Project No.	Sheet No.
U–6003	Sig. 1.0

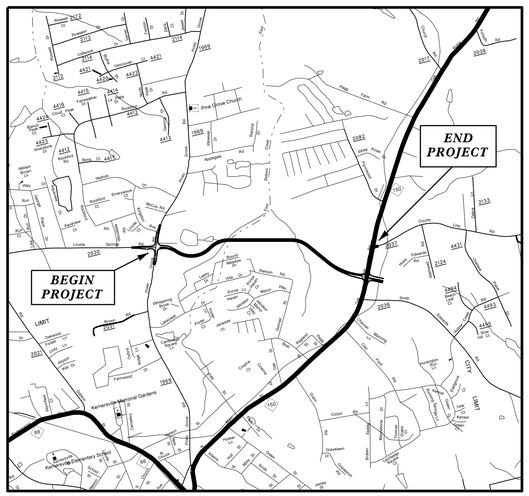
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

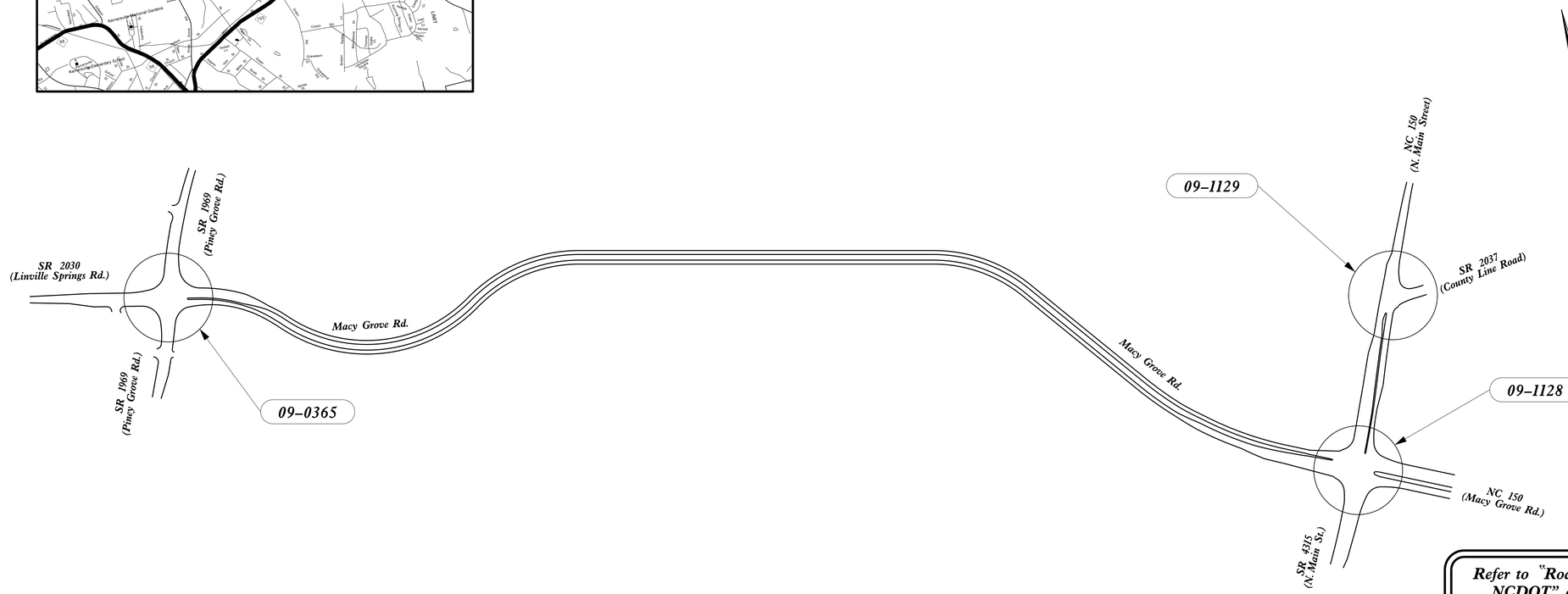
FORSYTH COUNTY

LOCATION: MACY GROVE ROAD FROM SR 1969 (PINEY GROVE ROAD) TO SR 4315 (N. MAIN STREET) AND SR 4315/NC 150 (N. MAIN STREET) FROM NC 150 (MACY GROVE ROAD) TO SR 2037 (COUNTY LINE ROAD)

TYPE OF WORK: TRAFFIC SIGNALS AND SIGNAL COMMUNICATIONS

Vicinity





Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.

Index of Plans

Sheet #	Reference #	Location/Description
Sig. 1.0	--------	Title Sheet
Sig. 1.1	--------	Standard Plate Sheet
Sig. 2.0–2.3	09–0365	SR 1969 (Piney Grove Road) at SR 2030 (Linville Springs Road) and Macy Grove Road
Sig. 3.0–3.3	09–1128	NC 150/SR 4315 (N. Main Street) at NC 150 (Macy Grove Road)
Sig. 4.0–4.2	09–1129	NC 150 (N. Main Street) at SR 2037 (County Line Road)
M1–M8	--------	Standard Metal Pole Sheets
SCP 1–6	--------	Signal Communication Plans

TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS UNIT

Contacts:

Robert J. Ziemba, PE – Central Region Signals Engineer
Ryan W. Hough, PE – Signal Equipment Project Engineer
Gregg Green – Signal Communications Project Engineer

Prepared in the Office of:
DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY & SAFETY DIVISION

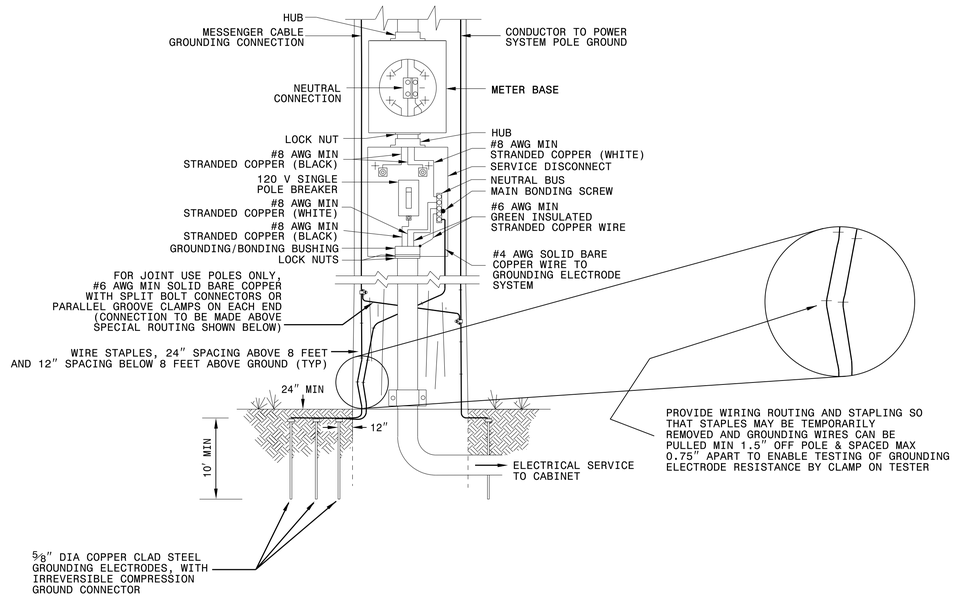
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
TSMO UNIT

750 N. Greenfield Parkway, Garner, NC 27529

Project: U–6003

Contract: C204880

PROJECT NO.	SHEET NO.
U-6003	Sig. 1.1



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

1-18

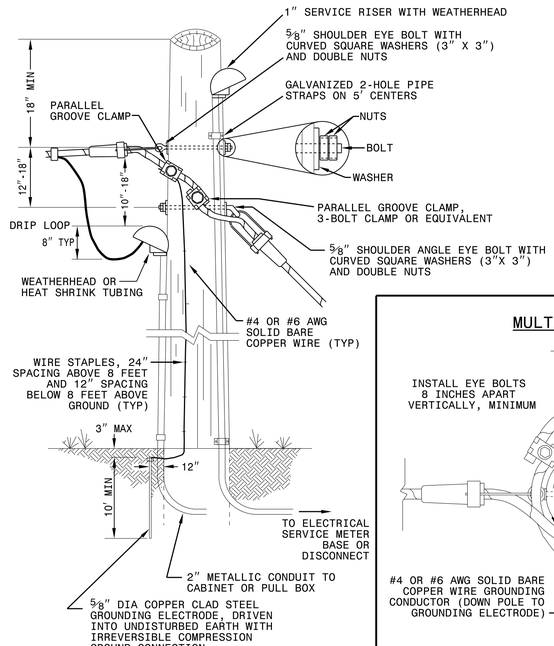
ENGLISH STANDARD DRAWING FOR

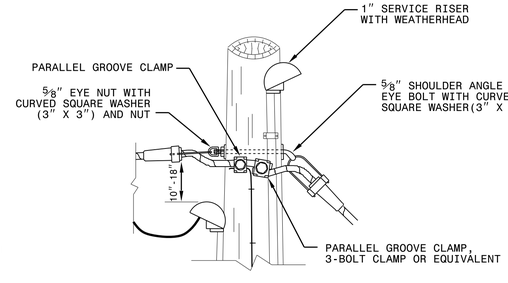
ELECTRICAL SERVICE GROUNDING

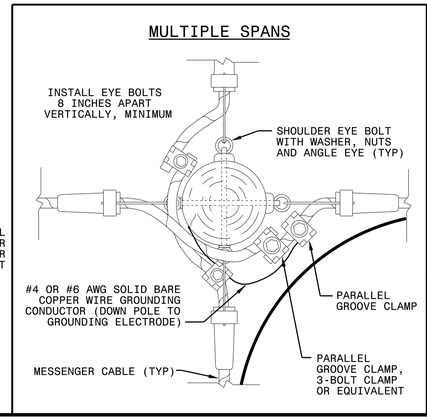
GROUNDING AND BONDING

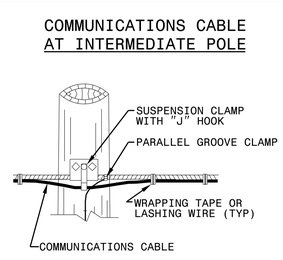
SHEET 1 OF 1

1700D01









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.

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

1-18

ENGLISH STANDARD DRAWING FOR

WOOD POLES

METHODS OF ATTACHMENT AND GROUNDING

SHEET 1 OF 1

1720D01

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See Plate for Title

Prepared in the Offices of:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
ITS & Signals Unit

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 032108 ENGINEER MOHD A. ASLAMI

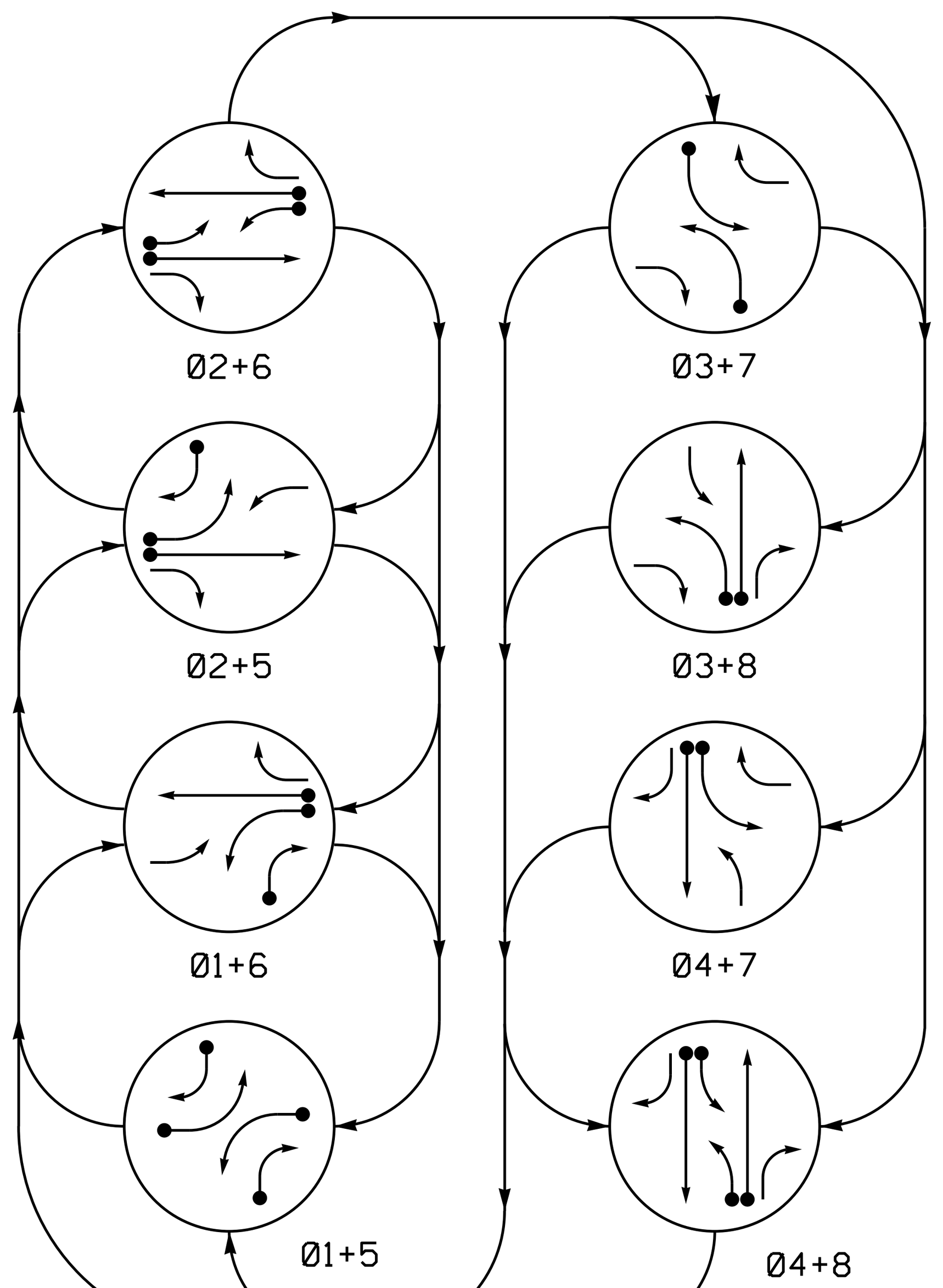
DocuSigned by: Mohd Aslami
5D90B0BA6DBB6495...

10/11/2017
DATE

11-OCT-2017 08:56
U:\NCDOT\Std Drawings\Plate Sheets\2018_Plate Sheet .dgn
rwhough

PROJECT REFERENCE NO.	SHEET NO.
U-6003	Sig 2.0

DEFAULT PHASING DIAGRAM



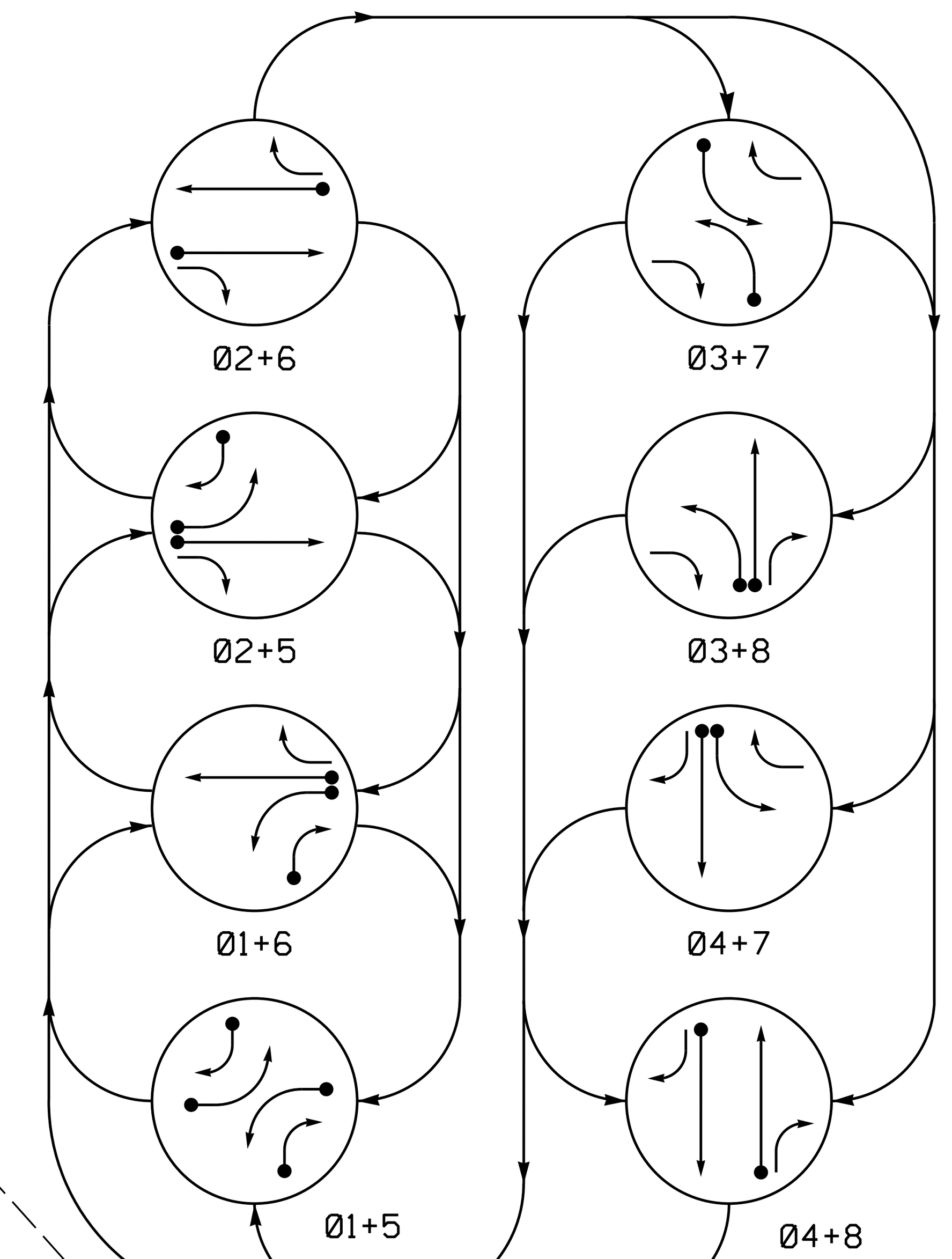
PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←	←	←F/Y	←F/Y	←R	←R	←R	←R	←Y
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R/→	R/→	R	R	Y
31	←R	←R	←R	←R	←	←	←F/Y	←F/Y	←R
41	R	R	R	R	R	R	G	G	R
42	R/→	R	R/→	R	R	R	G	G	R
51	←	←F/Y	←	←F/Y	←R	←R	←R	←R	←Y
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R/→	R	R/→	R	Y
71	←R	←R	←R	←R	←	←F/Y	←	←F/Y	←R
81	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R

ALTERNATE PHASING DIAGRAM



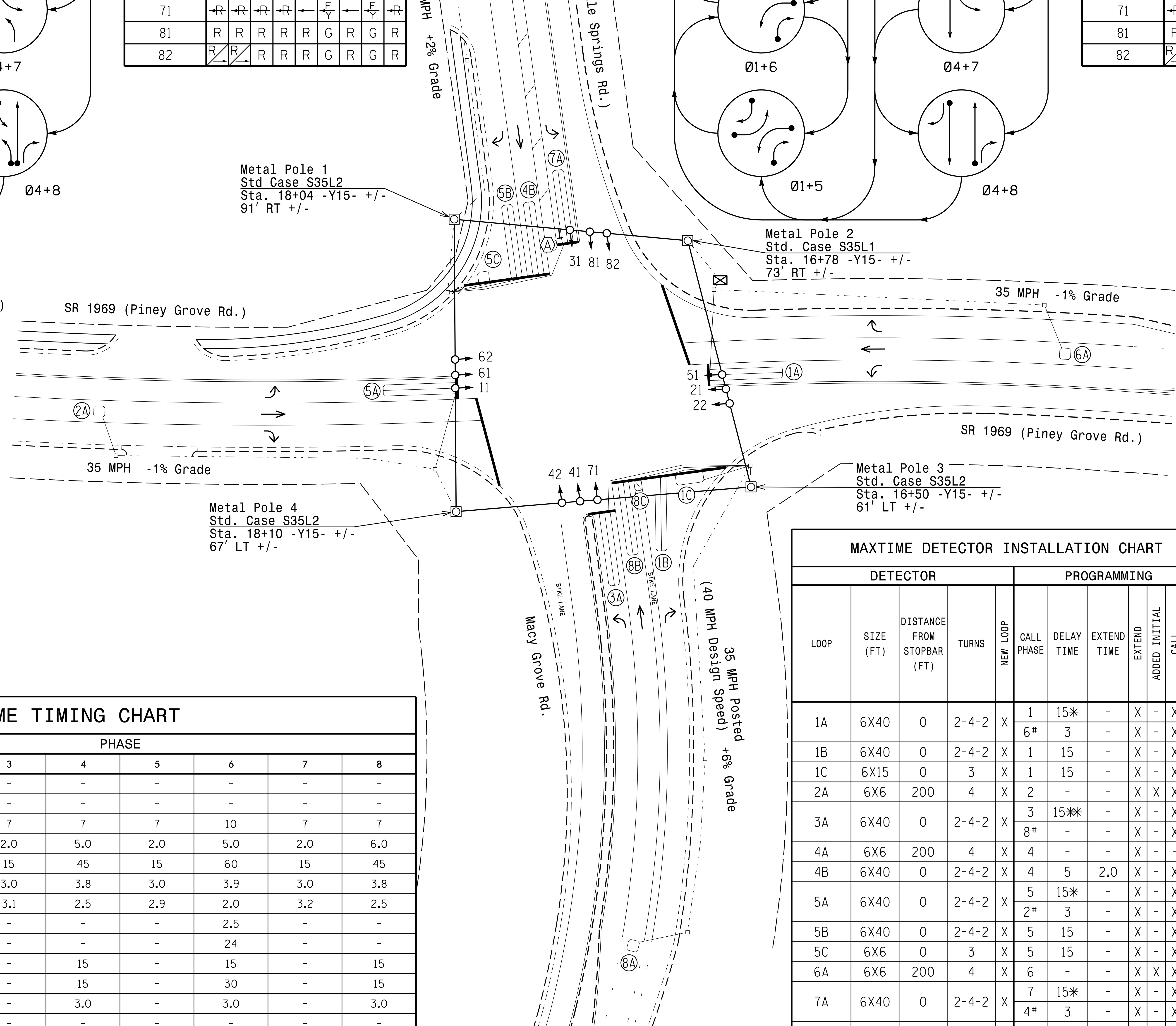
ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←	←	←R	←R	←R	←R	←R	←R	←Y
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R/→	R/→	R	R	Y
31	←R	←R	←R	←R	←	←	←R	←R	←R
41	R	R	R	R	R	R	G	G	R
42	R/→	R	R/→	R	R	R	G	G	R
51	←	←R	←	←R	←R	←R	←R	←R	←Y
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R/→	R	R/→	R	Y
71	←R	←R	←R	←R	←	←R	←	←R	←R
81	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R

8 Phase
Fully Actuated
(NC 150 at Macy Grove Road and County Line Road CLS)
Signal System #: D09-28_Kernersville

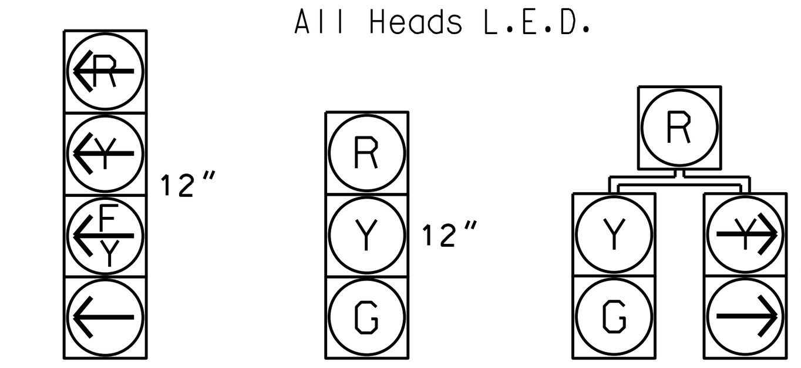
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. The Division Traffic Engineer will determine the hours of use for each phasing plan.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data:
   Controller Asset #: 0365.



SIGNAL FACE I.D.

All Heads L.E.D.



11	21	22
31	41	42
51	61	62
71	81	82

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	
N/A	Right of Way	
	Directional Arrow	
	Metal Strain Pole	
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Walk *	-	-	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-	-	-
Min Green *	7	10	7	7	7	10	7	7
Passage *	2.0	5.0	2.0	5.0	2.0	5.0	2.0	6.0
Max 1 *	15	60	15	45	15	60	15	45
Yellow Change	3.0	3.9	3.0	3.8	3.0	3.9	3.0	3.8
Red Clear	2.9	2.0	3.1	2.5	2.9	2.0	3.2	2.5
Added Initial *	-	2.5	-	-	-	2.5	-	-
Maximum Initial *	-	24	-	-	-	24	-	-
Time Before Reduction *	-	15	-	15	-	15	-	15
Time To Reduce *	-	30	-	15	-	30	-	15
Minimum Gap	-	3.0	-	3.0	-	3.0	-	3.0
Advance Walk	-	-	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-	X	X
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X

* 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.

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	X	1	15*	-	X	-	X	-	X
					6#	3	-	X	-	X	X	X
1B	6X40	0	2-4-2	X	1	15	-	X	-	X	-	X
1C	6X15	0	3	X	1	15	-	X	-	X	-	X
2A	6X6	200	4	X	2	-	-	X	X	X	-	X
3A	6X40	0	2-4-2	X	3	15**	-	X	-	X	-	X
					8#	-	-	X	-	X	-	X
4A	6X6	200	4	X	4	-	-	X	-	-	-	X
4B	6X40	0	2-4-2	X	4	5	2.0	X	-	X	-	X
5A	6X40	0	2-4-2	X	5	15*	-	X	-	X	-	X
					2#	3	-	X	-	X	X	X
5B	6X40	0	2-4-2	X	5	15	-	X	-	X	-	X
5C	6X6	0	3	X	5	15	-	X	-	X	-	X
6A	6X6	200	4	X	6	-	-	X	X	X	-	X
7A	6X40	0	2-4-2	X	7	15*	-	X	-	X	-	X
					4#	3	-	X	-	X	-	X
8A	6X6	250	5	X	8	-	-	X	-	-	-	X
8B	6X40	0	2-4-2	X	8	5	2.0	X	-	X	X	X
8C##	4X6	0	2-4-2 Diagonal	X	8	-	-	X	-	X	-	X

* Reduce Delay to 3 seconds during Alternate Phasing Operation.
** Disable Delay during Alternate Phasing Operation.
# Disable phase call for loop during Alternate Phasing Operation.
Set sensitivity at appropriate level to detect bicycles.

New Installation

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SR 1969 (Piney Grove Road)
at
SR 2030 (Linville Springs Road)
and Macy Grove Road

Division 9 Forsyth County Kernersville

PLAN DATE:	June 2023	REVIEWED BY:
PREPARED BY:	J.A. Lohr	REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

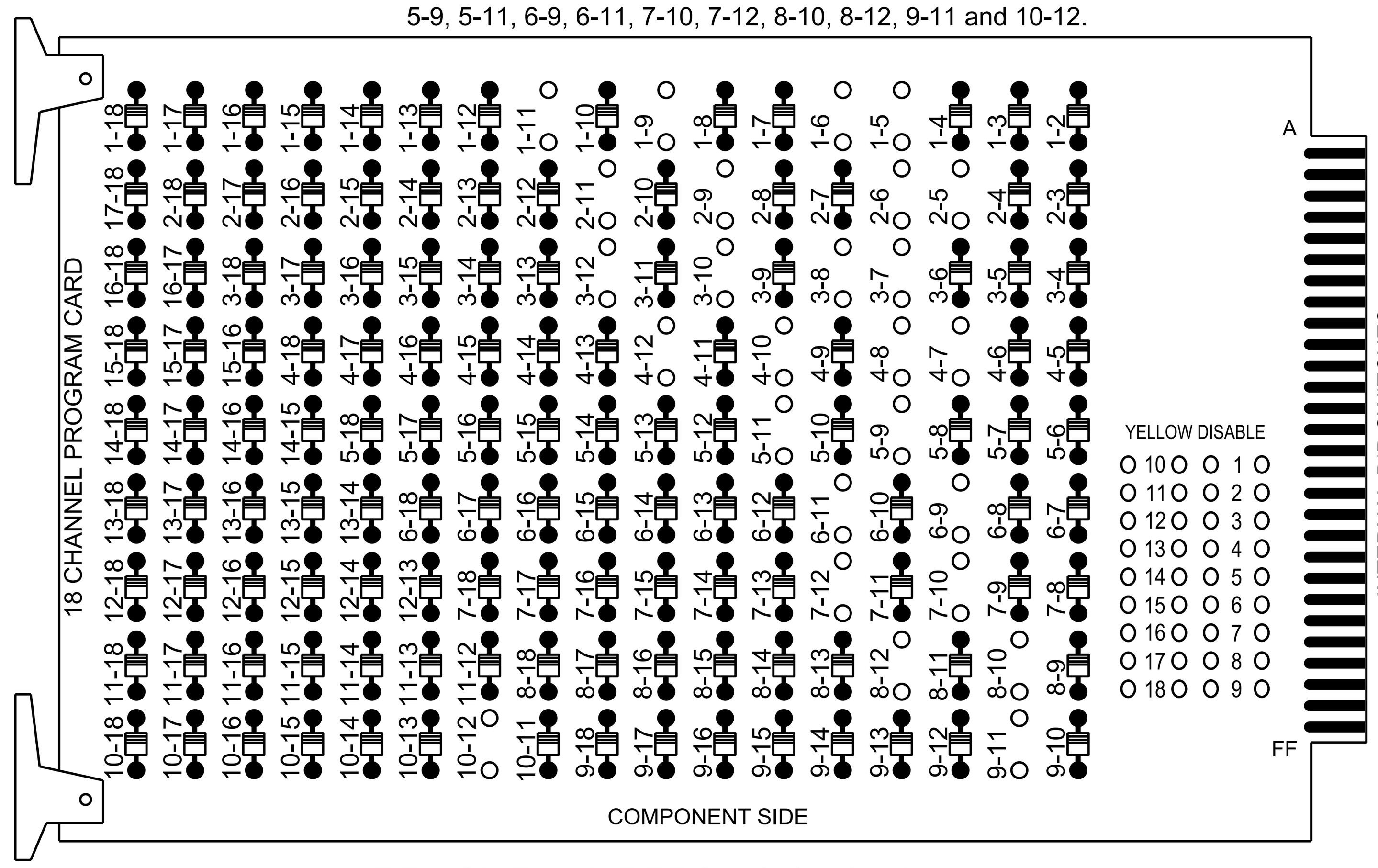
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA
DocuSigned by: Robert J. Ziemba 1B9B4B66274A494...
08/10/2023
DATE
SIG. INVENTORY NO. 09-0365

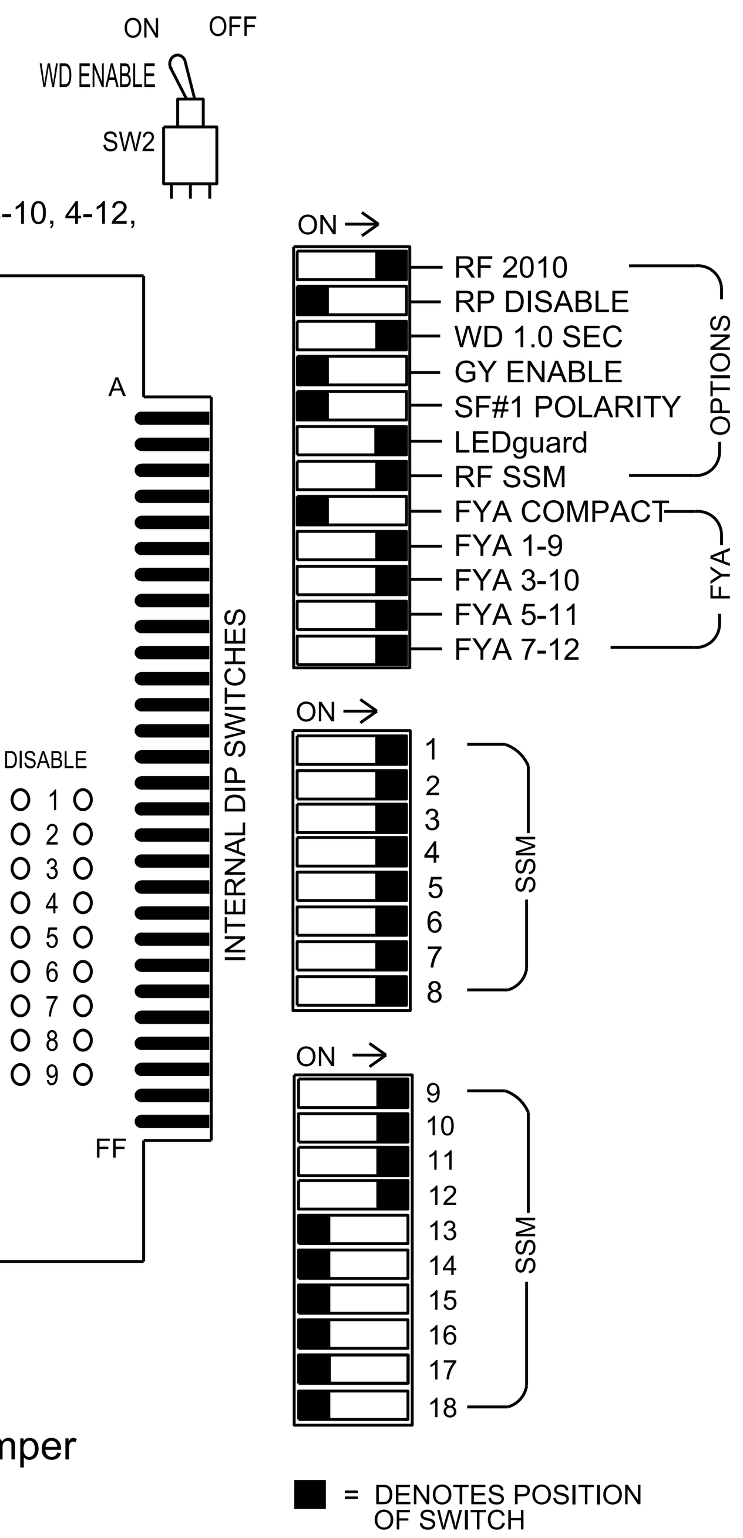
10-AUG-2023 12:16
S:*ITS&SU*ITS Signals*Signal Design Section*Central Region*Div 9*U-6003*090365_sig_dsn_2023mmdd.dgn
JALohr

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 8-10, 8-12, 9-11 and 10-12.





REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the (NC 150 at Macy Grove - Road and County Line Road CLS) Signal System #: D09-28_Kernersville.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet...332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount.....................................Base
Output File Positions..........................18 With Aux. Output File
Load Switches Used............................S1, S2, S4, S5, S7, S8, S10, S11, AUX S1, AUX S2
Phases Used..1, 2, 3, 4, 5, 6, 7, 8
Overlap "1"..*
Overlap "2"..*
Overlap "3"..*
Overlap "4"..*

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4		S5	S6	S7		S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3		4	14	5		6	15	7		8	16	9	10	17	11	12	18
PHASE	1		2	2 PED	3		4	4 PED	5		6	6 PED	7		8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	82	21,22	NU	22	31★	41,42	NU	42	51★	61,62	NU	62	71★	81,82	NU	11★	31★	NU	51★	71★	NU
RED	*		128			*	101			*	134			*	107							
YELLOW			129				102				135				108							
GREEN			130				103				136				109							
RED ARROW																	A121	A124			A101	A104
YELLOW ARROW		127			117				132				124				A122	A125			A102	A105
FLASHING YELLOW ARROW																	A123	A126			A103	A106
GREEN ARROW	127	127			118	118			133	133			124	124								

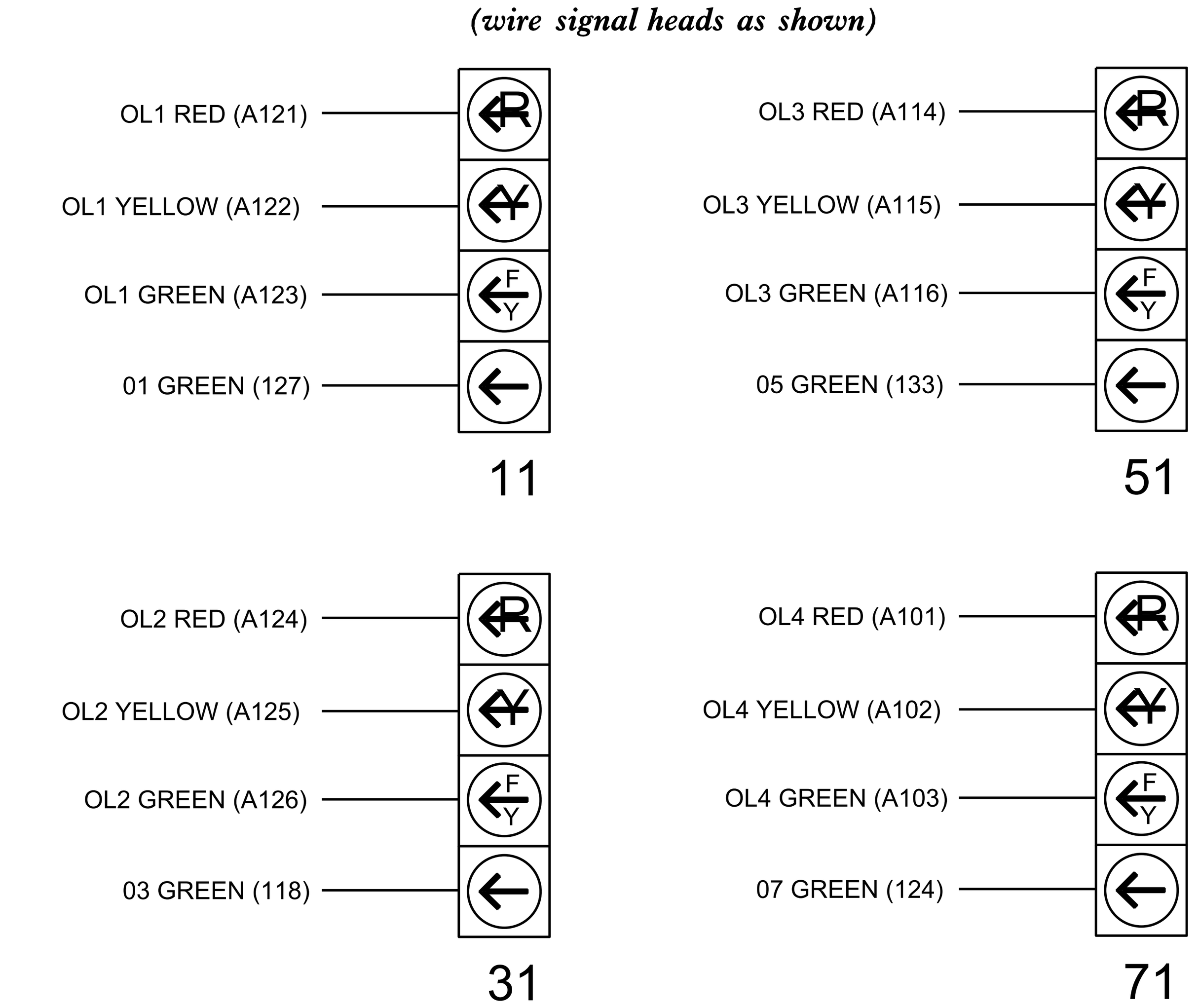
NU = Not Used

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

★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	1O	11	12	13	14
"I"	U	Ø 1 1A	Ø 1 1B	Ø 2 2A	SLOT EMPTY	Ø 3 3A	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
"I"	L	NOT USED	Ø 1 1C	NOT USED		NOT USED	Ø 4 4B								ST DC ISOLATOR
"J"	U	Ø 5 5A	Ø 5 5B	Ø 6 6A	SLOT EMPTY	Ø 7 7A	Ø 8 8A	Ø 8 8C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
"J"	L	NOT USED	Ø 5 5C	NOT USED		NOT USED	Ø 8 8B	NOT USED							

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

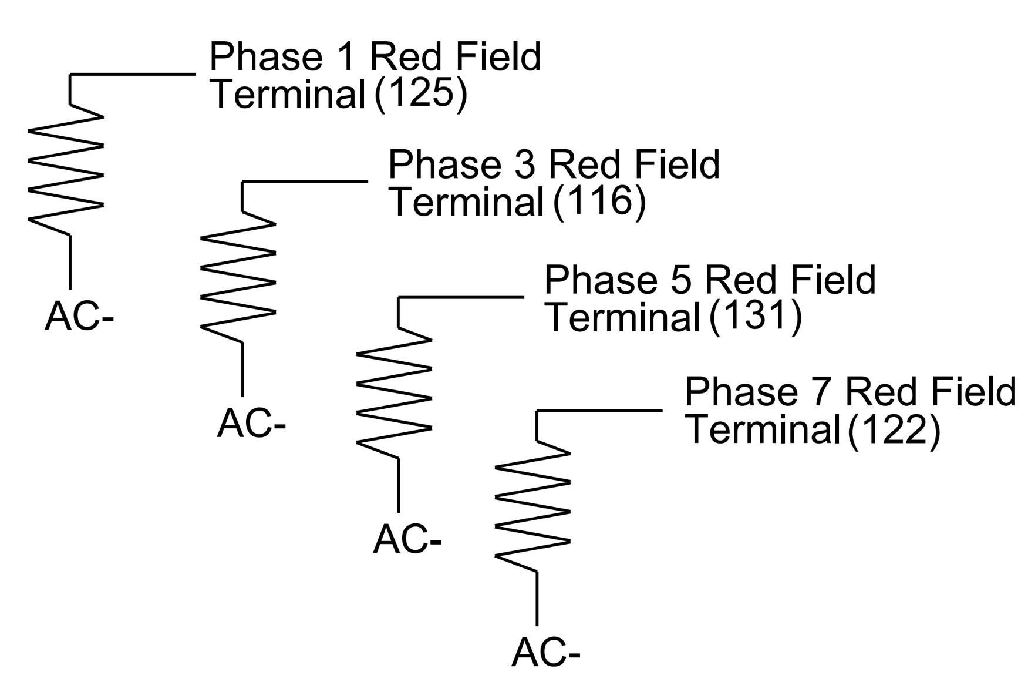
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15		X		X	
				-	29	6	3		X		X	X
1B	TB2-5,6	I2U	39	1	2	1	15		X		X	
1C	TB2-7,8	I2L	43	5	3	1	15		X		X	
2A	TB2-9,10	I3U	63	29	4	2			X	X	X	
3A	TB4-5,6	I5U	58	20	7	3	15		X		X	
				-	30	8			X		X	
4A	TB4-9,10	I6U	41	3	8	4			X		X	
4B	TB4-11,12	I6L	45	7	9	4	5	2.0	X		X	X
5A	TB3-1,2	J1U	55	17	15	5	15		X		X	
				-	31	2	3		X		X	X
5B	TB3-5,6	J2U	40	2	16	5	15		X		X	
5C	TB3-7,8	J2L	44	6	17	5	15		X		X	
6A	TB3-9,10	J3U	64	30	18	6			X	X	X	
7A	TB5-5,6	J5U	57	19	21	7	15		X		X	
				-	32	4	3		X		X	
8A	TB5-9,10	J6U	42	4	22	8			X		X	
8B	TB5-11,12	J6L	46	8	23	8	5	2.0	X		X	X
8C	TB7-1,2	J7U	66	32	24	8			X		X	

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0365
DESIGNED: June 2023
SEALED: 8-10-23
REVISED: N/A

Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

SR 1969 (Piney Grove Road)
at
SR 2030 (Linville Springs Road)
and Macy Grove Road

Division 9 | Forsyth County | Kernersville

PLAN DATE: July 2023 | REVIEWED BY:
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS | INIT. | DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 430320FAA2654C3... 08/14/2023 DATE

SIG. INVENTORY NO. 09-0365

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6	8
Modifier Phases	1	3	5	7
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

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

Overlap Plan 2

Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	-	-	-	-
Modifier Phases	1	3	5	7
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

← NOTICE INCLUDED PHASE

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 1A, 3A, 5A & 7A

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

1A

Detector	Call Phase	Delay
1	1	3
29	0	3

3A

Detector	Call Phase	Delay
7	3	-
30	0	-

5A

Detector	Call Phase	Delay
15	5	3
31	0	3

7A

Detector	Call Phase	Delay
21	7	3
32	0	3

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0365
DESIGNED: June 2023
SEALED: 8-10-23
REVISED: N/A

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

SR 1969 (Piney Grove Road)
at
SR 2030 (Linville Springs Road)
and Macy Grove Road

Division 9 | Forsyth County | Kernersville

PLAN DATE: July 2023 | REVIEWED BY:
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036833 RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 08/14/2023
430320EAA2654C3
DATE

SIG. INVENTORY NO. 09-0365

11-AUG-2023 07:28
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jtpeterson

PROJECT REFERENCE NO.	SHEET NO.
U-6003	Sig. 2.3

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

OVERLAP PLAN 2: Modifies overlap included phases for heads 11, 31, 51, and 71 to run protected turns only.

VEH DET PLAN 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 3 seconds.

Disables phase 8 call on loop 3A and reduces delay time for phase 3 call on loop 3A to 0 seconds.

Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 3 seconds.

Disables phase 4 call on loop 7A and reduces delay time for phase 7 call on loop 7A to 3 seconds.

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

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

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0365
DESIGNED: June 2023
SEALED: 8-10-23
REVISED: N/A

Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

Prepared in the Offices of:

Transportation Mobility and Safety Division, NC DEPARTMENT OF TRANSPORTATION, Traffic Signals Management Section

750 N. Greenfield Pkwy, Garner, NC 27529

SR 1969 (Piney Grove Road)
at
SR 2030 (Linville Springs Road)
and Macy Grove Road

Division 9 | Forsyth County | Kernersville

PLAN DATE: July 2023 | REVIEWED BY:

PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 08/14/2023
E3D3DEAA2654C3... DATE

SIG. INVENTORY NO. 09-0365

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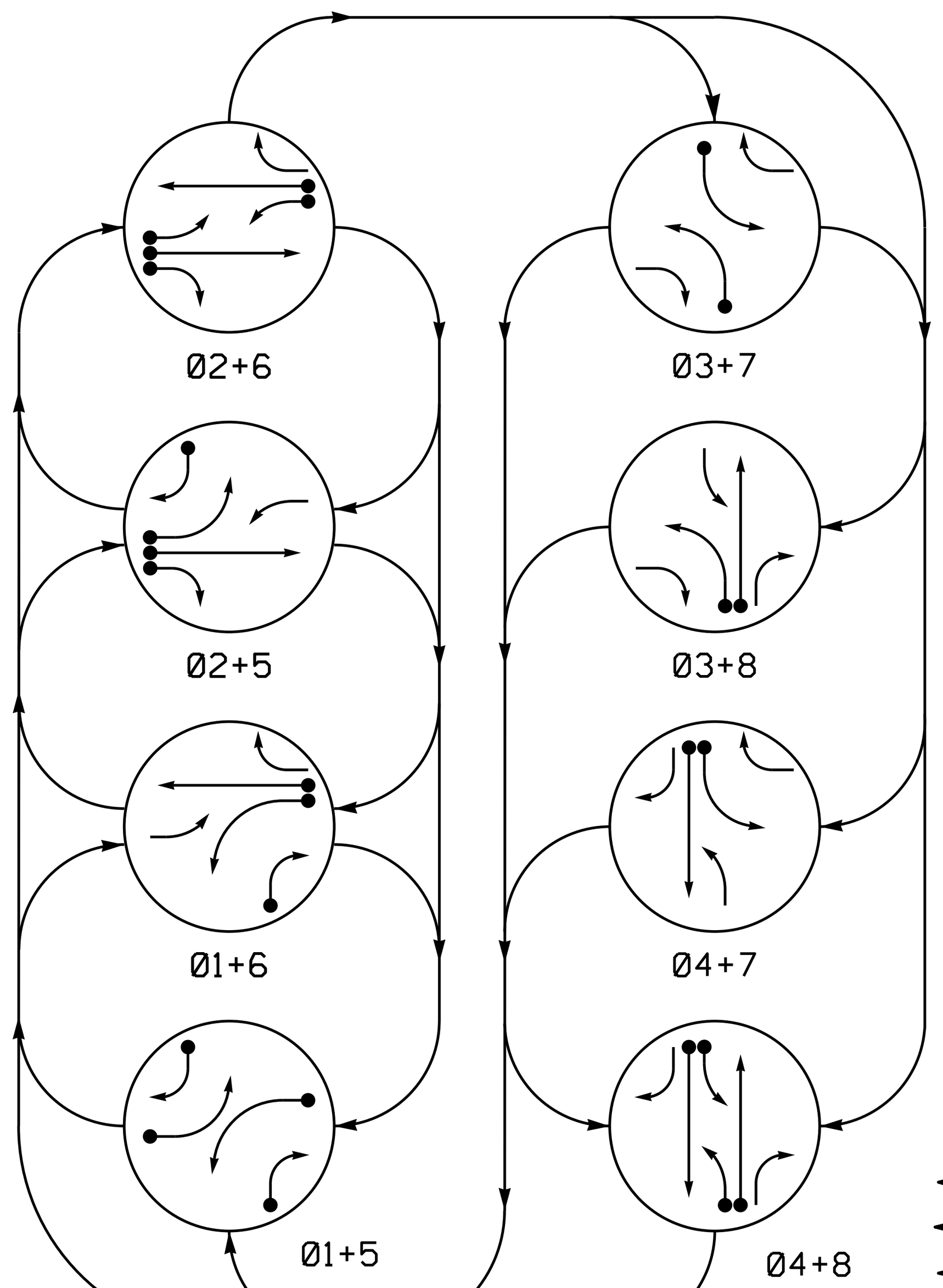
jtpeterson

DEFAULT PHASING DIAGRAM



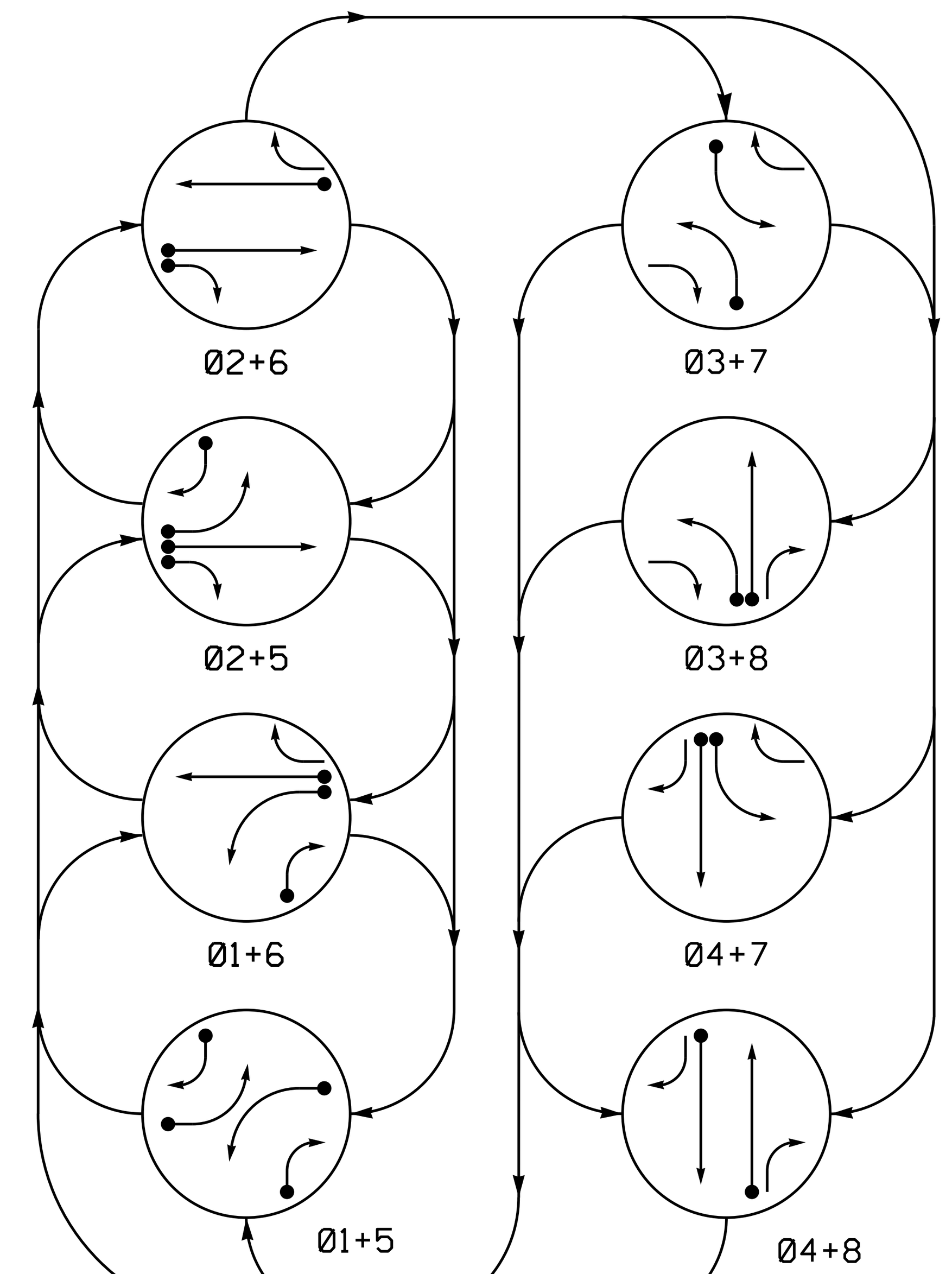
DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←	←	F/Y ←	F/Y ←	←R	←R	←R	←R	←Y
21, 23	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R/→	R/→	R	R	Y
31	←R	←R	←R	←R	←	←	F/Y ←	F/Y ←	←R
41	R	R	R	R	R	R	G	G	R
42	R/→	R	R/→	R	R	R	G	G	R
51	←	F/Y ←	←	F/Y ←	←R	←R	←R	←R	←Y
61, 63	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R/→	R	R/→	R	Y
71	←R	←R	←R	←R	←	F/Y ←	←	F/Y ←	←R
81	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R

PHASING DIAGRAM DETECTION LEGEND

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

ALTERNATE PHASING DIAGRAM



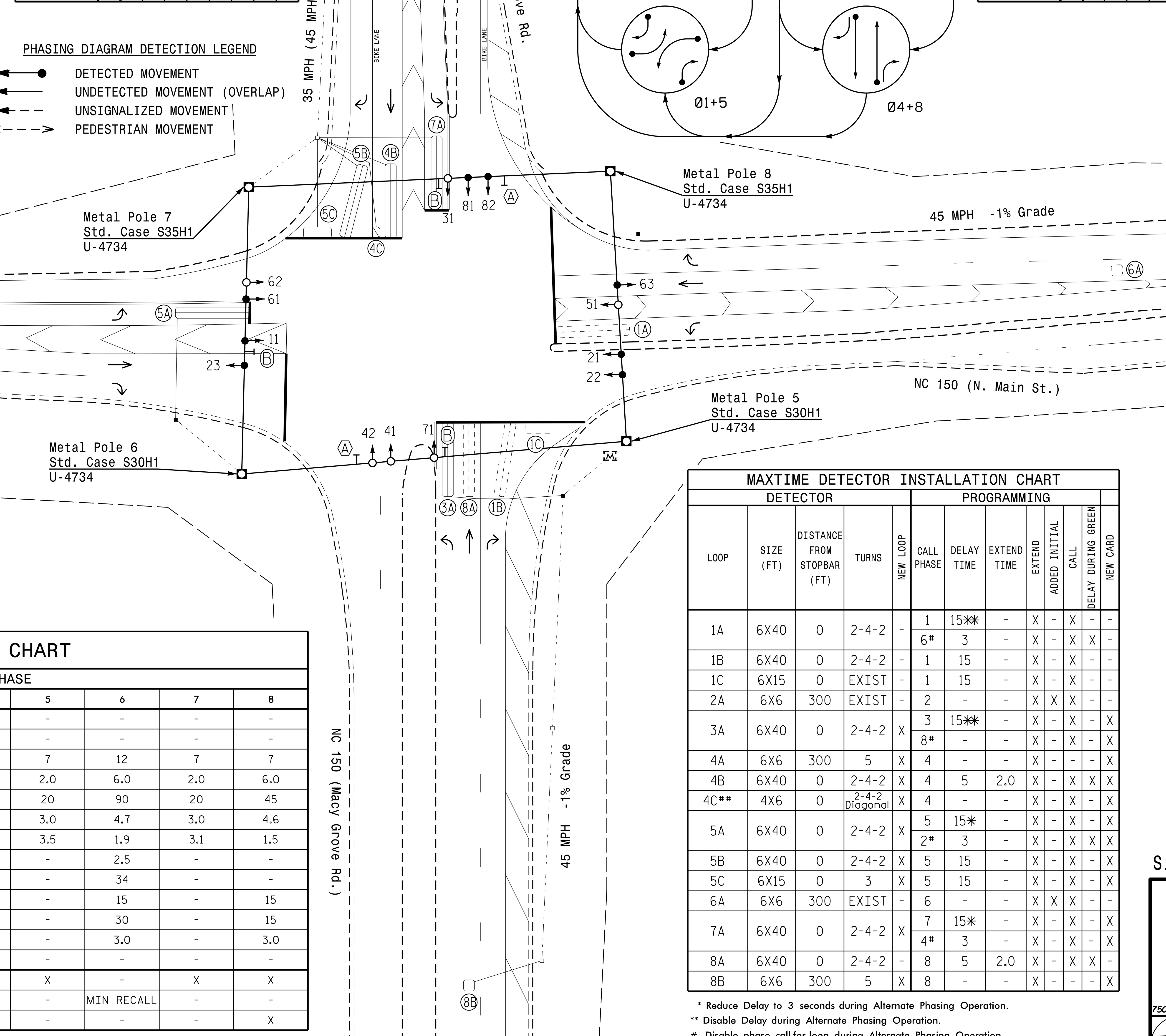
ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←	←	←R	←R	←R	←R	←R	←R	←Y
21, 23	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R/→	R/→	R	R	Y
31	←R	←R	←R	←R	←	←	←R	←R	←R
41	R	R	R	R	R	R	G	G	R
42	R/→	R	R/→	R	R	R	G	G	R
51	←	←R	←	←R	←R	←R	←R	←R	←Y
61, 63	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R/→	R	R/→	R	Y
71	←R	←R	←R	←R	←	←R	←	←R	←R
81	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R

8 Phase
Fully Actuated
(NC 150 at Macy Grove Road and County Line Road CLS)
Signal System #: D09-28_Kernersville

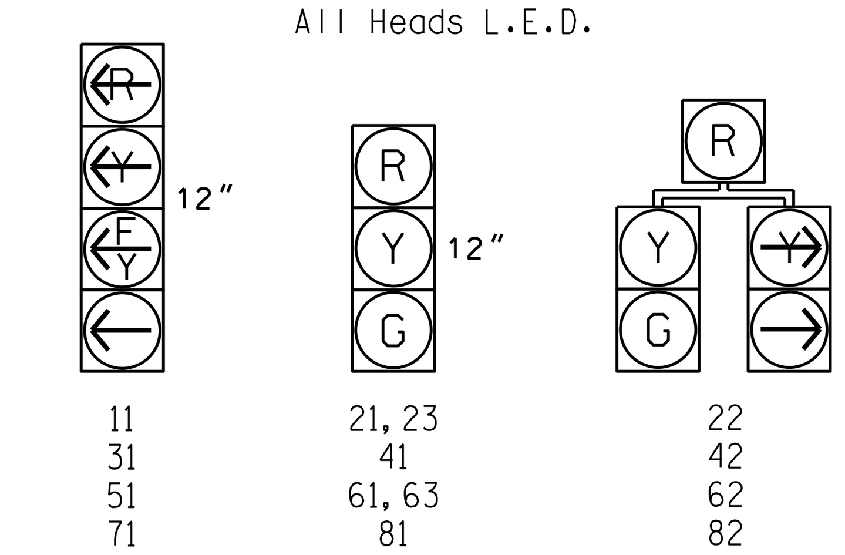
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Install new controller in existing cabinet.
7. Pavement markings are existing unless otherwise shown.
8. The Division Traffic Engineer will determine the hours of use for each phasing plan.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Closed loop system data:
    Master Asset #: 10928.
    Controller Asset #: 1128.



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	
N/A	Right of Way	
	Directional Arrow	
	Metal Strain Pole	
A	Right Arrow "ONLY" Sign (R3-5R)	A
B	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	B

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8
Walk *	-	-	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-	-	-
Min Green *	7	12	7	7	7	12	7	7
Passage *	2.0	6.0	2.0	6.0	2.0	6.0	2.0	6.0
Max 1 *	20	90	20	45	20	90	20	45
Yellow Change	3.0	4.7	3.0	4.6	3.0	4.7	3.0	4.6
Red Clear	3.3	1.9	3.1	1.5	3.5	1.9	3.1	1.5
Added Initial *	-	2.5	-	-	-	2.5	-	-
Maximum Initial *	-	34	-	-	-	34	-	-
Time Before Reduction *	-	15	-	15	-	15	-	15
Time To Reduce *	-	30	-	15	-	30	-	15
Minimum Gap	-	3.0	-	3.0	-	3.0	-	3.0
Advance Walk	-	-	-	-	-	-	-	-
Non Lock Detector	X	-	X	X	X	-	X	X
Vehicle Recall	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Dual Entry	-	-	-	X	-	-	-	X

* 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.

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR: LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING: CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15**	-	X	-	X	-	-
					6#	3	-	X	-	X	X	-
1B	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
1C	6X15	0	EXIST	-	1	15	-	X	-	X	-	-
2A	6X6	300	EXIST	-	2	-	-	X	X	X	-	-
3A	6X40	0	2-4-2	X	3	15**	-	X	-	X	-	X
					8#	-	-	X	-	X	-	X
4A	6X6	300	5	X	4	-	-	X	-	-	-	X
4B	6X40	0	2-4-2	X	4	5	2.0	X	-	X	X	X
4C##	4X6	0	2-4-2 Diagonal	X	4	-	-	X	-	X	-	X
5A	6X40	0	2-4-2	X	5	15*	-	X	-	X	-	X
					2#	3	-	X	-	X	X	X
5B	6X40	0	2-4-2	X	5	15	-	X	-	X	-	X
5C	6X15	0	3	X	5	15	-	X	-	X	-	X
6A	6X6	300	EXIST	-	6	-	-	X	X	X	-	-
7A	6X40	0	2-4-2	X	7	15*	-	X	-	X	-	X
					4#	3	-	X	-	X	-	X
8A	6X40	0	2-4-2	-	8	5	2.0	X	-	X	X	-
8B	6X6	300	5	X	8	-	-	X	-	-	-	X

* Reduce Delay to 3 seconds during Alternate Phasing Operation.
** Disable Delay during Alternate Phasing Operation.
# Disable phase call for loop during Alternate Phasing Operation.
Set sensitivity at appropriate level to detect bicycles.

Signal Upgrade

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'

NC 150/SR 4315 (N. Main St.) at NC 150 (Macy Grove Road)

Division 9 Forsyth County Kernersville

PLAN DATE:	May 2023	REVIEWED BY:
PREPARED BY:	J.A. Lohr	REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

DocuSigned by:
1B9B4B66274A494...
DATE 08/10/2023

SIG. INVENTORY NO. 09-1128

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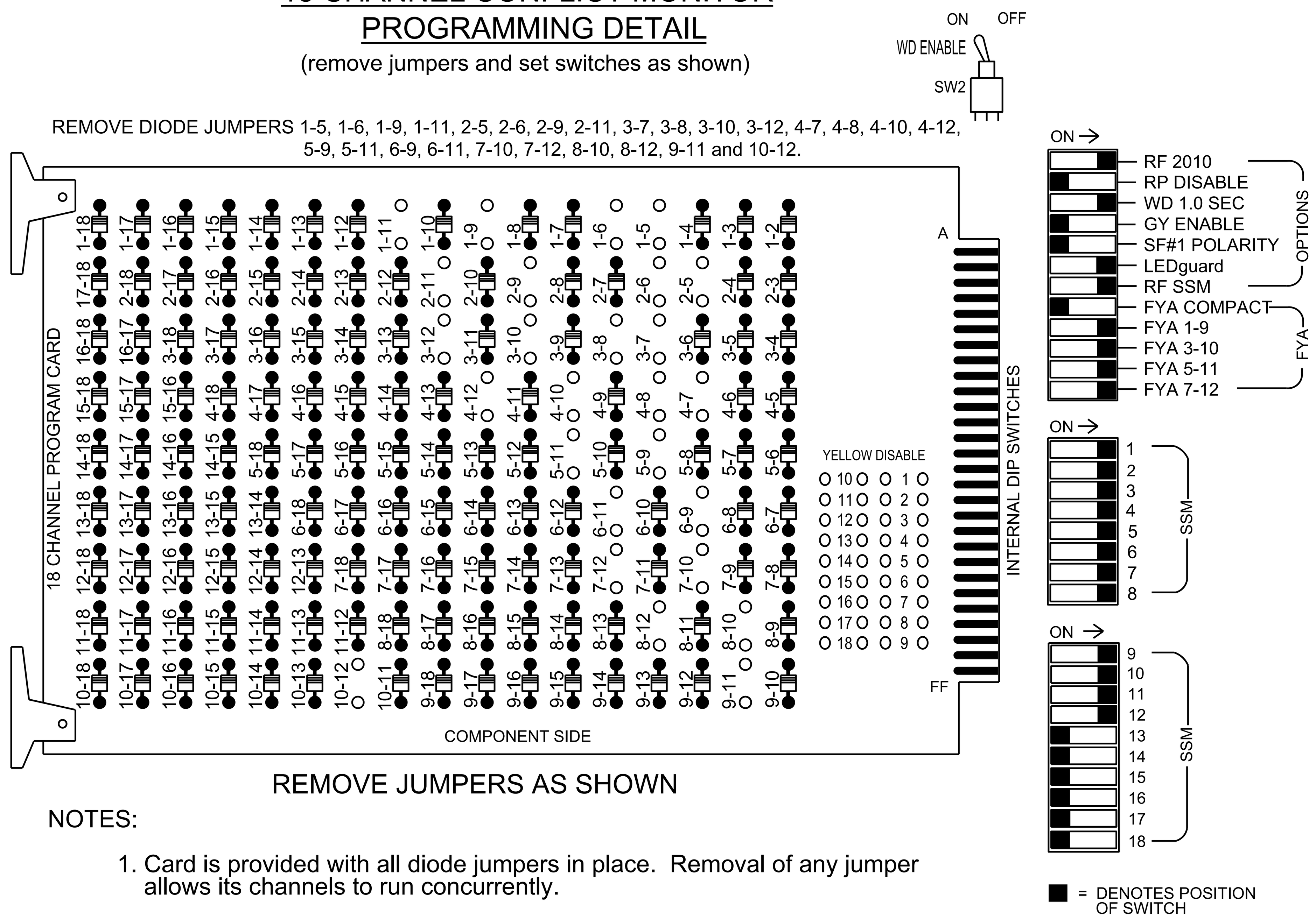
JALohr

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 2-5, 2-6, 2-9, 2-11, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-12, 5-9, 5-11, 6-9, 6-11, 7-10, 7-12, 8-10, 8-12, 9-11 and 10-12.



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 4 and 8 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the (NC 150 at Macy Grove - Road and County Line Road CLS) Signal System #: D09-28_Kernersville.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet..332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount...................................Base
Output File Positions..........................18 With Aux. Output File
Load Switches Used...........................S1, S2, S4, S5, S7, S8, S10, S11, AUX S1, AUX S2, AUX S4, AUX S5
Phases Used.......................................1, 2, 3, 4, 5, 6, 7, 8
Overlap "1"..*
Overlap "2"..*
Overlap "3"..*
Overlap "4"..*

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4		S5	S6	S7		S8	S9	S10		S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3		4	14	5		6	15	7		8	16	9	10	17	11	12	18
PHASE	1		2	2 PED	3		4	4 PED	5		6	6 PED	7		8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	82	21,22 23	NU	22	31★	41,42	NU	42	51★	61,62 63	NU	62	71★	81,82	NU	11★	31★	NU	51★	71★	NU
RED	*		128			*	101			*	134			*	107							
YELLOW			129				102				135				108							
GREEN			130				103				136				109							
RED ARROW																	A121	A124			A101	A104
YELLOW ARROW		127			117				132				124				A122	A125			A102	A105
FLASHING YELLOW ARROW																	A123	A126			A103	A106
GREEN ARROW	127	127			118	118			133	133			124	124								

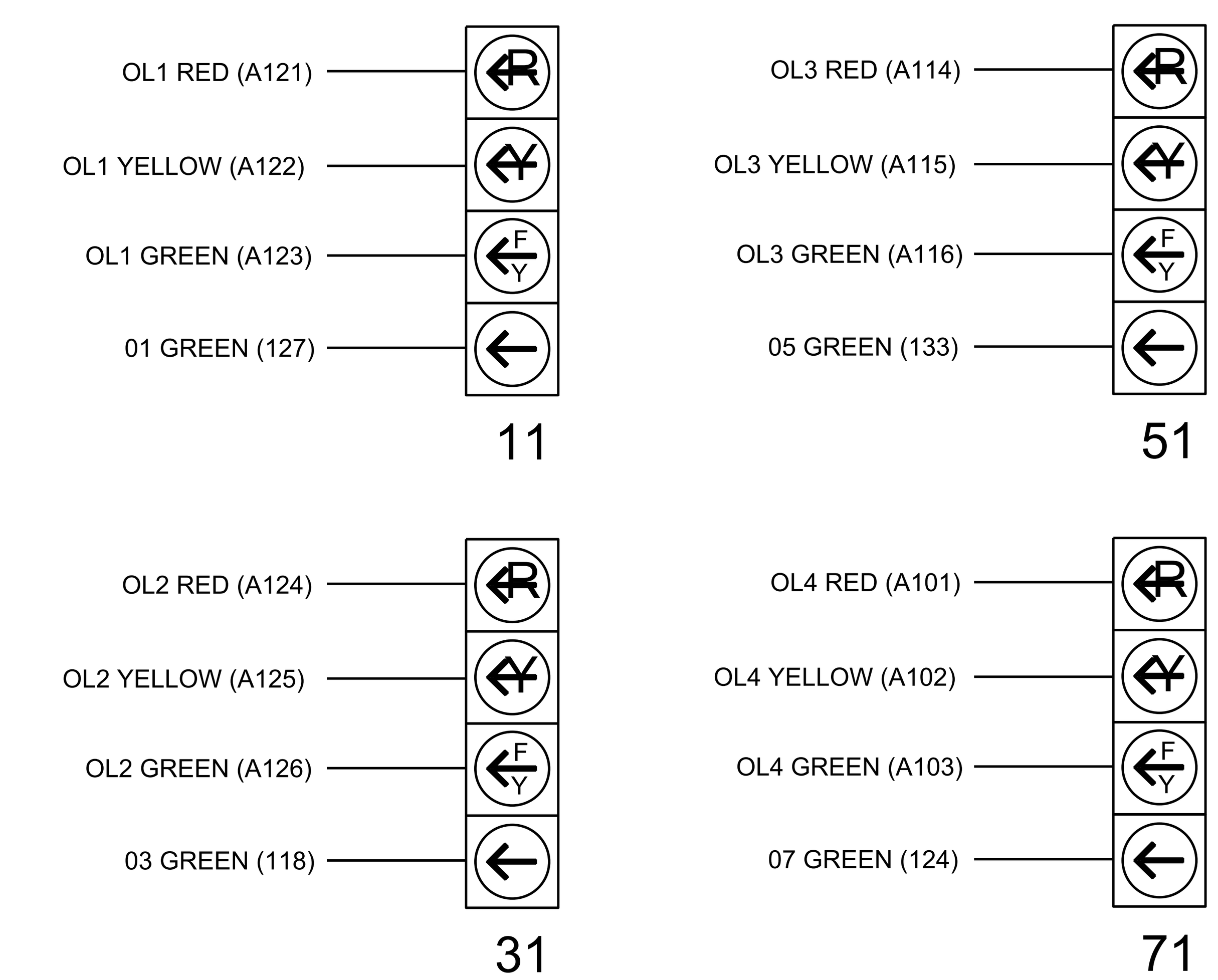
NU = Not Used

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

★See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	1O	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 1 1B	Ø 2 2A	SLOT EMPTY	Ø 3 3A	Ø 4 4A	Ø 4 4C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	Ø 1 1C	NOT USED		NOT USED	Ø 4 4B	NOT USED							ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 5 5B	Ø 6 6A	SLOT EMPTY	Ø 7 7A	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	Ø 5 5C	NOT USED		NOT USED	Ø 8 8B								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15		X		X	
				-	29	6	3		X		X	X
1B	TB2-5,6	I2U	39	1	2	1	15		X		X	
1C	TB2-7,8	I2L	43	5	3	1	15		X		X	
2A	TB2-9,10	I3U	63	29	4	2			X	X	X	
3A	TB4-5,6	I5U	58	20	7	3	15		X		X	
				-	30	8			X		X	
4A	TB4-9,10	I6U	41	3	8	4			X		X	
4B	TB4-11,12	I6L	45	7	9	4	5	2.0	X		X	X
4C	TB6-1,2	I7U	65	31	10	4			X		X	
5A	TB3-1,2	J1U	55	17	15	5	15		X		X	
				-	31	2	3		X		X	X
5B	TB3-5,6	J2U	40	2	16	5	15		X		X	
5C	TB3-7,8	J2L	44	6	17	5	15		X		X	
6A	TB3-9,10	J3U	64	30	18	6			X	X	X	
7A	TB5-5,6	J5U	57	19	21	7	15		X		X	
				-	32	4	3		X		X	
8A	TB5-9,10	J6U	42	4	22	8	5	2.0	X		X	X
8B	TB5-11,12	J6L	46	8	23	8			X		X	

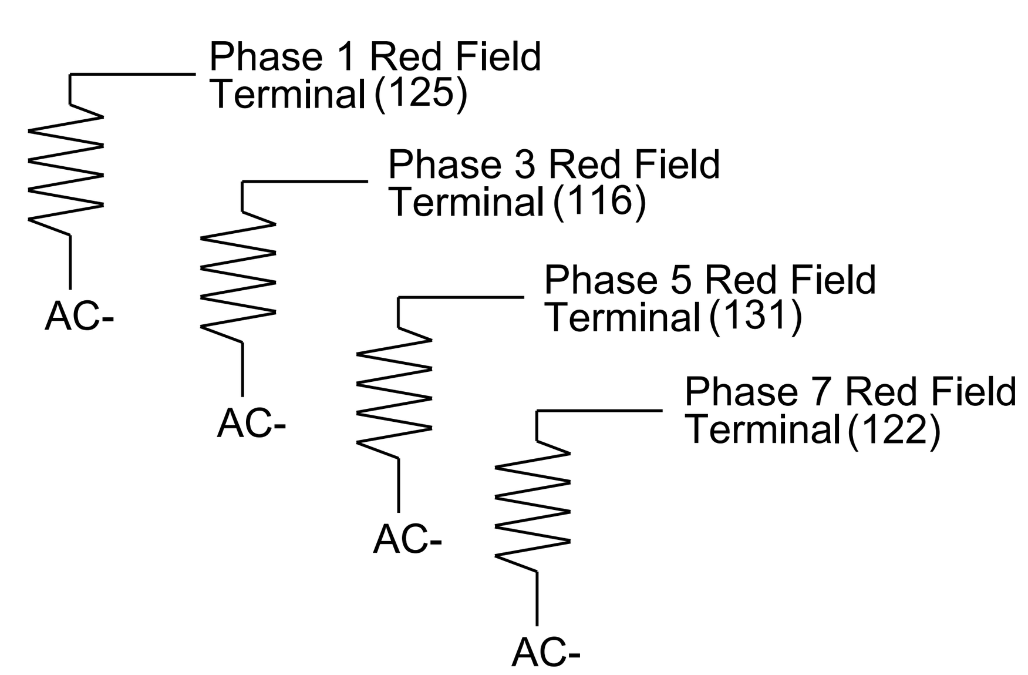
INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-1128
DESIGNED: June 2023
SEALED: 08-10-23
REVISED: N/A

Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

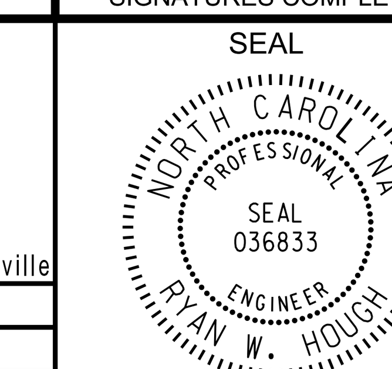
NC 150/ SR 4315 (N. Main St.)
at
NC 150 (Macy Grove Road)

Division 9 Forsyth County Kernersville

PLAN DATE: July 2023 | REVIEWED BY:
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

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



DocuSigned by: Ryan W. Hough 08/14/2023
DATE

SIG. INVENTORY NO. 09-1128

11-AUG-2023 07:56
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jtpeterson

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	2	4	6	8
Modifier Phases	1	3	5	7
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

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

Overlap Plan 2

Overlap	1	2	3	4
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section
Included Phases	-	-	-	-
Modifier Phases	1	3	5	7
Modifier Overlaps	-	-	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

← NOTICE INCLUDED PHASE

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 1A, 3A, 5A & 7A

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

Plan 2

1A

Detector	Call Phase	Delay
1	1	
29	0	3

3A

Detector	Call Phase	Delay
7	3	-
30	0	-

5A

Detector	Call Phase	Delay
15	5	3
31	0	3

7A

Detector	Call Phase	Delay
21	7	3
32	0	3

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-1128
DESIGNED: June 2023
SEALED: 08-10-23
REVISED: N/A

Electrical Detail - Sheet 2 of 3

Electrical and Programming Details For:

NC 150/ SR 4315 (N. Main St.)
at
NC 150 (Macy Grove Road)

Division 9 Forsyth County Kernersville

PLAN DATE: July 2023 REVIEWED BY:
PREPARED BY: James Peterson REVIEWED BY:

REVISIONS	INIT.	DATE

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 08/14/2023
430320FAA2654C3...
DATE

SIG. INVENTORY NO. 09-1128

11-AUG-2023 07:57
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jtpeterson

PROJECT REFERENCE NO.	SHEET NO.
U-6003	Sig. 3.3

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

OVERLAP PLAN 2: Modifies overlap included phases for heads 11, 31, 51, and 71 to run protected turns only.

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

Disables phase 8 call on loop 3A and reduces delay time for phase 3 call on loop 3A to 0 seconds.

Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 3 seconds.

Disables phase 4 call on loop 7A and reduces delay time for phase 7 call on loop 7A to 3 seconds.

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

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

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-1128
DESIGNED: June 2023
SEALED: 08-10-23
REVISED: N/A

Electrical Detail - Sheet 3 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

NC 150/ SR 4315 (N. Main St.)
at
NC 150 (Macy Grove Road)

Division 9 | Forsyth County | Kernersville

PLAN DATE: July 2023 | REVIEWED BY:
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

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

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
036833
ENGINEER
RYAN W. HOUGH

DocuSigned by:
Ryan W. Hough
43020FAA2654C3...
08/14/2023
DATE

SIG. INVENTORY NO. 09-1128

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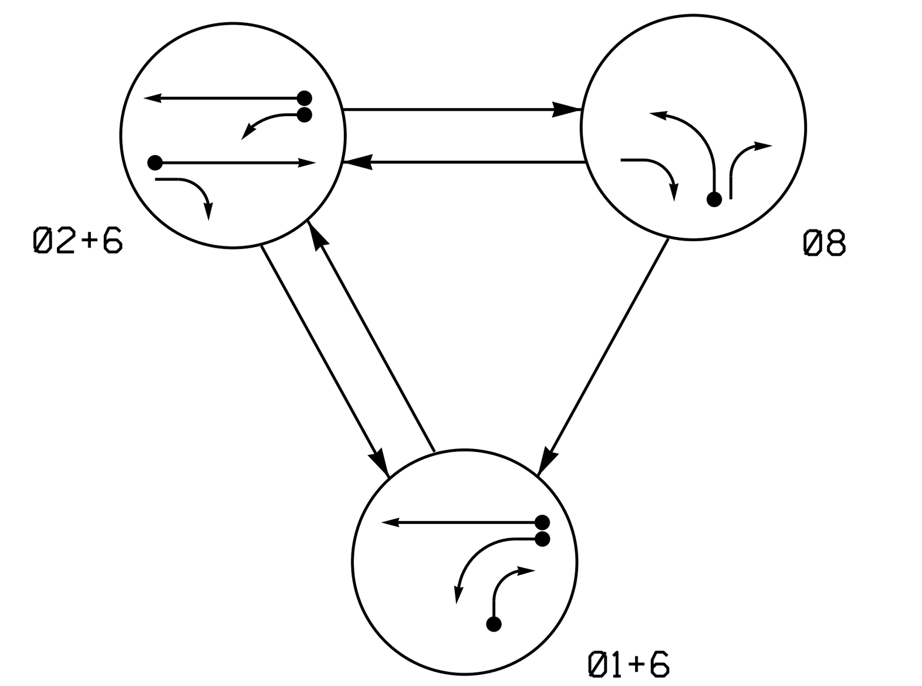
jtpeterson

PROJECT REFERENCE NO.	SHEET NO.
U-6003	Sig 4.0

DEFAULT PHASING DIAGRAM



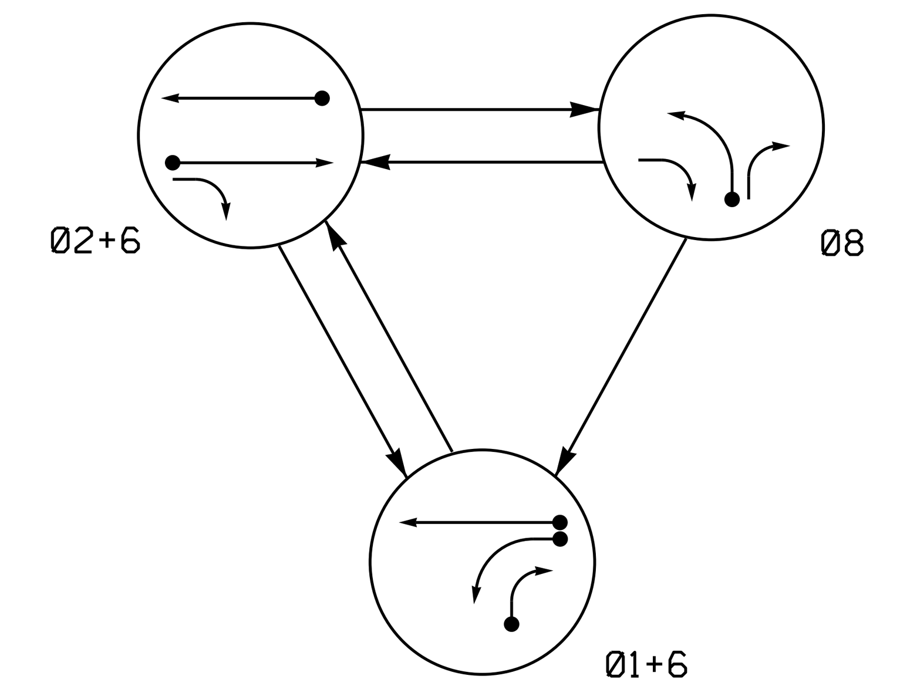
PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø8	FLASH
11	←	← F/Y	←R	←Y
21	R	G	R	Y
22	R	G	R / →	Y
61, 62	G	G	R	Y
81, 83	←R	←R	←	←R
82	→	R	→	R

ALTERNATE PHASING DIAGRAM

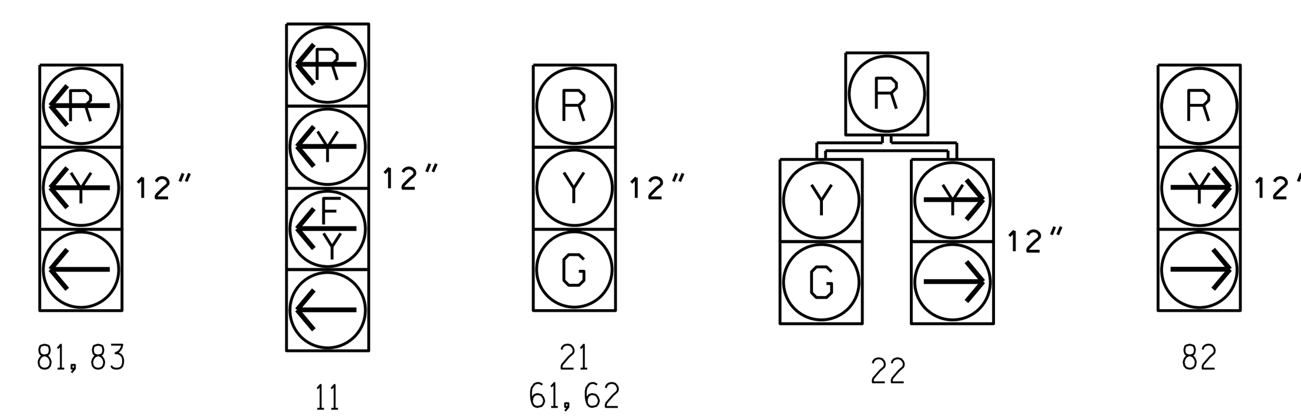


ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	Ø2+6	Ø8	FLASH
11	←	←R	←R	←Y
21	R	G	R	Y
22	R	G	R / →	Y
61, 62	G	G	R	Y
81, 83	←R	←R	←	←R
82	→	R	→	R

SIGNAL FACE I.D.

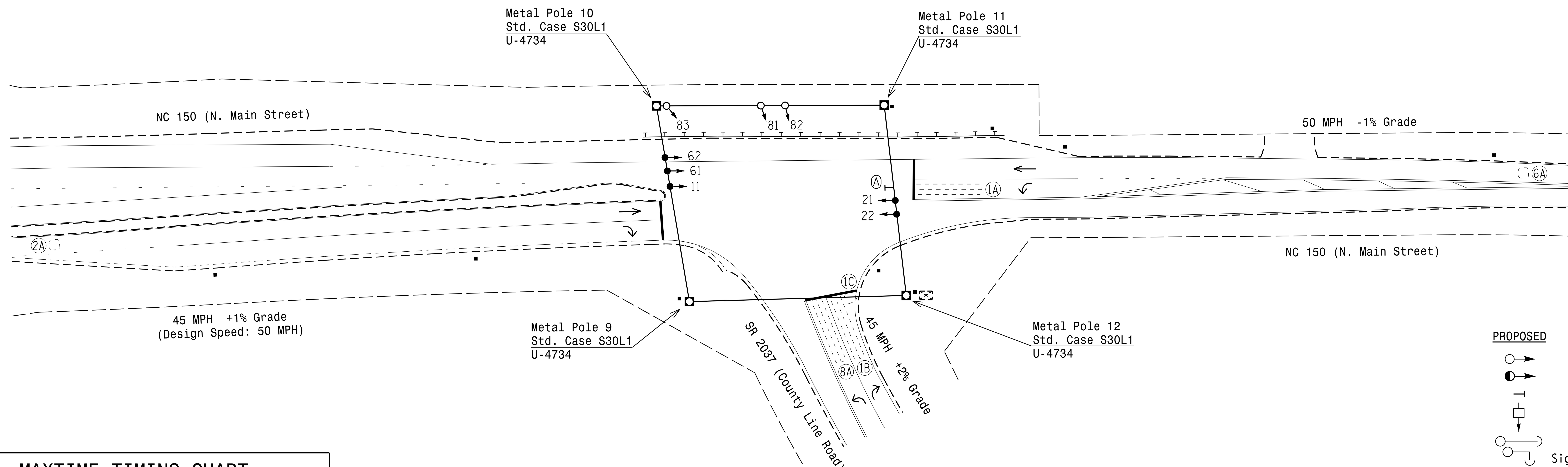
All Heads L.E.D.



3 Phase
Fully Actuated
(NC 150 at Macy Grove Road and County Line Road CLS)
Signal System #: D09-28_Kernersville

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. Install new controller in existing cabinet.
6. Pavement markings are existing.
7. The Division Traffic Engineer will determine the hours of use for each phasing plan.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Closed loop system data:
   Controller Asset #: 1129.



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	
N/A	Right of Way	
	Directional Arrow	
	Metal Strain Pole	
N/A	Guardrail	
A	No U-Turn Sign (R3-4)	A

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	6	8
Walk *	-	-	-	-
Ped Clear	-	-	-	-
Min Green *	7	14	14	7
Passage *	2.0	6.0	6.0	2.0
Max 1 *	15	90	90	30
Yellow Change	3.0	4.9	4.9	3.0
Red Clear	2.9	2.1	2.1	3.5
Added Initial *	-	2.5	2.5	-
Maximum Initial *	-	39	39	-
Time Before Reduction *	-	20	20	-
Time To Reduce *	-	40	40	-
Minimum Gap	-	3.0	3.0	-
Advance Walk	-	-	-	-
Non Lock Detector	X	-	-	X
Vehicle Recall	-	MIN RECALL	MIN RECALL	-
Dual Entry	-	-	-	-

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

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR: LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING: CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	2-4-2	-	1	15*	-	X	-	X	-	-
					6#	3	-	X	-	X	X	-
1B	6X40	0	2-4-2	-	1	15	-	X	-	X	-	-
1C	6X6	0	EXIST	-	1	15	-	X	-	X	-	-
2A	6X6	355	EXIST	-	2	-	-	X	X	X	-	-
6A	6X6	355	EXIST	-	6	-	-	X	X	X	-	-
8A	6X40	0	2-4-2	-	8	3	-	X	-	X	-	-

* Disable Delay During Alternate Phasing Operation.
# Disable Phase Call For Loop(s) During Alternate Phasing Operation.

Signal Upgrade

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

NC 150 (N. Main Street)
at
SR 2037 (County Line Road)

Division 9	Forsyth County	Kernersville
PLAN DATE: June 2023	REVIEWED BY:	
PREPARED BY: J.A. Lohr	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

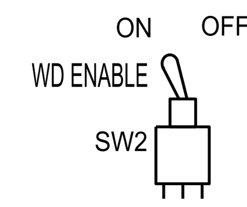
DocuSigned by: 08/10/2023
DATE

SIG. INVENTORY NO. 09-1129

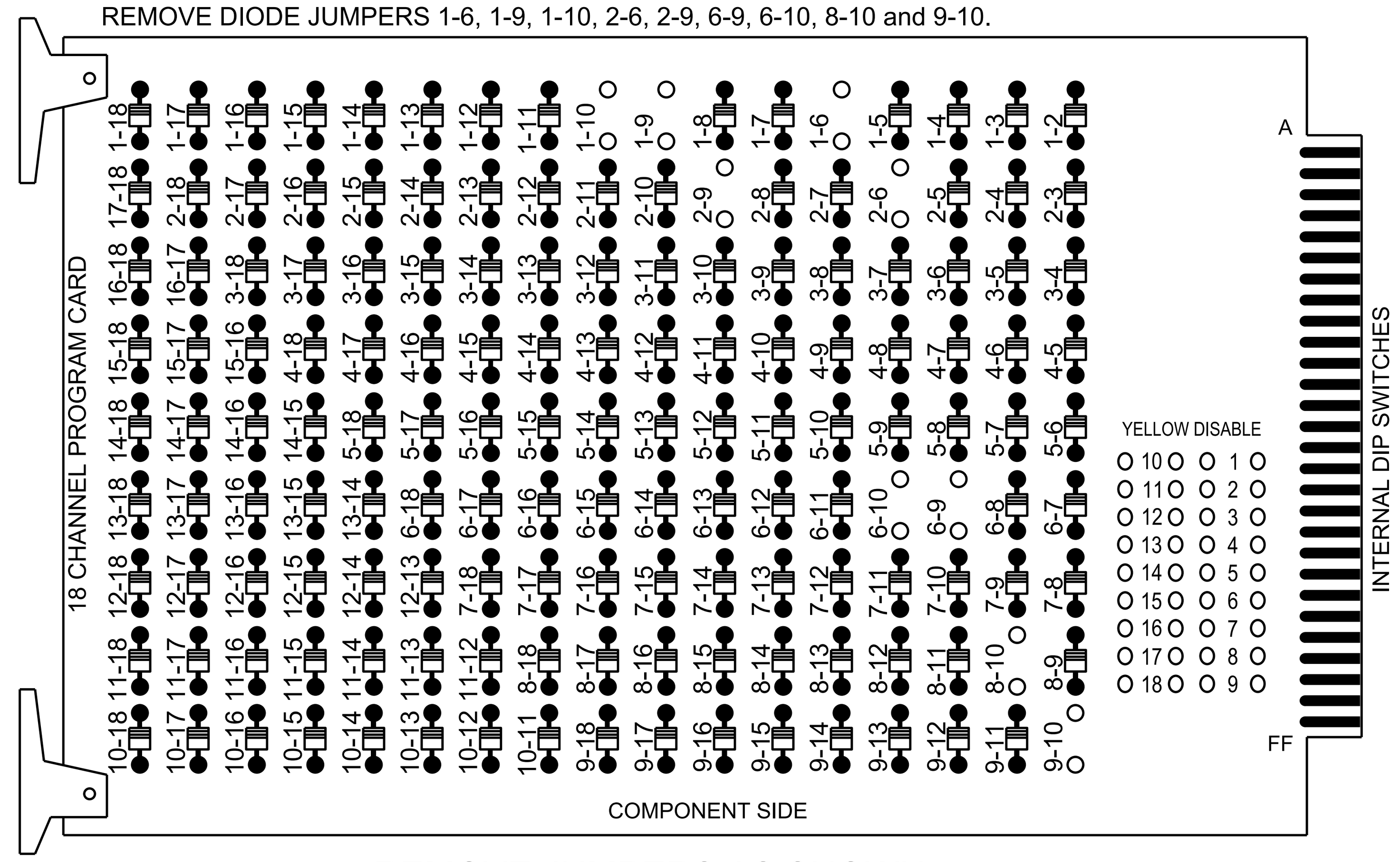
10-AUG-2023 12:26
JALohr

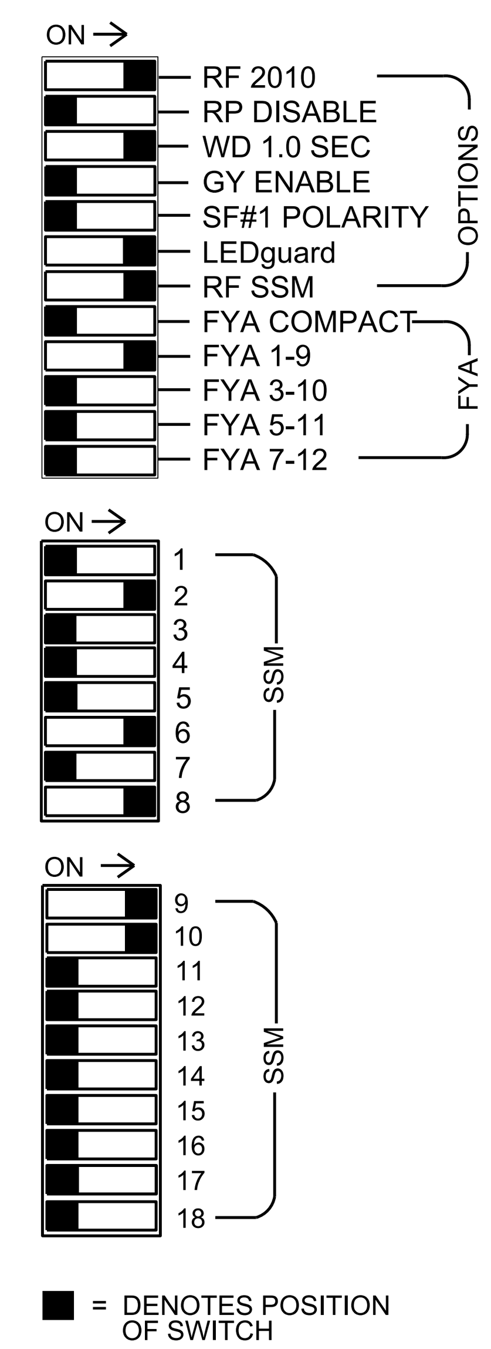
18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-6, 1-9, 1-10, 2-6, 2-9, 6-9, 6-10, 8-10 and 9-10.





REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the (NC 150 at Macy Grove - Road and County Line Road CLS) Signal System #: D09-28_Kernersville.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet...332 w/ Aux
Software...Q-Free MAXTIME
Cabinet Mount....................................Base
Output File Positions..........................18 With Aux. Output File
Load Switches Used...........................S1, S2, S8, S11, S12, AUX S1, AUX S2
Phases Used.......................................1, 2, 6, 8
Overlap "1"..*
Overlap "2"..*
Overlap "3"..NOT USED
Overlap "4"..NOT USED

*See overlap programming detail on sheet 2

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11		S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8		16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8		8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11★	21.22	NU	NU	NU	NU	NU	61,62	NU	NU	22	81,83	NU	11★	82	NU	NU	NU	NU
RED		128						134							A124				
YELLOW	*	129						135											
GREEN		130						136											
RED ARROW												107		A121					
YELLOW ARROW														A122	A125				
FLASHING YELLOW ARROW											108	108		A123					
GREEN ARROW	127										109	109			A126				

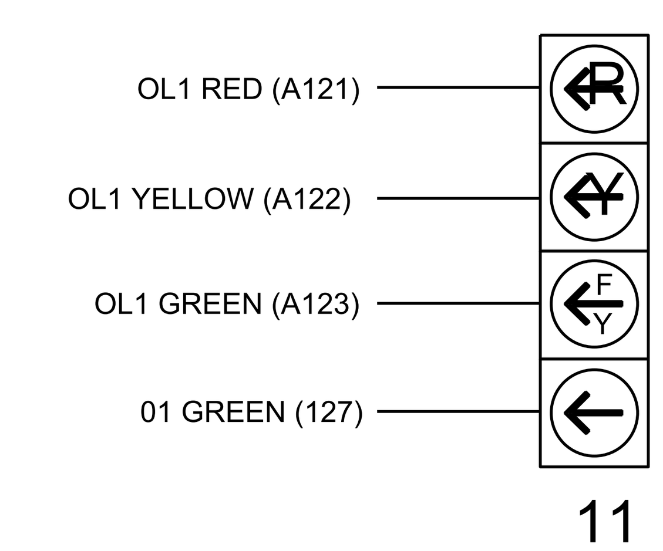
NU = Not Used

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

★See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

FILE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
"I"	U	Ø 1 1A	Ø 1 1A	Ø 2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	Ø 1 1B	NOT USED											ST DC ISOLATOR
"J"	U	SLOT EMPTY	Ø 6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		NOT USED				NOT USED								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN
1A	TB2-1,2	I1U	56	18	1	1	15		X		X	
				-	29	6	3		X		X	X
1B	TB2-5,6	I2U	39	1	2	1	15		X		X	
1C	TB2-7,8	I2L	43	5	3	1	15		X		X	
2A	TB2-9,10	I3U	63	29	4	2			X	X	X	
6A	TB3-5,6	J2U	40	2	16	6			X	X	X	
8A	TB5-9,10	J6U	42	4	22	8	3		X		X	

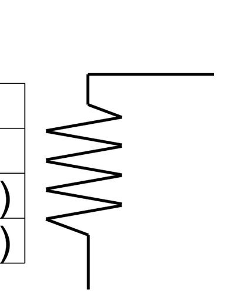
INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown)

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



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-1129
DESIGNED: June 2023
SEALED: 08-10-23
REVISED: N/A

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
ITS & Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

NC 150 (N. Main Street)
at
SR 2037 (County Line Road)

Division 09 Forsyth County Kernersville

PLAN DATE: July 2023 REVIEWED BY:
PREPARED BY: James Peterson REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 430320FAA2654C3... 08/14/2023 DATE

SIG. INVENTORY NO. 09-1129

11-AUG-2023 07:36
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jtpeterson

PROJECT REFERENCE NO.	SHEET NO.
U-6003	Sig. 4.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2
Type	FYA 4 - Section	Normal
Included Phases	2	1,8
Modifier Phases	1	-
Modifier Overlaps	-	-
Trail Green	0	0
Trail Yellow	0.0	0.0
Trail Red	0.0	0.0

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

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

Overlap Plan 2

Overlap	1	2	
Type	FYA 4 - Section	Normal	
Included Phases	-	1,8	← NOTICE INCLUDED PHASE
Modifier Phases	1	-	
Modifier Overlaps	-	-	
Trail Green	0	0	
Trail Yellow	0.0	0.0	
Trail Red	0.0	0.0	

FLASHER CIRCUIT MODIFICATION DETAIL

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

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

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

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOPS 1A

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

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

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

1A

Plan 2

Detector	Call Phase	Delay
1	1	0
29	0	3

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

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

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

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

ALTERNATE PHASING CHANGE SUMMARY

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

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

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-1129
DESIGNED: June 2023
SEALED: 08-10-23
REVISED: N/A

Electrical Detail - Sheet 2 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

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

NC 150 (N. Main Street)
at
SR 2037 (County Line Road)

Division 09 | Forsyth County | Kernersville

PLAN DATE: July 2023 | REVIEWED BY:
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

DocuSigned by: Ryan W. Hough 08/14/2023
430320FAA2654C3 DATE

SIG. INVENTORY NO. 09-1129

11-AUG-2023 07:37
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jtpeterson

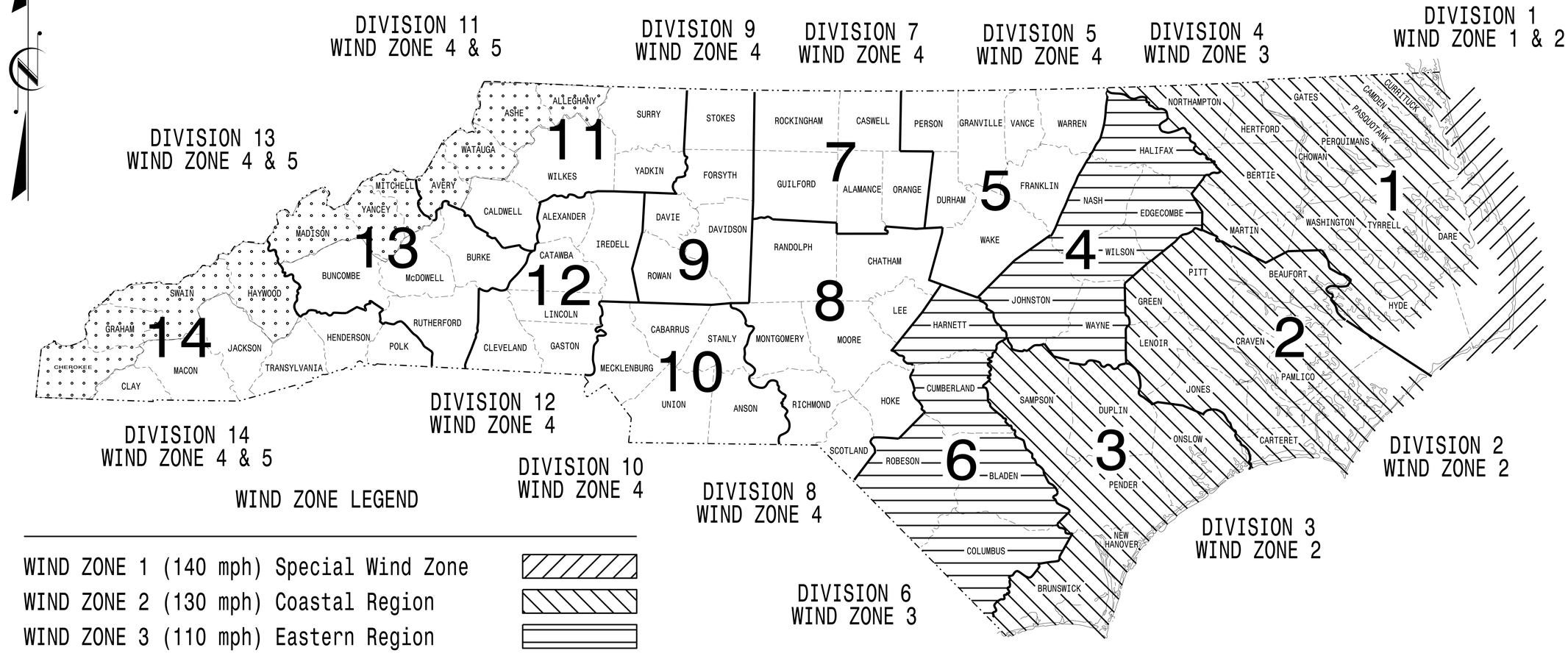
POLE STANDARDS

NCDOT METAL POLES

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT I.D. NO.	SHEET NO.
U-6003	Sig.M1

STANDARD DRAWINGS FOR ALL METAL POLES



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

M.M. MCDIARMID, P.E. – STATE ITS AND SIGNALS ENGINEER

J. P. GALLOWAY, P.E. – STATE SIGNALS ENGINEER

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

SEAL

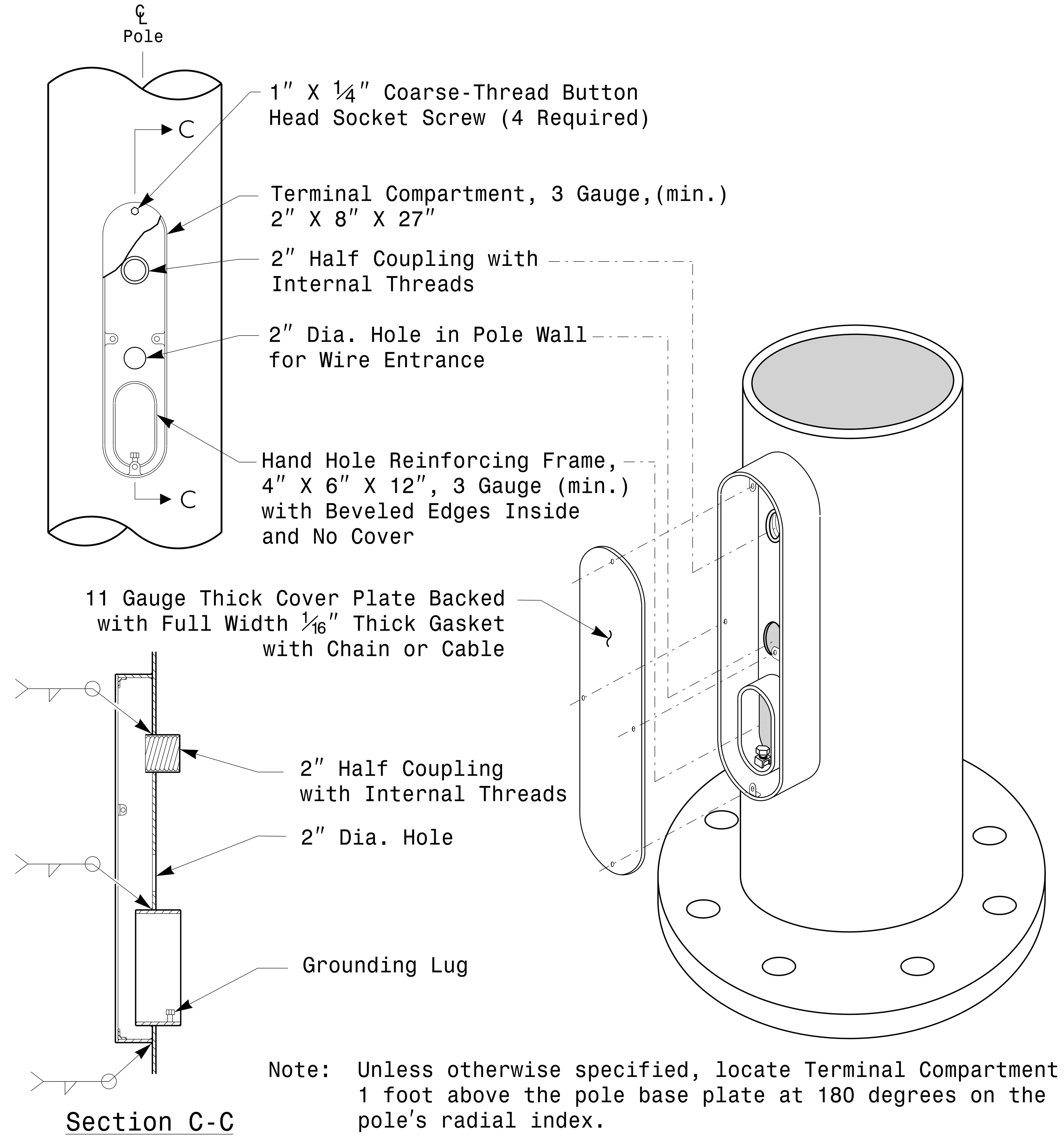
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

DocuSigned by: Debesh C. Sarkar 44E8E3... SIGNATURE

10/11/2017 DATE

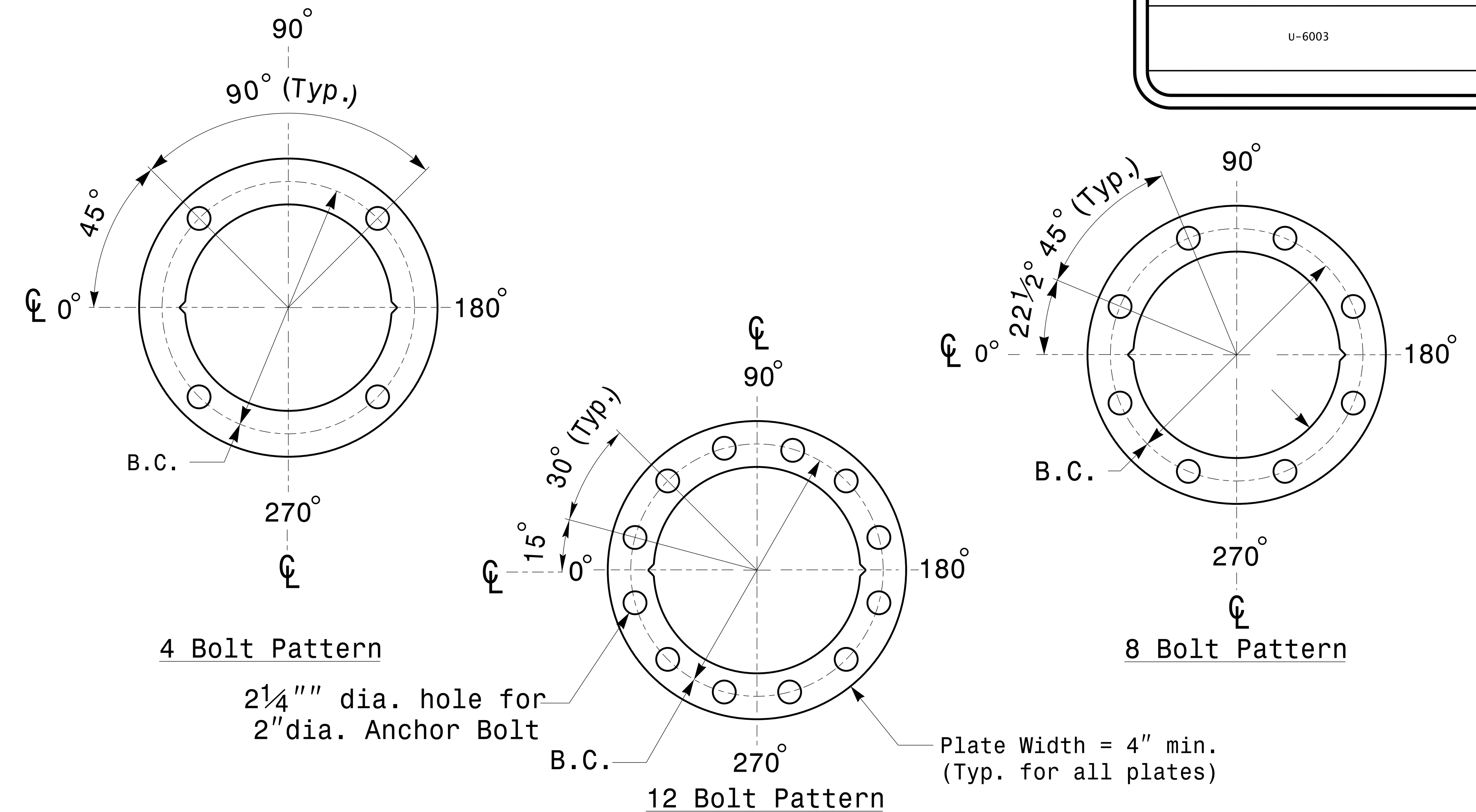
PROJECT ID. NO.	SHEET NO.
U-6003	Sig.M2

Fabrication Details – All Metal Poles



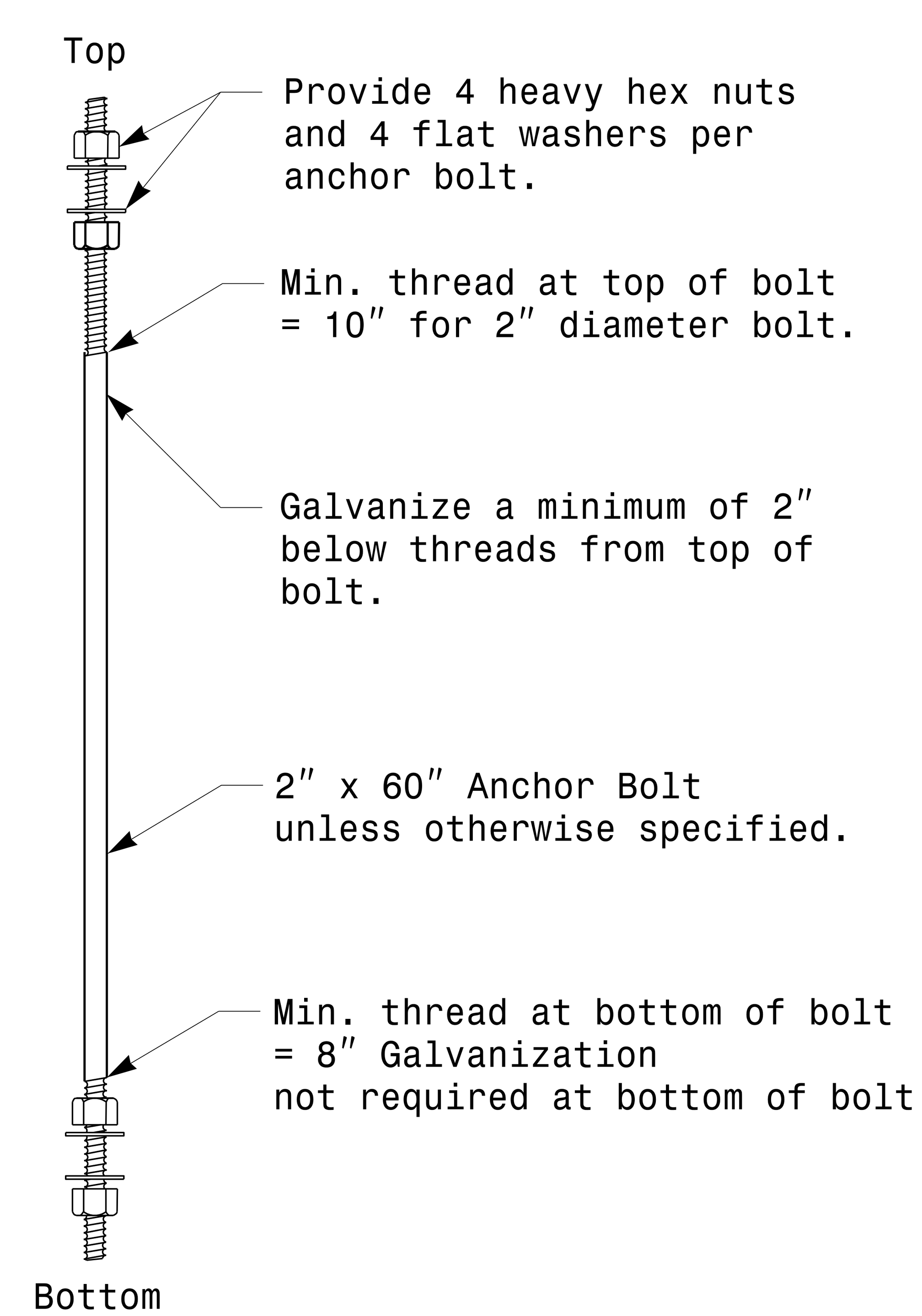
Note: Unless otherwise specified, locate Terminal Compartment 1 foot above the pole base plate at 180 degrees on the pole's radial index.

Terminal Compartment Detail

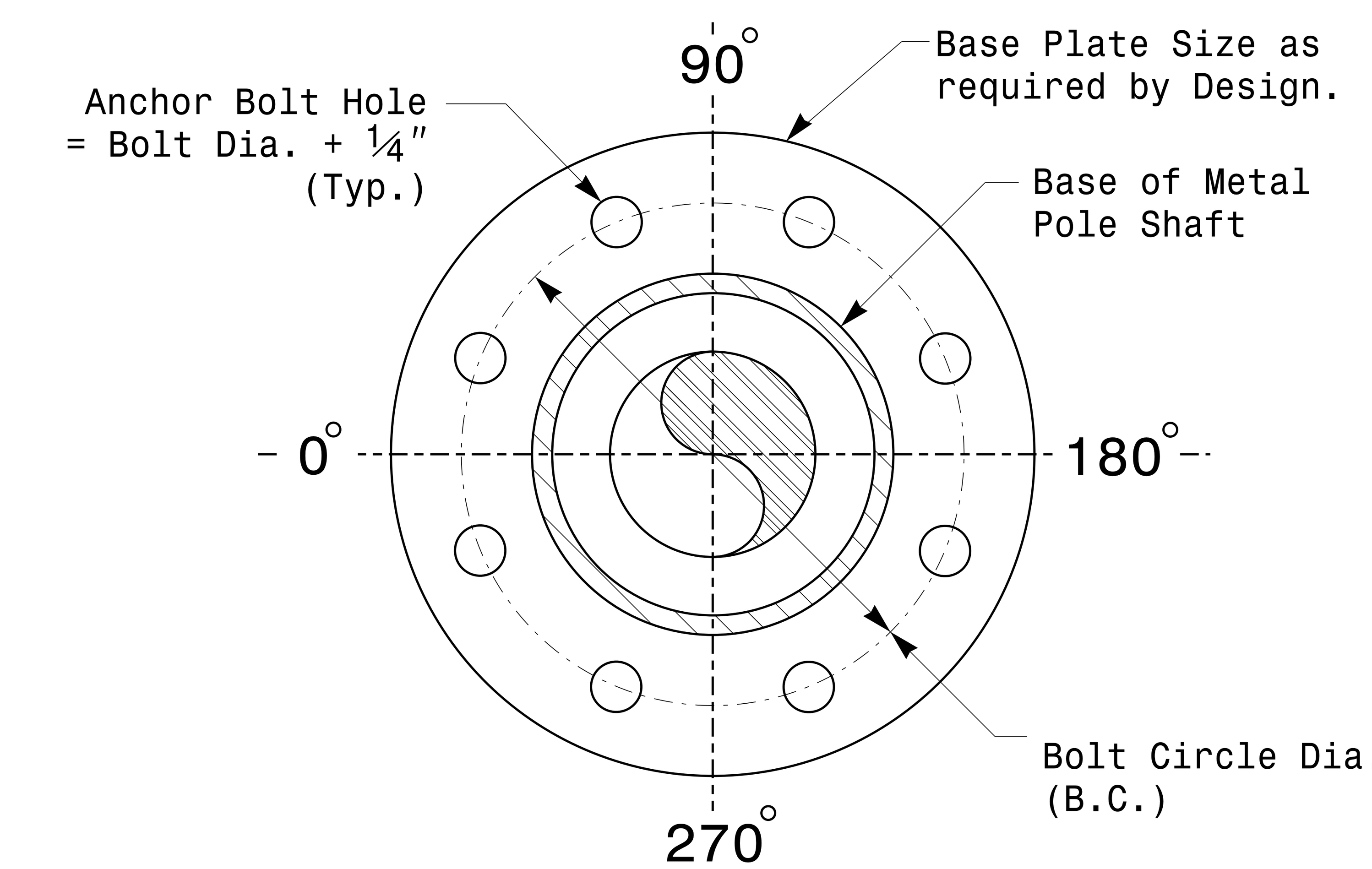


Construct Templates and Plates from ¼" min. thick Steel. Galvanizing is not required.

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

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

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

Typical Fabrication Details
For
All Metal Poles

PLAN DATE:	OCTOBER 2017	DESIGNED BY:	C.F.ANDREWS
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

SCALE: 0 NA — NONE

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028094 DEBESH C. SARKAR

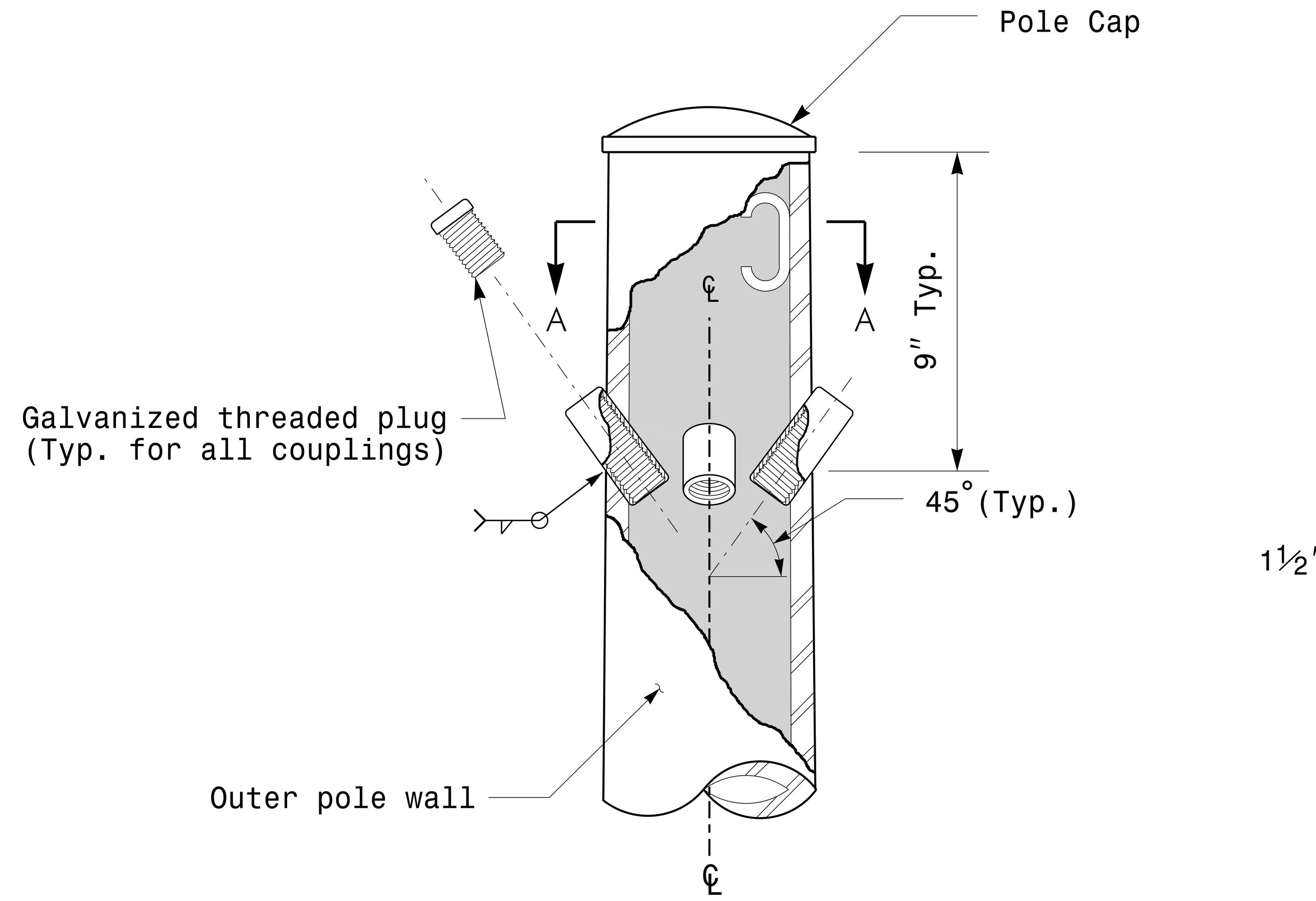
DocuSigned by: Debesh C. Sarkar
SIGNATURE — DATE 10/11/2017

11-OCT-2017 08:30

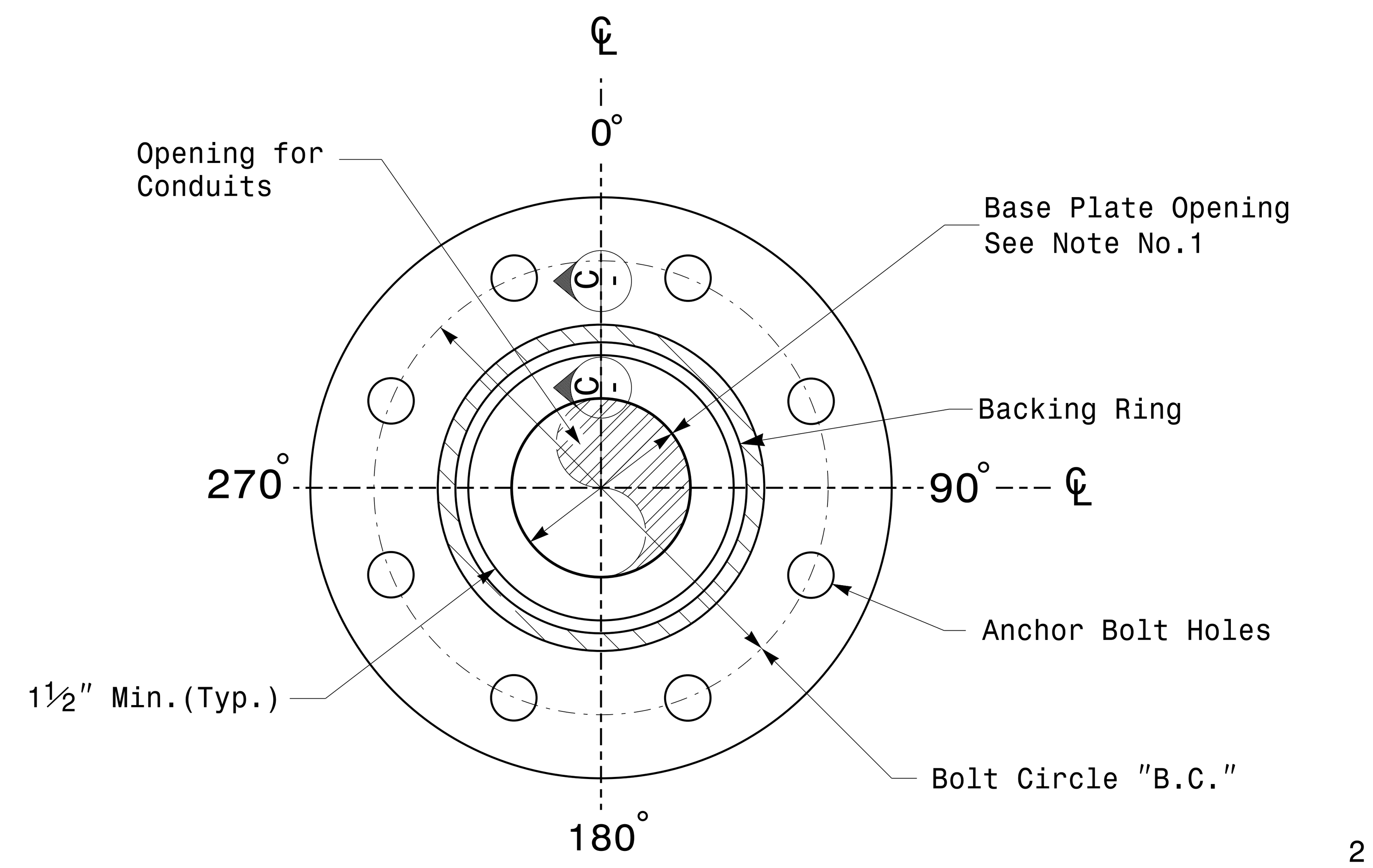
Fabrication Details – Strain Poles

PROJECT ID. NO.	SHEET NO.
U-6003	Sig.M3

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

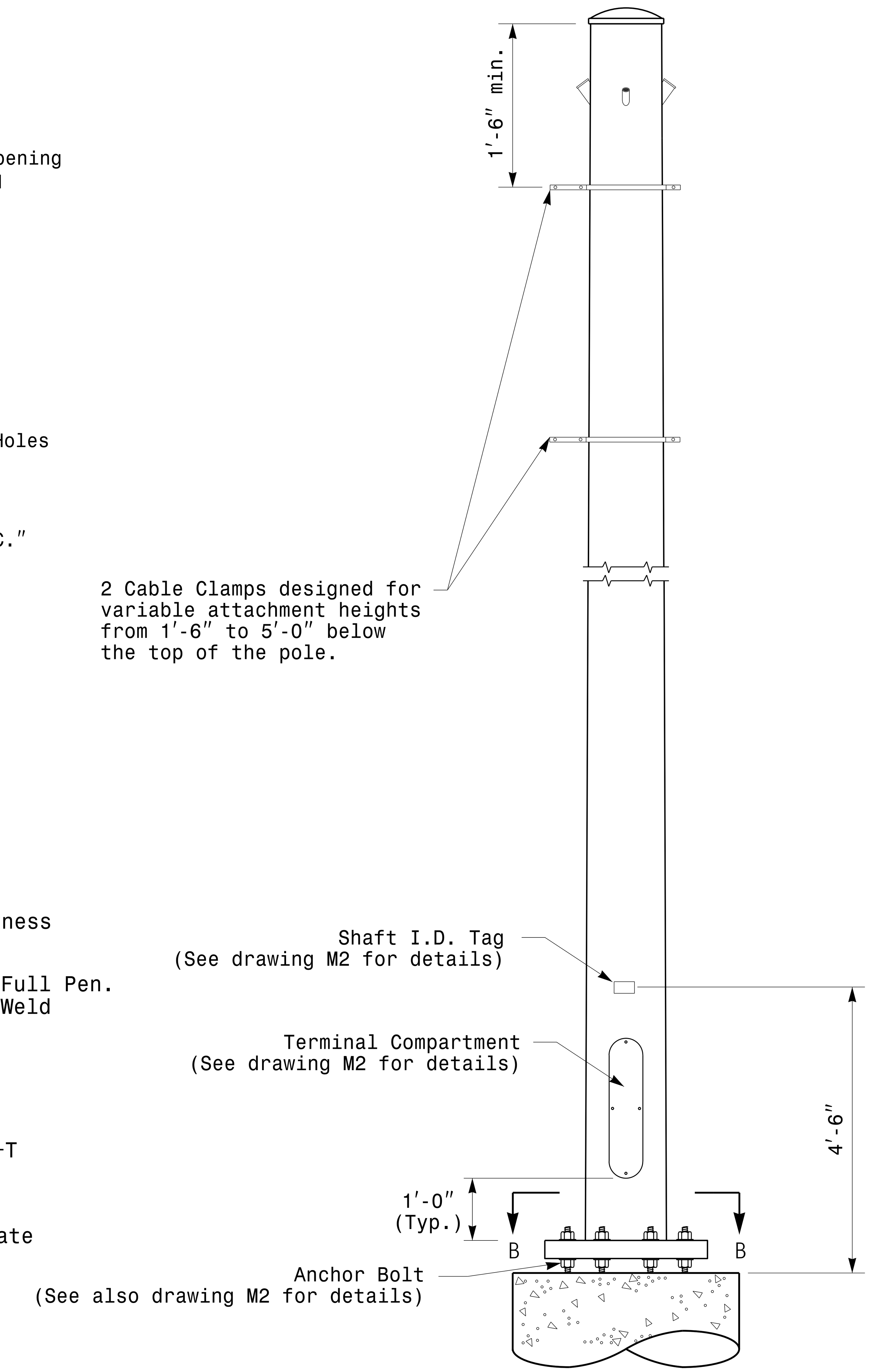


Cable Entrances at Top of Pole

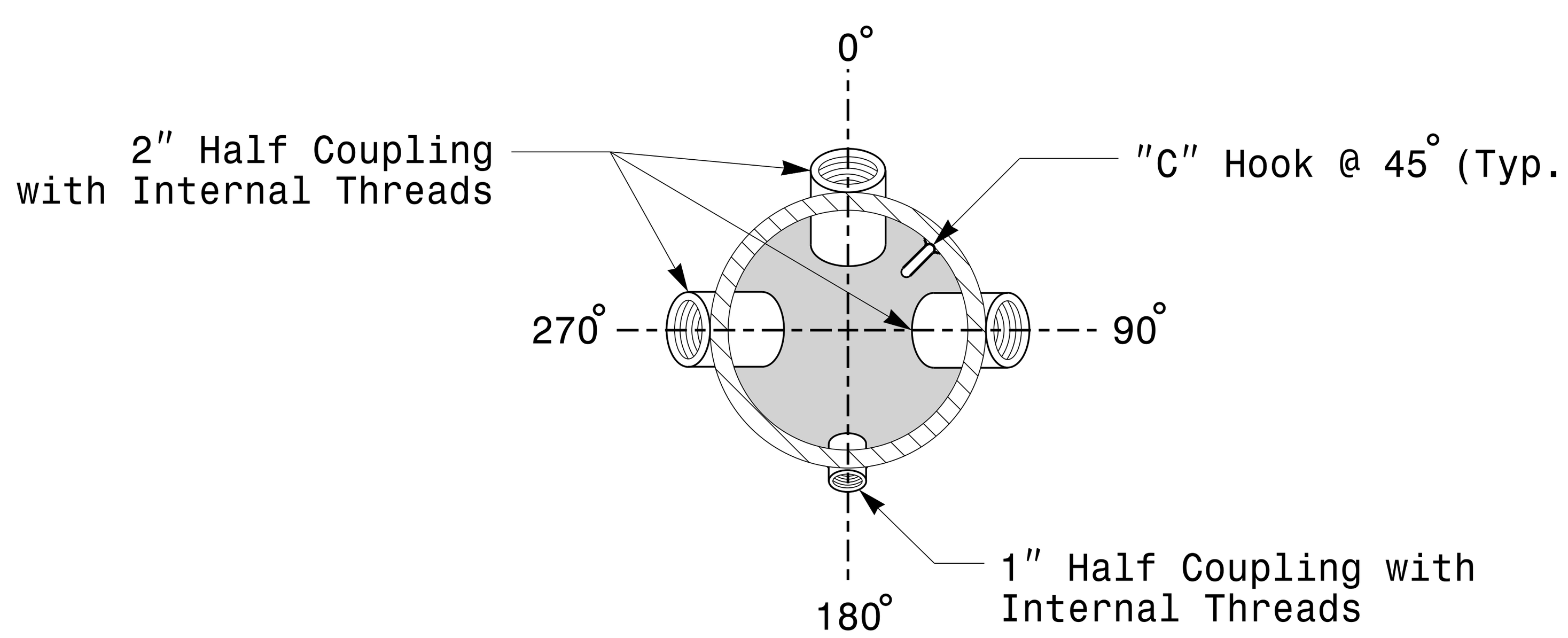


Section B-B

Pole Base Plate Details (8 and 12 Bolt Pattern)

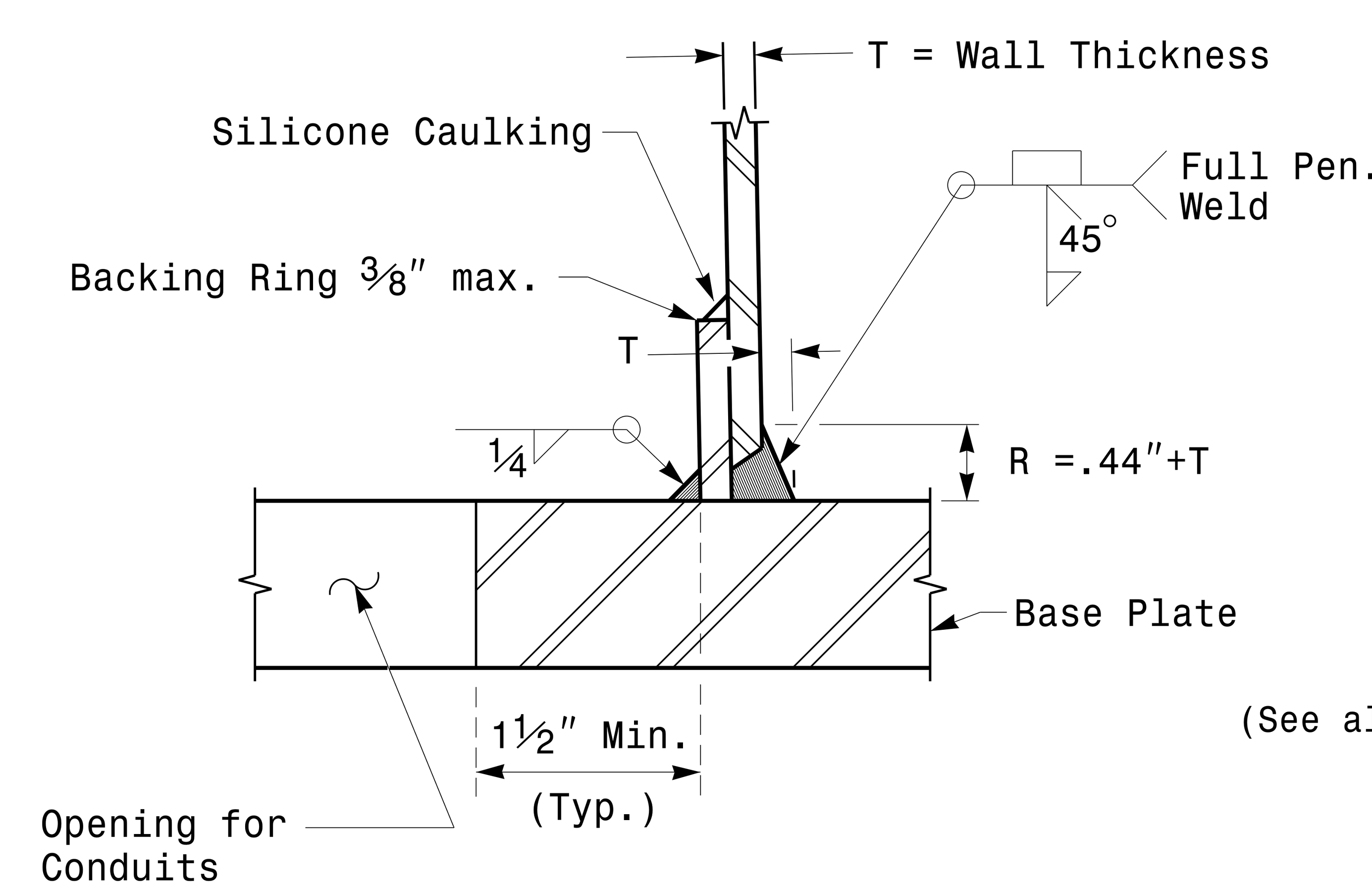


Monotube Strain Pole



Section A-A

Radial Orientation for Factory Installed Accessories at Top of Pole



Section C-C

(Pole Attachment to Base Plate)

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 Strain Poles

PLAN DATE:	OCTOBER 2017	DESIGNED BY:	K.C.DURIGON
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

SCALE: 0 NA — NONE

REVISIONS | INIT. | DATE

SEAL
North Carolina Professional Engineer Seal 028094 Debesh C. Sarkar

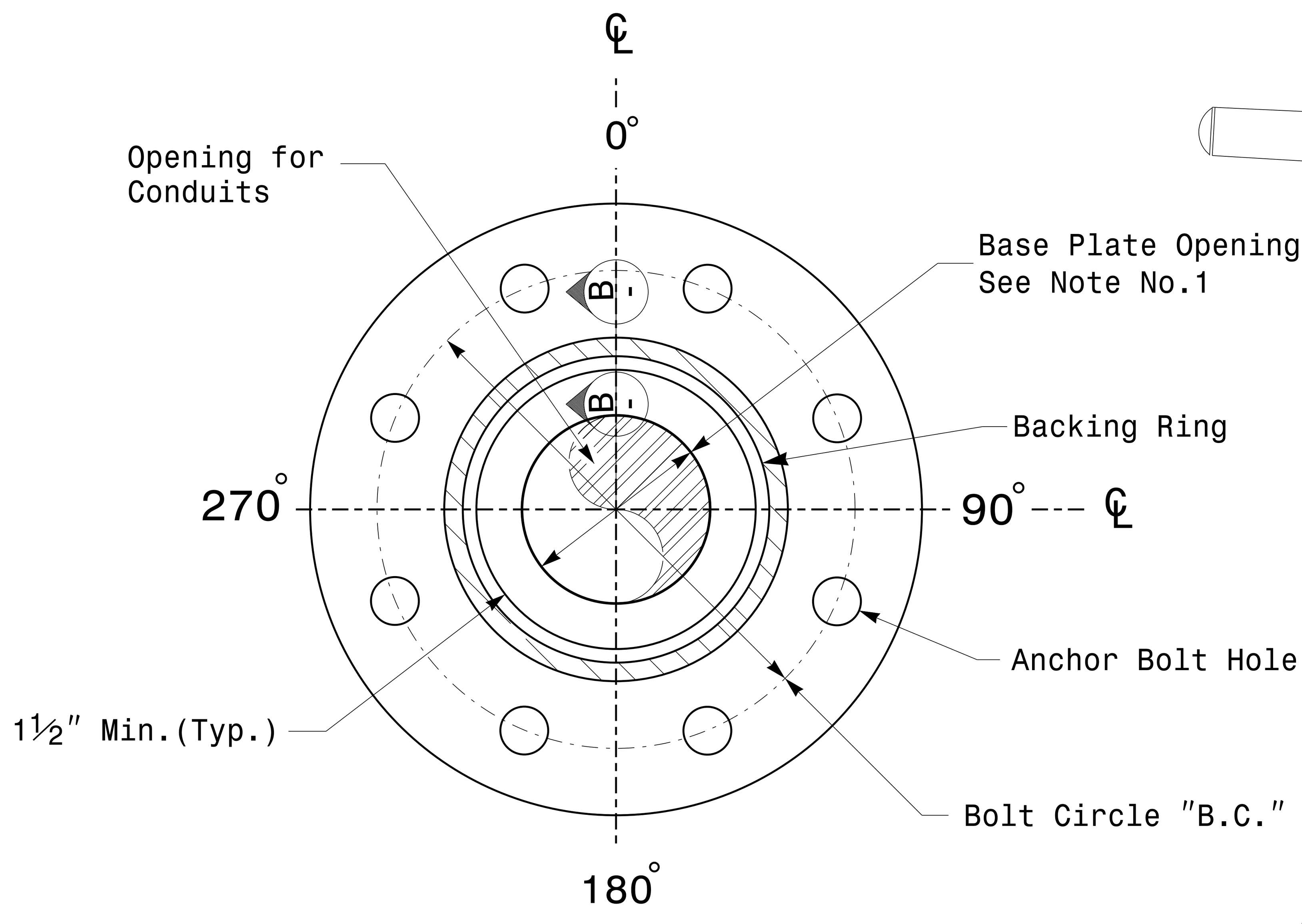
DocuSigned by: Debesh C. Sarkar
SIGNATURE
10/11/2017
DATE

11-OCT-2017 08:25
S:*ITS&U*ITS Signals*Signal Design Section*Eastern Region*M Sheets*2016*2014 Sig.M3 Std. Fabrication Details-Strain Poles.dgn

PROJECT ID. NO.	SHEET NO.
U-6003	Sig.M4

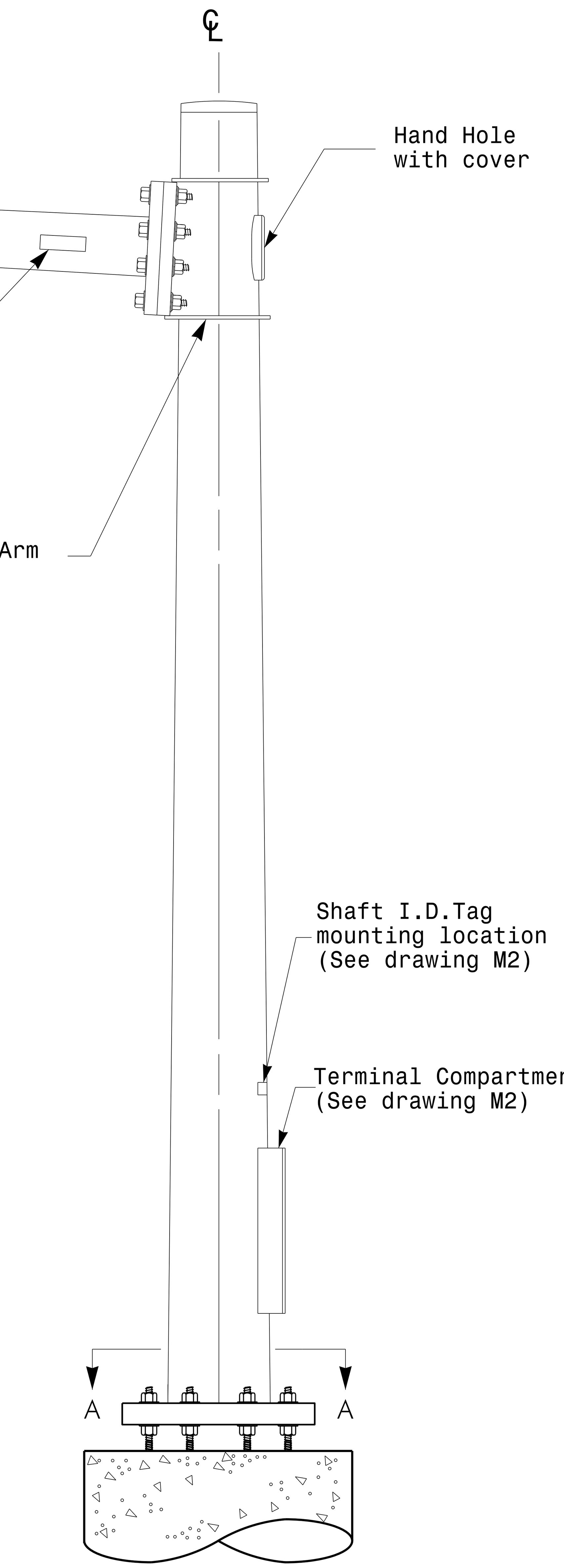
Fabrication Details – Mast Arm Poles

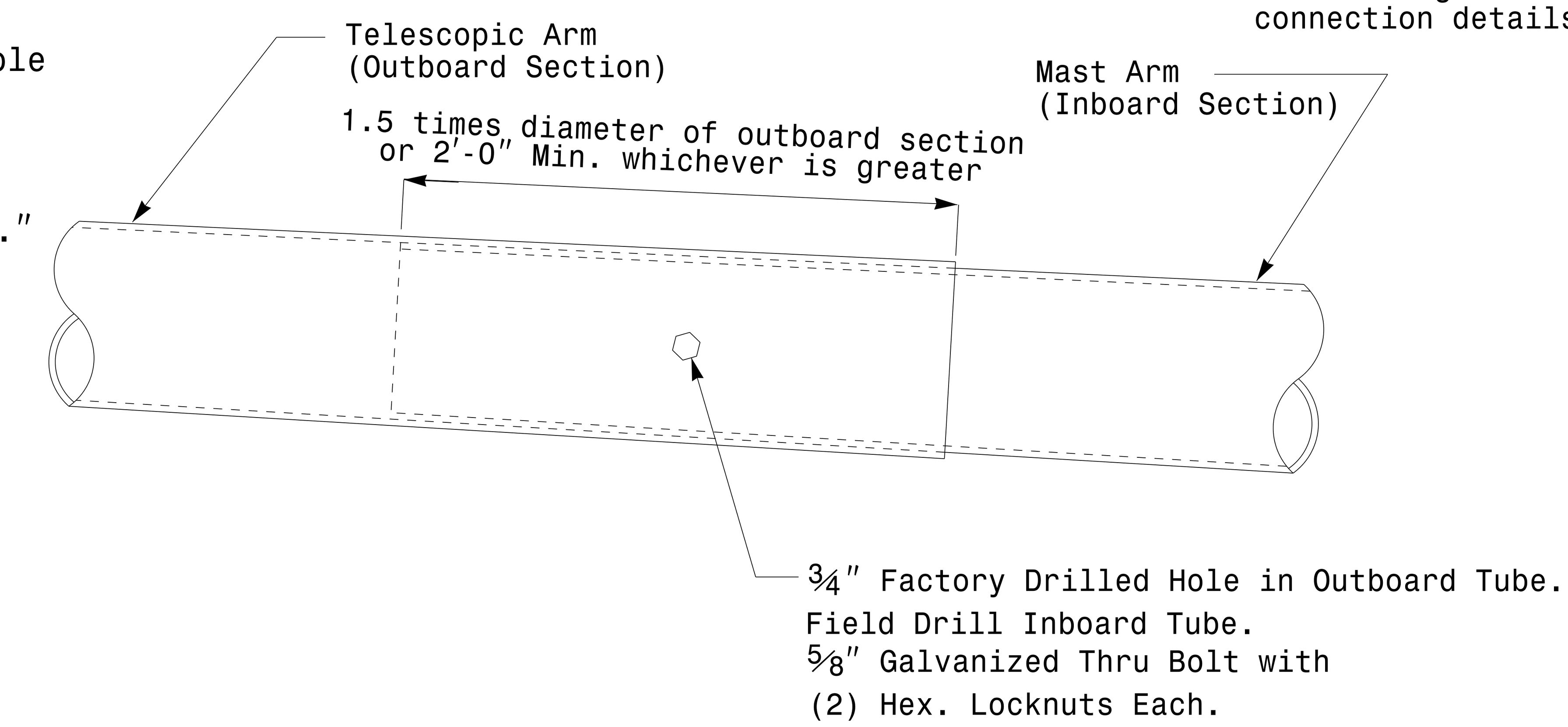
Note:
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3½" but shall not be less than 8½".



Section A-A

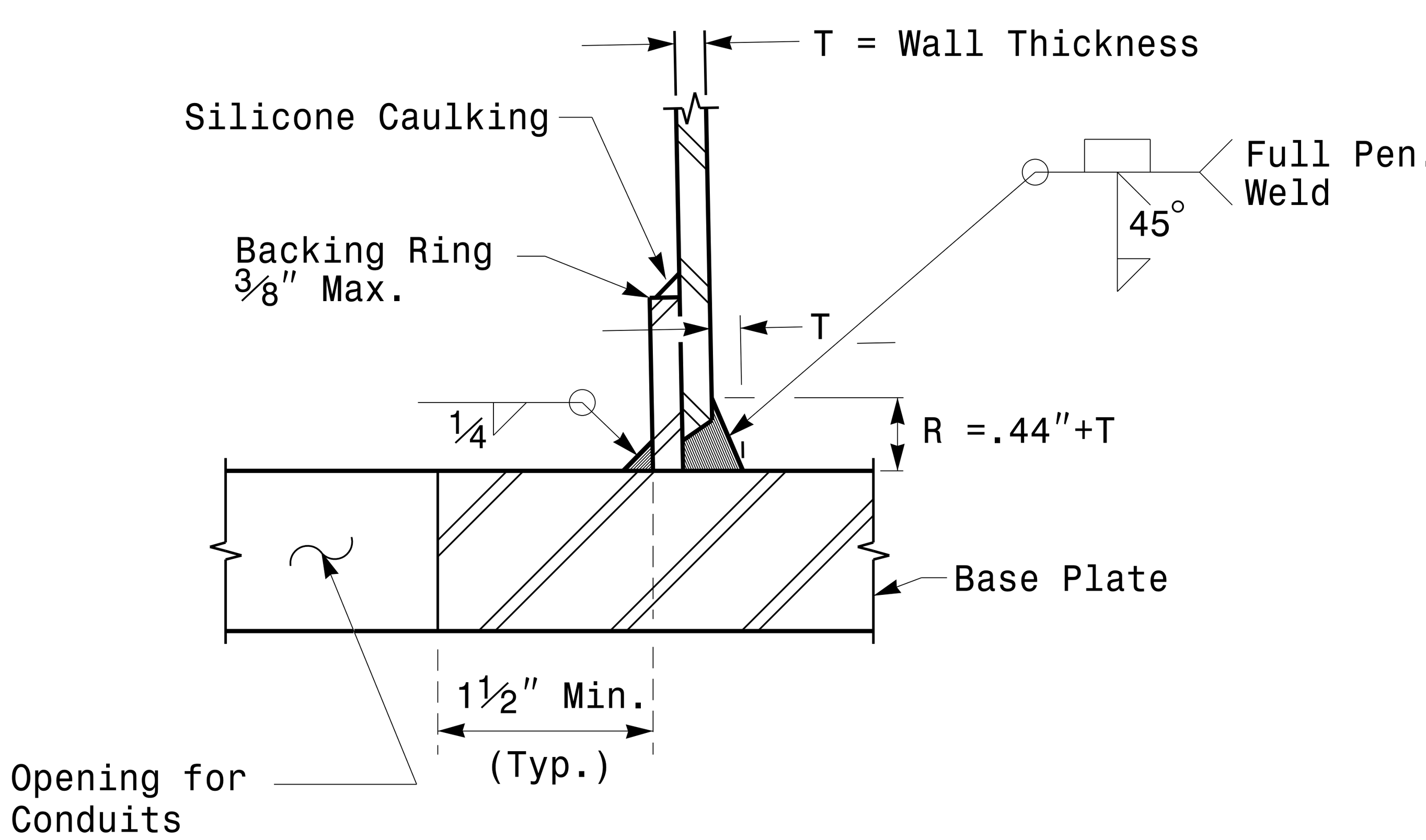
Pole Base Plate Details





Slip Fit Joint Detail for Mast Arm

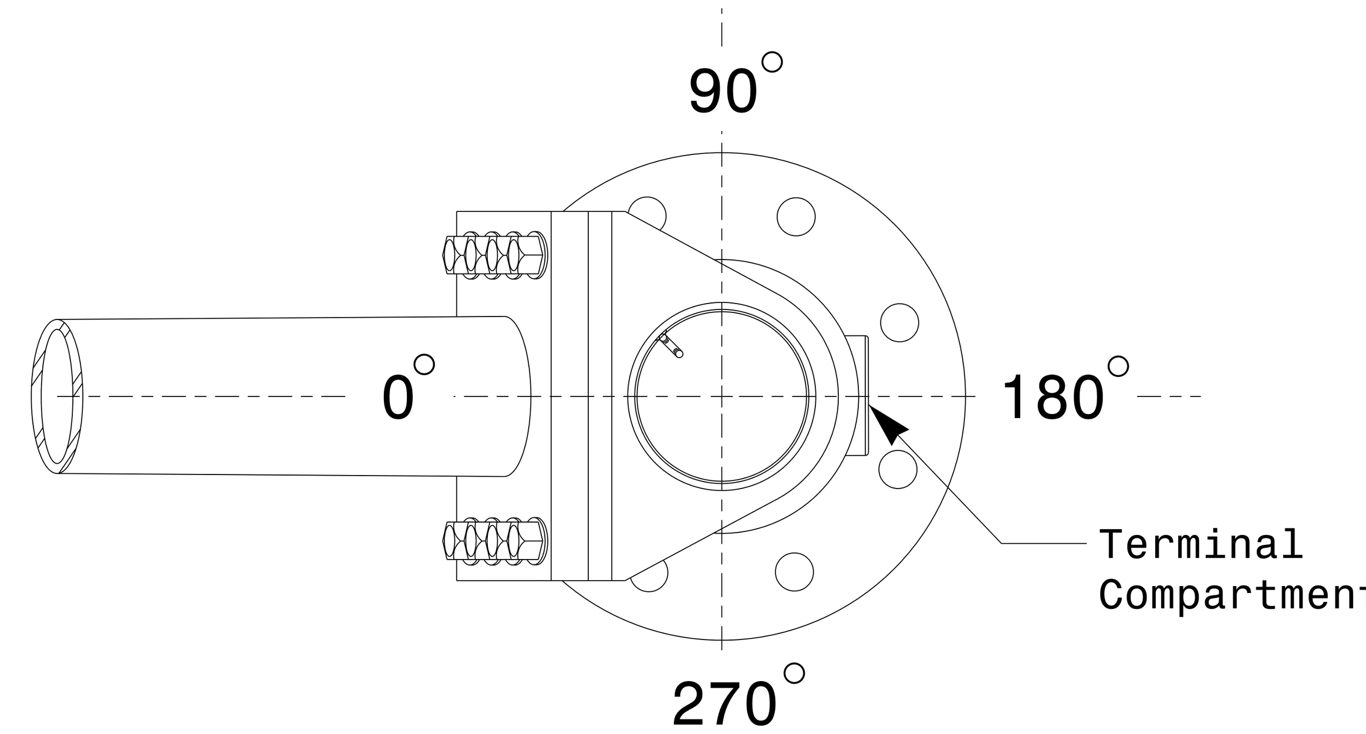
Mast Arm Pole



Section B-B

(Pole Attachment to Base Plate)

Full-Penetration Groove Weld Detail



Mast Arm Radial Orientation

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 Poles

PLAN DATE:	OCTOBER 2017	DESIGNED BY:	K.C.DURIGON
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
10/11/2017
DATE

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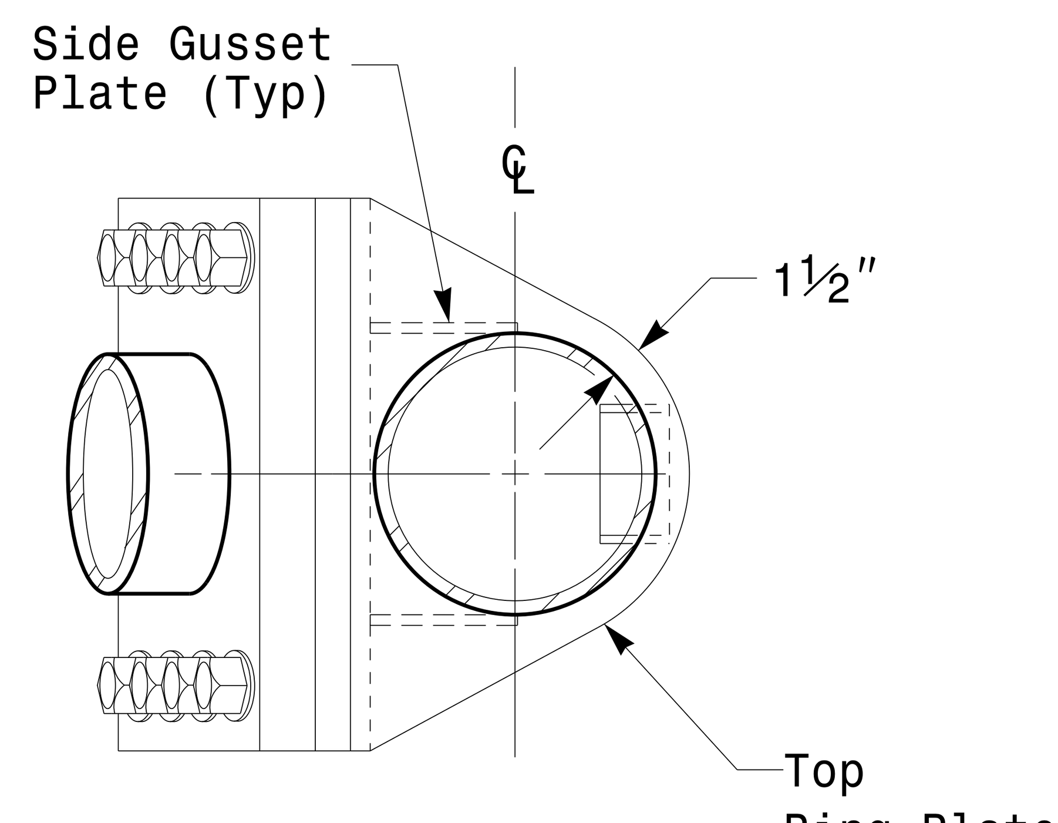
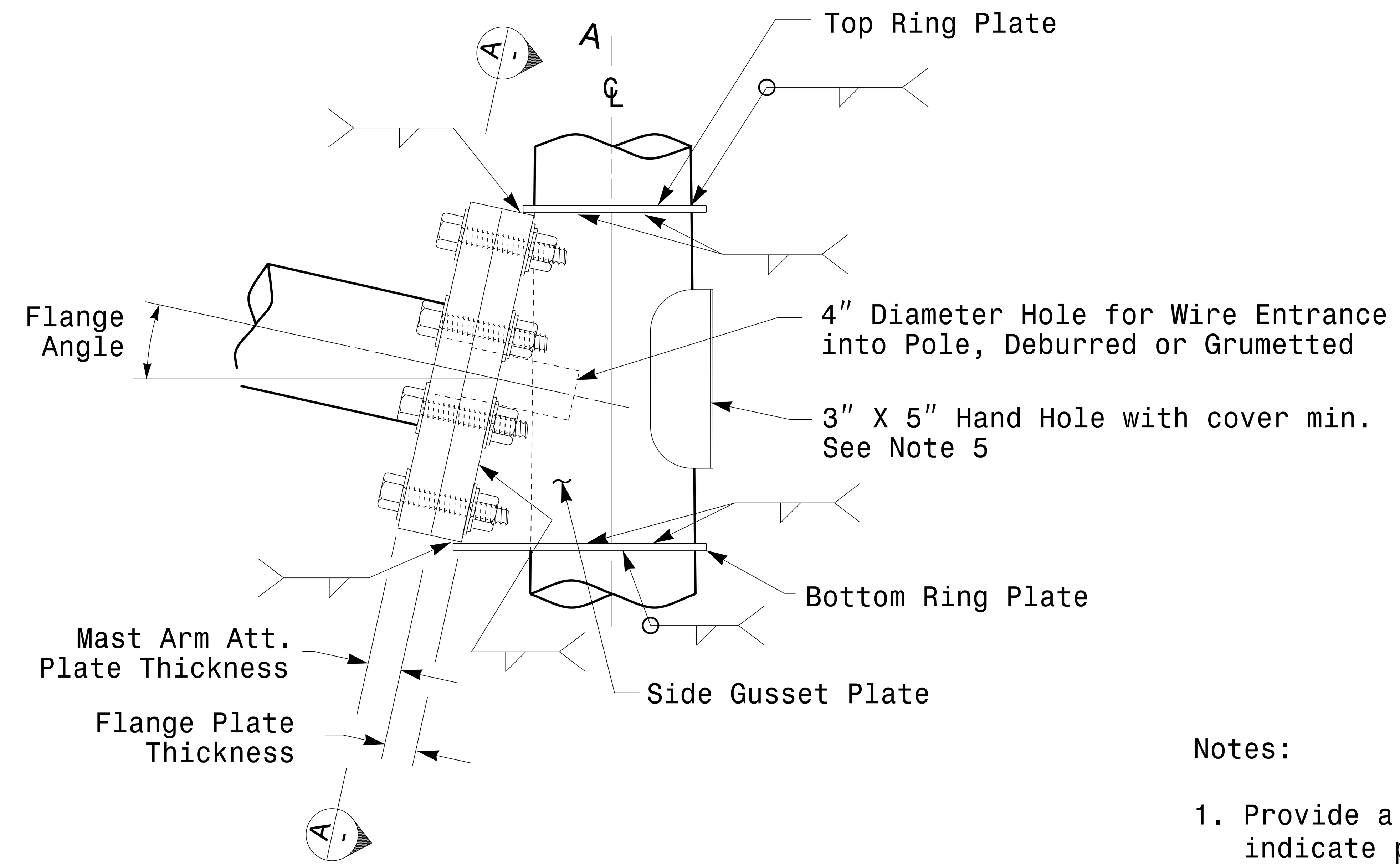
rnzinser

Welded Ring Stiffened Mast Arm Connection

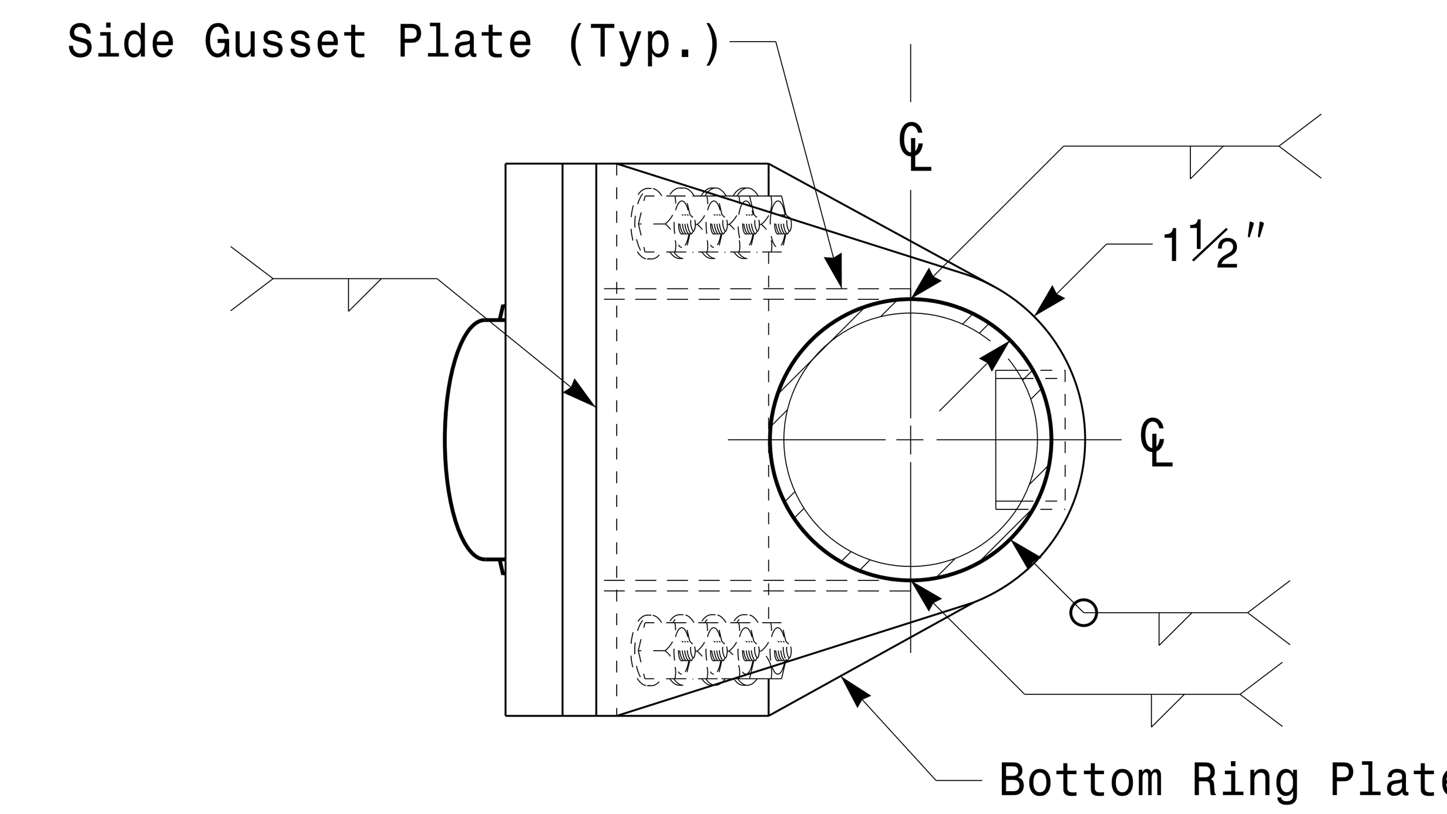
PROJECT ID. NO.	SHEET NO.
U-6003	Sig.M5



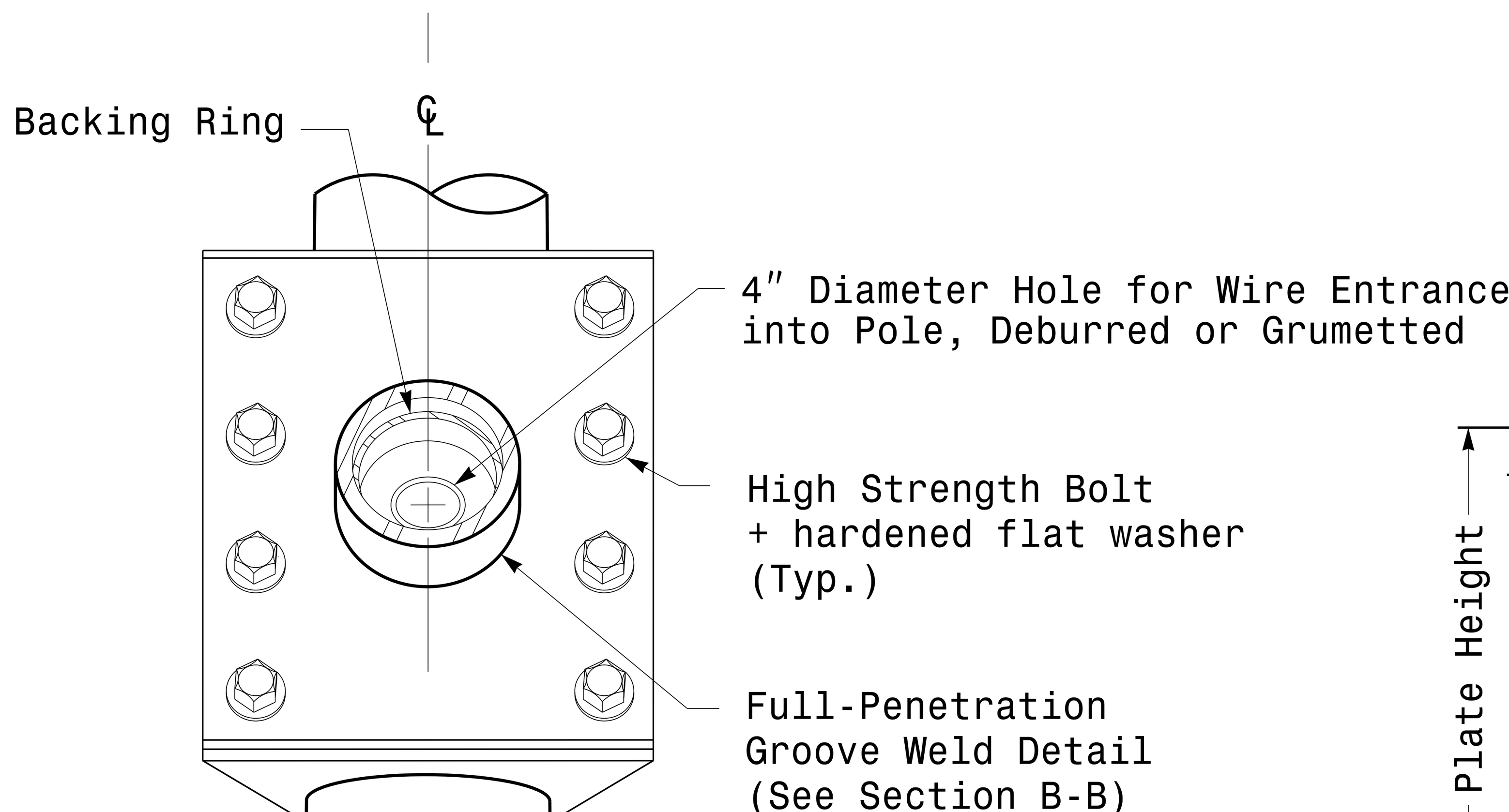
Plan View



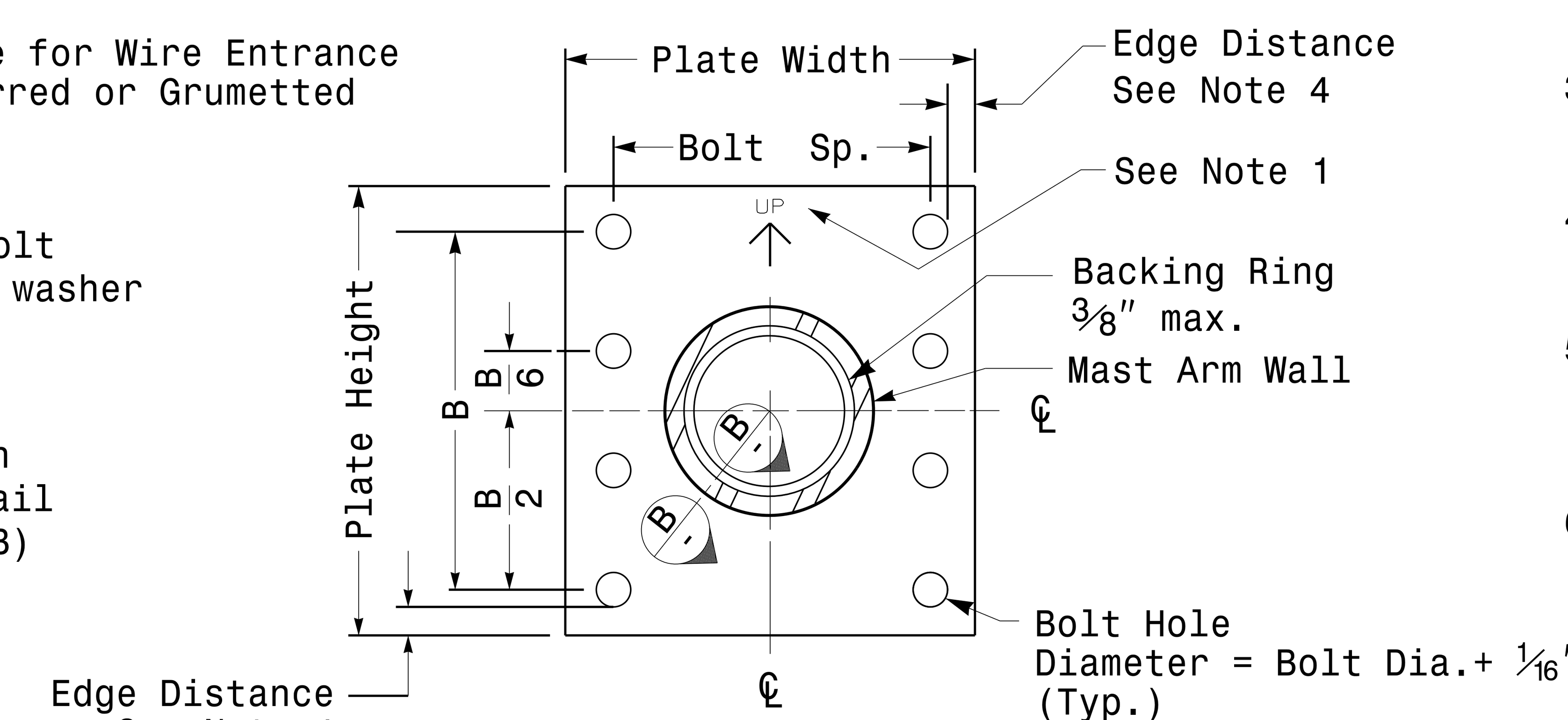
Side Elevation View



Bottom View

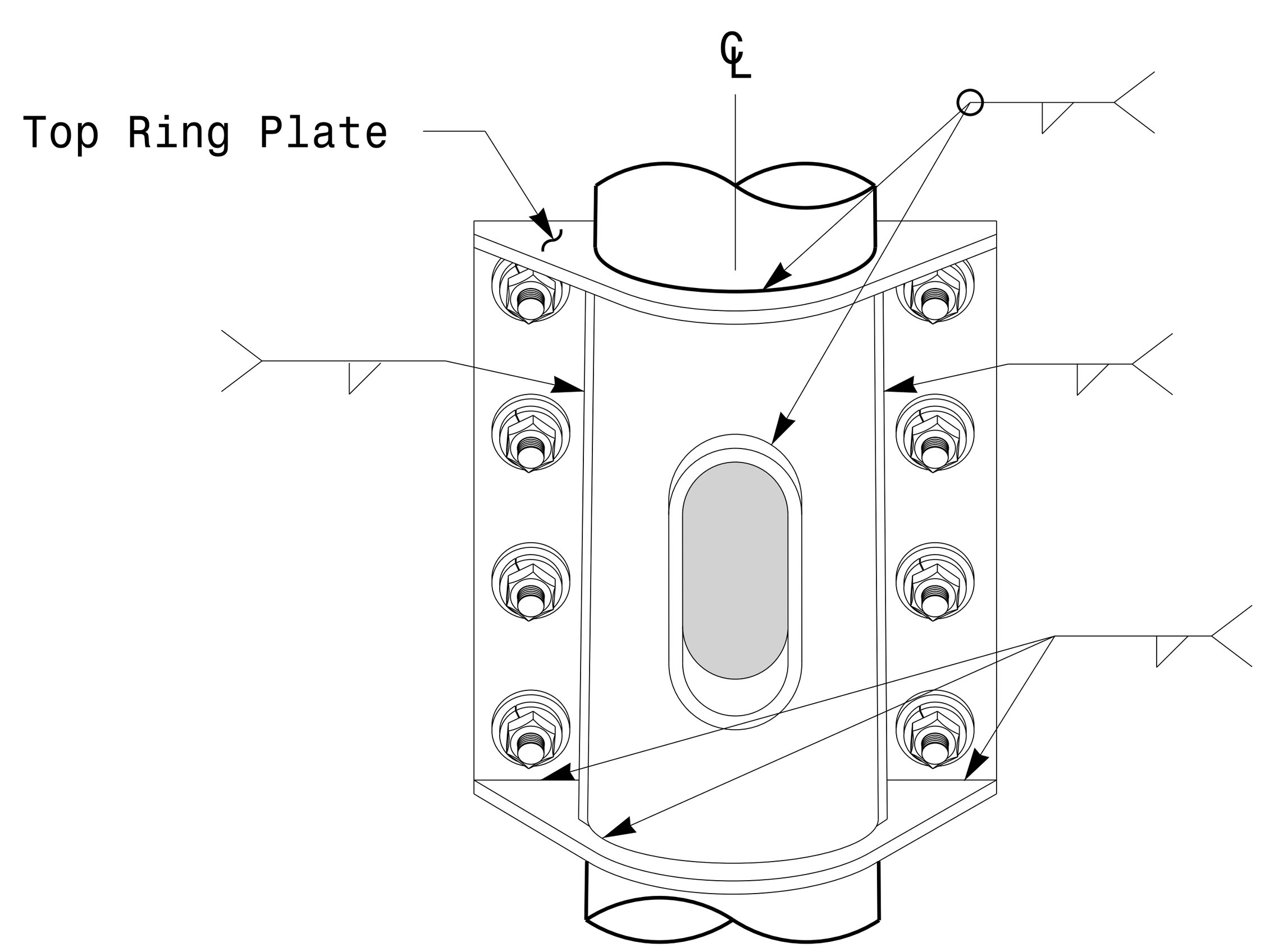


Front Elevation View

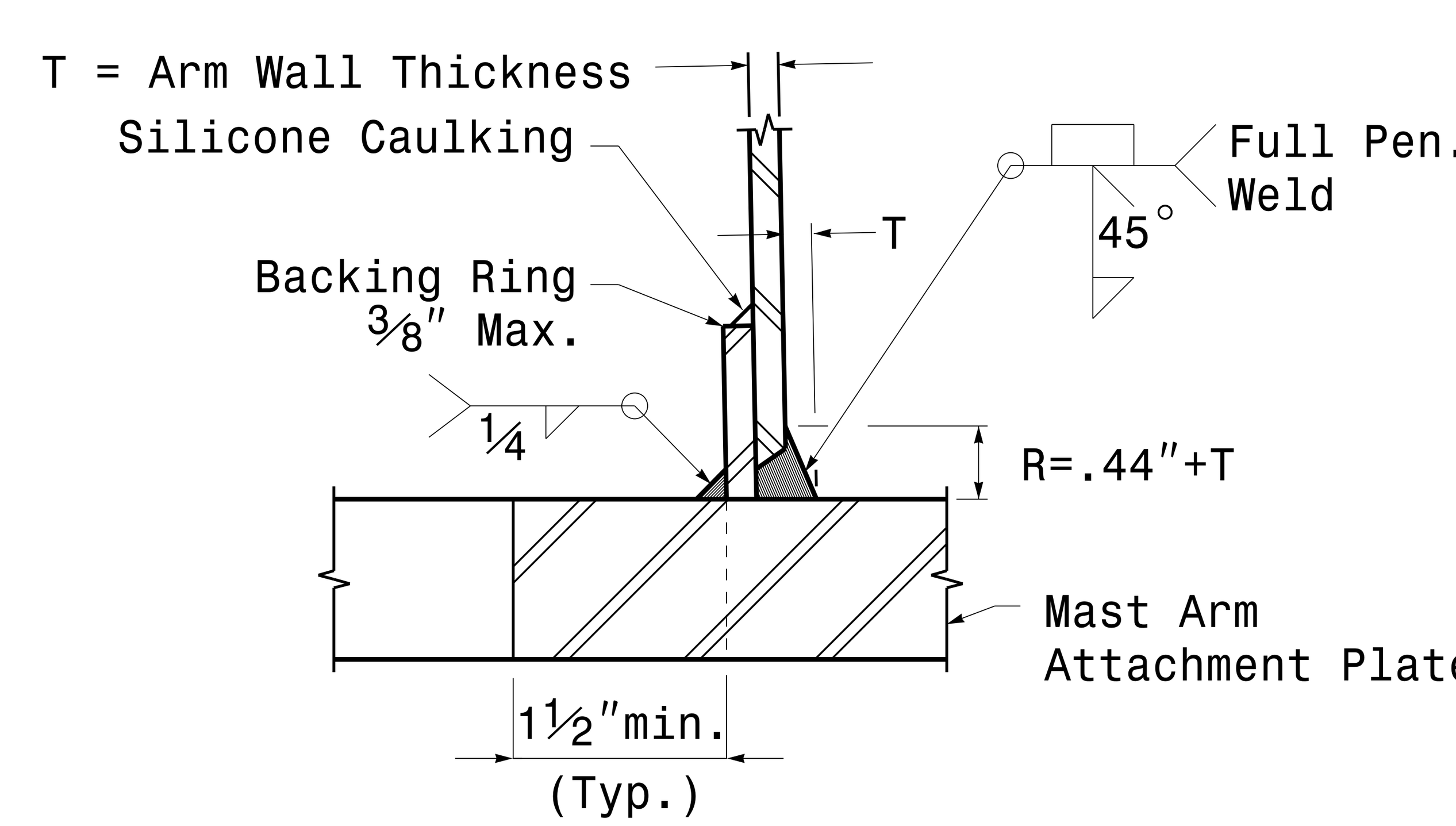


Section A-A

Mast Arm Attachment Plate



Back Elevation View



Section B-B

Full-Penetration Groove Weld Detail

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.

Fabrication Details – Mast Arm Connection

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:	OCTOBER 2017	DESIGNED BY:	C.F.ANDREWS
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

SCALE: 0 NA — NONE

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028094 DEBESH C. SARKAR

DocuSigned by: Debesh C. Sarkar — SIGNATURE — 10/11/2017 DATE

11-OCT-2017 08:35
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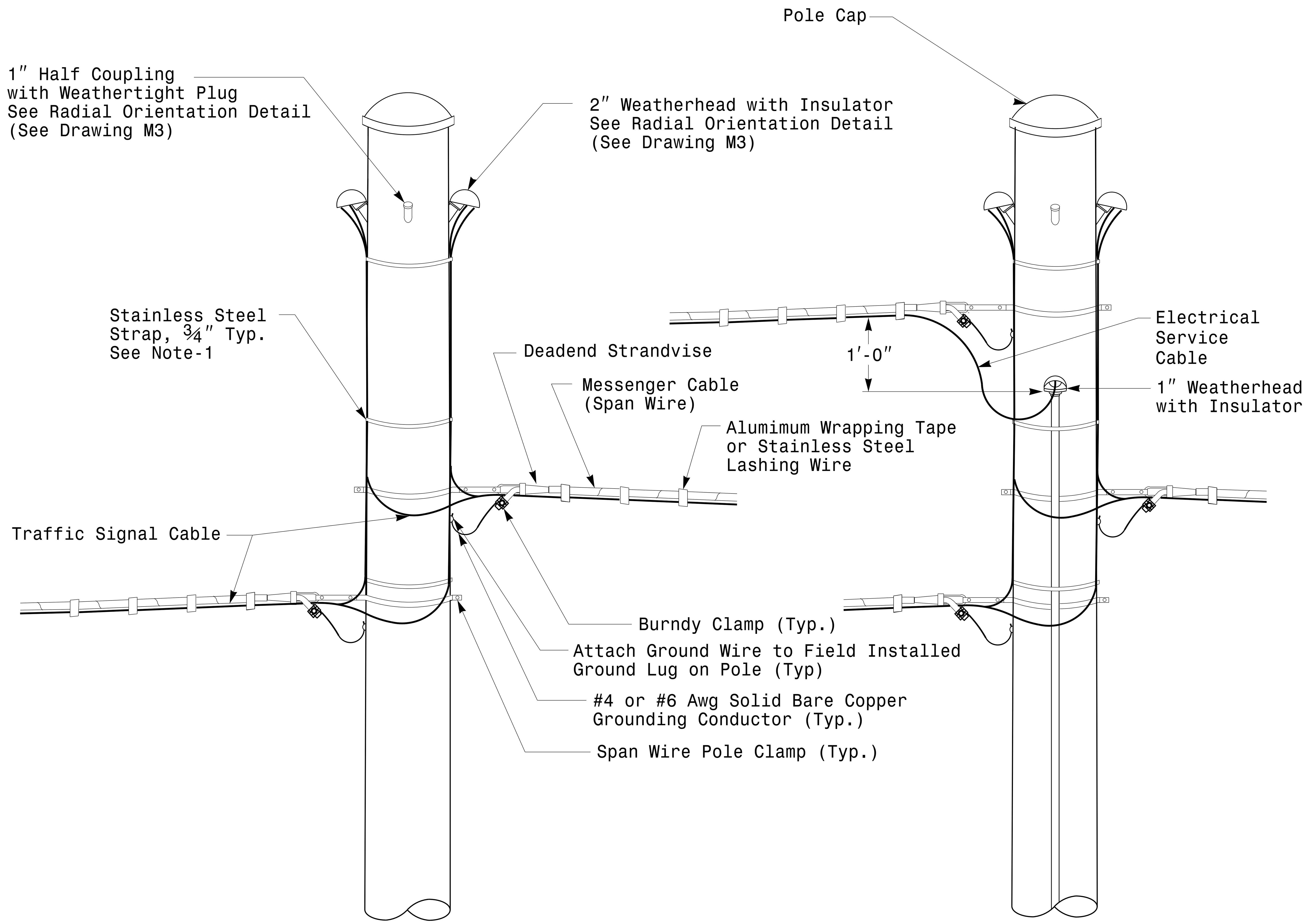
PROJECT ID. NO.	SHEET NO.
U-6003	Sig.M6

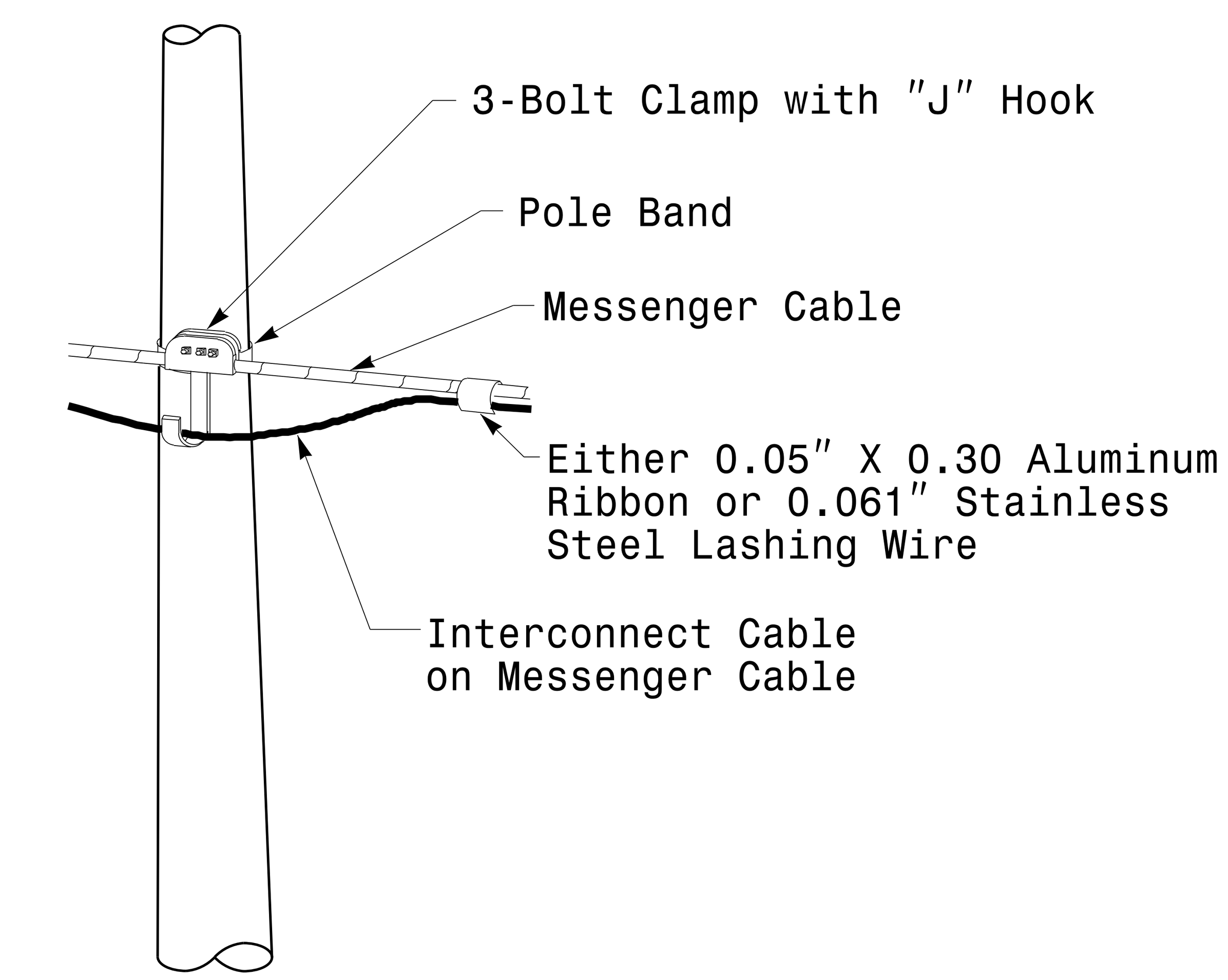
Fabrication Details – Strain Pole Attachments



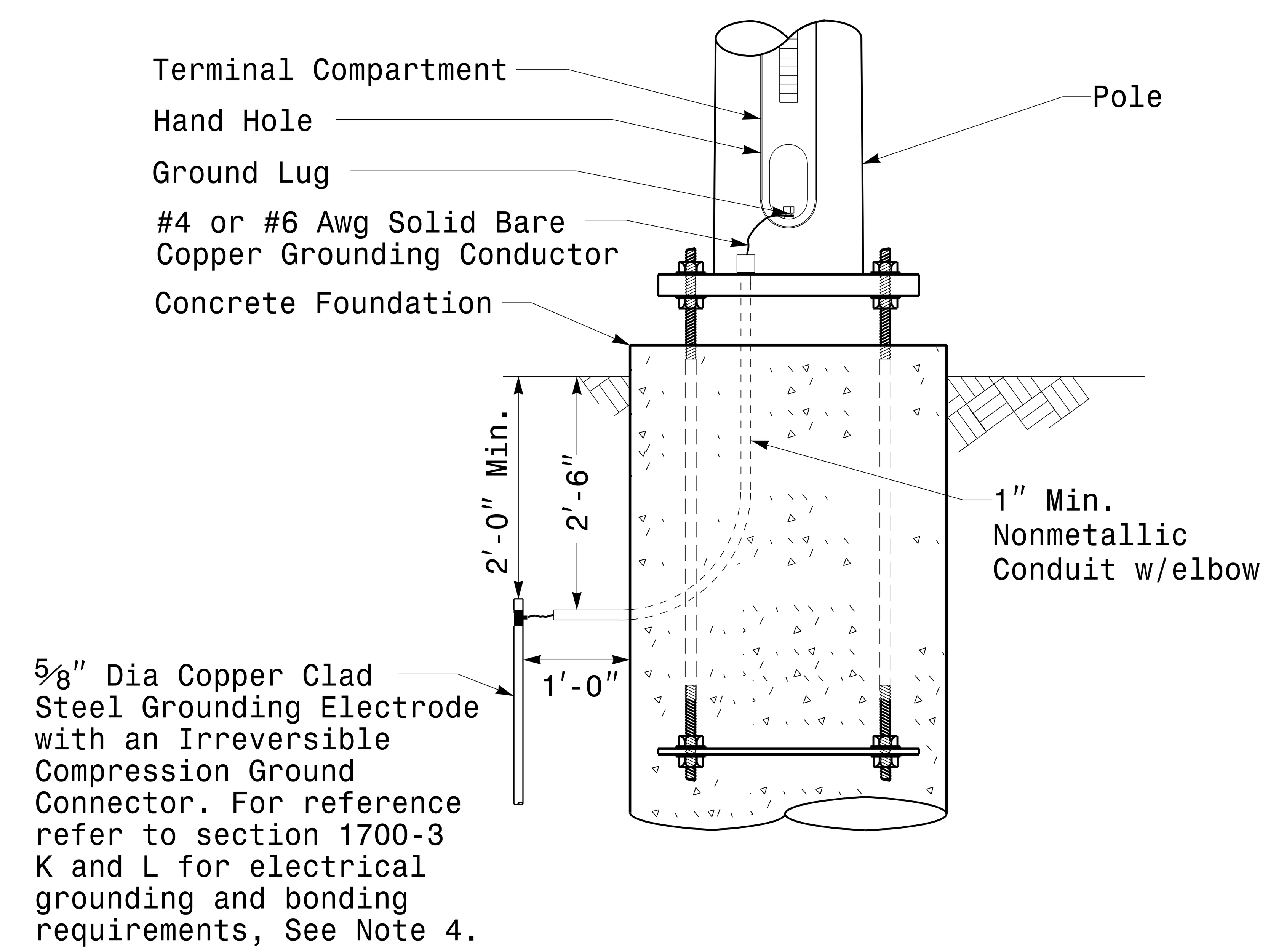
Strain Pole Attachments

NOTE:

1. Strap all signal cables to the side of the pole with ¾″ stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 3′-0″.
2. Provide minimum two spanwire pole clamps per pole.
3. It is prohibited to attach two span wires at one pole clamp.
4. For general requirements refer to NCDOT Standard Specifications for Roadway and Structures, January 2018.



Attachment of Cable to Intermediate Metal Pole



⅝″ Dia Copper Clad Steel Grounding Electrode with an Irreversible Compression Ground Connector. For reference refer to section 1700-3 K and L for electrical grounding and bonding requirements, See Note 4.

Metal Pole Grounding Detail For Strain Pole and Mast Arm

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

Typical Fabrication Details
For
Strain Pole Attachments

PLAN DATE:	OCTOBER 2017	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 ENGINEER SEAL 028094 DEBESH C. SARKAR

DocuSigned by: Debesh C. Sarkar
SIGNATURE 10/11/2017 DATE

11-OCT-2017 08:36
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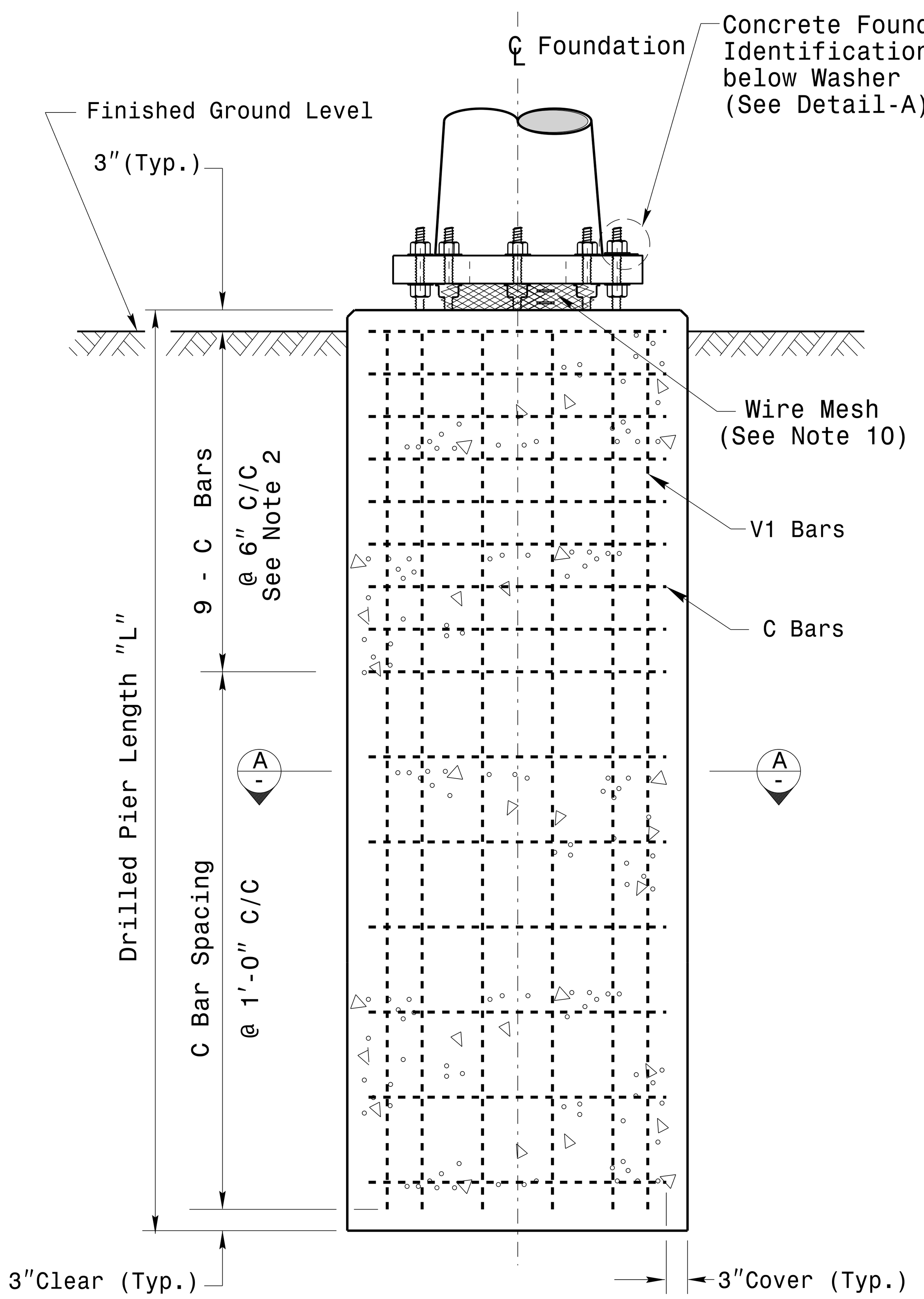
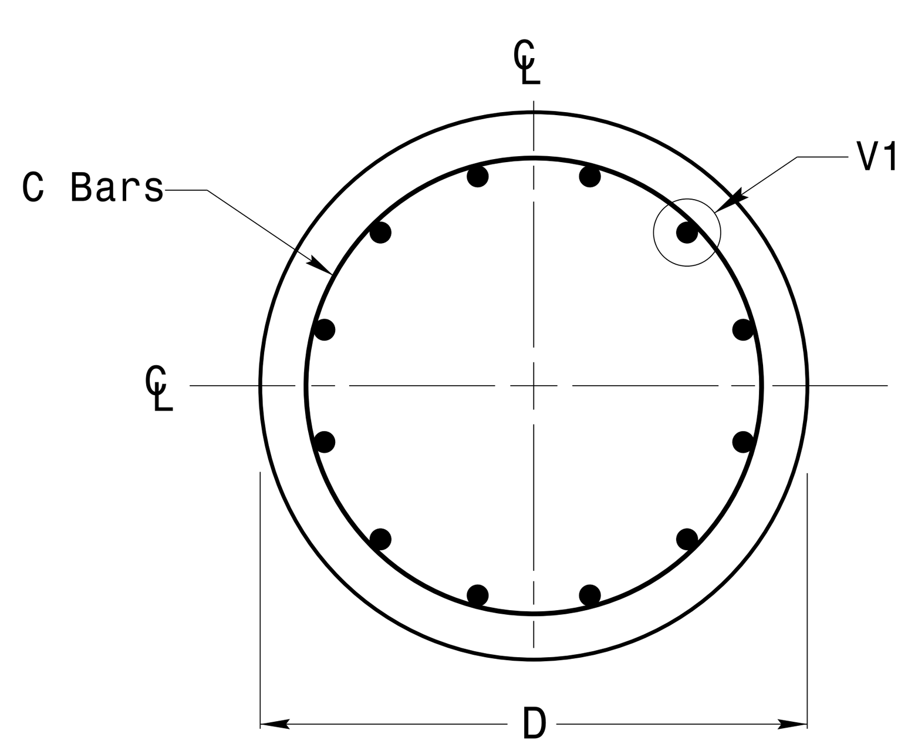
rnzinser

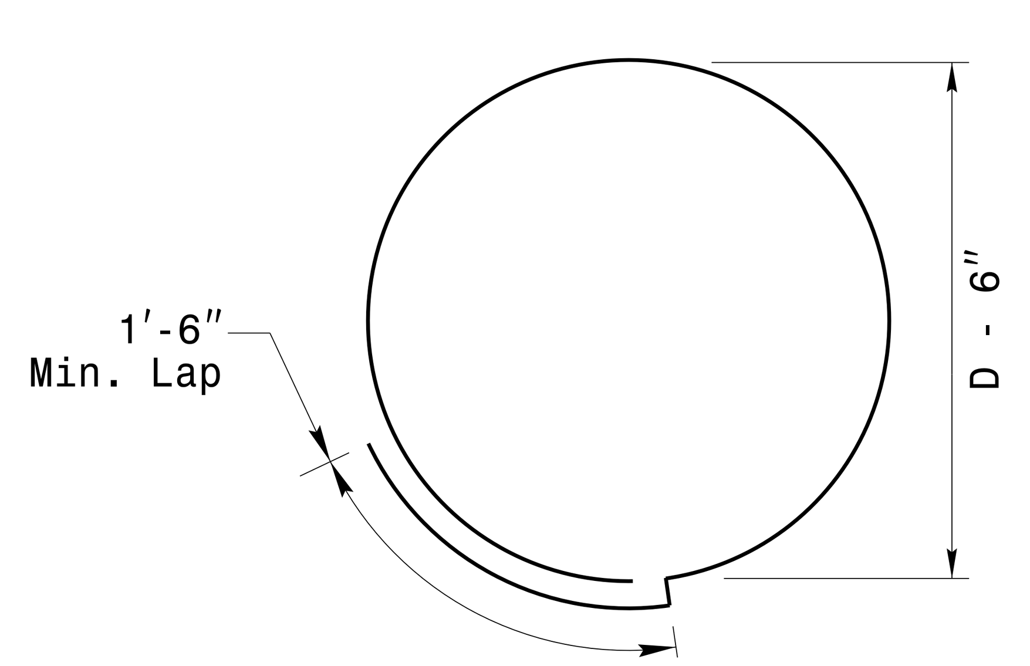
Construction Details – Foundations



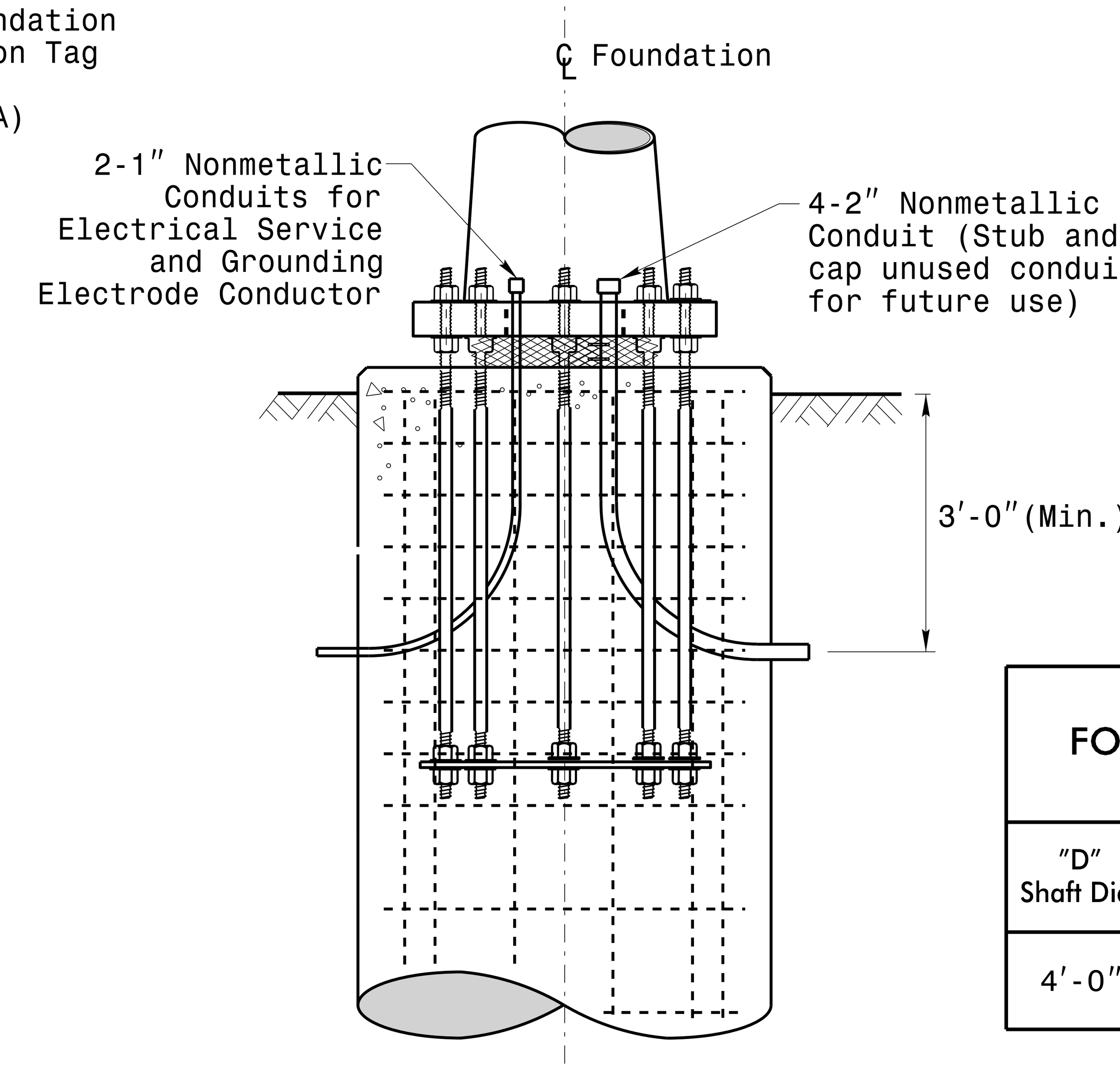
Concrete Shaft Elevation



Section A-A



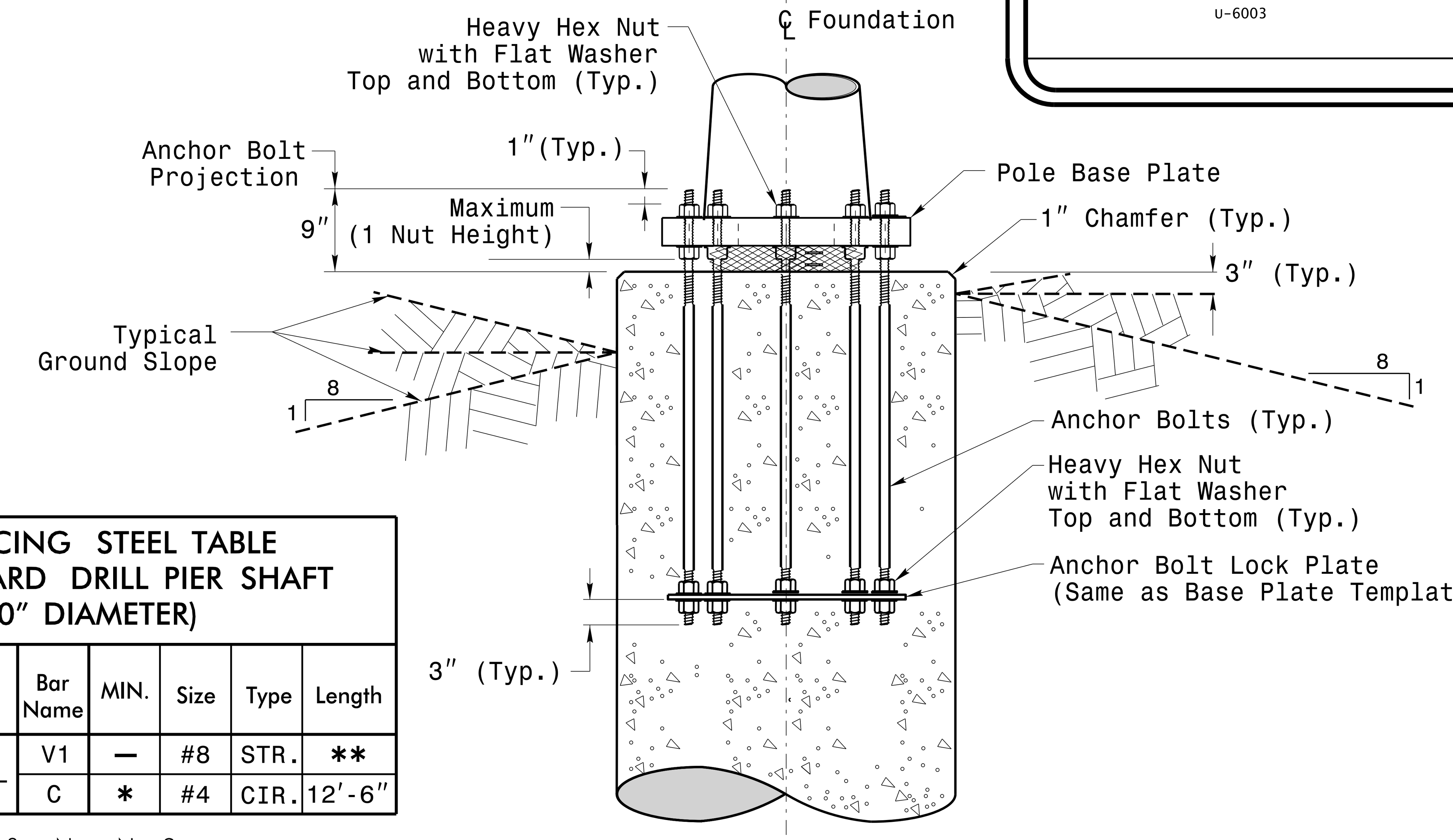
Typical "C" Bar Detail



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



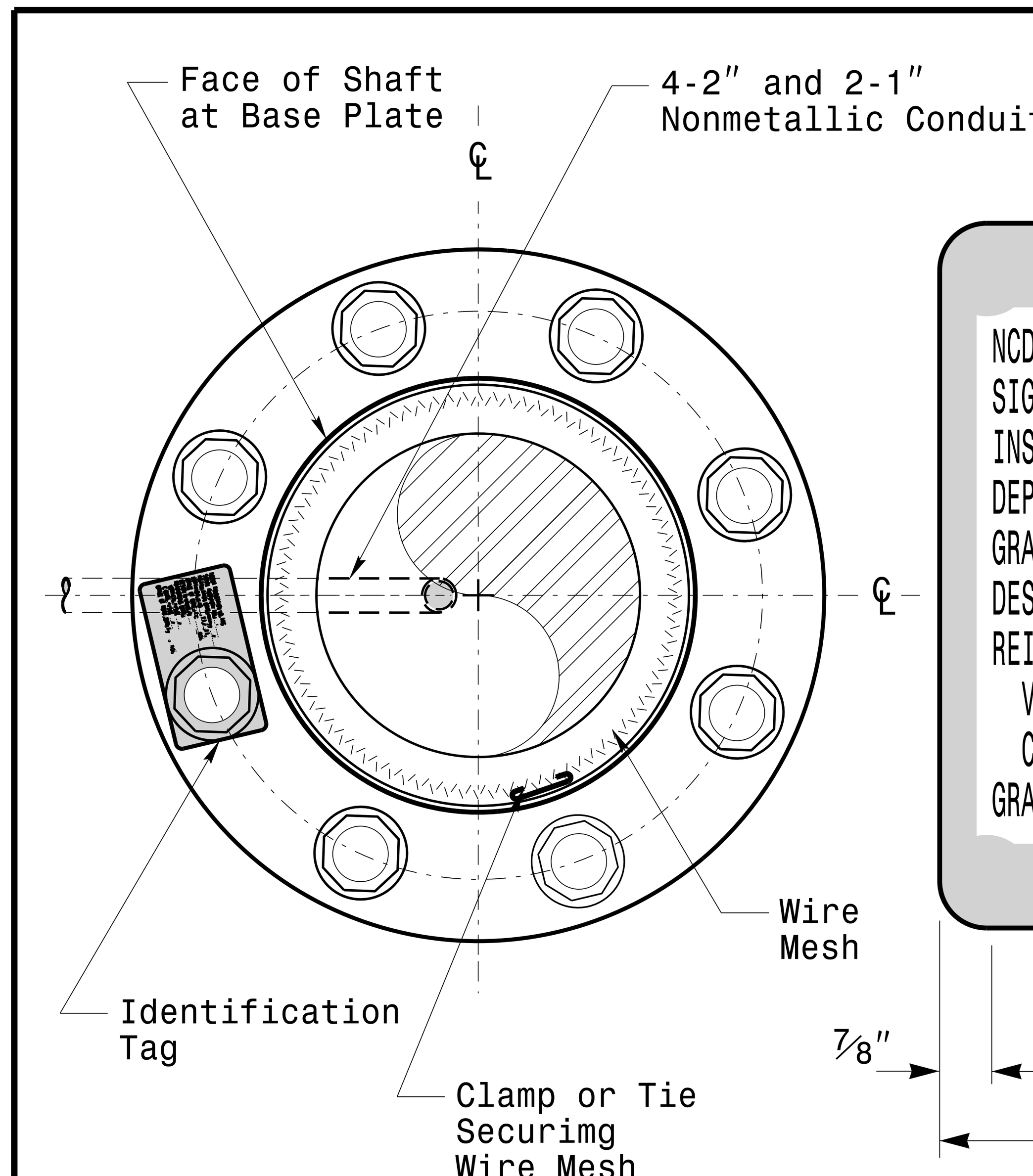
Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)

General Notes:

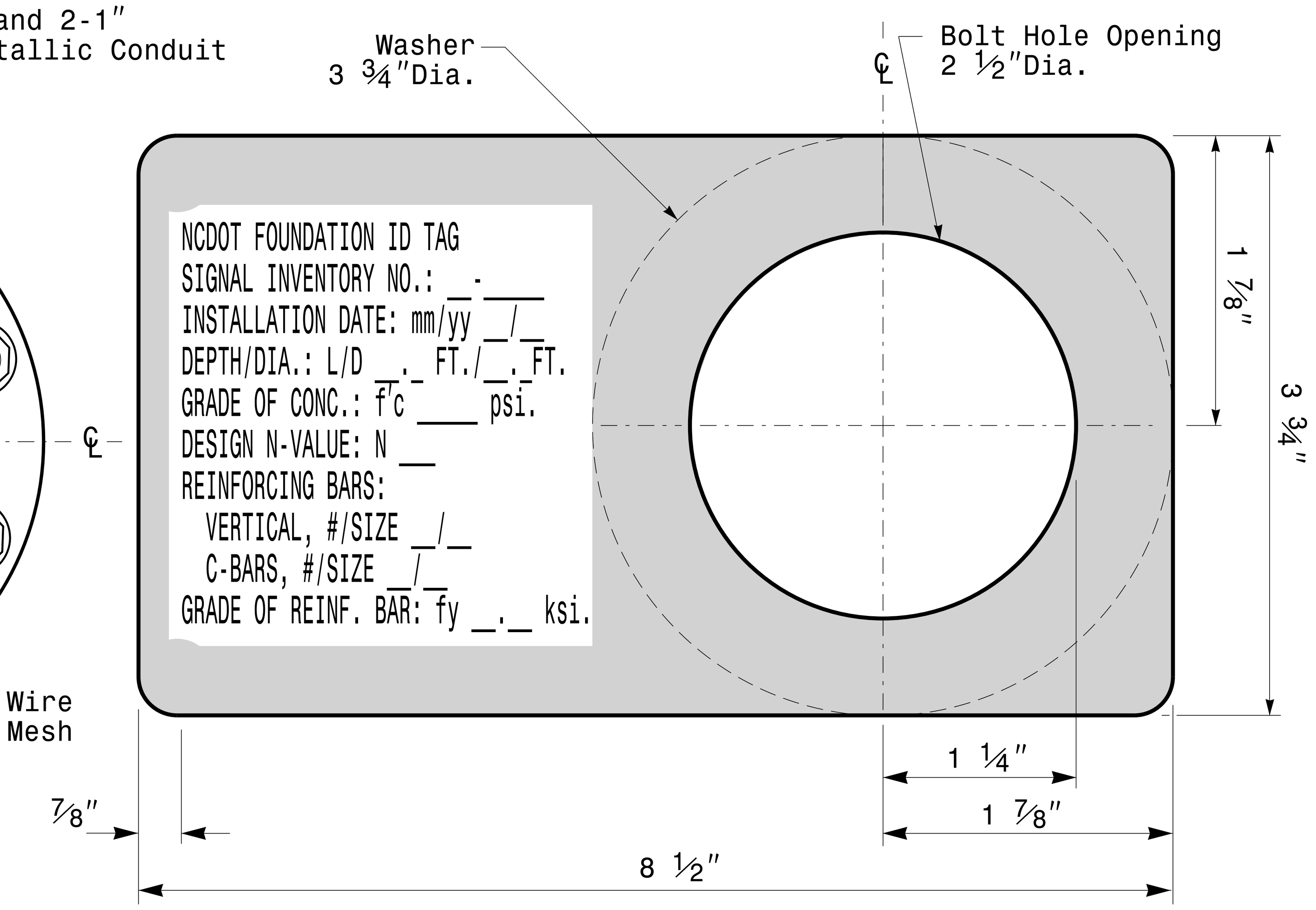
1. If actual subsurface conditions differ significantly from boring data contact the Engineer before excavating or placing concrete.
2. Circular tie reinforcing rings may be vertically adjusted by +/-3″ at a depth between 2'-0″ and 3'-0″ to facilitate the installation of electrical conduit entering in 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 2018 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, Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

Construction Details For Foundations

PLAN DATE:	OCTOBER 2018	DESIGNED BY:	C.B.COGDELL
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

SCALE: 0 NA — NONE

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

SEAL: North Carolina Professional Engineer Seal 028094 Debesh C. Sarkar
DocuSigned by: Debesh C. Sarkar — SIGNATURE — 10/11/2017 DATE

SOIL CONDITION

		STANDARD STRAIN POLES						STANDARD FOUNDATIONS 48″ Diameter Drilled Pier Length (L) – Feet							Reinforcement			
					Reactions at the Pole Base			Clay				Sand			Longitudinal		Stirrups	
		Case No.	Pole Height (Ft.)	Base Plate BC (In.)	Axial (kip)	Shear (kip)	Moment (ft-kip)	Medium N-Value 4–8	Stiff N-Value 9–15	Very Stiff N-Value 16–30	Hard N-Value >30	Loose N-Value 4–10	Medium N-Value 11–30	Dense N-Value >30	Bar Size (#)	Quantity (ea.)	Bar Size (#)	Spacing (in.)
WIND ZONE 1	LIGHT	S26L3	26	25	2	11	270	19	13	10	8	17	14.5	12.5	8	12	4	12
		S30L3	30	25	2	11	300	19.5	13.5	10	8	17.5	15	13	8	14	4	12
		S35L3	35	25	3	11	320	20	13.5	10.5	8	17.5	15	13	8	14	4	12
	HEAVY	S30H3	30	29	3	16	450	24.5	16	12	9	21	17.5	15	8	16	4	6
		S35H3	35	29	4	16	515	26	17	12.5	9.5	22	18.5	16	8	16	4	6
WIND ZONE 2	LIGHT	S26L2	26	23	2	10	245	18	12.5	9.5	8	16.5	14	12	8	12	4	12
		S30L2	30	23	2	10	270	18.5	12.5	10	8	16.5	14	12.5	8	12	4	12
		S35L2	35	23	3	10	300	19.5	13	10	8	17	14.5	13	8	12	4	12
	HEAVY	S30H2	30	29	3	15	415	23	15.5	11.5	9	20	17	14.5	8	16	4	6
		S35H2	35	29	4	15	475	25	16.5	12	9.5	21	17.5	15.5	8	16	4	6
WIND ZONE 3	LIGHT	S26L2	26	23	2	10	245	18	12.5	9.5	8	16.5	14	12	8	12	4	12
		S30L2	30	23	2	10	270	18.5	12.5	10	8	16.5	14	12.5	8	12	4	12
		S35L2	35	23	3	10	300	19.5	13	10	8	17	14.5	13	8	12	4	12
	HEAVY	S30H2	30	29	3	15	415	23	15.5	11.5	9	20	17	14.5	8	16	4	6
		S35H2	35	29	4	15	475	25	16.5	12	9.5	21	17.5	15.5	8	16	4	6
WIND ZONE 4	LIGHT	S26L1	26	22	2	8	190	16	11.5	8.5	8	15	12.5	11	8	12	4	12
		S30L1	30	22	2	8	205	16.5	11.5	9	8	15	13	11.5	8	12	4	12
		S35L1	35	22	3	8	230	17	12	9	8	15.5	13.5	11.5	8	12	4	12
	HEAVY	S30H1	30	25	3	12	320	20.5	13.5	10.5	8	18	15	13.5	8	16	4	6
		S35H1	35	25	4	12	350	21	14	10.5	8.5	18.5	15.5	13.5	8	16	4	6
WIND ZONE 5	LIGHT	S26L2	26	23	2	10	245	18	12.5	9.5	8	16.5	14	12	8	12	4	12
		S30L2	30	23	2	10	270	18.5	12.5	10	8	16.5	14	12.5	8	12	4	12
		S35L2	35	23	3	10	300	19.5	13	10	8	17	14.5	13	8	12	4	12
	HEAVY	S30H2	30	29	3	15	415	23	15.5	11.5	9	20	17	14.5	8	16	4	6
		S35H2	35	29	4	15	475	25	16.5	12	9.5	21	17.5	15.5	8	16	4	6

48″ Dia. Foundations Concrete Volume (cubic yards) = (0.465) x Drilled Pier Length

PROJECT ID. NO.	SHEET NO.
U-6003	Sig.M8

General Notes:

1. Values shown in the "Reactions at the Pole Base" column represent the minimum acceptable capacity allowed for design using a design CSR of 1.00.
2. Use chairs and spacers to maintain proper clearance.
3. For foundation, always use air-entrain concrete mix.

Foundation Selection:

1. Perform a standard penetration test at each proposed foundation site to determine "N" value.
2. Select the appropriate wind zone from M 1 drawing.
3. Select the soil type (Clay or Sand) that best describes the soil characteristics.
4. Get the appropriate standard pole case number from the plans or from the Engineer.
5. Select the appropriate column under "Standard Foundations" based on soil type and "N" value. Select the appropriate row based on the pole load case.
6. The foundation depth is the value shown in the "Standard Foundations" category where the column and the row intersect.
7. Use Construction Procedures and Design Methods prescribed by FHWA-NHI-10-016 for Reference Drilled Shafts.

Standard Strain Pole Foundation–All Soil Condition

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

Standard Strain Pole Foundation for All Soil Conditions

PLAN DATE:	OCTOBER 2017	DESIGNED BY:	C.B. COGDELL
PREPARED BY:	N. BITTING	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE
Changed "Foundation Depth" to "Drilled Pier Length"in Conc. Eqn.	N.B.	7/12/2015

SCALE: 0 NA NONE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

DocuSigned by: Debesh C. Sarkar
SIGNATURE

10/11/2017
DATE

11-OCT-2017 08:40
S:\TS&SU\TS Signals\Signal Design Section\Eastern Region\MW Sheets\2016\2014 Sig.M8 Std. Strain Pole Found.-Saturated Soil Condition.dgn
rtaylor

PROJECT REFERENCE NO.	SHEET NO.
U-6003	SCP 1

1. INSTALL COAX CABLE
2. INSTALL ETHERNET CABLE
3. EXISTING ETHERNET (OR COAX) CABLE
4. INSTALL SMFO CABLE
5. EXISTING SMFO 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. INSTALL NEW ETHERNET EDGE SWITCH
27. INSTALL NEW FIBER OPTIC TRANSCEIVER
28. INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS AND FUSION SPLICE CABLE IN CABINET
29. INSTALL UNDERGROUND SPLICE ENCLOSURE
30. INSTALL AERIAL SPLICE ENCLOSURE
31. MODIFY EXISTING INTERCONNECT CENTER /SPLICE ENCLOSURE
32. INSTALL POLE MOUNTED SPLICE CABINET
33. INSTALL BASE MOUNTED SPLICE CABINET
34. INSTALL CABINET FOUNDATION
35. INSTALL CCTV CAMERA POLE MOUNTED CABINET
36. INSTALL CCTV CAMERA ASSEMBLY
37. INSTALL CCTV CAMERA WOOD POLE
38. INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
39. INSTALL JUNCTION BOX
40A. INSTALL OVERSIZED JUNCTION BOX
40B. INSTALL SPECIAL OVERSIZED JUNCTION BOX (36″ x 24″ x 24″)
41. REMOVE EXISTING JUNCTION BOX
42. INSTALL WOOD POLE
43. REMOVE EXISTING WOOD POLE
44. INSTALL AERIAL GUY ASSEMBLY
45. INSTALL STANDARD GUY ASSEMBLY
46. INSTALL SIDEWALK GUY ASSEMBLY
47. INSTALL MESSENGER CABLE
48A. REMOVE EXISTING COMMUNICATIONS AND MESSENGER CABLE
48B. REMOVE EXISTING COMMUNICATIONS CABLE
49. BACK PULL EXISTING COMMUNICATIONS CABLE
50. INSTALL CELL MODEM AND ANTENNA
51. INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
52A. INSTALL DELINEATOR MARKER
52B. INSTALL JUNCTION BOX MARKER
53A. STORE 20 FEET OF COMMUNICATIONS CABLE
53B. STORE 50 FEET OF EACH COMMUNICATIONS CABLE
54. LASH CABLE(S) TO EXISTING COMMUNICATIONS CABLE
55. LASH CABLE(S) TO EXISTING MESSENGER CABLE
56. LASH CABLE(S) TO NEW MESSENGER CABLE
57. MODIFY EXISTING ELECTRICAL SERVICE
58. INSTALL NEW ELECTRICAL SERVICE
59. INSTALL NEW EQUIPMENT CABINET DISCONNECT
60. BOND TRACER WIRE TO EQUIPMENT GROUND BUS
61. DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS
62. BOND RISER AND MESSENGER CABLE TO POLE GROUND
63. BOND RISER TO POLE GROUND
64. BOND MESSENGER CABLE TO POLE GROUND
65. INSTALL HEAT SHRINK TUBING RETROFIT KIT
66. INSTALL MOLDABLE DUCT SEAL
67. SLACK SPAN

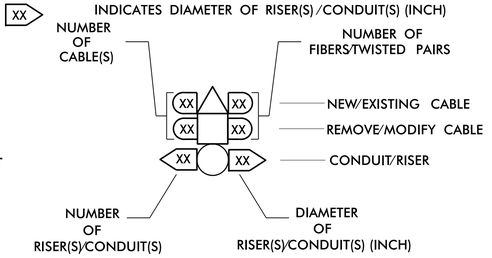
LEGEND

- FO — NEW FIBER OPTIC 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

NEW		EXISTING
	OVERSIZED JUNCTION BOX	
	WOOD POLE	
S	AERIAL SPLICE ENCLOSURE	S
S	UNDERGROUND SPLICE ENCLOSURE	S
	METAL POLE	
	CCTV ASSEMBLY	
	STANDARD GUY ASSEMBLY	
	SIDEWALK GUY ASSEMBLY	
	CABLE STORAGE RACKS (SNOW SHOES)	
	SIGNAL/EQUIPMENT CABINET	
S	SPLICE CABINET	S
	FLAT PANEL ANTENNA (SINGLE)	
	YAGI ANTENNA (DOUBLE) FOR REPEATER OPERATION	
	YAGI ANTENNA (SINGLE)	
	OMNI ANTENNA	
SP	SIGNAL POLE	SP
XX–XXXX	SIGNAL INVENTORY NUMBER	XX–XXXX

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)



ATTACHMENT POINT:

- XX″/SS / YYY — DISTANCE ABOVE (IN)/ATTACHMENT POINT REFERENCE POINT
- YYY / XX″/SS — REFERENCE POINT DISTANCE BELOW (IN)/ATTACHMENT POINT

"SS"	REFERENCE LOCATION
FS =	FRONT SIDE OF POLE
BS =	BACK SIDE OF POLE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of:

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

750 N. Greenfield Pkwy., Garner, NC 27529

D09-28 KERNERSVILLE CONSTRUCTION NOTES

DIVISION 09 FORSYTH KERNERSVILLE

PLAN DATE: JULY 2023

REVIEWED BY: DocuSigned by: Brian Gray P.E. 99F8BBEF705A4FA...

PREPARED BY: H.T.BERGGREN, EI

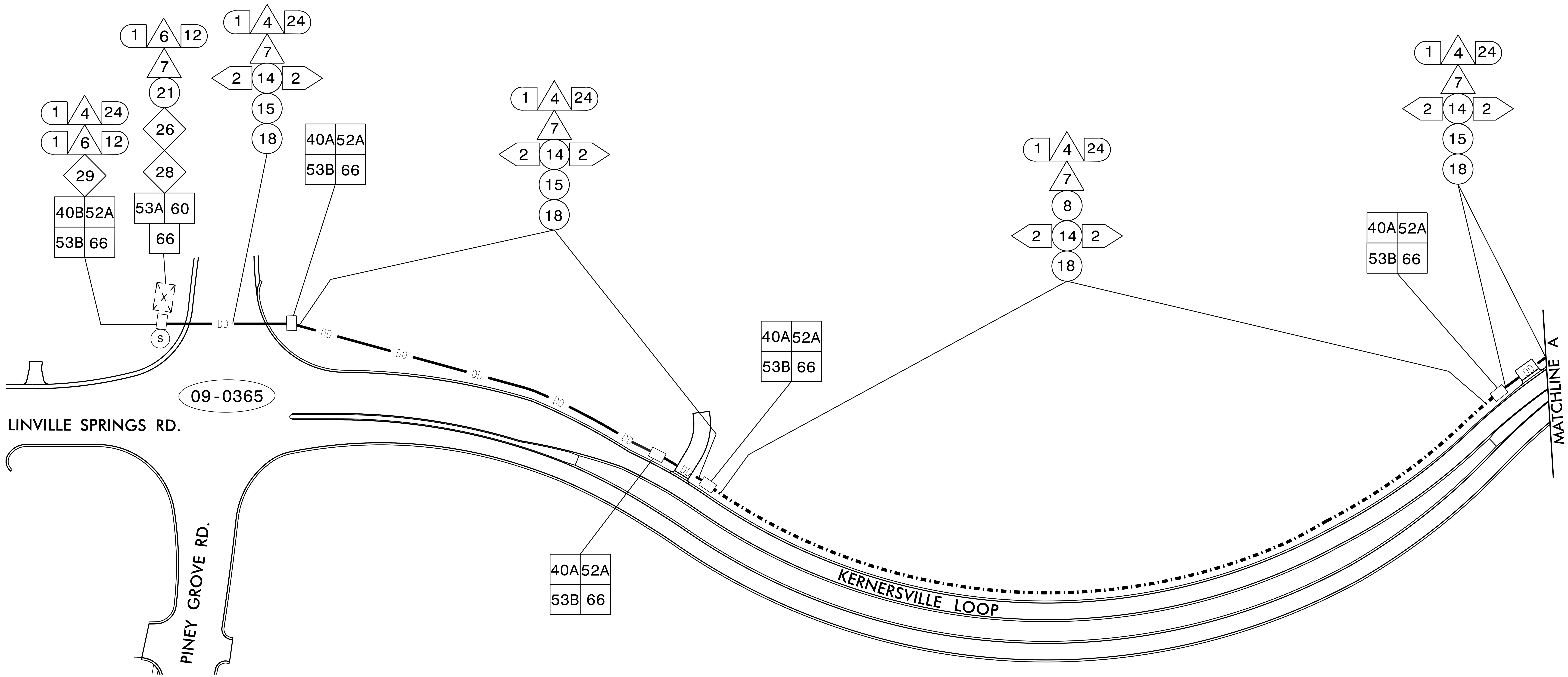
REVISIONS	INIT.	DATE

SEAL — NORTH CAROLINA PROFESSIONAL SEAL 046152 ENGINEER ALEX D. STEWART

DocuSigned by: Alex D. Stewart BE9EBBEF3A764A5...

08/01/2023

PROJECT REFERENCE NO.	SHEET NO.
U-6003	SCP 2



GENERAL NOTE:

1. FIVE (5) DAYS PRIOR TO BEGINNING WORK ON THE SIGNAL SYSTEM, CONTACT THE DIVISION TRAFFIC ENGINEER AT (336)747–7800 TO ARRANGE FOR THE DIVISION TO PROGRAM THE NEW FIELD ETHERNET SWITCHES 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 DIVISION TRAFFIC ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS OPERATIONAL AND COMMUNICATING WITH THE CENTRAL SYSTEM.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of:

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

750 N. Greenfield Pkwy., Garner, NC 27529

D09-28_KERNERSVILLE
COMMUNICATIONS CABLE AND
CONDUIT ROUTING PLANS

DIVISION 09 FORSYTH KERNERSVILLE

PLAN DATE: JULY 2023

PREPARED BY: H.T.BERGGREN, EI

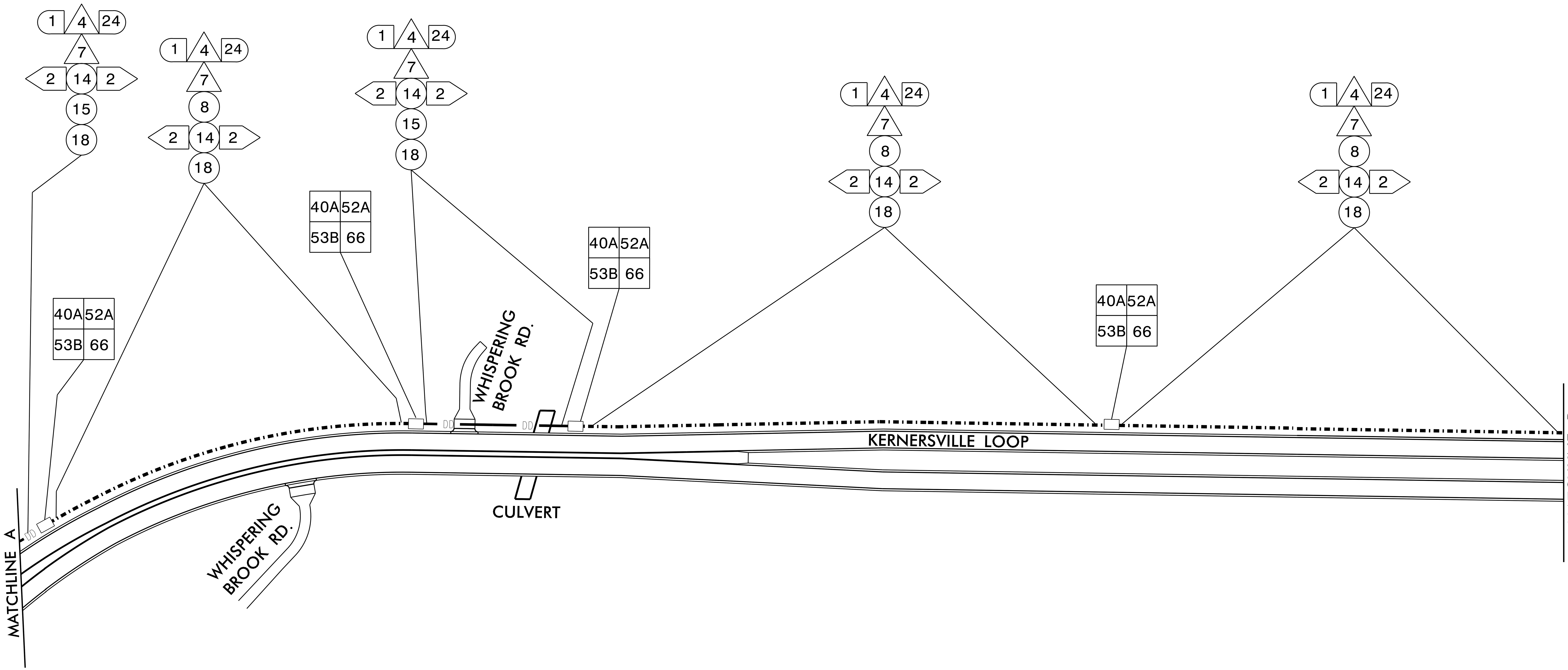
REVIEWED BY: DocuSigned by: Green, Gregg A. 99F8BBEF705A4FA...

SCALE 0 N/A N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046152 ENGINEER ALEX D. STEWART

DocuSigned by: Alex D. Stewart BE9EB5EF3A784A5...
08/01/2023



GENERAL NOTE:

1. FIVE (5) DAYS PRIOR TO BEGINNING WORK ON THE SIGNAL SYSTEM, CONTACT THE DIVISION TRAFFIC ENGINEER AT (336)747–7800 TO ARRANGE FOR THE DIVISION TO PROGRAM THE NEW FIELD ETHERNET SWITCHES 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 DIVISION TRAFFIC ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS OPERATIONAL AND COMMUNICATING WITH THE CENTRAL SYSTEM.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

D09-28_KERNERSVILLE
COMMUNICATIONS CABLE AND
CONDUIT ROUTING PLANS

DIVISION 09 FORSYTH KERNERSVILLE

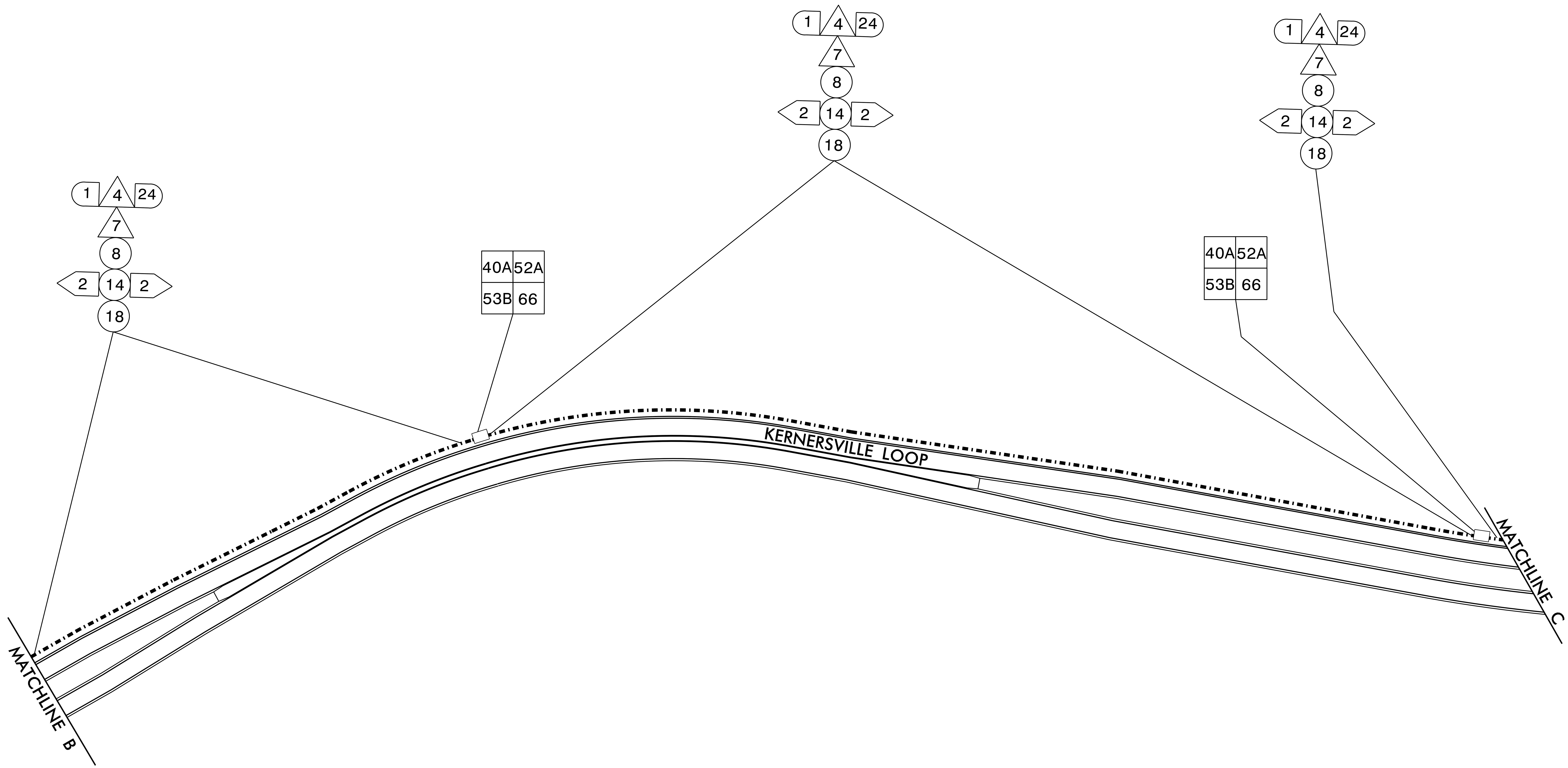
PLAN DATE: JULY 2023
PREPARED BY: H.T.BERGGREN, EI
REVIEWED BY: DocuSigned by: Green, Gregg A. 99F8BBEF705A4FA...

SCALE 0 N/A
N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046152 ENGINEER ALEX D. STEWART
DocuSigned by: Alex D. Stewart BE9EB5EF3A784A5...
08/01/2023

PROJECT REFERENCE NO.	SHEET NO.
U-6003	SCP 4



GENERAL NOTE:

1. FIVE (5) DAYS PRIOR TO BEGINNING WORK ON THE SIGNAL SYSTEM, CONTACT THE DIVISION TRAFFIC ENGINEER AT (336)747-7800 TO ARRANGE FOR THE DIVISION TO PROGRAM THE NEW FIELD ETHERNET SWITCHES 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 DIVISION TRAFFIC ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS OPERATIONAL AND COMMUNICATING WITH THE CENTRAL SYSTEM.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of:

750 N. Greenfield Pkwy., Garner, NC 27529

D09-28_KERNERSVILLE
COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

DIVISION 09 FORSYTH KERNERSVILLE

PLAN DATE: JULY 2023

PREPARED BY: H.T.BERGGREN, EI

REVIEWED BY:

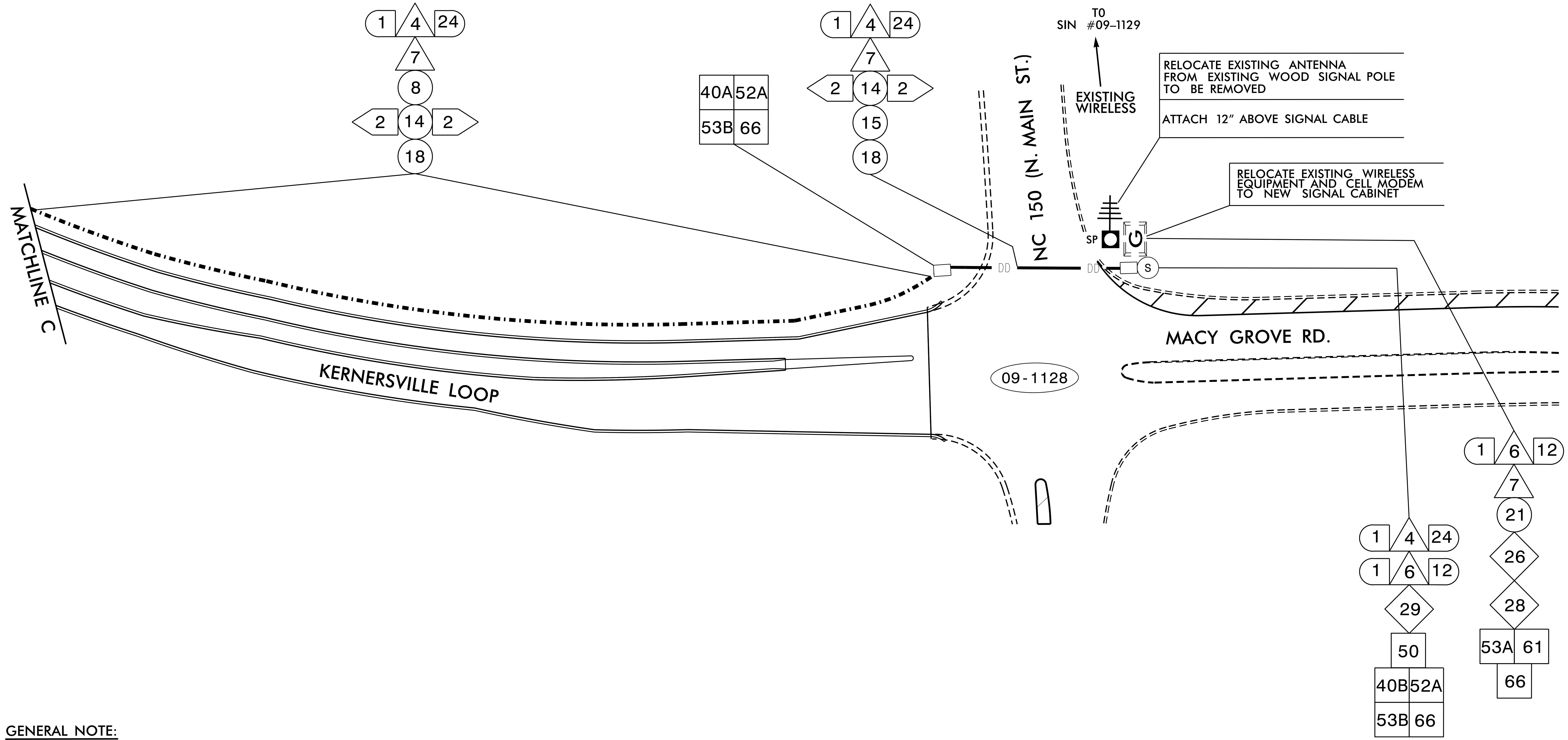
SCALE 0 N/A

N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL 046152
ENGINEER
ALEX D. STEWART

08/01/2023



GENERAL NOTE:

1. FIVE (5) DAYS PRIOR TO BEGINNING WORK ON THE SIGNAL SYSTEM, CONTACT THE DIVISION TRAFFIC ENGINEER AT (336)747–7800 TO ARRANGE FOR THE DIVISION TO PROGRAM THE NEW FIELD ETHERNET SWITCHES 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 DIVISION TRAFFIC ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER AND WIRELESS CIRCUITSARE FUNCTIONING PROPERLY. WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS OPERATIONAL AND COMMUNICATING WITH THE CENTRAL SYSTEM.

NOTES FOR WIRELESS COMMUNICATIONS:

1. INSTALL COAXIAL CABLE:
   A. ON WOOD POLES, REQUIRING A NEW RIGID GALVANIZED STEEL RISER, INSTALL A 2" RISER WITH WEATHERHEAD AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
   B. ON METAL POLES WITH MAST ARMS, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE MAST ARM; FIELD DRILL A 1/2" HOLE UP THROUGH THE BOTTOM OF MAST ARM FOR INSTALLATION OF THE COAXIAL CABLE TO THE ANTENNA.
   C. ON METAL STRAIN POLES, RUN COAXIAL CABLE UP THROUGH THE POLE AND OUT THE WEATHERHEAD AND ROUTE THE COAXIAL CABLE TO THE ANTENNA.
   D. BETWEEN THE POINT OF EXITING THE RISER, METAL POLE OR MAST ARM AND THE ANTENNA, SECURE THE COAXIAL CABLE TO THE STRUCTURE USING 3/4" STAINLESS STEEL STRAPS EVERY 12".
2. IF AN EXISTING 2" SPARE RIGID GALVANIZED STEEL RISER IS AVAILABLE, INSTALL THE COAXIAL CABLE IN THE SPARE RISER WITH 2" WEATHERHEAD.
3. INSTALL WIRELESS ANTENNA ON POLE WITH RF WARNING SIGN. (NOTE: RF WARNING SIGN NOT REQUIRED WHEN ANTENNA IS INSTALLED ON AN NCDOT–OWNED POLE.)
4. INSTALL WIRELESS RADIO WITH EXTERIOR DISCONNECT SWITCH LOCATED ON CABINET. (NOTE: RF ANTENNA DISCONNECT SWITCH AND DECAL ARE NOT REQUIRED WHEN THE ANTENNA IS INSTALLED ON AN NCDOT–OWNED POLE.)
5. MAINTAIN PROPER CLEARANCE FROM ALL UTILITIES PER THE NATIONAL ELECTRICAL SAFETY CODE.
6. REFERENCE "WIRELESS RADIO ANTENNA TYPICAL DETAILS."

LEGEND

Symbol	Description
	YAGI ANTENNA (SINGLE)
×	EXISTING CONTROLLER AND CABINET
G	GATEWAY RADIO LOCATION
XX-XXXX	SIGNAL INVENTORY NUMBER
	EXISTING METAL POLE W/MAST ARM
SP	SIGNAL POLE
	EXISTING METAL POLE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of:

750 N. Greenfield Pkwy., Garner, NC 27529

D09-28_KERNERSVILLE
COMMUNICATIONS CABLE AND
CONDUIT ROUTING PLANS

DIVISION 09 FORSYTH KERNERSVILLE

PLAN DATE: JULY 2023
PREPARED BY: H.T.BERGGREN, EI
REVIEWED BY: DocuSigned by: Green, Gregg A. 99F8BBEF705A4FA...

SCALE 0 N/A
N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046152 ALEX D. STEWART
DocuSigned by: Alex D. Stewart BE9EB5EF3A784A5...
08/01/2023

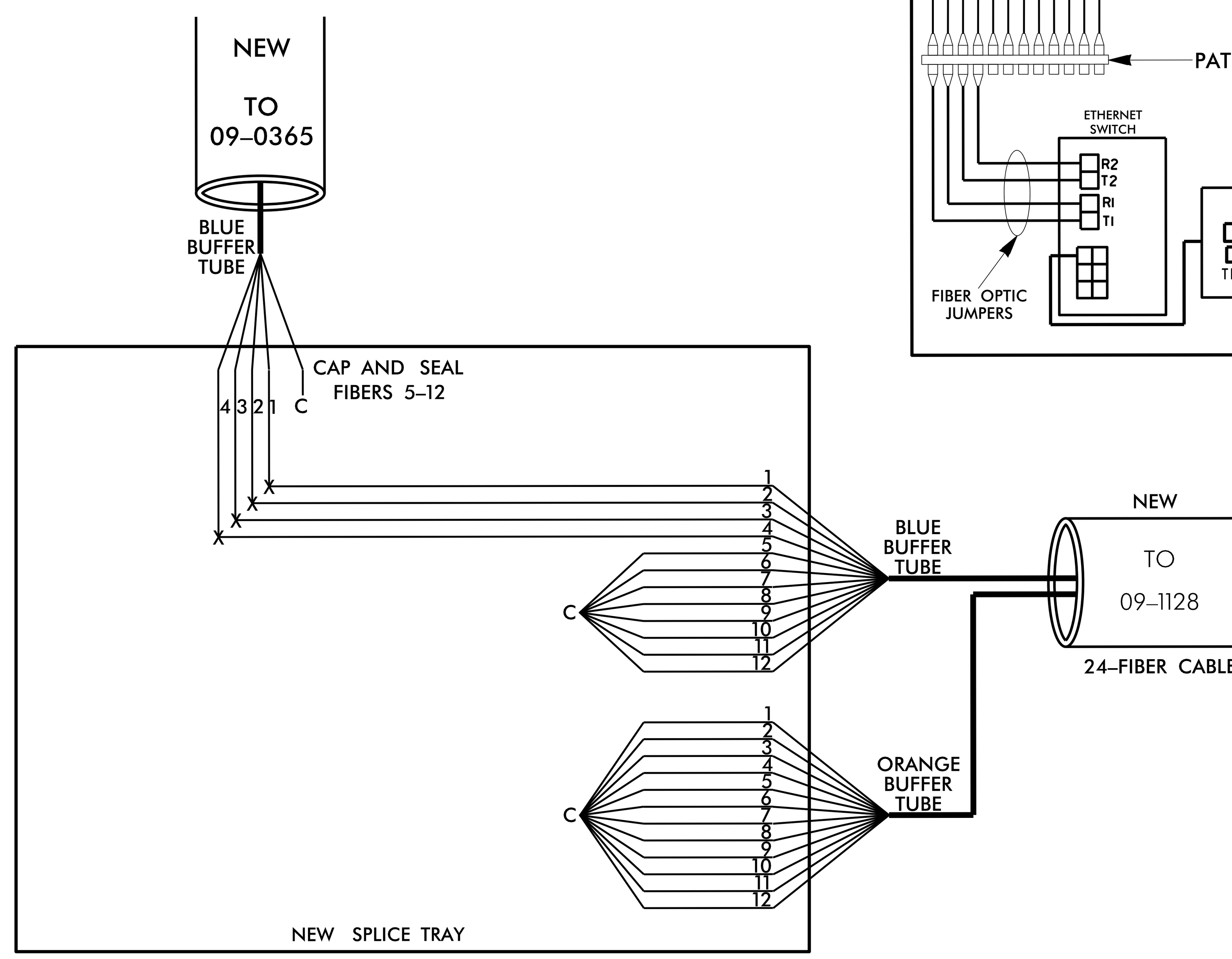
KERNERSVILLE LOOP
AT LINVILLE SPRINGS RD./
PINEY GROVE RD.
SIG. INV. # 09–0365

Notes:
Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.

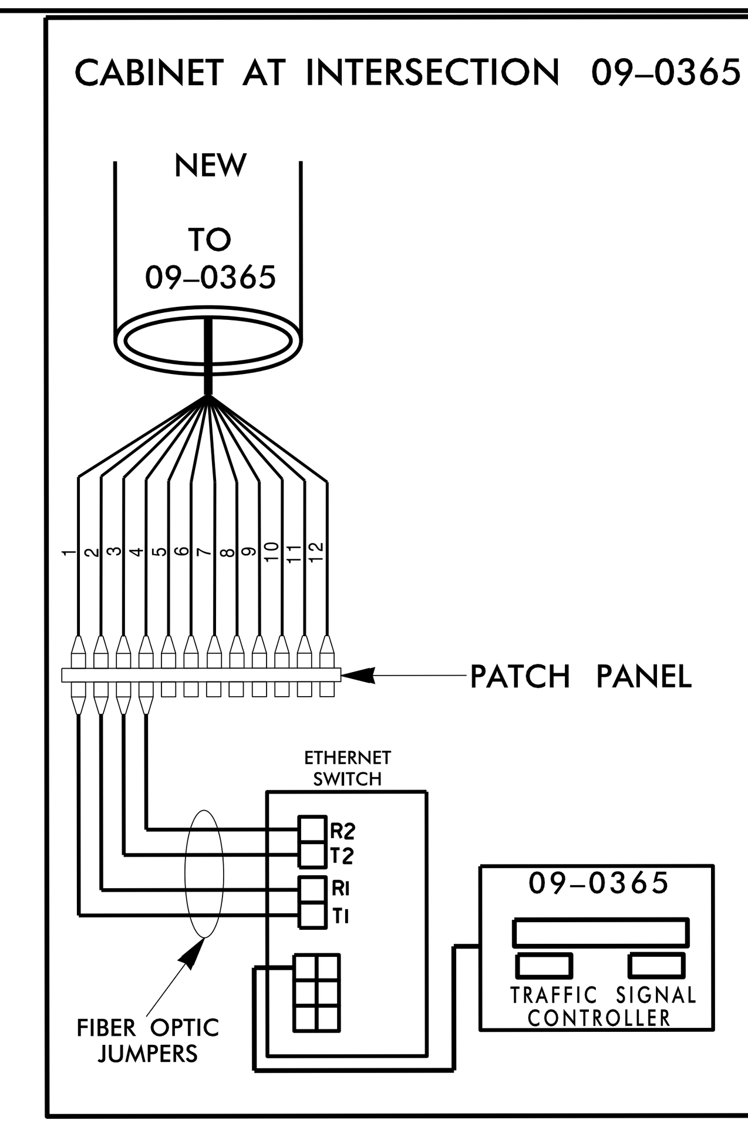
LEGEND
X = FUSION SPLICE
E = EXISTING SPLICE
C = CAP IN TRAY

COLOR CODE
TIA/EIA 598–A

(1) BLUE	(7) RED
(2) ORANGE	(8) BLACK
(3) GREEN	(9) YELLOW
(4) BROWN	(10) VIOLET
(5) SLATE	(11) ROSE
(6) WHITE	(12) AQUA



CABINET AT INTERSECTION 09–0365



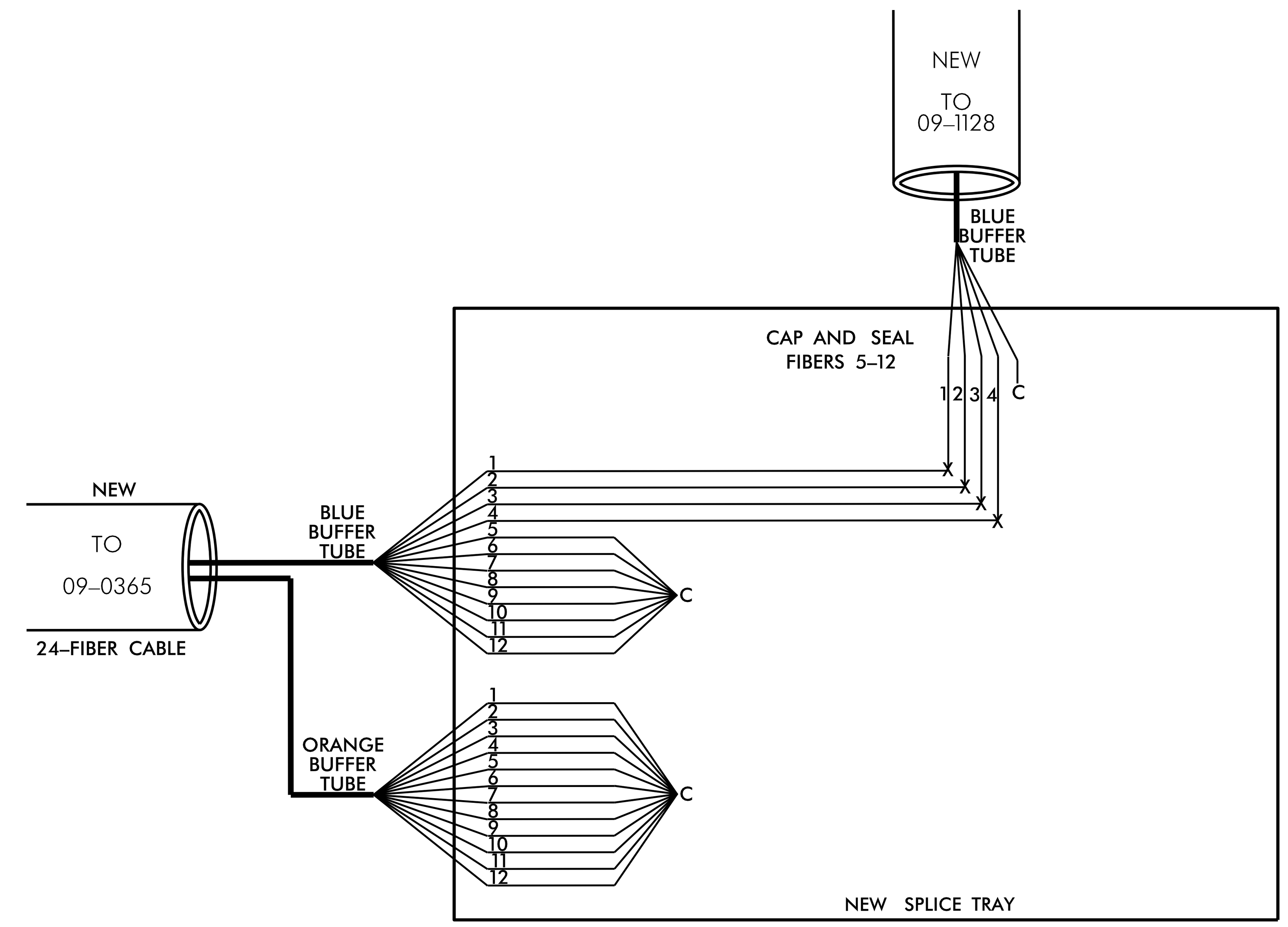
KERNERSVILLE LOOP
AT NC 150 (N. MAIN ST.)/
MACY GROVE RD.
SIG. INV. # 09–1128

Notes:
Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.

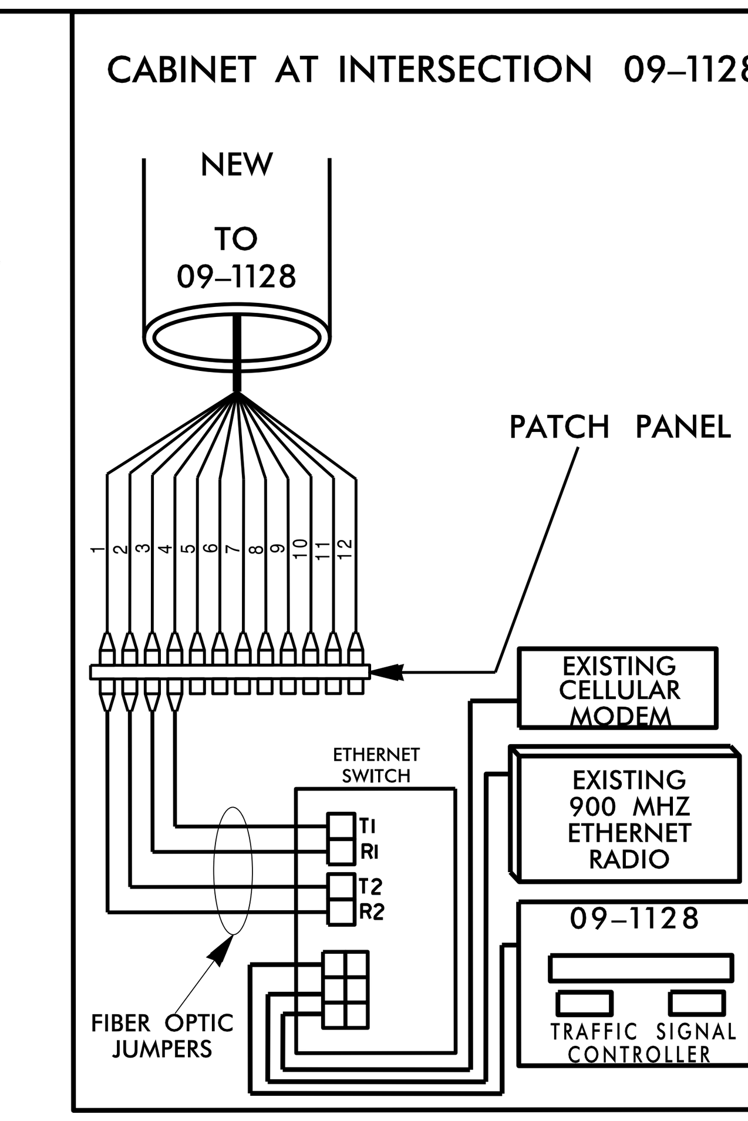
LEGEND
X = FUSION SPLICE
E = EXISTING SPLICE
C = CAP IN TRAY

COLOR CODE
TIA/EIA 598–A

(1) BLUE	(7) RED
(2) ORANGE	(8) BLACK
(3) GREEN	(9) YELLOW
(4) BROWN	(10) VIOLET
(5) SLATE	(11) ROSE
(6) WHITE	(12) AQUA



CABINET AT INTERSECTION 09–1128



GENERAL NOTES:

1. FIVE (5) DAYS PRIOR TO BEGINNING WORK ON THE SIGNAL SYSTEM, CONTACT THE DIVISION TRAFFIC ENGINEER AT (336)747–7800 TO ARRANGE FOR THE DIVISION TO PROGRAM THE NEW FIELD ETHERNET SWITCHES 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 DIVISION TRAFFIC ENGINEER AFTER ALL WORK IS PERFORMED TO ENSURE THAT ALL FIBER CIRCUITS ARE FUNCTIONING PROPERLY. WORK IS NOT COMPLETE UNTIL THE SIGNAL SYSTEM IS OPERATIONAL AND COMMUNICATING WITH THE CENTRAL SYSTEM.

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

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

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

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

D09-28_KERNERSVILLE
SPLICE DETAILS

DIVISION 09 FORSYTH KERNERSVILLE
PLAN DATE: JULY 2023
PREPARED BY: H.T.BERGGREN, EI
REVIEWED BY: DocuSigned by: Green, Gregg A. 99F8BBEF705A4FA...

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046152 ENGINEER ALEX D. STEWART
DocuSigned by: Alex D. Stewart BE9EB5EF3A784A5...
08/01/2023