Project: U-5746

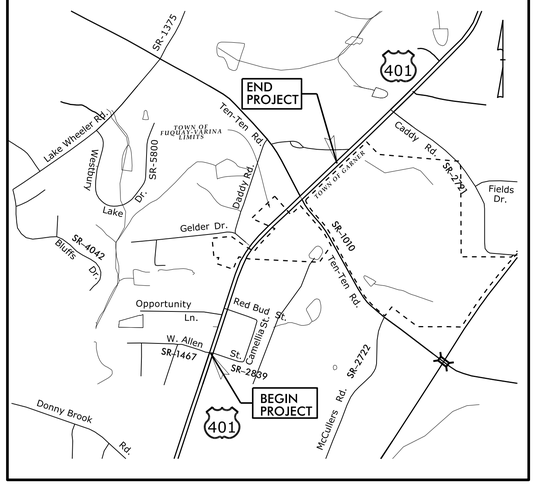
Contract: C204968

Project No.	Sheet No.
U-5746	Sig. 1.0

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

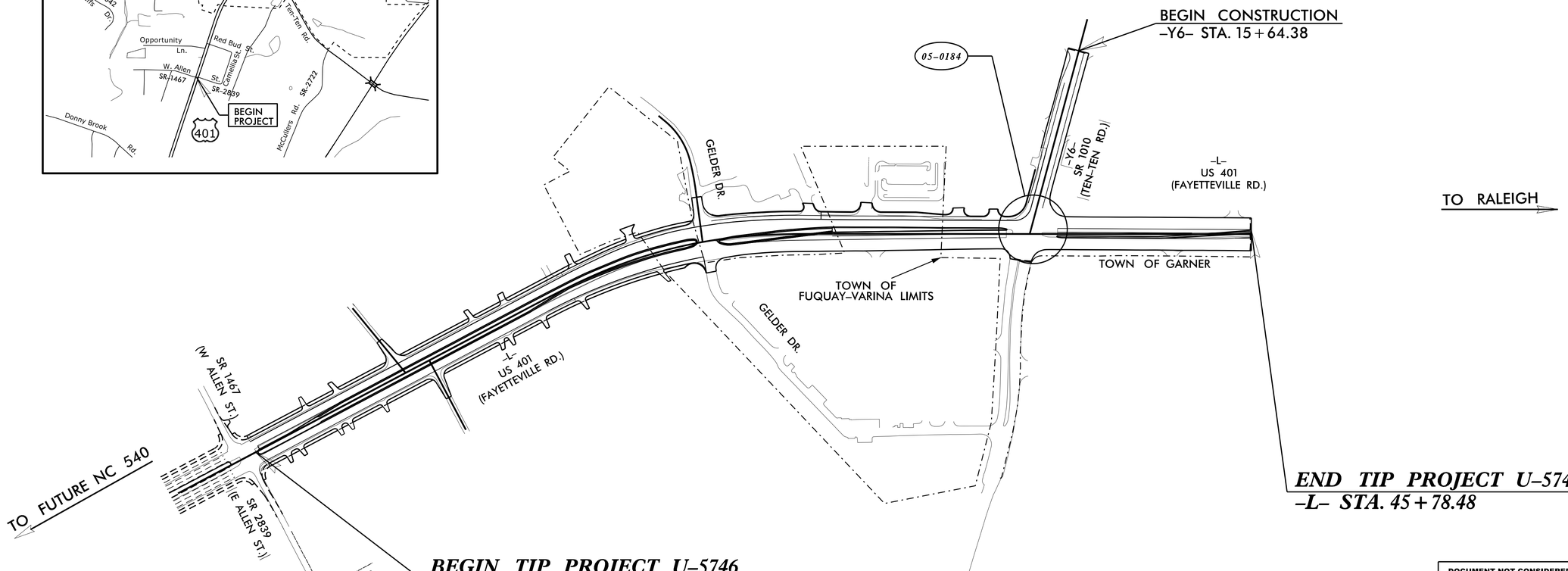
Vicinity Map



LOCATION: US 401 (FAYETTEVILLE ROAD) FROM SR 1467/
SR 2839 (ALLEN STREET) TO NORTH OF SR 1010 (TEN-TEN ROAD)

TYPE OF WORK: TRAFFIC SIGNALS

NAD 83/NA 2011



DOCUMENT NOT CONSIDERED FINAL
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Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.

Index of Plans

Sheet #	Inventory #	Description
Sig. 1.0	--------	Title Sheet
Sig. 2.0-4.5	05-0184	US 401 (Fayetteville Road) at SR 1010 (Ten-Ten Road)
Sig. M1A-M9	--------	Metal Pole Standards

LEGEND

(XX-XXXX) - SIGNAL INVENTORY NUMBER

TRANSPORTATION SYSTEMS
MANAGEMENT AND OPERATIONS UNIT

Contacts:

Robert J. Ziemba, PE
Central Region Signals Engineer

Ryan W. Hough, PE
Signal Equipment Project Engineer

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

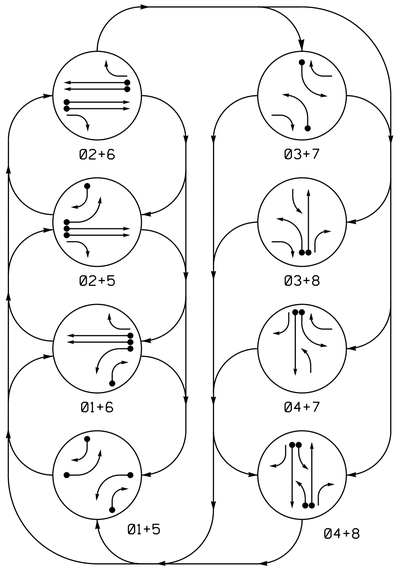
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
TSMO UNIT

750 N. Greenfield Parkway, Garner, NC 27529

PROJECT REFERENCE NO.	SHEET NO.
U-5746	Sig. 2.0

8 Phase
Fully Actuated
(US 401 Closed Loop System #29)
Signal System #: D05-09_Garner

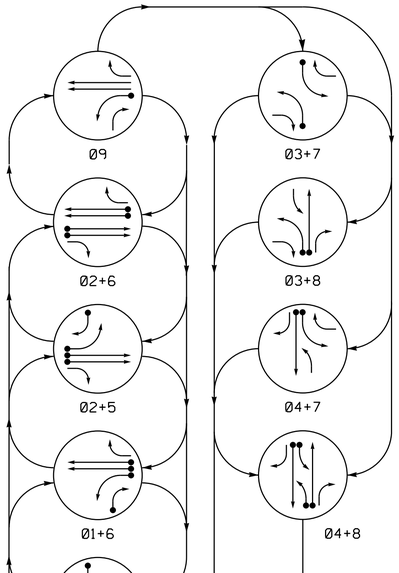
DEFAULT PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

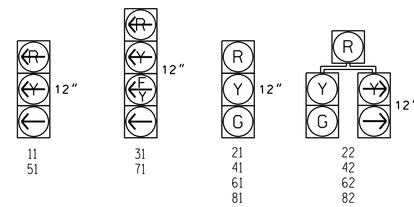
SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21	R	R	G	G	R	R	R	R	R
22	R	R	G	G	R/→	R/→	R	R	R
31	~~R~~	~~R~~	~~R~~	~~R~~	←	←	F Y	F Y	~~R~~
41	R	R	R	R	R	R	G	G	R
42	R/→	R	R/→	R	R	R	G	G	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
61	R	G	R	G	R	R	R	R	R
62	R	G	R	G	R/→	R	R/→	R	R
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 TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	09	03+7	03+8	04+7	04+8	FLASH
11	←	←	~~R~~	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
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~~	~~R~~	←	←	F Y	F Y	~~R~~
41	R	R	R	R	R	R	R	G	G	R
42	R/→	R	R/→	R	R	R	R	G	G	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
61	R	G	R	G	G	R	R	R	R	R
62	R	G	R	G	G	R/→	R	R/→	R	R
71	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	F Y	←	F Y	~~R~~
81	R	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R/→	R	G	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8	9	OL 7	OL 8
Walk *	–	–	–	–	–	–	–	–	–		
Ped Clear *	–	–	–	–	–	–	–	–	–		
Min Green	7	12	7	7	7	12	7	7	7		
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0	2.0		
Max 1 *	25	90	15	45	25	90	15	45	25		
Yellow Change	3.0	4.5	3.0	4.5	3.0	4.5	3.0	4.5	3.0	3.0	4.5
Red Clear	3.3	1.3	3.4	1.9	3.4	1.3	2.6	1.9	3.3	3.3	1.3
Added Initial *	–	1.5	–	–	–	1.5	–	–	–		
Maximum Initial *	–	34	–	–	–	34	–	–	–		
Time Before Reduction *	–	15	–	–	–	15	–	–	–		
Time To Reduce *	–	30	–	–	–	30	–	–	–		
Minimum Gap	–	3.0	–	–	–	3.0	–	–	–		
Advance Walk	–	–	–	–	–	–	–	–	–		
Non Lock Detector	X	–	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

LOOP	DETECTOR 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	-	1/9	-	-	X	-	X	-	-
1B	6X40	0	2-4-2	-	1	15.0	-	X	-	X	-	-
2A	6X6	300	5	-	2	-	-	X	X	X	-	-
2B	6X6	300	5	-	2	-	-	X	X	X	-	-
3A	6X40	0	2-4-2	-	3	15.0	-	X	-	X	-	-
					8	-	-	X	-	X	-	-
4A	6X40	0	2-4-2	X	4	-	-	X	-	X	-	-
5A	6X40	0	2-4-2	-	5	-	-	X	-	X	-	-
5B	6X40	0	2-4-2	X	5	15.0	-	X	-	X	-	-
6A	6X6	300	5	-	6	-	-	X	-	X	-	-
6B	6X6	300	5	-	6	-	-	X	-	X	-	-
7A	6X40	0	2-4-2	X	7	15.0	-	X	-	X	-	-
					4	3.0	-	X	-	X	-	-
8A	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-
S3	6X6	+215	4	-	-	-	-	X	-	X	-	-
S4	6X6	+215	4	-	-	-	-	X	-	X	-	-

NOTES

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

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	→
MVA	Pedestrian Barricade	MVA
▭	Construction Zone	▭
•—•	Construction Zone Drums	•—•
Ⓐ	U-Turn "MUST YIELD" Sign (R3-27)	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	Right Arrow "ONLY" Sign (R3-5R) "Right Lane Must Turn Right" Sign (R3-7)	Ⓒ
Ⓓ		Ⓓ

Signal Upgrade -
Temporary Design 1 (TMP Phase 1 Step 2)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 401 (Fayetteville Rd.)
at
SR 1010 (Ten-Ten Rd.)

Division 5 Wake County Fuquay-Varina

PLAN DATE: July 2024 REVIEWED BY:

PREPARED BY: I.O. Umozurike REVIEWED BY:

SCALE 0 50 1"=50'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

DocuSigned by: Robert J. Ziemba 08/12/2024
ORIGINAL SIGNED DATE

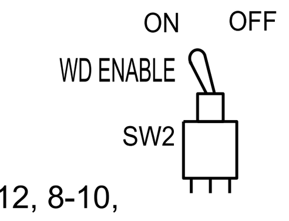
SIG. INVENTORY NO. 05-0184T1

12-AUG-2024 11:02
I:\STIP\R-5746\Signals\Signal Design Section\Central Region\Div 5\U-5746_MAXTIME Plans_20240812.dgn
USER: rziemba

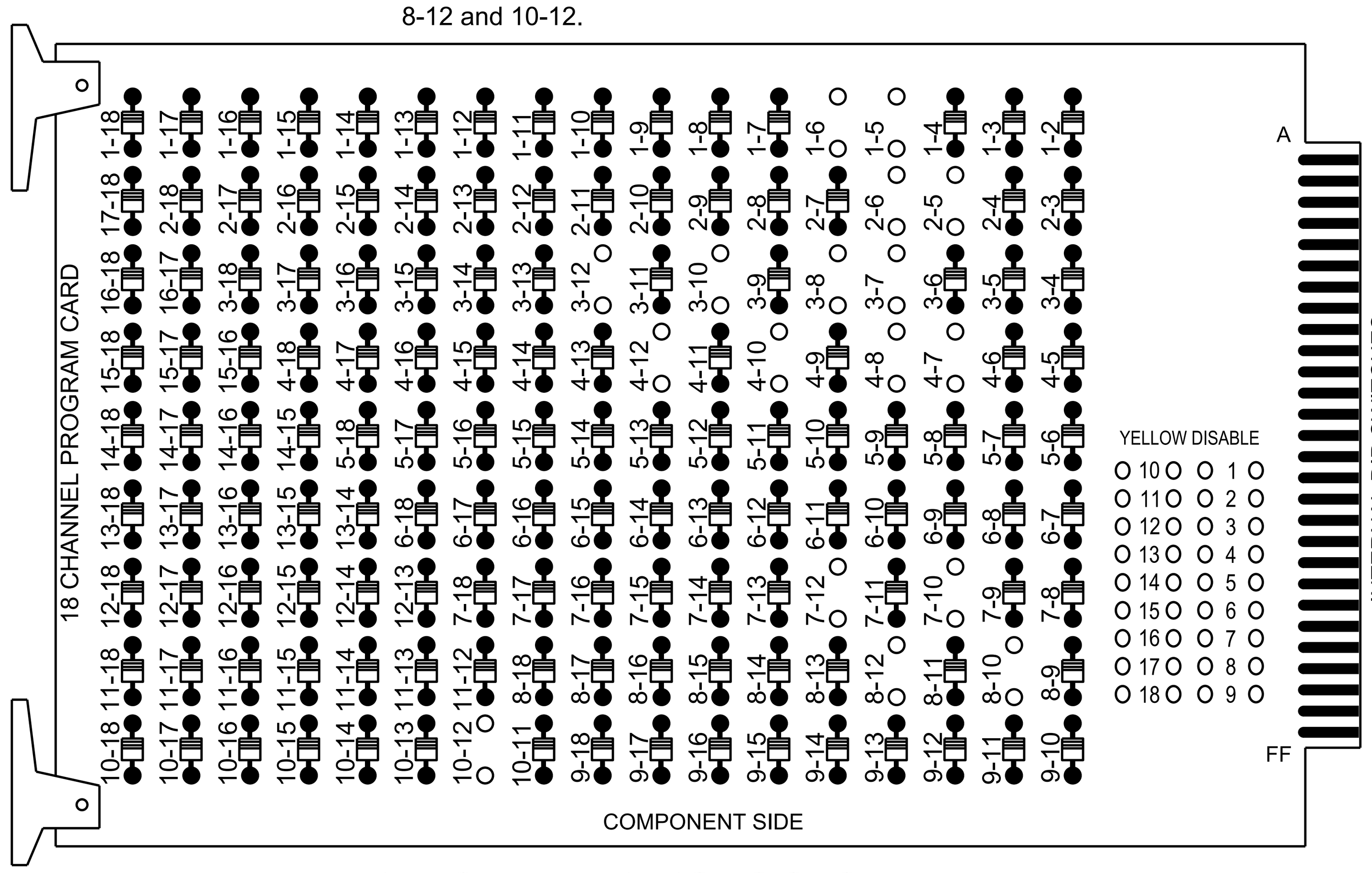
PROJECT REFERENCE NO.	SHEET NO.
U-5746	Sig. 2.1

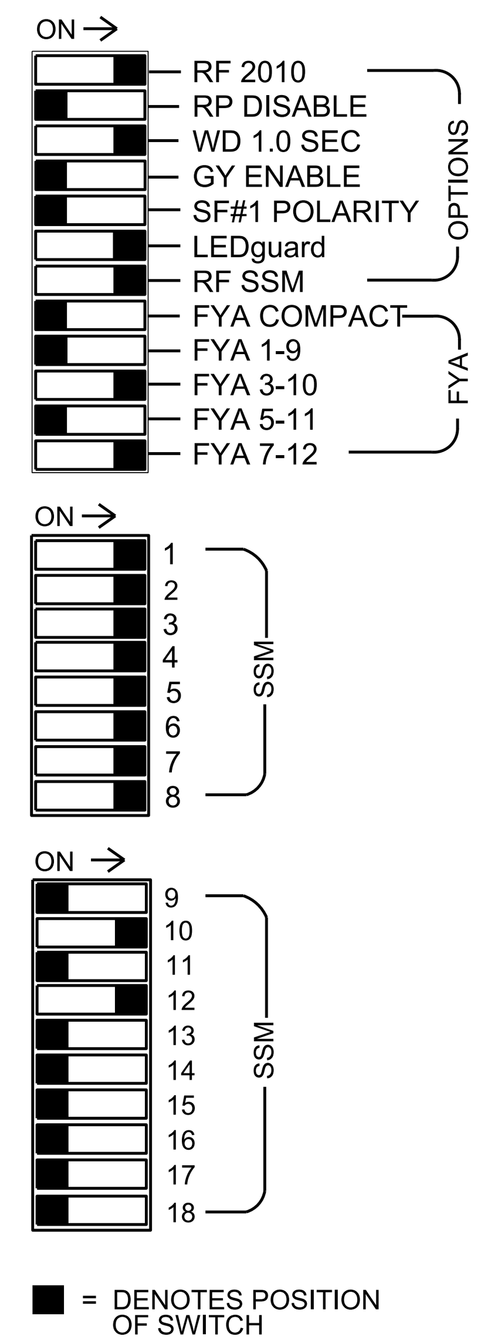
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE DIODE JUMPERS 1-5, 1-6, 2-5, 2-6, 3-7, 3-8, 3-10, 3-12, 4-7, 4-8, 4-10, 4-12, 7-10, 7-12, 8-10, 8-12 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. Integrate monitor with Ethernet network in cabinet.

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 (US 401 Closed Loop System #29) Signal System #: D05-09_Garner.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet...332 w/ Aux
Software..Q-Free MAXTIME
Cabinet Mount.....................................18 With Aux. Output File
Load Switches Used...........................S1, S2, S4, S5, S7, S8, S10, S11, AUX S2, AUX S5
Phases Used..1, 2, 3, 4, 5, 6, 7, 8, *9
Overlap "1"...NOT USED
Overlap "2"...*
Overlap "3"...NOT USED
Overlap "4"...*
Overlap "5"...NOT USED
Overlap "6"...NOT USED
Overlap "7"...*
Overlap "8"...*

*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	OL7		2	2 PED	3		4	4 PED	5		OL8	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	NU	31★	NU	NU	71★	NU
RED			128		*		101				134		*		107							
YELLOW			129				102				135				108							
GREEN			130				103				136				109							
RED ARROW	125									131								A124			A101	
YELLOW ARROW	126	126			117				132	132			123					A125			A102	
FLASHING YELLOW ARROW																		A126			A103	
GREEN ARROW	127	127			118	118			133	133			124	124								

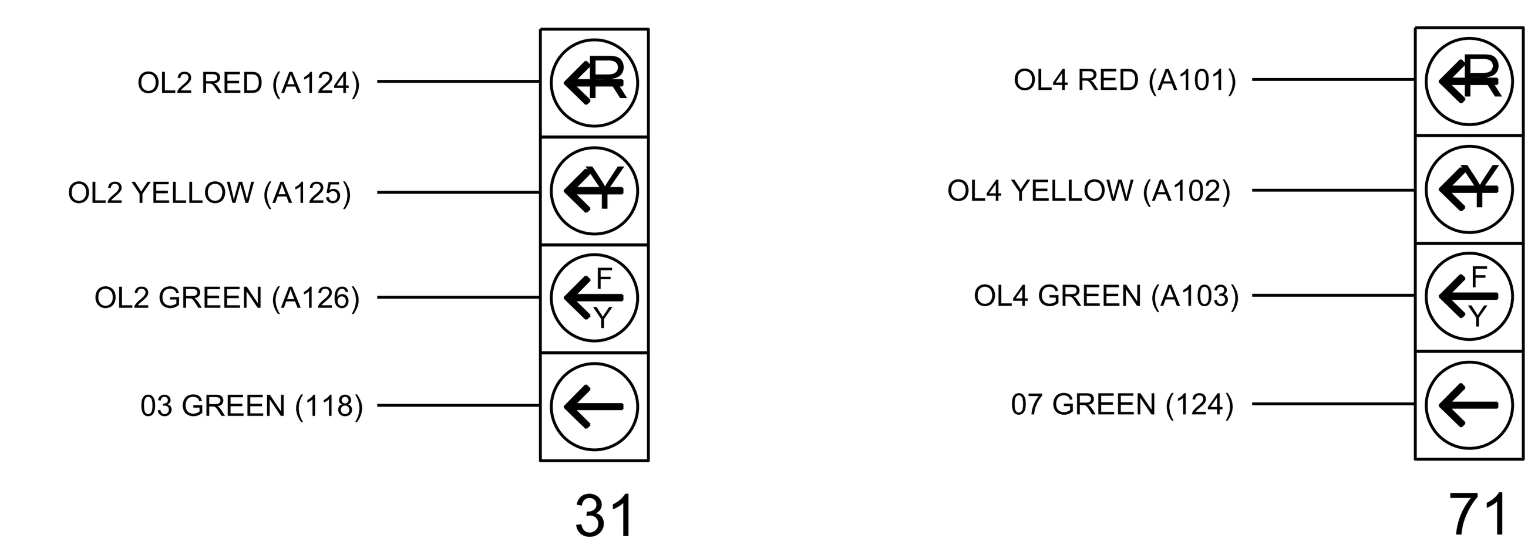
NU = Not Used

*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	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L	NOT USED	NOT USED	Ø 2 2B		NOT USED	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	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L	NOT USED	NOT USED	Ø 6 6B		NOT USED	NOT USED			SYS. DET. S4					

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	1/9			X		X	
1B	TB2-5,6	I2U	39	1	2	1	15		X		X	
2A	TB2-9,10	I3U	63	29	4	2			X	X	X	
2B	TB2-11,12	I3L	76	42	5	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	
5A	TB3-1,2	J1U	55	17	15	5			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	
6B	TB3-11,12	J3L	77	43	19	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	
*S3	TB7-9,10	J9U	59	21	27	SYS						
*S4	TB7-11,12	J9L	61	23	28	SYS						

*System detector only. Remove any assigned vehicle phase.

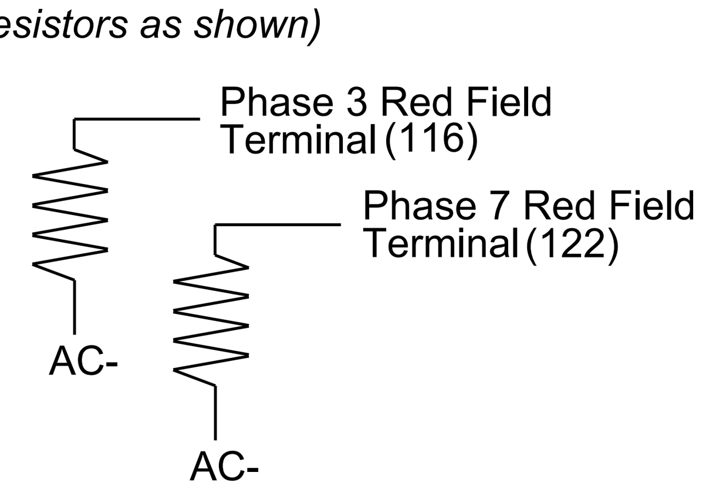
INPUT FILE POSITION LEGEND: J2L

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)



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0184T1
DESIGNED: July 2024
SEALED: 8-12-24
REVISED: N/A

Electrical Detail - Sheet 1 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
ITS & Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 401 (Fayetteville Rd.)
at
SR 1010 (Ten-Ten Rd.)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: August 2024 | REVIEWED BY: -
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

Signed by: Ryan W. Hough 08/13/2024
430320FAA2654C3...
DATE

SIG. INVENTORY NO. 05-0184T1

13-AUG-2024 13:33
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JTPeterson

MAXTIME OVERLAP PROGRAMMING DETAIL

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

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	3	4	7	8
Type	FYA 4 - Section	FYA 4 - Section	Normal	Normal
Included Phases	4	8	1,9	6,9
Modifier Phases	3	7	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	3.0	4.5
Trail Red	0.0	0.0	4.3	2.2

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Sequence 2
*	2

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

SEQUENCE DETAIL

Front Panel
Main Menu >Controller >Sequence & Phs Config>Sequences

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b
2	5,6,a,7,8,b

Sequence 2

Ring	Sequence Data
1	1,2,a,9,b,3,4,c
2	5,6,a,b,7,8,c

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: 05-0184T1
DESIGNED: July 2024
SEALED: 8-12-24
REVISED: N/A

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 401 (Fayetteville Rd.)
at
SR 1010 (Ten-Ten Rd.)

Division 5 | Wake County | Fuquay-Varina

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

PLAN DATE:	August 2024	REVIEWED BY:	-
PREPARED BY:	James Peterson	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

Signed by:
Ryan W. Hough 08/13/2024
430320FAA2654C3...
DATE

SIG. INVENTORY NO. 05-0184T1

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JTPeterson

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

PHASING	SEQUENCE
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN

SEQUENCE 2 PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SEQUENCE 2: Add phase 9 to sequence.

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channel Configuration

Channel Configuration

NOTICE OVERLAP 7 ASSIGNED TO CHANNEL 1

NOTICE OVERLAP 8 ASSIGNED TO CHANNEL 5

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Overlap	7		X	X	1
2	Phase Vehicle	2		X		2
3	Phase Vehicle	3		X	X	3
4	Phase Vehicle	4		X		4
5	Phase Vehicle	5		X		5
6	Overlap	8		X	X	6
7	Phase Vehicle	7		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1		X	X	9
10	Overlap	2		X	X	10
11	Overlap	3		X		11
12	Overlap	4		X		12
13	Phase Ped	2				13
14	Phase Ped	4				14
15	Phase Ped	6				15
16	Phase Ped	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0184T1
DESIGNED: July 2024
SEALED: 8-12-24
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
ITS & Signals Management Section
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
750 N. Greenfield Pkwy, Garner, NC 27529

US 401 (Fayetteville Rd.)
at
SR 1010 (Ten-Ten Rd.)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: August 2024	REVIEWED BY: -
PREPARED BY: James Peterson	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

Signed by: Ryan W. Hough 08/13/2024
430320EAA2654C3
DATE

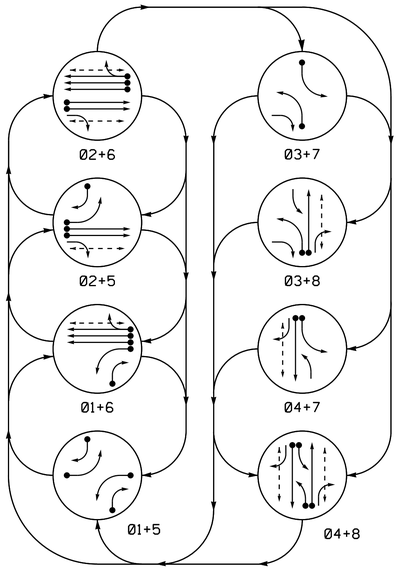
SIG. INVENTORY NO. 05-0184T1

13-AUG-2024 13:38
S:*ITS&SU*ITS Signals*Workgroups*Sig Man*Peterson*050184_sm_ele_xxx.dgn
JTPeterson

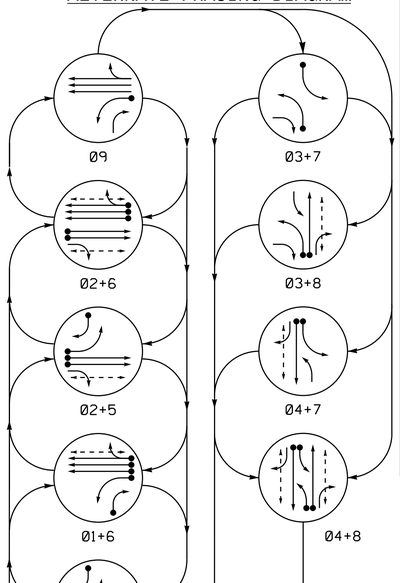
PROJECT REFERENCE NO.	SHEET NO.
U-5746	Sig. 3.0

8 Phase
Fully Actuated
(US 401 Closed Loop System #29)
Signal System #: D05-09_Garner

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	FLASH
12	←	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21	R	R	G	G	R	R	R	R	R
22	R	R	G	G	R→	R↘	R	R	R
31	~~R~~	~~R~~	~~R~~	~~R~~	←	←	~~FY~~	~~FY~~	~~R~~
41, 42	R	R	R	R	R	R	G	G	R
43	→	R	→	R	R	R	~~FY~~	~~FY~~	R
52	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
61, 62, 63	R	G	R	G	R	R	R	R	R
71	~~R~~	~~R~~	~~R~~	~~R~~	←	←	~~FY~~	~~FY~~	~~R~~
81, 82	R	R	R	R	R	G	R	G	R
83	→	→	R	R	R	~~FY~~	R	~~FY~~	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

ALTERNATE PHASING TABLE OF OPERATION

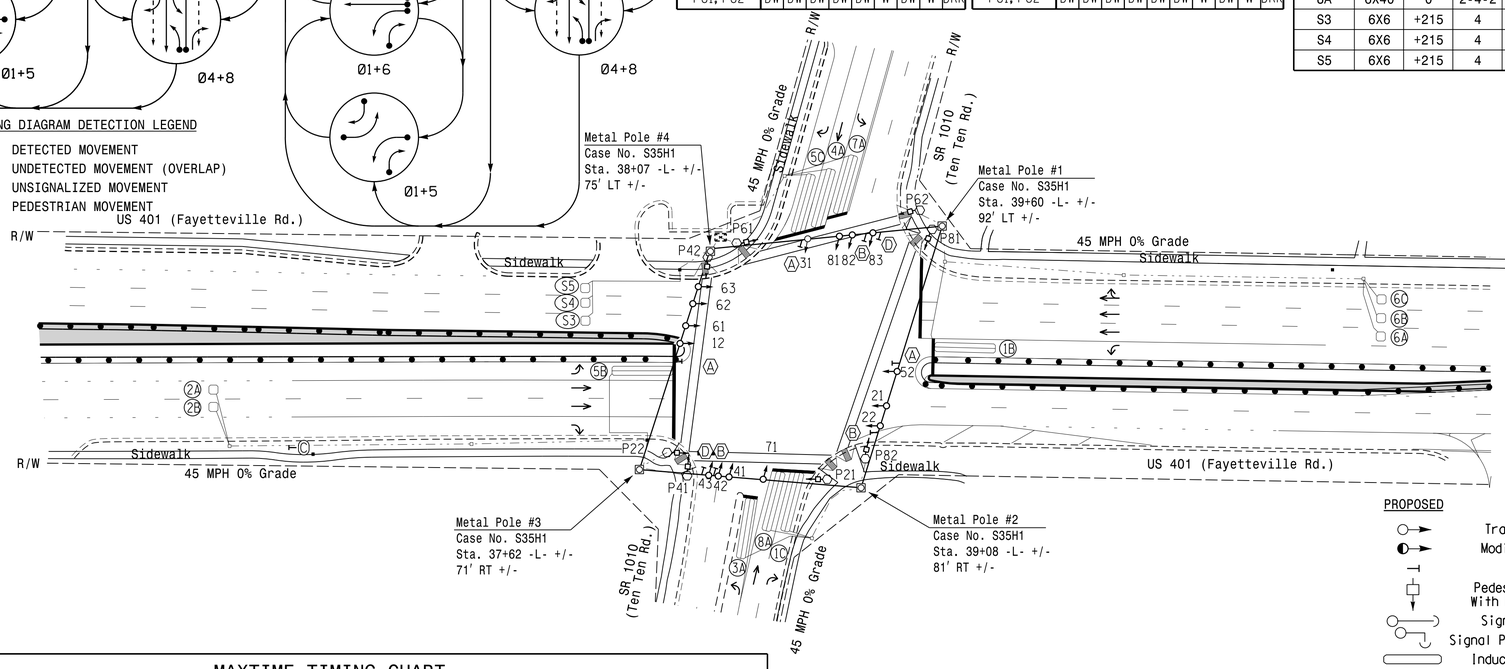
SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	09	03+7	03+8	04+7	04+8	FLASH
12	←	←	~~R~~	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
21	R	R	G	G	R	R	R	R	R	R
22	R	R	G	G	R	R→	R↘	R	R	R
31	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	←	~~FY~~	~~FY~~	~~R~~
41, 42	R	R	R	R	R	R	R	G	G	R
43	→	R	→	R	R	R	R	~~FY~~	~~FY~~	R
52	←	~~R~~	←	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
61, 62, 63	R	G	R	G	G	R	R	R	R	R
71	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	←	←	~~FY~~	~~FY~~	~~R~~
81, 82	R	R	R	R	R	R	G	R	G	R
83	→	→	R	R	→	R	~~FY~~	R	~~FY~~	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	DW	W	DW	W	DRK

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
1B	6X40	0	2-4-2	X	1/9	-	-	X	-	X	-	-
1C	6X40	0	2-4-2	X	1	15.0	-	X	-	X	-	X
2A	6X6	300	5	X	2	-	-	X	X	X	-	-
2B	6X6	300	5	X	2	-	-	X	X	X	-	-
3A	6X40	0	2-4-2	X	3	15.0	-	X	-	X	-	-
					8	-	-	X	-	X	-	-
4A	6X40	0	2-4-2	X	4	-	-	X	-	X	-	-
5B	6X40	0	2-4-2	X	5	-	-	X	-	X	-	-
5C	6X40	0	2-4-2	X	5	15.0	-	X	-	X	-	X
6A	6X6	300	5	X	6	-	-	X	-	X	-	-
6B	6X6	300	5	X	6	-	-	X	-	X	-	-
6C	6X6	300	5	X	6	-	-	X	-	X	-	X
7A	6X40	0	2-4-2	X	7	15.0	-	X	-	X	-	-
					4	3.0	-	X	-	X	-	-
8A	6X40	0	2-4-2	X	8	-	-	X	-	X	-	-
S3	6X6	+215	4	X	-	-	-	X	-	X	-	-
S4	6X6	+215	4	X	-	-	-	X	-	X	-	-
S5	6X6	+215	4	X	-	-	-	X	-	X	-	X

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
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. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "DON'T WALK" time only.
8. 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. To provide a leading pedestrian interval on phase 4, program FYA heads numbered 31 and 43 to delay for 7 seconds after the start of phase 4 WALK interval. See Electrical Details for Programming.
11. To provide a leading pedestrian interval on phase 8, program FYA heads numbered 71 and 83 to delay for 7 seconds aafetr the start of phase 8 WALK interval. See Electrical Details for Programming.



MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8	9	OL 7	OL 8
Walk *	–	14	–	14	–	14	–	14	–		
Ped Clear *	–	23	–	32	–	26	–	37	–		
Min Green	7	12	7	7	7	12	7	7	7		
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0	2.0		
Max 1 *	25	90	15	45	25	90	15	45	25		
Yellow Change	3.0	4.5	3.0	4.5	3.0	4.5	3.0	4.5	3.0	3.0	4.5
Red Clear	4.3	2.2	3.5	2.6	4.2	2.2	3.4	2.6	4.3	4.3	2.2
Added Initial *	–	1.5	–	–	–	1.5	–	–	–		
Maximum Initial *	–	34	–	–	–	34	–	–	–		
Time Before Reduction *	–	15	–	–	–	15	–	–	–		
Time To Reduce *	–	30	–	–	–	30	–	–	–		
Minimum Gap	–	3.0	–	–	–	3.0	–	–	–		
Advance Walk	–	7	–	**	–	7	–	***	–		
Non Lock Detector	X	–	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.
** See Note 10.
*** See Note 11.

LEGEND

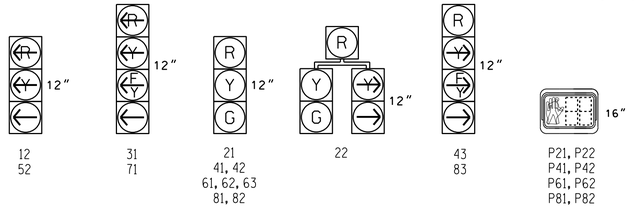
PROPOSED		EXISTING
○→	Traffic Signal Head	●→
◐→	Modified Signal Head	N/A
⊣	Sign	⊣
⊓↓	Pedestrian Signal Head With Push Button & Sign	■↓
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	▨
□	Junction Box	■
·····	2-in Underground Conduit	·····
N/A	Right of Way	-----
→	Directional Arrow	→
⬡	Type II Signal Pedestal	⬢
▣	Metal Strain Pole	■
▭	Construction Zone	▭
●●	Construction Zone Drums	●●

SIGNS

PROPOSED		EXISTING
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
Ⓒ	"Right Lane Must Turn Right" Sign (R3-7)	Ⓒ
Ⓓ	"RIGHT TURN SIGNAL" Sign (R10-10R)	Ⓓ

SIGNAL FACE I.D.

All Heads L.E.D.



Signal Upgrade -
Temporary Design 2 (TMP Phase 2)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 401 (Fayetteville Rd.)
at
SR 1010 (Ten-Ten Rd.)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: July 2024 | REVIEWED BY:
PREPARED BY: I.O. Umozurike | REVIEWED BY:

SCALE 0 50 1"=50'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA
Docusigned by: Robert J. Ziemba
08/12/2024
SIGNATURE DATE

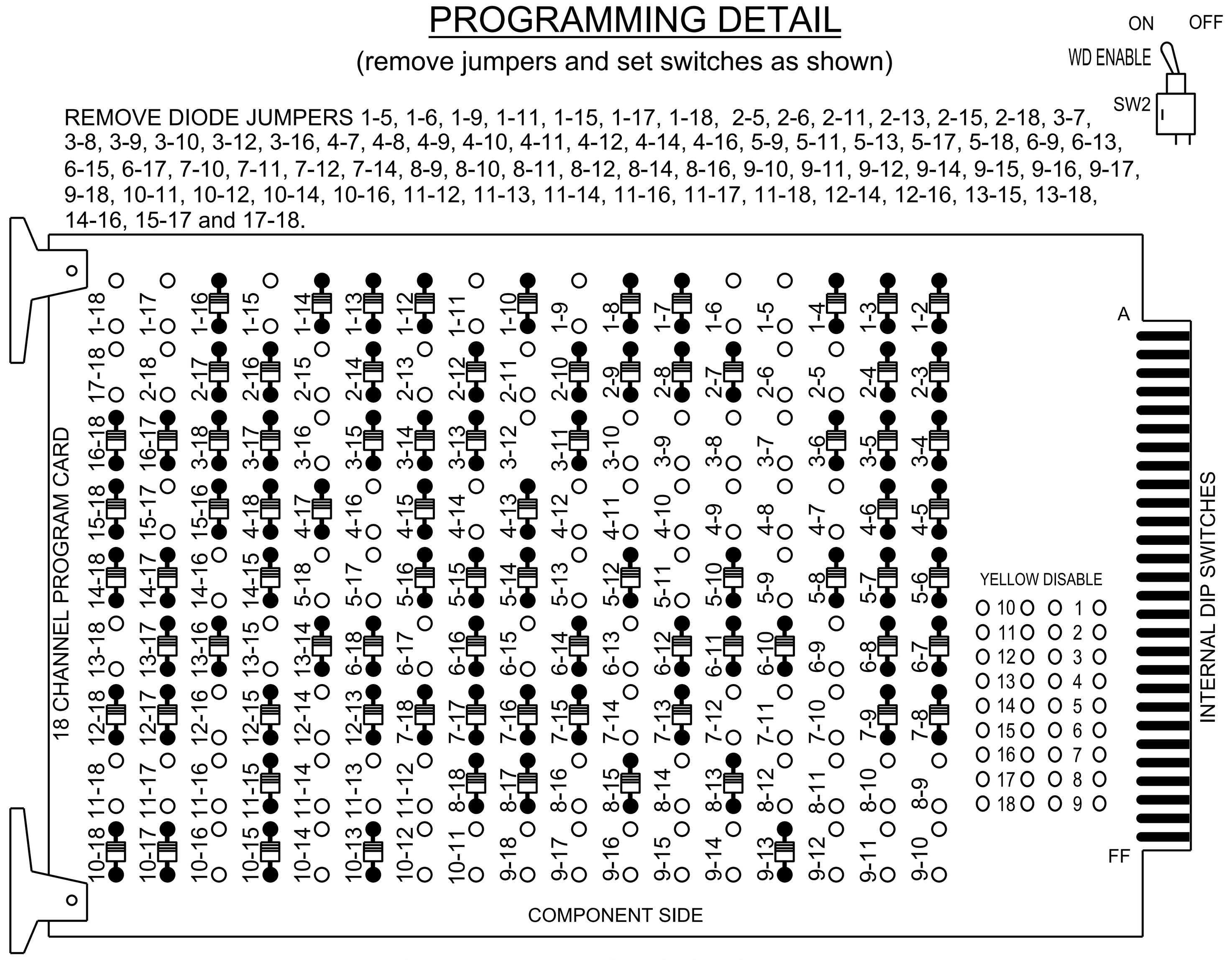
SIG. INVENTORY NO. 05-0184T2

12-AUG-2024 10:53
S:\Active\5018472\TIS Signals\Signal Design Section\Central Region\Div 5\U-5746\MAXTIME Plans\D5018472_sig_dsn_20240812.dgn
rziemba

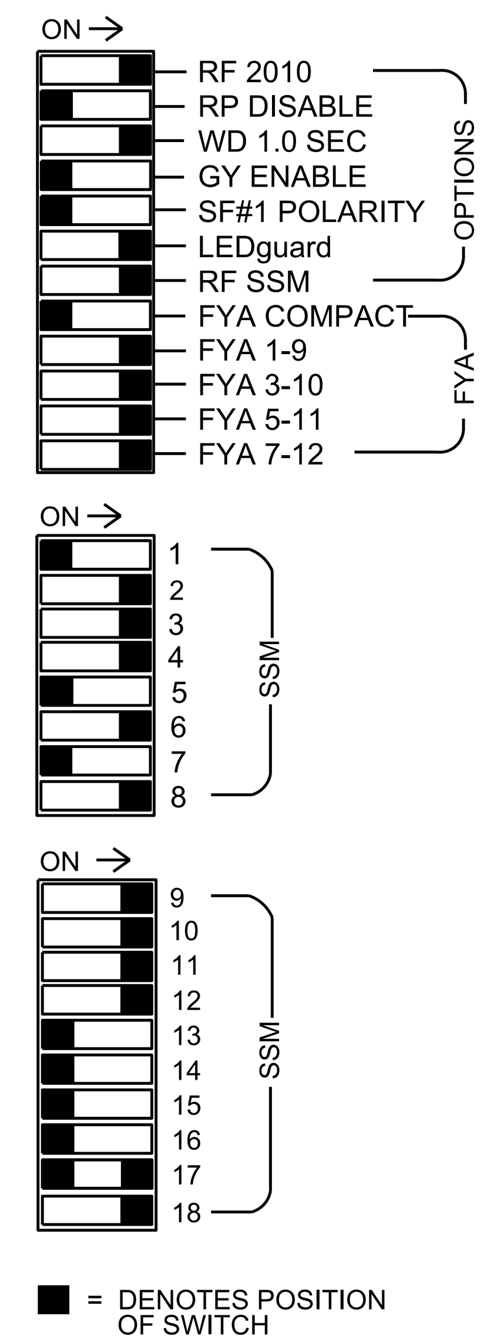
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 1-17, 1-18, 2-5, 2-6, 2-11, 2-13, 2-15, 2-18, 3-7, 3-8, 3-9, 3-10, 3-12, 3-16, 4-7, 4-8, 4-9, 4-10, 4-11, 4-12, 4-14, 4-16, 5-9, 5-11, 5-13, 5-17, 5-18, 6-9, 6-13, 6-15, 6-17, 7-10, 7-11, 7-12, 7-14, 8-9, 8-10, 8-11, 8-12, 8-14, 8-16, 9-10, 9-11, 9-12, 9-14, 9-15, 9-16, 9-17, 9-18, 10-11, 10-12, 10-14, 10-16, 11-12, 11-13, 11-14, 11-16, 11-17, 11-18, 12-14, 12-16, 13-15, 13-18, 14-16, 15-17 and 17-18.



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. Integrate monitor with Ethernet network in cabinet.

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 (US 401 Closed Loop System #29) Signal System #: D05-09_Garner.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet..332 w/ Aux
Software...Q-Free MAXTIME
Cabinet Mount....................................18 With Aux. Output File
Load Switches Used...........................S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, AUX S1, AUX S2, AUX S3, AUX S4, AUX S5, AUX S6
Phases Used......................................1, 2, 3, 4, 5, 6, 7, 8, *9
Overlap "1"..*
Overlap "2"..*
Overlap "3"..*
Overlap "4"..*
Overlap "5"..*
Overlap "6"..*
Overlap "7"..*
Overlap "8"..*

*See overlap programming detail on Sheet 2.

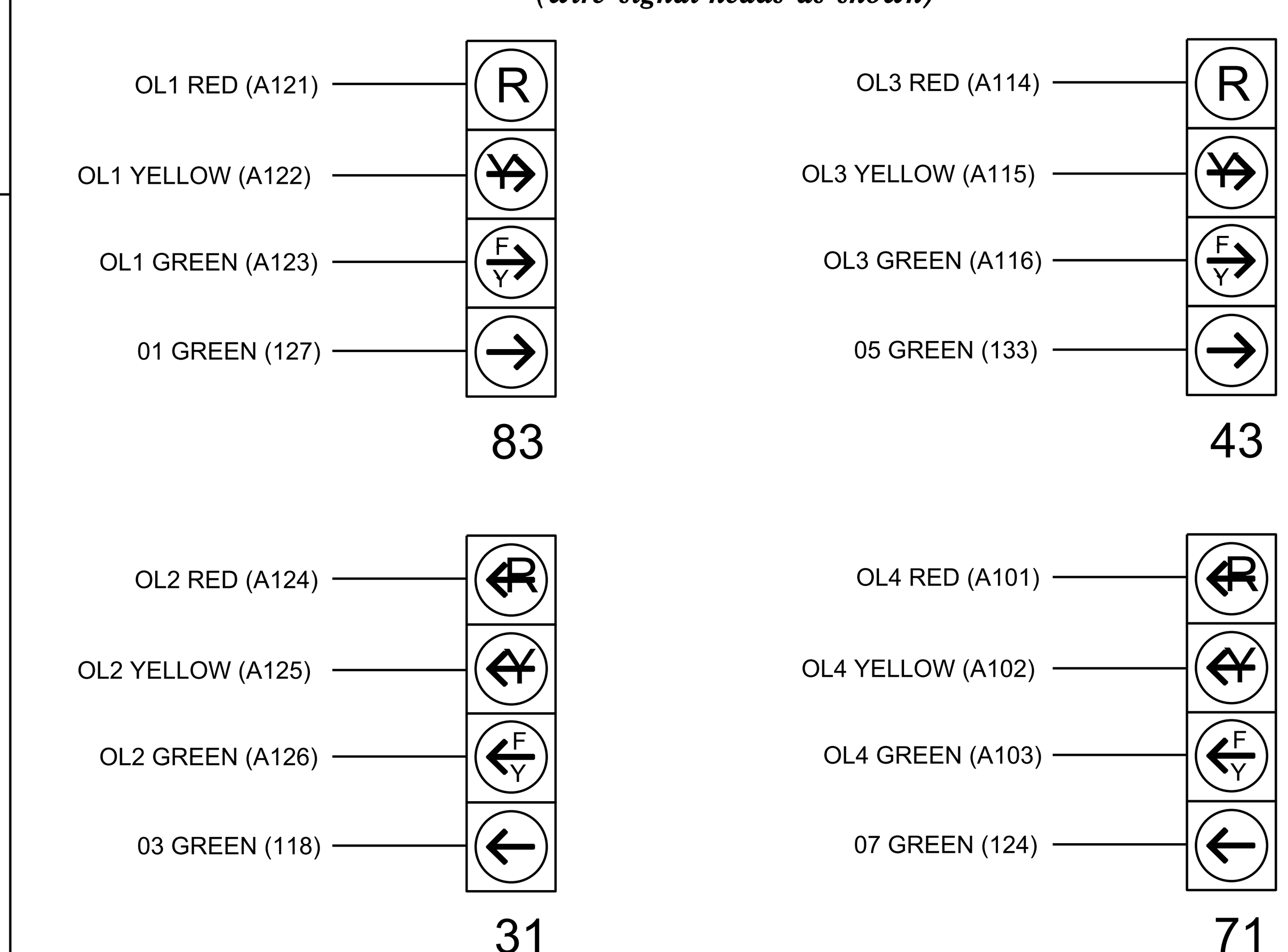
SIGNAL HEAD HOOK-UP CHART

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	OL7	2	2 PED	3		4	4 PED	5	OL8	6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	OL6
SIGNAL HEAD NO.	83★	21,22	P21, P22	22	31★	41,42	P41, P42	43★	61,62 63	P61, P62	71★	81,82	P81, P82	83★	31★	12	43★	71★	52
RED		128		*		101			134			107		A121			A114		
YELLOW	*	129				102		*	135		*	108							
GREEN		130				103			136			109							
RED ARROW															A124	A111		A101	A104
YELLOW ARROW				117										A122	A125	A112	A115	A102	A105
FLASHING YELLOW ARROW														A123	A126		A116	A103	
GREEN ARROW	127			118	118			133			124					A113			A106
(Don't Walk hand)			113				104			119			110						
(Walk pedestrian)			115				106			121			112						

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	SLOT EMPTY	Ø 1 1B	Ø 2 2A	SLOT EMPTY	Ø 3 3A	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S5	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		Ø 1 1C	Ø 2 2B		NOT USED	NOT USED			NOT USED					ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø 5 5B	Ø 6 6A	Ø 6 6C	Ø 7 7A	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø 5 5C	Ø 6 6B	NOT USED	NOT USED	NOT USED			SYS. DET. S4					

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
1B	TB2-5,6	I2U	39	1	2	1/9			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	
2B	TB2-11,12	I3L	76	42	5	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	
*S5	TB6-9,10	I9U	60	22	13	SYS			X		X	
5B	TB3-5,6	J2U	40	2	16	5			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	
6B	TB3-11,12	J3L	77	43	19	6			X	X	X	
6C	TB5-1,2	J4U	48	10	20	6			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	
*S3	TB7-9,10	J9U	59	21	27	SYS						
*S4	TB7-11,12	J9L	61	23	28	SYS						

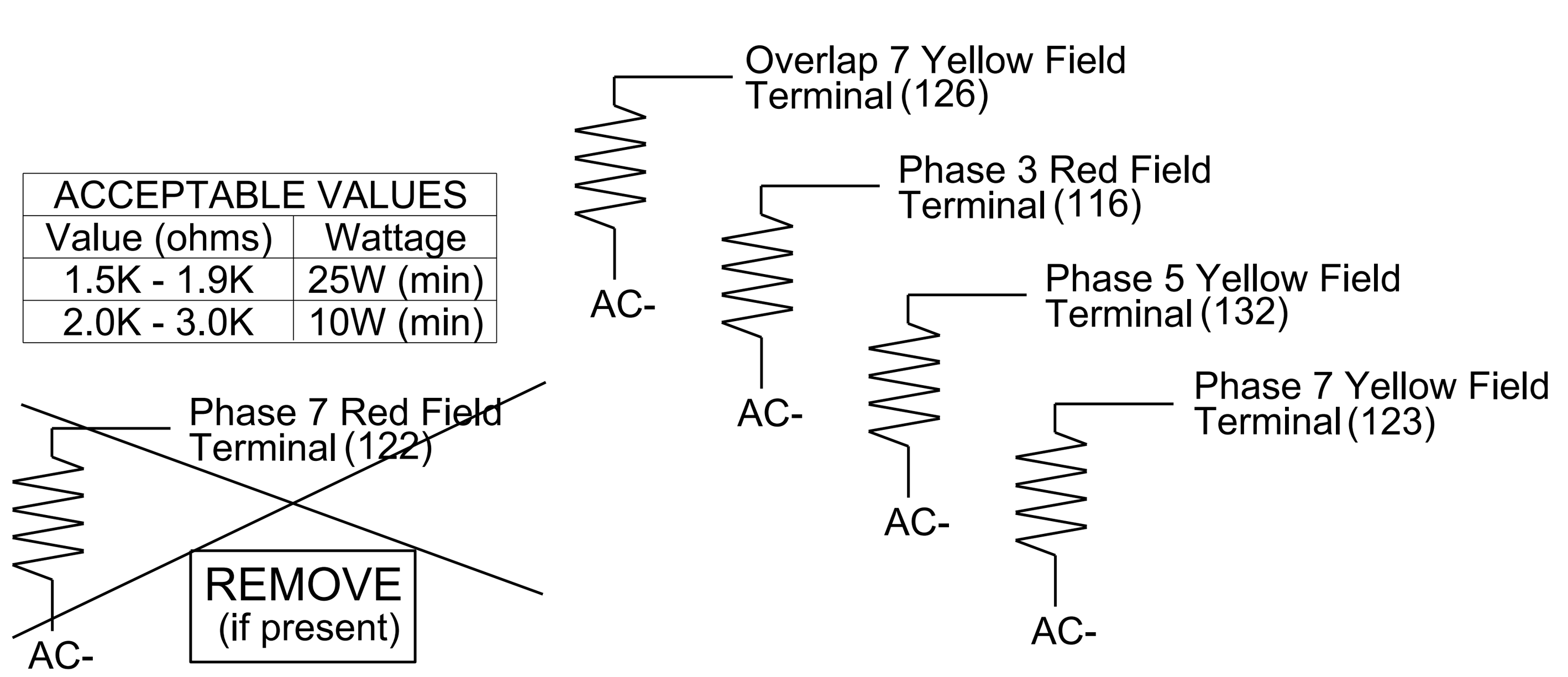
*System detector only. Remove any assigned vehicle phase.

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)



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0184T2
DESIGNED: July 2024
SEALED: 8-12-24
REVISED: N/A

Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 401 (Fayetteville Rd.)
at
SR 1010 (Ten-Ten Rd.)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: August 2024 | 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

Signed by: Ryan W. Hough 08/13/2024
430320FAA2654C3
DATE

SIG. INVENTORY NO. 05-0184T2

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	5	6	7	8
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal	Normal	Normal	Normal
Included Phases	8	4	4	8	1,9	5	1,9	6,9
Modifier Phases	-	3	5	7	-	-	-	-
Modifier Overlaps	7	-	-	-	-	-	-	-
Trail Green	0	0	0	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0	0.0	3.0	4.5
Trail Red	0.0	0.0	0.0	0.0	0.0	0.0	4.3	2.2
FYA Ped Delay	7	7	7	7	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	Sequence
*	2

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

SEQUENCE DETAIL

Front Panel
Main Menu >Controller >Sequence & Phs Config>Sequences

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b
2	5,6,a,7,8,b

Sequence 2

Ring	Sequence Data
1	1,2,a,9,b,3,4,c
2	5,6,a,b,7,8,c

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: 05-0184T2
DESIGNED: July 2024
SEALED: 8-12-24
REVISED: N/A

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

US 401 (Fayetteville Rd.)
at
SR 1010 (Ten-Ten Rd.)

Division 5 Wake County Fuquay-Varina

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

PLAN DATE: August 2024	REVIEWED BY: -
PREPARED BY: James Peterson	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

Signed by: Ryan W. Hough 08/13/2024
430320FAA2654C3...
DATE

SIG. INVENTORY NO. 05-0184T2

13-AUG-2024 13:43
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JTPeterson

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

PHASING	SEQUENCE
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN

SEQUENCE 2 PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SEQUENCE 2: Add phase 9 to sequence.

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channel Configuration

Channel Configuration

NOTICE OVERLAP 7 ASSIGNED TO CHANNEL 1 →

NOTICE OVERLAP 8 ASSIGNED TO CHANNEL 5 →

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Overlap	7		X	X	1
2	Phase Vehicle	2		X		2
3	Phase Vehicle	3		X	X	3
4	Phase Vehicle	4		X		4
5	Phase Vehicle	5		X		5
6	Overlap	8		X	X	6
7	Phase Vehicle	7		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1		X	X	9
10	Overlap	2		X	X	10
11	Overlap	3		X		11
12	Overlap	4		X		12
13	Phase Ped	2				13
14	Phase Ped	4				14
15	Phase Ped	6				15
16	Phase Ped	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0184T2
DESIGNED: July 2024
SEALED: 8-12-24
REVISED: N/A

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Electrical and Programming Details For:

Prepared in the Offices of:

Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
ITS & Signals Management Section

750 N. Greenfield Pkwy, Garner, NC 27529

US 401 (Fayetteville Rd.)
at
SR 1010 (Ten-Ten Rd.)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: August 2024 | REVIEWED BY: -

PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

Signed by: Ryan W. Hough 08/13/2024
DATE

SIG. INVENTORY NO. 05-0184T2

13-AUG-2024 13:45
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JTPeterson

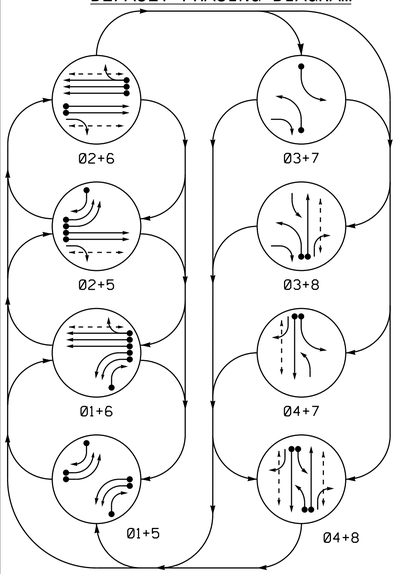
PROJECT REFERENCE NO.	SHEET NO.
U-5746	Sig. 4.0

8 Phase
Fully Actuated
(US 401 Closed Loop System #29)
Signal System #: D05-09_Garner

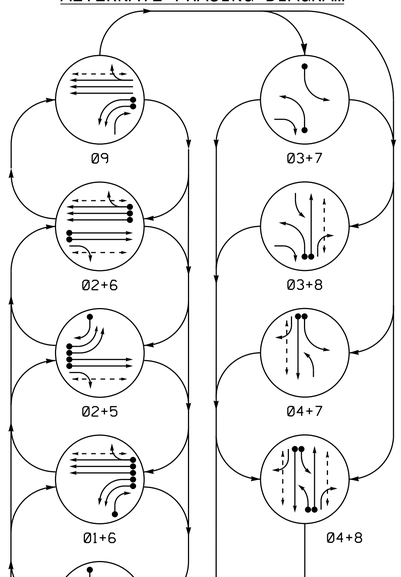
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2024 and "Standard Specifications for Roads and Structures" dated January 2024.
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. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. 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. To provide a leading pedestrian interval on phase 4, program FYA heads numbered 31 and 43 to delay for 7 seconds after the start of phase 4 WALK interval. See Electrical Details for Programming.
11. To provide a leading pedestrian interval on phase 8, program FYA heads numbered 71 and 83 to delay for 7 seconds aafetr the start of phase 8 WALK interval. See Electrical Details for Programming.

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION

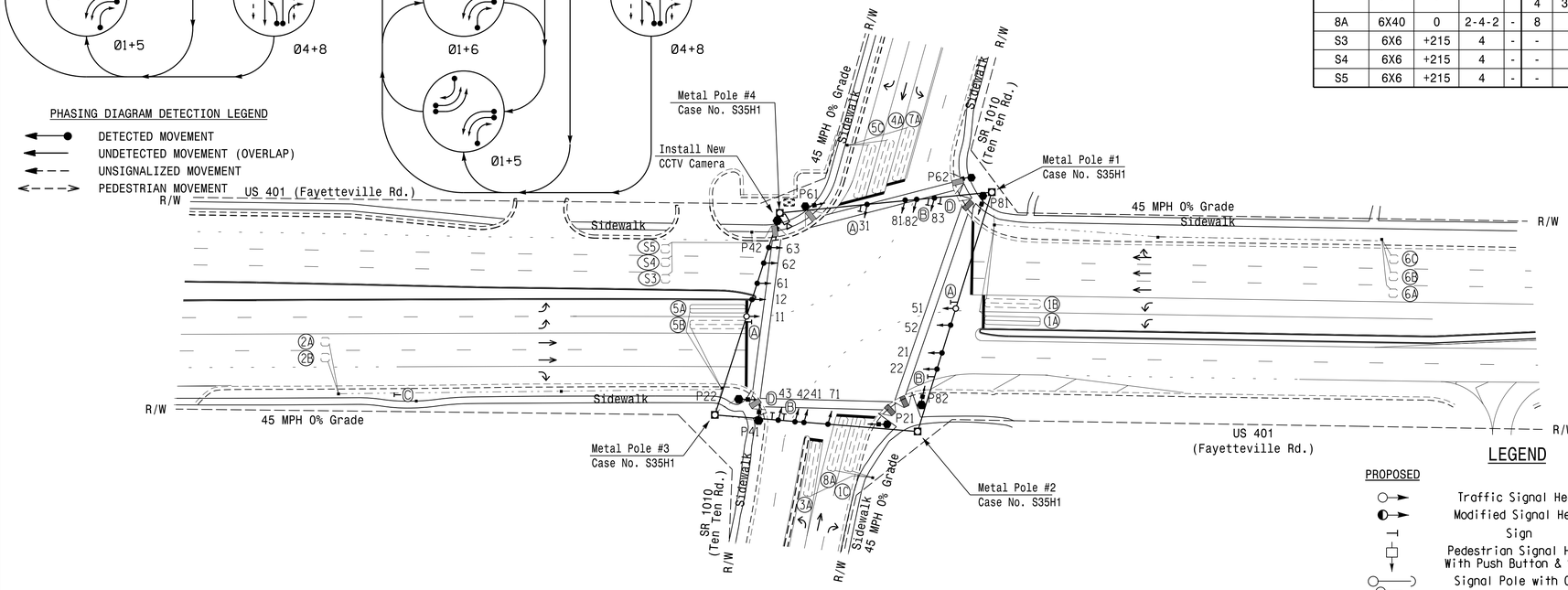
SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	03+07	03+08	04+07	04+08	FLASH
11, 12	←̶	←̶	R̶	R̶	R̶	R̶	R̶	R̶	R̶
21	R	R	G	G	R	R	R	R	R
22	R	R	G	G	R/→	R/→	R	R	R
31	R̶	R̶	R̶	R̶	←̶	←̶	F/Y̶	F/Y̶	R̶
41, 42	R	R	R	R	R	R	G	G	R
43	→	R	→	R	R	R	F/Y̶	F/Y̶	R
51, 52	←̶	R̶	←̶	R̶	←̶	R̶	R̶	R̶	R̶
61, 62, 63	R	G	R	G	R	R	R	R	R
71	R̶	R̶	R̶	R̶	←̶	F/Y̶	←̶	F/Y̶	R̶
81, 82	R	R	R	R	R	G	R	G	R
83	→	→	R	R	F/Y̶	R	F/Y̶	R	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	09	03+07	03+08	04+07	04+08	FLASH
11, 12	←̶	←̶	R̶	R̶	←̶	R̶	R̶	R̶	R̶	R̶
21	R	R	G	G	R	R	R	R	R	R
22	R	R	G	G	R	R/→	R/→	R	R	R
31	R̶	R̶	R̶	R̶	R̶	←̶	←̶	F/Y̶	F/Y̶	R̶
41, 42	R	R	R	R	R	R	R	G	G	R
43	→	R	→	R	R	R	R	F/Y̶	F/Y̶	R
51, 52	←̶	R̶	←̶	R̶	R̶	R̶	R̶	R̶	R̶	R̶
61, 62, 63	R	G	R	G	G	R	R	R	R	R
71	R̶	R̶	R̶	R̶	R̶	←̶	F/Y̶	←̶	F/Y̶	R̶
81, 82	R	R	R	R	R	R	G	R	G	R
83	→	→	R	R	→	R	F/Y̶	R	F/Y̶	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK	
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK	
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK	

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	1/9	-	-	X	-	X	-	-
1B	6X40	0	2-4-2	-	1/9	-	-	X	-	X	-	-
1C	6X40	0	2-4-2	-	1	15.0	-	X	-	X	-	-
2A	6X6	300	5	-	2	-	-	X	X	X	-	-
2B	6X6	300	5	-	2	-	-	X	X	X	-	-
3A	6X40	0	2-4-2	-	3	15.0	-	X	-	X	-	-
					8	-	-	X	-	X	-	-
4A	6X40	0	2-4-2	-	4	-	-	X	-	X	-	-
5A	6X40	0	2-4-2	X	5	-	-	X	-	X	-	-
5B	6X40	0	2-4-2	-	5	-	-	X	-	X	-	-
5C	6X40	0	2-4-2	-	5	15.0	-	X	-	X	-	-
6A	6X6	300	5	-	6	-	-	X	-	X	-	-
6B	6X6	300	5	-	6	-	-	X	-	X	-	-
6C	6X6	300	5	-	6	-	-	X	-	X	-	-
7A	6X40	0	2-4-2	-	7	15.0	-	X	-	X	-	-
					4	3.0	-	X	-	X	-	-
8A	6X40	0	2-4-2	-	8	-	-	X	-	X	-	-
S3	6X6	+215	4	-	-	-	-	X	-	X	-	-
S4	6X6	+215	4	-	-	-	-	X	-	X	-	-
S5	6X6	+215	4	-	-	-	-	X	-	X	-	-



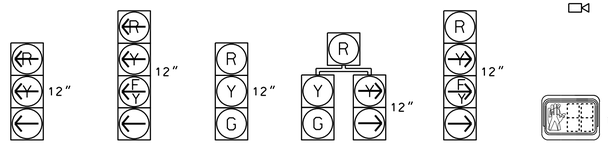
MAXTIME TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	7	8	9	OL 7	OL 8
Walk *	–	14	–	14	–	14	–	14	–		
Ped Clear *	–	23	–	32	–	26	–	37	–		
Min Green	7	12	7	7	7	12	7	7	7		
Passage *	2.0	6.0	2.0	2.0	2.0	6.0	2.0	2.0	2.0		
Max 1 *	25	90	15	45	25	90	15	45	25		
Yellow Change	3.0	4.5	3.0	4.5	3.0	4.5	3.0	4.5	3.0	3.0	4.5
Red Clear	4.3	2.2	3.5	2.6	4.2	2.2	3.4	2.6	4.3	4.3	2.2
Added Initial *	–	1.5	–	–	–	1.5	–	–	–		
Maximum Initial *	–	34	–	–	–	34	–	–	–		
Time Before Reduction *	–	15	–	–	–	15	–	–	–		
Time To Reduce *	–	30	–	–	–	30	–	–	–		
Minimum Gap	–	3.0	–	–	–	3.0	–	–	–		
Advance Walk	–	7	–	**	–	7	–	***	–		
Non Lock Detector	X	–	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.
** See Note 10.
*** See Note 11.

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	◘
⬡	Type II Signal Pedestal	⬢
▭	CCTV Camera Assembly	■

SIGNS

PROPOSED		EXISTING
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
Ⓒ	"Right Lane Must Turn Right" Sign (R3-7)	Ⓒ
Ⓓ	"RIGHT TURN SIGNAL" Sign (R10-10R)	Ⓓ

Signal Upgrade - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 401 (Fayetteville Rd.)
at
SR 1010 (Ten Ten Rd.)

Divsion 5 | Wake County | Fuquay-Varina

PLAN DATE: July 2024 | REVIEWED BY:
PREPARED BY: I.O. Umozurike | REVIEWED BY:

SCALE: 0 50 1"=50'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 026486 ENGINEER ROBERT J. ZIEMBA

DocuSigned by: Robert Ziemba 08/12/2024
SIGNATURE DATE

SIG. INVENTORY NO. 05-0184

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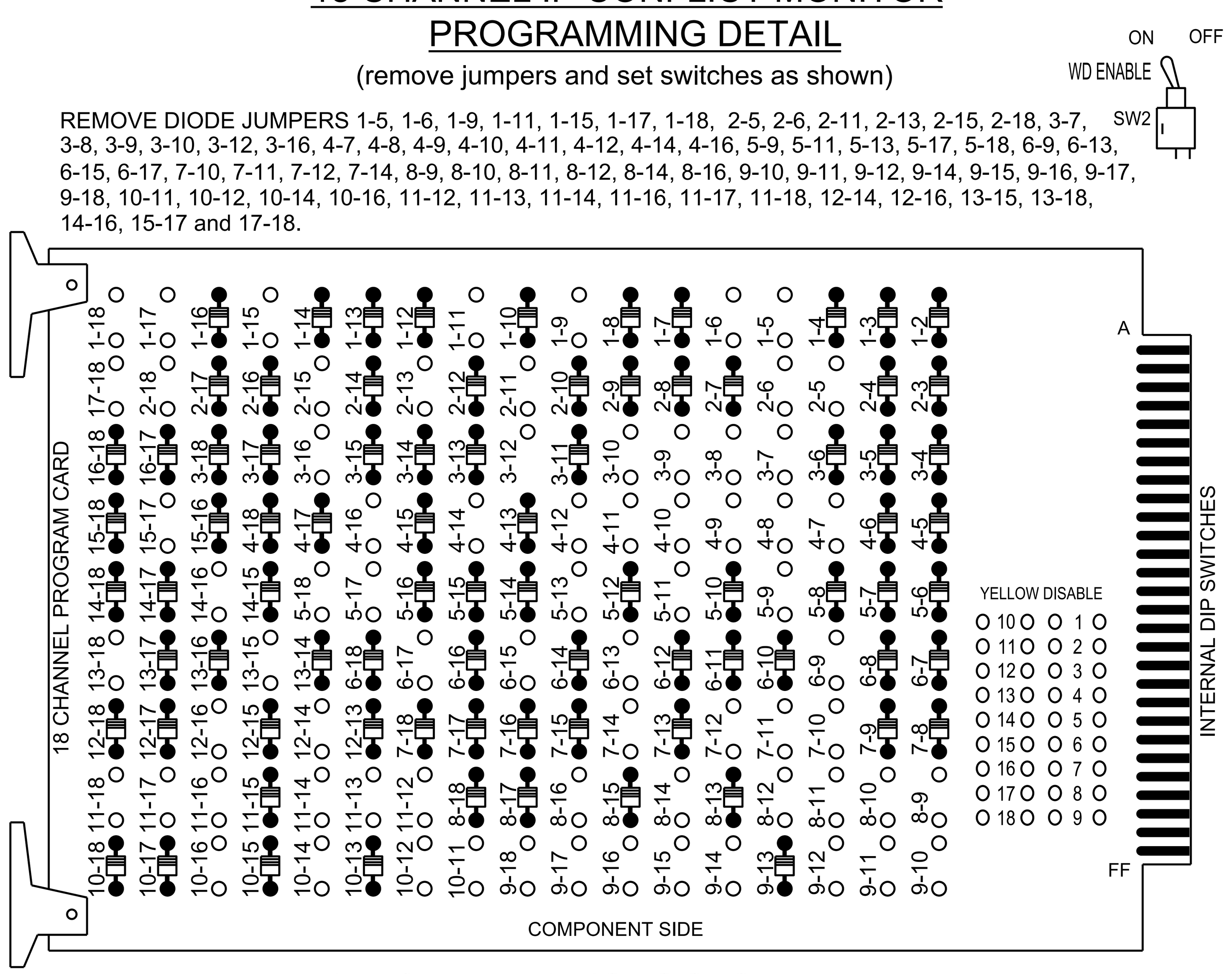
rziemba

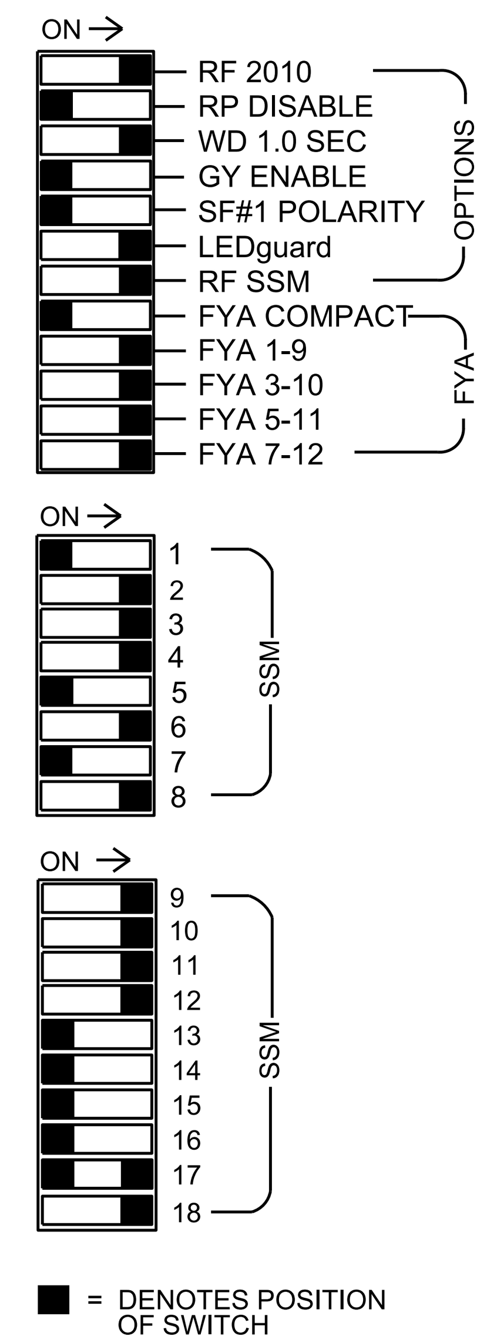
18 CHANNEL IP CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 1-17, 1-18, 2-5, 2-6, 2-11, 2-13, 2-15, 2-18, 3-7, 3-8, 3-9, 3-10, 3-12, 3-16, 4-7, 4-8, 4-9, 4-10, 4-11, 4-12, 4-14, 4-16, 5-9, 5-11, 5-13, 5-17, 5-18, 6-9, 6-13, 6-15, 6-17, 7-10, 7-11, 7-12, 7-14, 8-9, 8-10, 8-11, 8-12, 8-14, 8-16, 9-10, 9-11, 9-12, 9-14, 9-15, 9-16, 9-17, 9-18, 10-11, 10-12, 10-14, 10-16, 11-12, 11-13, 11-14, 11-16, 11-17, 11-18, 12-14, 12-16, 13-15, 13-18, 14-16, 15-17 and 17-18.



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. Integrate monitor with Ethernet network in cabinet.

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 (US 401 Closed Loop System #29) Signal System #: D05-09_Garner.

EQUIPMENT INFORMATION

Controller..2070LX
Cabinet..332 w/ Aux
Software...Q-Free MAXTIME
Cabinet Mount....................................18 With Aux. Output File
Load Switches Used...........................S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, AUX S1, AUX S2, AUX S3, AUX S4, AUX S5, AUX S6
Phases Used.......................................1, 2, 3, 4, 5, 6, 7, 8, *9
Overlap "1"..*
Overlap "2"..*
Overlap "3"..*
Overlap "4"..*
Overlap "5"..*
Overlap "6"..*
Overlap "7"..*
Overlap "8"..*

*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	OL7	2	2 PED	3		4	4 PED	5	OL8	6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	OL6
SIGNAL HEAD NO.	83★	21,22	P21, P22	22	31★	41,42	P41, P42	43★	61,62 63	P61, P62	71★	81,82	P81, P82	83★	31★	11,12	43★	71★	51,52
RED		128		*		101			134			107		A121			A114		
YELLOW	*	129				102		*	135		*	108							
GREEN		130				103			136			109							
RED ARROW															A124	A124		A101	A124
YELLOW ARROW				117										A122	A125	A125	A115	A102	A125
FLASHING YELLOW ARROW														A123	A126		A116	A103	
GREEN ARROW	127			118	118			133			124					124			124
(Don't Walk symbol)			113				104			119			110						
(Walk symbol)			115				106			121			112						

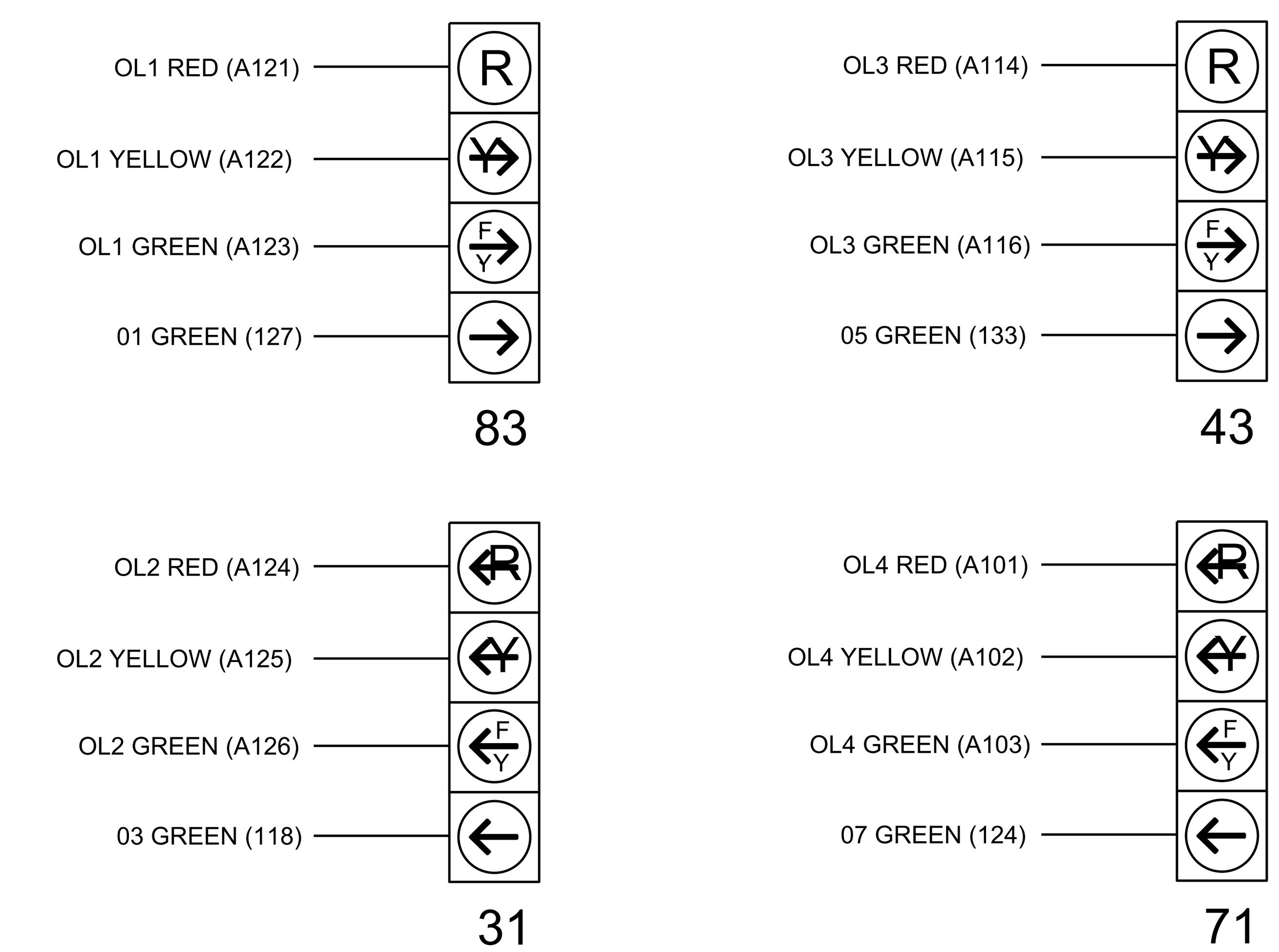
NU = Not Used

*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 1B	Ø 2 2A	SLOT EMPTY	Ø 3 3A	Ø 4 4A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
"I"	L	NOT USED	Ø 1 1C	Ø 2 2B		NOT USED	NOT USED			NOT USED					ST DC ISOLATOR
"J"	U	Ø 5 5A	Ø 5 5B	Ø 6 6A	Ø 6 6C	Ø 7 7A	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
"J"	L	NOT USED	Ø 5 5C	Ø 6 6B	NOT USED	NOT USED	NOT USED			SYS. DET. S4					

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	1/9			X		X	
1B	TB2-5,6	I2U	39	1	2	1/9			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	
2B	TB2-11,12	I3L	76	42	5	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	
*S5	TB6-9,10	I9U	60	22	13	SYS			X		X	
5A	TB3-1,2	J1U	55	17	15	5			X		X	
5B	TB3-5,6	J2U	40	2	16	5			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	
6B	TB3-11,12	J3L	77	43	19	6			X	-	X	
6C	TB5-1,2	J4U	48	10	20	6			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	
*S3	TB7-9,10	J9U	59	21	27	SYS						
*S4	TB7-11,12	J9L	61	23	28	SYS						

*System detector only. Remove any assigned vehicle phase.

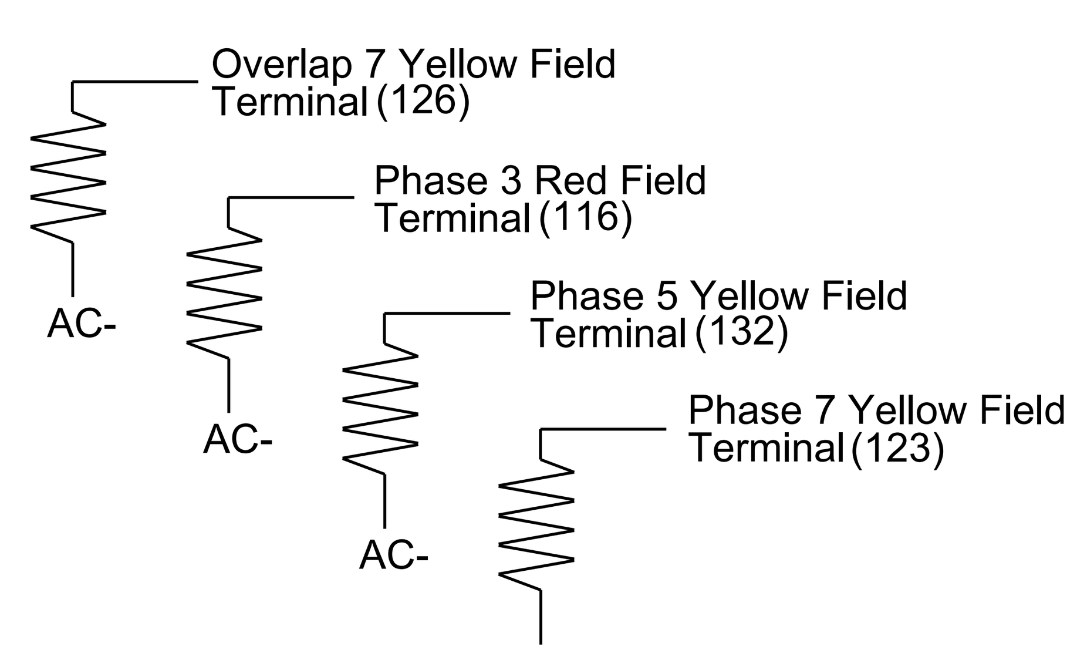
INPUT FILE POSITION LEGEND: J2L

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)



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0184
DESIGNED: July 2024
SEALED: 8-12-24
REVISED: N/A

Electrical Detail - Sheet 1 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
ITS & Signals Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 401 (Fayetteville Rd.)
at
SR 1010 (Ten-Ten Rd.)

Division 5 | Wake County | Fuquay-Varina

PLAN DATE: August 2024	REVIEWED BY: -
PREPARED BY: James Peterson	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

Signed by: Ryan W. Hough 08/13/2024
430320FAA2654C3...
DATE

SIG. INVENTORY NO. 05-0184

13-AUG-2024 13:49
S:*ITS&SU*ITS Signals*Workgroups*Sig Man*Peterson*050184_sm_ele_xxx.dgn
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	5	6	7	8
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal	Normal	Normal	Normal
Included Phases	8	4	4	8	1,9	5	1,9	6,9
Modifier Phases	-	3	5	7	-	-	-	-
Modifier Overlaps	7	-	-	-	-	-	-	-
Trail Green	0	0	0	0	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0	0.0	0.0	3.0	4.4
Trail Red	0.0	0.0	0.0	0.0	0.0	0.0	4.3	1.6
FYA Ped Delay	7	7	7	7	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	Sequence
*	2

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

SEQUENCE DETAIL

Front Panel
Main Menu >Controller >Sequence & Phs Config>Sequences

Web Interface
Home >Controller >Sequence

Sequence 1

Ring	Sequence Data
1	1,2,a,3,4,b
2	5,6,a,7,8,b

Sequence 2

Ring	Sequence Data
1	1,2,a,9,b,3,4,c
2	5,6,a,b,7,8,c

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: 05-0184
DESIGNED: July 2024
SEALED: 8-12-24
REVISED: N/A

Electrical Detail - Sheet 2 of 3

Electrical and Programming Details For:

US 401 (Fayetteville Rd.)
at
SR 1010 (Ten-Ten Rd.)

Division 5 Wake County Fuquay-Varina

PLAN DATE: August 2024 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

Signed by: Ryan W. Hough 08/13/2024
430320FAA2654C3...
DATE

SIG. INVENTORY NO. 05-0184

PROJECT REFERENCE NO.	SHEET NO.
U-5746	Sig. 4.3

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

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

PHASING	SEQUENCE
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN

SEQUENCE 2 PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SEQUENCE 2: Add phase 9 to sequence.

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channel Configuration

Channel Configuration

NOTICE OVERLAP 7 ASSIGNED TO CHANNEL 1

NOTICE OVERLAP 8 ASSIGNED TO CHANNEL 5

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Overlap	7		X	X	1
2	Phase Vehicle	2		X		2
3	Phase Vehicle	3		X	X	3
4	Phase Vehicle	4		X		4
5	Phase Vehicle	5		X		5
6	Overlap	8		X	X	6
7	Phase Vehicle	7		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1		X	X	9
10	Overlap	2		X	X	10
11	Overlap	3		X		11
12	Overlap	4		X		12
13	Phase Ped	2				13
14	Phase Ped	4				14
15	Phase Ped	6				15
16	Phase Ped	8				16
17	Overlap	5		X	X	17
18	Overlap	6		X		18

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-0184
DESIGNED: July 2024
SEALED: 8-12-24
REVISED: N/A

Electrical Detail - Sheet 3 of 3

Electrical and Programming Details For:

US 401 (Fayetteville Rd.)
at
SR 1010 (Ten-Ten Rd.)

Division 5 Wake County Fuquay-Varina

PLAN DATE: August 2024 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

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SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH

Signed by: Ryan W. Hough 08/13/2024
430320FAA2654C3...
DATE

SIG. INVENTORY NO. 05-0184

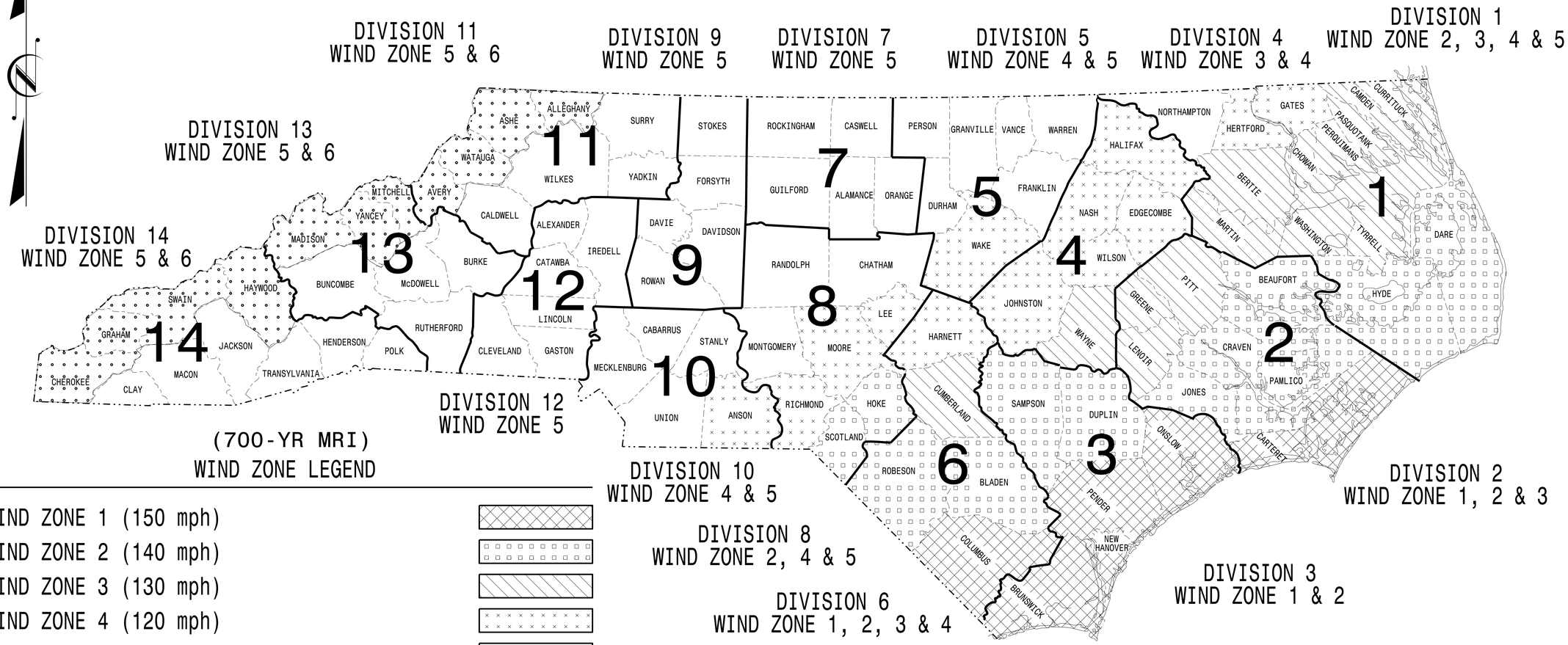
13-AUG-2024 13:53
S:*ITS&SU*ITS Signals*Workgroups*Sig Man*Peterson*050184_sm_ele_xxx.dgn
JTPeterson

PROJECT I.D.NO.	SHEET NO.
U-5746	Sig.M1A

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STANDARD DRAWINGS FOR ALL METAL POLES (LRFD)

NCDOT METAL POLE STANDARDS



(700-YR MRI)
WIND ZONE LEGEND

WIND ZONE 1 (150 mph)	
WIND ZONE 2 (140 mph)	
WIND ZONE 3 (130 mph)	
WIND ZONE 4 (120 mph)	
WIND ZONE 5 (110 mph)	
WIND ZONE 6 (135 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
750 N.Greenfield Pkwy.
Garner, NC 27529

Designed in conformance with the latest 2020 Interim to the 1st Edition 2015

AASHTO LRFD

Standard Specifications for Highway Signs, Luminaires, and Traffic Signals

INDEX OF PLANS

DRAWING NUMBER	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

NORTH CAROLINA PROFESSIONAL SEAL 036626 ENGINEER KEVIN C. DURIGON

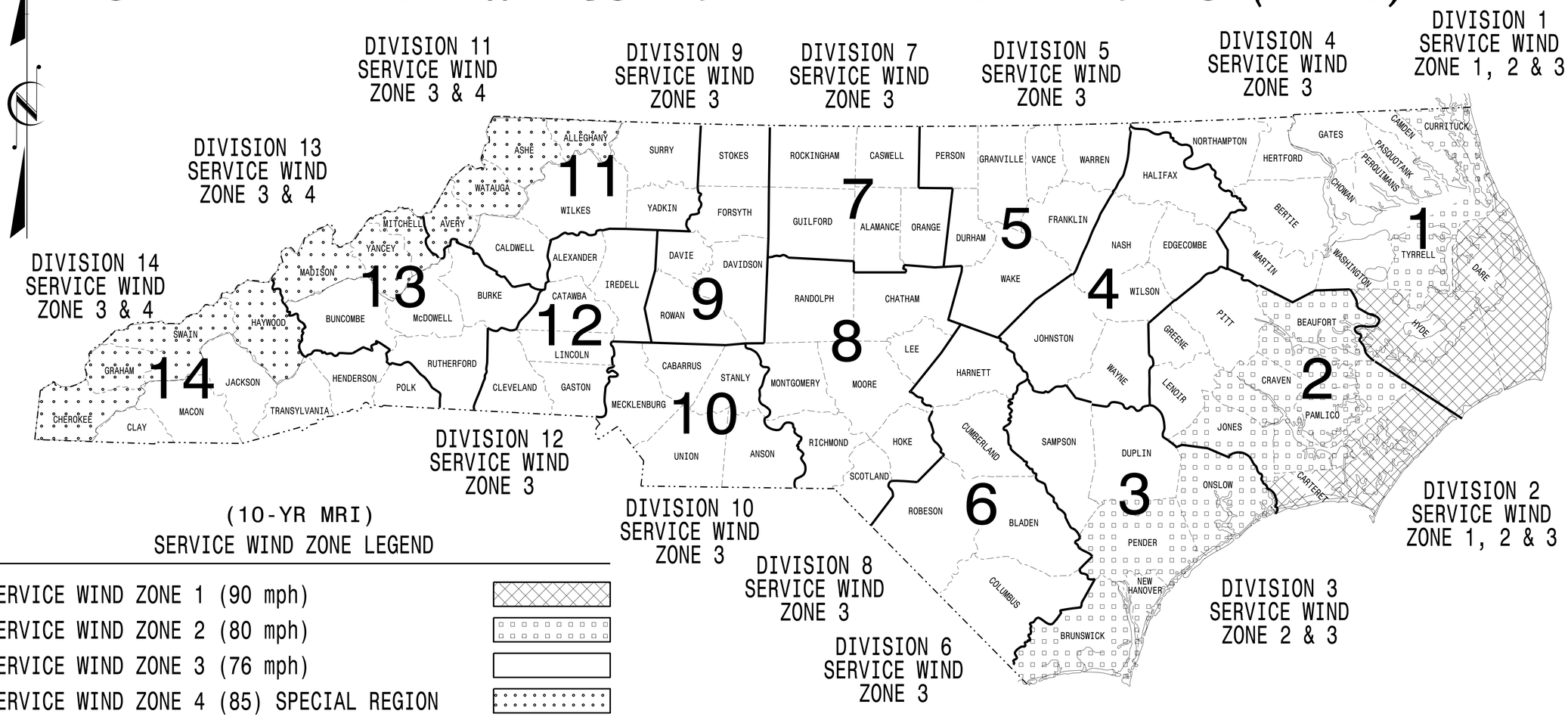
DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE

PROJECT I.D.NO.	SHEET NO.
U-5746	Sig.M1B

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STANDARD DRAWINGS FOR ALL METAL POLES (LRFD)

NCDOT METAL POLE STANDARDS



(10-YR MRI)
SERVICE WIND ZONE LEGEND

SERVICE WIND ZONE 1 (90 mph)	
SERVICE WIND ZONE 2 (80 mph)	
SERVICE WIND ZONE 3 (76 mph)	
SERVICE WIND ZONE 4 (85) SPECIAL REGION	

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

Prepared in the Offices of:

Transportation Mobility and Safety Division
Signal Design Section

750 N.Greenfield Pkwy.
Garner, NC 27529

Designed in conformance with the latest 2020 Interim to the 1st Edition 2015

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NCDOT CONTACTS:

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

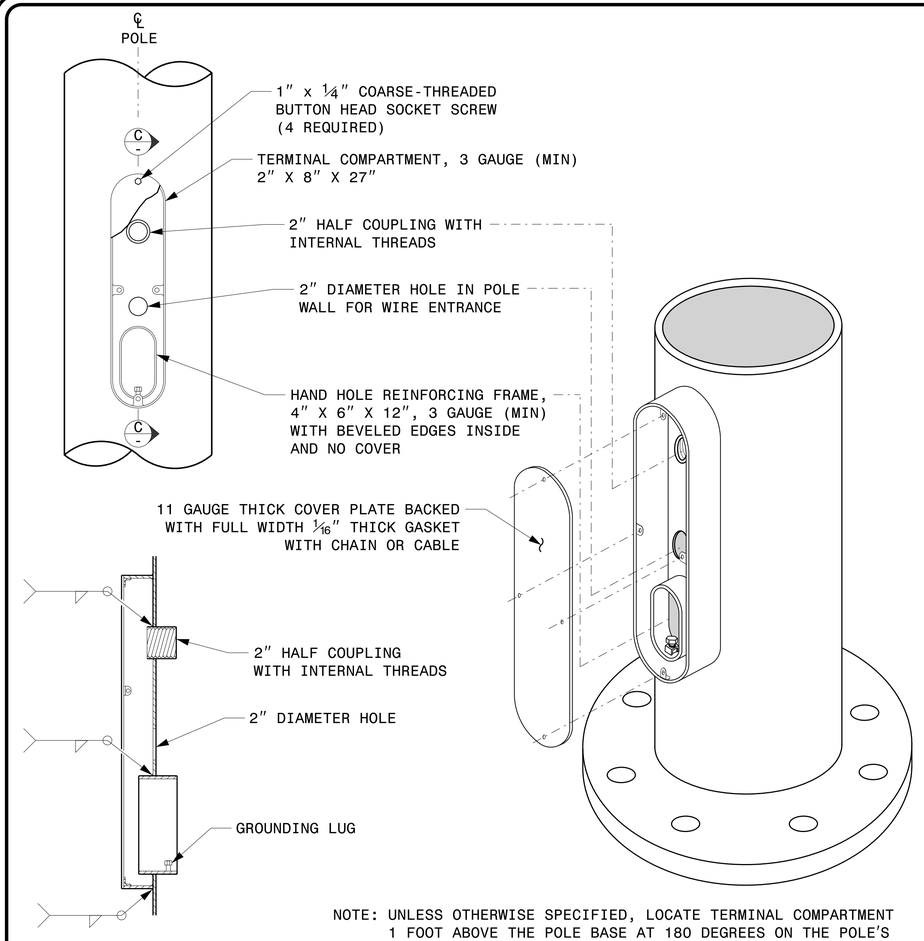
B. WALKER, P.E. – ITS AND SIGNALS STRUCTURAL ENGINEER

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036626 ENGINEER KEVIN C. DURIGON

DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...

09/21/2023
DATE



SECTION C-C

NOTE: UNLESS OTHERWISE SPECIFIED, LOCATE TERMINAL COMPARTMENT 1 FOOT ABOVE THE POLE BASE AT 180 DEGREES ON THE POLE'S RADIAL INDEX.

TERMINAL COMPARTMENT DETAIL

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

SHAFT I.D. TAG
(PROVIDE ON SHAFT OF STRAIN POLES
AND MAST ARM POLE SHAFT)

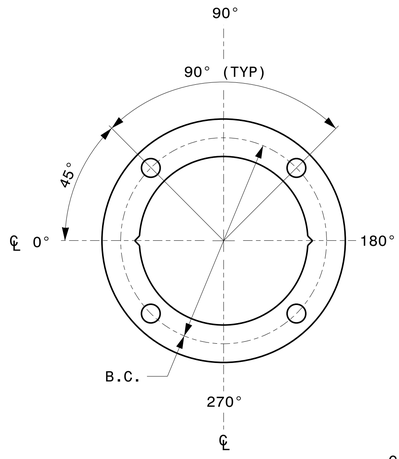
MFG _____ MFG. DATE: MM/YY
SECTION D/T/L/Y ----/----/----/----
NCDOT SIG. INV. NO. _ _ _ _ _ _ _ _
NCDOT POLE NO. _ _ _ _ _ _ _ _

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

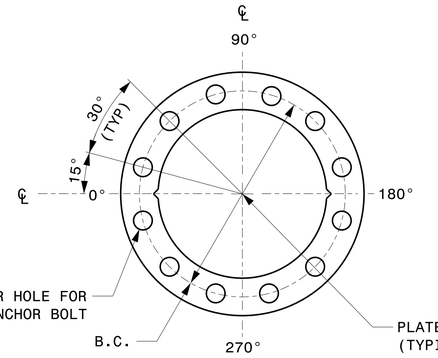
NOTES:

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 STANDARD DESIGN, INCLUDE CASE NUMBER IN ADDITION TO POLE NUMBER ON "NCDOT POLE NO." LINE.
5. SIGNAL INV. NUMBER AND POLE I.D. NUMBER. SEE DRAWING M3 AND M4 FOR MOUNTING POSITIONS OF I.D. TAGS.

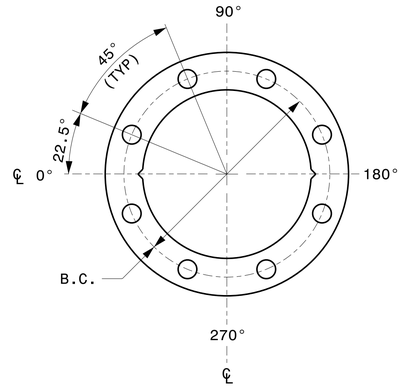
IDENTIFICATION TAG DETAILS



4 BOLT PATTERN



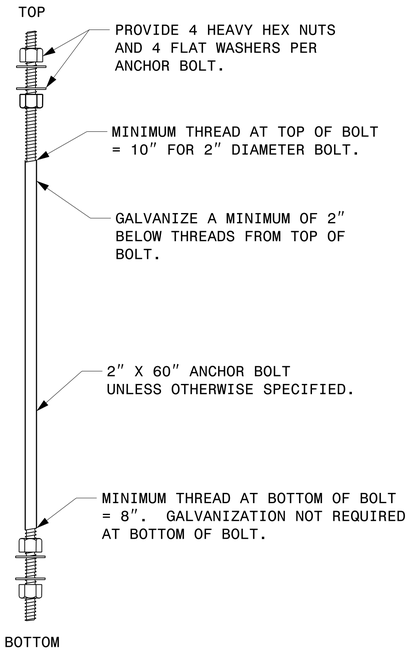
12 BOLT PATTERN



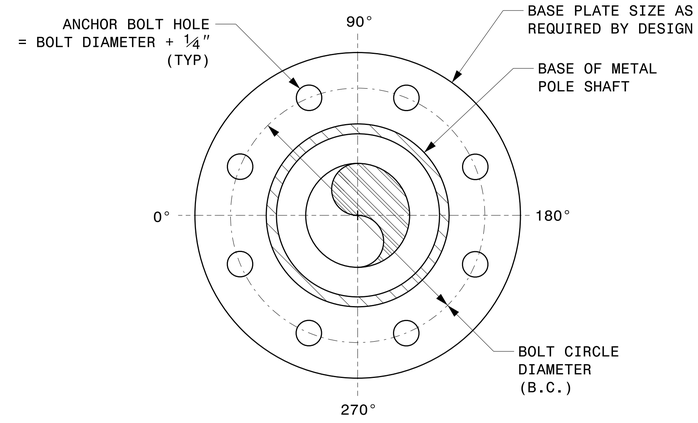
8 BOLT PATTERN

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

PROJECT I.D. NO.	SHEET NO.
U-5746	Sig.M2

Fabrication Details – All Metal Poles

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

SCALE 0 NA NONE

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 SEAL 036626 ENGINEER KEVIN C. DURIGON

DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE

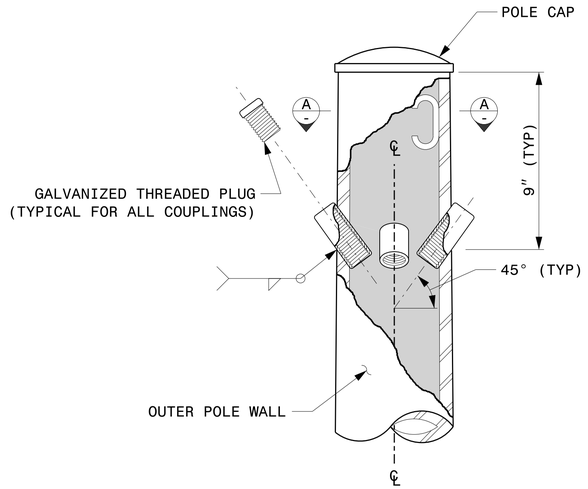
03-OCT-2023 12:24
S:\TTSSUM\TIS\Signal Design Section\Structures\Drawings\2024 Metal Pole Std Drawings for LRFD\2024 Sig-M2 Std. Fabrication Details-All Poles.dgn
kcdurigon

PROJECT I.D. NO.	SHEET NO.
U-5746	Sig.M3

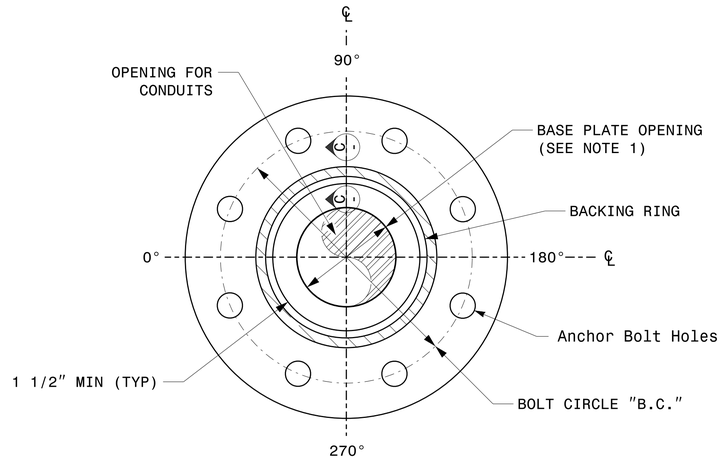
Fabrication Details — Strain Poles

NOTE:

1. OPENING IN POLE BASE PLATE SHALL BE EQUAL TO POLE BASE INSIDE DIAMETER MINUS 3½" BUT SHALL NOT BE LESS THAN 8½".

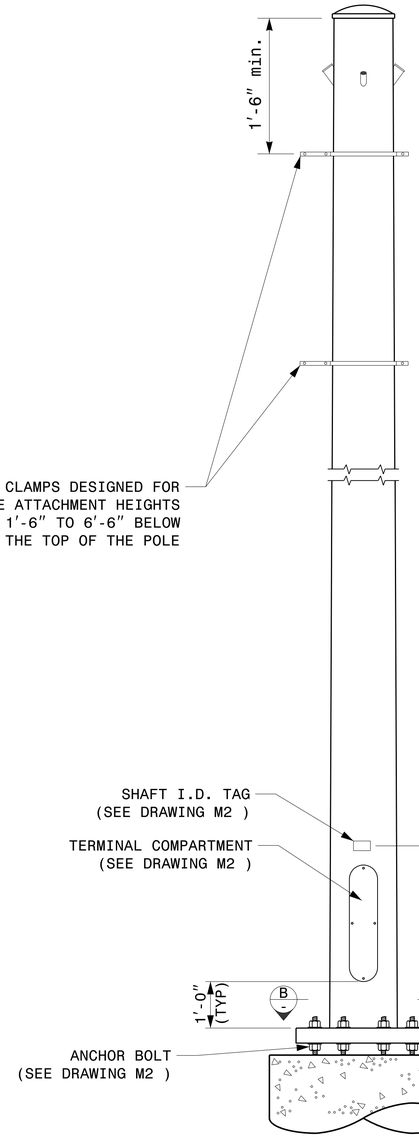


CABLE ENTRANCES AT TOP OF POLE

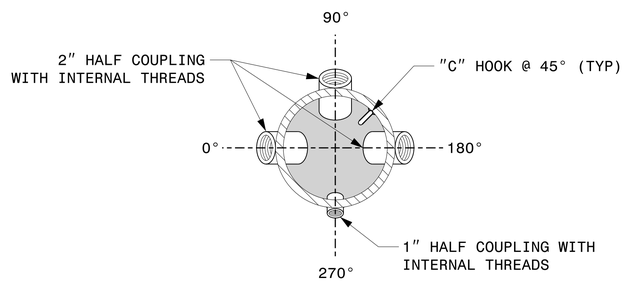


SECTION B-B

POLE BASE PLATE DETAILS
(8 AND 12 BOLT PATTERN)

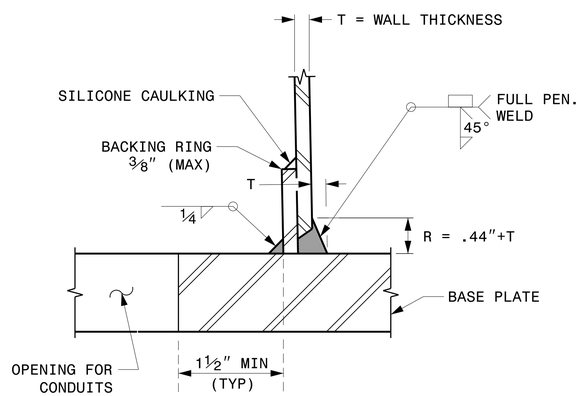


MONOTUBE STRAIN POLE



SECTION A-A

RADIAL ORIENTATION OF 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

SCALE
0 NA
NONE

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
036626
ENGINEER
KEVIN C. DURIGON

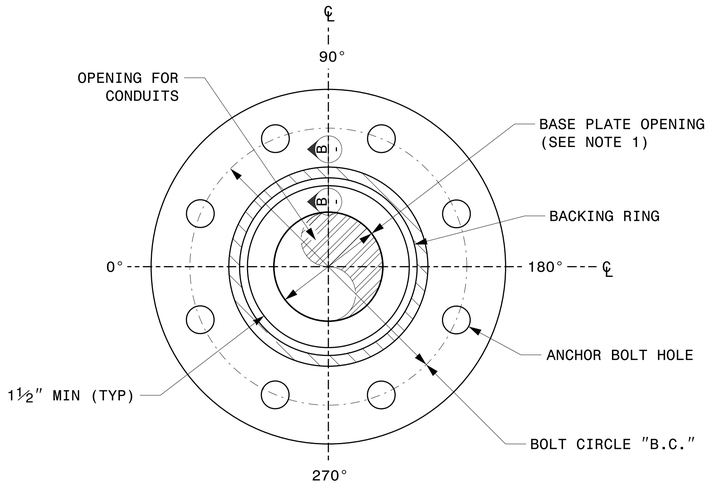
DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE

PROJECT I.D. NO.	SHEET NO.
U-5746	Sig.M4

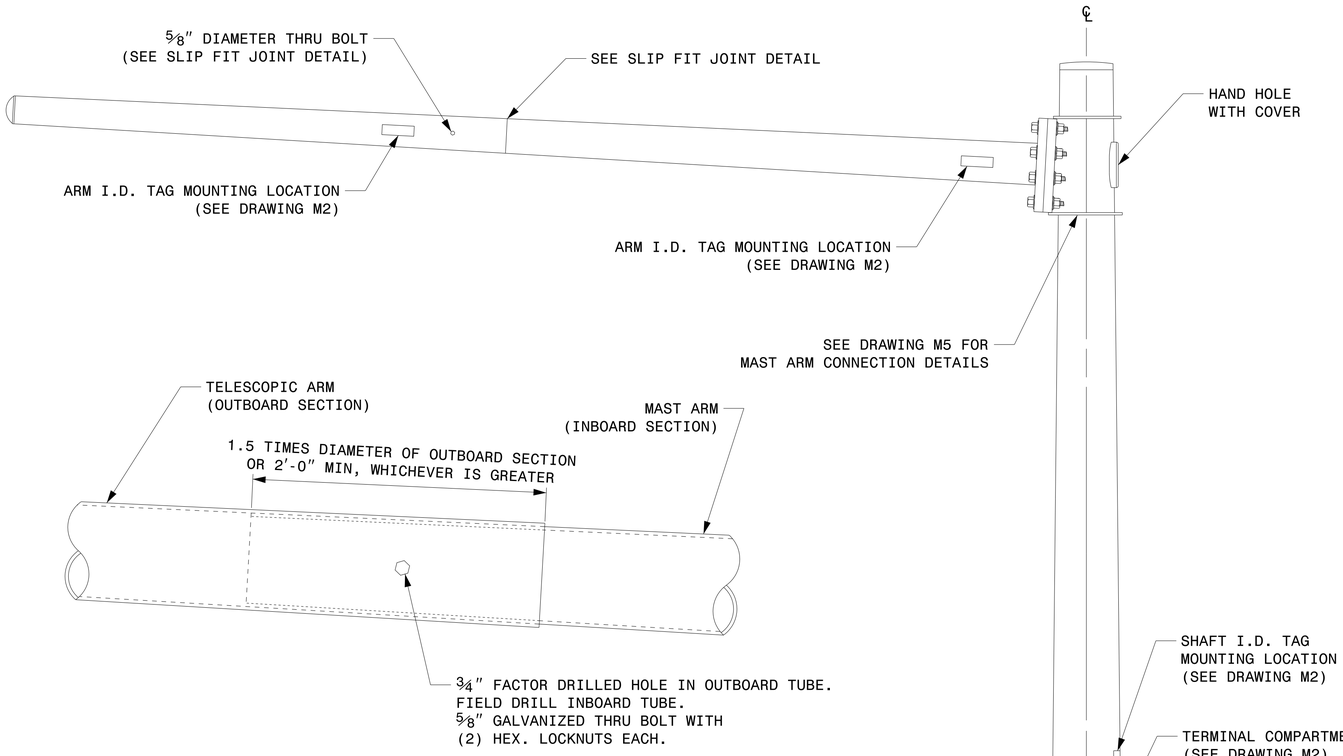
Fabrication Details – Mast Arm Poles

NOTE:

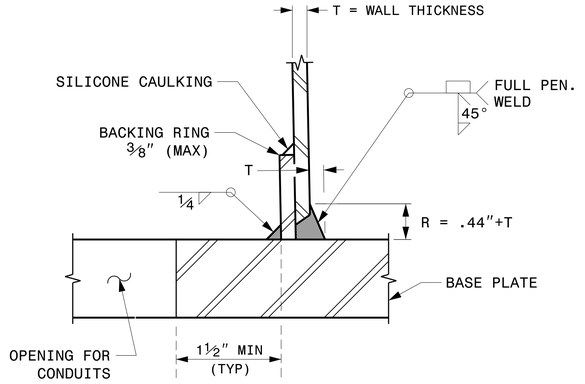
1. OPENING IN POLE BASE PLATE SHALL BE EQUAL TO POLE BASE INSIDE DIAMETER MINUS 3½" BUT SHALL NOT BE LESS THAN 8½".



SECTION A-A
POLE BASE PLATE DETAILS

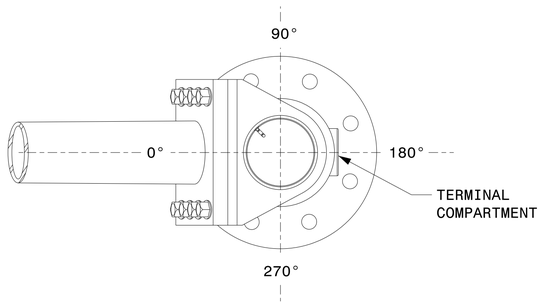


SLIP FIT JOINT DETAIL FOR MAST ARM



SECTION B-B
(POLE ATTACHMENT TO BASE PLATE)

FULL-PENETRATION GROOVE WELD DETAIL



MAST ARM RADIAL ORIENTATION

MAST ARM POLE

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

SCALE
0 NA
NONE

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

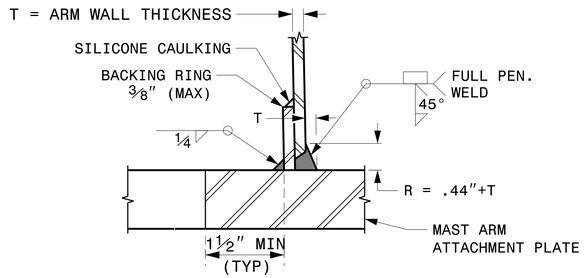
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036626 ENGINEER KEVIN C. DURIGON

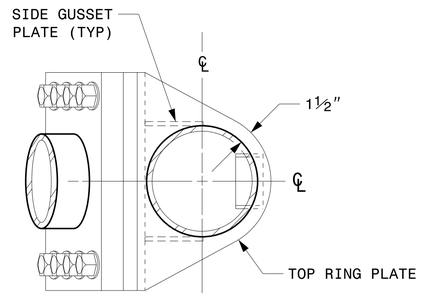
DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE

WELDED RING STIFFENED MAST ARM CONNECTION

PROJECT I.D. NO.	SHEET NO.
U-5746	Sig.M5



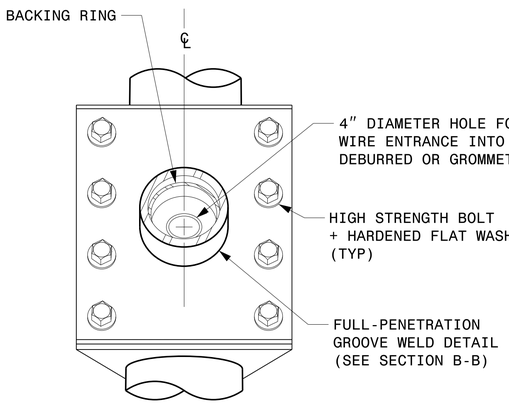
SECTION B-B
FULL-PENETRATION GROOVE WELD DETAIL



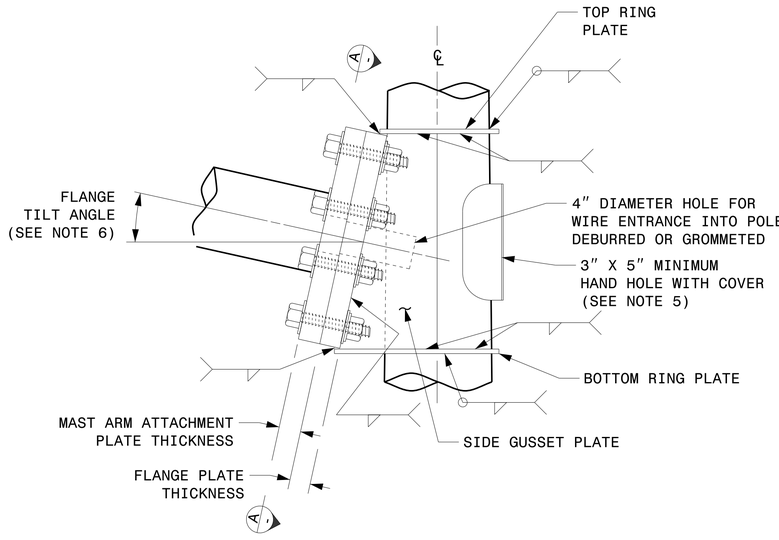
PLAN VIEW

NOTES:

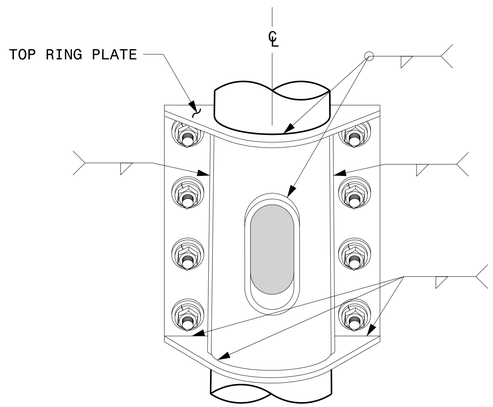
1. PROVIDE A PERMANENT MEANS OF IDENTIFICATION ABOVE THE MAST ARM TO INDICATE PROPER ATTACHMENT ORIENTATION OF THE MAST ARM.
2. DESIGNER WILL DETERMINE THE SIZE OF ALL STRUCTURAL COMPONENTS, PLATES, FASTENERS, AND WELDS SHOWN UNLESS THEY ARE ALREADY SPECIFIED.
3. FABRICATOR IS RESPONSIBLE FOR PROVIDING APPROPRIATE HOLES AT DRAINAGE POINTS TO DRAIN GALVANIZING MATERIALS.
4. FOR MINIMUM EDGE DISTANCE 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.



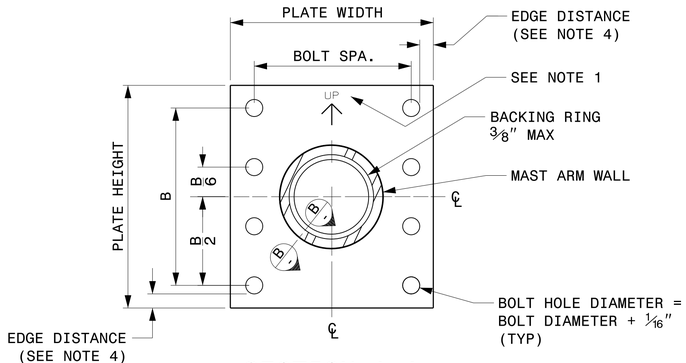
FRONT ELEVATION VIEW



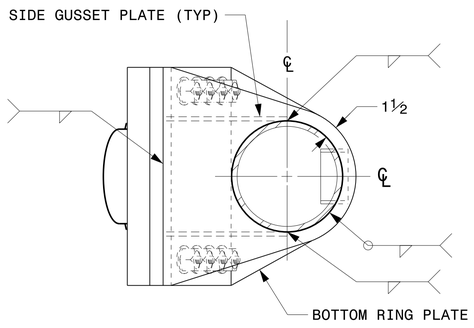
SIDE ELEVATION VIEW



BACK ELEVATION VIEW



SECTION A-A
MAST ARM ATTACHMENT PLATE



BOTTOM VIEW

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

SCALE
0 NA
NONE

Typical Fabrication Details
For
Mast Arm Connection To Pole

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

REVISIONS	INIT.	DATE

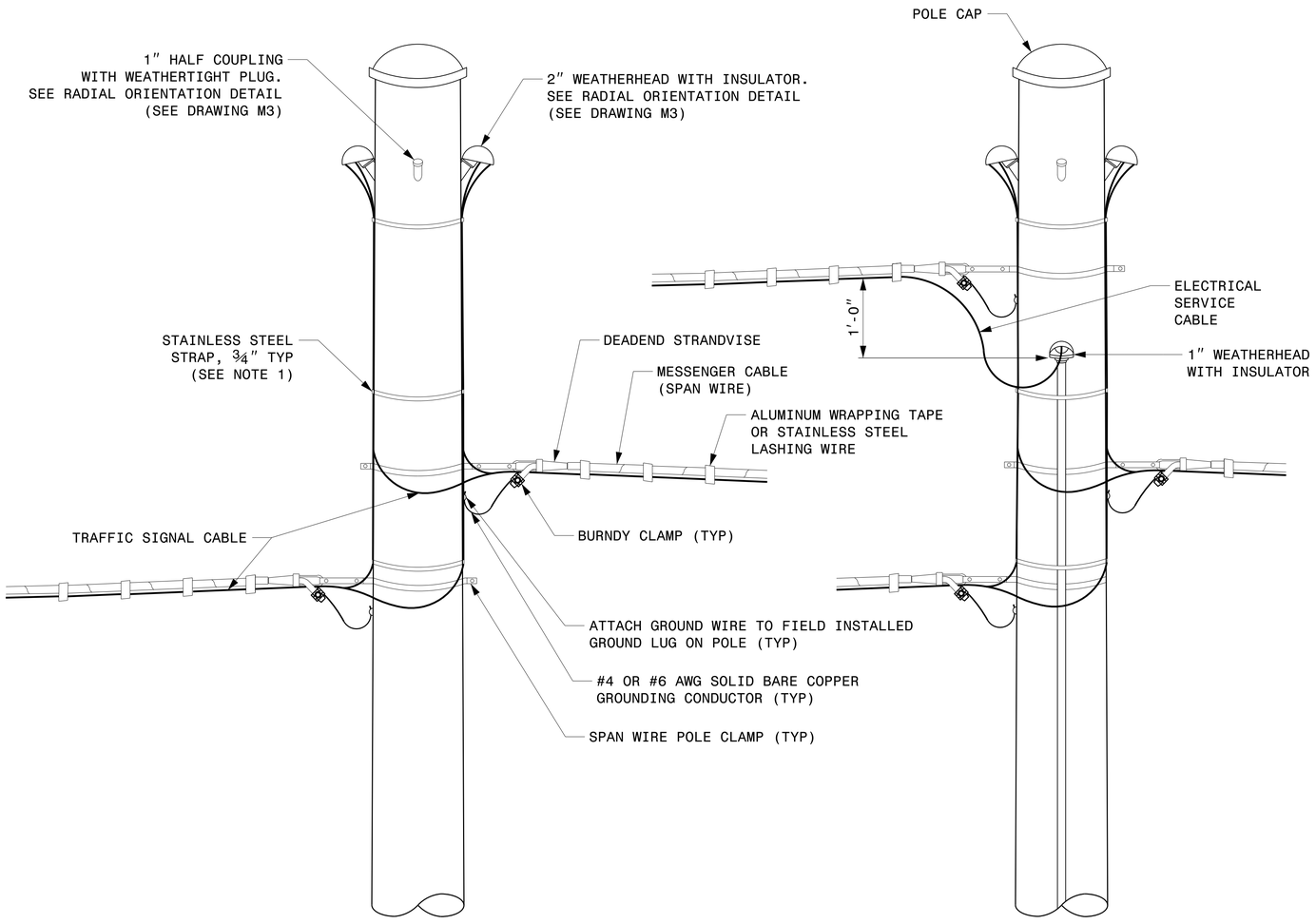
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036626 ENGINEER KEVIN C. DURIGON

DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE

Fabrication Details – Mast Arm Connection

PROJECT I.D. NO.	SHEET NO.
u-5746	Sig.M6

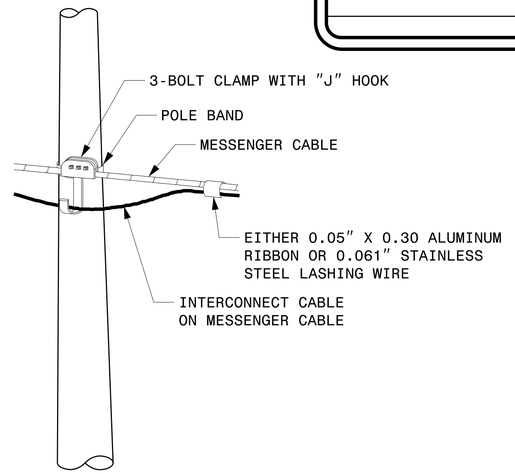
Fabrication Details – Strain Pole Attachments



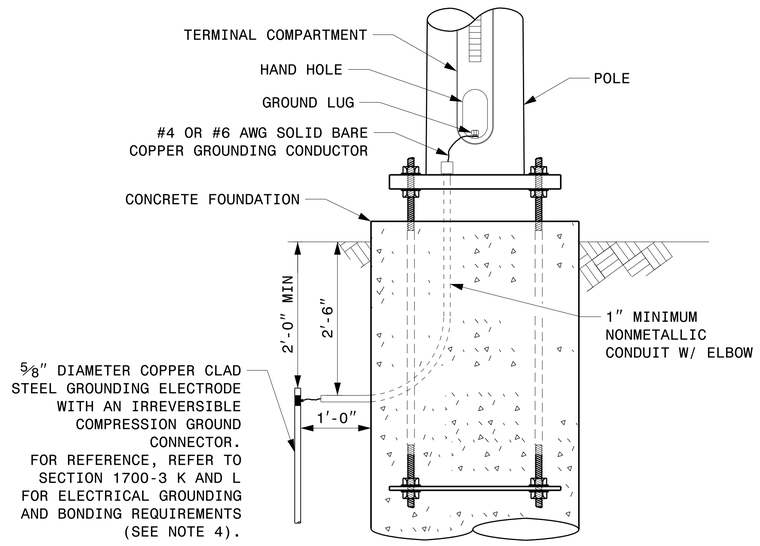
STRAIN POLE ATTACHMENTS

NOTES:

1. STRAP ALL SIGNAL CABLES TO THE SIDE OF THE POLE WITH ¾″ STAINLESS STEEL STRAPS WHEN THE DISTANCE BETWEEN SPAN WIRE ATTACHMENT CLAMP AND WEATHERHEADS EXCEEDS 3′-0″.
2. PROVIDE MINIMUM TWO SPAN WIRE 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 2024.



ATTACHMENT OF CABLE TO INTERMEDIATE METAL POLE



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

SCALE
0 NA
NONE

Typical Fabrication Details
For
Strain Pole Attachments

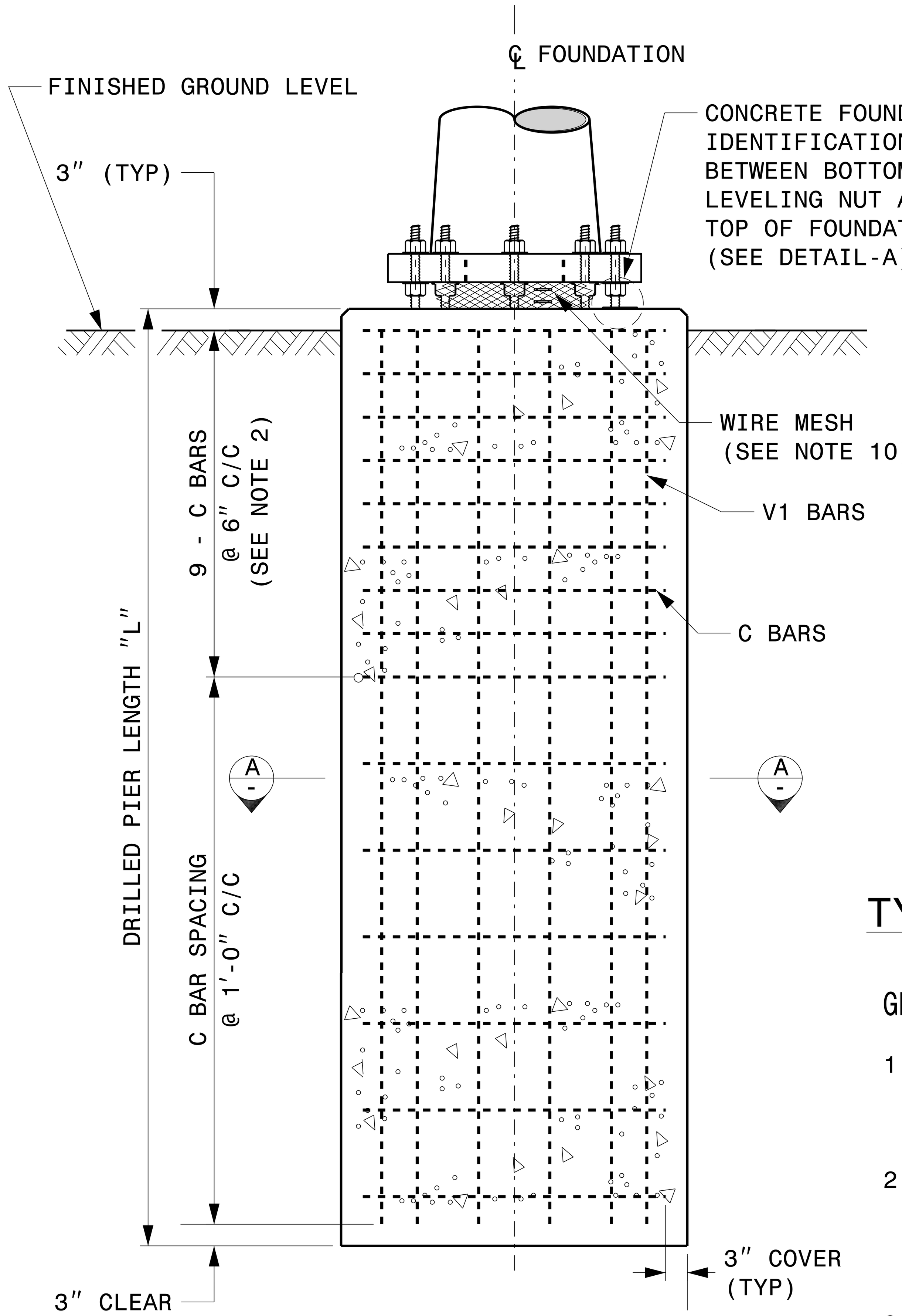
PLAN DATE:	SEPTEMBER 2023	DESIGNED BY:	C.F. ANDREWS
PREPARED BY:	K.C. DURIGON	REVIEWED BY:	D.C. SARKAR

REVISIONS	INIT.	DATE

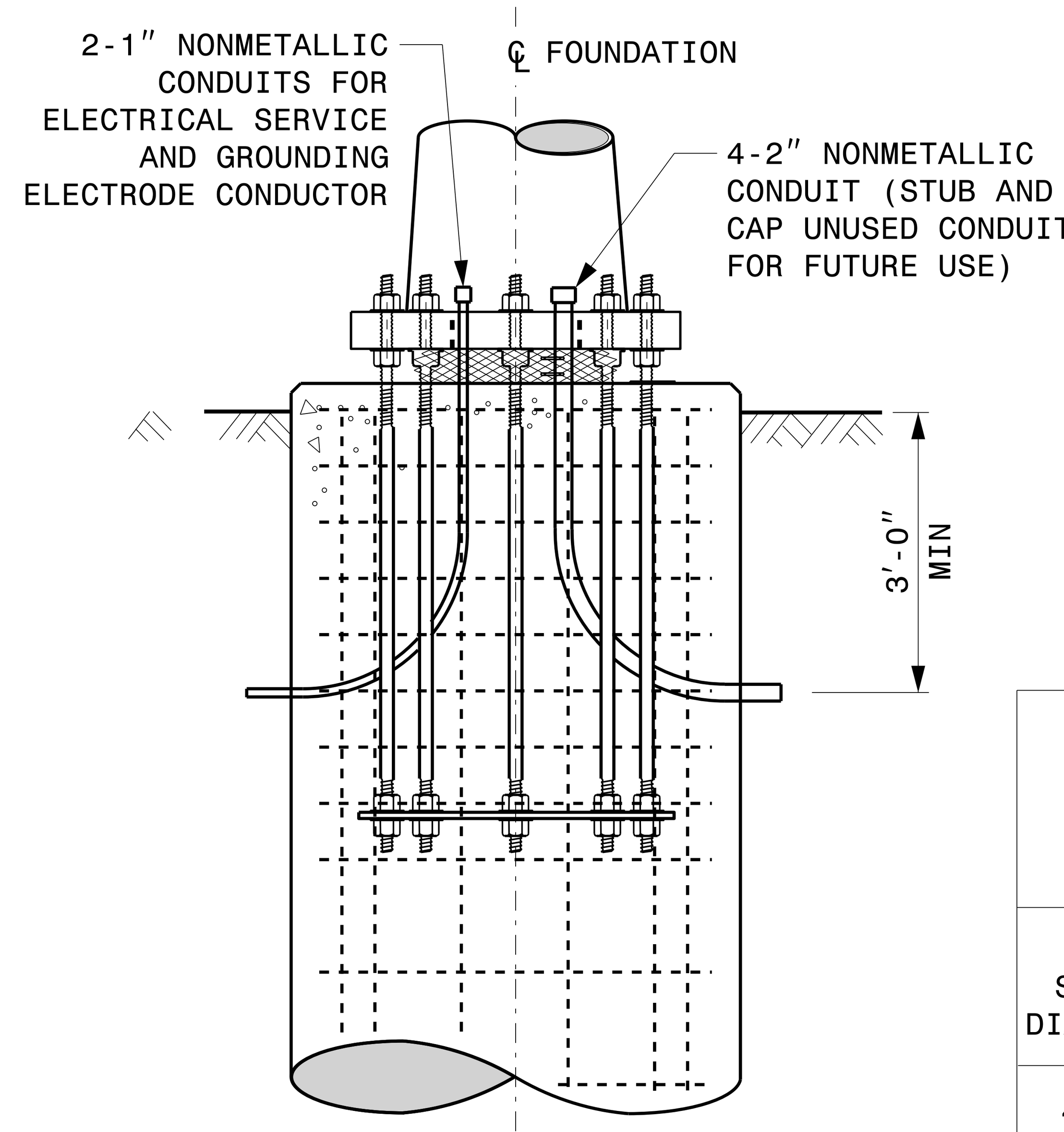
SEAL

NORTH CAROLINA PROFESSIONAL SEAL 036626 ENGINEER KEVIN C. DURIGON

DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE



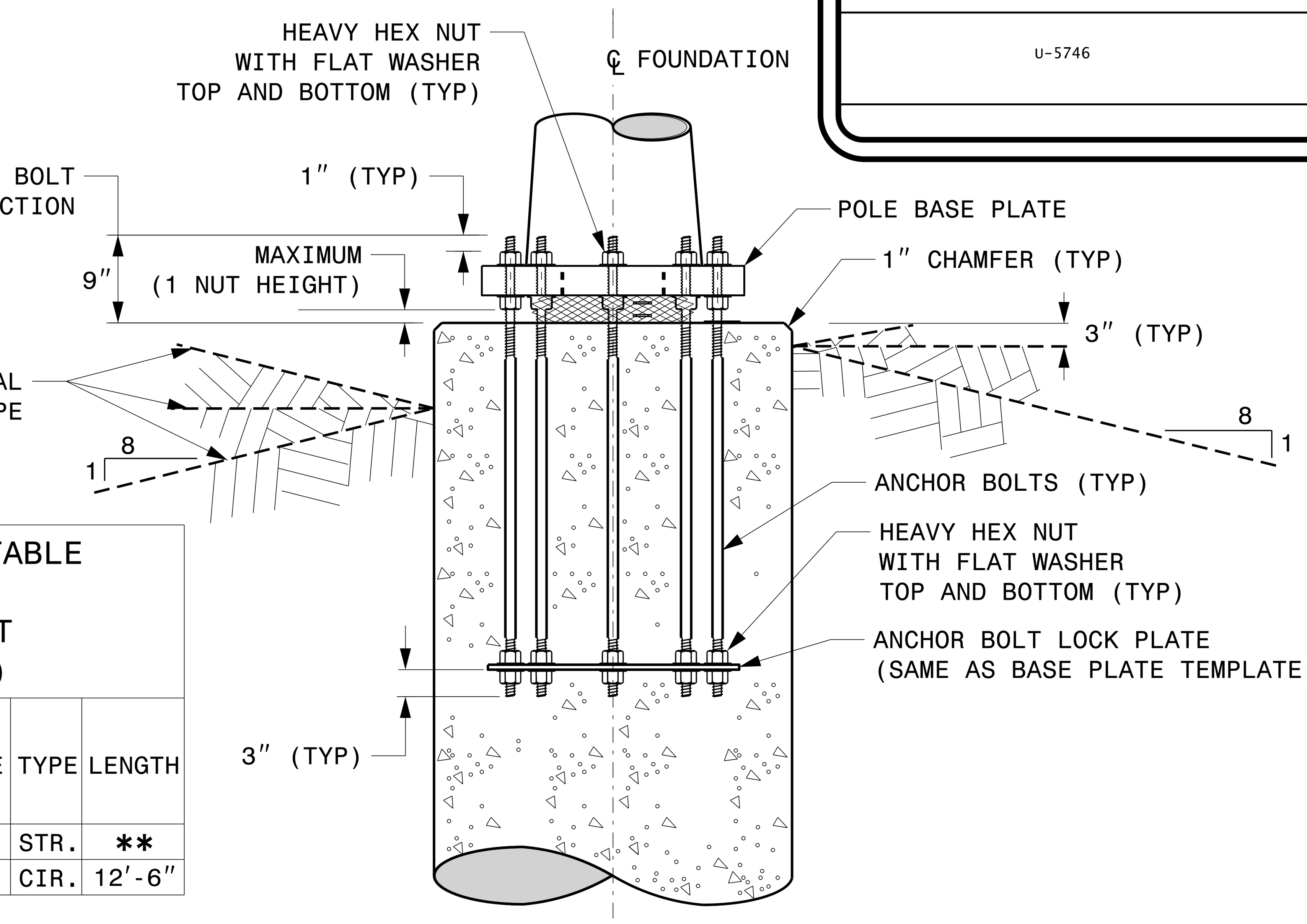
CONCRETE SHAFT ELEVATION



TYPICAL FOUNDATION CONDUIT DETAILS

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)

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 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

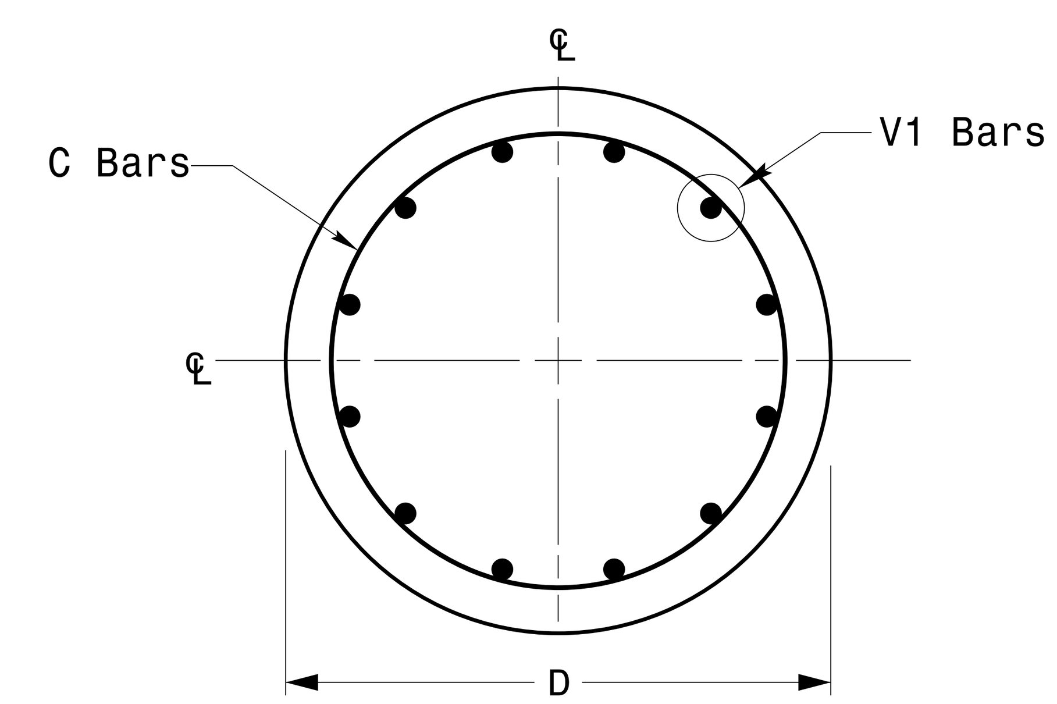
7. USE AIR ENTRAINED AA CONCRETE MIX WITH A COMPRESSION STRENGTH OF f′c=4500 psi (MIN) AFTER 28 DAYS.

8. USE ASTM A615 GRADE 60 DEFORMED BARS FOR ALL REINFORCING STEEL. MAINTAIN AT LEAST 3″ COVER ON ALL REINFORCEMENT.

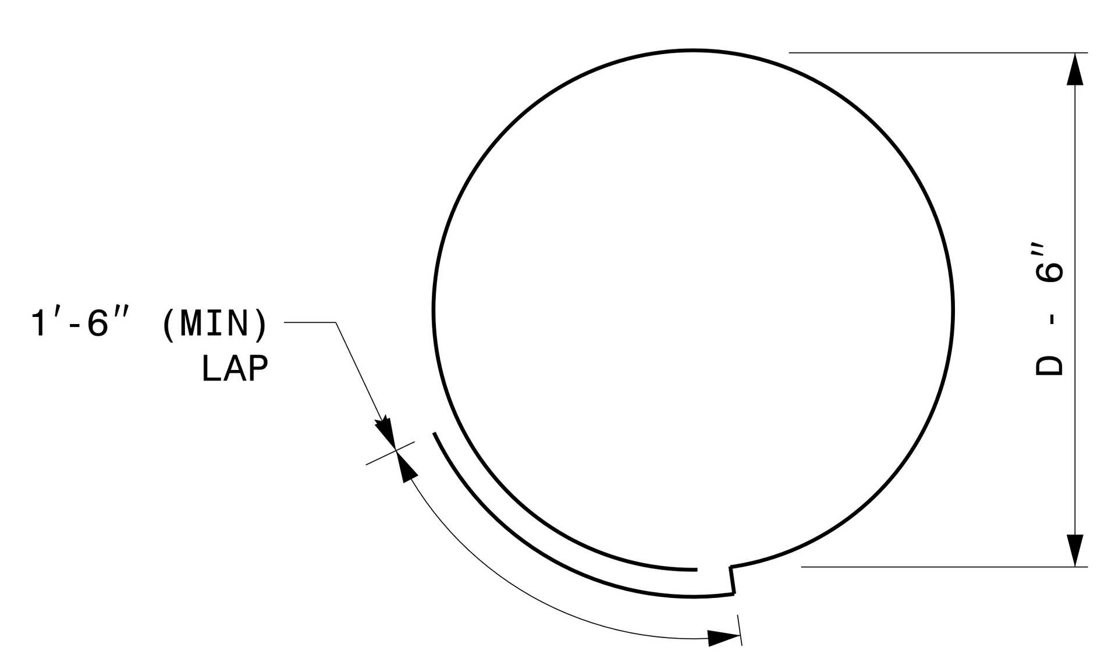
9. LOCATE IDENTIFICATION TAG ON TOP OF THE FOUNDATION, DIRECTLY ABOVE THE CONDUIT′S ENTRY POINT.

10. 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.

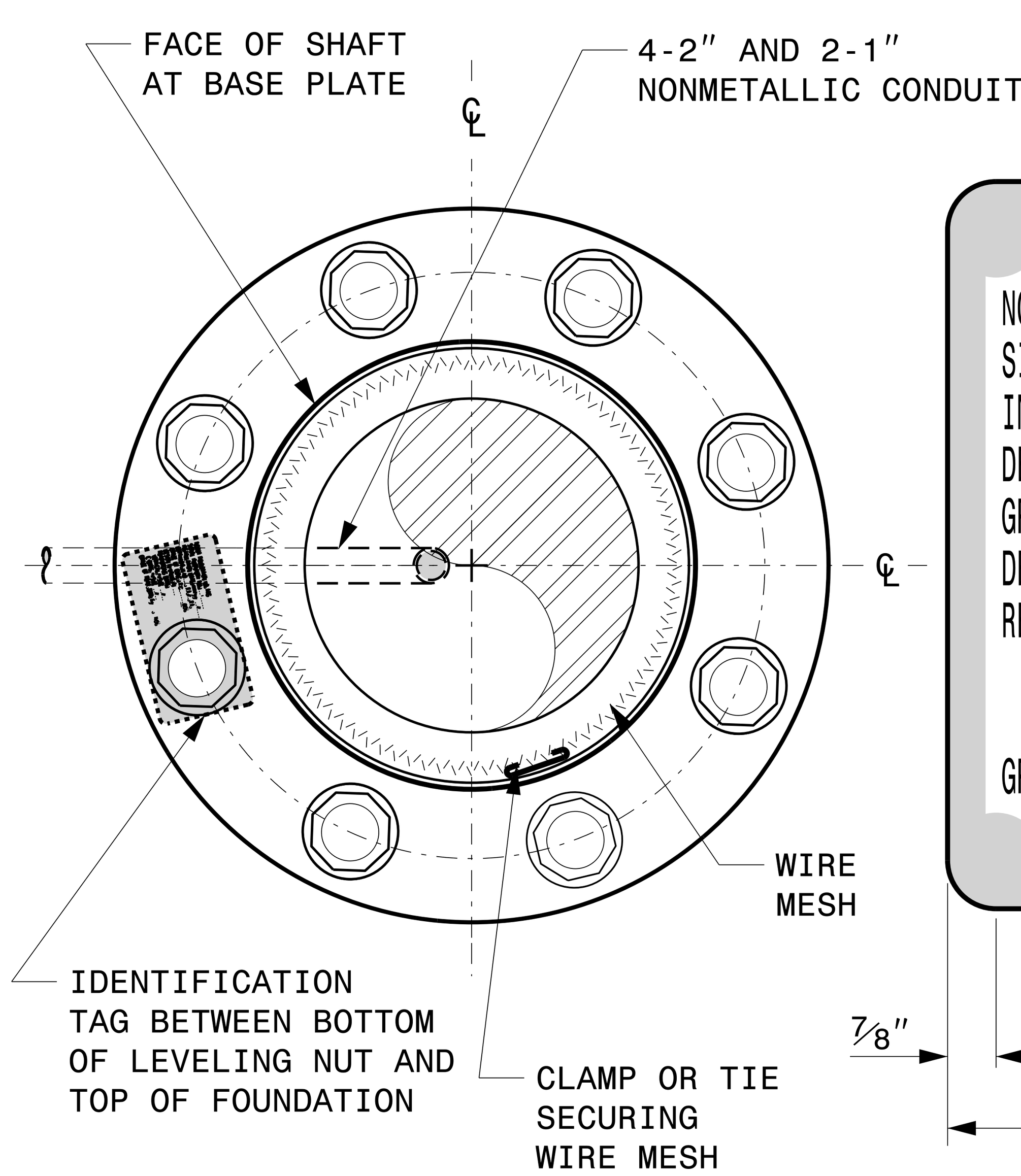
11. PREFERRED LOCATION FOR THE I.D. TAG IS AS SHOWN IN DETAIL-A: DIRECTLY ABOVE THE CONDUIT ENTERING THE FOUNDATION.



SECTION A-A

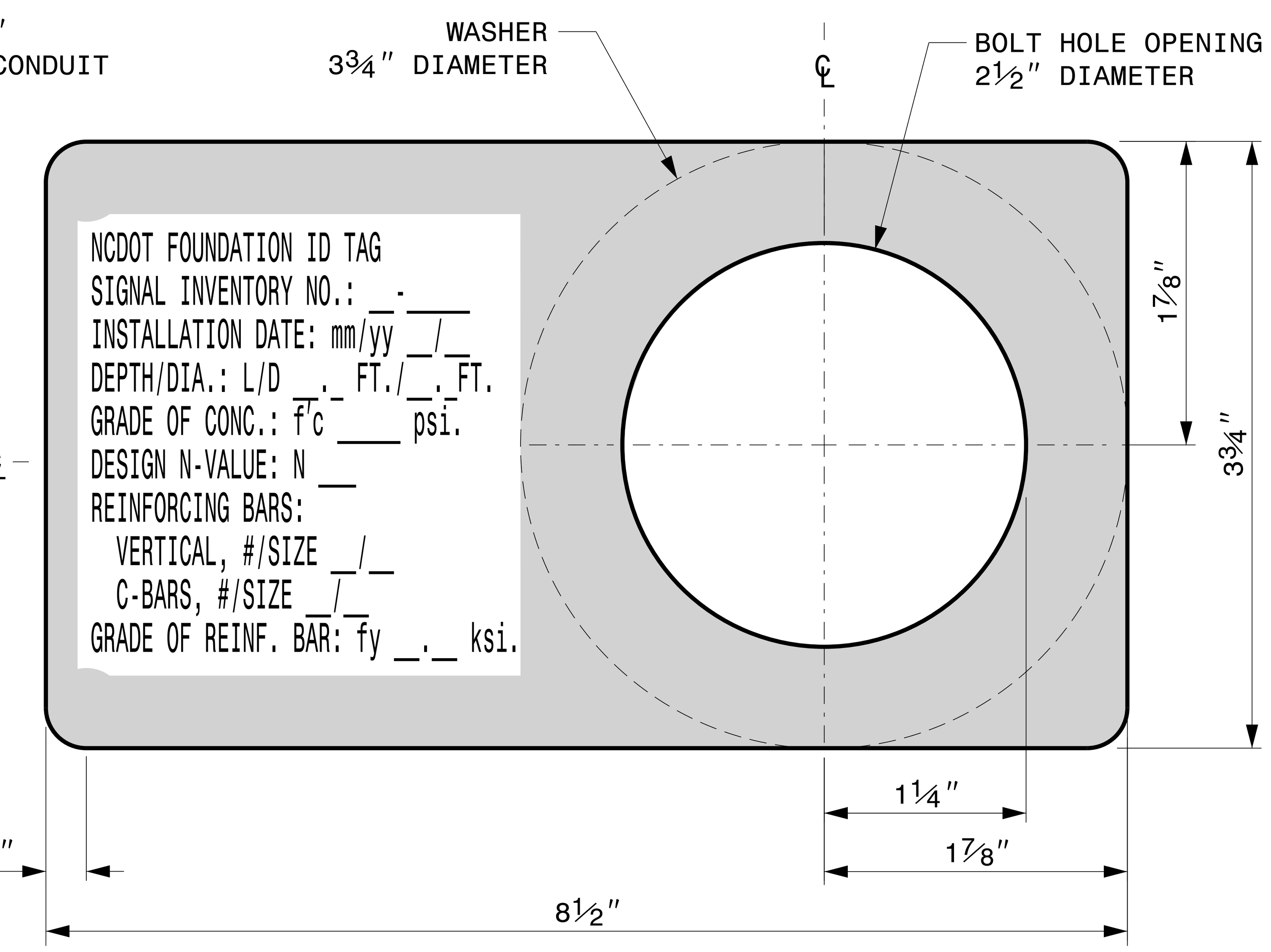


TYPICAL "C" BAR DETAIL



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

DETAIL-A



CONCRETE FOUNDATION IDENTIFICATION TAG DETAILS

Construction Details – Foundations

PROJECT I.D. NO.	SHEET NO.
U-5746	Sig.M7

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

SCALE 0 NA NONE

Construction Details For Foundations

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036626 ENGINEER KEVIN C. DURIGON

DocuSigned by: Kevin Durigon
SIGNATURE 4B23DC79B3784DA...
09/21/2023 DATE

03-OCT-2023 12:45
S:*ITS&SU*ITS Signals*Signal Design Section*Structures*Drawings*2024 Metal Pole Std Drawings for LRFD*2024 Sig.M7 Std. Construction Details-Strain Poles.dgn
kcdurigon

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.)
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

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.

Standard Strain Pole Foundation – All Soil Conditions

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

SCALE 0 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

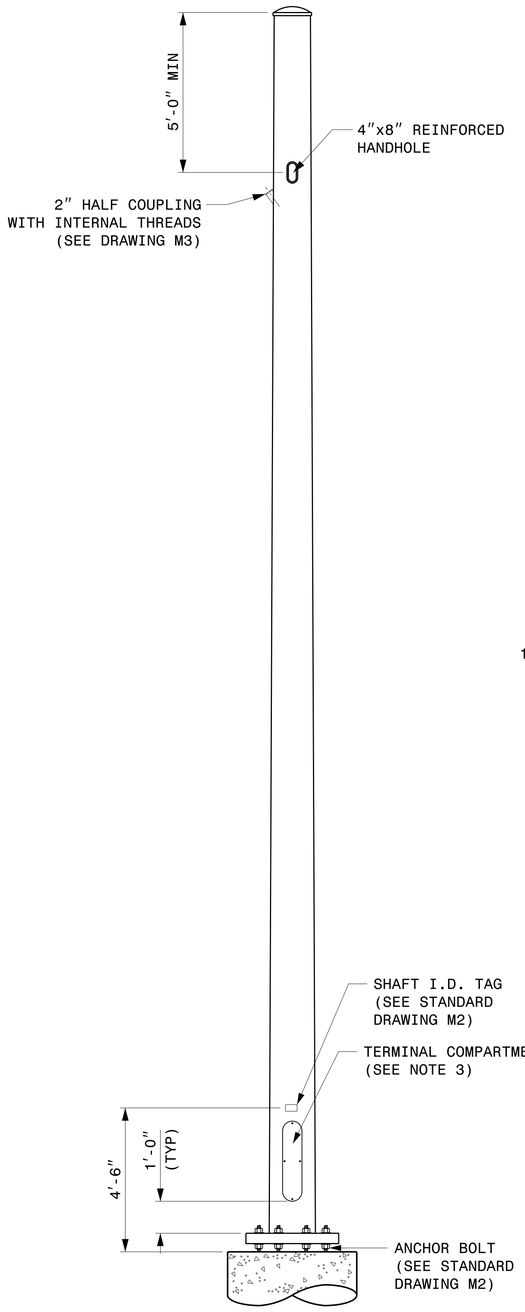
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036626 ENGINEER KEVIN C. DURIGON

DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE

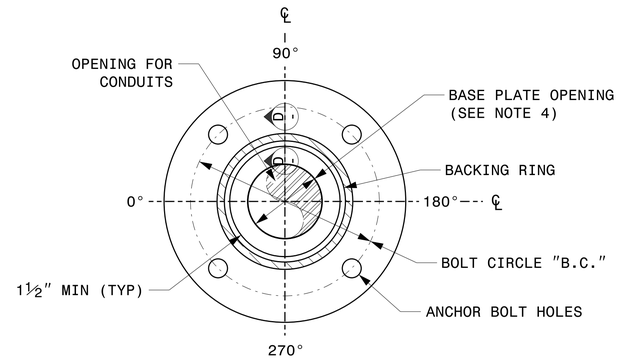
PROJECT I.D. NO.	SHEET NO.
U-5746	Sig.M9

Fabrication Details – CCTV Camera Poles

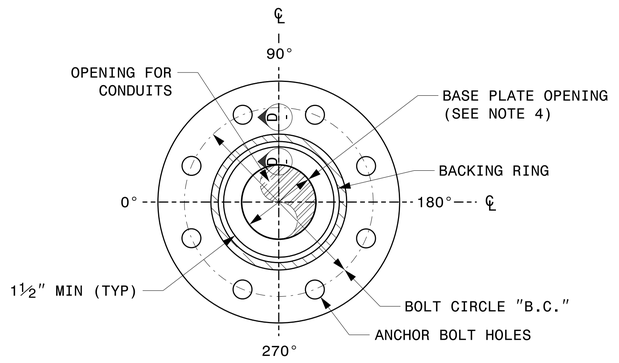


CCTV CAMERA POLE

(NOT TO SCALE)

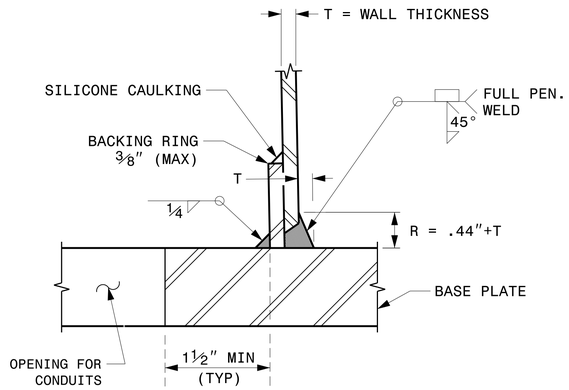


4 BOLT PATTERN
FOR POLES UP TO 40'



8 BOLT PATTERN
FOR POLES TALLER THAN 40'

BASE PLATE DETAILS



SECTION D-D

(POLE ATTACHMENT TO BASE PLATE)

FULL-PENETRATION GROOVE WELD DETAIL

NOTES:

1. THIS DRAWING PROVIDES BASIC DETAILS FOR CCTV POLES. PROJECT REQUIREMENTS MAY REQUIRE SPECIAL FACTORY PREPS THAT ARE NOT SHOWN ON THESE DETAILS.
2. DETAILS FOR INTERNAL CAMERA LOWERING SYSTEMS ARE NOT SHOWN.
3. POLE MOUNTED CABINETS MAY REQUIRE MODIFICATIONS TO THE LOWER HANDHOLE OPENING TO MOUNT CABINETS. 4" X 8" REINFORCED HANDHOLES ARE ACCEPTABLE OPTIONS, AND MAY BE PREFERRED.
4. OPENING IN POLE BASE SHALL BE EQUAL TO POLE BASE INSIDE DIAMETER MINUS 3½" BUT SHALL NOT BE LESS THAN 8½".
5. USE COMPACT SECTION CRITERIA D/T RATIO PER AASHTO LTS-LRFD 1ST EDITION SECTION 5.7.2.

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

SCALE
0 NA
NONE

Typical Fabrication Details For CCTV Poles

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

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036626 ENGINEER KEVIN C. DURIGON

DocuSigned by:
Kevin Durigon
SIGNATURE
4B23DC79B3784DA...
09/21/2023
DATE