STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

JOSH STEIN
GOVERNOR

J.R. "JOEY" HOPKINS
SECRETARY

SOLICITATION ADDENDUM

Issuing Agency:	Department of Transportation
Solicitation Number:	54-LC-12167363
Solicitation Description:	Mast Arm Poles
Solicitation Opening Date and Time:	March 3, 2025 at 2:00PM ET
Addendum Number:	1
Addendum Date:	February 27, 2025
Procurement Specialist:	Lyndsey K. Campbell

THIS ADDENDUM DOES NOT NEED TO BE RETURNED.

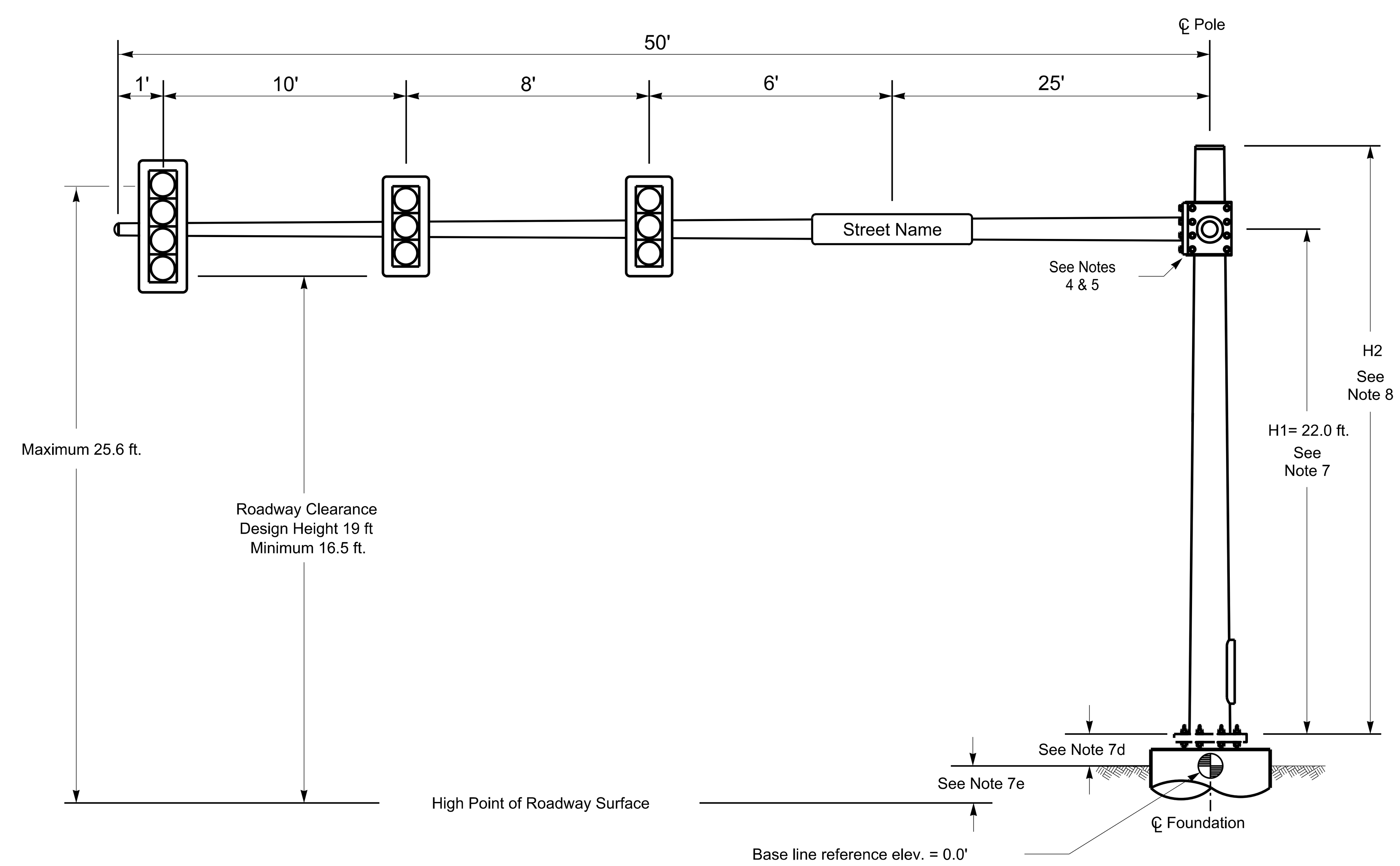
1. The following are questions received about the Solicitation and the State's response to those questions:

Question #	Solicitation Section	Vendor Question	State's Response
1	Exhibit A-C	Can you provide clearer drawings?	See Attached Pages
2			
3			
4			
5			

2. The Solicitation Opening Date is hereby extended to March 13, 2025 at 2:00PM ET.

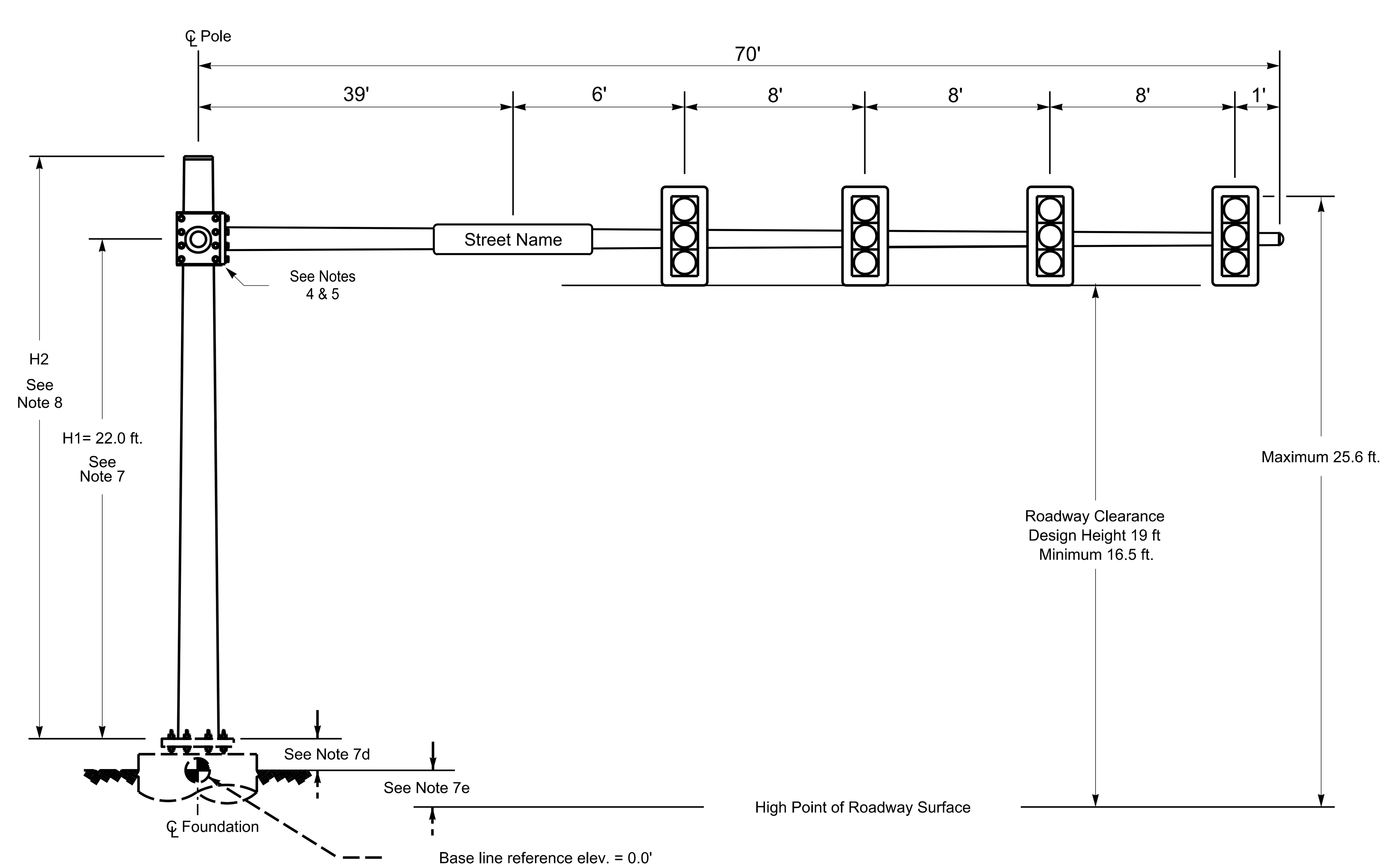
14-JAN-2025 17:13
pw://ncdot-pw.bentley.com:ncdot-pw-01/Documents/NCDOT TSMO/Signal Design Section/Division_03/03-1191/Signal Design/2024-08/031191_sig_dsn_2024mmdd.dgn
zmlittle

Design Loading for METAL POLE NO. 1, MAST ARM A



Elevation View @ 270

Design Loading for METAL POLE NO. 1, MAST ARM B



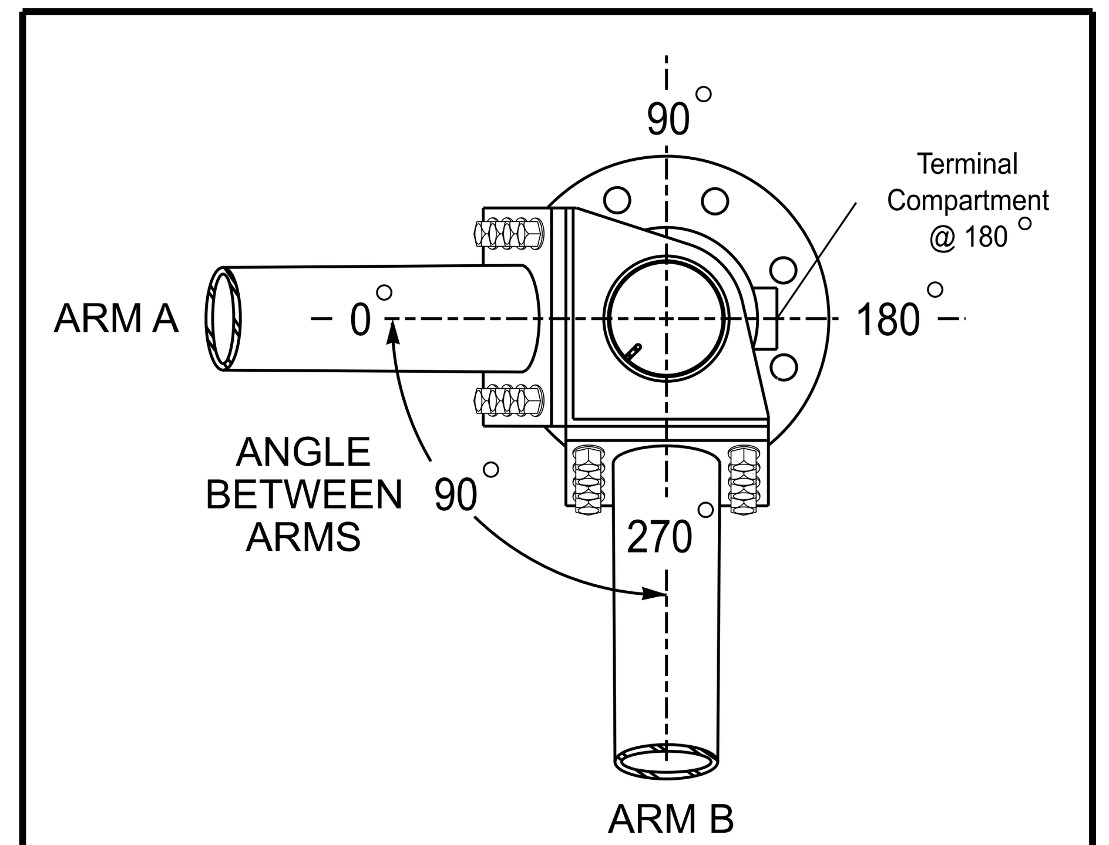
Elevation View @ 0

SPECIAL NOTE

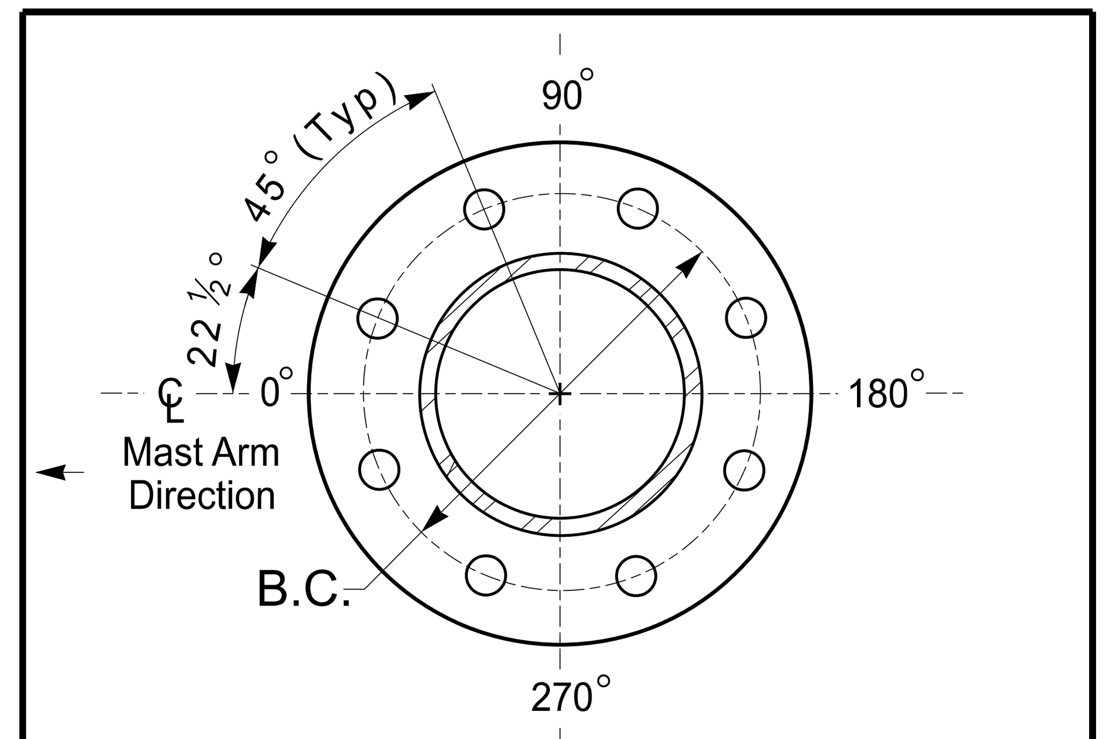
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Arm A	Arm B
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.7 ft.	0.0 ft.
Elevation difference at Edge of travelway or face of curb	+0.1 ft.	-0.3 ft.

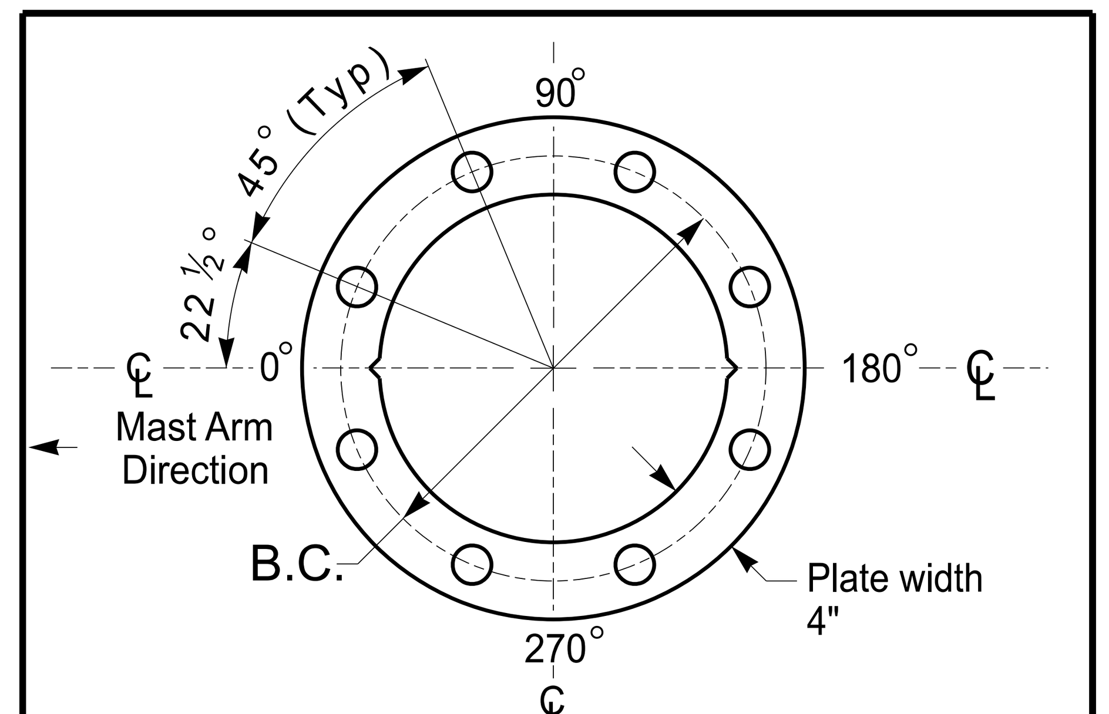


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

METAL POLE No. 1

PROJECT REFERENCE NO.	SHEET NO.
-	Sig. 1.4

MAST ARM LOADING SCHEDULE

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

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 1st Edition 2015 AASHTO LRFD "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2024 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2024 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/TSMO-Design-Resources.aspx

DESIGN REQUIREMENTS

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

NCDOT Wind Zone 1 (150 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SCALE: 0 N/A
N/A

US 421
at
SR 1120
(Malpass Corner Road)

Division 3 Pender County Near Atkinson

PLAN DATE: August 2024	REVIEWED BY: ZML
PREPARED BY: KGP, Jr.	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030530 ZACHARY M. LITTLE

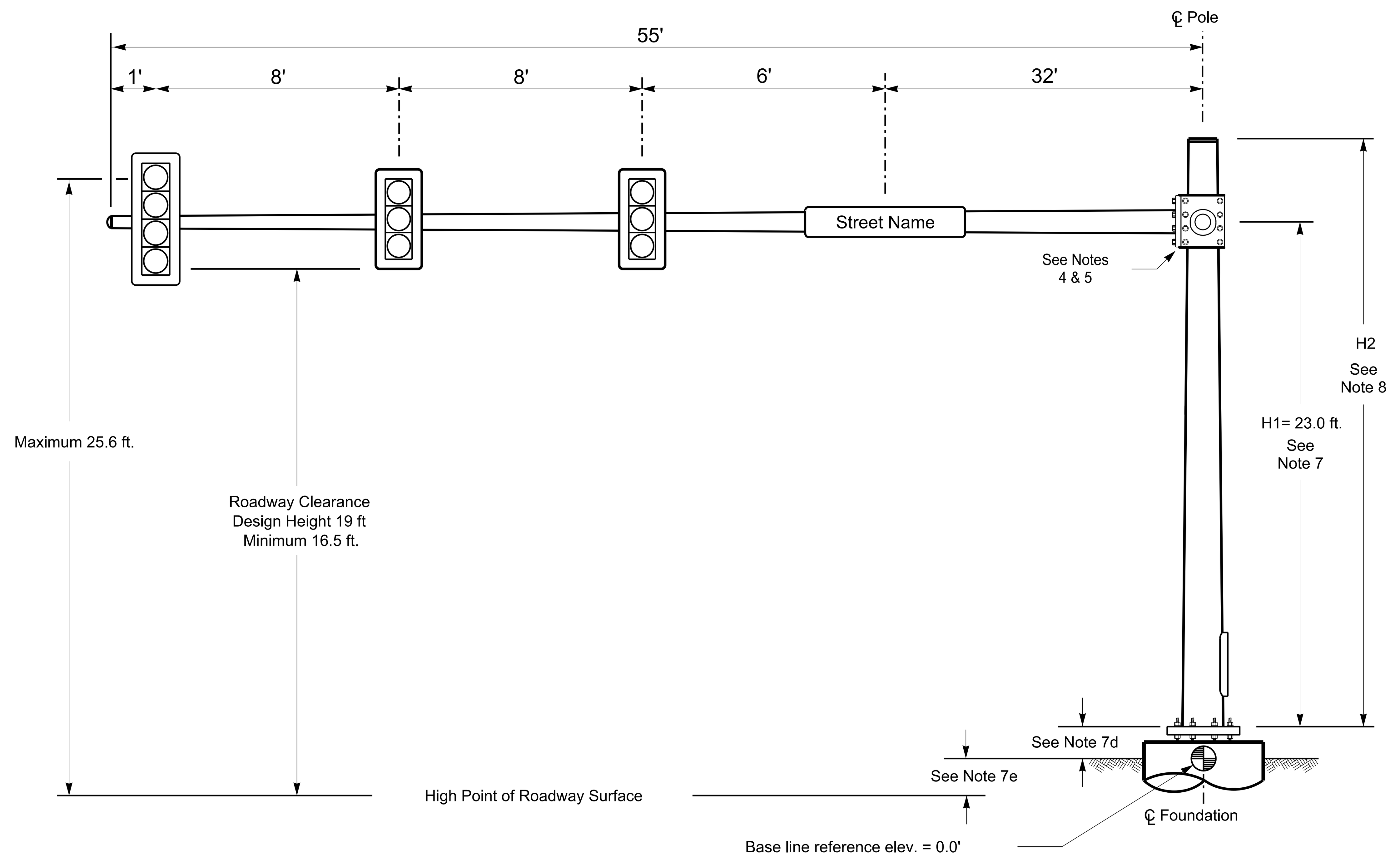
Signed by: Zachary M. Little 01/14/2025
DATE

SIG. INVENTORY NO. 03-1191

METAL POLE No. 2

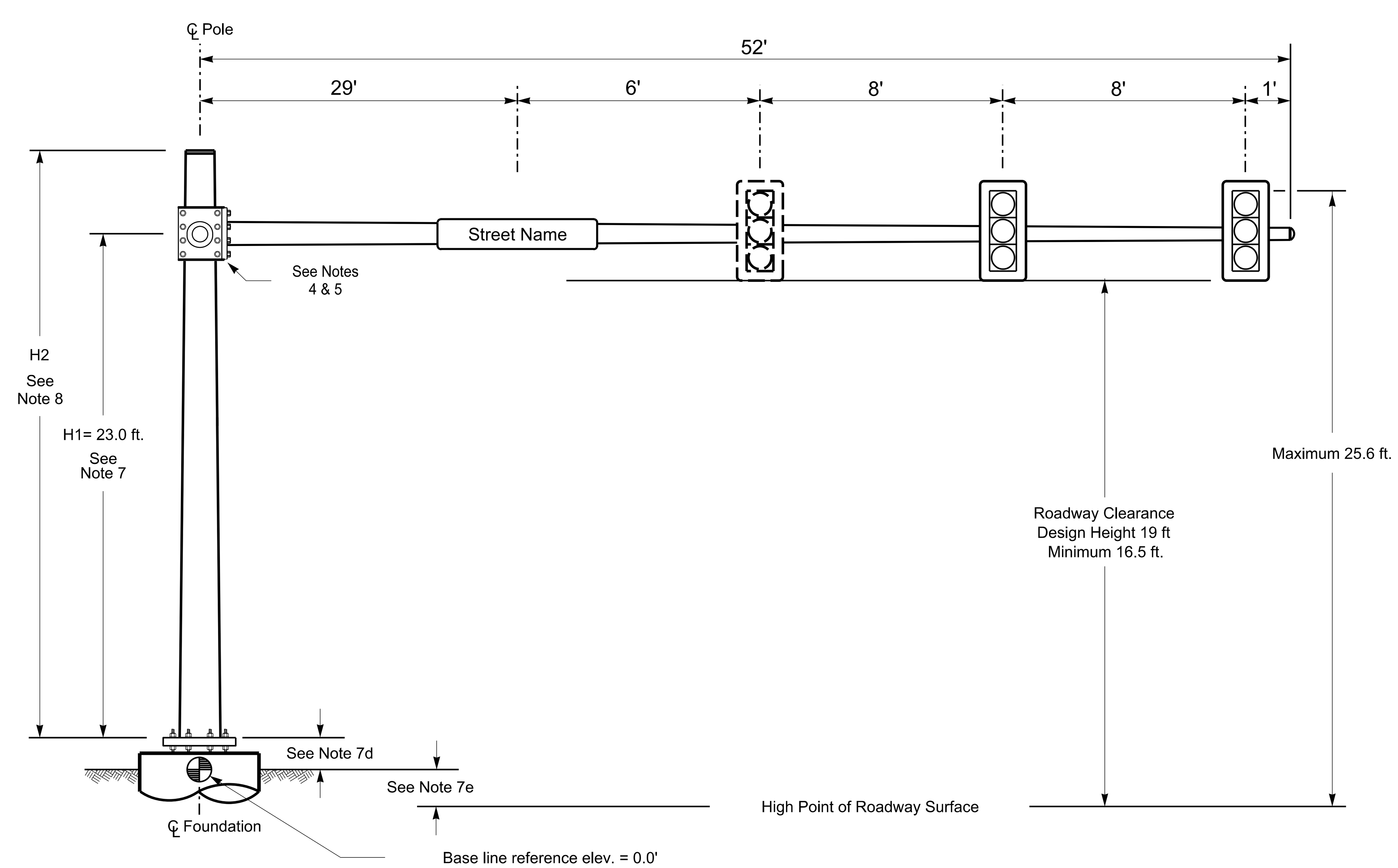
PROJECT REFERENCE NO.	SHEET NO.
-	Sig. 1.5

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



Elevation View @ 270 °

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



Elevation View @ 0 °

SPECIAL NOTE

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Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Arm A	Arm B
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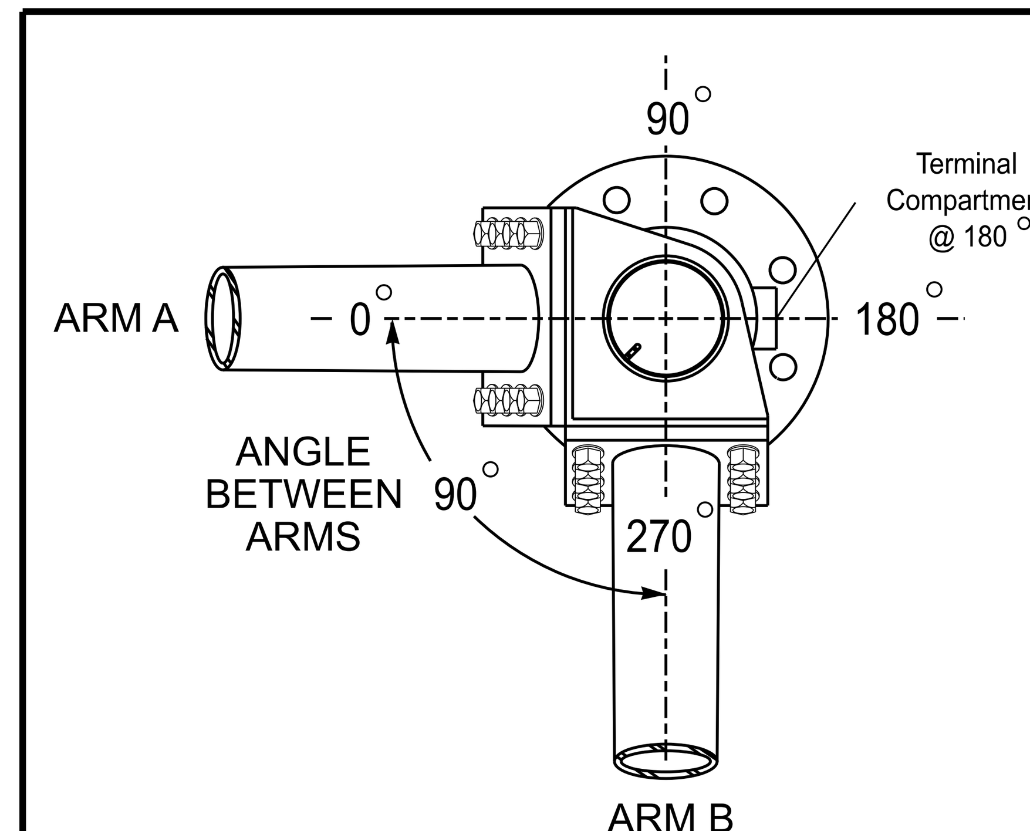
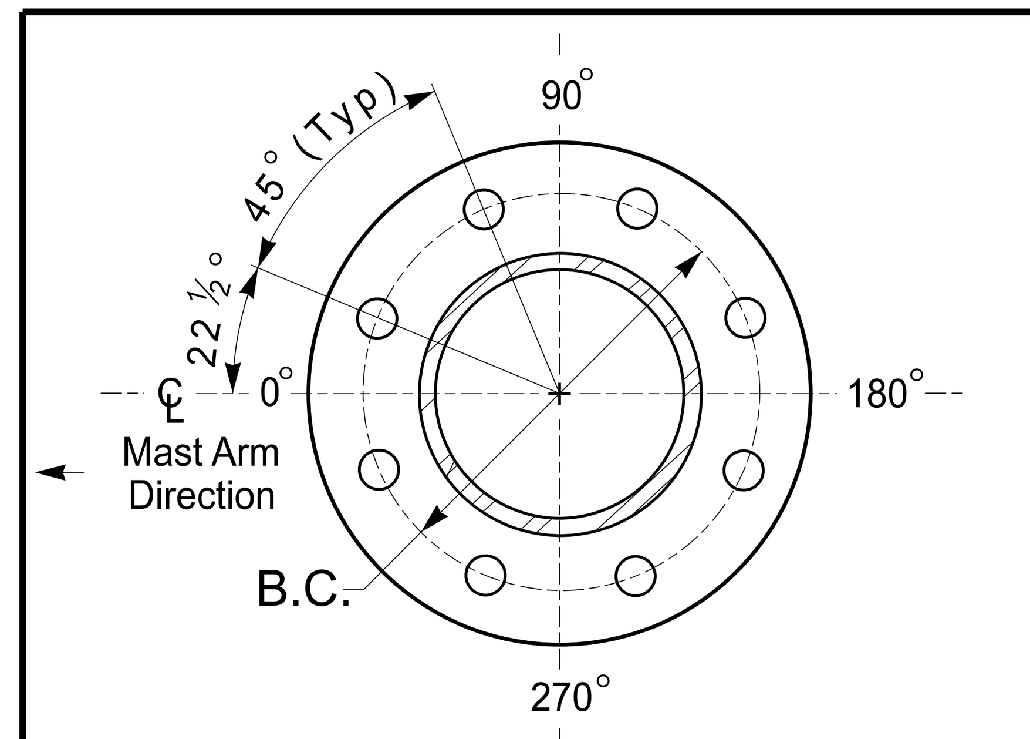
Elevation difference at High point of roadway surface	+1.7 ft.	+1.0 ft.
Elevation difference at Edge of travelway or face of curb	+1.1 ft.	+0.5 ft.

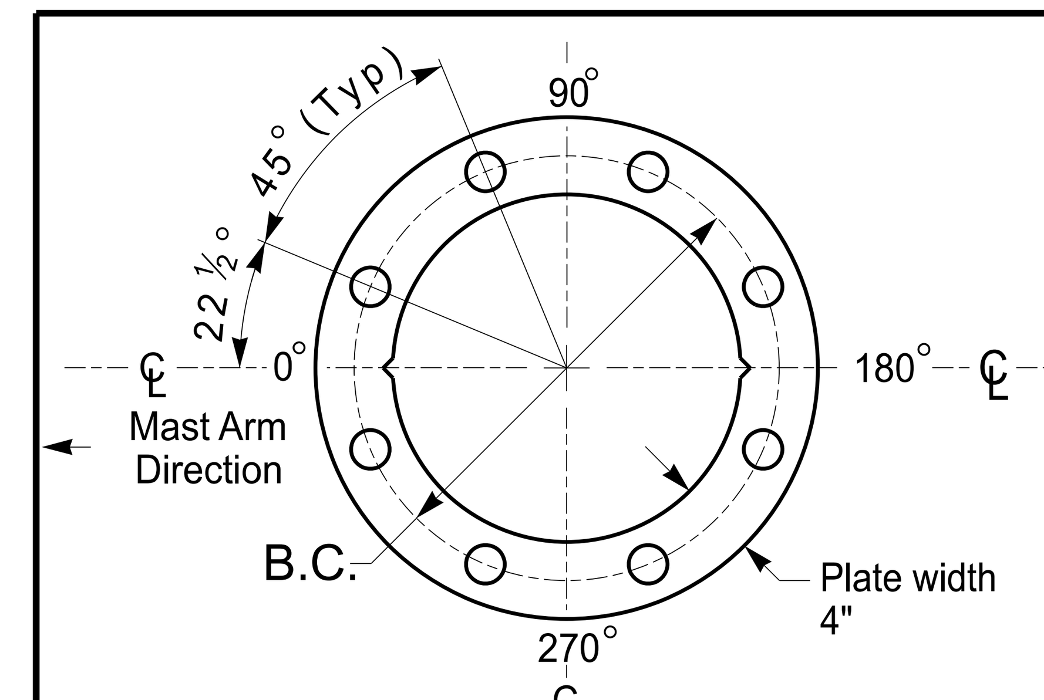


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

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

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
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   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/TSMO-Design-Resources.aspx

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
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4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
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6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
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NCDOT Wind Zone 1 (150 mph)

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

SCALE
0 N/A
N/A

US 421
at
SR 1120
(Malpass Corner Road)

Division 3 Pender County Near Atkinson

PLAN DATE:	August 2024	REVIEWED BY:	ZML
PREPARED BY:	KGP, Jr.	REVIEWED BY:	

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

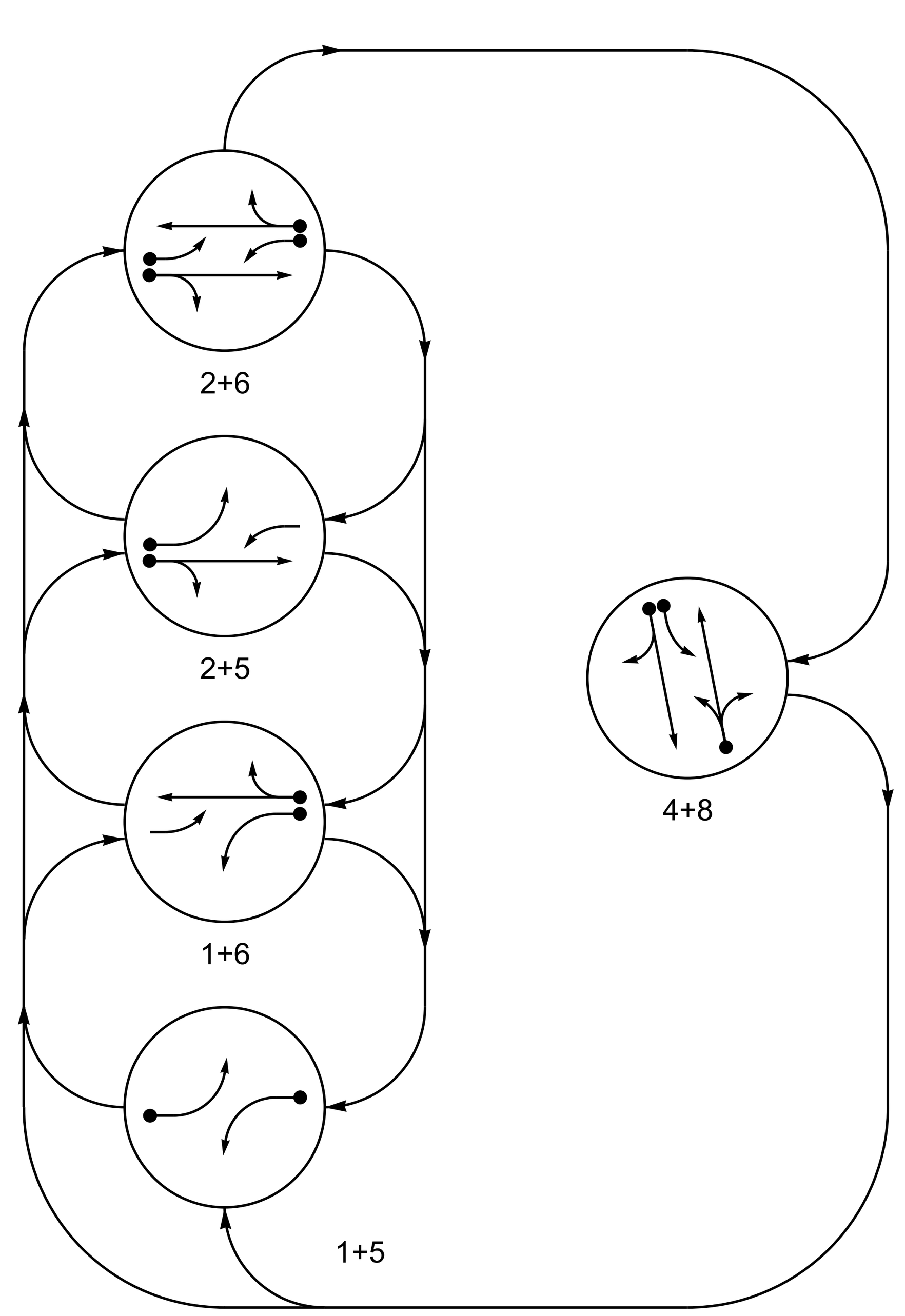
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030530 ZACHARY M. LITTLE

Signed by: Zachary M. Little 01/14/2025
DATE

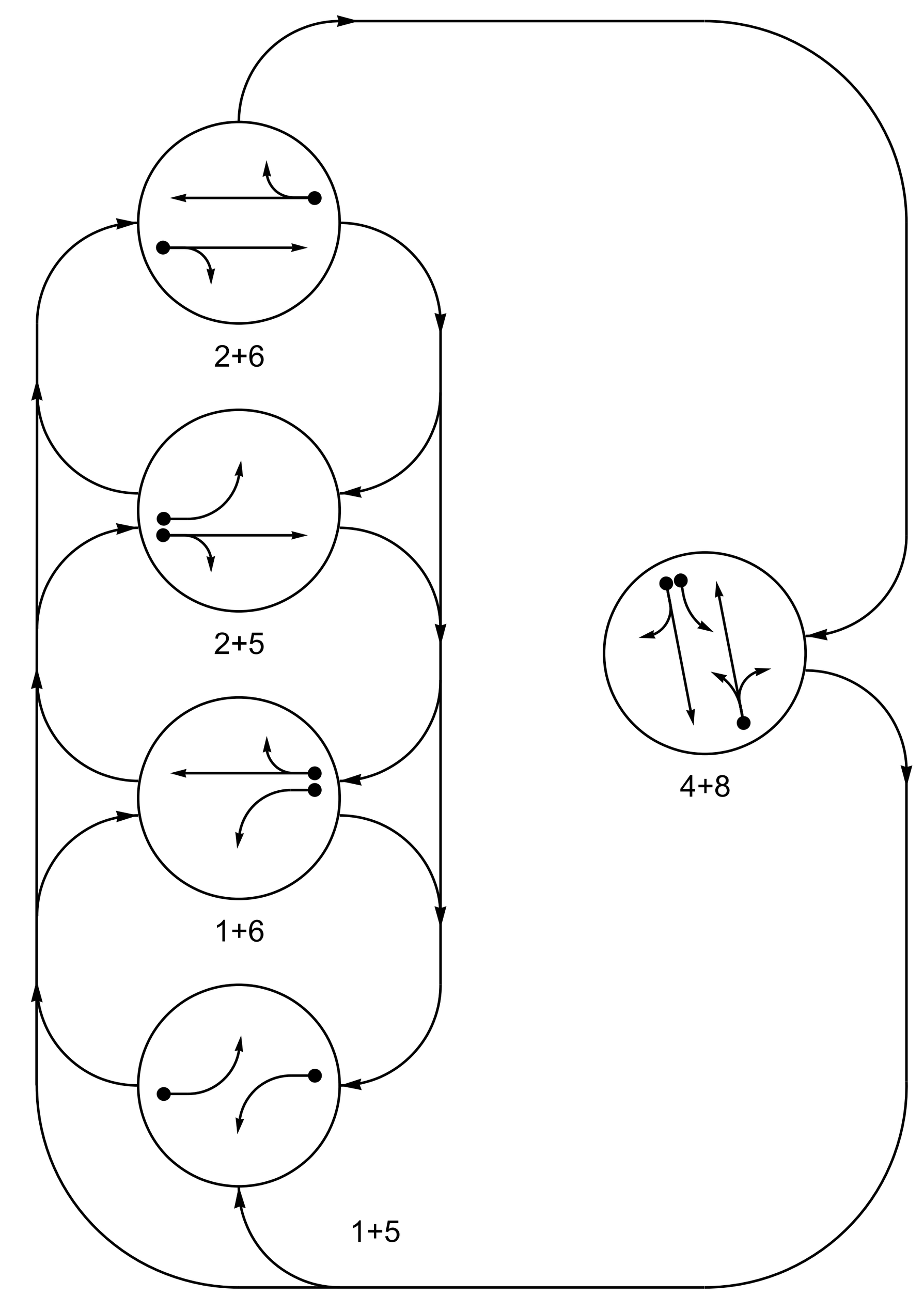
SIG. INVENTORY NO. 03-1191

PROJECT REFERENCE NO.	SHEET NO.
-	Sig. 1.0

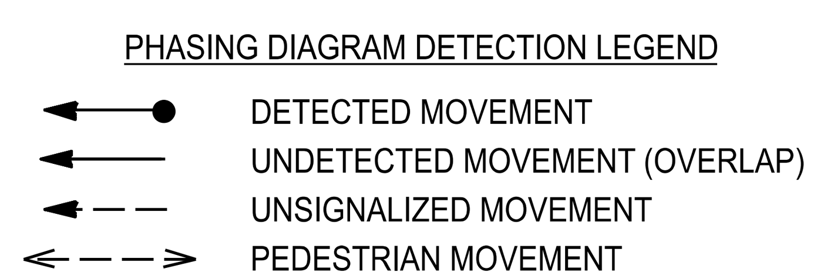
DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM

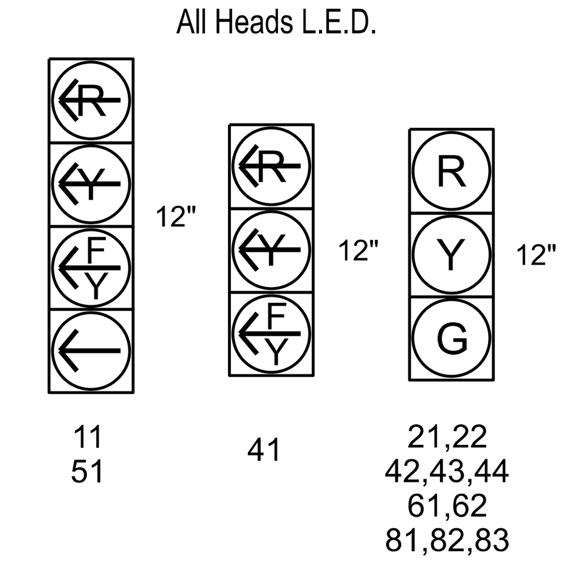


PHASING DIAGRAM DETECTION LEGEND



SIGNAL FACE I.D.

All Heads L.E.D.



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	4+8	FLASH
11	←	←	←FY	←FY	←R	←R
21,22	R	R	G	G	R	R
41	←R	←R	←R	←R	←FY	←R
42,43,44	R	R	R	R	G	R
51	←	←FY	←	←FY	←R	←R
61,62	R	G	R	G	R	R
81,82,83	R	R	R	R	G	R

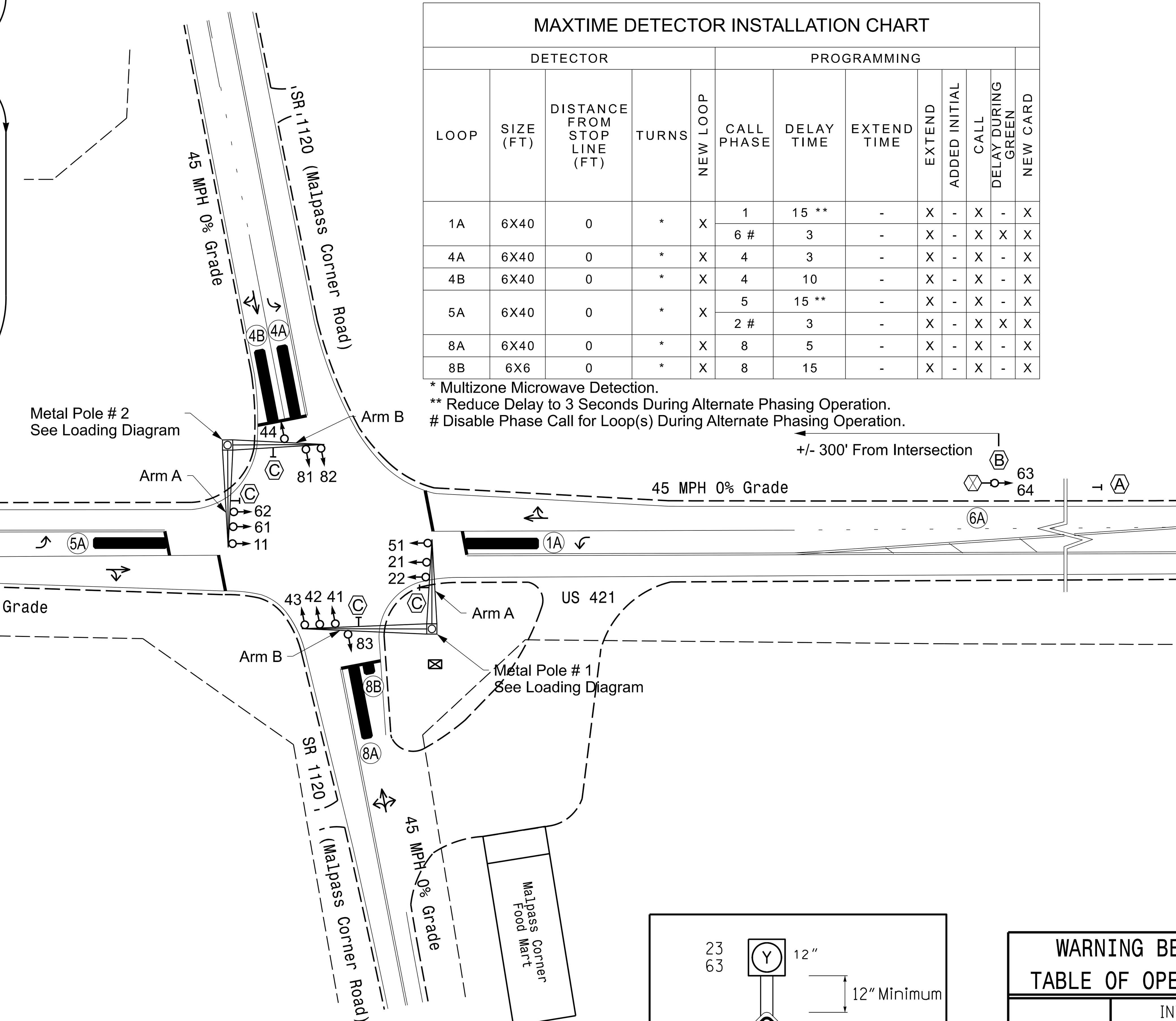
ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE 1+5	1+6	2+5	2+6	4+8	FLASH
11	←	←	←R	←R	←R	←R
21,22	R	R	G	G	R	R
41	←R	←R	←R	←R	←FY	←R
42,43,44	R	R	R	R	G	R
51	←	←R	←	←R	←R	←R
61,62	R	G	R	G	R	R
81,82,83	R	R	R	R	G	R

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR: LOOP	SIZE (FT)	DISTANCE FROM STOP LINE (FT)	TURNS	NEW LOOP	PROGRAMMING: CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
1A	6X40	0	*	X	1	15 **	-	X	-	X	-	X
					6 #	3	-	X	-	X	X	X
4A	6X40	0	*	X	4	3	-	X	-	X	-	X
4B	6X40	0	*	X	4	10	-	X	-	X	-	X
5A	6X40	0	*	X	5	15 **	-	X	-	X	-	X
					2 #	3	-	X	-	X	X	X
8A	6X40	0	*	X	8	5	-	X	-	X	-	X
8B	6X6	0	*	X	8	15	-	X	-	X	-	X

* Multizone Microwave Detection.
** Reduce Delay to 3 Seconds During Alternate Phasing Operation.
# Disable Phase Call for Loop(s) During Alternate Phasing Operation.



5-Phase
Fully Actuated
Isolated

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. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. The Division Traffic Engineer will determine the hours of use for each phasing plan.
7. This intersection uses multi-zone microwave detection. Install detectors according to the manufacturer's instructions to achieve the desired detection.
8. Activate beacons 23, 24 to flash 3 seconds prior to the end of phase 2 green. These beacons shall remain flashing until the beginning of phase 4 + 8 green.
9. Activate beacons 63, 64 to flash 3 seconds prior to the end of phase 6 green. These beacons shall remain flashing until the beginning of phase 4 + 8 green.

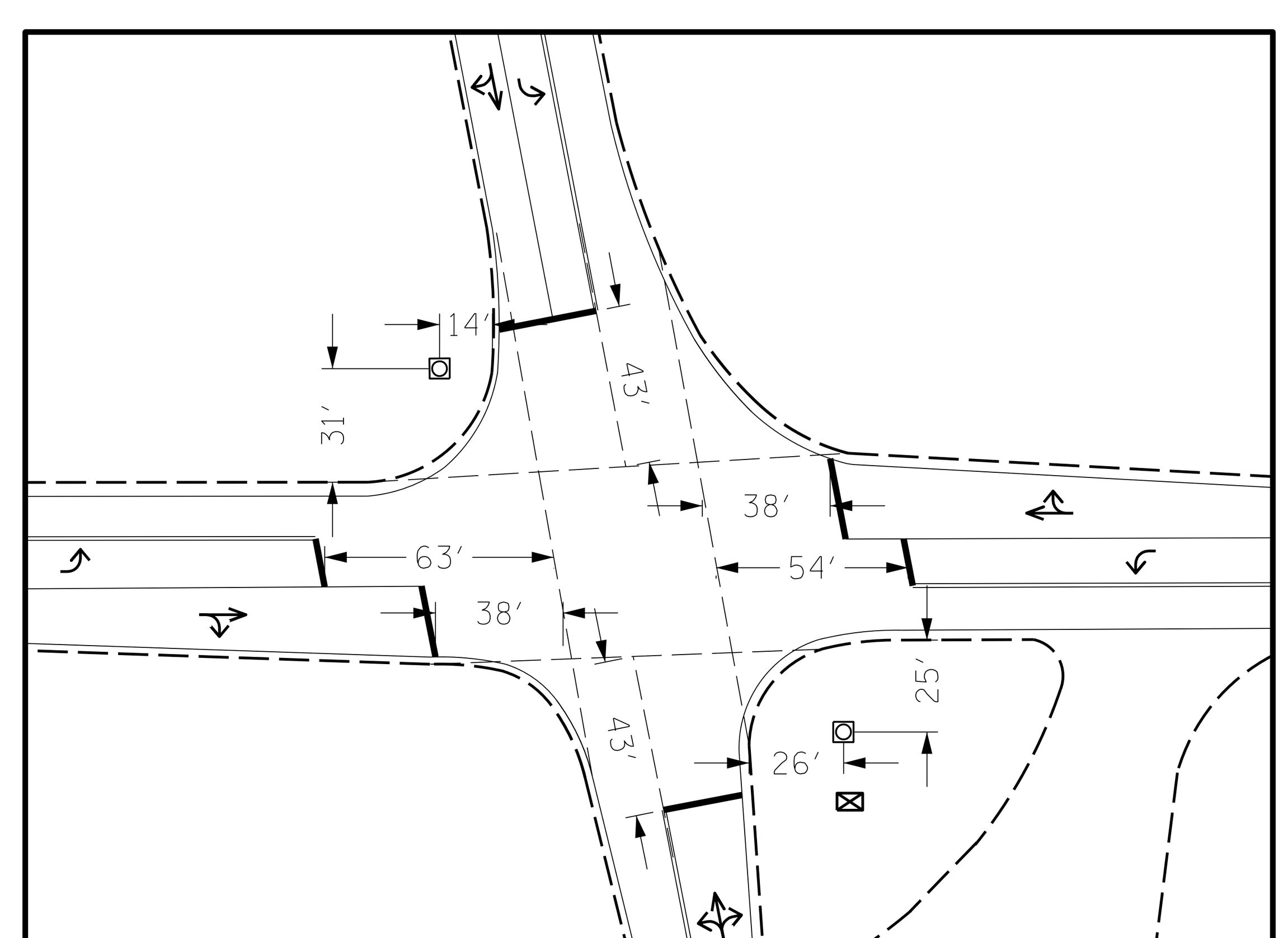
Radar Detection System

FUNCTION	Sensor 1 (2A)		Sensor 2 (6A)	
Channel	1	QUEUE	1	QUEUE
Phase	2	2	6	6
Direction of Travel	EB	EB	WB	WB
Detection Zone (ft)	100-600	100-150	100-600	100-150
Enable Speed	Y	Y	Y	Y
Speed Range (mph)	35-100	1-35	35-100	1-35
Enable Estimated Time of Arrival	Y	N	Y	N
Estimated Time of Arrival (sec)	1.0-6.5	-	1.0-6.5	-

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Walk *	-	-	-	-	-	-
Ped Clear	-	-	-	-	-	-
Min Green *	7	12	7	7	12	7
Passage *	2.0	2.0	2.0	2.0	2.0	2.0
Max 1 *	20	90	30	20	90	30
Yellow Change	3.0	4.6	4.5	3.0	4.6	4.5
Red Clear	2.8	1.5	1.6	3.1	1.5	1.6
Added Initial *	-	-	-	-	-	-
Maximum Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Advance Walk	-	-	-	-	-	-
Pre-Clearance	-	3	-	-	3	-
Non Lock Detector	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.



Metal Pole and Stopbar Locations

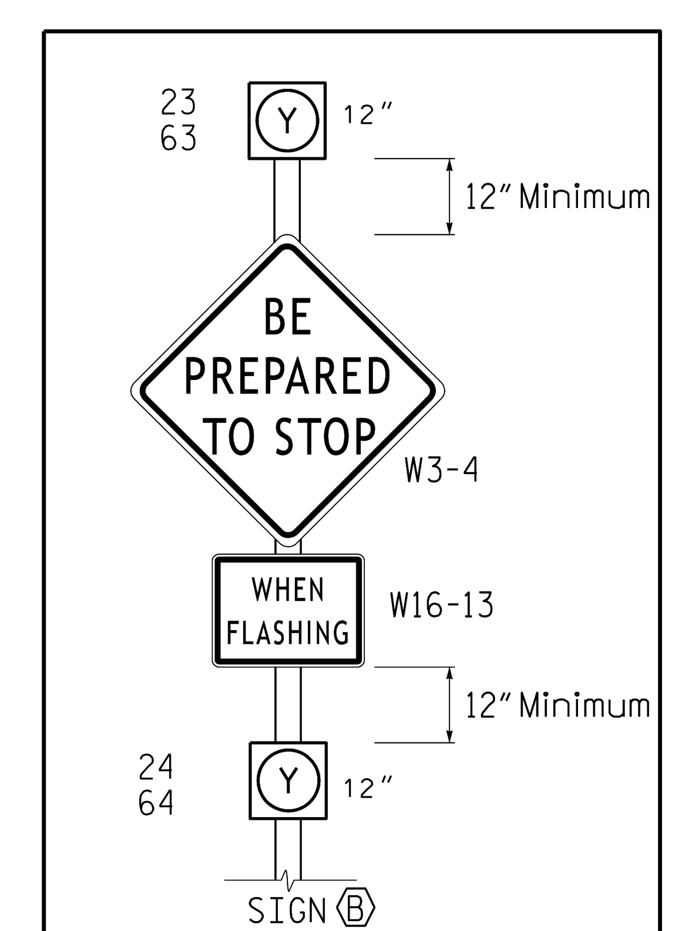


FIGURE 1

WARNING BEACON TABLE OF OPERATION

SIGNAL FACE	INTERVAL 1	2
23 @	ON	OFF
24 @	OFF	ON
63 @	ON	OFF
64 @	OFF	ON

@ See Note 8, 9.

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 III Signal Pedestal	
	Signal Ahead Sign (W3-3)	
	See Figure 1	
	Metal Pole with Mastarm	
	Multizone Microwave Detection	
	Type III Pedestal	
	Street Name Sign	

New Installation

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

SCALE 0 50'
1"=50'

US 421
at
SR 1120
(Malpass Corner Road)

Division 3 Pender County Near Atkinson
PLAN DATE: August 2024 REVIEWED BY: ZML
PREPARED BY: KGP, Jr. REVIEWED BY:
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