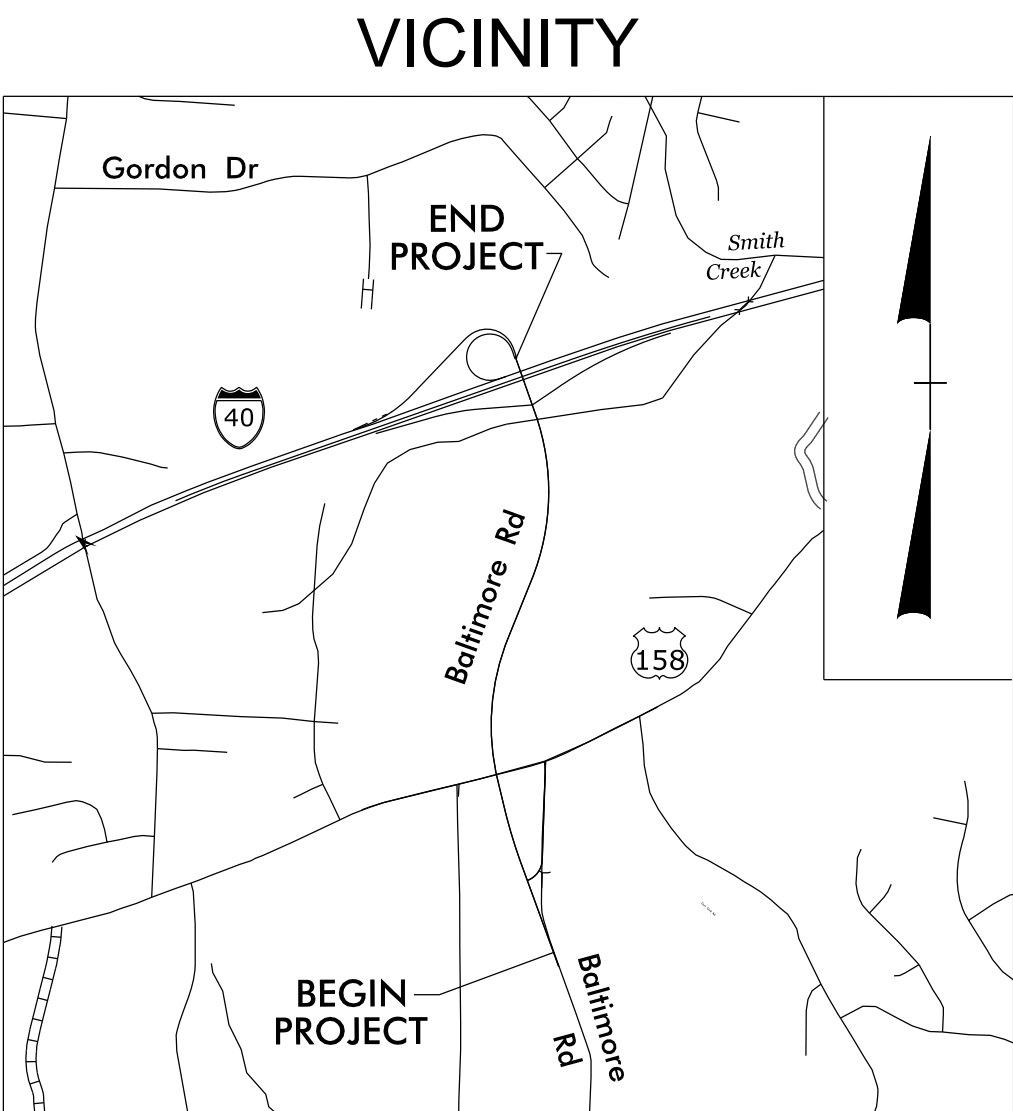


Project: U-6187

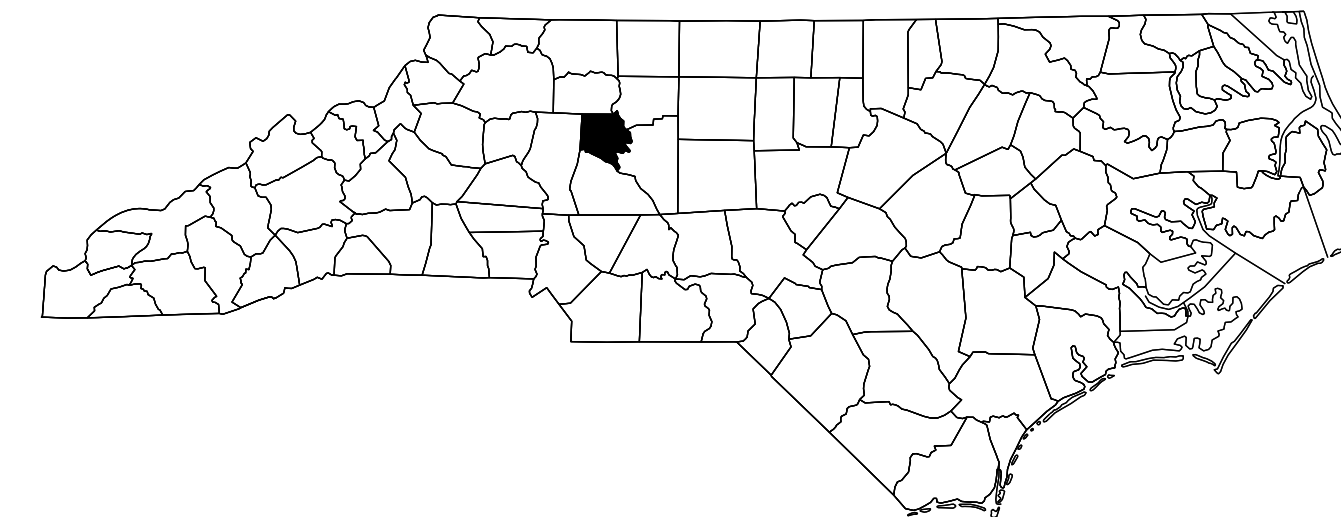


STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

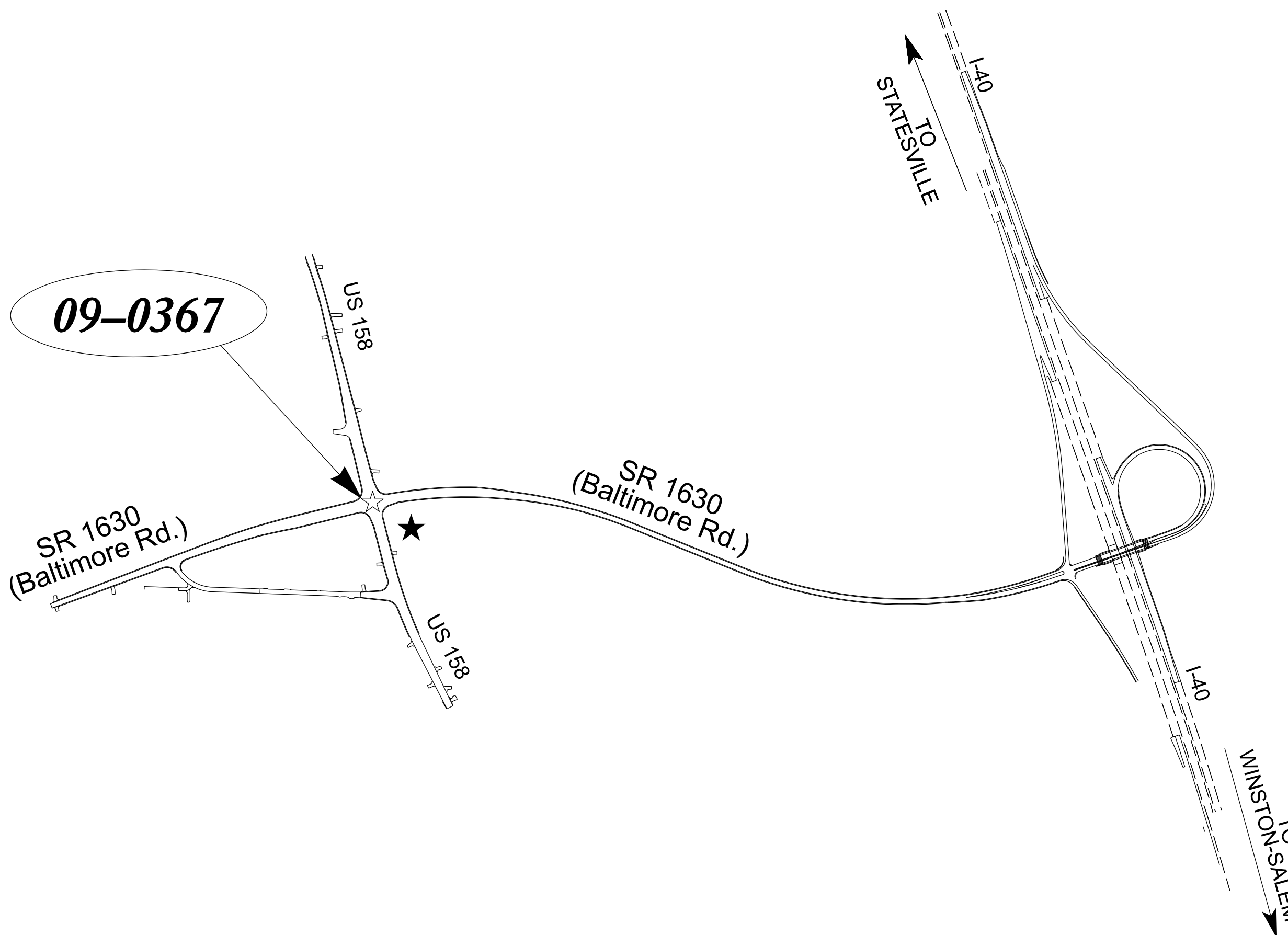
DAVIE COUNTY

LOCATION: *REALIGNMENT AND EXTENSION OF SR 1630
(BALTIMORE ROAD) FROM SOUTH OF US 158
TO A NEW INTERCHANGE AT I-40*

TYPE OF WORK: Traffic Signal



NAD 83/ 2011



Refer to "Roadway Standard Drawings
NCDOT" dated January 2024 and
"Standard Specifications for Roads
and Structures" dated January 2024.

TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS

Contacts:

Robert J. Ziemba, PE - Central Region Signals Engineer
Todd Joyce, PE - Signal Equipment Design Engineer

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



750 N. Greenfield Pkwy, Garner, NC 27529

Index of Plans

Sheet #	Reference #	Location/Description
Sig. 1.0	-----	Title Sheet
Sig. 2.0-2.3	09-0367	US 158 at SR 1630 (Baltimore Rd.)
M1A-M9	-----	Standard Metal Pole Details

8 Phase
Fully Actuated
Isolated

NOTES

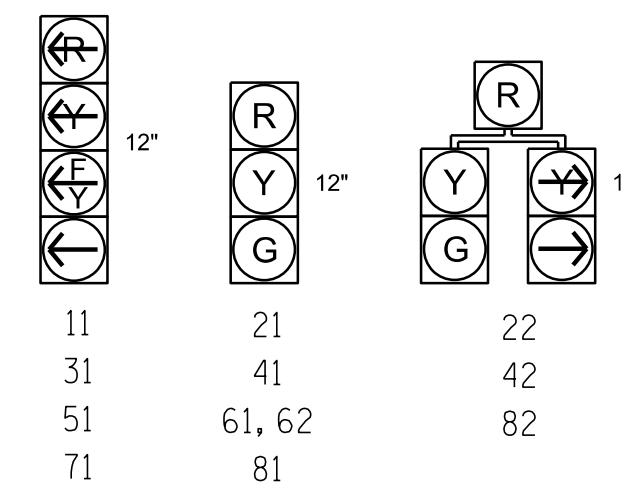
- Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- Phase 3 and/or phase 7 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- The Division Traffic Engineer will determine the hours of use for each phasing plan.

MAXTIME DETECTOR INSTALLATION CHART										
DETECTOR					PROGRAMMING					
LOOP	SIZE (FT)	DISTANCE FROM STOP LINE (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL DELAY DURING GREEN
1A	6X40	0	2-4-2	X	1	15.0 *	-	X	-	X
1B	6X40	0	2-4-2	X	6 #	3.0	-	X	-	X
2A	6X6	420	6	X	2	-	-	X	X	X
3A	6X40	0	2-4-2	X	3	15.0 **	-	X	-	X
4A	6X40	0	2-4-2	X	8 #	3.0	-	X	-	X
5A	6X40	0	2-4-2	X	4	-	-	X	-	X
5B	6X40	0	2-4-2	X	5	15.0 *	-	X	-	X
6A	6X6	420	6	X	2 #	3.0	-	X	X	X
7A	6X40	0	2-4-2	X	7	15.0 **	-	X	-	X
8A	6X40	0	2-4-2	X	8	3.0	-	X	-	X

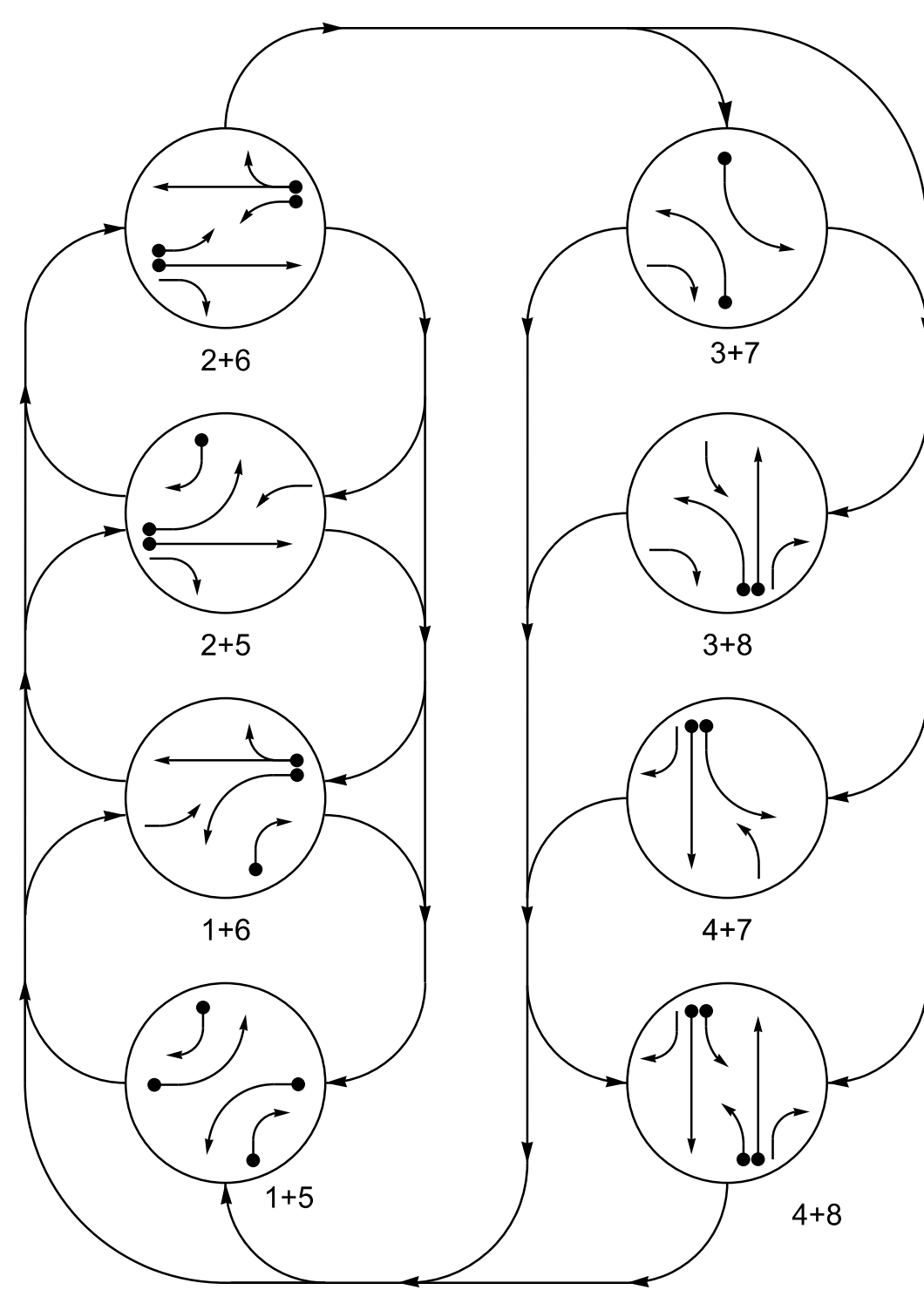
* Disable Delay During Alternate Phasing Operation.
** Reduce Delay to 3 Seconds During Alternate Phasing Operation.
Disable Phase Call For Loops During Alternate Phasing Operation.

SIGNAL FACE I.D.

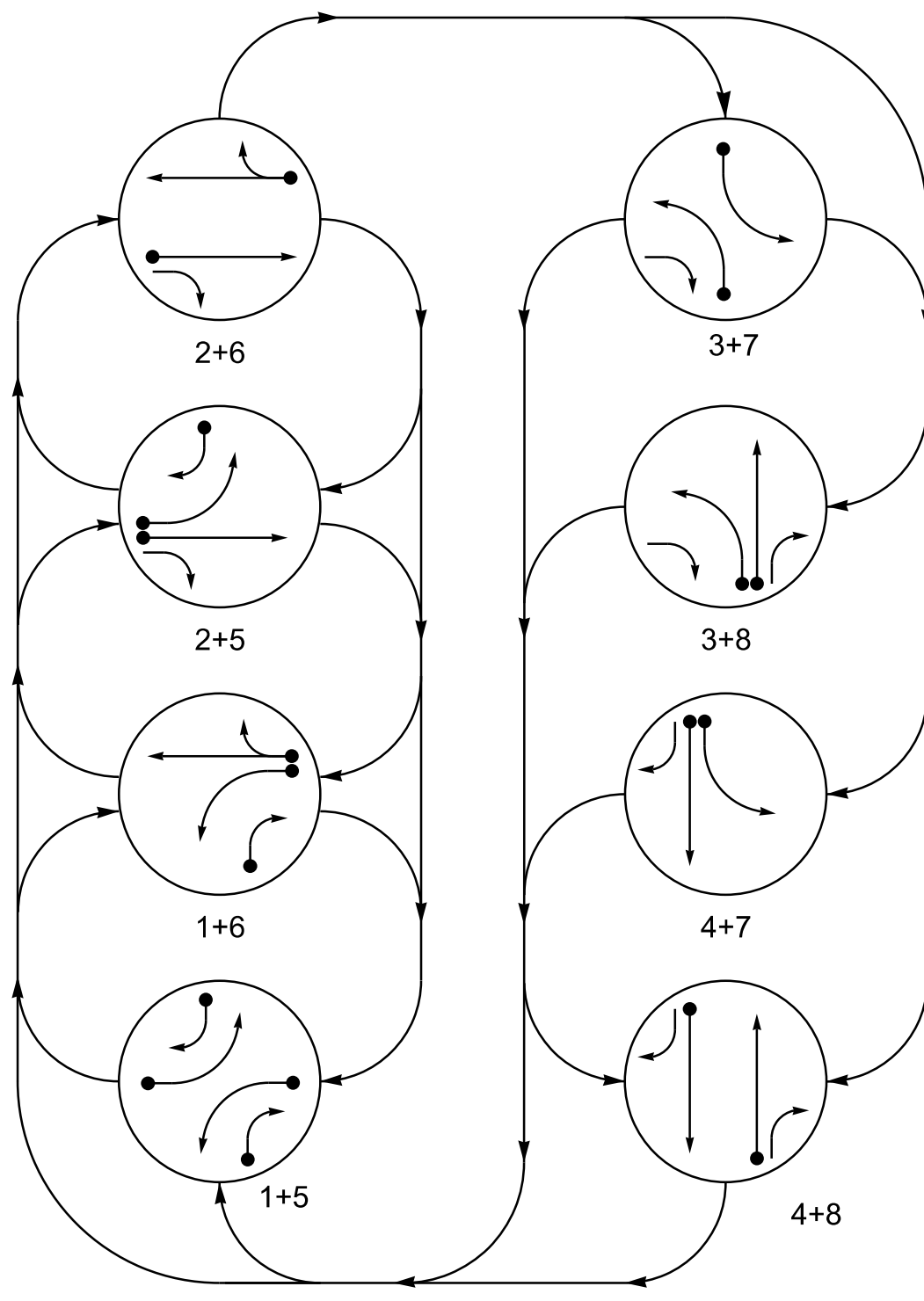
All Heads L.E.D.



DEFAULT PHASING DIAGRAM



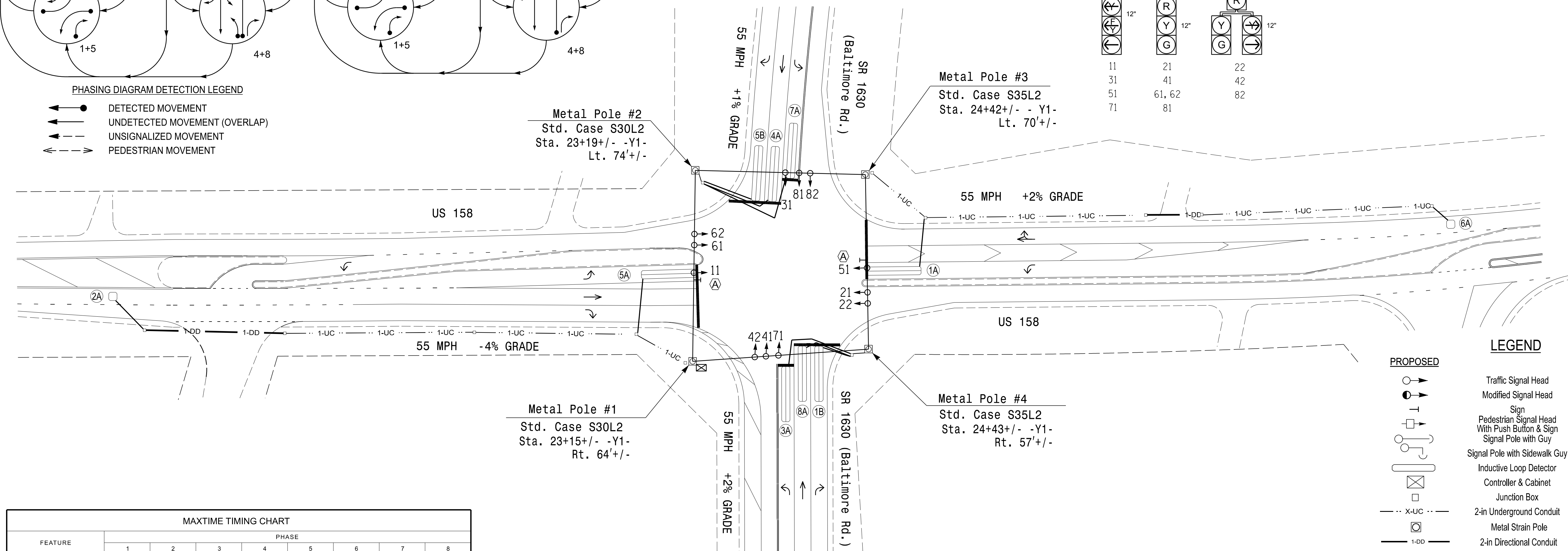
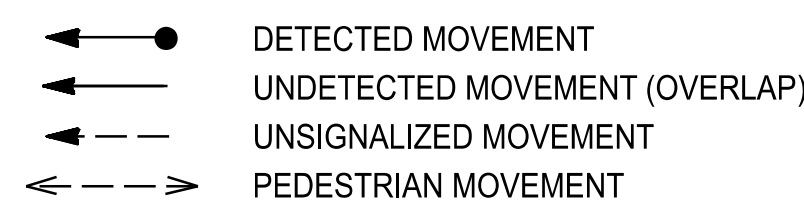
ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION										
SIGNAL FACE	PHASE								L	H
	1	2	3	4	5	6	7	8		
11	-	-	-	-	-	-	-	-	-	-
21	R	R	G	G	R	R	R	R	R	R
22	R	R	G	G	R	R	R	R	R	R
31	R	R	R	R	-	-	-	-	-	-
41	R	R	R	R	R	R	G	G	R	R
42	R	R	R	R	R	R	G	G	R	R
51	-	-	-	-	-	-	-	-	-	-
61, 62	R	R	G	G	R	R	R	R	R	R
71	R	R	R	R	-	-	-	-	-	-
81	R	R	R	R	R	R	G	G	R	R
82	R	R	R	R	R	R	G	G	R	R

ALTERNATE PHASING TABLE OF OPERATION										
SIGNAL FACE	PHASE								L	H
	1	2	3	4	5	6	7	8		
11	-	-	-	-	-	-	-	-	-	-
21	R	R	G	G	R	R	R	R	R	R
22	R	R	G	G	R	R	R	R	R	R
31	R	R	R	R	-	-	-	-	-	-
41	R	R	R	R	R	R	G	G	R	R
42	R	R	R	R	R	R	G	G	R	R
51	-	-	-	-	-	-	-	-	-	-
61, 62	R	R	G	G	R	R	R	R	R	R
71	R	R	R	R	-	-	-	-	-	-
81	R	R	R	R	R	R	G	G	R	R
82	R	R	R	R	R	R	G	G	R	R

PHASING DIAGRAM DETECTION LEGEND



MAXTIME TIMING CHART								
FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Walk *	-	-	-	-	-	-	-	-
Ped Clear *	-	-	-	-	-	-	-	-
Min Green *	7	14	7	7	7	14	7	7
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0
Max 1 *	20	75	20	30	20	75	20	30
Yellow Change	3.0	5.6	3.0	5.1	3.0	5.6	3.0	5.1
Red Clear	2.8	1.3	3.3	1.3	2.9	1.3	3.1	1.3
Added Initial *	-	2.5	-	-	-	2.5	-	-
Maximum Initial *	-	46	-	-	-	46	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	30	-	-	-	30	-	-
Minimum Gap	-	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 Passage 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		EXISTING	
	Traffic Signal Head		N/A
	Modified Signal Head		N/A
	Sign		N/A
	Pedestrian Signal Head With Push Button & Sign		N/A
	Signal Pole with Guy		N/A
	Signal Pole with Sidewalk Guy		N/A
	Inductive Loop Detector		N/A
	Controller & Cabinet		N/A
	Junction Box		N/A
	2-in Underground Conduit		N/A
	Metal Strain Pole		N/A
	2-in Directional Conduit		N/A
	Right of Way		N/A
	Directional Arrow		N/A
	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)		N/A

New Installation



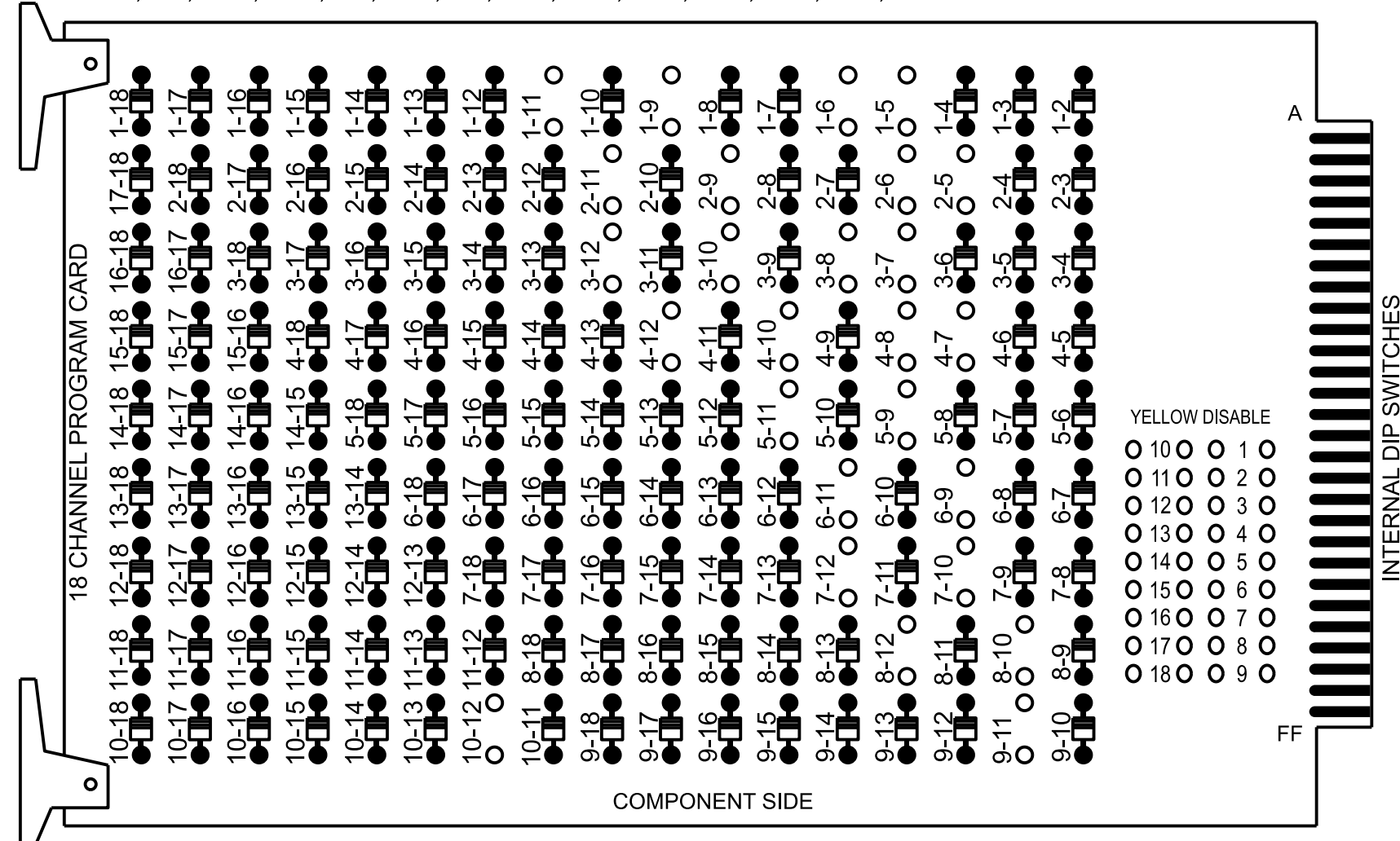
Prepared for the Offices of: 750 N. Greenfield Pkwy, Garner, NC 27529	US 158 at SR 1630 (Baltimore Rd.) Division 9 Davie County Bermuda Run PLAN DATE: July 2025 REVIEWED BY: L. Gottlieb PREPARED BY: J. Ma REVIEWED BY: M. L. Styles	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED SEAL NORTH CAROLINA PROFESSIONAL SEAL 033108 ENGINEER JIANXIN MA 7/10/2025 SIG. INVENTORY NO. 09-0367
--	---	---

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:

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

NOTES

- 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.
- Program phases 4 and 8 for Dual Entry.
- Program controller to start up in phase 2 Green No Walk and 6 Green No Walk.
- If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

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	NU	31★	22	41,42	NU	51★	42	61,62	NU	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		A114	A101			
YELLOW ARROW		126				117				132				A122	A125		A115	A102			
FLASHING YELLOW ARROW														A123	A126		A116	A103			
GREEN ARROW	127	127			118	118			133	133			124								

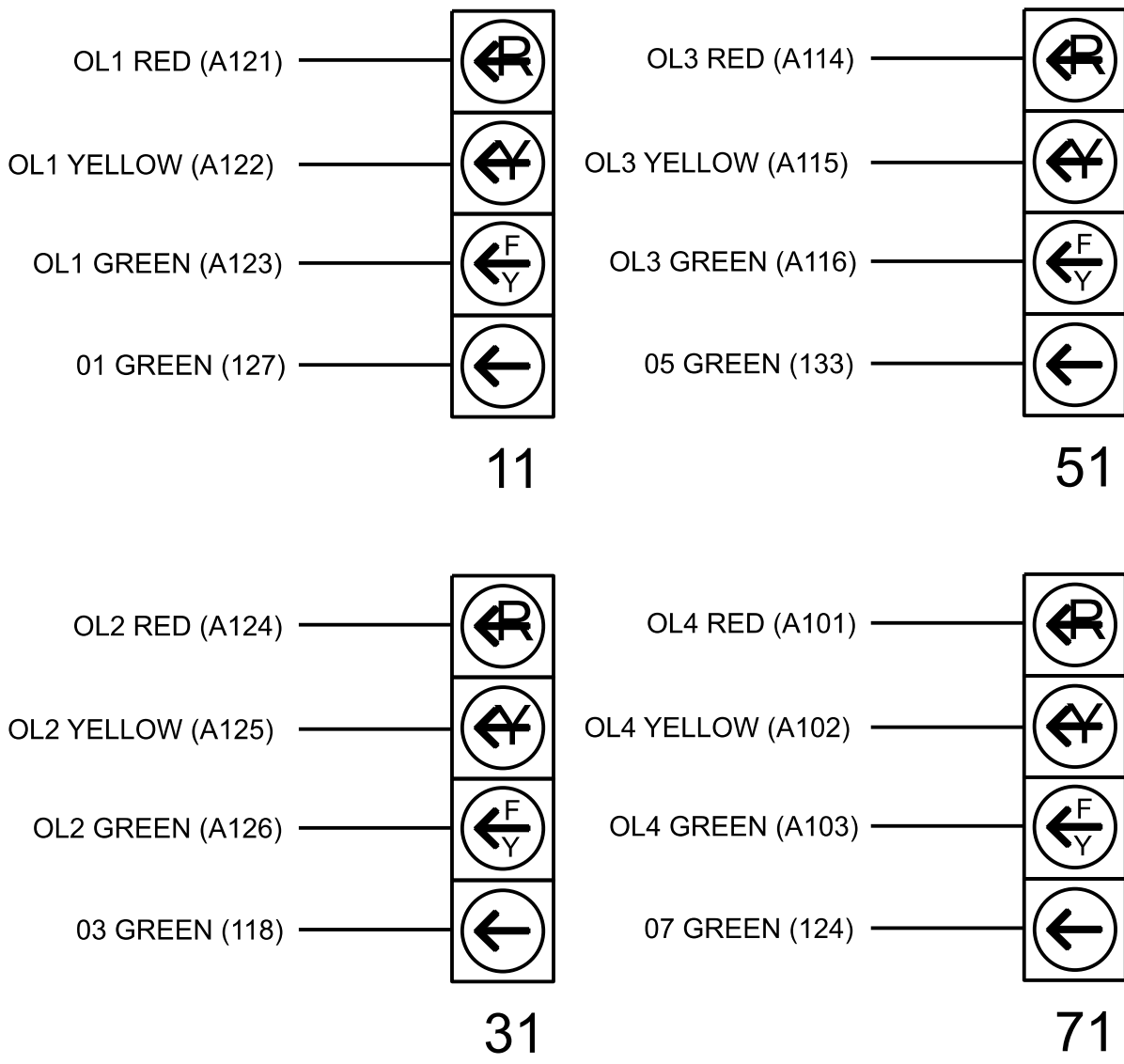
NU = Not Used

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

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

FS = FLASH SENSE
ST = STOP TIME

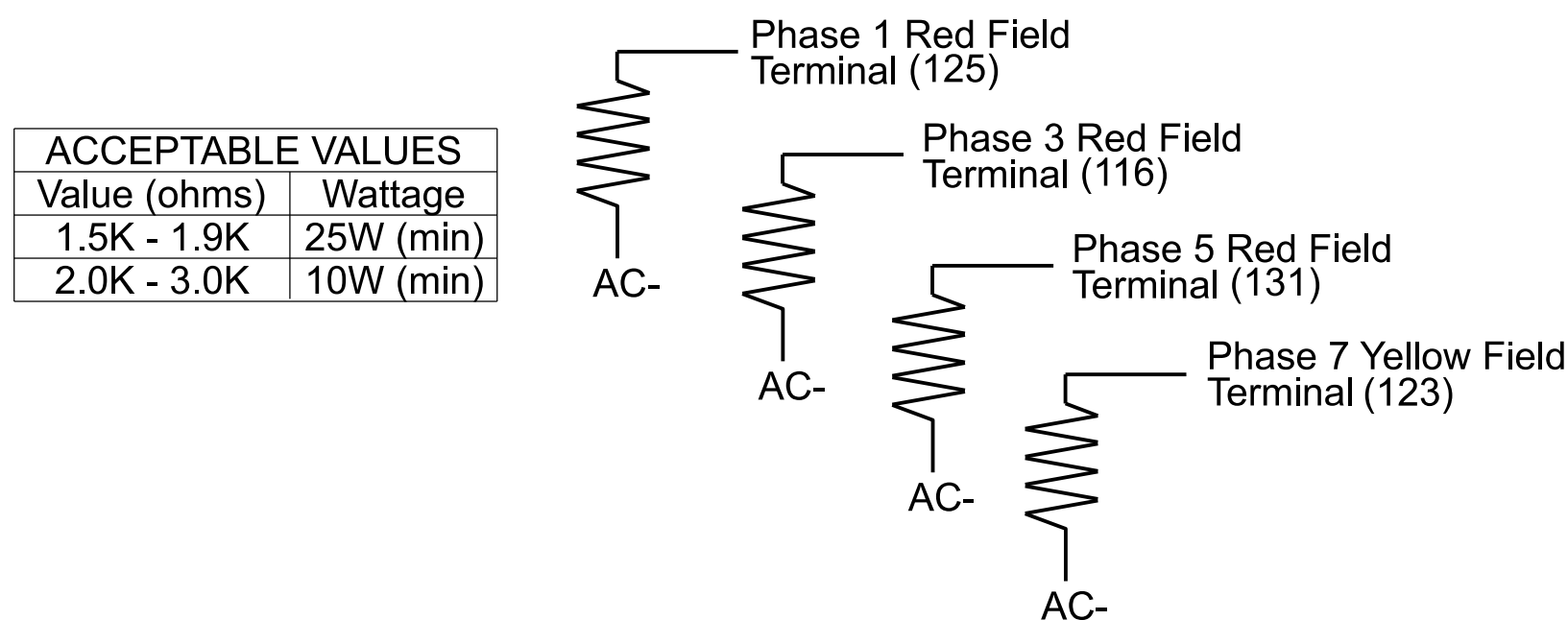
INPUT FILE CONNECTION & PROGRAMMING CHART

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	
1B	TB2-5,6	I2U	39	-	29★	6	3		X		X	X
2A	TB2-9,10	I3U	63	29	4	2	15		X	X	X	
3A	TB4-5,6	I5U	58	20	7★	3	15		X		X	
4A	TB4-9,10	I6U	41	3	8★	8	3		X		X	
5A	TB3-1,2	J1U	55	17	15★	5	15		X		X	X
5B	TB3-5,6	J2U	40	2	16	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	
8A	TB5-9,10	J6U	42	-	32	4	3		X		X	
				4	22	8			X		X	

★ For the detectors to work as shown on the signal design plan, see the Vehicle Detector Setup Programming Detail for Alternate Phasing on sheet 2.

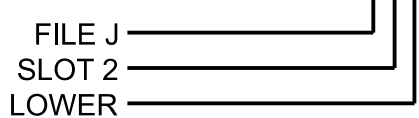
LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)



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

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 09-0367
DESIGNED: July 2025
SEALED: 7/10/2025
REVISED: N/A

Electrical Detail-Sheet 1 of 3

	US 158 at SR 1630 (Baltimore Rd.)		Division 9 Davie County Bermuda Run		
	PLAN DATE: July 2025	REVIEWED BY: L. Gottlieb			
	PREPARED BY: J. Ma	REVIEWED BY: M. L. Stygles			
	REVISIONS	INIT.	DATE		
750 N. Greenfield Pkwy, Corner, NC 27529		JAN 20 2025		7/10/2025	
		SIGNATURE		DATE	
		SIG. INVENTORY NO.		09-0367	

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 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 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.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 09-0367
DESIGNED: July 2025
SEALED: 7/10/2025
REVISED: N/A

Plan 2		
Detector	Call Phase	Delay
1	1	0.0
29	0	3.0

3A	Detector	Call Phase	Delay
	7	3	3.0
	30	0	3.0

Detector	Call Phase	Delay
15	5	0.0
31	0	3.0

7A	Detector	Call Phase	Delay
	21	7	3.0
	32	0	3.0

Electrical Detail-Sheet 2 of 3

ELECTRICAL AND PROGRAMMING
DETAILS FOR:



750 N.Greenfield Pkwy, Garner, NC 27529

US 158
at
SR 1630 (Baltimore Rd.)

Division 9	Davie County	Bermuda Run
PLAN DATE: July 2025	REVIEWED BY: L. Gottlieb	
PREPARED BY: J. Ma	REVIEWED BY: M. L. Styles	
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
033108
ENGINEER
JANUARY 1990

DocuSigned by:
J. Ma
7/10/2025
b27e1953081446f-

SIGNATURE	DATE
SIG. INVENTORY NO. 09.0367	

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

FLASHER CIRCUIT MODIFICATION DETAIL

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.

<u>PHASING</u>	<u>OVERLAP PLAN</u>	<u>VEH DET PLAN</u>
ACTIVE PLAN REQUIRED TO <u>RUN DEFAULT PHASING</u>	1	1
ACTIVE PLAN REQUIRED TO <u>RUN ALTERNATE PHASING</u>	2	2

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

All Red Flash Exit Time
6



VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

SEAL

NORTH CAROLINA

PROFESSIONAL

SEAL
033108

ENGINEER

JIANXIN MA

DocuSigned by
Jianxin Ma 7/10/2025

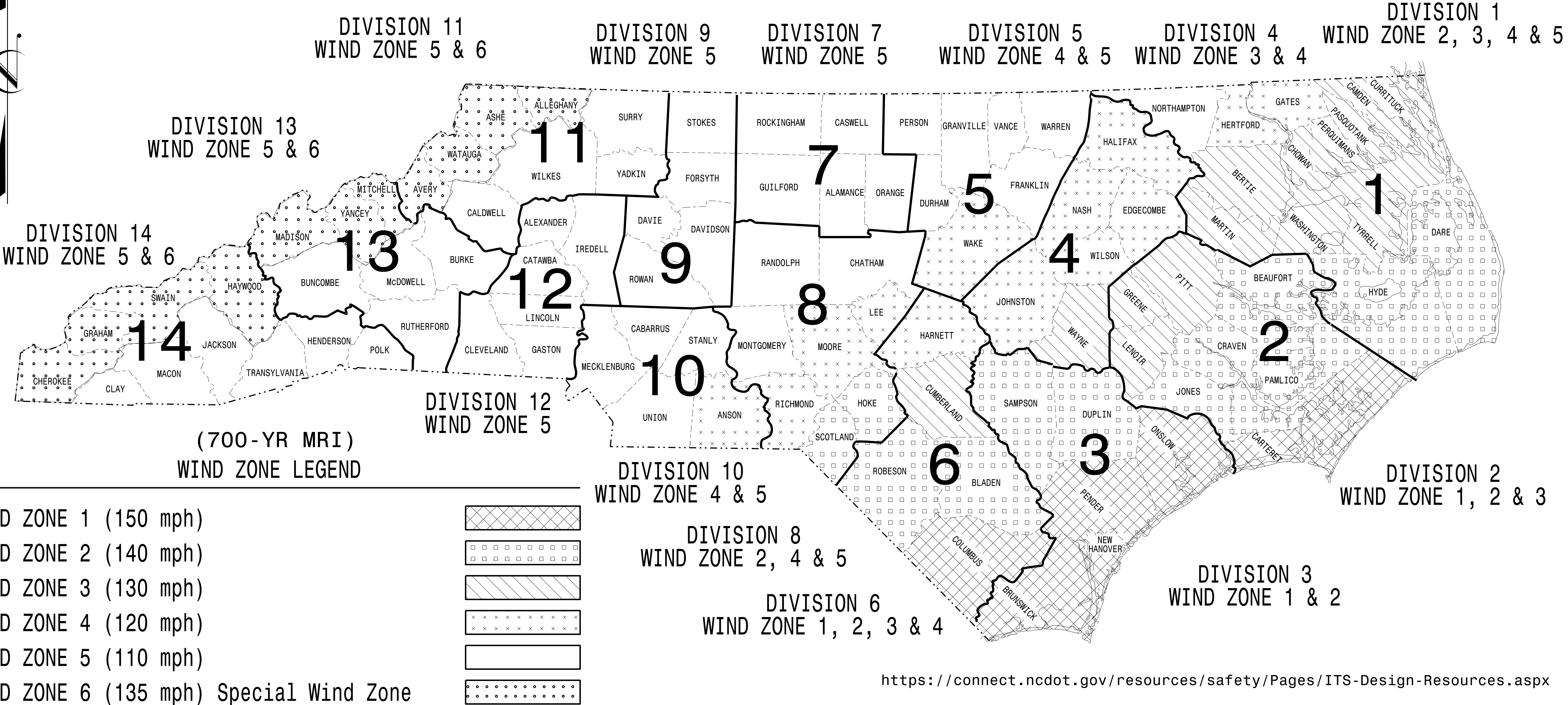
SIGNED DATE SIGNATURE 09-0367

SIG. INVENTORY NO. 09-0367

STATE OF NORTH CAROLINA

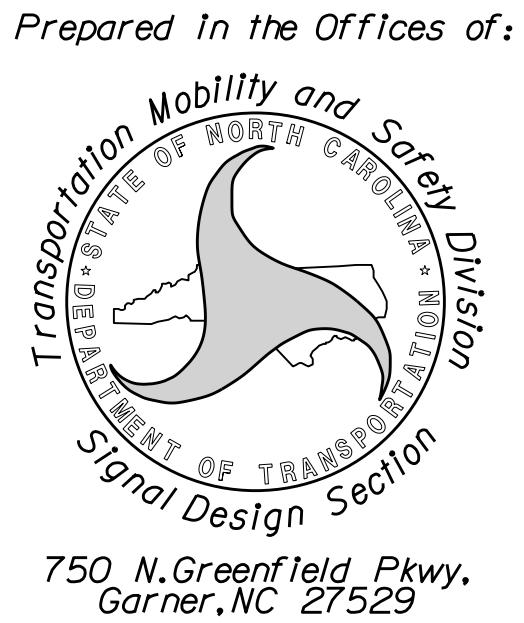
DIVISION OF HIGHWAYS

STANDARD DRAWINGS FOR ALL METAL POLES (LRFD)



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

NCDOT METAL POLE STANDARDS



Designed in conformance
with the latest
2020 Interim to the
1st Edition 2015
AASHTO
LRFD
Standard Specifications for
Highway Signs, Luminaires,
and Traffic Signals

DRAWING NUMBER	INDEX OF PLANS DESCRIPTION
Sig. M 1A	Statewide Wind Zone Map (700-yr MRI)
Sig. M 1B	Statewide Wind Zone Map (10-yr MRI)
Sig. M 2	Typical Fabrication Details-All Metal Poles
Sig. M 3	Typical Fabrication Details-Strain Poles
Sig. M 4	Typical Fabrication Details-Mast Arm Poles
Sig. M 5	Typical Fabrication Details-Mast Arm Connection
Sig. M 6	Typical Fabrication Details-Strain Pole Attachments
Sig. M 7	Construction Details-Foundations
Sig. M 8	Standard Strain Pole Foundation-All Soil Conditions
Sig. M 9	Typical Fabrication Details-CCTV Camera Poles

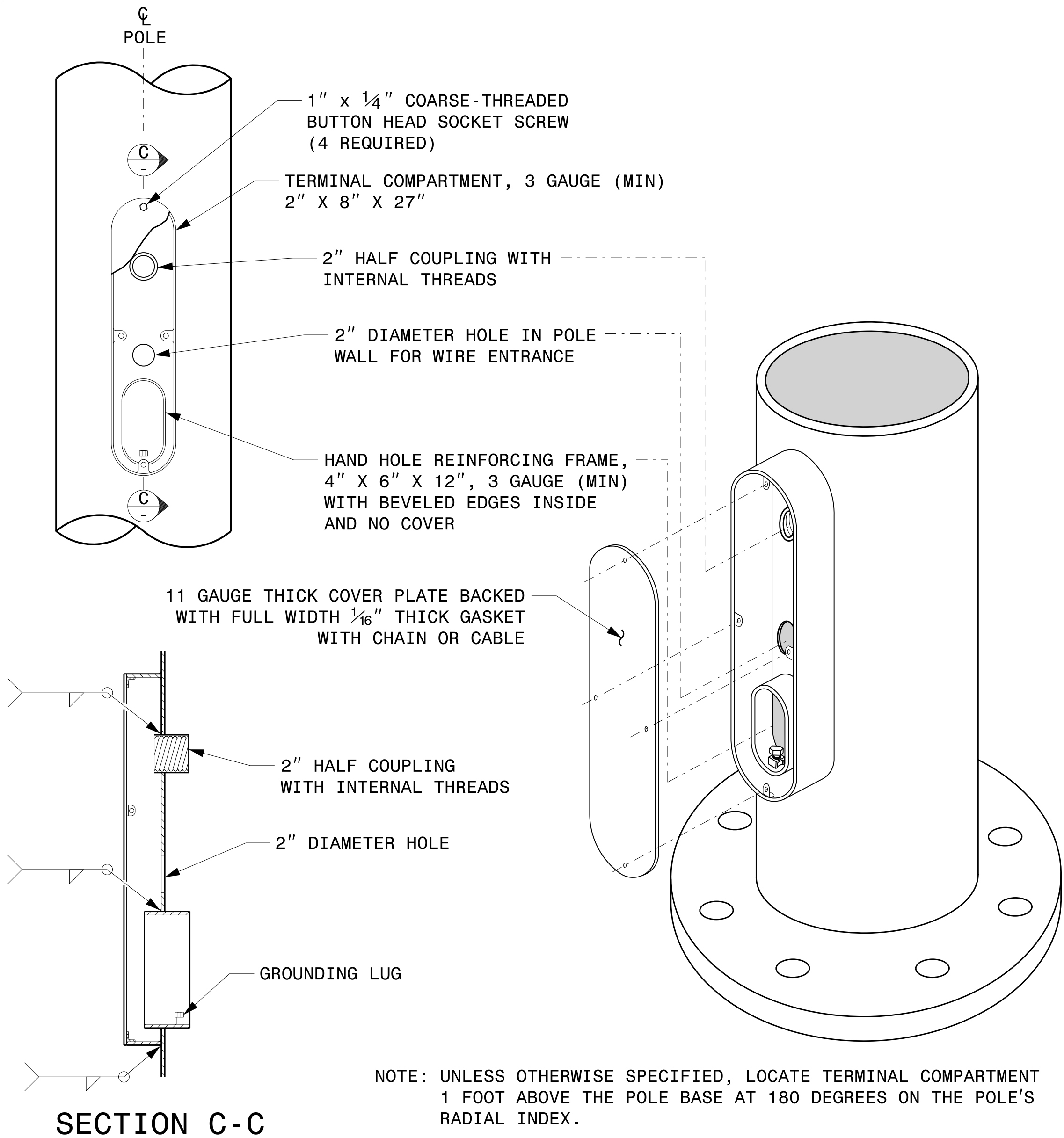
MOBILITY AND SAFETY DIVISION -
TRANSPORTATION SYSTEMS MANAGEMENT
AND OPERATIONS UNIT

D.Y. ISHAK - STATE SIGNALS ENGINEER
K. DURIGON, P.E. - ITS AND SIGNALS STRUCTURAL ENGINEER
B. WALKER, P.E. - ITS AND SIGNALS STRUCTURAL ENGINEER

SEAL

DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3764DA

09/21/2023
DATE



SECTION C-C

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 POLE SHAFT)

MFG _____ MFG. DATE: MM/YY

SECTION D/T/L/Y ____/____/____/____

NCDOT SIG. INV. NO. _____

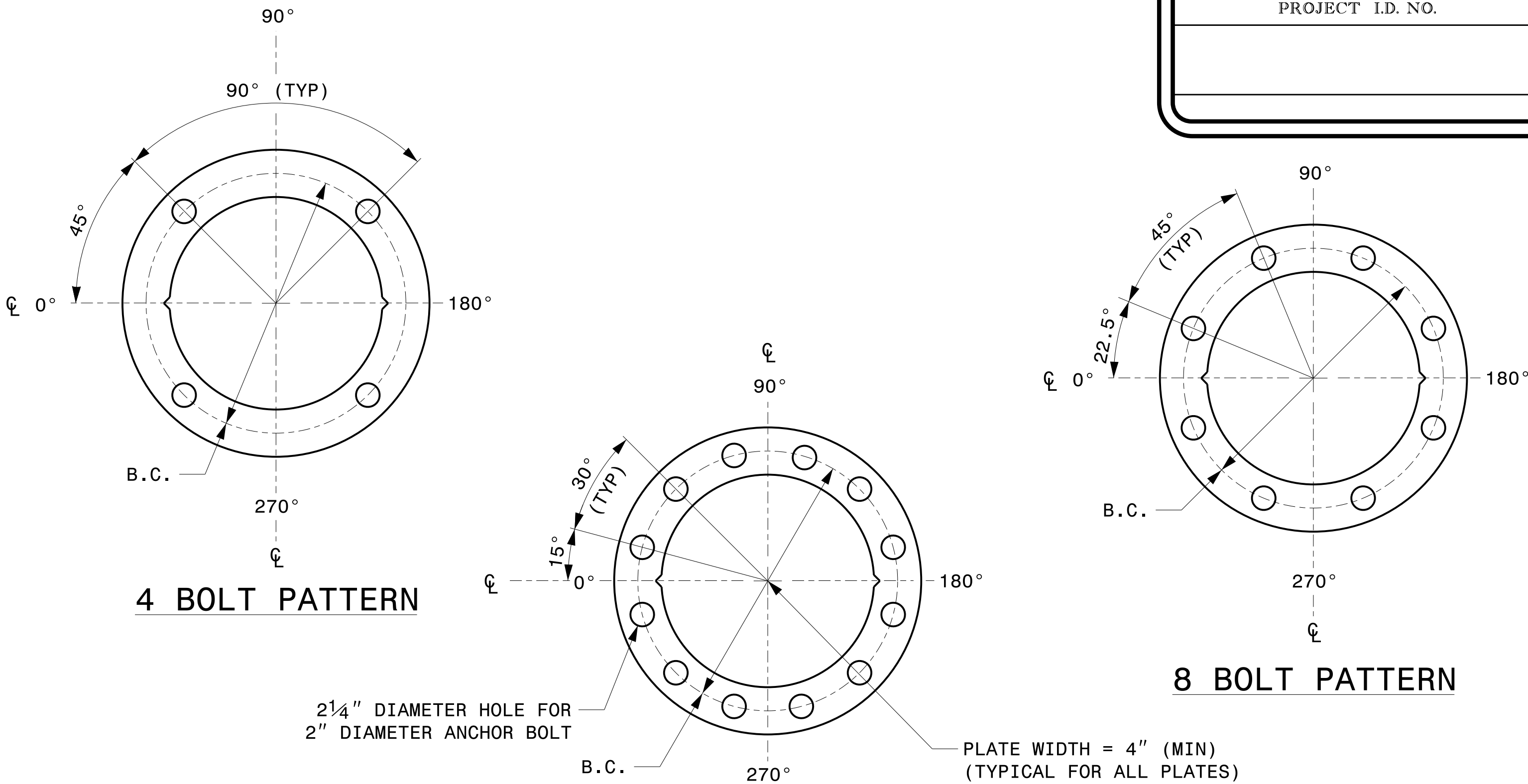
NCDOT POLE NO. _____

ARM I.D. TAG
(PROVIDE ON EACH SECTION OF
A MULTI-SECTION MAST ARM)

NOTES:

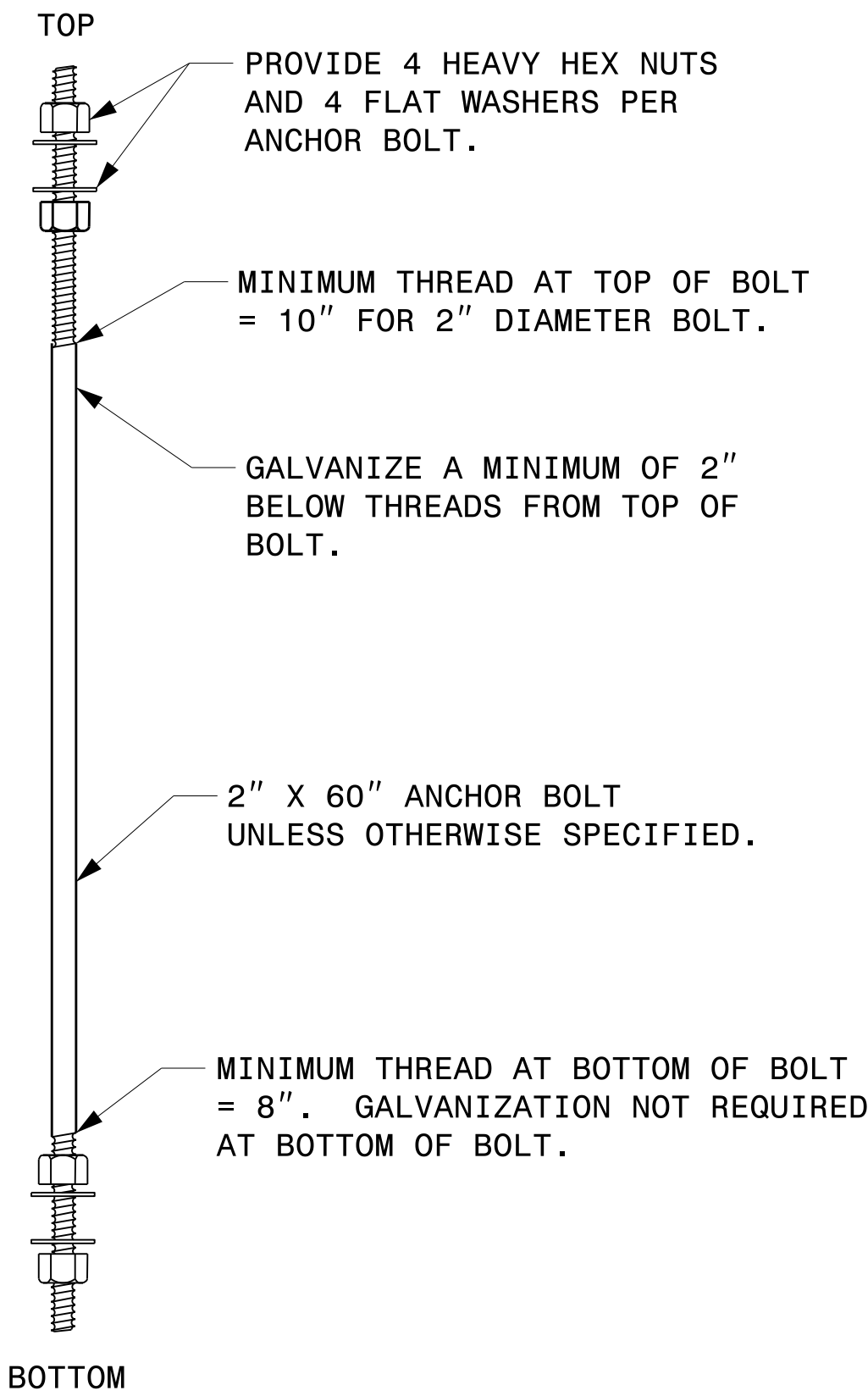
- D = DIAMETER, T = THICKNESS, L = LENGTH, Y = YIELD STRENGTH
- A.B. = ANCHOR BOLT
- B.C. = BOLT CIRCLE OF ANCHOR BOLTS
- IF STANDARD DESIGN, INCLUDE CASE NUMBER IN ADDITION TO POLE NUMBER ON "NCDOT POLE NO." LINE.
- SIGNAL INV. NUMBER AND POLE I.D. NUMBER.
SEE DRAWING M3 AND M4 FOR MOUNTING POSITIONS OF I.D. TAGS.

IDENTIFICATION TAG DETAILS

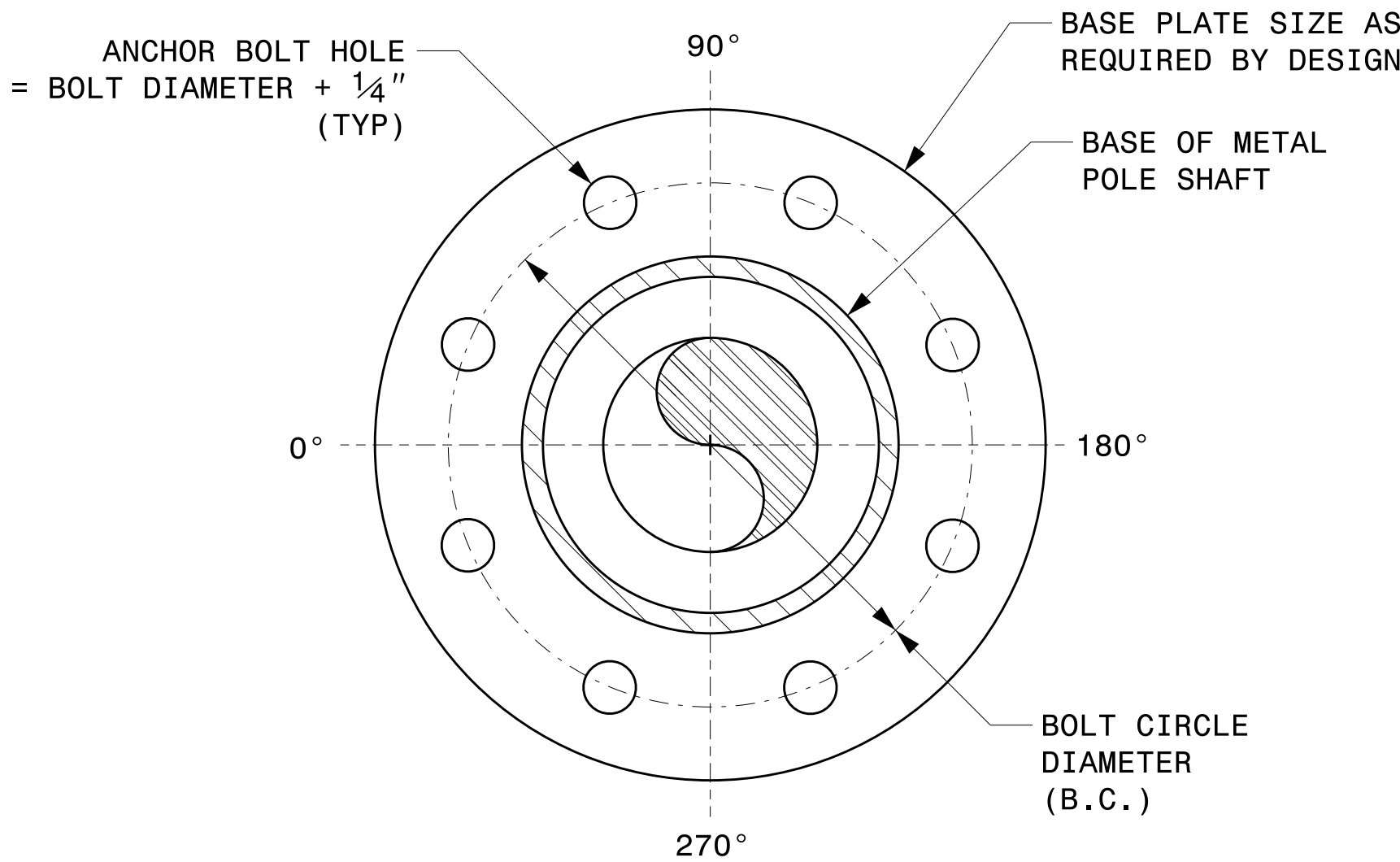


CONSTRUCT TEMPLATES AND PLATES FROM 1/4" (MIN) THICK STEEL. GALVANIZING IS NOT REQUIRED.

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

Prepared In the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

Typical Fabrication Details
For
All Metal Poles

PLAN DATE: SEPTEMBER 2023 DESIGNED BY: C.F. ANDREWS
PREPARED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR

REVISIONS
INIT. DATE

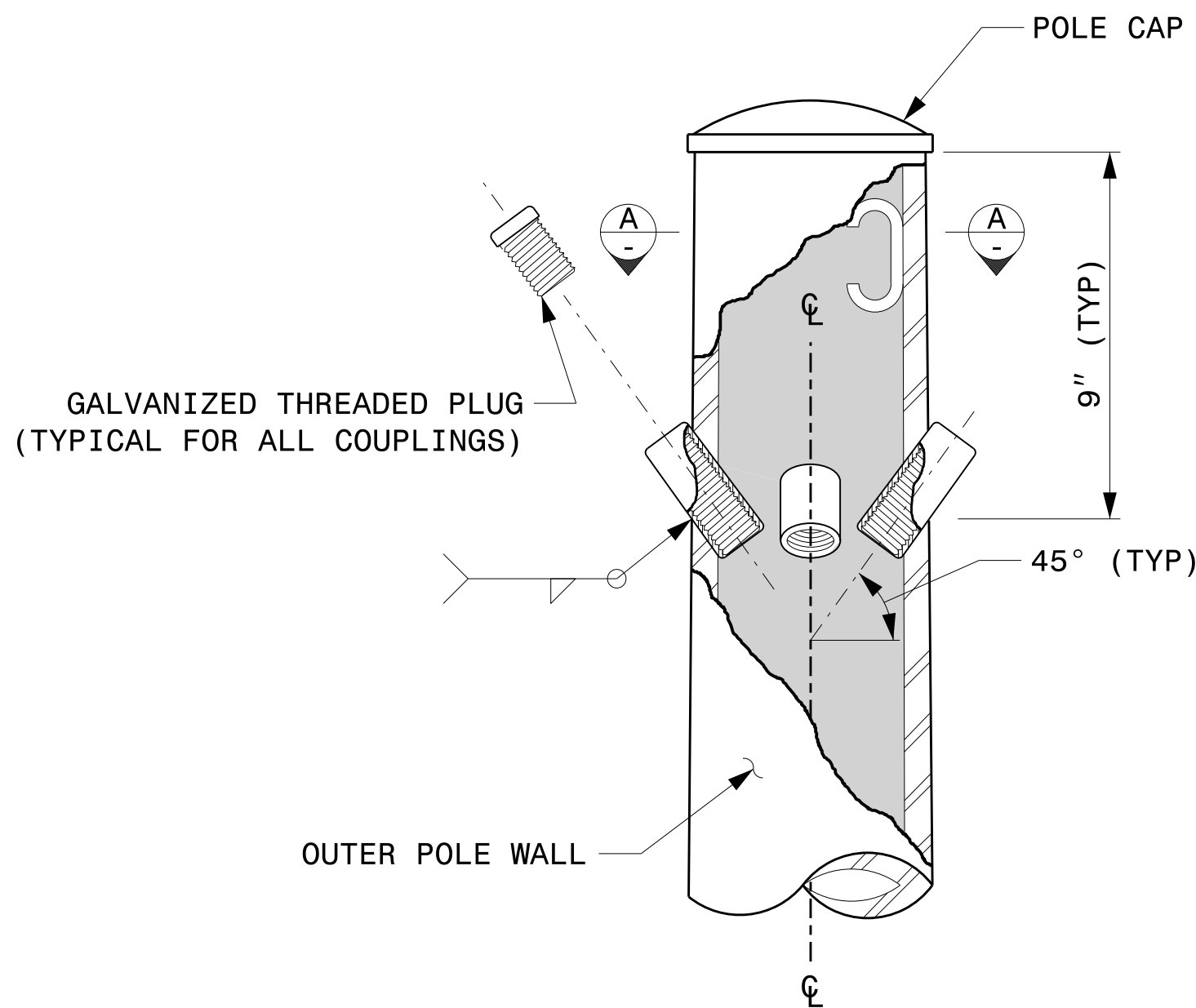
SEAL
NORTH CAROLINA
PROFESSIONAL ENGINEER
SEAL
036626
KEVIN C. DURIGON

DocuSigned by:
Kevin Durigon
4B23DC79B3784DA

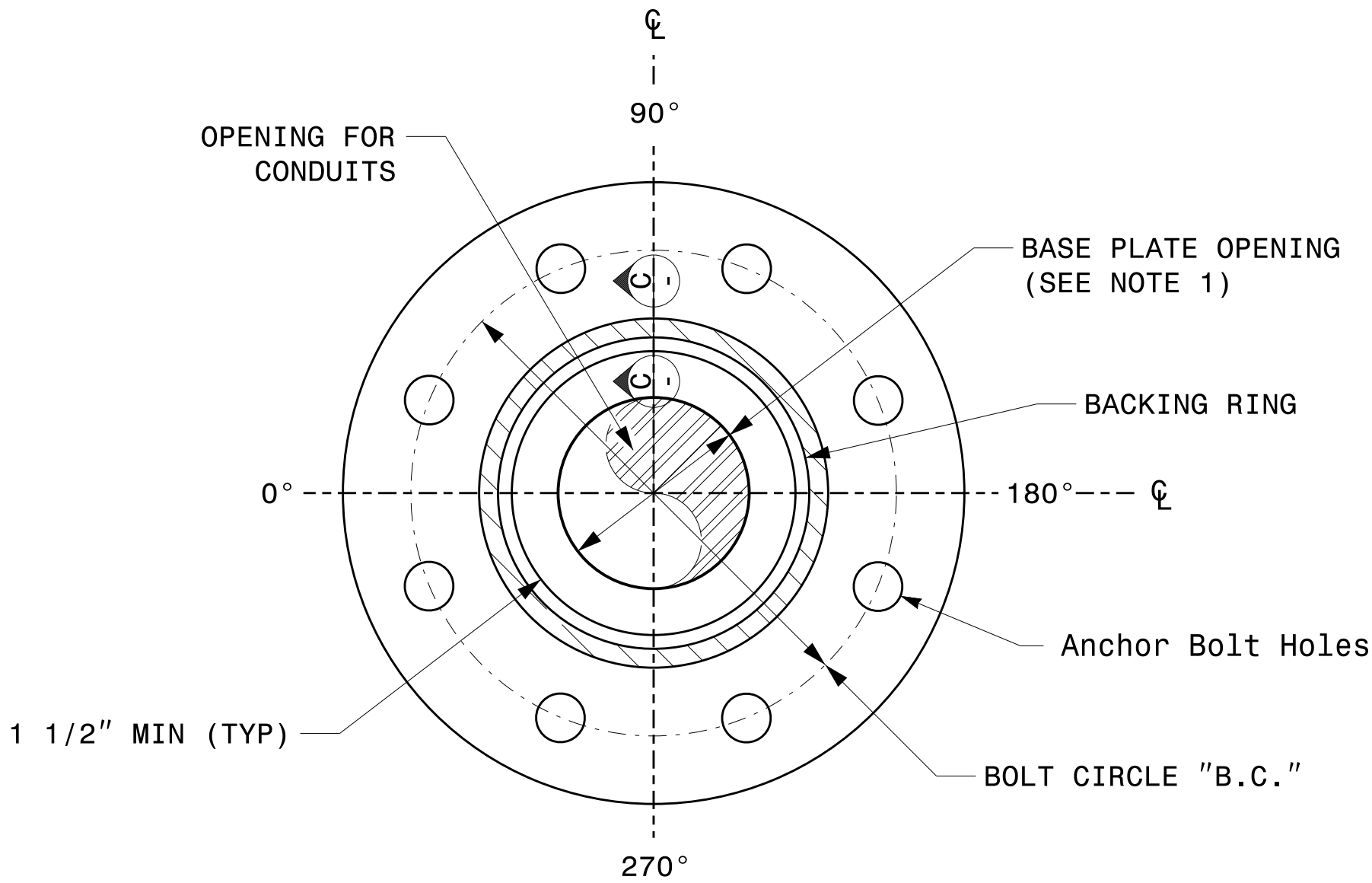
09/21/2023
DATE

NOTE:

1. OPENING IN POLE BASE PLATE SHALL BE EQUAL TO POLE BASE INSIDE DIAMETER MINUS $3\frac{1}{2}$ " BUT SHALL NOT BE LESS THAN $8\frac{1}{2}$ ".

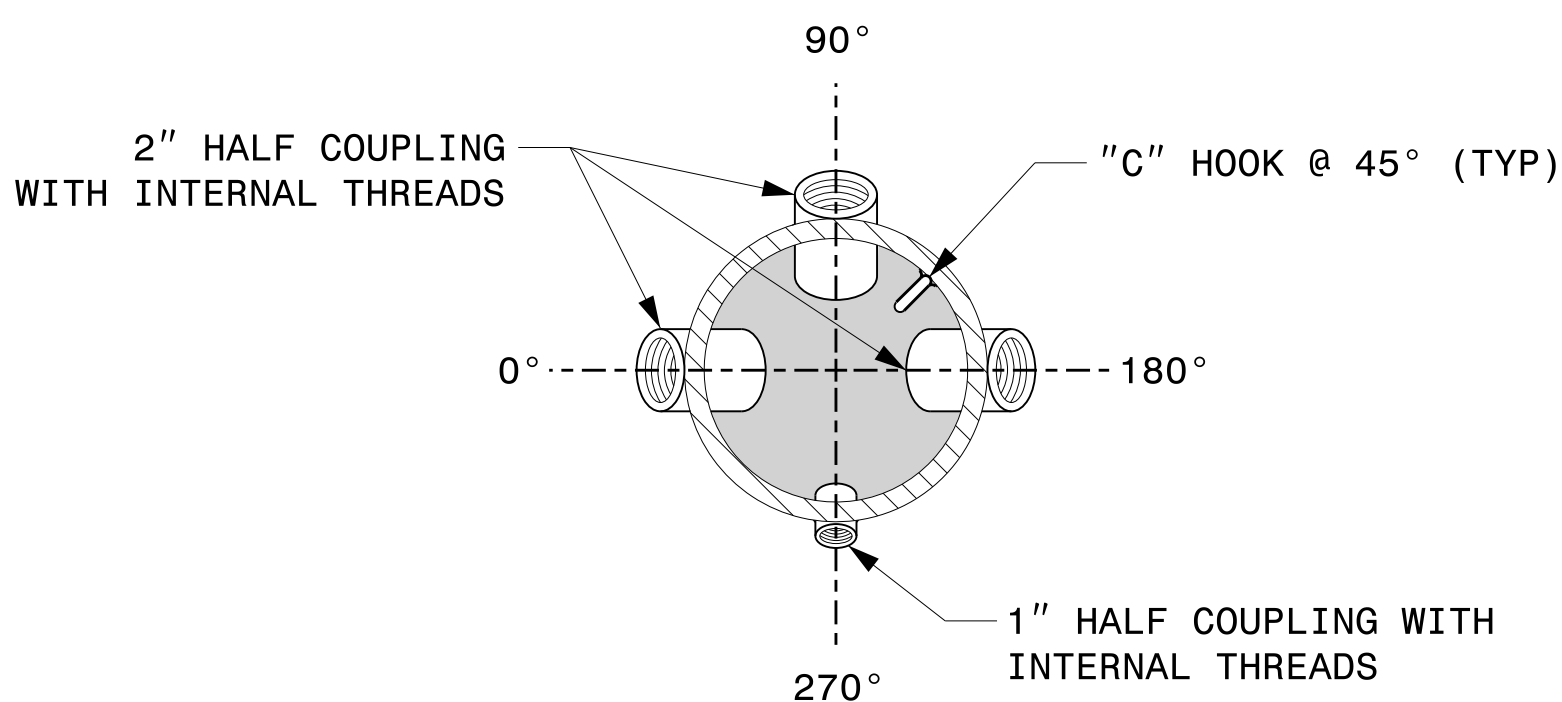


CABLE ENTRANCES AT TOP OF POLE



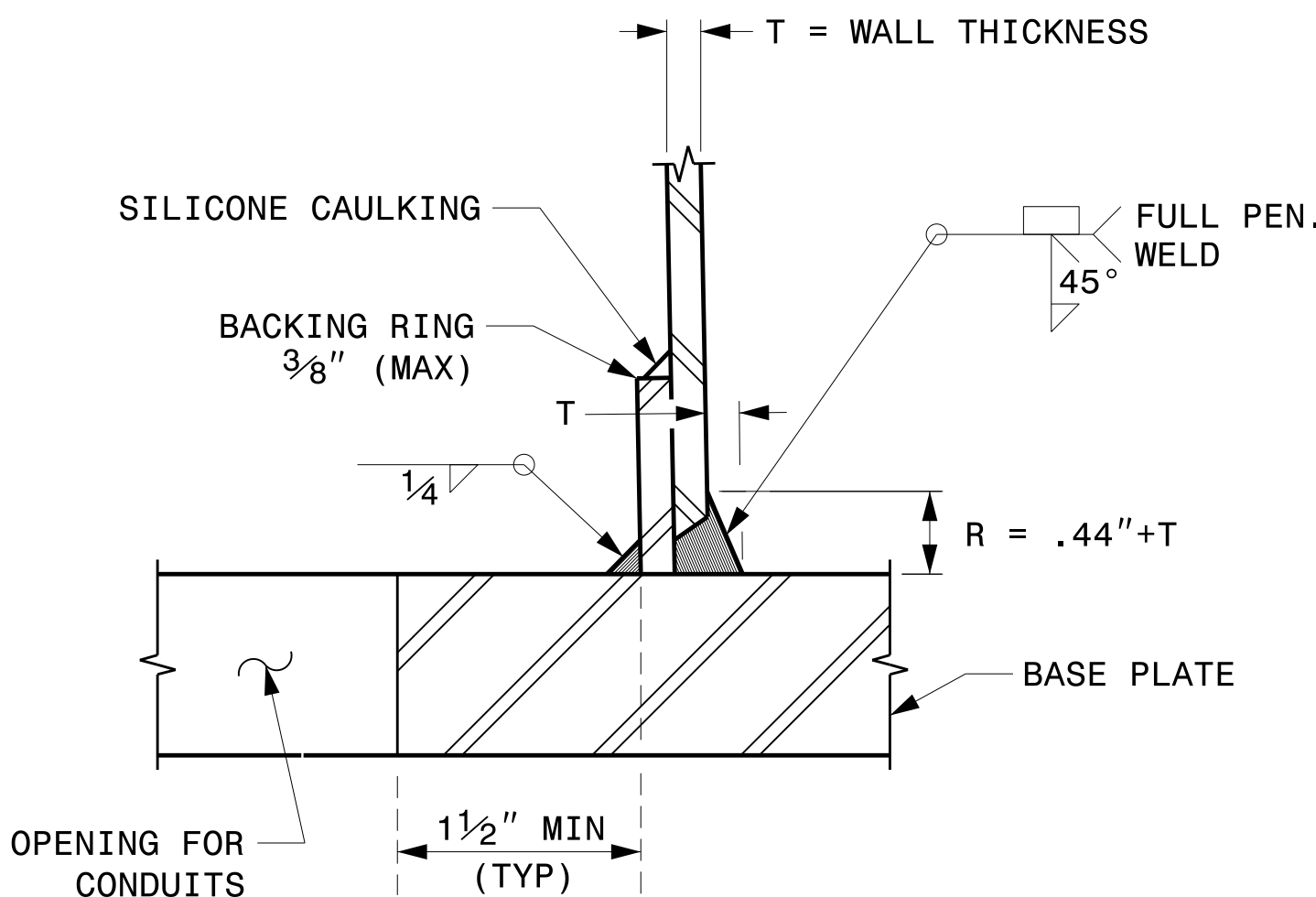
SECTION B-B

POLE BASE PLATE DETAILS
(8 AND 12 BOLT PATTERN)



SECTION A-A

RADIAL ORIENTATION OF FACTORY INSTALLED
ACCESSORIES AT TOP OF POLE

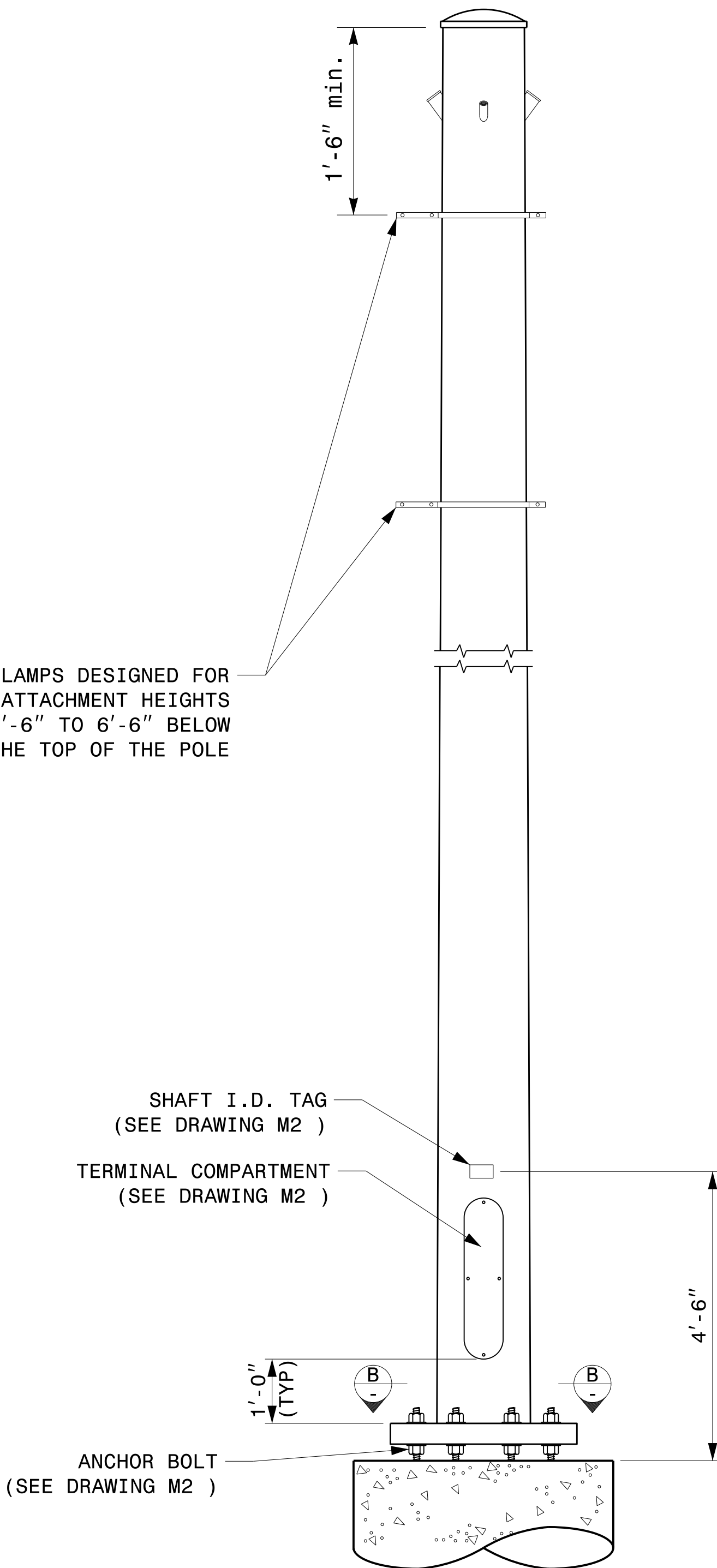


SECTION C-C

(POLE ATTACHMENT TO BASE PLATE)

FULL-PENETRATION
GROOVE WELD DETAIL

2 CABLE CLAMPS DESIGNED FOR
VARIABLE ATTACHMENT HEIGHTS
FROM 1'-6" TO 6'-6" BELOW
THE TOP OF THE POLE

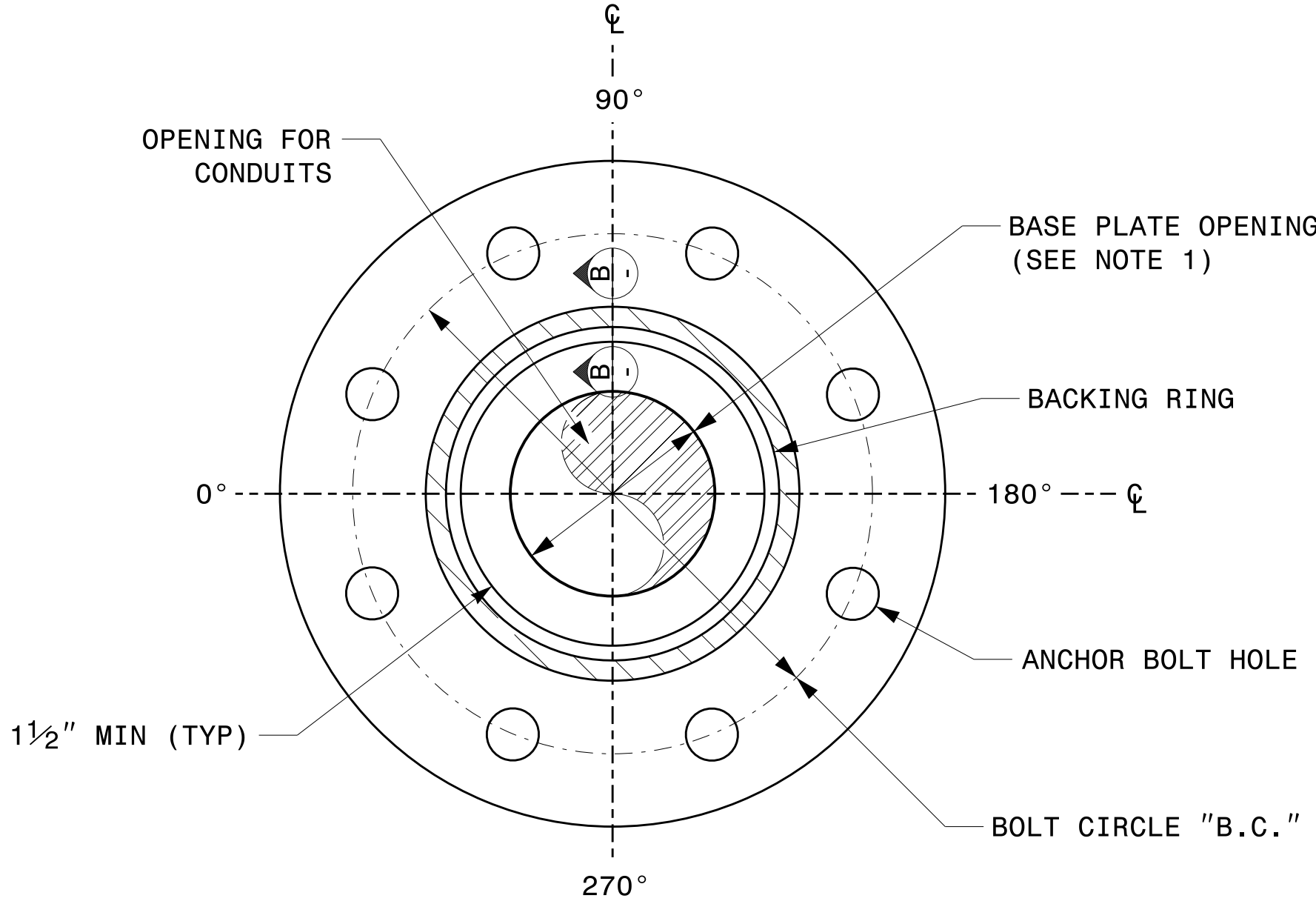


MONOTUBE STRAIN POLE

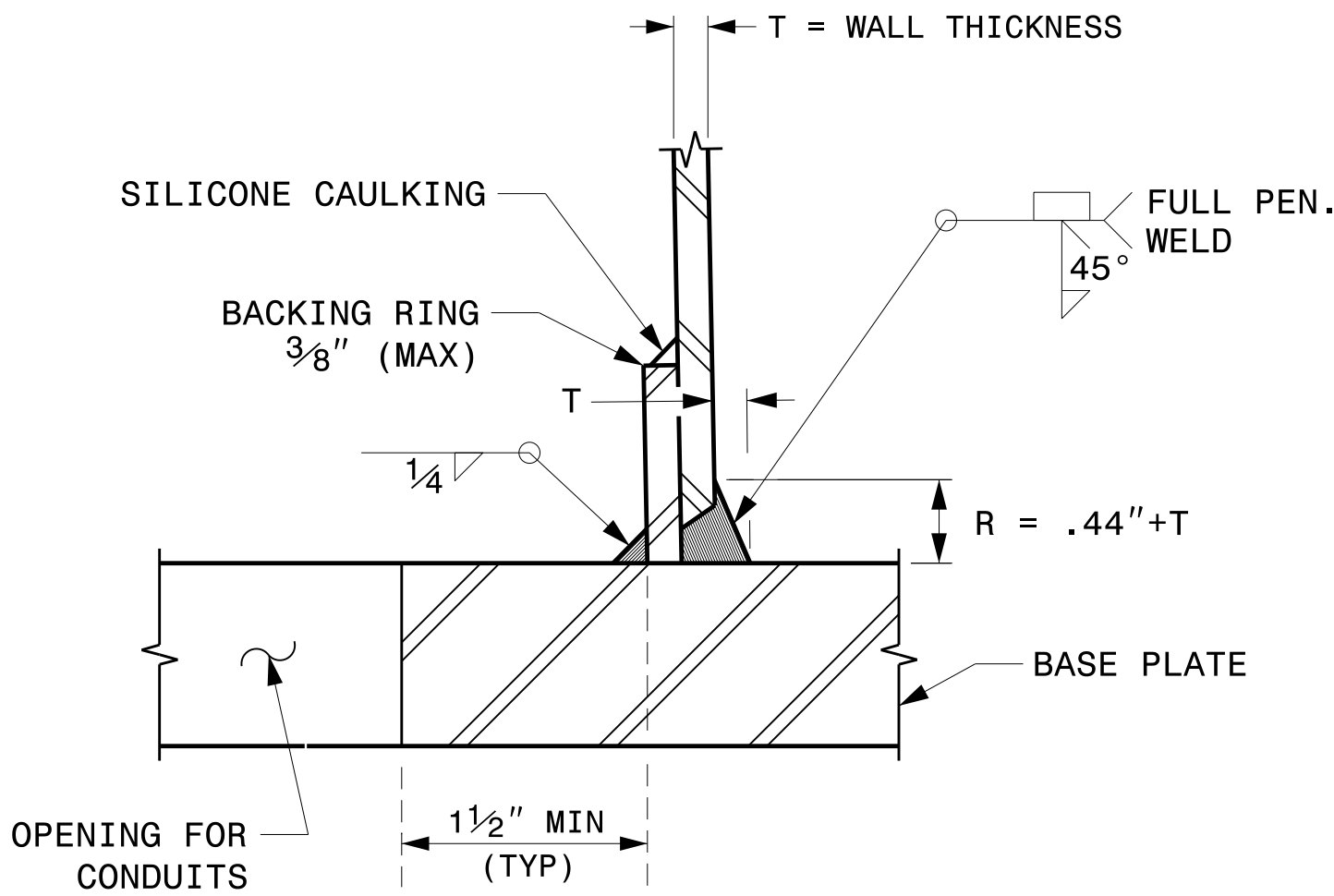
	Typical Fabrication Details For Strain Poles		
	PLAN DATE: SEPTEMBER 2023 DESIGNED BY: K.C. DURIGON PREPARED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR	DESIGNED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR	

NOTE:

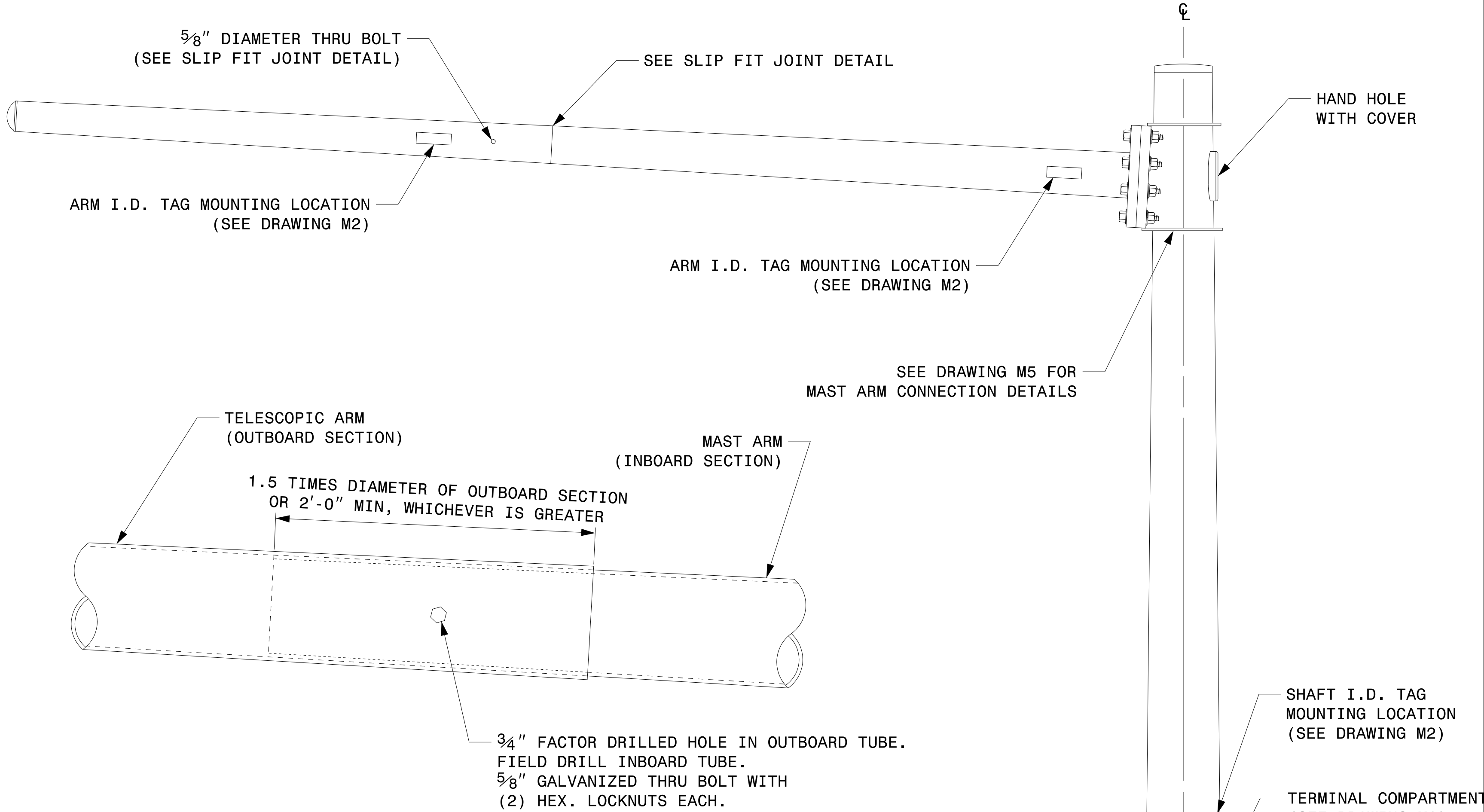
1. OPENING IN POLE BASE PLATE SHALL BE EQUAL TO POLE BASE INSIDE DIAMETER MINUS 3 1/2" BUT SHALL NOT BE LESS THAN 8 1/2".



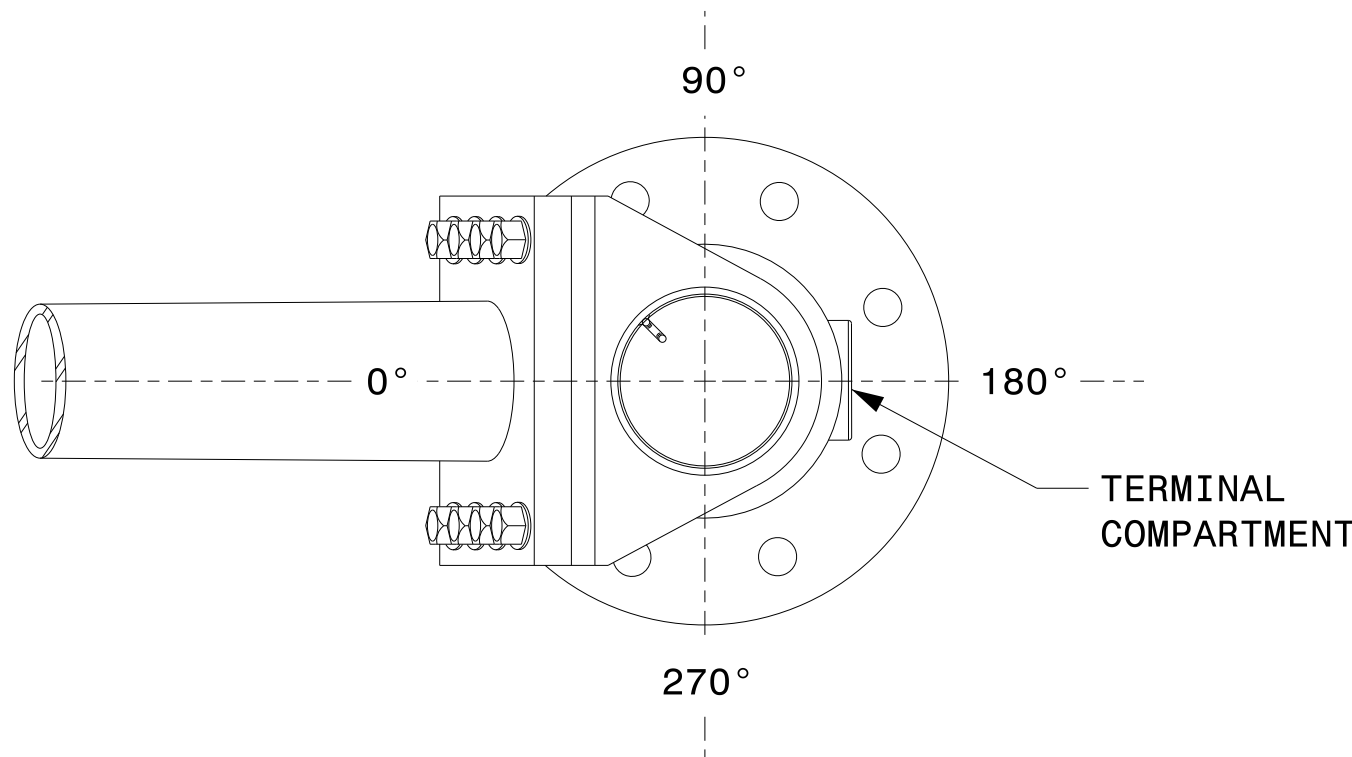
SECTION A-A
POLE BASE PLATE DETAILS



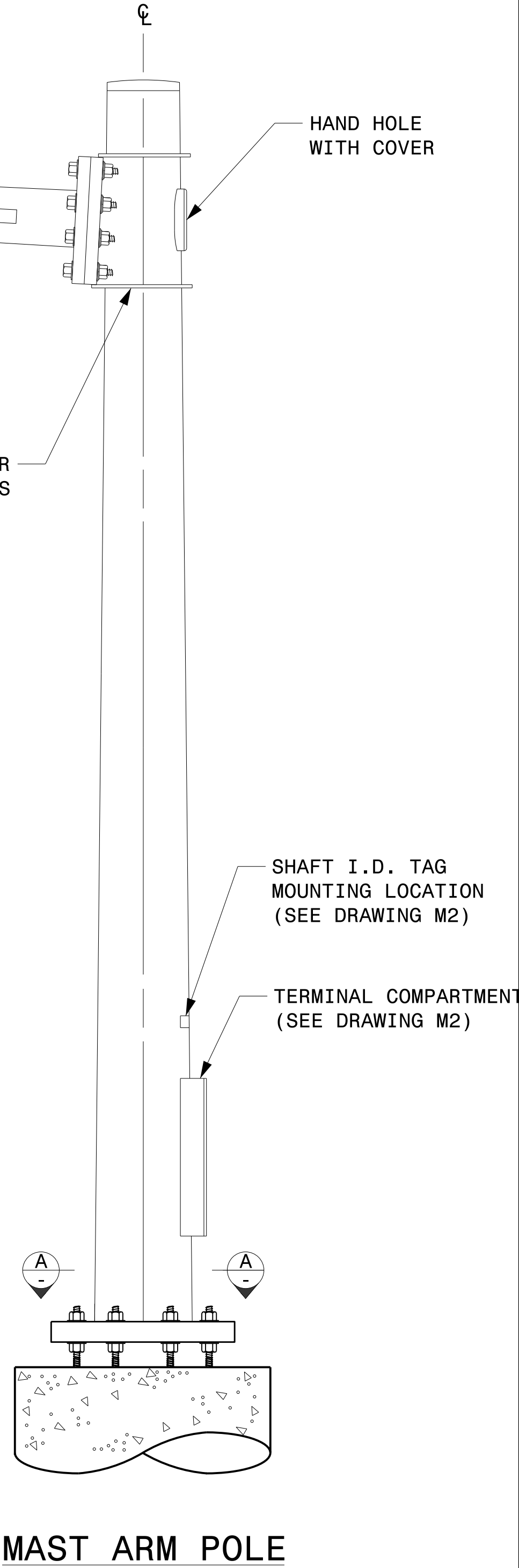
SECTION B-B
(POLE ATTACHMENT TO BASE PLATE)
FULL-PENETRATION
GROOVE WELD DETAIL



SLIP FIT JOINT DETAIL FOR MAST ARM



MAST ARM RADIAL ORIENTATION



MAST ARM POLE

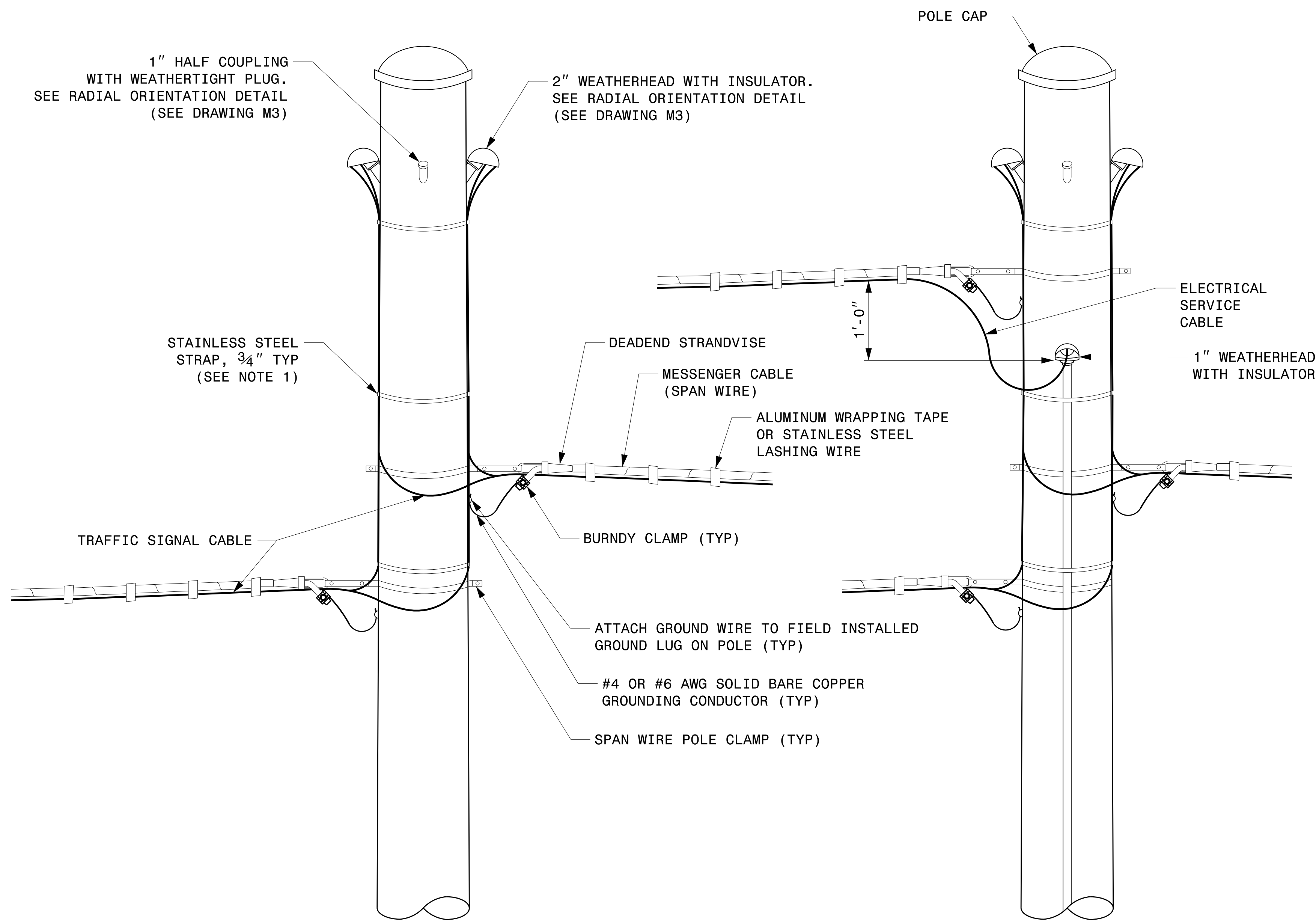
	Typical Fabrication Details For Mast Arm Poles			
	PLAN DATE: SEPTEMBER 2023	DESIGNED BY: K.C. DURIGON		
	PREPARED BY: K.C. DURIGON	REVIEWED BY: D.C. SARKAR		
	REVISIONS			
0	SCALE	NA	INIT.	DATE
NONE				

DocuSigned by:

SEAL
036626
ENGINEER
KEVIN C. DURIGON
DATE: 09/21/2023

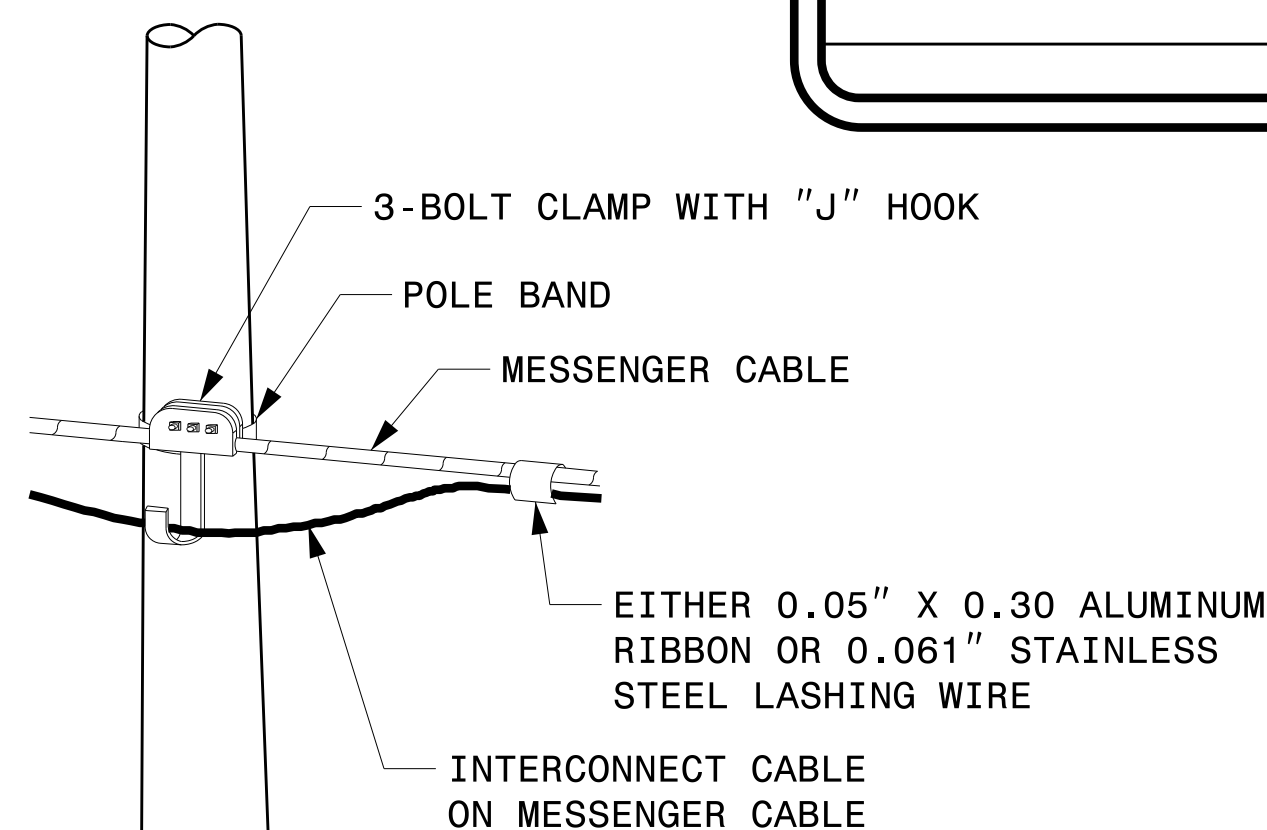


1. PROVIDE A PERMANENT MEANS OF IDENTIFICATION ABOVE THE MAST ARM TO INDICATE PROPER ATTACHMENT ORIENTATION OF THE MAST ARM.
2. DESIGNER WILL DETERMINE THE SIZE OF ALL STRUCTURAL COMPONENTS, PLATES, FASTENERS, AND WELDS SHOWN UNLESS THEY ARE ALREADY SPECIFIED.
3. FABRICATOR IS RESPONSIBLE FOR PROVIDING APPROPRIATE HOLES AT DRAINAGE POINTS TO DRAIN GALVANIZING MATERIALS.
4. FOR MINIMUM EDGE DISTANCE AND NOMINAL BOLT HOLE SIZE, FOLLOW THE LATEST AISC STEEL CONSTRUCTION MANUAL.
5. PROVIDE UPPER HANDHOLE AS NECESSARY WHEN SHAFT EXTENSIONS ARE REQUIRED 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.

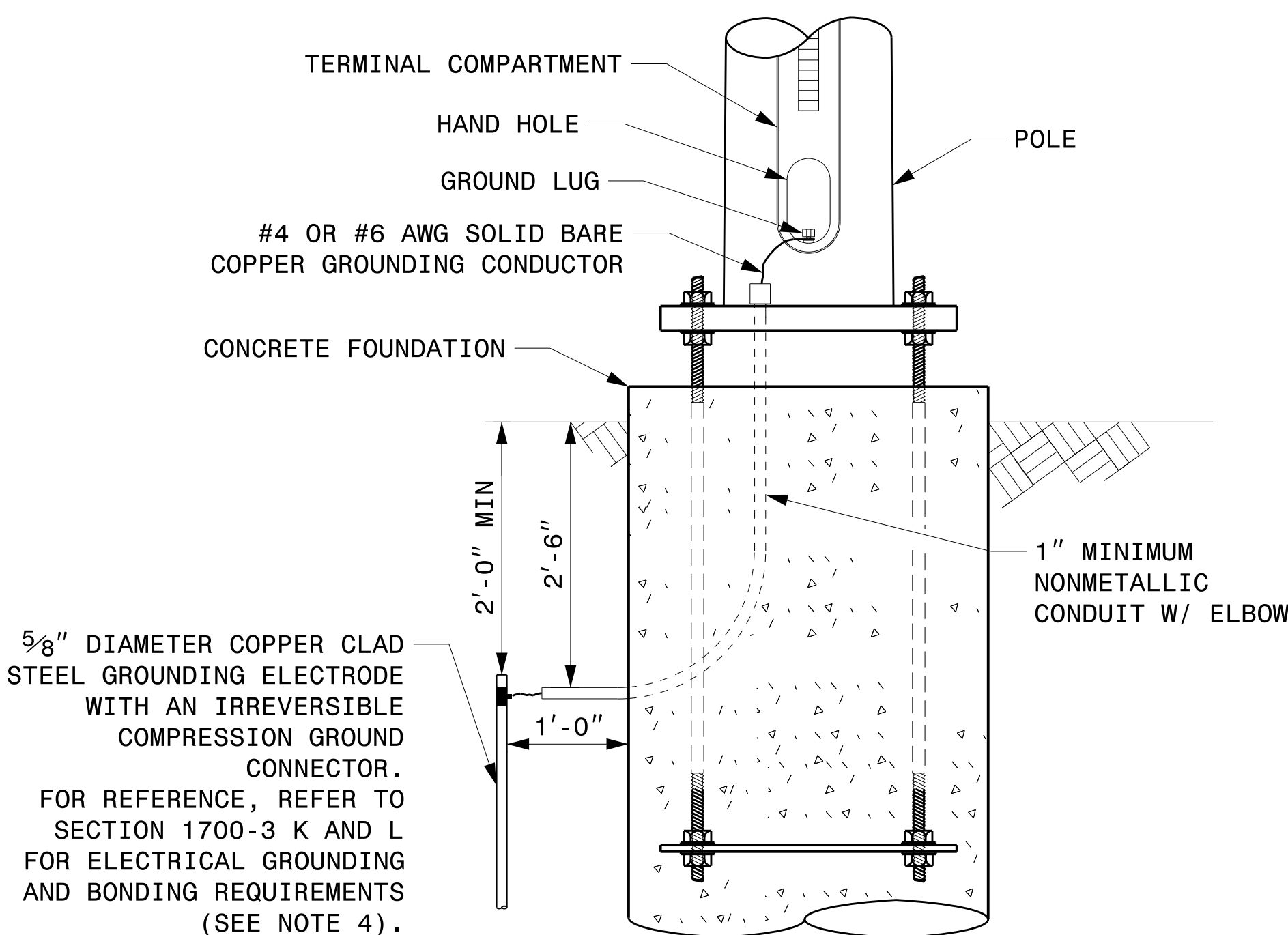


STRAIN POLE ATTACHMENTS

- NOTES:
- STRAP ALL SIGNAL CABLES TO THE SIDE OF THE POLE WITH 3/4" STAINLESS STEEL STRAPS WHEN THE DISTANCE BETWEEN SPAN WIRE ATTACHMENT CLAMP AND WEATHERHEADS EXCEEDS 3'-0".
 - PROVIDE MINIMUM TWO SPAN WIRE POLE CLAMPS PER POLE.
 - IT IS PROHIBITED TO ATTACH TWO SPAN WIRES AT ONE POLE CLAMP.
 - FOR GENERAL REQUIREMENTS, REFER TO NCDOT STANDARD SPECIFICATIONS FOR ROADWAY AND STRUCTURES, JANUARY 2024.



ATTACHMENT OF CABLE TO INTERMEDIATE METAL POLE



METAL POLE GROUNDING DETAIL FOR STRAIN POLE AND MAST ARM

Prepared In the Offices of:

750 N.Greenfield Pkwy,Garner,NC 27529

Typical Fabrication Details For Strain Pole Attachments

PLAN DATE: SEPTEMBER 2023 DESIGNED BY: C.F. ANDREWS
PREPARED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR

REVISIONS
INIT. DATE

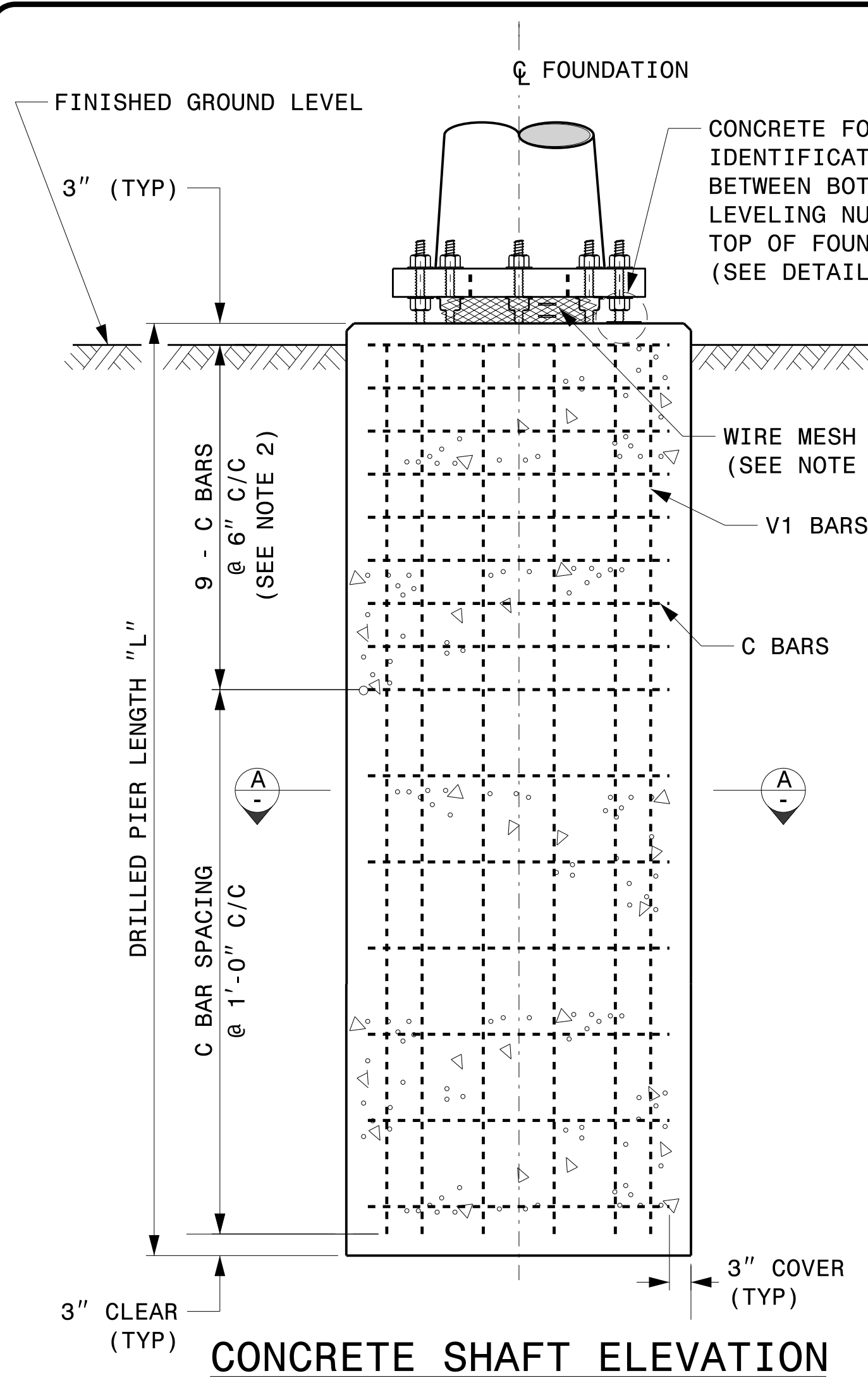
SEAL
NORTH CAROLINA
PROFESSIONAL ENGINEER
SEAL 036626
KEYVIN C. DURIGON

DocuSigned by:
Kevin Durigon
4B23DC79B3784DA...

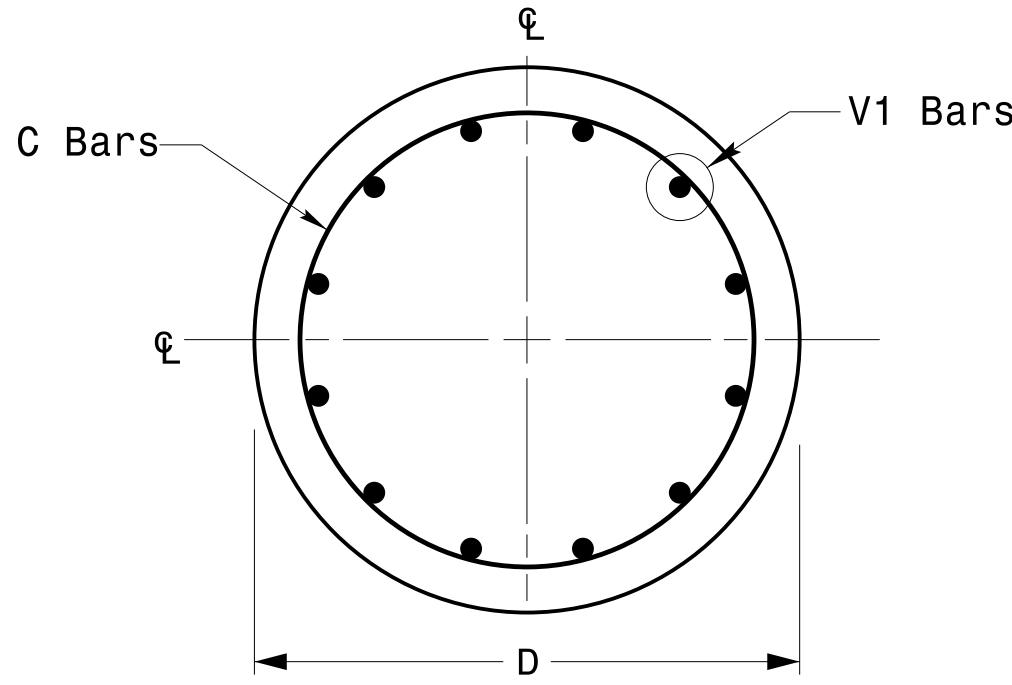
09/21/2023
DATE

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Kedar Igon

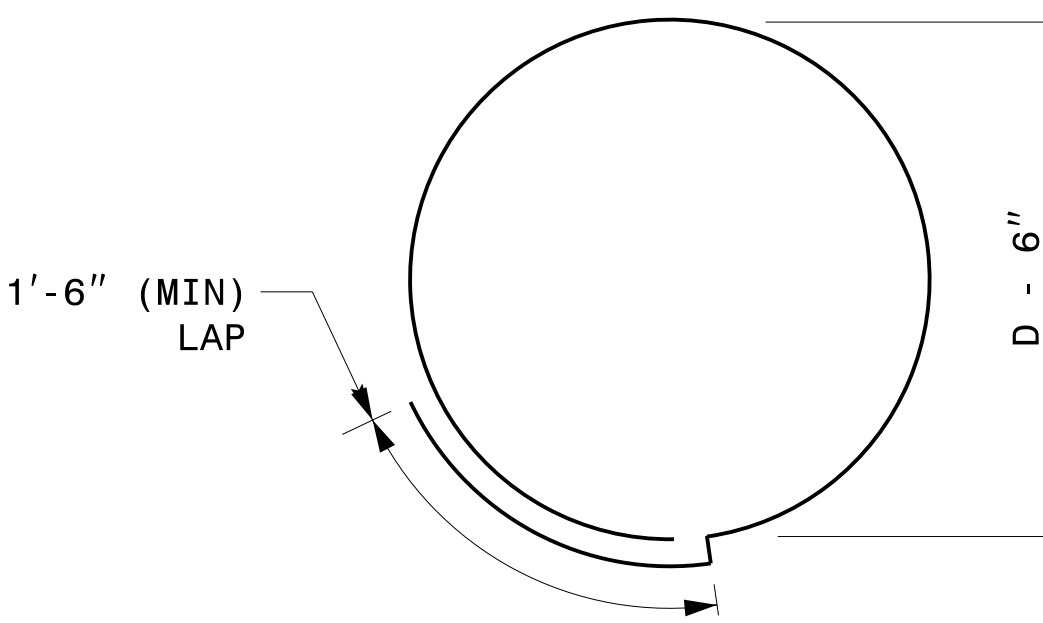
Fabrication Details – Strain Pole Attachments



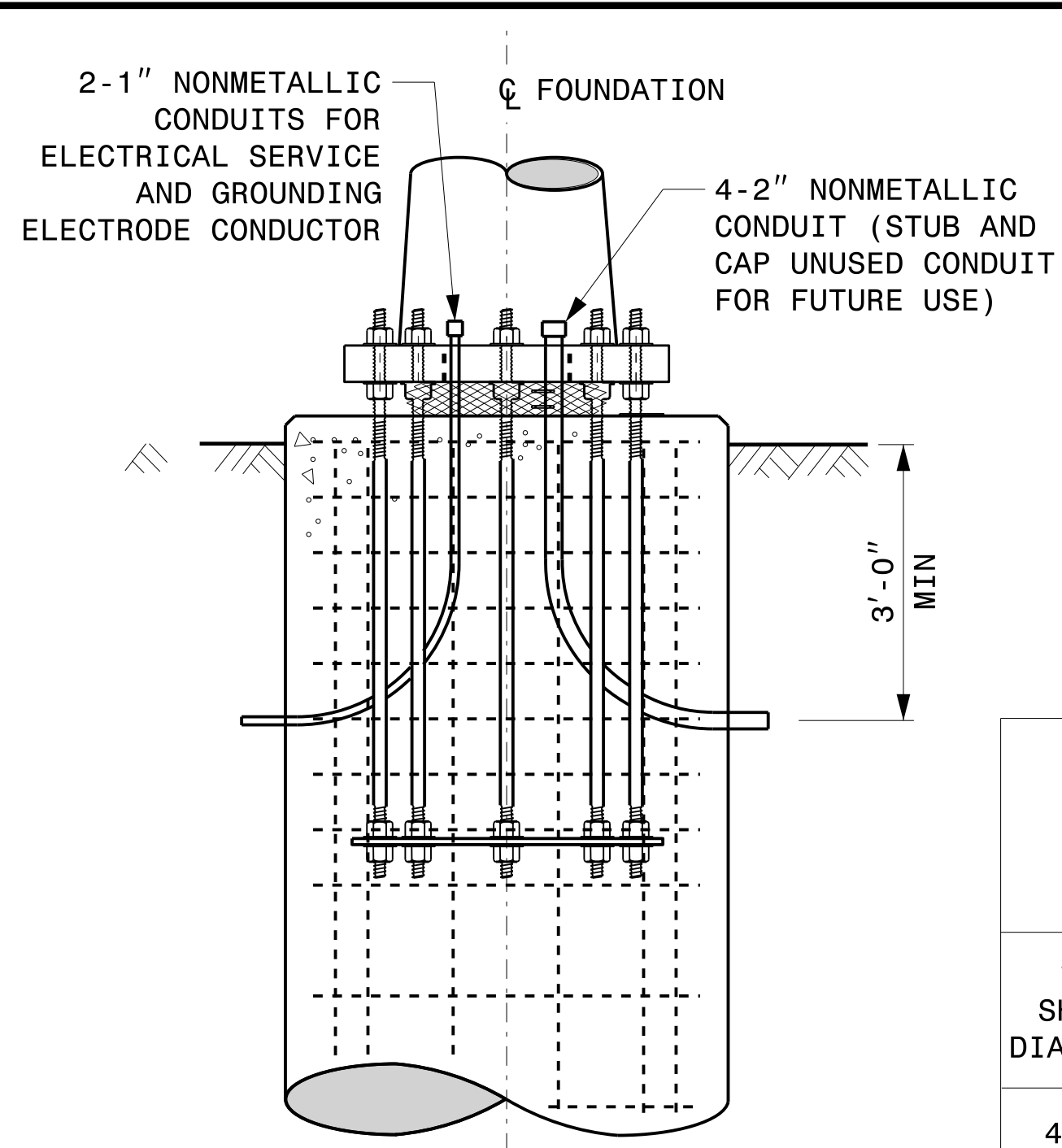
CONCRETE SHAFT ELEVATION



SECTION A-A



TYPICAL "C" BAR DETAIL



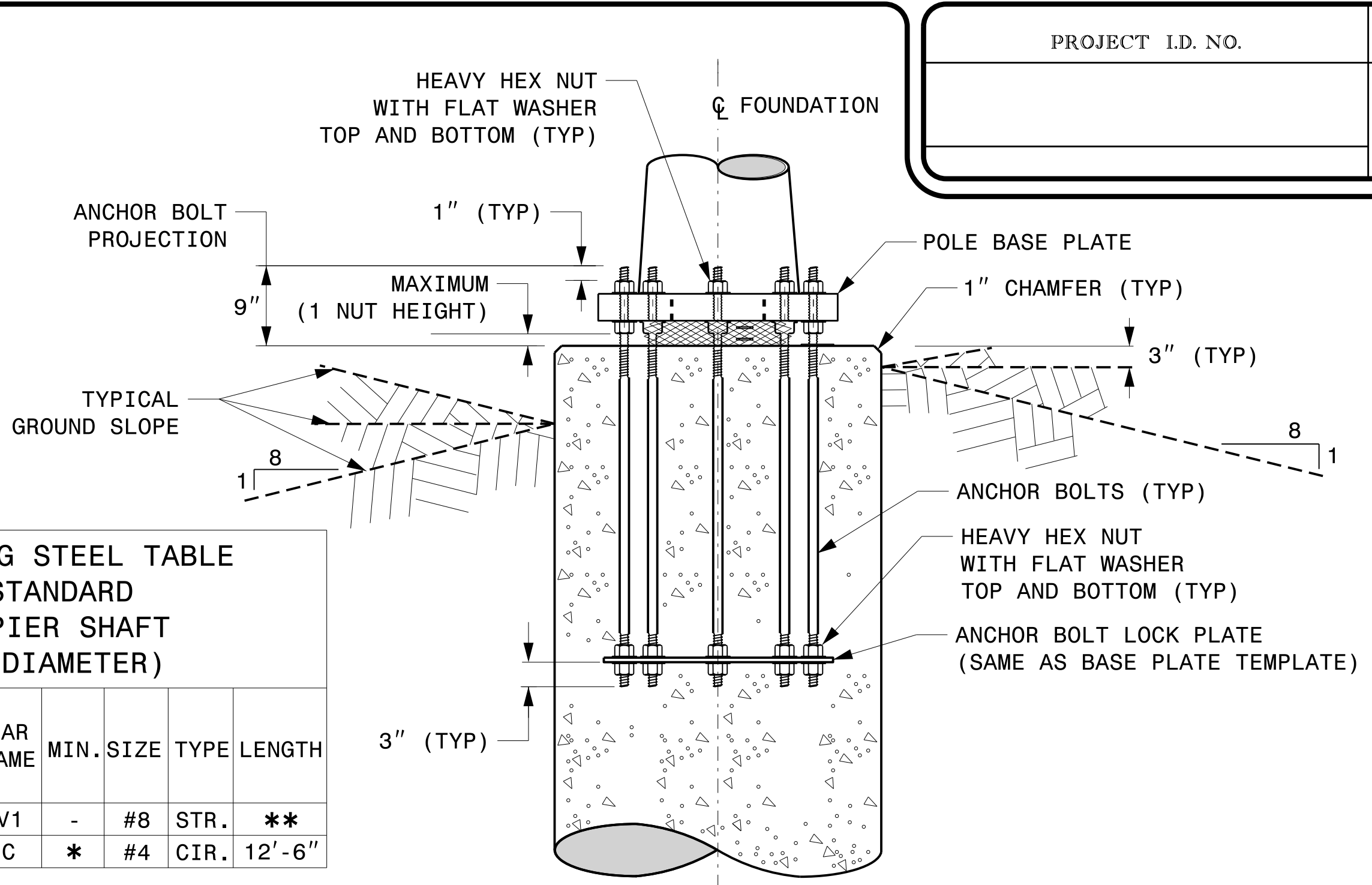
TYPICAL FOUNDATION CONDUIT DETAILS

GENERAL NOTES:

- IF ACTUAL SUBSURFACE CONDITIONS DIFFER SIGNIFICANTLY FROM BORING DATA, CONTACT THE ENGINEER BEFORE EXCAVATING OR PLACING CONCRETE.
- 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.
- 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.
- PROVIDE 2" TO 5" FOUNDATION PROJECTION ABOVE GROUND LEVEL, DEPENDING ON THE GROUND SLOPE.
- 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.
- CONSTRUCT FOUNDATIONS IN ACCORDANCE WITH NCDOT STANDARD PROVISIONS SP09 R005- FOUNDATIONS AND ANCHOR ROD ASSEMBLIES FOR METAL POLES. ALL APPLICABLE 2024 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](https://connect.ncdot.gov/resources/Specifications%20and%20Special%20Provisions.aspx)
- USE AIR ENTRAINED AA CONCRETE MIX WITH A COMPRESSION STRENGTH OF f'c=4500 psi (MIN) AFTER 28 DAYS.
- USE ASTM A615 GRADE 60 DEFORMED BARS FOR ALL REINFORCING STEEL. MAINTAIN AT LEAST 3" COVER ON ALL REINFORCEMENT.
- LOCATE IDENTIFICATION TAG ON TOP OF THE FOUNDATION, DIRECTLY ABOVE THE CONDUIT'S ENTRY POINT.
- PROVIDE TWO LAYERS OF 4 MESH GALVANIZED WELDED 23 GAUGE (0.025) 6" WIDE AROUND PIPES UNDER THE BASE PLATE AND SECURE IT WITH TIES IF NECESSARY.
- PREFERRED LOCATION FOR THE I.D. TAG IS AS SHOWN IN DETAIL-A: DIRECTLY ABOVE THE CONDUIT ENTERING THE FOUNDATION.

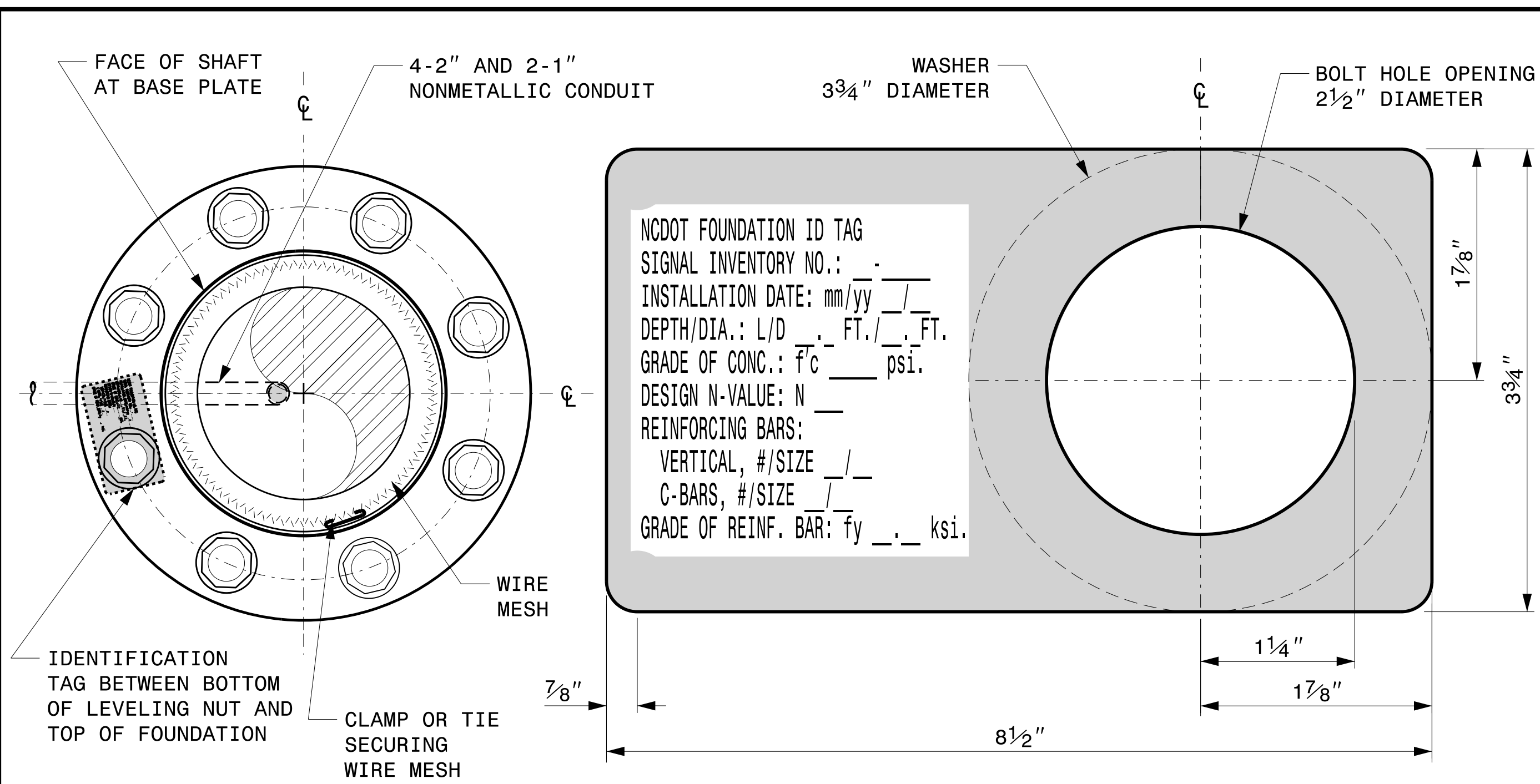
REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (4'-0" DIAMETER)						
"D" SHAFT DIAMETER	CONCRETE VOLUME (CU. YDS)	BAR NAME	MIN. SIZE	TYPE	LENGTH	
4'-0"	.465 X L	V1	-	#8	STR.	**
		C	*	#4	CIR.	12'-6"

* SEE NOTE 2
** SEE NOTE 3



TYPICAL FOUNDATION ANCHOR BOLT DETAILS

(REINFORCING CAGE NOT SHOWN FOR CLARITY)



CONCRETE FOUNDATION IDENTIFICATION TAG DETAILS

DETAIL-A

D = DIAMETER
L = LENGTH / DEPTH
mm = MONTH
yy = YEAR

Prepared In the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

Construction Details For Foundations
PLAN DATE: SEPTEMBER 2023 DESIGNED BY: K.C. DURIGON
PREPARED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR

SEAL
NORTH CAROLINA
PROFESSIONAL ENGINEER
SEAL 036626
KEVIN C. DURIGON
DocuSigned by:
Kevin Durigon
4B23DC79B3784DA

SCALE
0 NA
NONE

REVISIONS
INIT. DATE

DATE
09/23/2023

SOIL CONDITION

STANDARD STRAIN POLES						STANDARD FOUNDATIONS 48" Diameter Drilled Pier Length (L) – Feet							Reinforcement			
Case No.	Pole Height (Ft.)	Base Plate BC (In.)	Reactions at the Pole Base			Clay				Sand			Longitudinal		Stirrups	
			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.)
S26L1	26	22	2	9	210	19.5	12.5	9	6.5	15.5	14.5	13	8	12	4	12
S26L2	26	23	2	10	240	19.5	12	9	6.5	15.5	14.5	13	8	12	4	12
S26L3	26	25	2	11	260	20.5	12	10	8	16	15	13	8	12	4	12
S30L1	30	22	2	9	230	19	11	9	7	15.5	14	12.5	8	12	4	12
S30L2	30	23	2	10	270	20	12	10	8	16	14.5	13	8	12	4	12
S30L3	30	25	2	11	290	21	12	10	8	17	15	13.5	8	12	4	12
S30H1	30	25	3	13	355	23	13	11	9	18	16.5	14.5	8	12	4	12
S30H2	30	29	3	15	405	25	14	11	9	19	17.5	15.5	8	14	4	12
S30H3	30	29	3	16	430	26	15	12	9	20	18	16	8	14	4	6
S35L1	35	22	3	8	260	19.5	12	10	8	15.5	14.5	13	8	12	4	12
S35L2	35	23	3	10	300	21	12	10	8	16.5	15	13.5	8	12	4	12
S35L3	35	25	3	10	320	21.5	13	10	8	17	15.5	14	8	12	4	12
S35H1	35	25	3	12	390	23.5	14	11	9	18	17	15	8	14	4	12
S35H2	35	29	4	14	460	26	15	12	9	20	18	16	8	14	4	6
S35H3	35	29	4	16	495	28.5	15	13.5	10	21.5	19	17	8	14	4	6

48" DIAMETER FOUNDATION CONCRETE VOLUME (CUBIC YARDS) = (0.465) x DRILLED PIER LENGTH

PROJECT I.D. NO.	SHEET NO.
	Sig.M8

GENERAL NOTES:

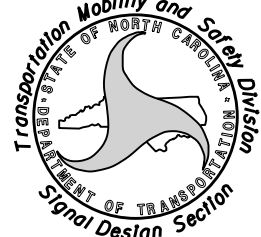
1. VALUES SHOWN IN THE "REACTIONS AT THE POLE BASE" COLUMN REPRESENT THE MINIMUM ACCEPTABLE CAPACITY ALLOWED FOR DESIGN USING A COMBINED FORCE RATIO (CFR) OF 1.00.
2. USE CHAIRS AND SPACERS TO MAINTAIN PROPER CLEARANCE.
3. FOR FOUNDATION, ALWAYS USE AIR-ENTRAINED CONCRETE MIX.

FOUNDATION SELECTION:

1. PERFORM A STANDARD PENETRATION TEST AT EACH PROPOSED FOUNDATION SITE TO DETERMINE "N" VALUE.
2. SELECT THE APPROPRIATE WIND ZONE FROM M1 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 MANUAL FOR DRILLED SHAFTS.

03-dct-2023 19:48
S:\1\SSM1\15 Signal\Signal Design Section\Structures\Drawings\2024 Merai Pole Strn Drawings for LBF02024 Sig.M8 Strn Strain Pole Found--Saturated Soil Condition.dgn
Kedur.fgm

Prepared In the Offices of:



750 N.Greenfield Pkwy,Garner,NC 27529

SCALE

0 1"=10' NA

NONE

Standard Strain Pole Foundation for All Soil Conditions

PLAN DATE: SEPTEMBER 2023

DESIGNED BY: K.C. DURIGON

PREPARED BY: K.C. DURIGON

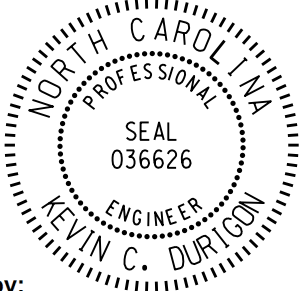
REVIEWED BY: D.C. SARKAR

REVISIONS

INIT.

DATE

SEAL



SEAL 036626

DocuSigned by:



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09/21/2023

DATE

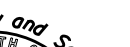
Standard Strain Pole Foundation – All Soil Conditions



Technical drawing showing a cross-section of a vertical pipe penetration through a base plate. The drawing includes the following labels and dimensions:

- T = WALL THICKNESS**: Dimension for the wall thickness of the pipe.
- SILICONE CAULKING**: Indicated by an arrow pointing to the sealant applied around the pipe.
- BACKING RING**: A ring used to support the pipe during welding.
- 3/8" (MAX)**: Dimension for the thickness of the backing ring.
- 1/4**: Dimension for the radius of the backing ring.
- FULL PEN. WELD**: Indicated by an arrow pointing to the weld joint.
- 45°**: Angle of the weld joint.
- R = .44" + T**: Dimension for the radius of the pipe.
- BASE PLATE**: The horizontal plate through which the pipe penetrates.
- OPENING FOR CONDUITS**: Indicated by an arrow pointing to the opening in the base plate.
- 1 1/2" MIN (TYP)**: Dimension for the minimum distance between the opening for conduits and the pipe.

CCTV CAMERA POLE
(NOT TO SCALE)

- | <p>Prepared In The Offices of:</p> <div style="text-align: center;">  <p>TRANSPORTATION MOBILITY AND SAFETY DIVISION
STATE OF NORTH CAROLINA
SEAL OF TRANSPORTATION
Sign Design Section</p> </div> <p>750 N. Greenfield Pkwy, Garner, NC 27529</p> | <h2 style="margin: 0;">Typical Fabrication Details</h2> <h3 style="margin: 0;">For</h3> <h2 style="margin: 0;">CCTV Poles</h2> | <p>SEAL</p> <div style="text-align: center;">  </div> | | | | | |
|---|--|--|---------------------------|---------------------------|------|---------------------------|---------------------------|
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| PLAN DATE: SEPTEMBER 2023 | DESIGNED BY: K.C. DURIGON | | | | | | |
| PREPARED BY: K.C. DURIGON | REVIEWED BY: C.F. ANDREWS | | | | | | |
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| | | <p>09/21/2023</p> <p>DATE</p> | | | | | |