — EXISTING COMMUNICATIONS CABLE
- REM — EXISTING COMMUNICATIONS CABLE TO BE REMOVED
- NEW AERIAL GUY ASSEMBLY
- NEW CONDUIT
- EXISTING CONDUIT
- DD — NEW DIRECTIONAL DRILLED CONDUIT
- B&J — NEW BORED AND JACKED CONDUIT
- NEW JUNCTION BOX
- EXISTING JUNCTION BOX
- NEW WOOD POLE
- EXISTING WOOD POLE
- (S) AERIAL SPLICE ENCLOSURE
- NEW METAL POLE
- EXISTING METAL POLE
- NEW CCTV ASSEMBLY
- NEW STANDARD GUY ASSEMBLY
- NEW SIDEWALK GUY ASSEMBLY
- NEW CABLE STORAGE RACKS (SNOW SHOES)
- EXISTING CONTROLLER AND CABINET
- S EXISTING SPLICE CABINET
- S NEW SPLICE CABINET
- SP SIGNAL POLE
- XX–XXXX SIGNAL INVENTORY NUMBER

CONSTRUCTION NOTE SYMBOLOGY KEY

- (XX) INDICATES NUMBER OF CABLES, LOOPS, ETC.
- XX INDICATES NUMBER OF FIBERS PER CABLE, TWISTED PAIRS PER CABLE, ETC.
- XX INDICATES NUMBER OF RISER(S)/CONDUIT(S)
- XX INDICATES DIAMETER OF RISER(S)/CONDUIT(S) (INCH)



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of:

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION — Transportation Mobility and Safety Division — Traffic Engineering Branch — Traffic Signal Systems Section

750 N. Greenfield Pkwy. , Garner, NC 27529

CONSTRUCTION NOTES

DIVISION 5 WAKE CO. CITY OF RALEIGH

PLAN DATE: JUNE 2016 REVIEWED BY:

PREPARED BY: I. N. AVERY

REVISIONS	INIT.	DATE

SEAL

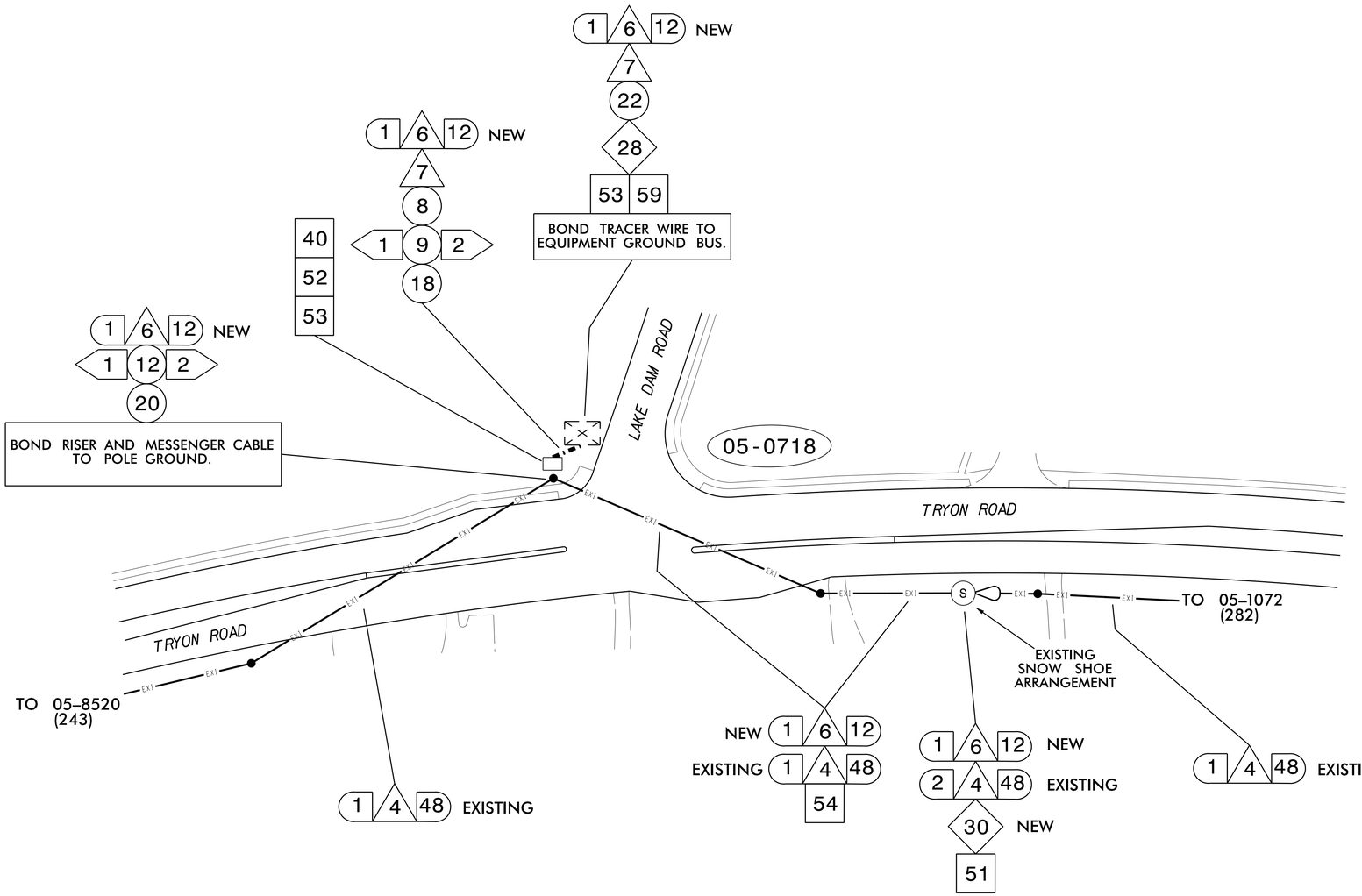
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

DocuSigned by: Gregory A. Fuller 6/15/2016

SIGNATURE DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
W-5601FB	SCP 2



NOTES:

1) FIVE (5) DAYS PRIOR TO BEGINNING WORK ON THE SIGNAL SYSTEM, CONTACT THE CITY OF RALEIGH, TRANSPORTATION ENGINEER, JED NIFFENEGGER, AT (919) 996–4039 TO ARRANGE FOR THE CITY OF RALEIGH TO PROGRAM THE NEW FIELD ETHERNET SWITCH WITH THE NECESSARY NETWORK CONFIGURATION DATA, INCLUDING BUT NOT LIMITED TO: THE PROJECT IP ADDRESS, DEFAULT GATEWAY, SUBNET MASK AND VLAN ID INFORMATION. NOTIFY THE CITY TRANSPORTATION ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS BACK UP AND OPERATIONAL

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of:

750 N. Greenfield Pkwy., Garner, NC 27529

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

DIVISION 05 WAKE CO. CITY OF RALEIGH

PLAN DATE: JUNE 2016 REVIEWED BY:

PREPARED BY: I. N. AVERY REVIEWED BY:

SCALE 0

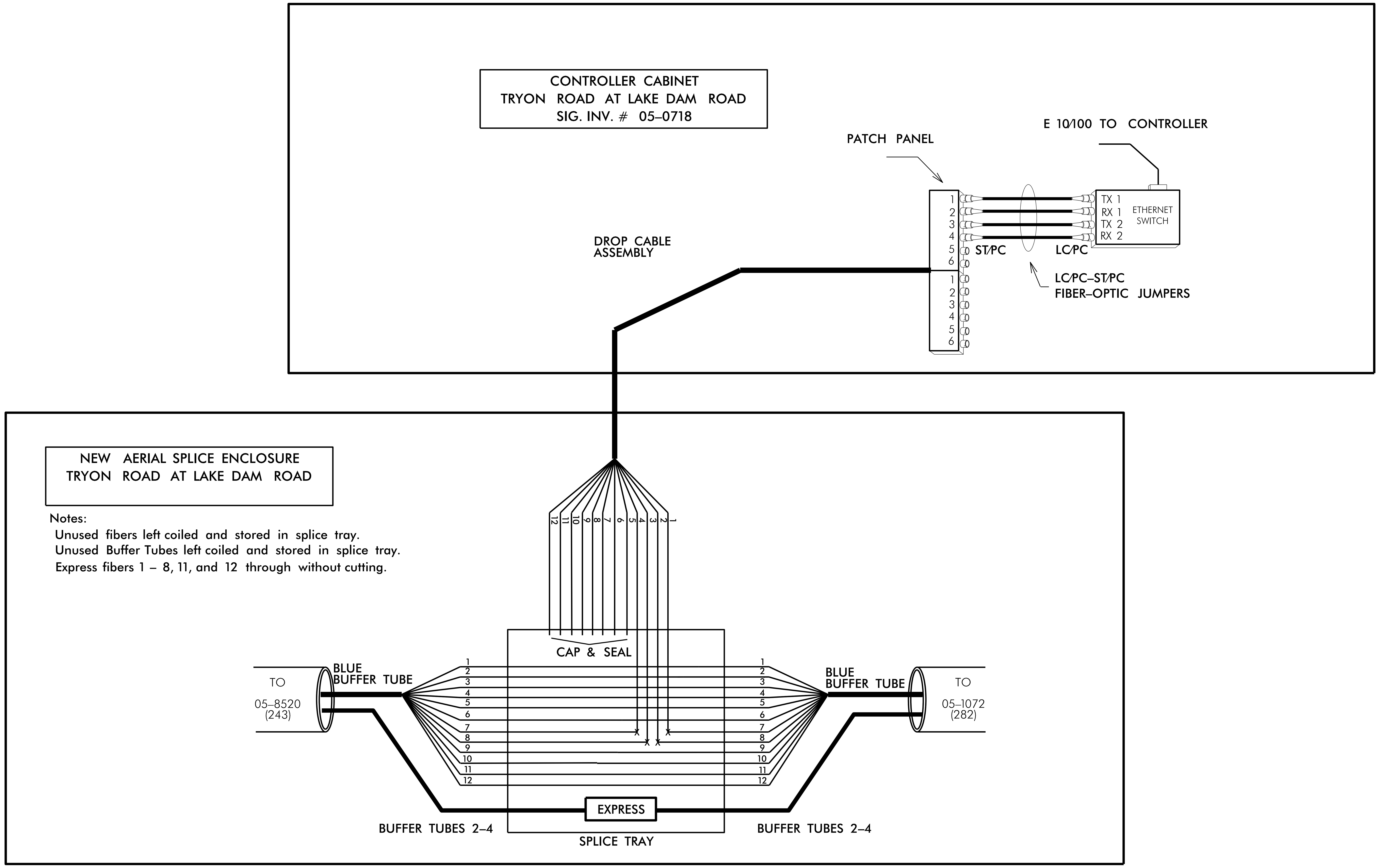
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

DocuSigned by: Gregory A. Fuller 6/15/2016
SIGNATURE DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
W-5601FB	SCP 3



LEGEND
X = FUSION SPLICE

COLOR CODE TIA/EIA 598-A	
(1) BLUE	(7) RED
(2) ORANGE	(8) BLACK
(3) GREEN	(9) YELLOW
(4) BROWN	(10) VIOLET
(5) SLATE	(11) ROSE
(6) WHITE	(12) AQUA

1) FIVE (5) DAYS PRIOR TO BEGINNING WORK ON THE SIGNAL SYSTEM, CONTACT THE CITY OF RALEIGH, TRANSPORTATION ENGINEER, JED NIFFENEGGER, AT (919) 996-4039 TO ARRANGE FOR THE CITY OF RALEIGH TO PROGRAM THE NEW FIELD ETHERNET SWITCH WITH THE NECESSARY NETWORK CONFIGURATION DATA, INCLUDING BUT NOT LIMITED TO: THE PROJECT IP ADDRESS, DEFAULT GATEWAY, SUBNET MASK AND VLAN ID INFORMATION. NOTIFY THE CITY TRANSPORTATION ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS BACK UP AND OPERATIONAL

2) ETHERNET TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING PROPER TERMINATIONS.

3) INCLUDE ON THE COVER OF EACH SPLICE TRAY THE FOLLOWING: REFERENCE SECTION 1731 "FIBER OPTIC SPLICE ENCLOSURE"

1) SPLICE LOCATION
2) DATE
3) COMPANY NAME
4) NAME OF INDIVIDUAL PERFORMING THE SPLICING

PRIOR TO INSTALLING THE COVER ON THE SPLICE TRAY TAKE A DIGITAL PHOTOGRAPH SHOWING THE SPLICE TRAY AND INFORMATION SHOWN ABOVE (1-4) AND SUBMIT PHOTOGRAPH ALONG WITH OTDR TEST RESULTS.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SPLICE PLAN

DIVISION 05 WAKE CO. RALEIGH

PLAN DATE: SEPTEMBER 2013	REVIEWED BY: I.N. AVERY
PREPARED BY: B.A. STOUCHKO	REVIEWED BY: G.A. FULLER

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

DocuSigned by:
Gregory A. Fuller
7032CA0AEE874EE...
6/15/2016
DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
W-5601FB	PMP / SGN

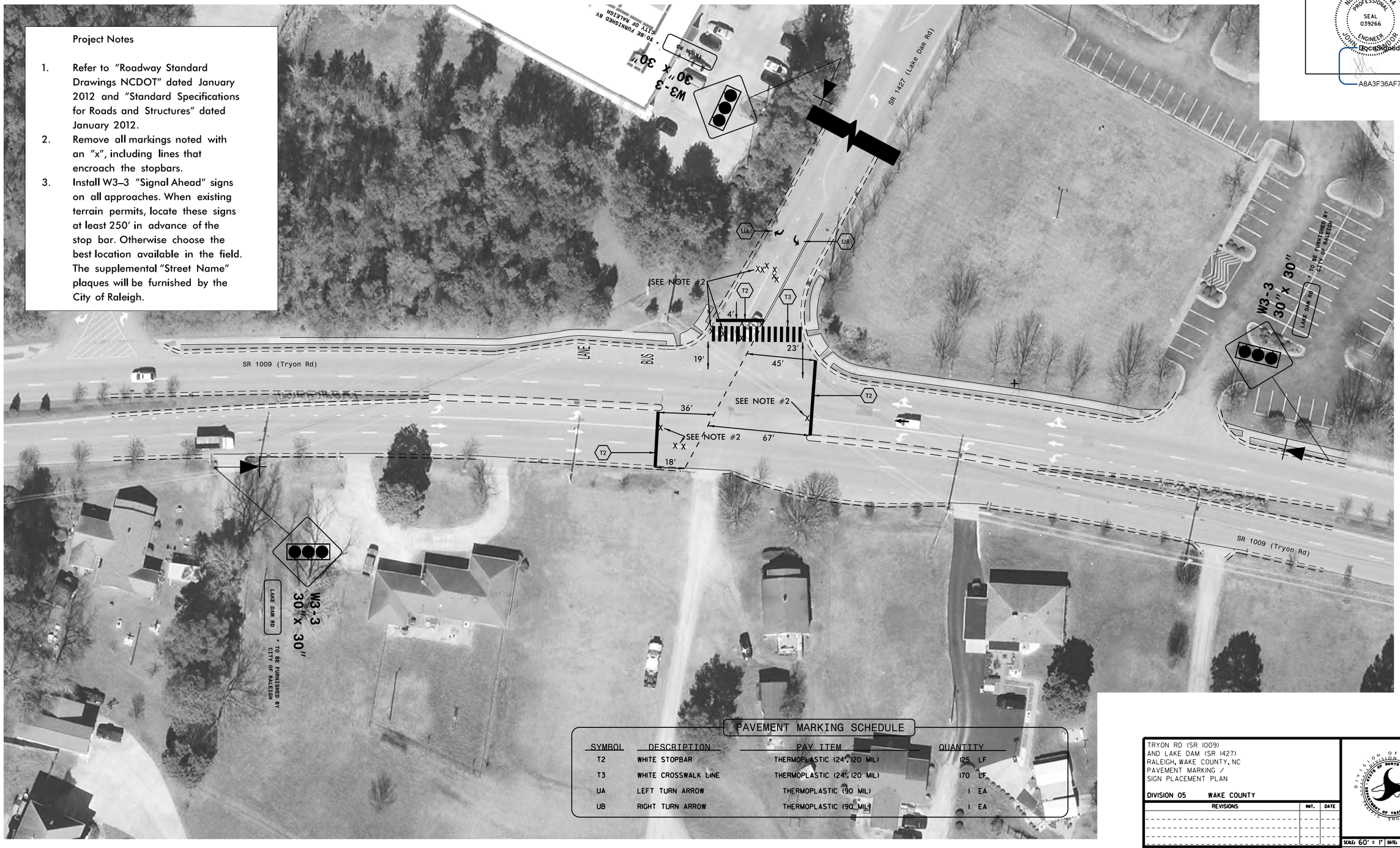
NORTH CAROLINA PROFESSIONAL SEAL 039266 ENGINEER JOHN DOUGLAS DOOR

Signed by:

A8A3F36AF75A4F7...

Project Notes

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Remove all markings noted with an "x", including lines that encroach the stopbars.
3. Install W3–3 "Signal Ahead" signs on all approaches. When existing terrain permits, locate these signs at least 250' in advance of the stop bar. Otherwise choose the best location available in the field. The supplemental "Street Name" plaques will be furnished by the City of Raleigh.



PAVEMENT MARKING SCHEDULE

SYMBOL	DESCRIPTION	PAY ITEM	QUANTITY
T2	WHITE STOPBAR	THERMOPLASTIC (24", 120 MIL)	125 LF
T3	WHITE CROSSWALK LINE	THERMOPLASTIC (24", 120 MIL)	170 LF
UA	LEFT TURN ARROW	THERMOPLASTIC (90 MIL)	1 EA
UB	RIGHT TURN ARROW	THERMOPLASTIC (90 MIL)	1 EA

TRYON RD (SR 1009)
AND LAKE DAM (SR 1427)
RALEIGH, WAKE COUNTY, NC
PAVEMENT MARKING /
SIGN PLACEMENT PLAN

DIVISION 05 WAKE COUNTY

REVISIONS	INIT.	DATE

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
DIVISION FIVE TRAFFIC ENGINEERING

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION TRAFFIC ENGINEERING

SCALE: 60' = 1" DATE: 12 OCT 2016
PREPARED BY: SJL
REVIEWED BY: _____
REVIEWED BY: _____