

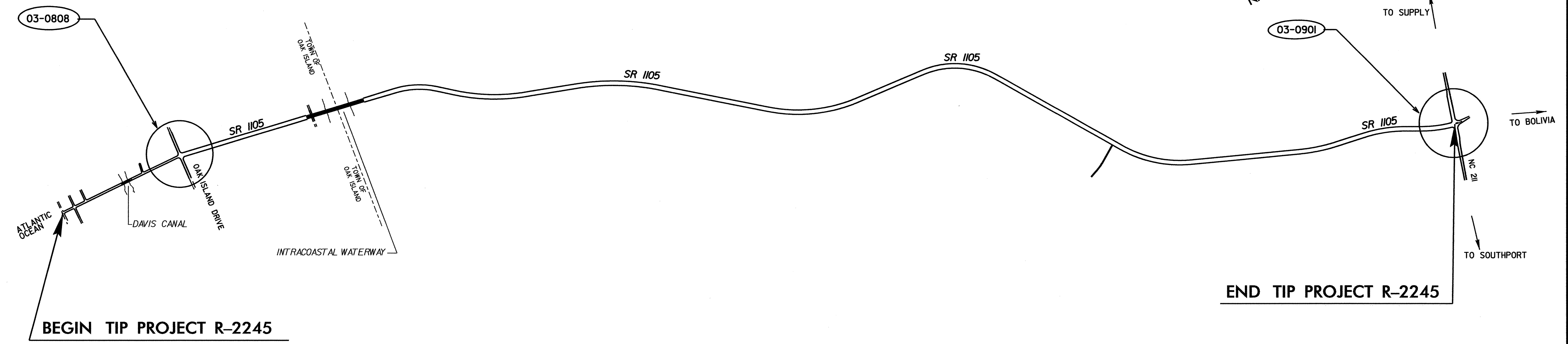
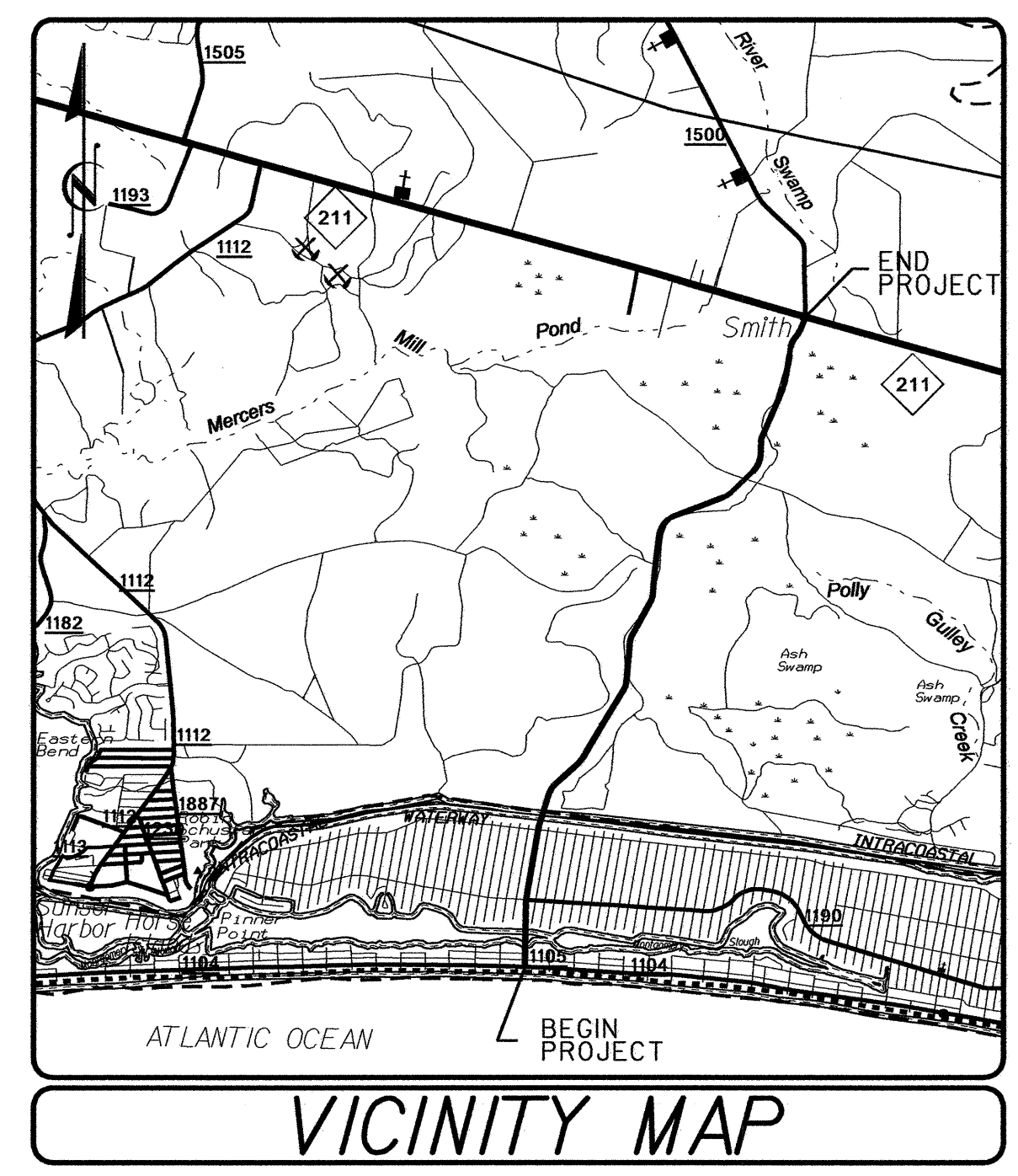
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

Brunswick County

**LOCATION: MIDDLETON AVENUE FROM SR 1104 (OCEAN BEACH DRIVE)
TO NC 211 (SECOND BRIDGE TO OAK ISLAND)**

TYPE OF WORK: Traffic Signals

Project: R-2245



Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.

Sheet #	Reference #	Index of Plans Location/Description
Sig. 1		Title Sheet
Sig. 2	03-0808	SR 1105 (South Middleton Ave./North Middleton Ave. at Oak Island Drive)
Sig. 6	03-0901	NC 211 at Middleton Ave./SR 1500 (Midway Rd.)
Sig. 15	N/A	Metal Pole Details

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:

D. Y. Ishak - Signals and Geometrics Contracts Engineer
G. C. Brown, PE - Signal Equipment Design Engineer
G. G. Murr, Jr., PE - Intelligent Transportation Systems Engineer

Prepared In the Office of:
DIVISION OF HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

122 N. McDowell St., Raleigh, NC 27603

PHASING DIAGRAM

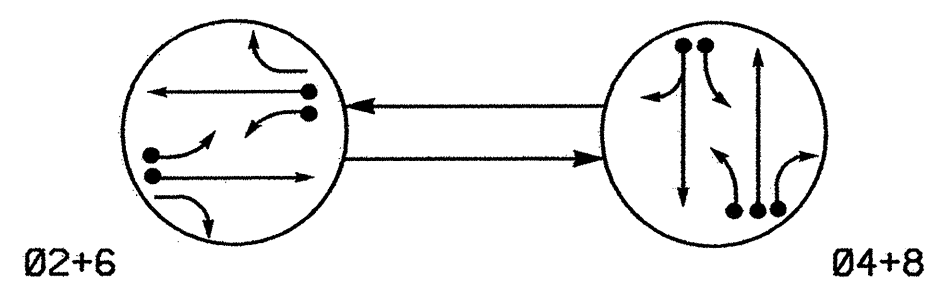


TABLE OF OPERATION

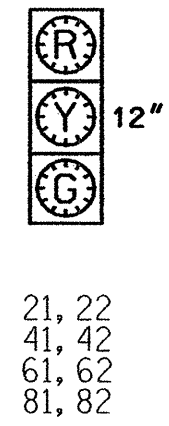
Table with 3 columns: SIGNAL FACE, PHASE (0 2+6, 0 4+8, F L 0 8), and values (e.g., 21, 22 | G | R | Y).

PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT (arrow with dot)
UNDETECTED MOVEMENT (OVERLAP) (two overlapping arrows)
UNSIGNALIZED MOVEMENT (dashed arrow)
PEDESTRIAN MOVEMENT (arrow with person icon)

SIGNAL FACE I.D.

Denotes L.E.D.



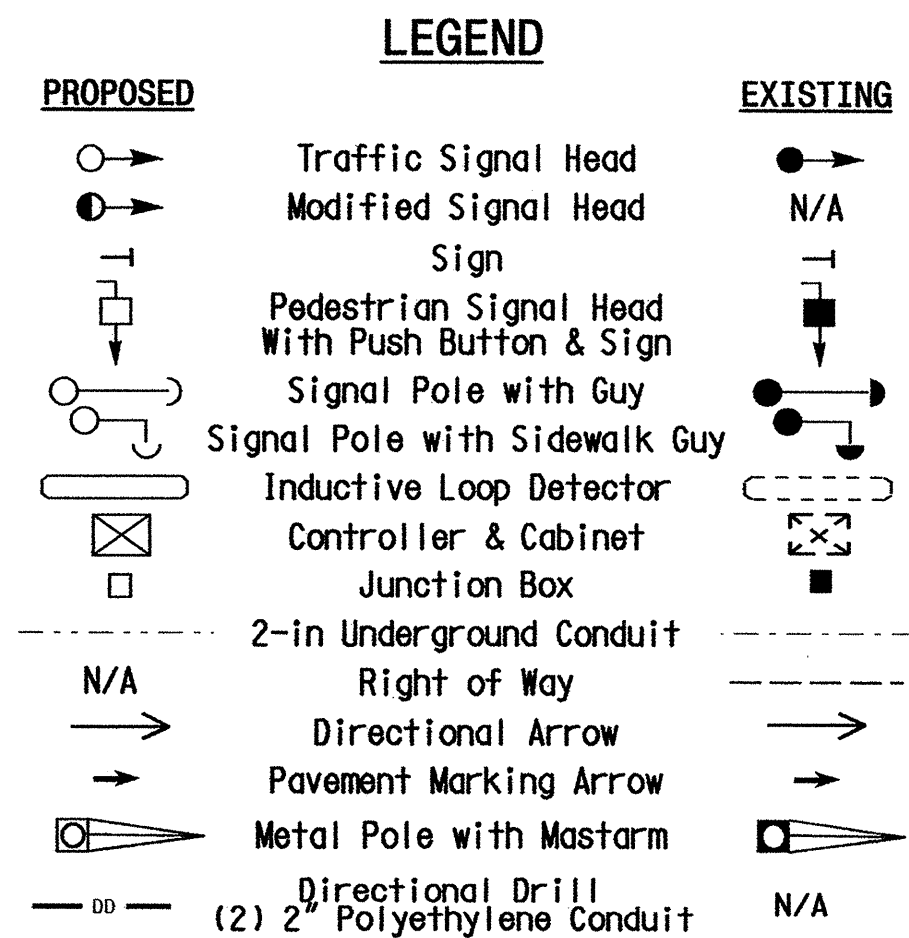
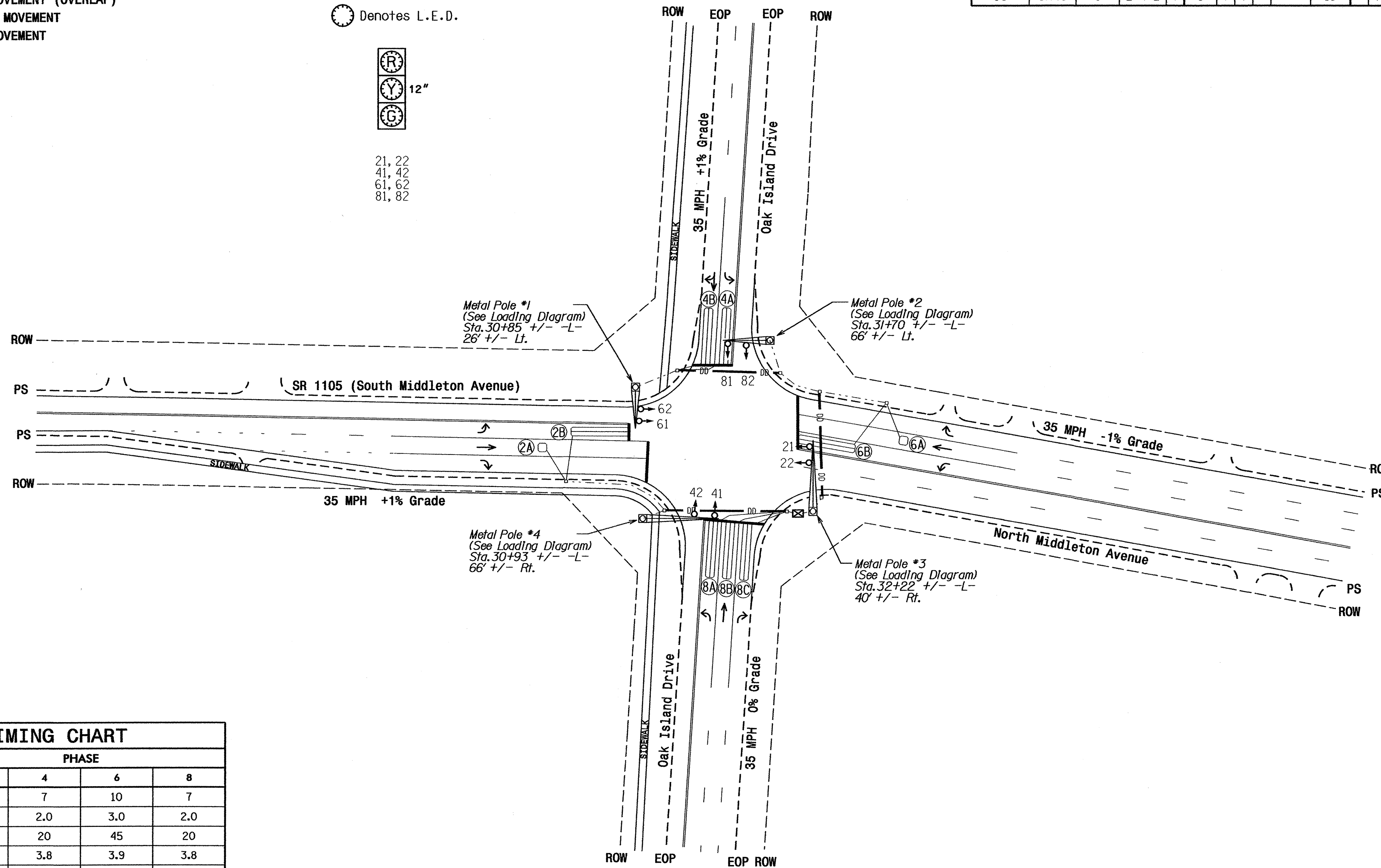
2070L LOOP & DETECTOR INSTALLATION

Table with columns: LOOP, SIZE (FT), DISTANCE FROM STOPBAR (FT), TURNS, NEW LOOP, PHASE, CALLING EXTENSION, FULL TIME DELAY, STRETCH TIME, DELAY TIME, SYSTEM LOOP, NEW CARD.

2 Phase Fully Actuated (Isolated)

NOTES

- 1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Use polycarbonate for all signal heads mounted on mastarms.



2070L TIMING CHART

Timing chart table with columns: FEATURE, PHASE (2, 4, 6, 8), and values (e.g., Min Green 1* | 10 | 7 | 10 | 7).

* 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.

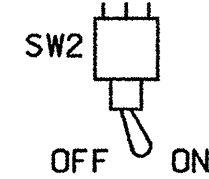
New Installation

Project information block including: SR 1105 (South Middleton Ave.) at Oak Island Drive, Division 3 Brunswick County, plan date (April 2006), reviewed by (RM Duffy, TS Thigpen), and professional seals/signatures.

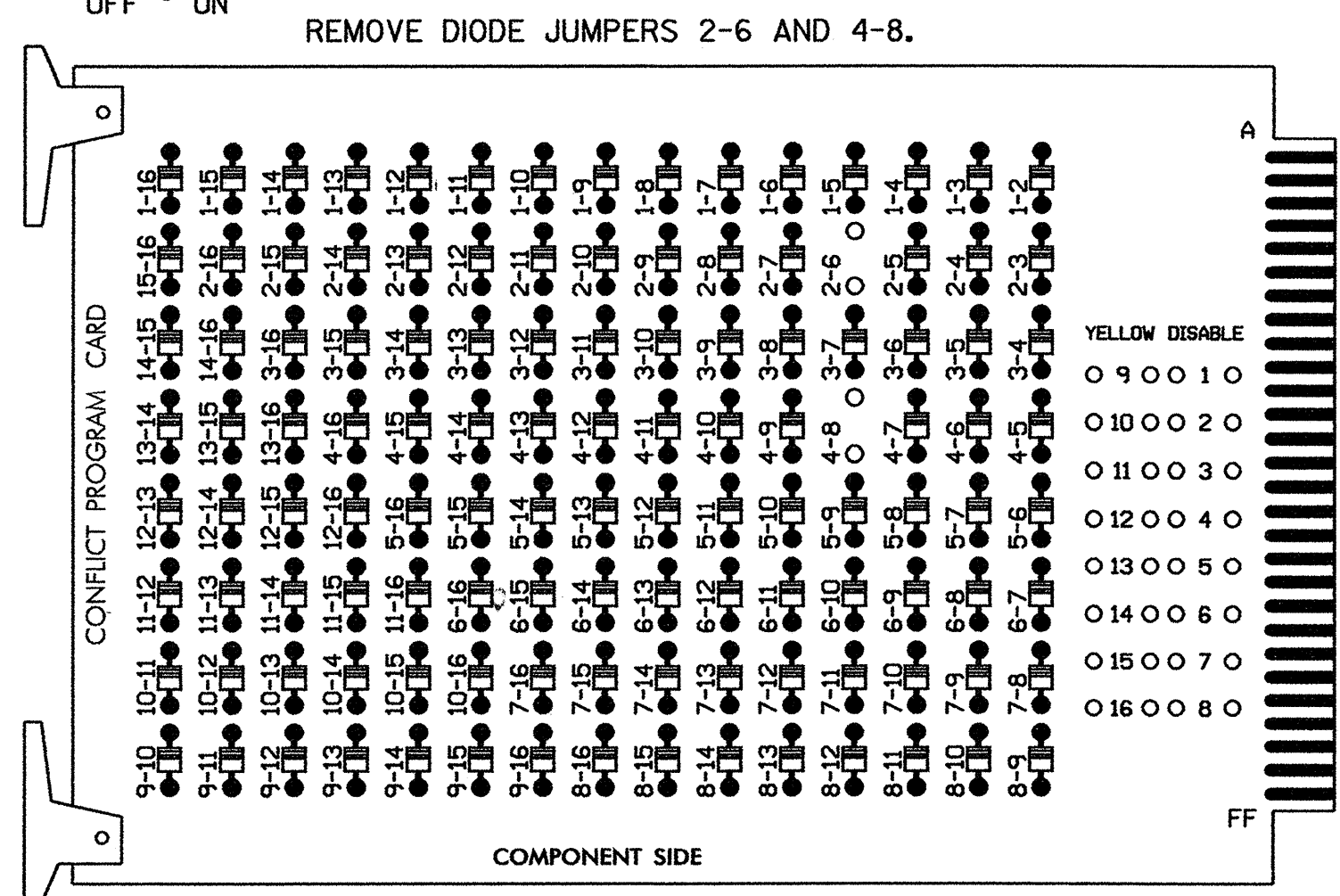
EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL

WD ENABLE

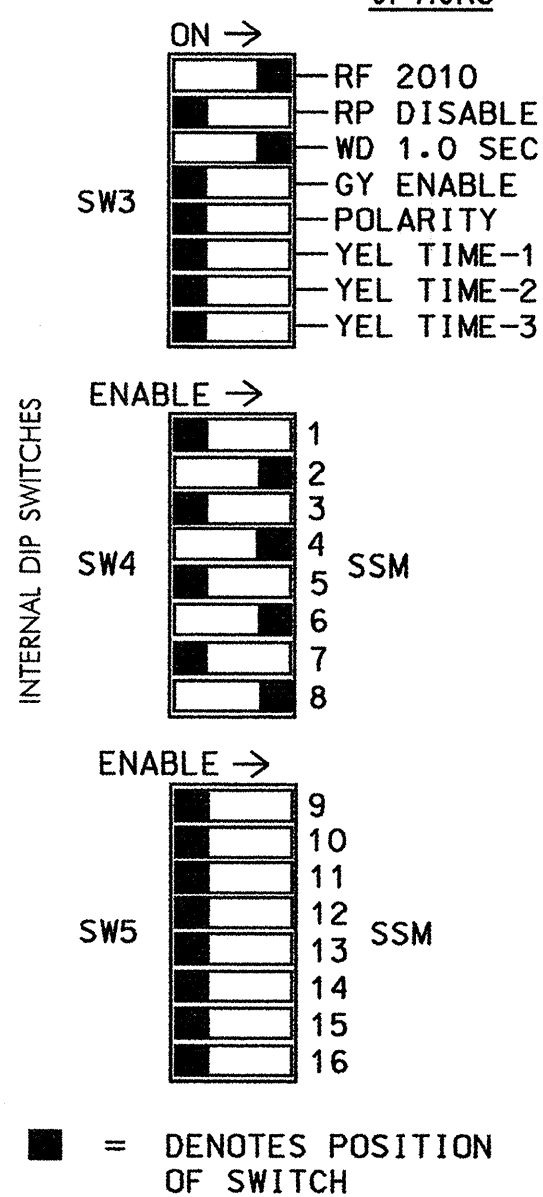


(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

OPTIONS



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Make sure jumpers SEL1-SEL5 are present on the monitor board.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,5,7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 2 and 6, on the controller unit, for Start Up In Green.
4. Enable Simultaneous Gap-Out, on the controller unit, for all phases.
5. Program phases 4 and 8, on the controller unit, for Dual Entry.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

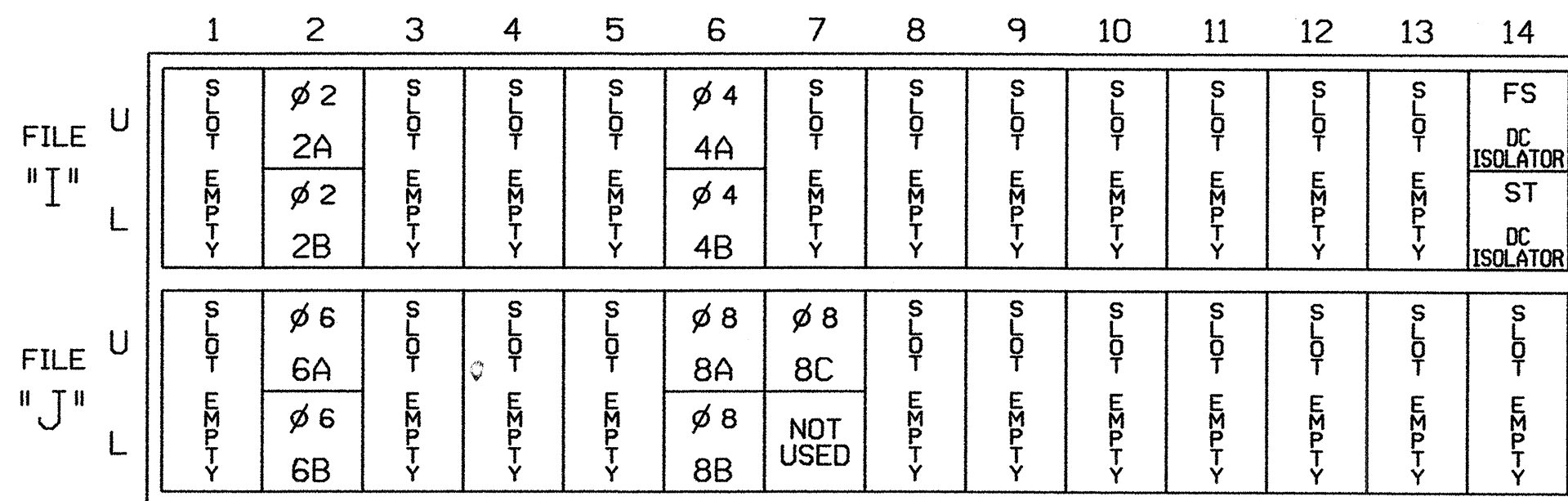
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
 CABINET.....CONTRACTOR SUPPLIED 332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4,S6,S8
 PHASES USED.....2,4,6,8
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



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 ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			10
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			
8C	TB7-1,2	J7U	66	28	38	8	Y	Y			15

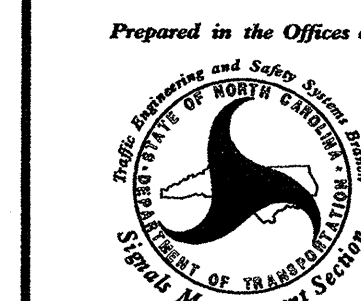
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-0808
 DESIGNED: April 2006
 SEALED: 08-28-06
 REVISED: NA

New Installation

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1105 (South Middleton Ave.)

North Middleton Ave.
 at
 Oak Island Drive



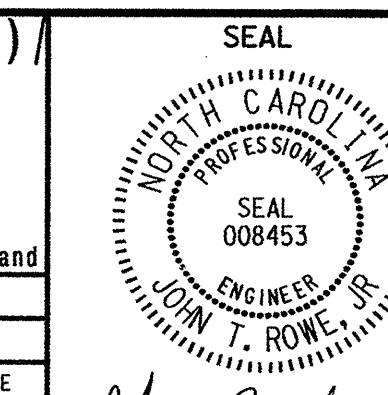
Division 3 Brunswick County Oak Island

PLAN DATE: April 2006 REVIEWED BY: JWP

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS INIT. DATE

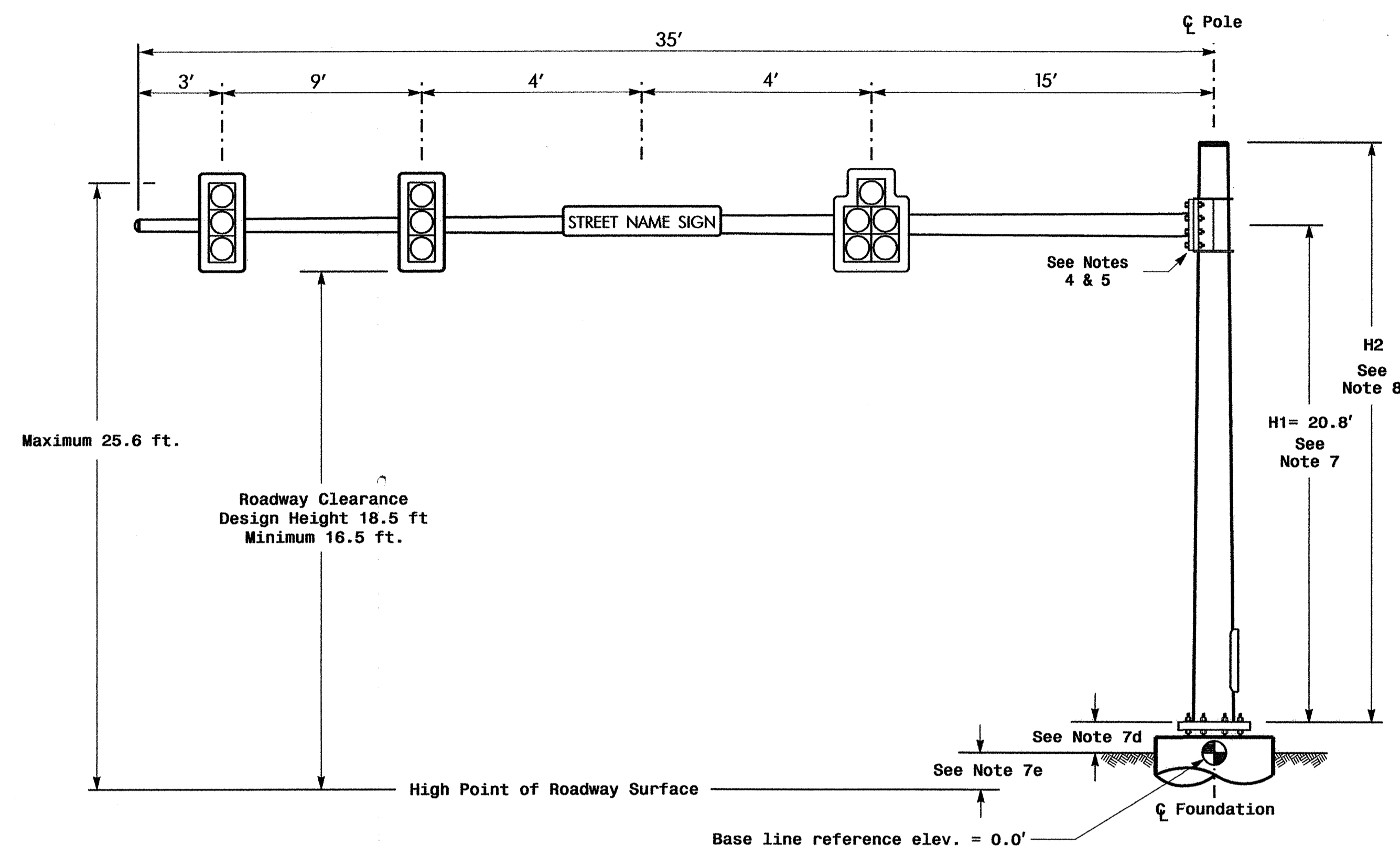
122 N. McDowell St., Raleigh, NC 27603



SIGNATURE DATE

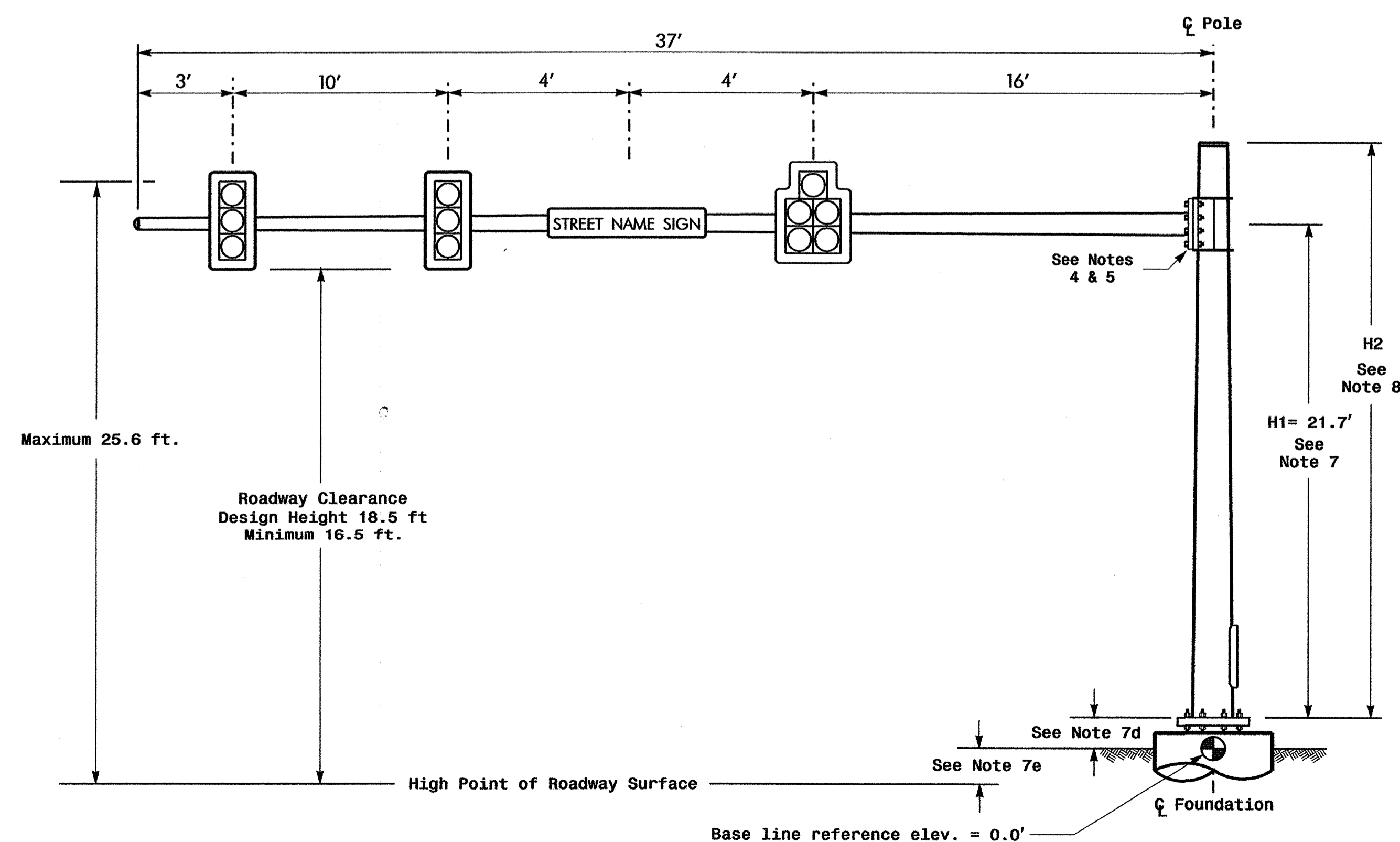
SIG. INVENTORY NO. 03-0808

Design Loading for METAL POLE NO. 1



Elevation View

Design Loading for METAL POLE NO. 2



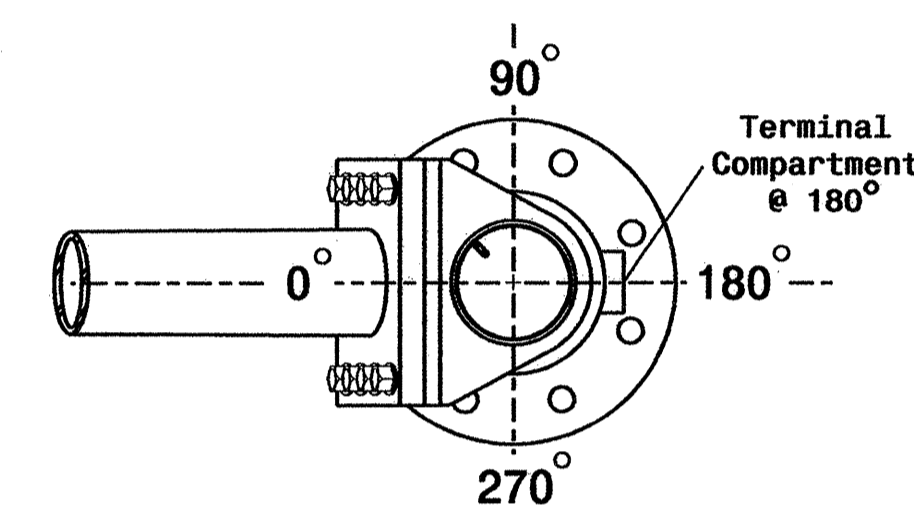
Elevation View

SPECIAL NOTE

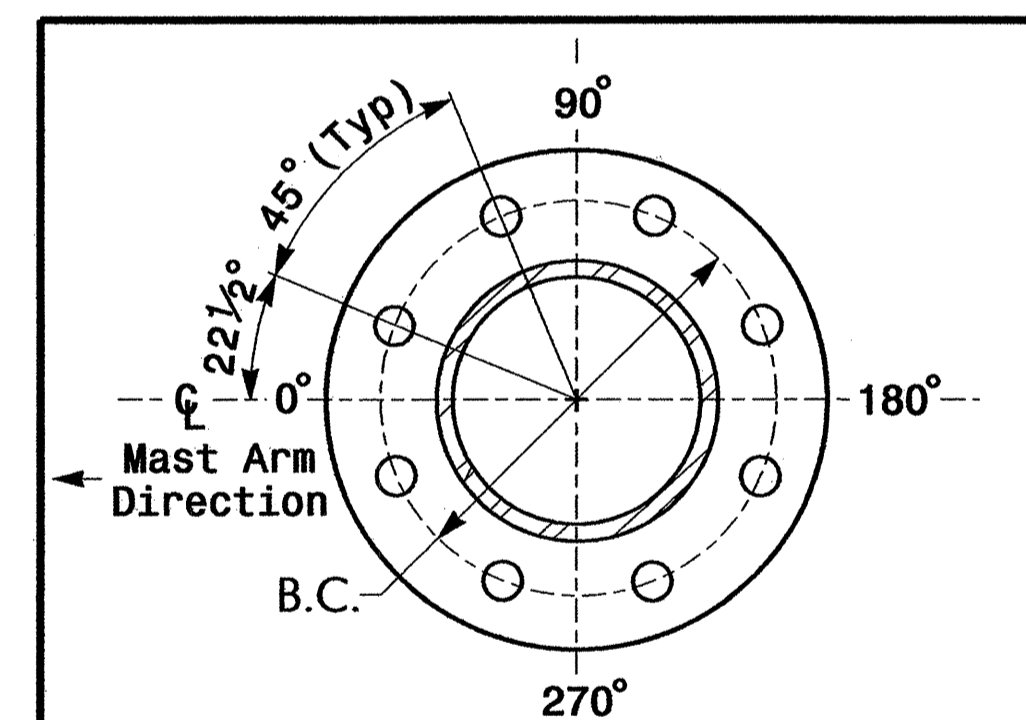
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

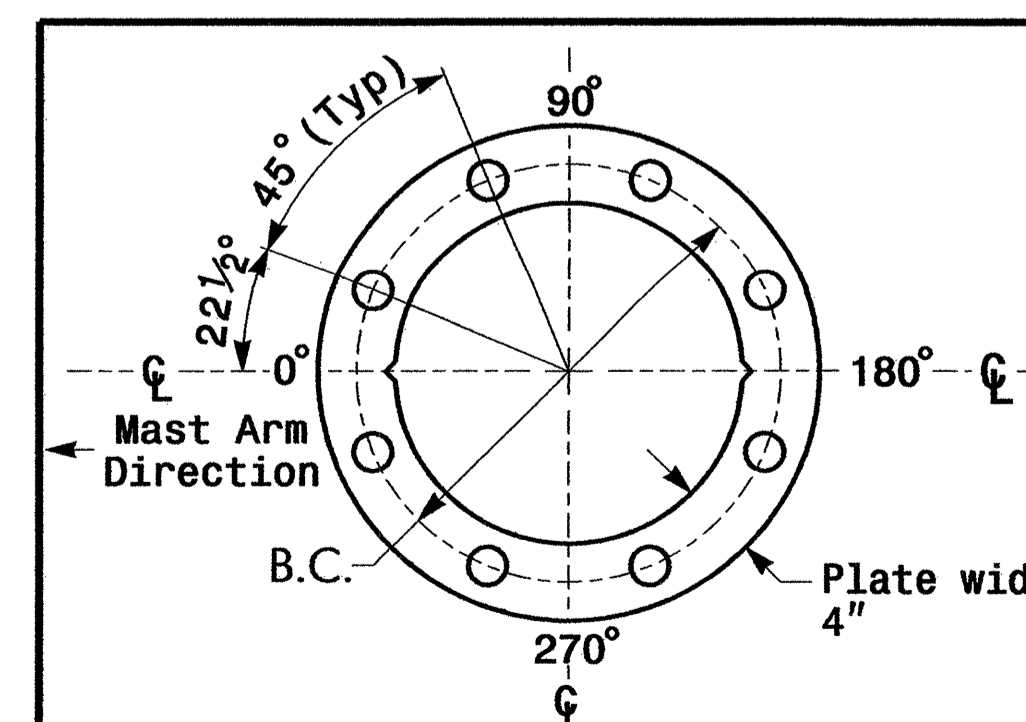
Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	0.7 ft.	1.6 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2006 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.ncdot.org/doh/preconstruct/traffic/tmssu/ws/mpoles/poles.htm>

Design Requirements

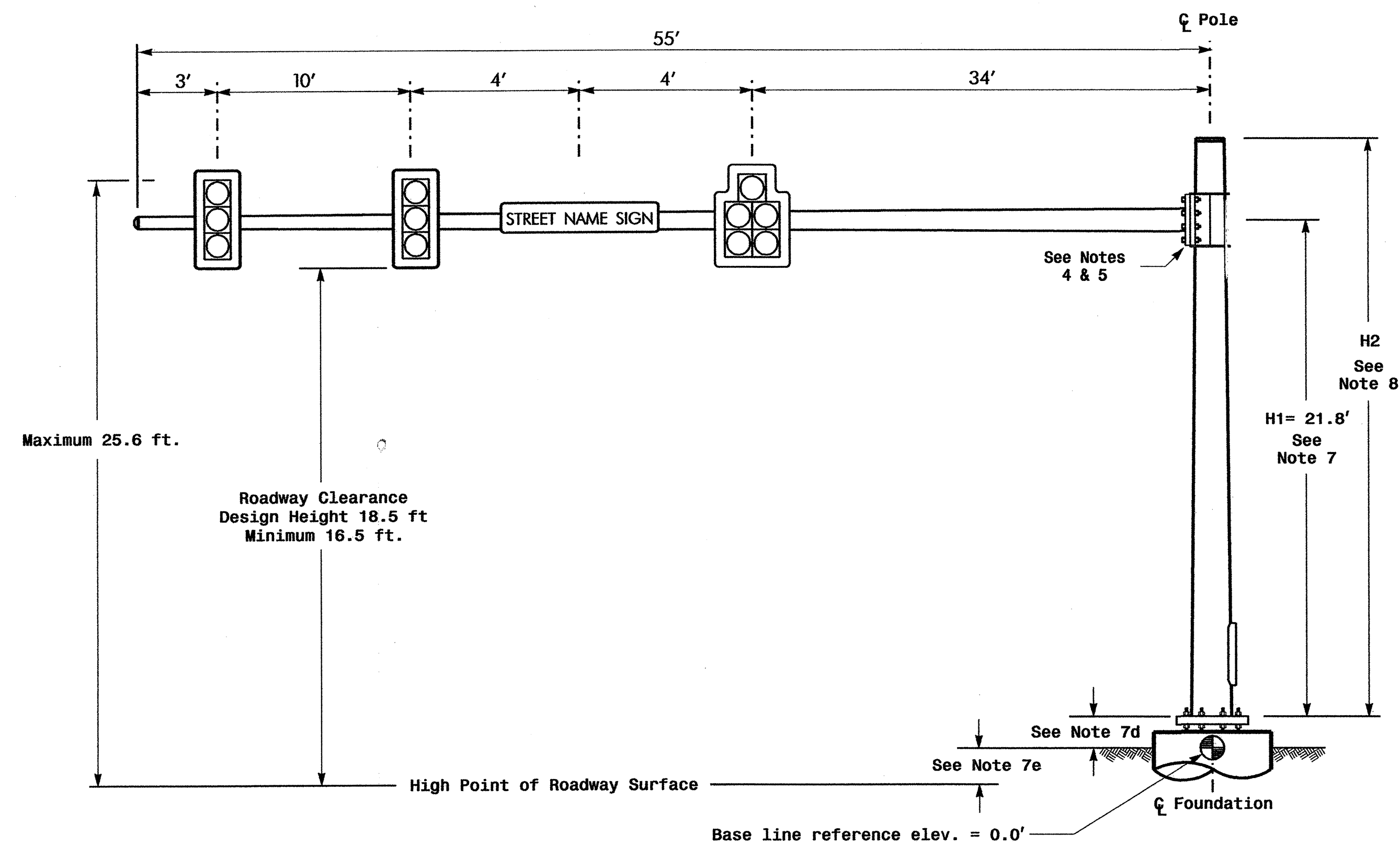
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- The camber design for 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.
- 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 is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
- 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.
- 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 Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- 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 2 (130 mph)

	SR 1105 (South Middleton Ave.)/ North Middleton Ave. at Oak Island Drive Brunswick County, Oak Island	SEAL
	Division 3 PLAN DATE: June 2006 PREPARED BY: TS Thigpen REVISIONS: _____ SCALE: 0 N/A N/A	
SIGNATURE: _____ DATE: _____ 31 Mar 2006		SIG. INVENTORY NO. 03-0808

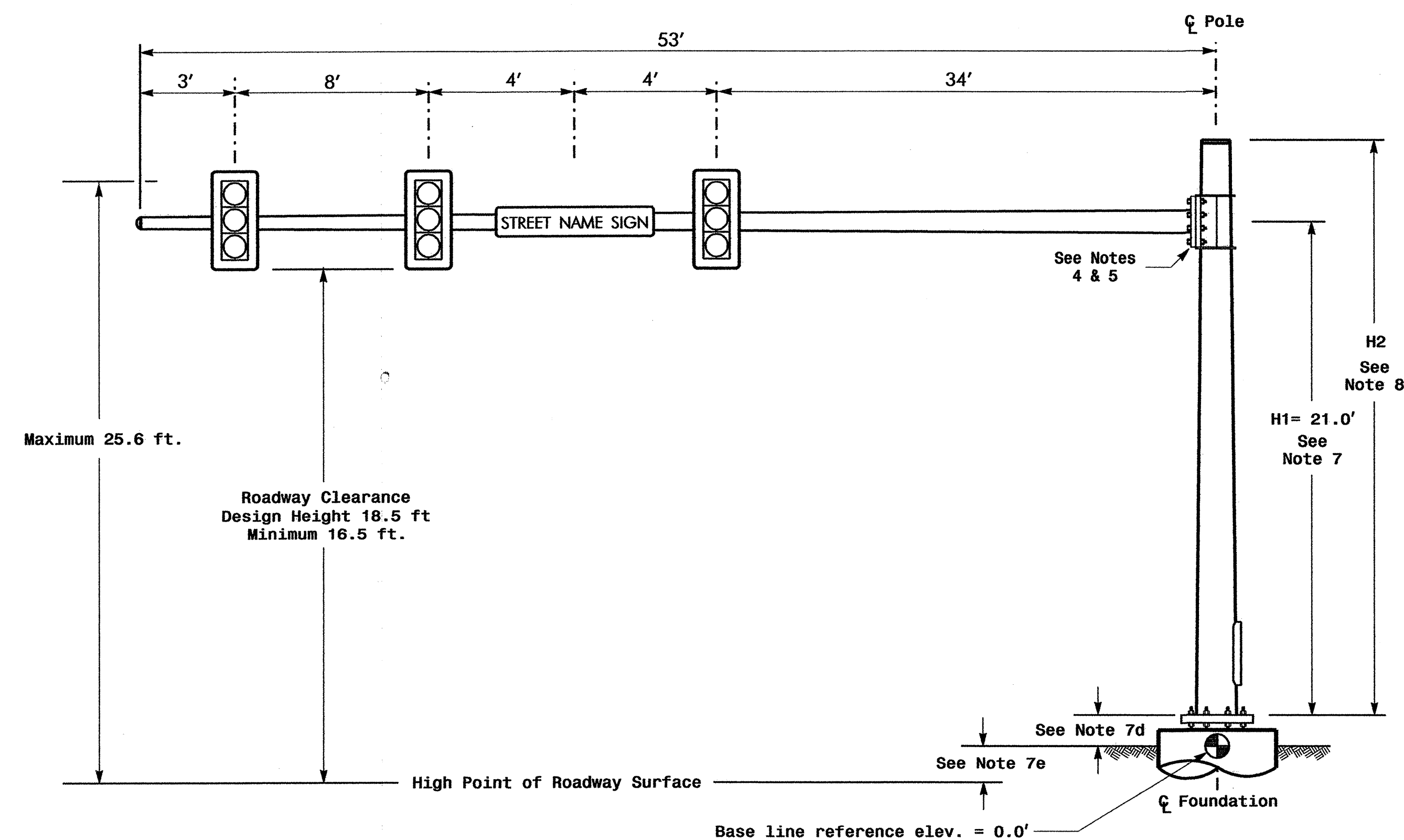
26-MAY-2006 09:04
 s:\projects\2245\mca\kpc\cup\p1\p_projects\m-2245\030808.metal.dwg
 tth:lgp

Design Loading for METAL POLE NO. 3



Elevation View

Design Loading for METAL POLE NO. 4



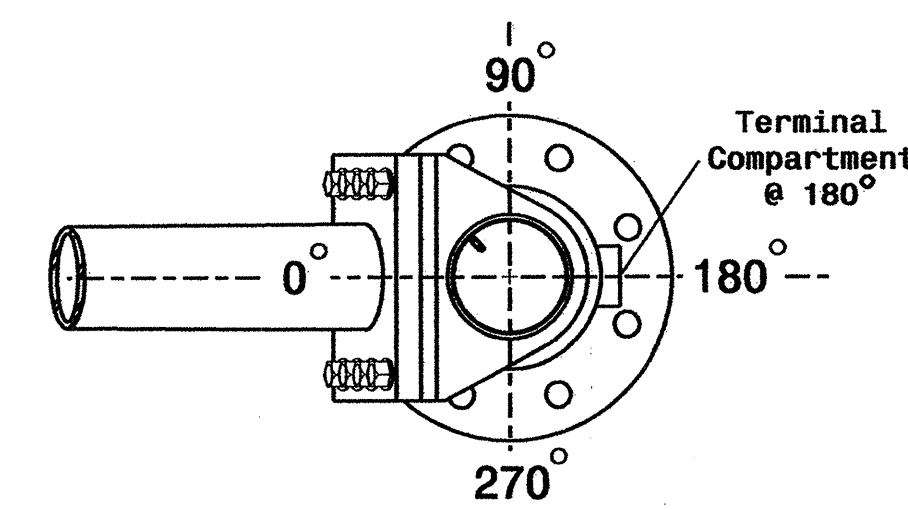
Elevation View

SPECIAL NOTE

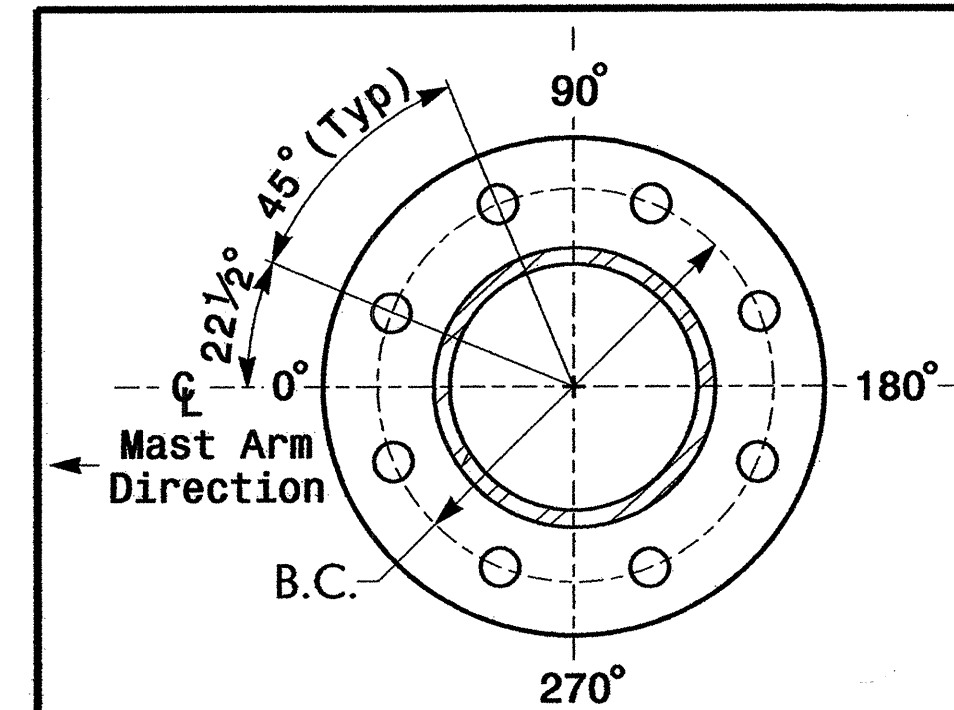
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

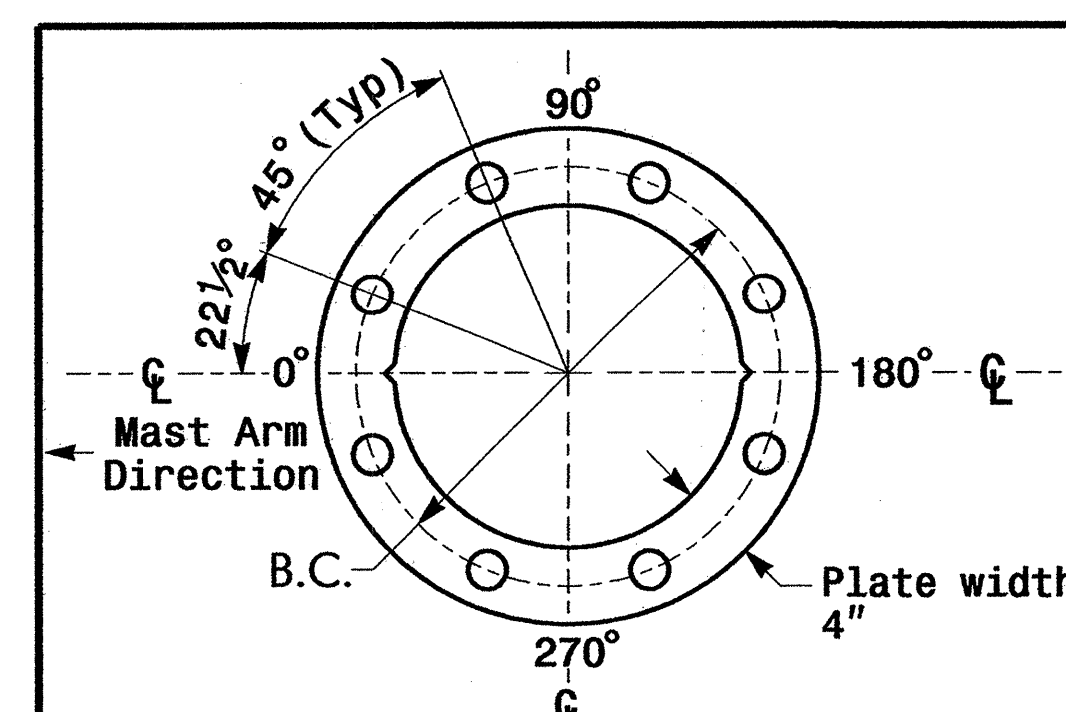
Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	1.7 ft.	0.9 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2006 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.ncdot.org/doh/preconstruct/traffic/tmsu/ws/mpoles/poles.htm>

Design Requirements

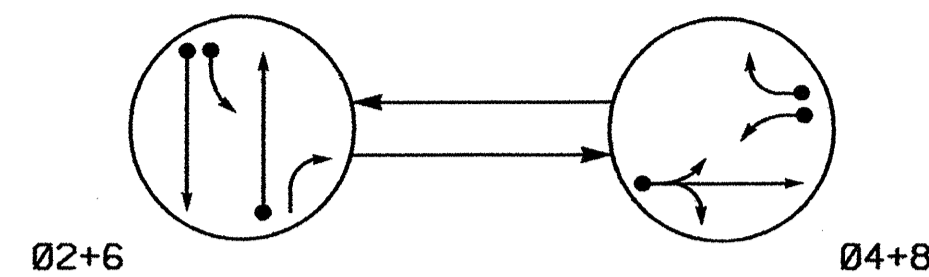
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- The camber design for 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.
- 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 is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
- 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.
- 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 Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- 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 2 (130 mph)

<p>Prepared in the Offices of: Signals and Geometrics STATE OF NORTH CAROLINA SIGNALS AND GEOMETRICS SECTION</p>	<p>SR 1105 (South Middleton Ave.) / North Middleton Ave. at Oak Island Drive</p>		<p>SEAL NORTH CAROLINA REGISTERED PROFESSIONAL ENGINEER 31 MAY 2006</p>
	<p>Division 3 Brunswick County Oak Island</p>	<p>PLN DATE: June 2006 REVIEWED BY: RM Duffy</p>	
<p>SCALE 0 N/A N/A</p>	<p>REVISIONS</p>	<p>INIT. DATE</p>	<p>SIGNATURE DATE SIG. INVENTORY NO. 03-0808</p>

26 MAY 2006 09:10
 ***S:\projects\2245\030808_metal pole2.dgn
 TTH:lpn

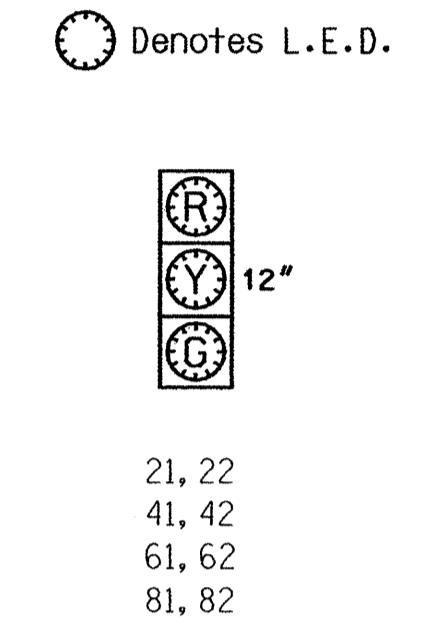
PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND
 ● DETECTED MOVEMENT
 ◄ UNDETECTED MOVEMENT (OVERLAP)
 - - - UNSIGNALIZED MOVEMENT
 ◄ - - - PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE		
	02+6	04+8	FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R

SIGNAL FACE I.D.



2070L LOOP & DETECTOR INSTALLATION

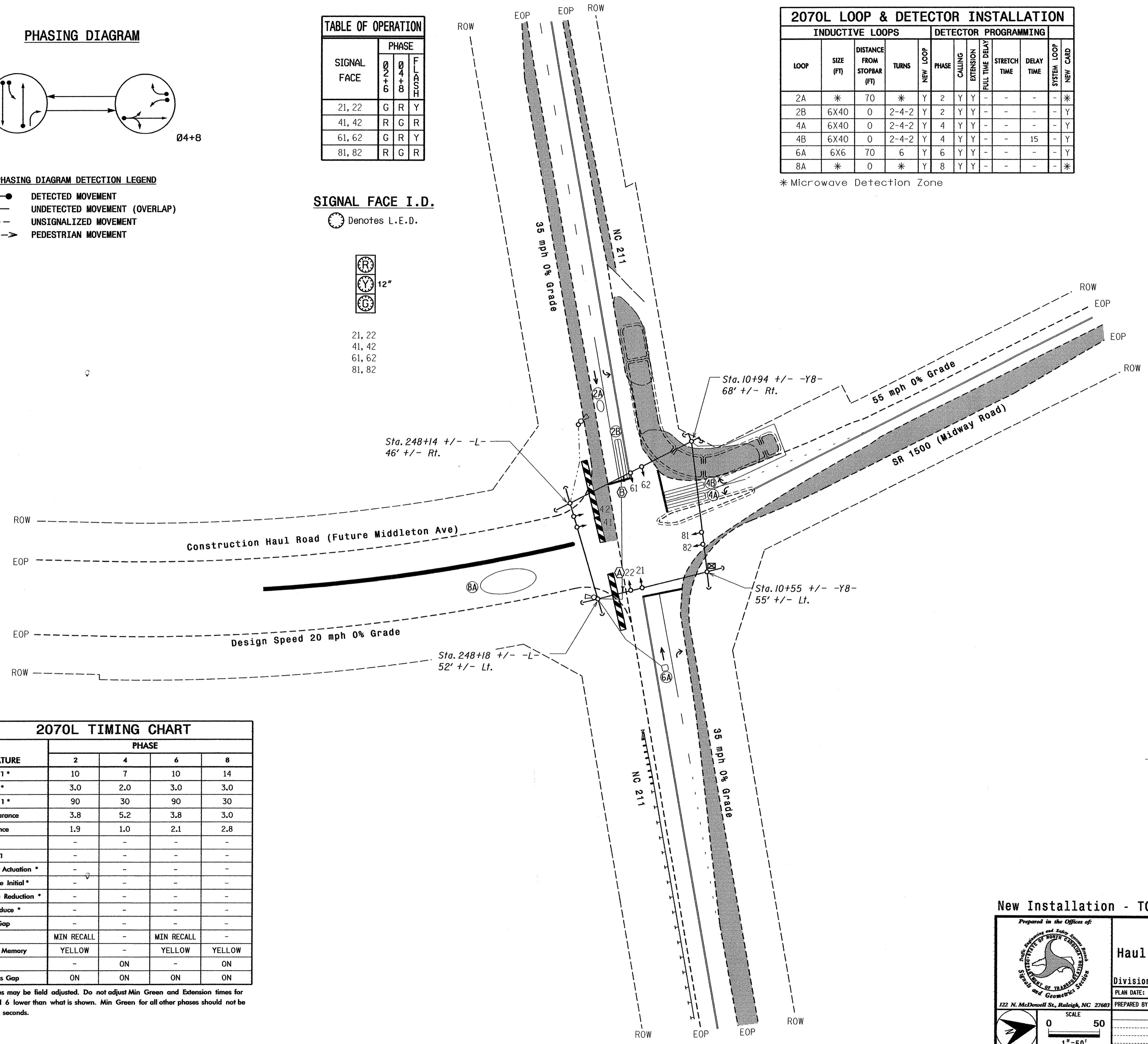
LOOP	INDUCTIVE LOOPS			DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD		
	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION			PULL TIME DELAY	STRETCH TIME
2A	*	70	*	Y	2	Y	Y	-	-	-	*
2B	6X40	0	2-4-2	Y	2	Y	Y	-	-	-	Y
4A	6X40	0	2-4-2	Y	4	Y	Y	-	-	-	Y
4B	6X40	0	2-4-2	Y	4	Y	Y	-	-	15	Y
6A	6X6	70	6	Y	6	Y	Y	-	-	-	Y
8A	*	0	*	Y	8	Y	Y	-	-	-	*

* Microwave Detection Zone

2 Phase Fully Actuated (Isolated)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.



FEATURE	PHASE			
	2	4	6	8
Min Green 1 *	10	7	10	14
Extension 1 *	3.0	2.0	3.0	3.0
Max Green 1 *	90	30	90	30
Yellow Clearance	3.8	5.2	3.8	3.0
Red Clearance	1.9	1.0	2.1	2.8
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	YELLOW	-	YELLOW	YELLOW
Dual Entry	-	ON	-	ON
Simultaneous Gap	ON	ON	ON	ON

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

PROPOSED	EXISTING
	N/A
N/A	

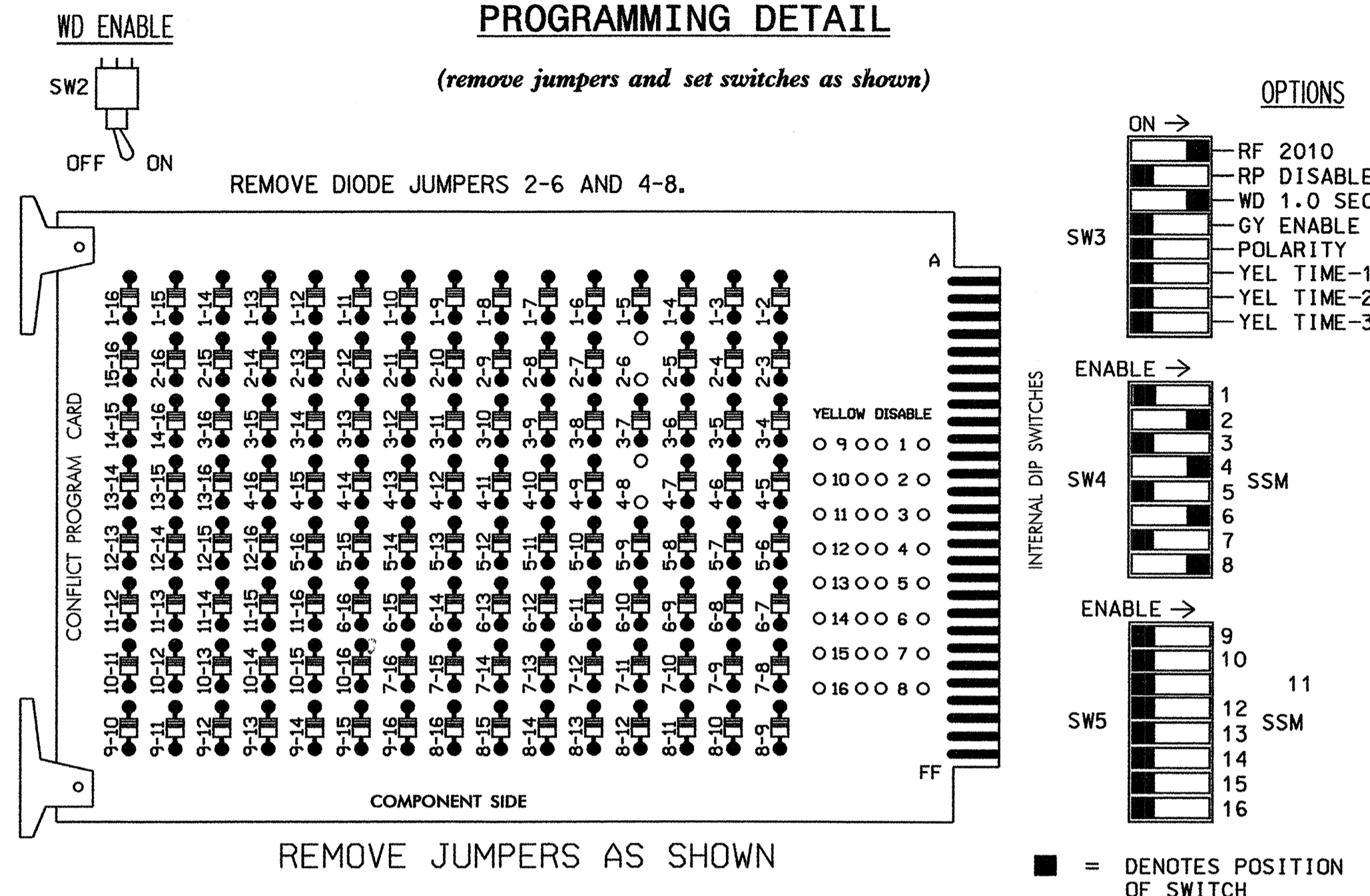
New Installation - TCP Phase I Temporary Plan 1

	<p>NC 211 at Haul Rd. (Future Middleton Ave) SR 1500 (Midway Road)</p> <p>Division 3 Brunswick County Oak Island</p> <p>PLANNED BY: April 2006 REVIEWED BY: BM Duffy</p> <p>PREPARED BY: TS Thigpen REVIEWED BY: [Signature]</p>	<p>SCALE: 1"=50'</p> <p>REVISIONS: [Table]</p>
	<p>222 N. McDowell St., Raleigh, NC 27603</p>	<p>SEAL</p> <p>EDWARD E. MULLINAX</p> <p>28 AUGUST 06</p>

22-AUG-2006 07:05
 s:\projects\2006\2245\2245.dwg
 t:\h\gben

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL



- NOTES:
- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
 - Make sure jumpers SEL1-SEL5 are present on the monitor board.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,5, 7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phases 2 and 6, on the controller unit, for Start Up In Green.
- Enable Simultaneous Gap-Out, on the controller unit, for all phases.
- Program phases 4 and 8, on the controller unit, for Dual Entry.

SIGNAL HEAD HOOK-UP CHART

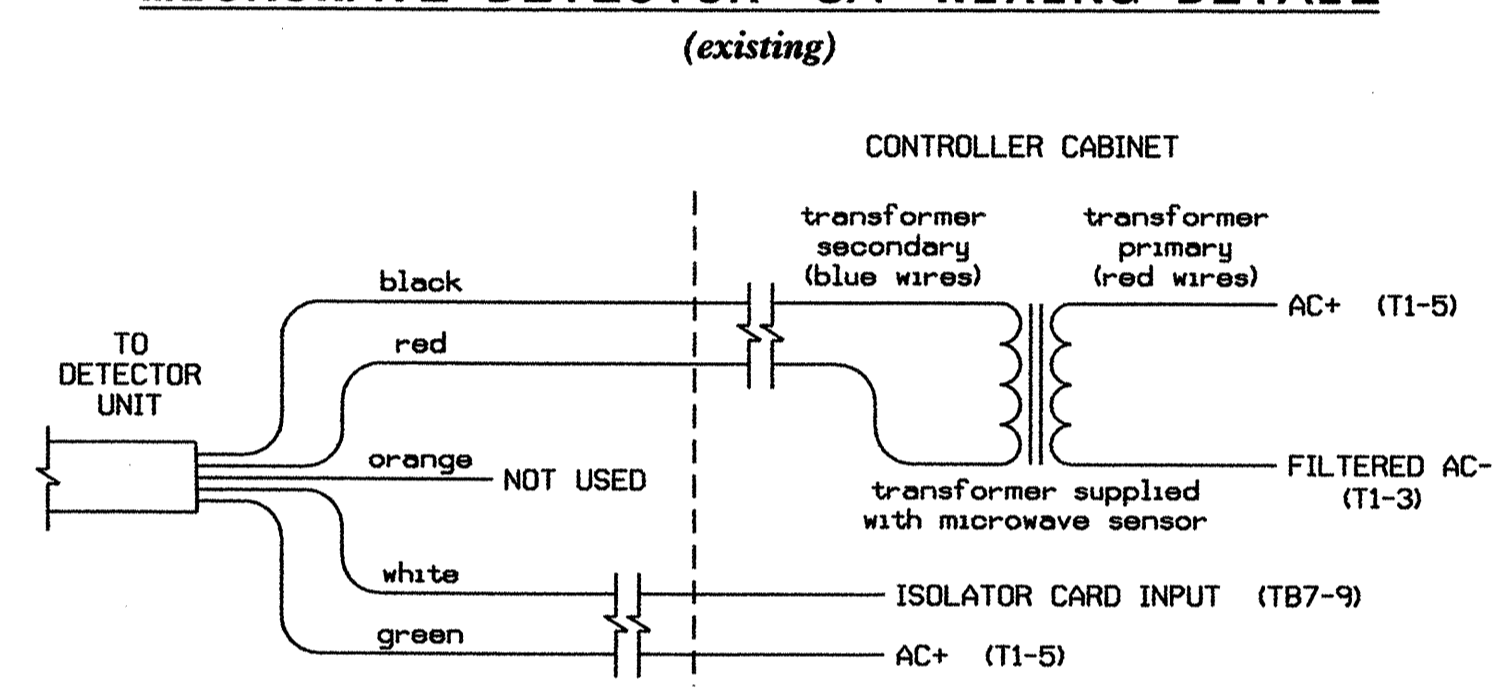
LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
 CABINET.....CONTRACTOR SUPPLIED 332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4,S6,S8
 PHASES USED.....2,4,6,8
 OVERLAPS.....NONE

MICROWAVE DETECTOR '8A' WIRING DETAIL

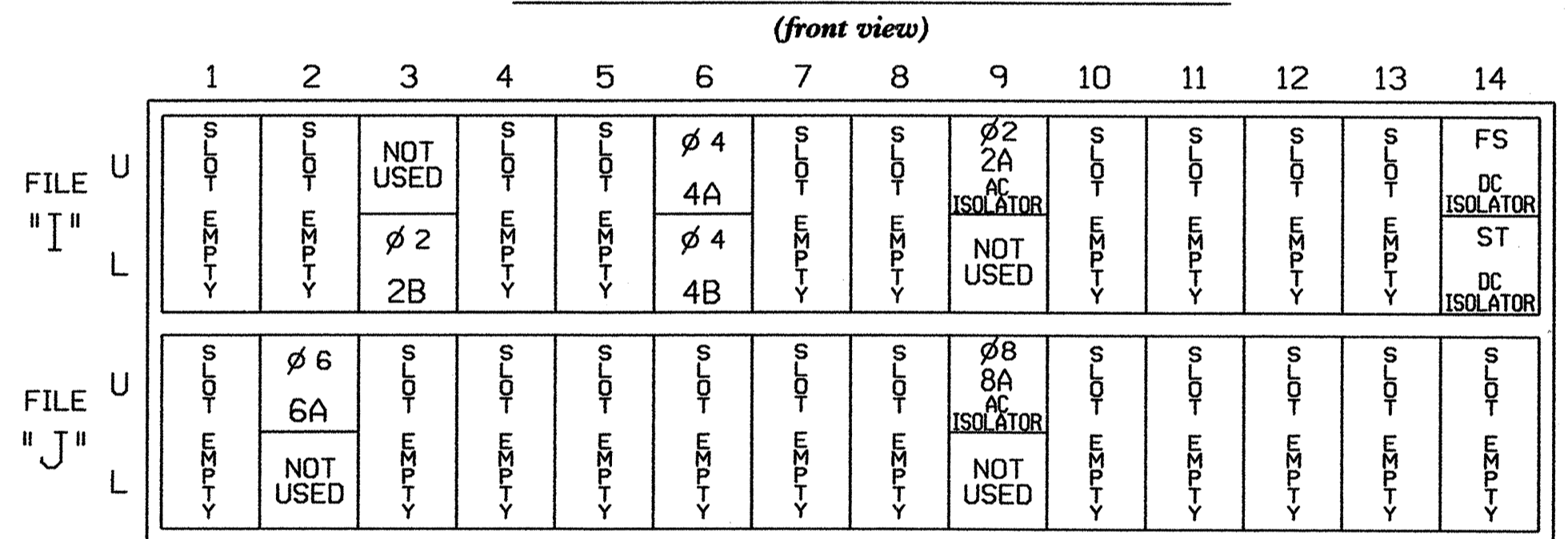


TC26B WIRE LIST

COLOR	FUNCTION
black	12V to 24V AC/DC (no polarity)
red	12V to 24V AC/DC (no polarity)
orange	Output Relay Normally Open
white	Output Relay Normally Closed
green	Output Relay Common

- NOTES:
- Sensor is a Microwave Sensors, Inc. Model TC-26B microwave motion detector mounted on poles as indicated on the Signal Design Plans.
 - Configure AC isolator card to place call upon removal of AC+ from the input.
 - Important: For proper operation of the microwave detector, remove surge protection from TB7-9 and TB7-10. Tie TB7-10 to AC neutral.

INPUT FILE POSITION LAYOUT



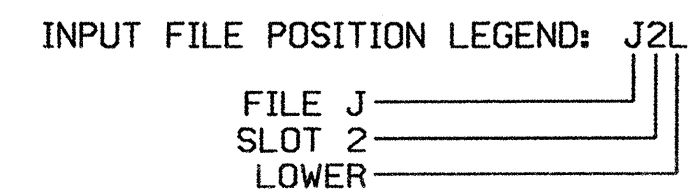
EX.: 1A, 2A, ETC. = LOOP NO.'S FS = FLASH SENSE ST = STOP TIME

- NOTE: INSTALL MODEL 252 AC ISOLATORS IN SLOT I9 AND SLOT J9 FOR USE WITH MIROWAVE DETECTOR. SEE MICROWAVE DETECTOR WIRING ON THIS PAGE.
- IMPORTANT:** For proper operation of the microwave detector, remove surge protection from TB6-9 and TB6-10. A DIRECT SHORT WILL OCCUR IF THIS IS NOT DONE. Tie TB6-10 to AC neutral.
- IMPORTANT:** For proper operation of the microwave detector, remove surge protection from TB7-9 and TB7-10. A DIRECT SHORT WILL OCCUR IF THIS IS NOT DONE. Tie TB7-10 to AC neutral.

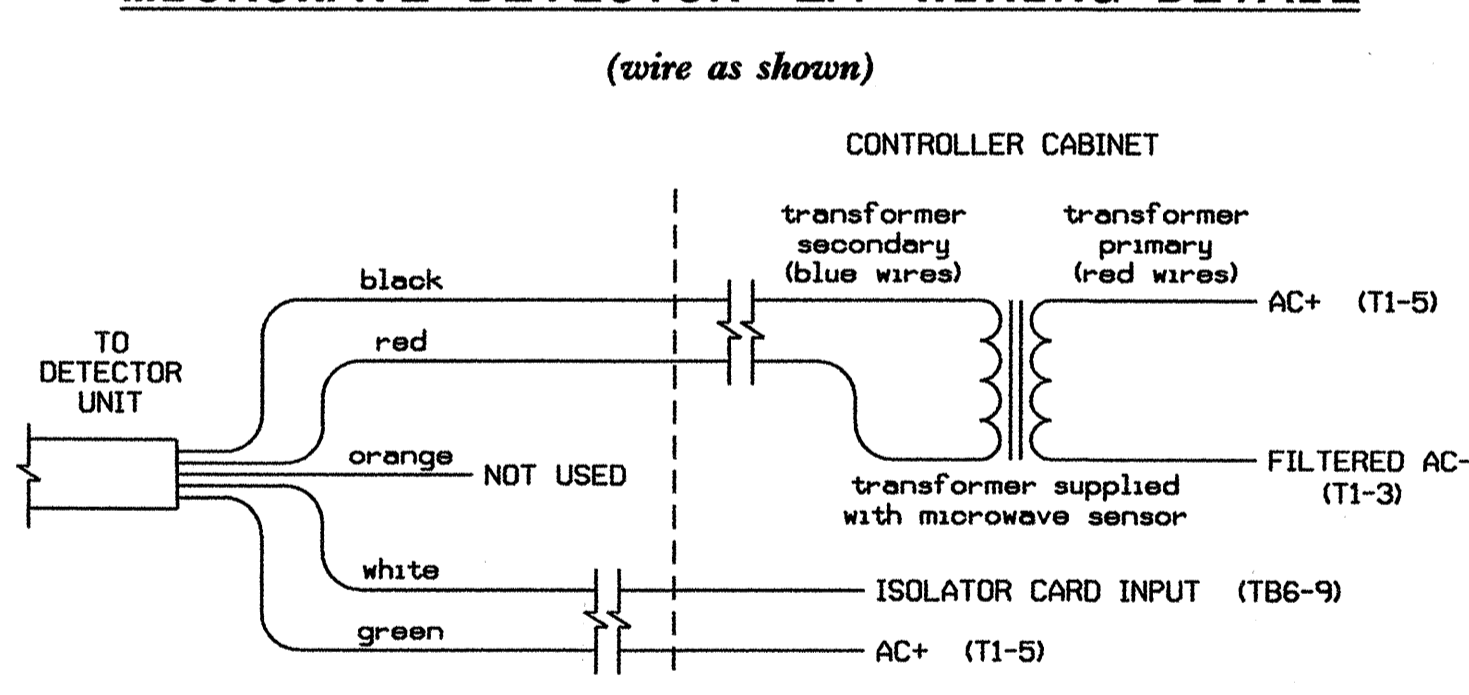
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2B	TB2-11,12	I3L	76	38	42	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			15
* 2A	TB6-9,10	I9U	60	22	11	2	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
* 8A	TB7-9,10	J9U	59	21	15	8	Y	Y			

*MICROWAVE DETECTOR. (SEE WIRING DETAIL THIS PAGE)



MICROWAVE DETECTOR '2A' WIRING DETAIL



TC26B WIRE LIST

COLOR	FUNCTION
black	12V to 24V AC/DC (no polarity)
red	12V to 24V AC/DC (no polarity)
orange	Output Relay Normally Open
white	Output Relay Normally Closed
green	Output Relay Common

- NOTES:
- Sensor is a Microwave Sensors, Inc. Model TC-26B microwave motion detector mounted on poles as indicated on the Signal Design Plans.
 - Configure AC isolator card to place call upon removal of AC+ from the input.
 - Important: For proper operation of the microwave detector, remove surge protection from TB6-9 and TB6-10. Tie TB6-10 to AC neutral.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-0901 T1
 DESIGNED: April 2006
 SEALED: 08-28-06
 REVISED: NA

New Installation - Temporary 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:

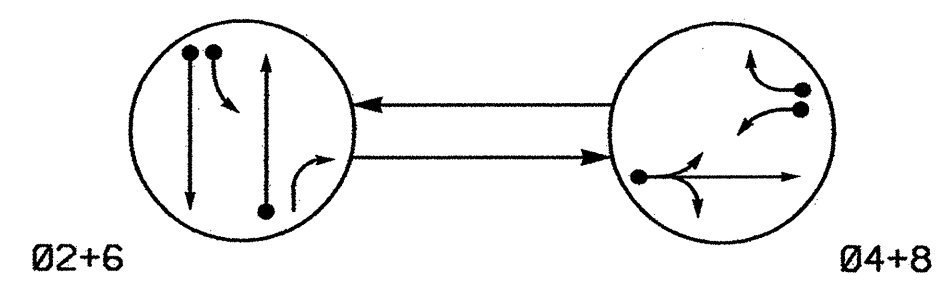
NC 211 AT
 Haul Rd. (Future Middleton Ave.) / SR 1500 (Midway Road)
 Division 3 Brunswick County Oak Island
 PLAN DATE: April 2006 REVIEWED BY: JWP
 PREPARED BY: James Peterson REVIEWED BY:

REVISIONS: INIT. DATE

Prepared in the Offices of:
 Traffic Engineering and Signal Design
 Department of Transportation
 Signal Management Section
 122 N. McDowell St., Raleigh, NC 27603

SEAL
 JOHN T. ROWE, JR.
 PROFESSIONAL ENGINEER
 SEAL 008453
 SIGNATURE: John T. Rowe, Jr. 9-12-06
 DATE: DATE
 S16. INVENTORY NO. 03-0901 T1

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

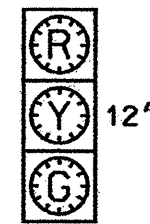
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	02+6	04+8	FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R

SIGNAL FACE I.D.

Denotes L.E.D.



21, 22
41, 42
61, 62
81, 82

2070L LOOP & DETECTOR INSTALLATION

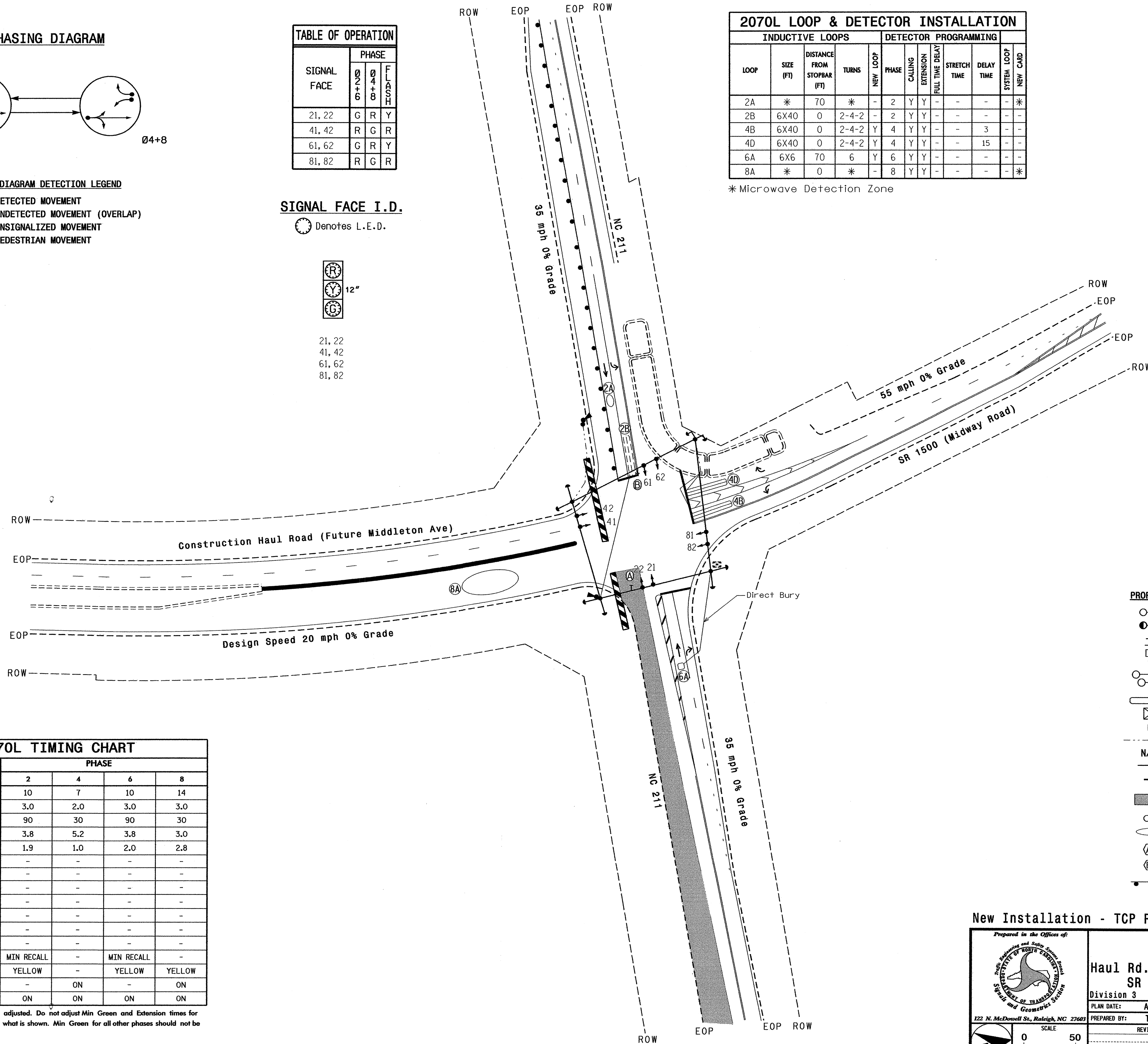
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	STRETCH TIME			DELAY TIME
2A	*	70	*	-	2	Y	Y	-	-	-	*
2B	6X40	0	2-4-2	-	2	Y	Y	-	-	-	-
4B	6X40	0	2-4-2	Y	4	Y	Y	-	-	3	-
4D	6X40	0	2-4-2	Y	4	Y	Y	-	-	15	-
6A	6X6	70	6	Y	6	Y	Y	-	-	-	-
8A	*	0	*	-	8	Y	Y	-	-	-	-

* Microwave Detection Zone

2 Phase Fully Actuated (Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads as needed.
4. Set all detectors units to presence mode.



LEGEND

- | | | | |
|--|---|--|--|
| | PROPOSED Traffic Signal Head | | EXISTING Traffic Signal Head |
| | PROPOSED Modified Signal Head | | EXISTING Modified Signal Head |
| | PROPOSED Pedestrian Signal Head With Push Button & Sign | | EXISTING Pedestrian Signal Head |
| | PROPOSED Signal Pole with Guy | | EXISTING Signal Pole with Guy |
| | PROPOSED Signal Pole with Sidewalk Guy | | EXISTING Signal Pole with Sidewalk Guy |
| | PROPOSED Inductive Loop Detector | | EXISTING Inductive Loop Detector |
| | PROPOSED Controller & Cabinet | | EXISTING Controller & Cabinet |
| | PROPOSED Junction Box | | EXISTING Junction Box |
| | PROPOSED 2-in Underground Conduit | | EXISTING 2-in Underground Conduit |
| | PROPOSED Right of Way | | EXISTING Right of Way |
| | PROPOSED Directional Arrow | | EXISTING Directional Arrow |
| | PROPOSED Pavement Marking Arrow | | EXISTING Pavement Marking Arrow |
| | PROPOSED Construction Zone | | EXISTING Construction Zone |
| | PROPOSED Out of Pavement Detector | | EXISTING Out of Pavement Detector |
| | PROPOSED Microwave Detection Zone | | EXISTING Microwave Detection Zone |
| | PROPOSED No Right Turn Sign (R3-1) | | EXISTING No Right Turn Sign (R3-1) |
| | PROPOSED No Left Turn Sign (R3-2) | | EXISTING No Left Turn Sign (R3-2) |
| | PROPOSED Construction Zone Drums | | EXISTING Construction Zone Drums |

2070L TIMING CHART

FEATURE	PHASE			
	2	4	6	8
Min Green 1 *	10	7	10	14
Extension 1 *	3.0	2.0	3.0	3.0
Max Green 1 *	90	30	90	30
Yellow Clearance	3.8	5.2	3.8	3.0
Red Clearance	1.9	1.0	2.0	2.8
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	YELLOW	-	YELLOW	YELLOW
Dual Entry	-	ON	-	ON
Simultaneous Gap	ON	ON	ON	ON

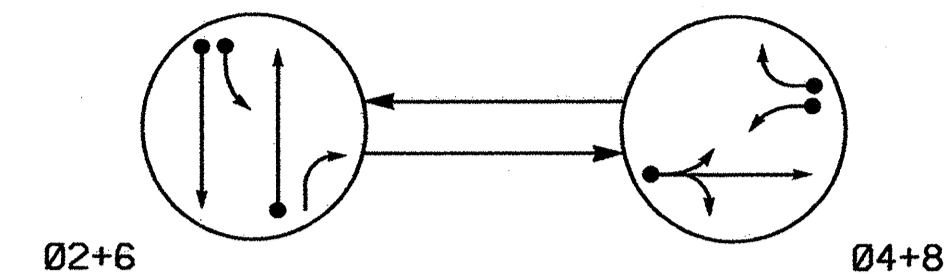
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

New Installation - TCP Phase I Temporary Plan 2

	<p>NC 211 at Haul Rd. (Future Middleton Ave) / SR 1500 (Midway Road)</p>		
	<p>Division 3 Brunswick County Oak Island</p>	<p>PLANNED BY: April 2006</p>	
<p>122 N. McDowell St., Raleigh, NC 27603</p>	<p>PREPARED BY: TS Thigpen</p>	<p>REVIEWED BY: [Signature]</p>	<p>DATE</p>
<p>SCALE: 1"=50'</p>	<p>REVISIONS</p>	<p>DATE</p>	<p>SIGNATURE</p>

20-AUG-2006 08:05
 s:\w\ts\signal\work\proj\2245\2070L\sig_dsn_2006mtd.dgn
 t\thigpen

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

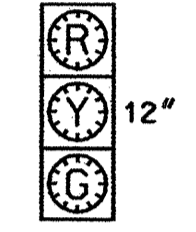
- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ←--- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE		
	Ø2+6	Ø4+8	FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R

SIGNAL FACE I.D.

⊙ Denotes L.E.D.



21, 22
41, 42
61, 62
81, 82

2070L LOOP & DETECTOR INSTALLATION

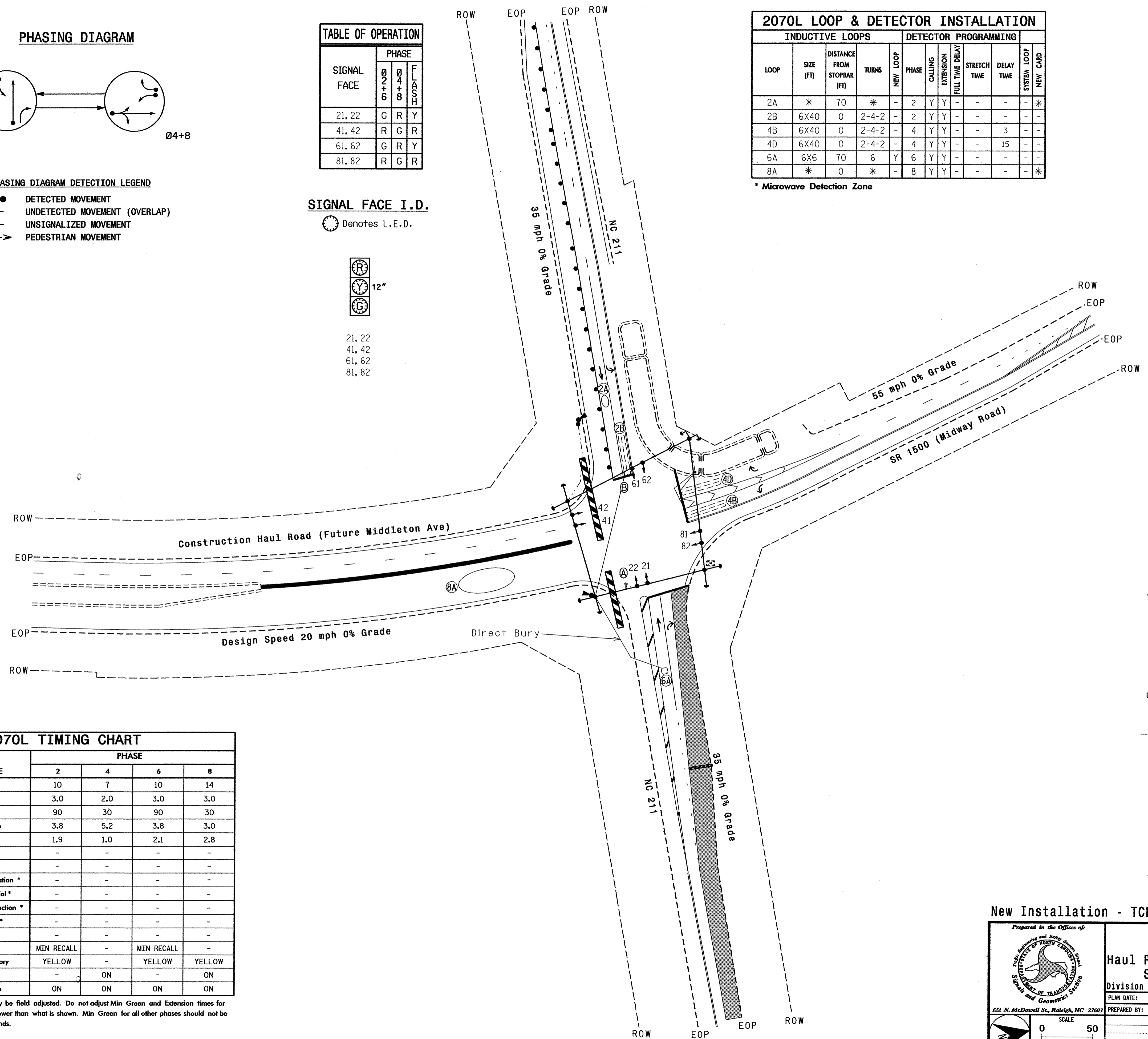
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	*	70	*	-	2	Y	Y	-	-	-	-	*
2B	6X40	0	2-4-2	-	2	Y	Y	-	-	-	-	-
4B	6X40	0	2-4-2	-	4	Y	Y	-	-	3	-	-
4D	6X40	0	2-4-2	-	4	Y	Y	-	-	15	-	-
6A	6X6	70	6	Y	6	Y	Y	-	-	-	-	-
8A	*	0	*	-	8	Y	Y	-	-	-	-	*

* Microwave Detection Zone

2 Phase Fully Actuated (Isolated)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads as needed.
4. Set all detectors units to presence mode.



LEGEND

- | PROPOSED | EXISTING |
|----------|----------|
| ○ | ● |
| ○ | N/A |
| T | T |
| □ | □ |
| □ | □ |
| □ | □ |
| □ | □ |
| □ | □ |
| N/A | N/A |
| → | → |
| → | → |
| ■ | ■ |
| ○ | ○ |
| ○ | ○ |
| ⊙ | ⊙ |
| ⊙ | ⊙ |
| ⊙ | ⊙ |

2070L TIMING CHART

FEATURE	PHASE			
	2	4	6	8
Min Green 1*	10	7	10	14
Extension 1*	3.0	2.0	3.0	3.0
Max Green 1*	90	30	90	30
Yellow Clearance	3.8	5.2	3.8	3.0
Red Clearance	1.9	1.0	2.1	2.8
Walk 1*	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation*	-	-	-	-
Max Variable Initial*	-	-	-	-
Time Before Reduction*	-	-	-	-
Time To Reduce*	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	YELLOW	-	YELLOW	YELLOW
Dual Entry	-	ON	-	ON
Simultaneous Gap	ON	ON	ON	ON

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

New Installation - TCP Phase I Temporary Plan 3

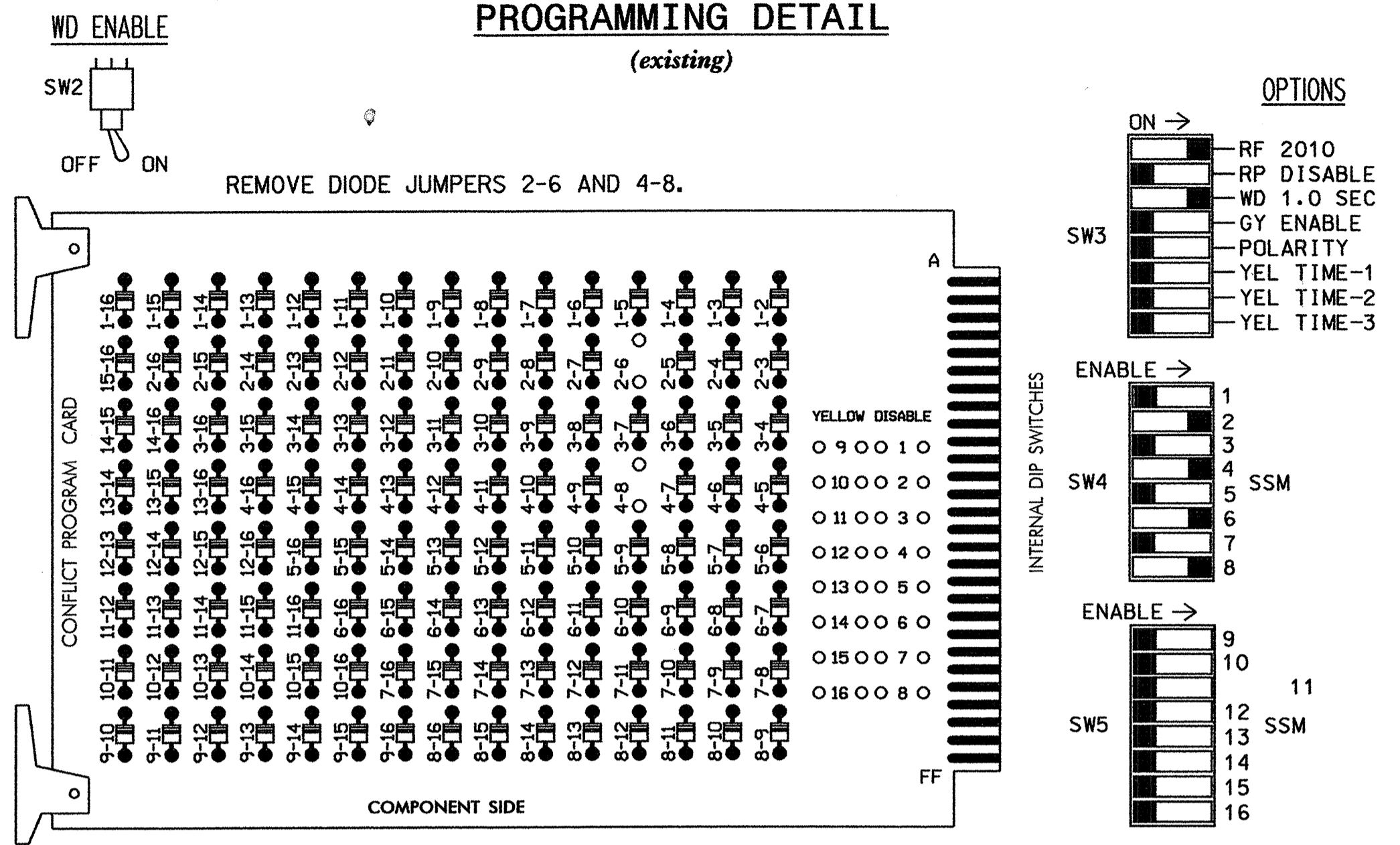
Prepared in the Offices of:

NC 211 at Haul Rd. (Future Middleton Ave) / SR 1500 (Midway Road)
 Division 3 Brunswick County Oak Island
 PLAN DATE: April 2006 REVIEWED BY: RN Duffey
 PREPARED BY: TS Thigpen REVIEWED BY: [Signature]
 SCALE: 1"=50'
 SIGNATURE: [Signature] DATE: 28 August 06
 SIG. INVENTORY NO. 03-0901 T3

22-AUG-2006 07:07:15 g:\planning\krcg\cup8\11p\project\br-2245\03001_sig_dsn_2006smcd.dgn

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Make sure jumpers SEL1-SEL5 are present on the monitor board.

INPUT FILE POSITION LAYOUT

FILE	U	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
"I"	S	1A	2A	NOT USED	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A
	L	1B	2B	2B	3B	4B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B
"J"	S	1A	2A	6A	3A	4A	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A
	L	1B	2B	NOT USED	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13B	14B

EX.: 1A, 2A, ETC. = LOOP NO.'S FS = FLASH SENSE ST = STOP TIME

NOTE: INSTALL MODEL 252 AC ISOLATORS IN SLOT I9 AND SLOT J9 FOR USE WITH MIROWAVE DETECTOR. SEE MICROWAVE DETECTOR WIRING ON THIS PAGE.

IMPORTANT: For proper operation of the microwave detector, remove surge protection from TB6-9 and TB6-10. A DIRECT SHORT WILL OCCUR IF THIS IS NOT DONE. Tie TB6-10 to AC neutral.

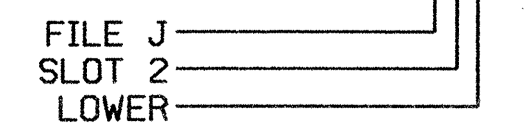
IMPORTANT: For proper operation of the microwave detector, remove surge protection from TB7-9 and TB7-10. A DIRECT SHORT WILL OCCUR IF THIS IS NOT DONE. Tie TB7-10 to AC neutral.

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2B	TB2-11,12	I3L	76	38	42	2	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			3
4D	TB6-3,4	I7L	78	40	44	4	Y	Y			15
* 2A	TB6-9,10	I9U	60	22	11	2	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
* 8A	TB7-9,10	J9U	59	21	15	8	Y	Y			

* MICROWAVE DETECTOR. (SEE WIRING DETAIL THIS PAGE)

INPUT FILE POSITION LEGEND: J2L



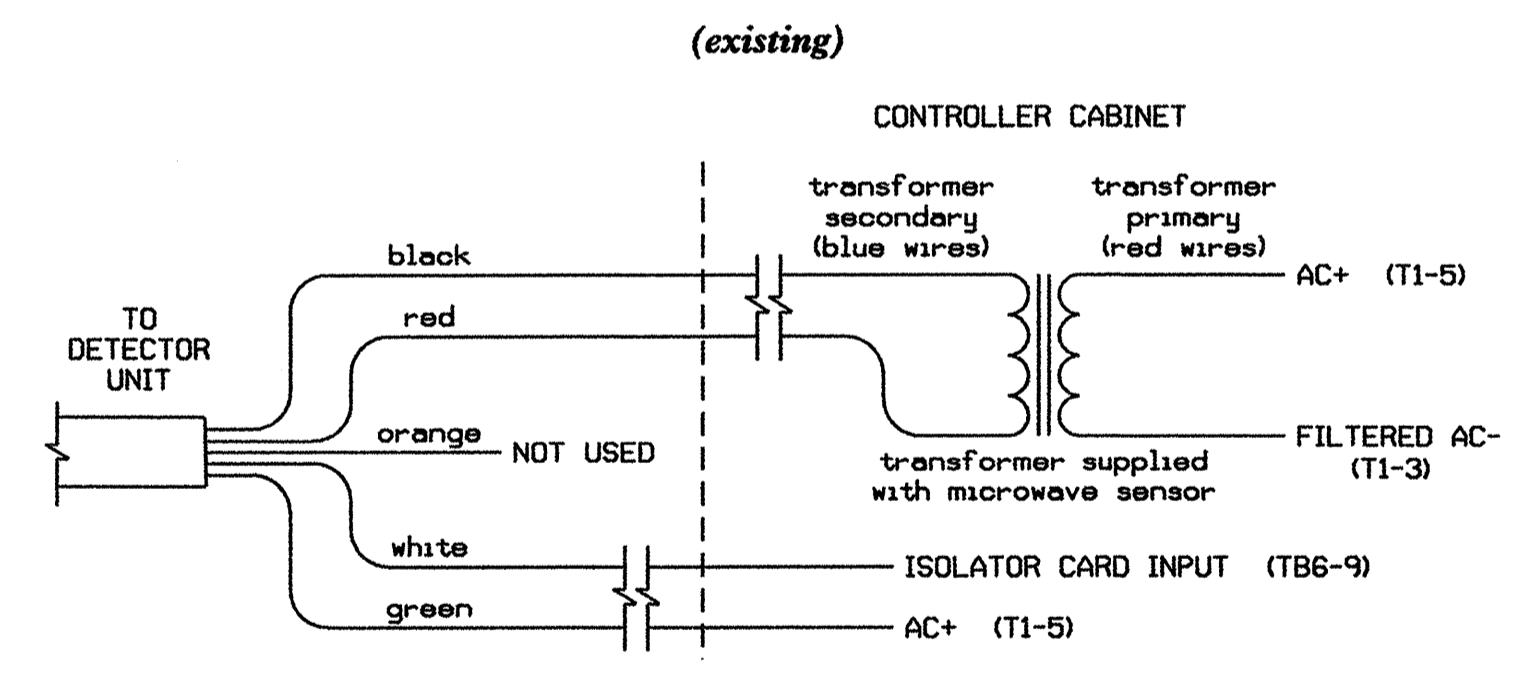
NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,5, 7,9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phases 2 and 6, on the controller unit, for Start Up In Green.
- Enable Simultaneous Gap-Out, on the controller unit, for all phases.
- Program phases 4 and 8, on the controller unit, for Dual Entry.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
 CABINET.....CONTRACTOR SUPPLIED 332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S4,S6,S8
 PHASES USED.....2,4,6,8
 OVERLAPS.....NONE

MICROWAVE DETECTOR '2A' WIRING DETAIL



TC26B WIRE LIST

COLOR	FUNCTION
black	12V to 24V AC/DC (no polarity)
red	12V to 24V AC/DC (no polarity)
orange	Output Relay Normally Open
white	Output Relay Normally Closed
green	Output Relay Common

NOTES:

- Sensor is a Microwave Sensors, Inc. Model TC-26B microwave motion detector mounted on poles as indicated on the Signal Design Plans.
- Configure AC isolator card to place call upon removal of AC+ from the input.

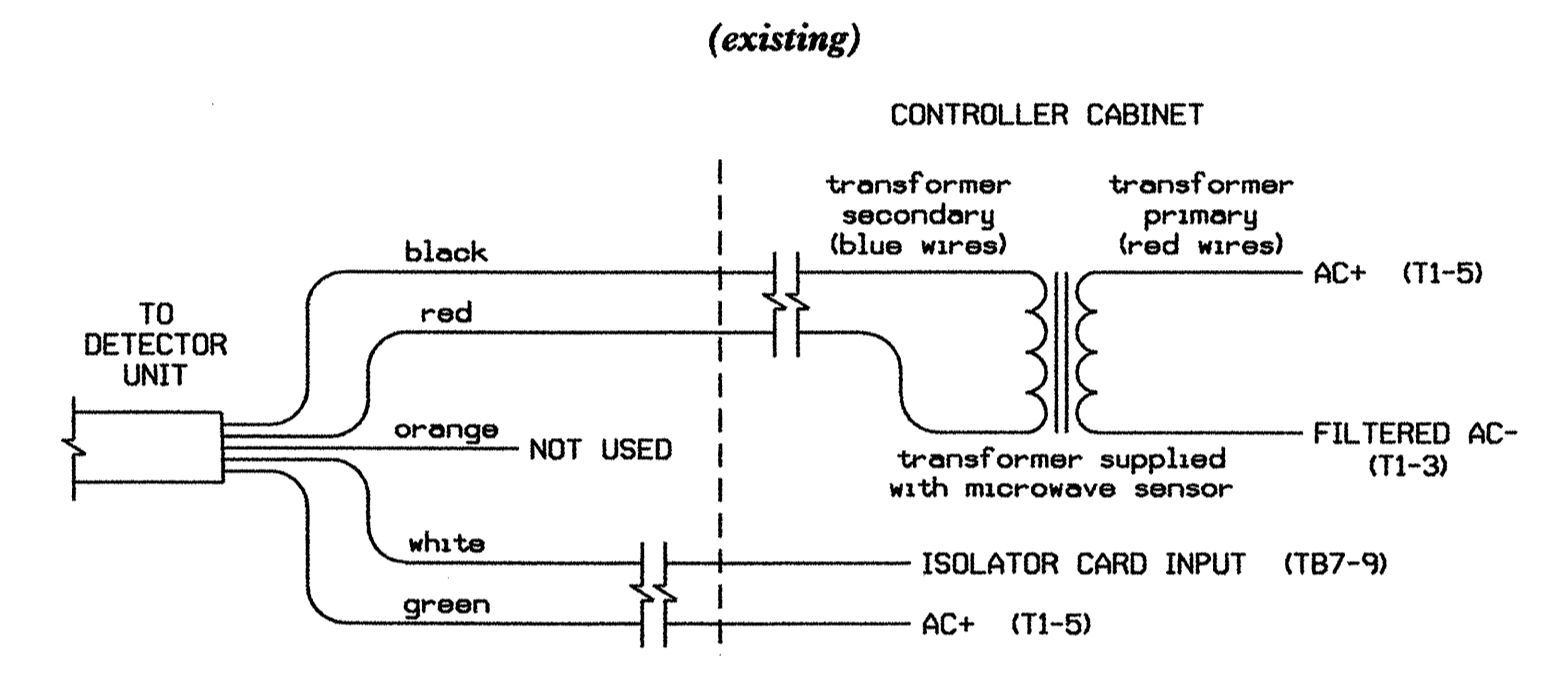
3. Important: For proper operation of the microwave detector, remove surge protection from TB6-9 and TB6-10. Tie TB6-10 to AC neutral.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW												
GREEN ARROW												

NU = Not Used

MICROWAVE DETECTOR '8A' WIRING DETAIL



TC26B WIRE LIST

COLOR	FUNCTION
black	12V to 24V AC/DC (no polarity)
red	12V to 24V AC/DC (no polarity)
orange	Output Relay Normally Open
white	Output Relay Normally Closed
green	Output Relay Common

NOTES:

- Sensor is a Microwave Sensors, Inc. Model TC-26B microwave motion detector mounted on poles as indicated on the Signal Design Plans.
- Configure AC isolator card to place call upon removal of AC+ from the input.

3. Important: For proper operation of the microwave detector, remove surge protection from TB7-9 and TB7-10. Tie TB7-10 to AC neutral.

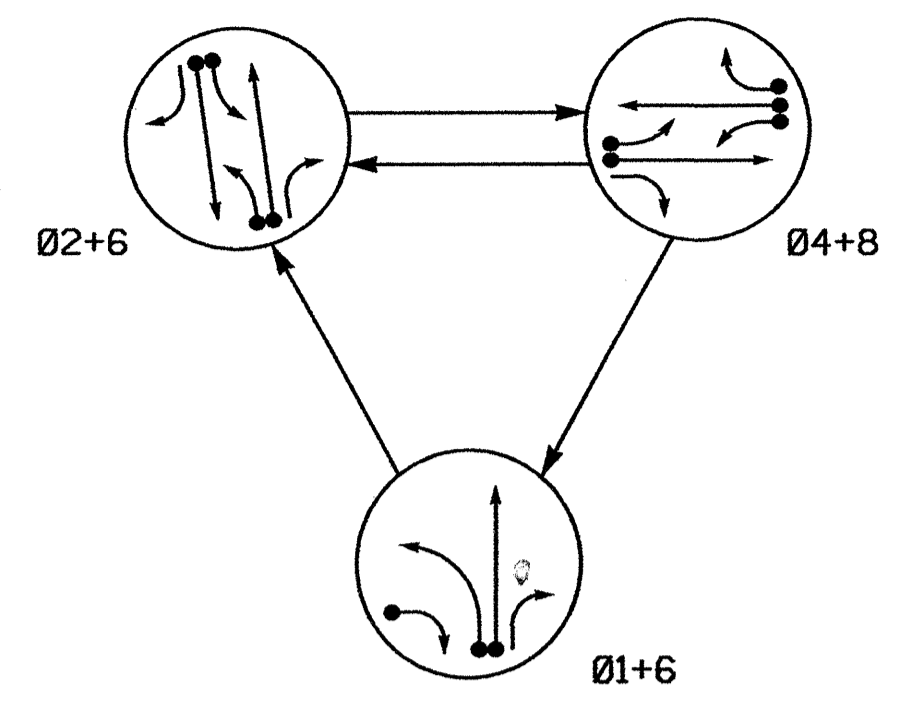
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-0901 T2 AND 03-0901 T3
 DESIGNED: April 2006
 SEALED: 08-28-06
 REVISED: NA

New Installation - Temporary 2 & Temporary 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:
 NC 211 AT
 Haul Rd. (Future Middleton Avenue) / SR 1500 (Midway Road)
 Division 3 Brunswick County Oak Island
 PLAN DATE: April 2006 REVIEWED BY: JLP
 PREPARED BY: James Peterson REVIEWED BY:
 REVISIONS INIT. DATE
 122 N. McDowell St., Raleigh, NC 27603

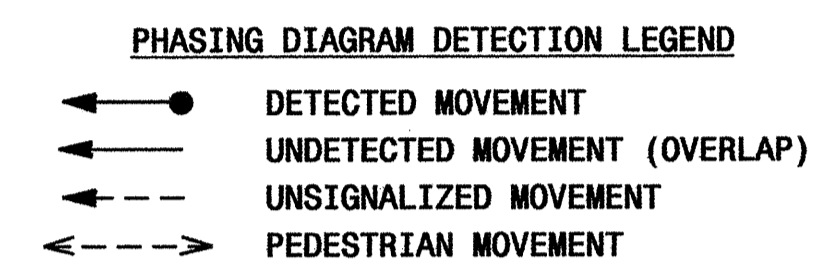
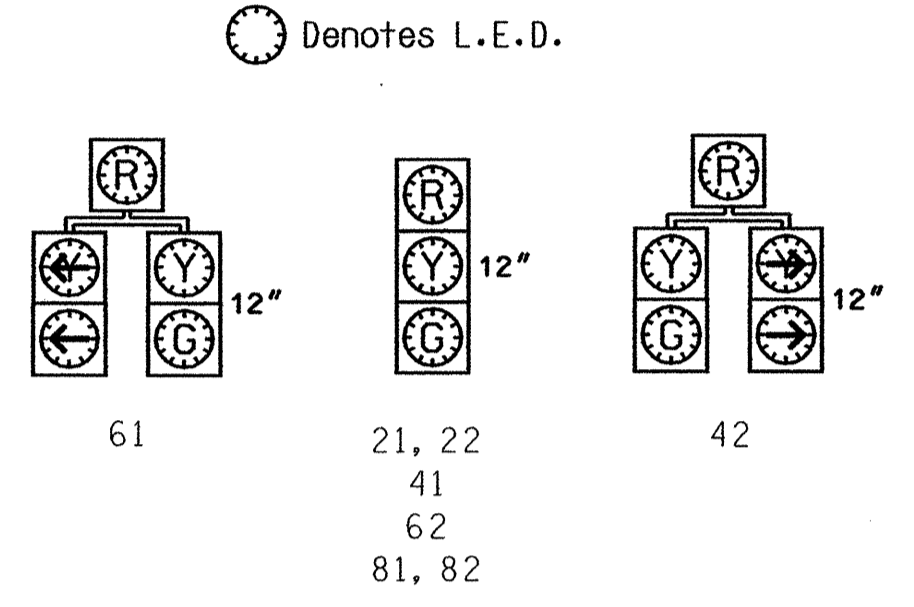
SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 008453
 JAMES T. ROWE, JR.
 SIGNATURE DATE
 SIG. INVENTORY NO. 03-0901 T2T3

PHASING DIAGRAM



SIGNAL FACE	PHASE			
	01+6	02+6	04+8	01+6
21, 22	R	G	R	Y
41	R	R	G	R
42	R	R	G	R
61	G	G	R	Y
62	G	G	R	Y
81, 82	R	R	G	R

SIGNAL FACE I.D.



2070L LOOP & DETECTOR INSTALLATION

LOOP	INDUCTIVE LOOPS			DETECTOR PROGRAMMING								
	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	Y	1	Y	Y	-	-	15	-	Y
1B	6X40	0	2-4-2	Y	1	Y	Y	-	-	3	-	Y
2A	6X6	420	6	-	2	Y	Y	-	-	-	-	-
2B	6X40	0	2-4-2	Y	2	Y	Y	-	-	3	-	-
4A	6X6	420	6	Y	4	-	Y	-	-	-	-	-
4B	6X40	0	2-4-2	-	4	Y	Y	-	-	3	-	-
4C	6X40	0	2-4-2	Y	4	Y	Y	Y	2	5	-	-
4D	6X40	0	2-4-2	-	4	Y	Y	-	-	15	-	-
6A	6X6	420	6	Y	6	Y	Y	-	-	-	-	-
8A	6X6	420	6	Y	8	-	Y	-	-	-	-	-
8B	6X40	0	2-4-2	Y	8	Y	Y	-	-	3	-	-
8C	6X40	0	2-4-2	Y	8	Y	Y	Y	2	5	-	-

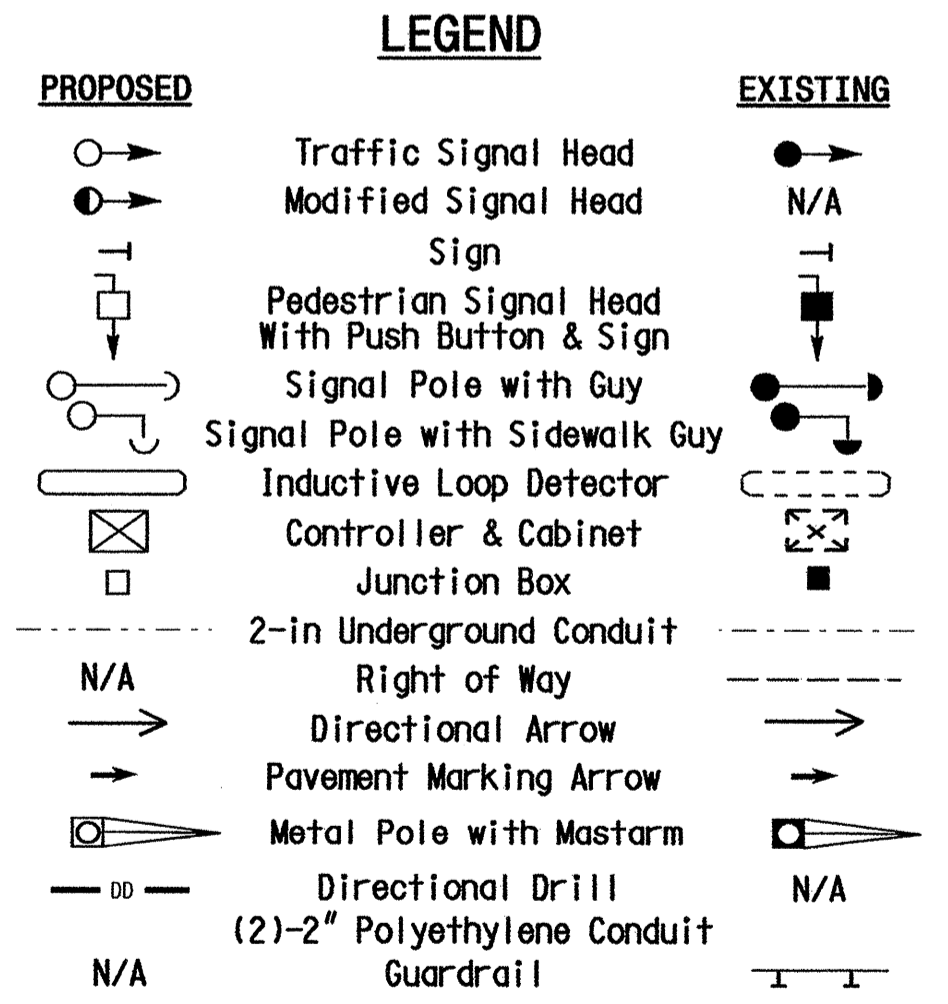
3 Phase Fully Actuated (Isolated)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Omit phase 1 during phase 2 on.
- Program controller to clear from phase 2+6 to phase 1+6 by progressing through phase 4+8 (see Electrical Details).
- Set all detector units to presence mode.
- Use polycarbonate for all signal heads mounted on mastarms.

FEATURE	PHASE				
	1	2	4	6	8
Min Green 1 *	7	14	7	14	7
Extension 1 *	2.0	6.0	6.0	6.0	6.0
Max Green 1 *	20	90	30	90	30
Yellow Clearance	3.0	5.2	5.2	5.2	5.2
Red Clearance	2.8	1.2	1.1	1.2	1.1
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	-	2.5	-	2.5	-
Max Variable Initial *	-	46	-	46	-
Time Before Reduction *	-	15	0	15	0
Time To Reduce *	-	30	15	30	15
Minimum Gap	-	3.0	3.0	3.0	3.0
Recall Mode	-	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	-	YELLOW	-
Dual Entry	-	-	ON	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON

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



New Installation- Final

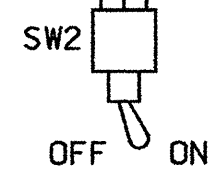
	<p>NC 211 at Middleton Avenue/ SR 1500 (Midway Road)</p>		<p>SEAL</p>			
	<p>Division 3 Brunswick County Oak Island</p> <p>PLAN DATE: April 2006 REVIEWED BY: D Y Ishak</p> <p>PREPARED BY: R Duffy REVIEWED BY:</p>	<p>REVISIONS</p> <table border="1"> <tr> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> </tr> </table>		INIT.	DATE	
INIT.	DATE					

22-AUG-2006 07:08 641115 5 (p) lsmwrcgrcpsw1p project:sr-2245w030901_s1.gdb_2006mddi.dgn

EDI MODEL 2010ECL CONFLICT MONITOR

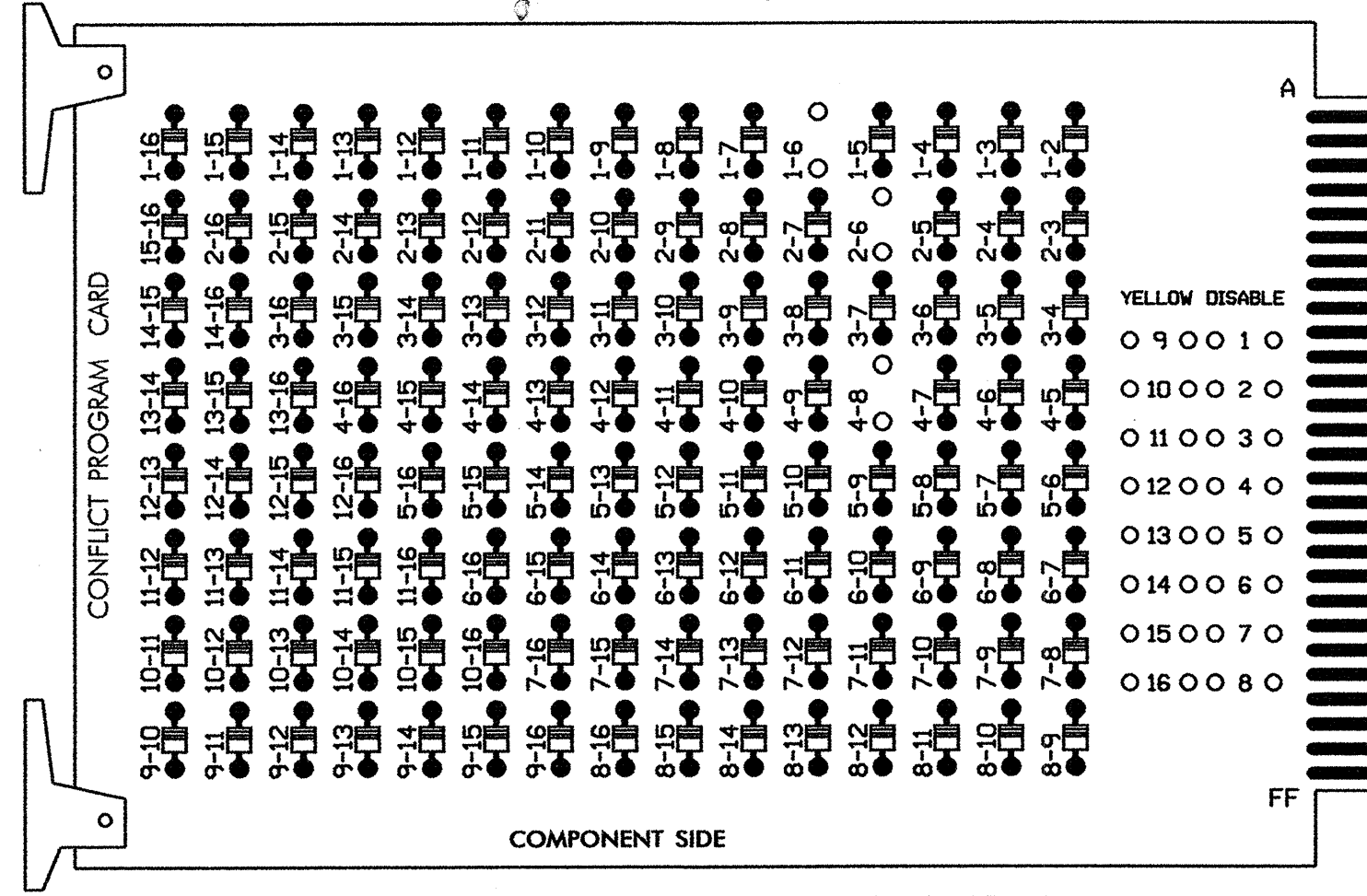
PROGRAMMING DETAIL

WD ENABLE



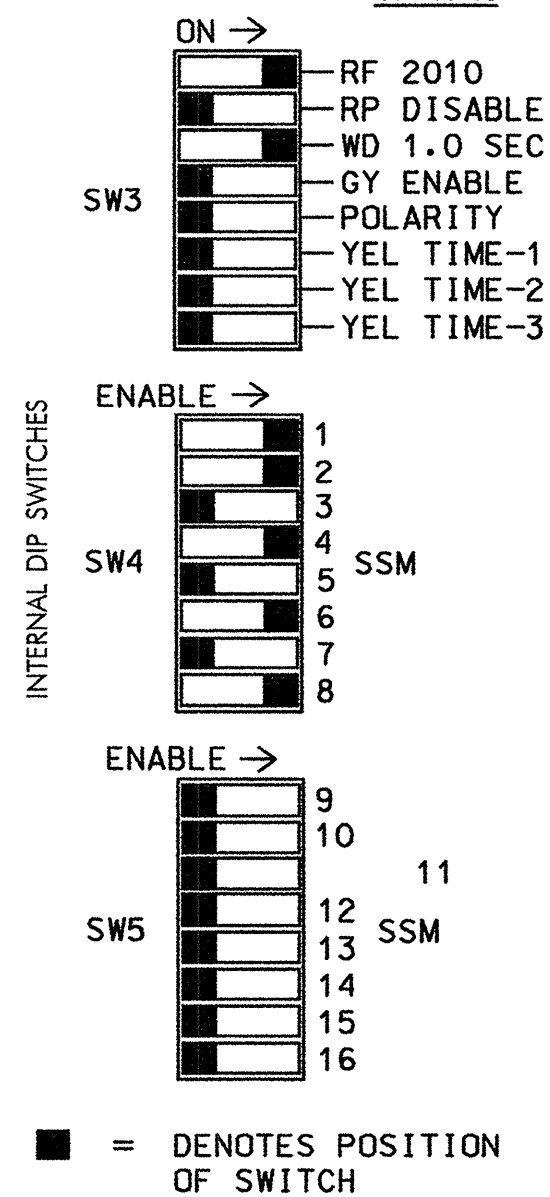
(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-6, 2-6 AND 4-8.



REMOVE JUMPERS AS SHOWN

OPTIONS



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Make sure jumpers SEL1-SEL5 are present on the monitor board.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 3,5,7, 9,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Program phases 2 and 6, on the controller unit, for Start Up In Green.
- Enable Simultaneous Gap-Out, on the controller unit, for all phases.
- Program phases 4 and 8, on the controller unit, for Dual Entry.
- Program phases 2, 4, 6 and 8, on the controller unit, for Gap Reduction.
- Program phases 2 and 6, on the controller unit, for Variable Initial.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	42,61	21,22	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU
RED	*	128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW												
YELLOW ARROW	126											
GREEN ARROW	127											

NU = Not Used

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

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
 CABINET.....CONTRACTOR SUPPLIED 332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S4,S6,S8
 PHASES USED.....1,2,4,6,8
 OVERLAPS.....NONE

DYNAMIC BACK-UP CONTROL PROGRAMMING

(program controller as shown below)

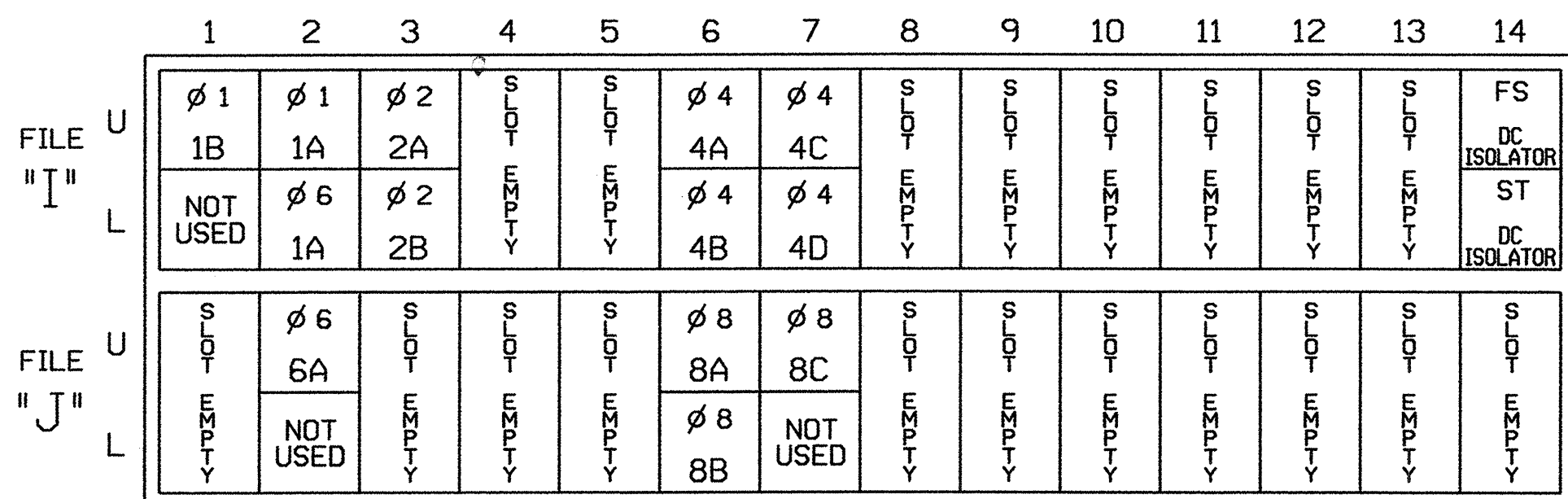
- From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Scroll to the bottom of the menu and enable Dynamic/Backup Control Function 1.
- From Phase Control Functions Menu press '2' (Dynamic/Backup Control Functions).

DYNAMIC/BACKUP CONTROL FUNCTION #01
 OVERLAPS: ABCDEFGHIJKLMNOP
 IF OVERLAPS ARE ACTIVE :
 OR PHASES: 12345678910111213141516
 IF PHASES ARE ON : X
 OMIT PHASES : X
 CALL PHASES : X

BACKUP PROTECTION PROGRAMMING COMPLETE

INPUT FILE POSITION LAYOUT

(front view)



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

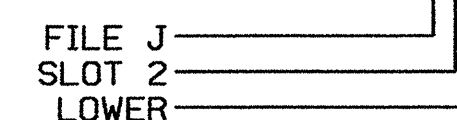
FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1B	TB2-1,2	I1U	56	18	1	1	Y	Y			15
1A ¹	TB2-5,6	I2U	39	1	2	1	Y	Y			15
	TB2-7,8	I2L	43	5	12	6	Y	Y	Y		3
2A	TB2-9,10	I3U	63	25	32	2	Y	Y			
2B	TB2-11,12	I3L	76	38	42	2	Y	Y	Y		3
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			3
4C	TB6-1,2	I7U	65	27	34	4	Y	Y	Y	2	5
4D	TB6-3,4	I7L	78	40	44	4	Y	Y			15
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8			Y		
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			3
8C	TB7-1,2	J7U	66	28	38	8	Y	Y	Y	2	5

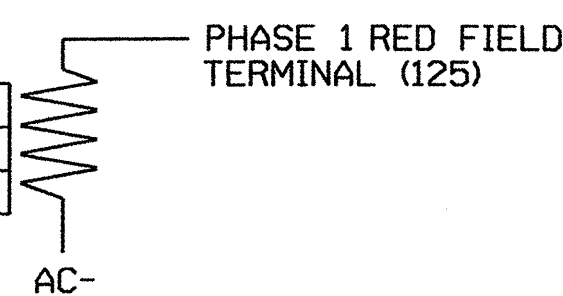
¹Add jumpers from TB2-5 to TB2-7, and from TB2-6 to TB2-8.

INPUT FILE POSITION LEGEND: J2L



LOAD RESISTOR INSTALLATION DETAIL

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

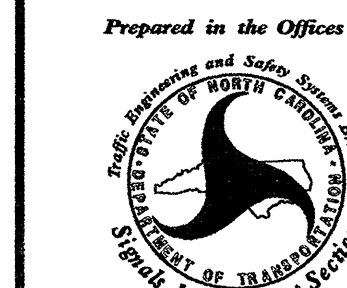


NOTE: The purpose of this resistor is to load the channel red monitor input in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

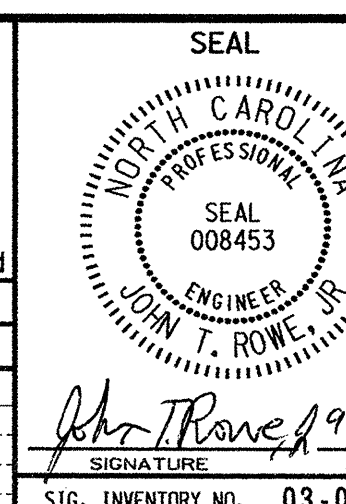
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-0901
 DESIGNED: April 2006
 SEALED: 08-28-06
 REVISED: NA

New Installation - Final

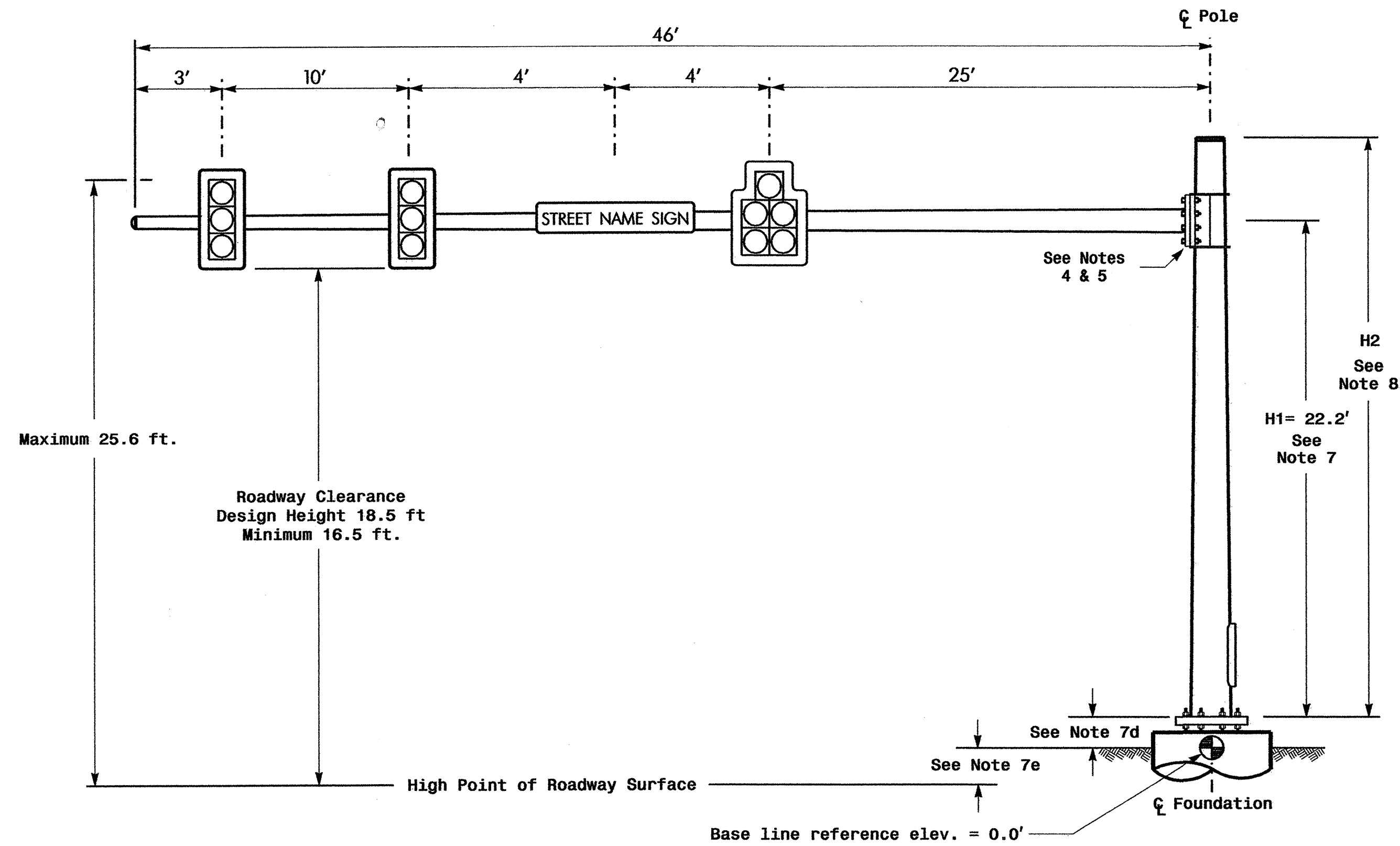
ELECTRICAL AND PROGRAMMING DETAILS FOR:



NC 211 AT Middleton Avenue/ SR 1500 (Midway Road)	
Division 3	Brunswick County
PREPARED BY: James Peterson	REVIEWED BY: JWP
REVISIONS	INIT. DATE

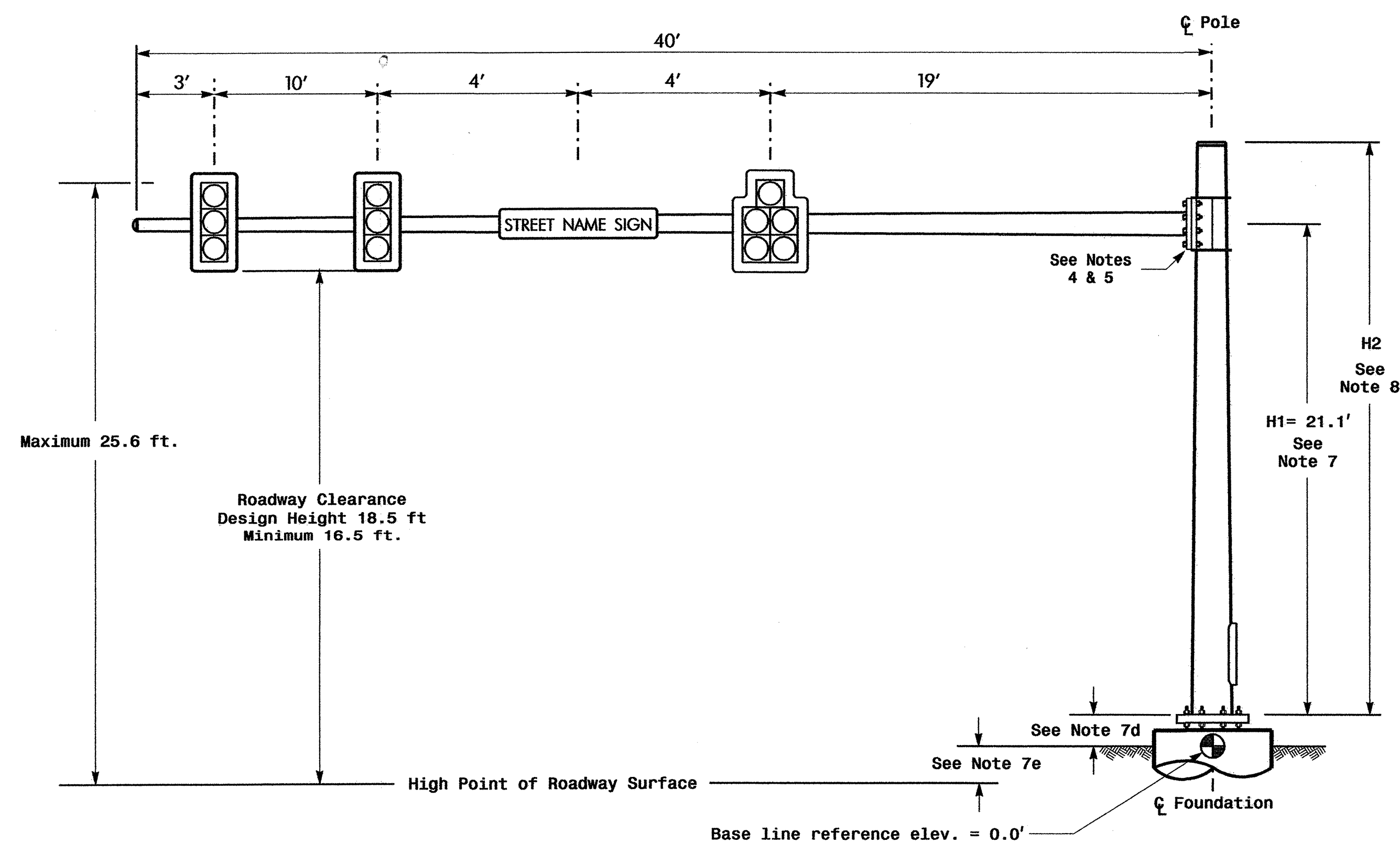


Design Loading for METAL POLE NO. 5



Elevation View

Design Loading for METAL POLE NO. 6

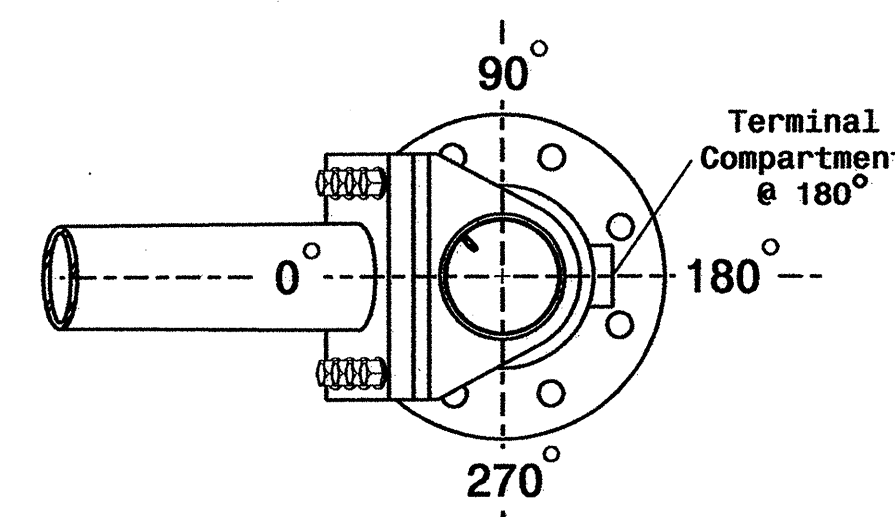


Elevation View

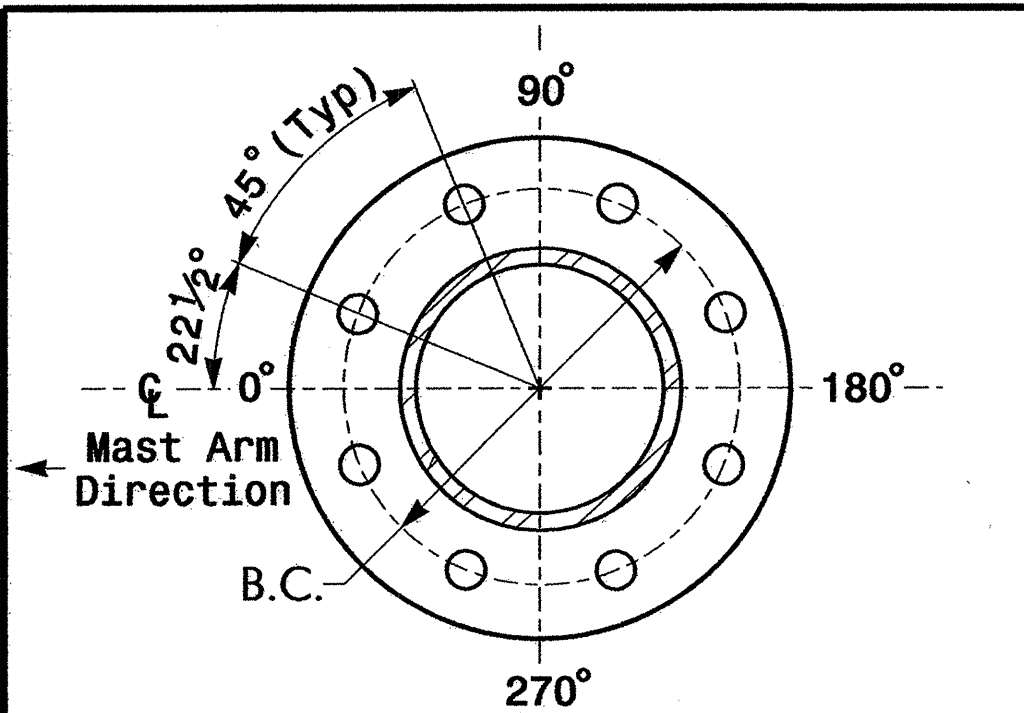
SPECIAL NOTE
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project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

Elevation Data for Mast Arm Attachment (H1)

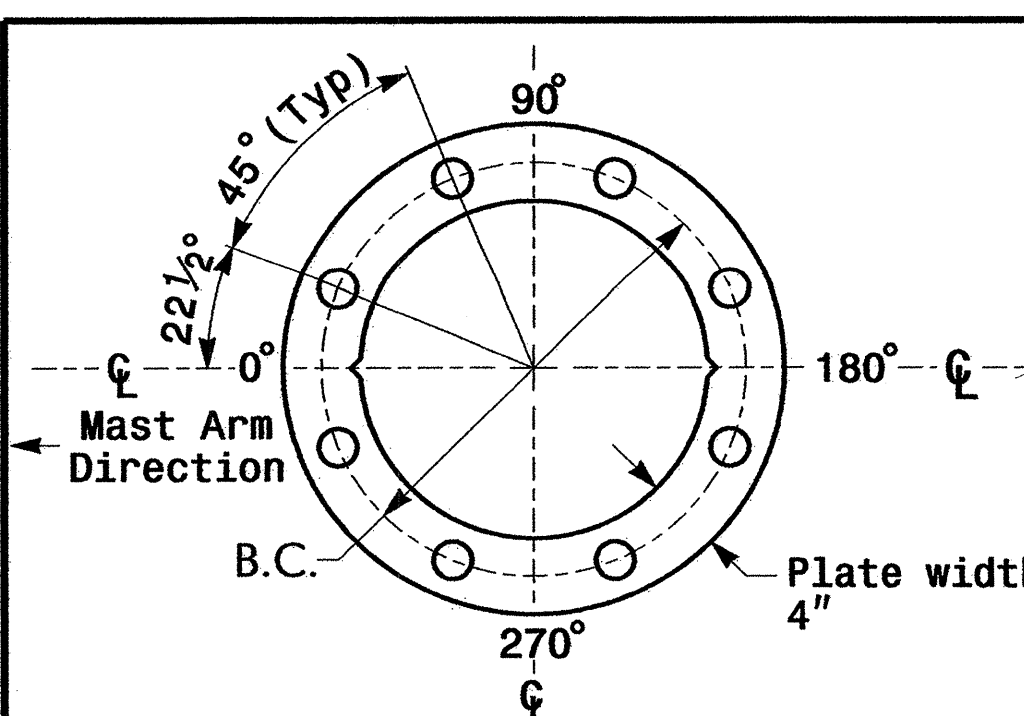
Elevation Differences for:	Pole 5	Pole 6
Baseline reference point at ϕ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	2.1 ft.	1.0 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2006 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.ncdot.org/doh/preconstruct/traffic/tmsu/ws/mpoles/poles.htm>

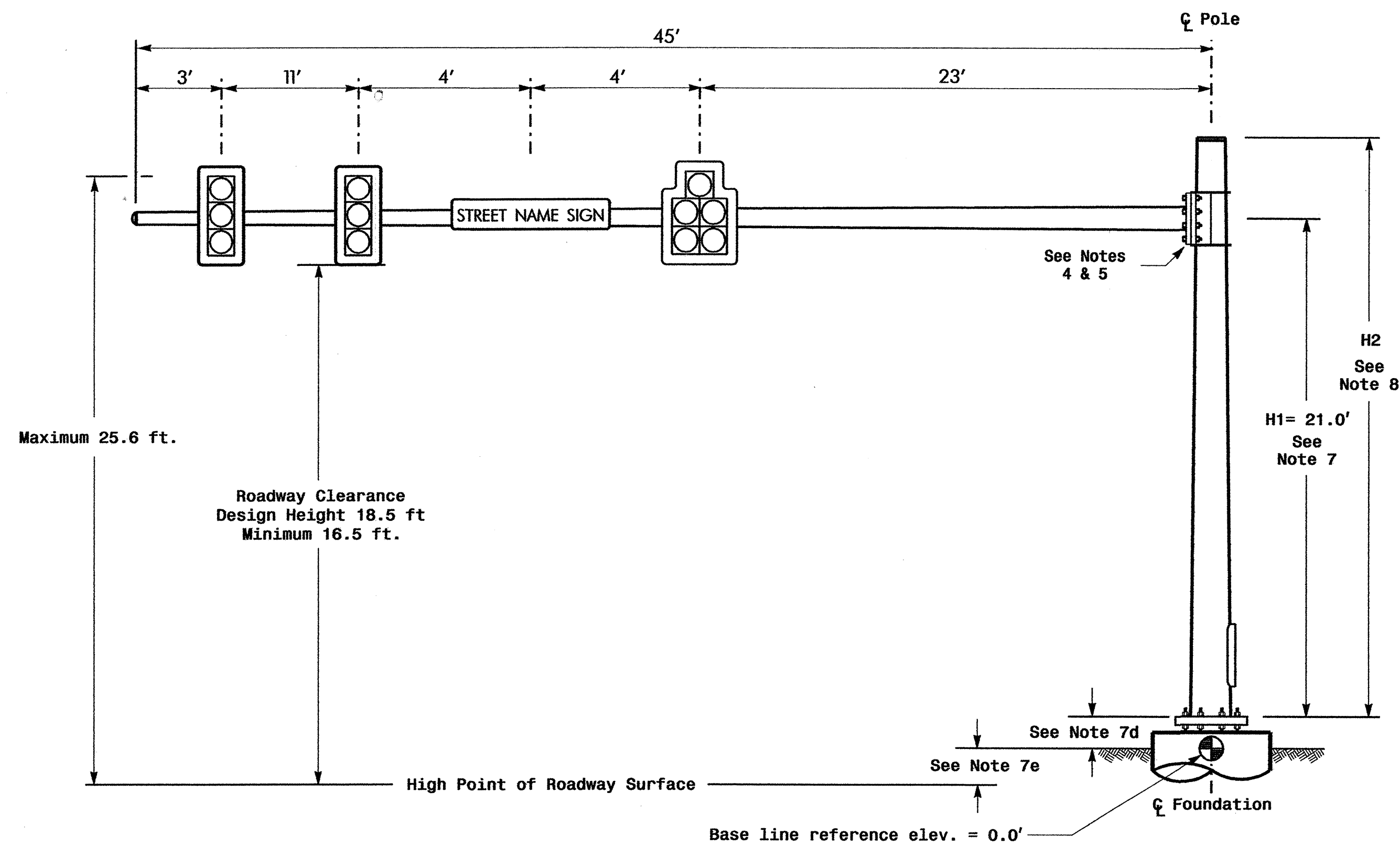
Design Requirements

- 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.
- Maximum allowable CSR for all signal supports is 0.9.
- The camber design for 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.
- 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 is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
- 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.
- 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 Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- 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 2 (130 mph)

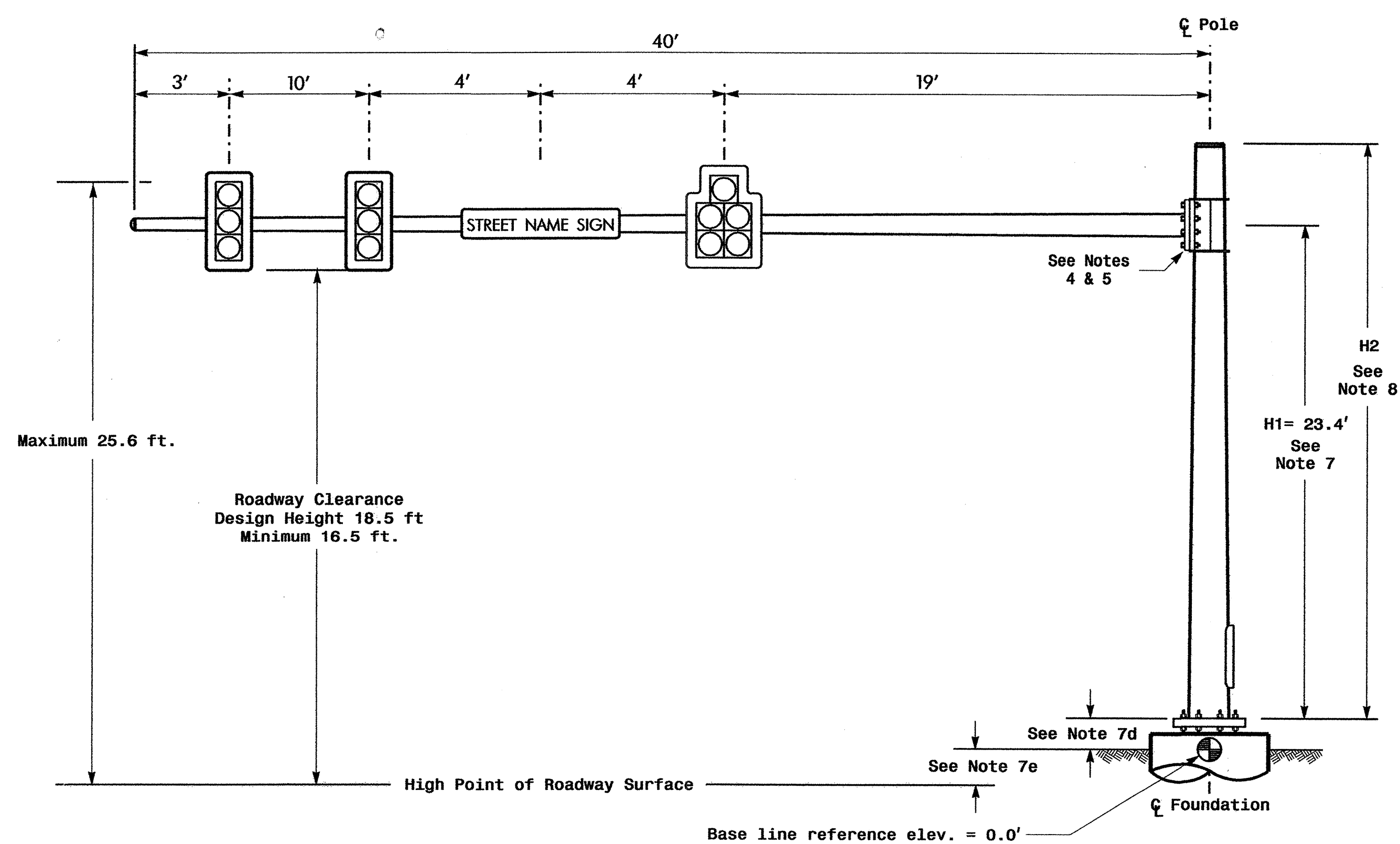
<p>122 N. McDowell St., Raleigh, NC 27603</p>	<p>NC 211 at Middleton Avenue/ SR 1500 (Midway Road)</p>		<p>SEAL</p>
	<p>Division 3 Brunswick County Oak Island</p>	<p>PLAN DATE: June 2006 REVIEWED BY: RW Duffy</p>	
<p>SCALE: N/A</p>	<p>REVISIONS</p>	<p>INIT. DATE</p>	<p>SIGNATURE: [Signature] DATE: 31 May 2006</p>
<p>N/A</p>	<p>SIG. INVENTORY NO. 03-0901</p>		

Design Loading for METAL POLE NO. 7



Elevation View

Design Loading for METAL POLE NO. 8



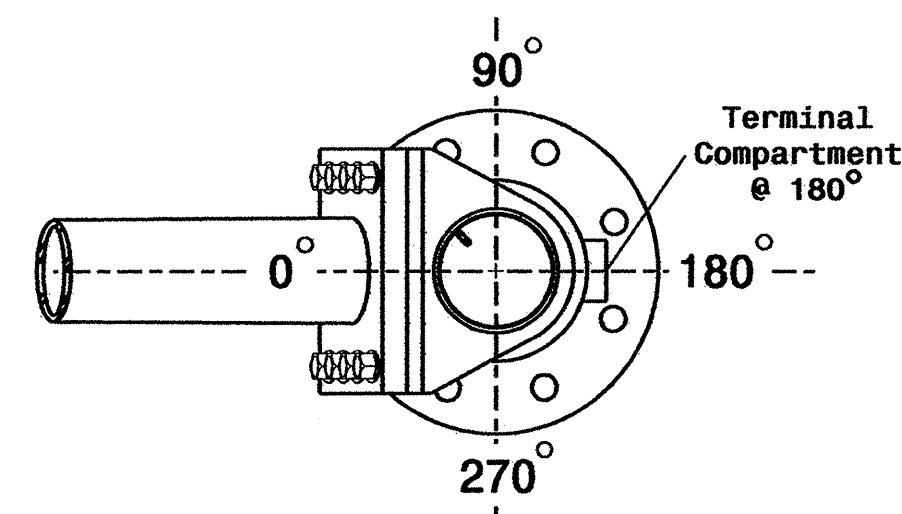
Elevation View

SPECIAL NOTE

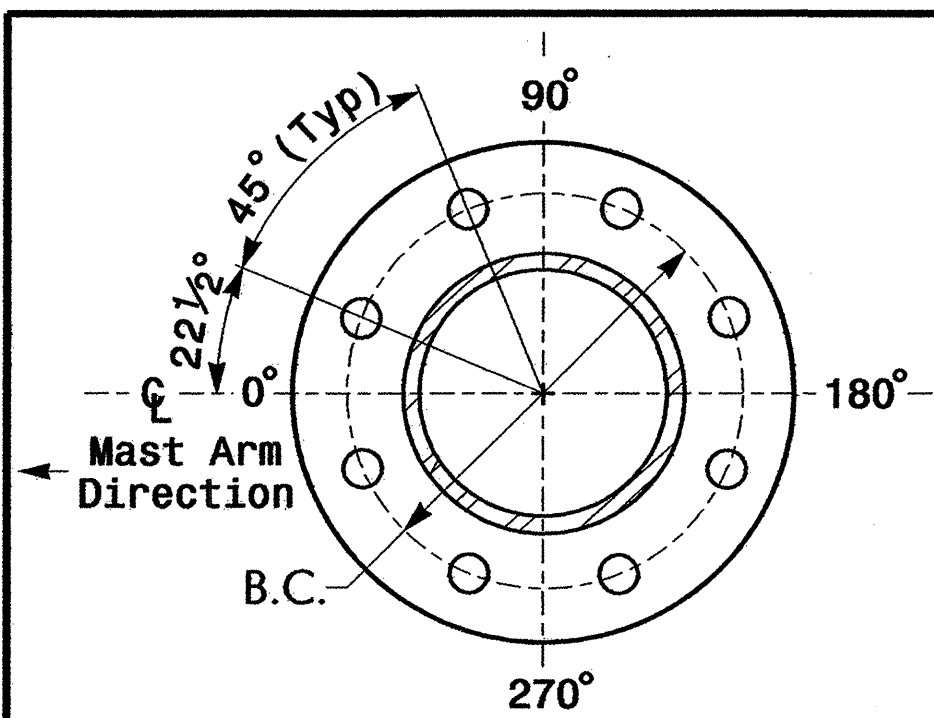
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 7	Pole 8
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	0.9 ft.	3.3 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

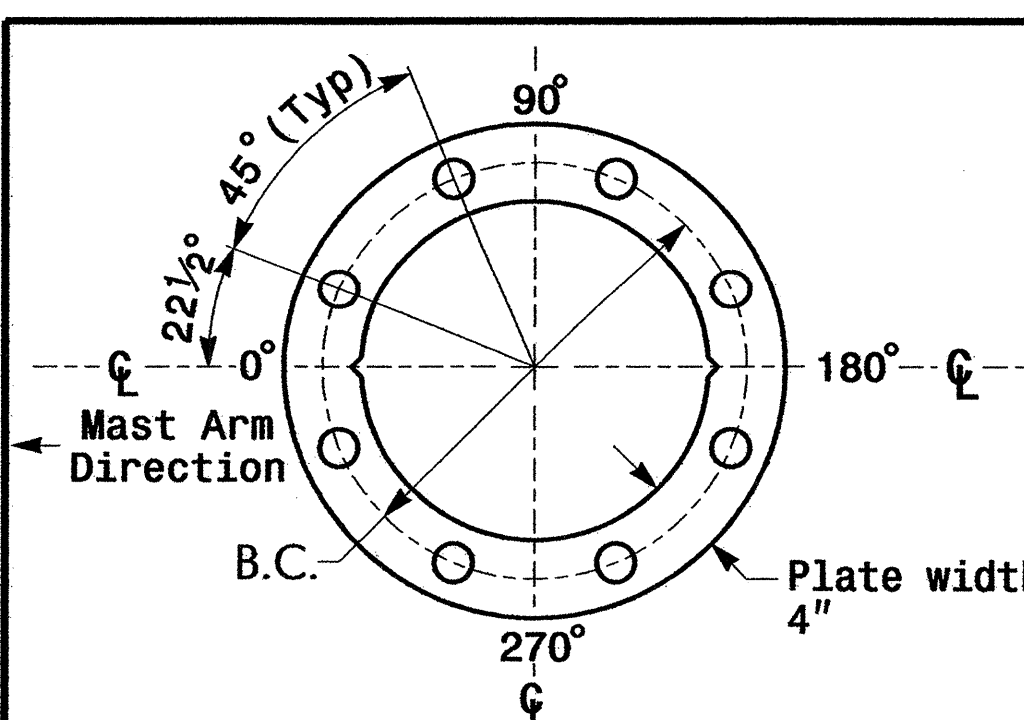


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

NOTES

Design Reference Material

- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2006 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <http://www.ncdot.org/doh/preconstruct/traffic/tmsu/ws/mpoles/poles.htm>

Design Requirements

- 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.
- Maximum allowable CSR for all signal supports is 0.9.
- The camber design for 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.
- 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 is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
- 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.
- 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 Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- 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 2 (130 mph)

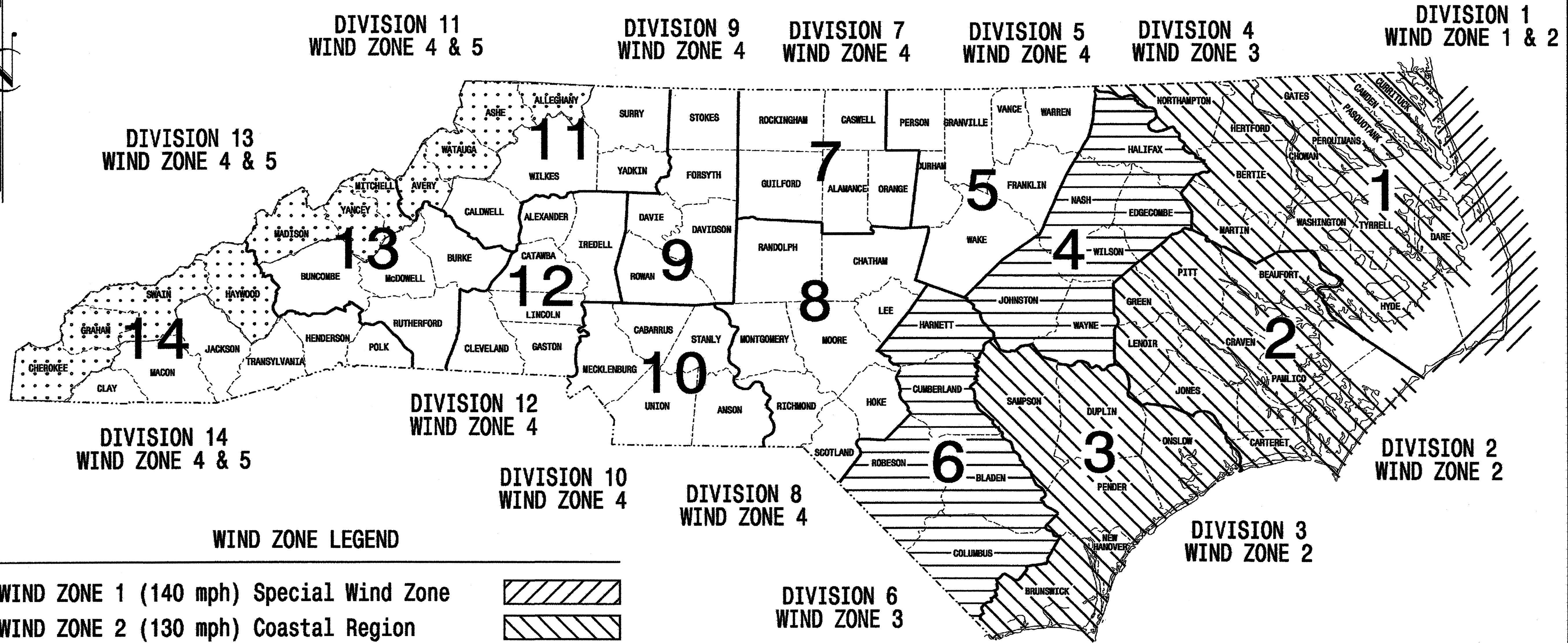
Prepared in the Office of:

 NC 211
 at
 Middleton Avenue/
 SR 1500 (Midway Road)
 Division 3 Brunswick County Oak Island
 PLAN DATE: June 2006 REVIEWED BY: RM Duffy
 PREPARED BY: TS Thigpen REVIEWED BY: TS Thigpen
 SCALE: 0 N/A
 REVISIONS: INIT. DATE
 SIGNATURE: DATE
 SIG. INVENTORY NO. 03-0901

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	R-2245	Sig. 15
F.A. PROJ. NO.		M 1
PROJECT ID. NO.		

STANDARD DRAWINGS FOR METAL POLES



WIND ZONE LEGEND

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

<http://www.ncdot.org/doh/preconstruct/traffic/tmssu/ws/default.htm>

Prepared in the Offices of:



122 N. McDowell St., Raleigh, NC 27603

Designed in conformance with the 2002 Interim to the 4th Edition 2001

AASHTO

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

INDEX OF PLANS

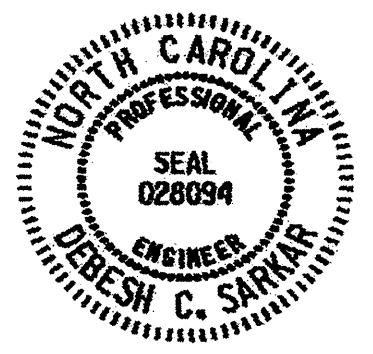
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

NC DOT CONTACTS:

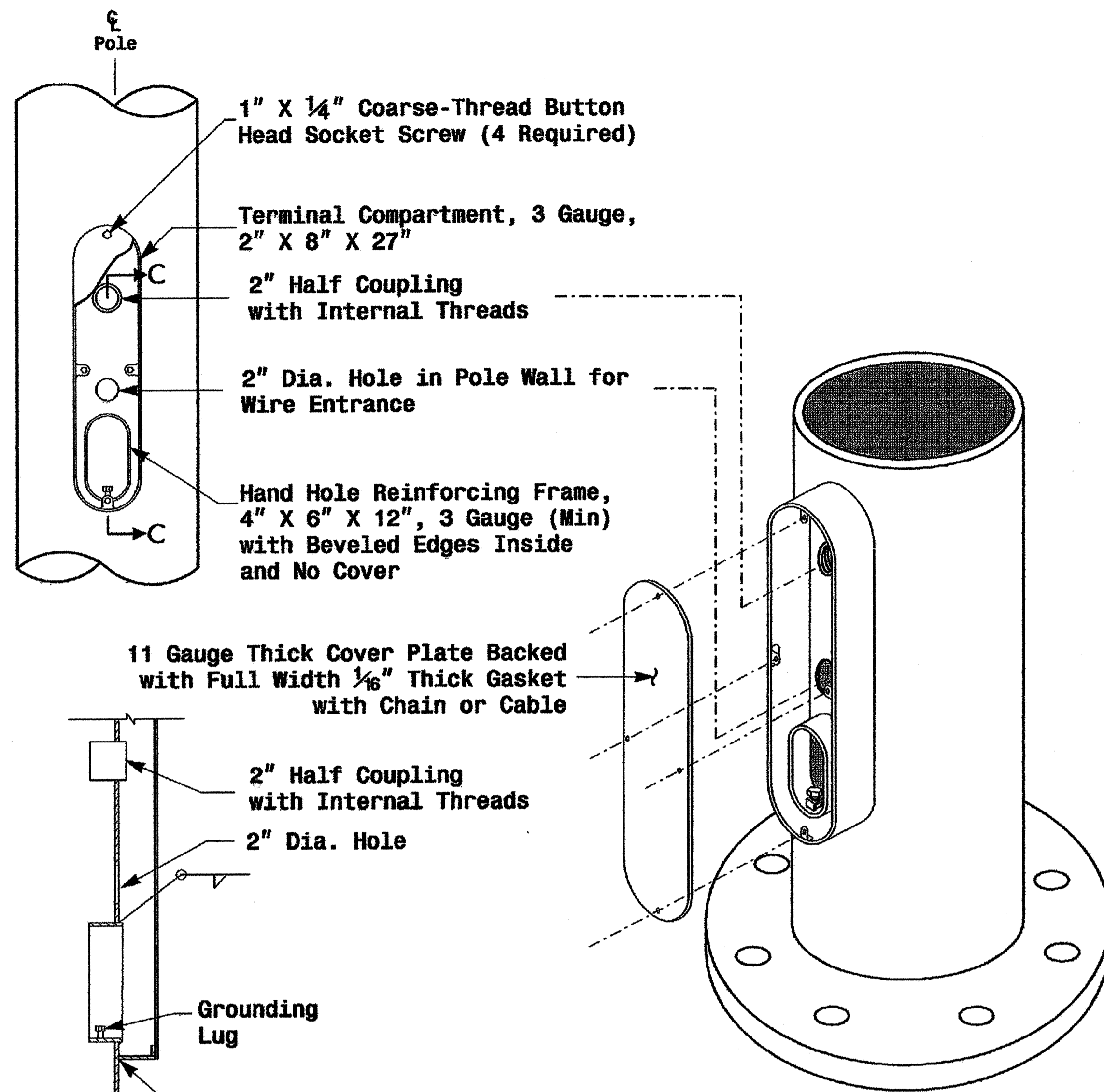
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

- G. A. Fuller, P.E. - State ITS and Signals Engineer
- R. E. Mullinax, P.E. - Signals and Geometrics Engineer
- P. L. Alexander, P.E. - Signals and Geometrics Special Projects Engineer
- D. C. Sarkar, P.E. - Signals and Geometrics Structural Engineer
- A. M. Esposito, P.E. - Signals and Geometrics Project Engineer
- C. F. Andrews, Jr. - Signals and Geometrics Project Engineer

SEAL



D. Sarkar 9.2.2005
SIGNATURE DATE



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

Terminal Compartment Detail

MFG _____	MFG. DATE: MM/YY _____
SHAFT D/T/L/Y _____	
ARM-A D/T/L/Y _____	
ARM-B D/T/L/Y _____	
A.B. DIA./B.C./L/Y _____	
NCDOT STANDARD _____	

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

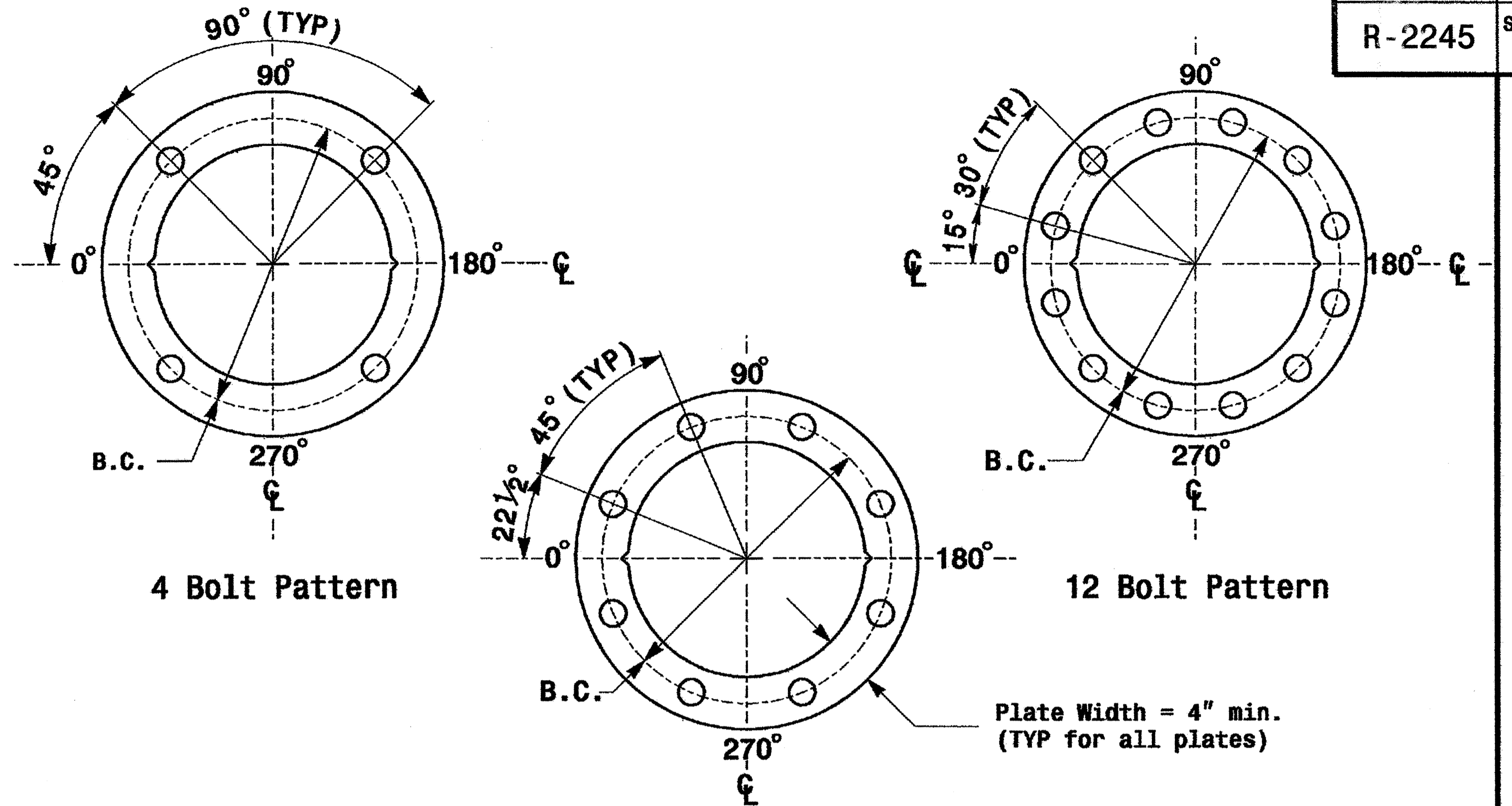
Notes:

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

Identification Tag Details

MFG _____	MFG. DATE: MM/YY _____
SECTION D/T/L/Y _____	
NCDOT STANDARD _____	

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

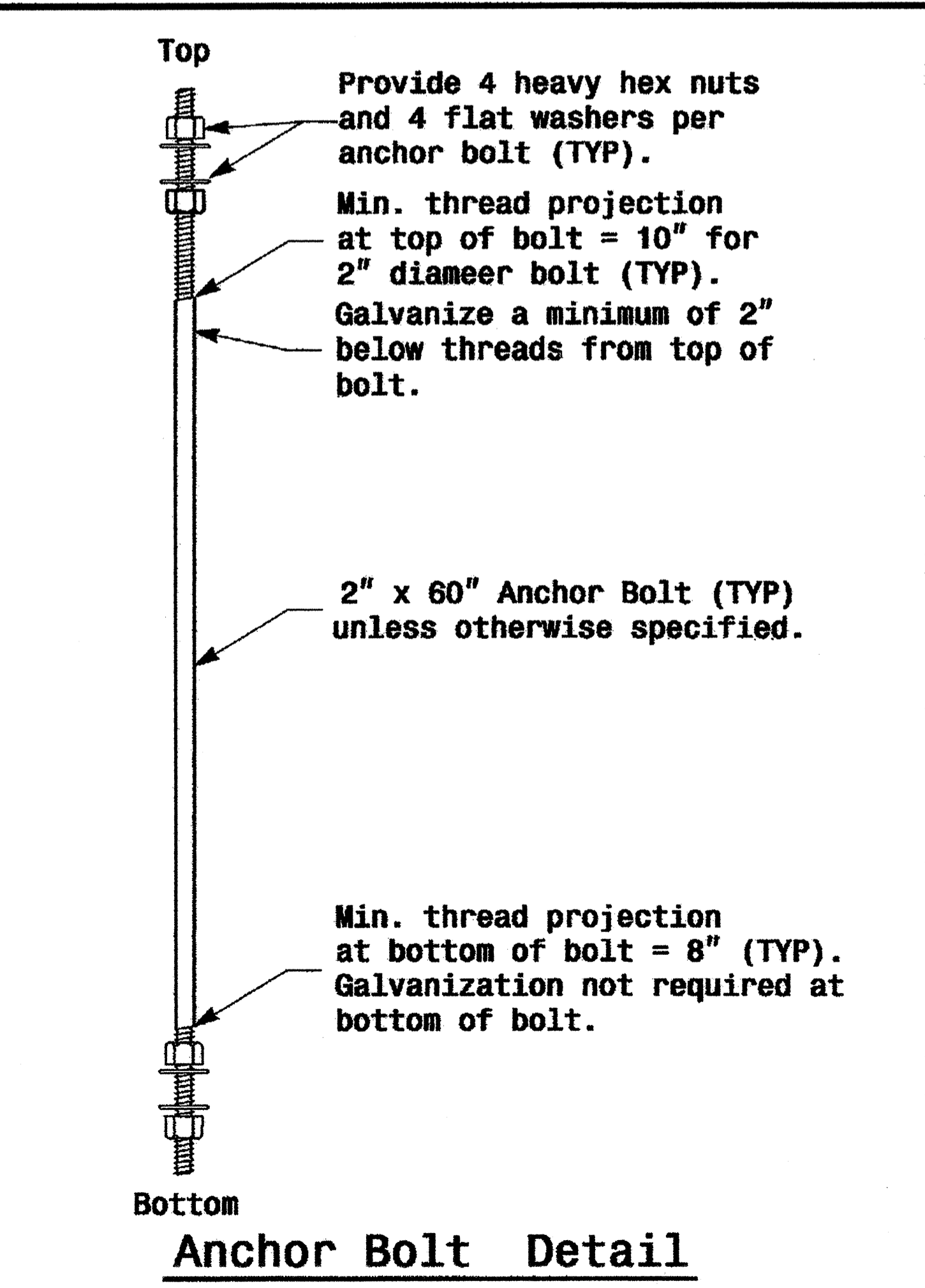


4 Bolt Pattern

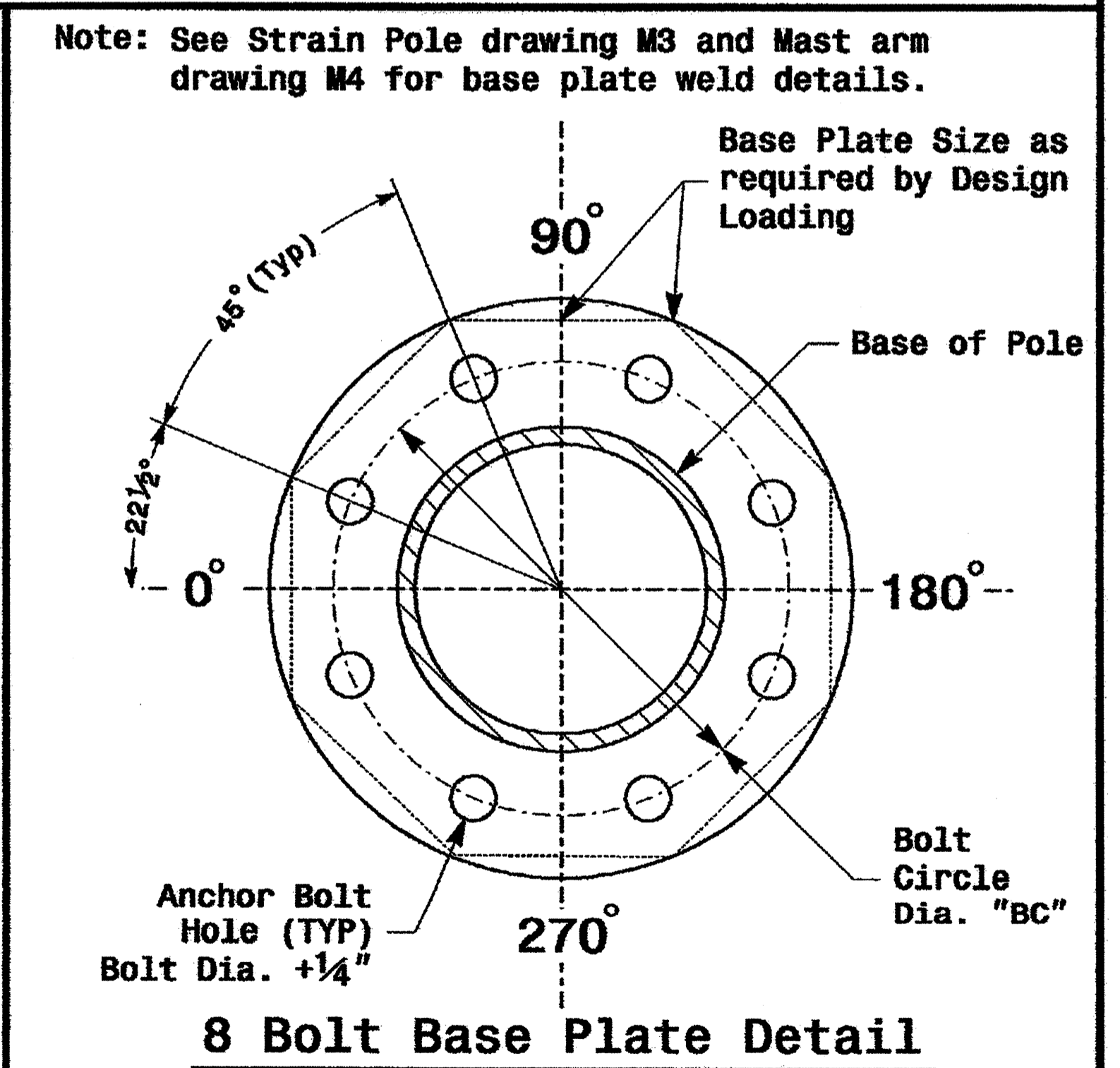
12 Bolt Pattern

8 Bolt Pattern

Construct Templates and Plates from 1/4 inch min. thick Steel. Galvanizing is not required. Base Plate Template and Anchor Bolt Lock Plate Details




Anchor Bolt Detail



8 Bolt Base Plate Detail

Prepared in the Office of:

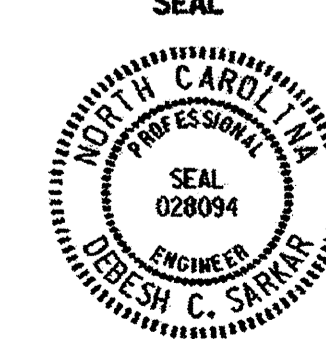


Typical Fabrication Details Common To All Metal Poles

PLAN DATE: May 2005 REVIEWED BY: C.F. Andrews
PREPARED BY: P.L. Alexander REVIEWED BY: A.W. Esposito

REVISIONS	INIT.	DATE

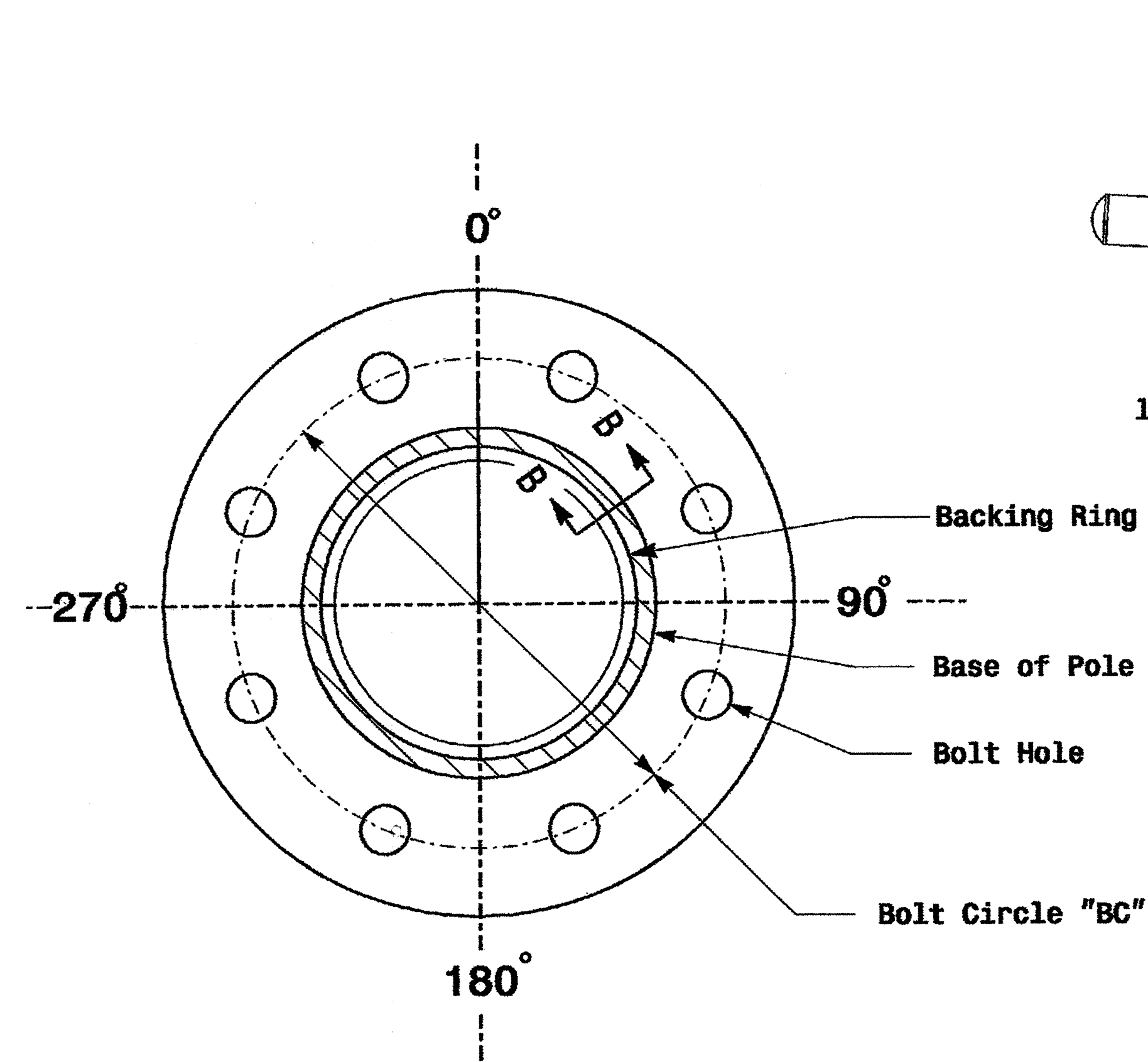
SCALE: NONE



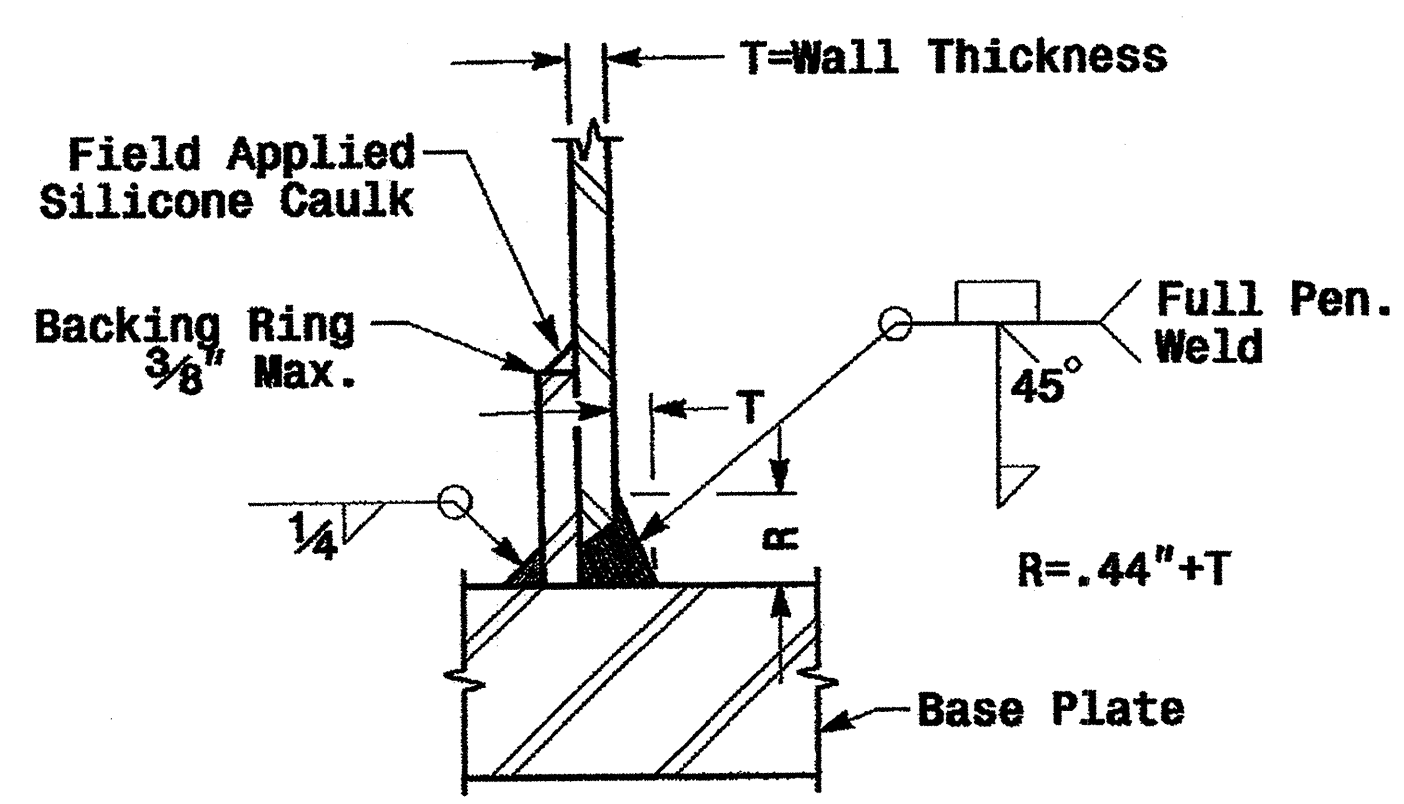
P.L. Alexander 9/2/2005
DATE

SIG. INVENTORY NO.

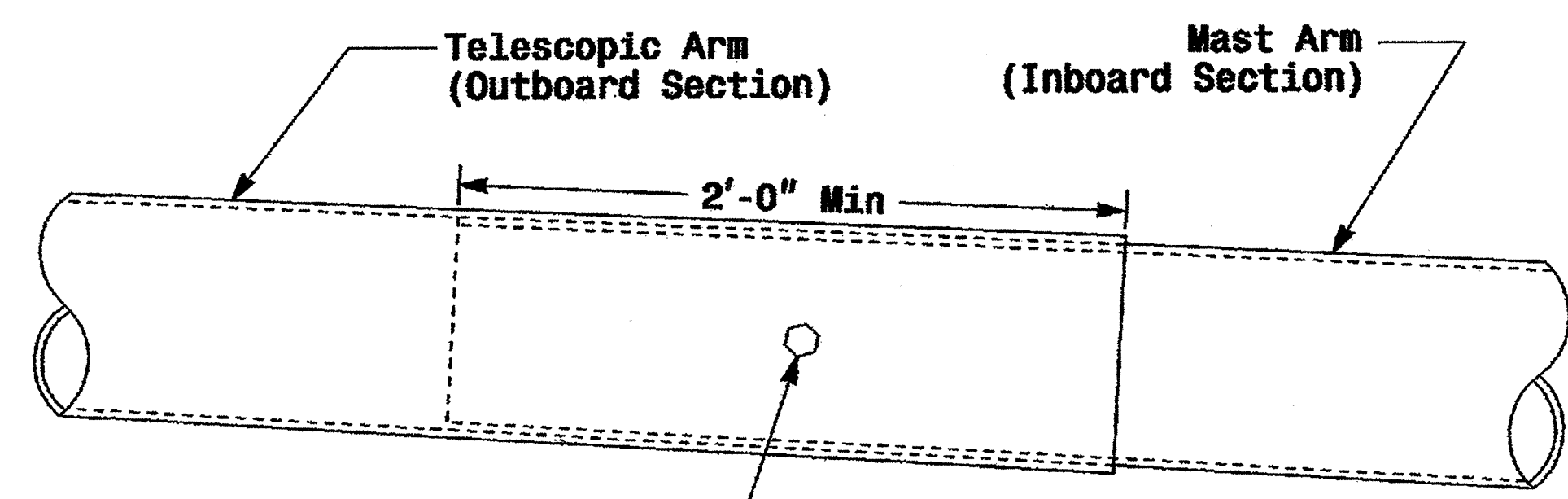
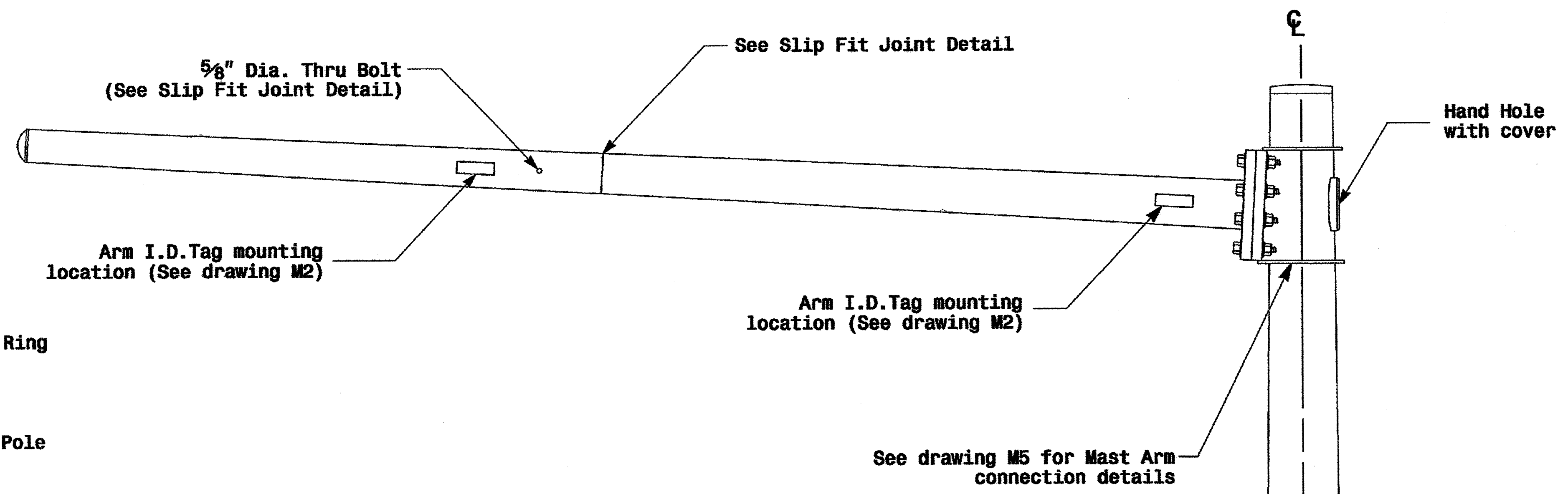
Fabrication Details - All Poles



Section A-A
(See drawing M 2)
Pole Base Plate

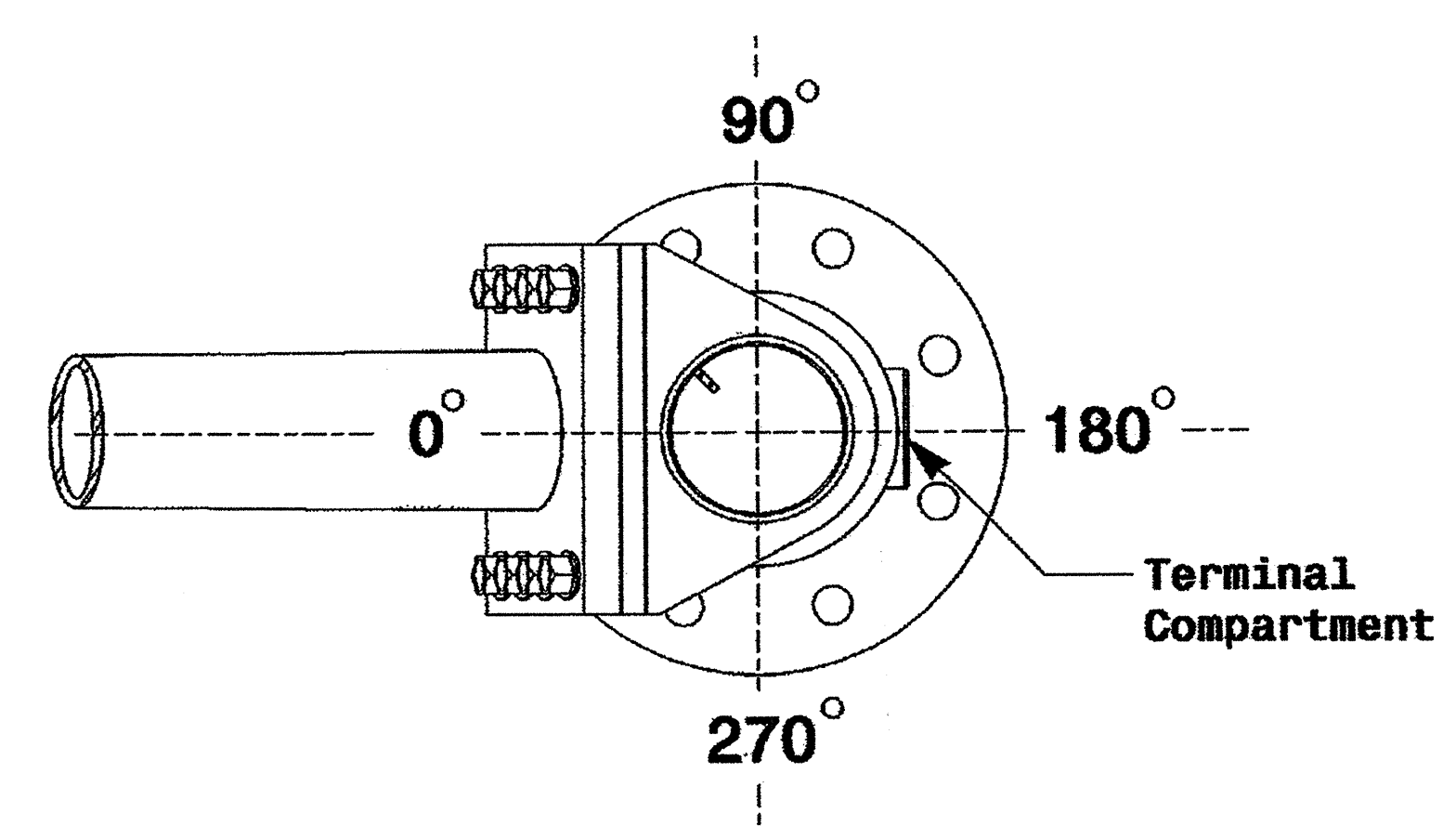


Section B-B
(Pole Attachment to Base Plate)
Full-Penetration Groove Weld Detail

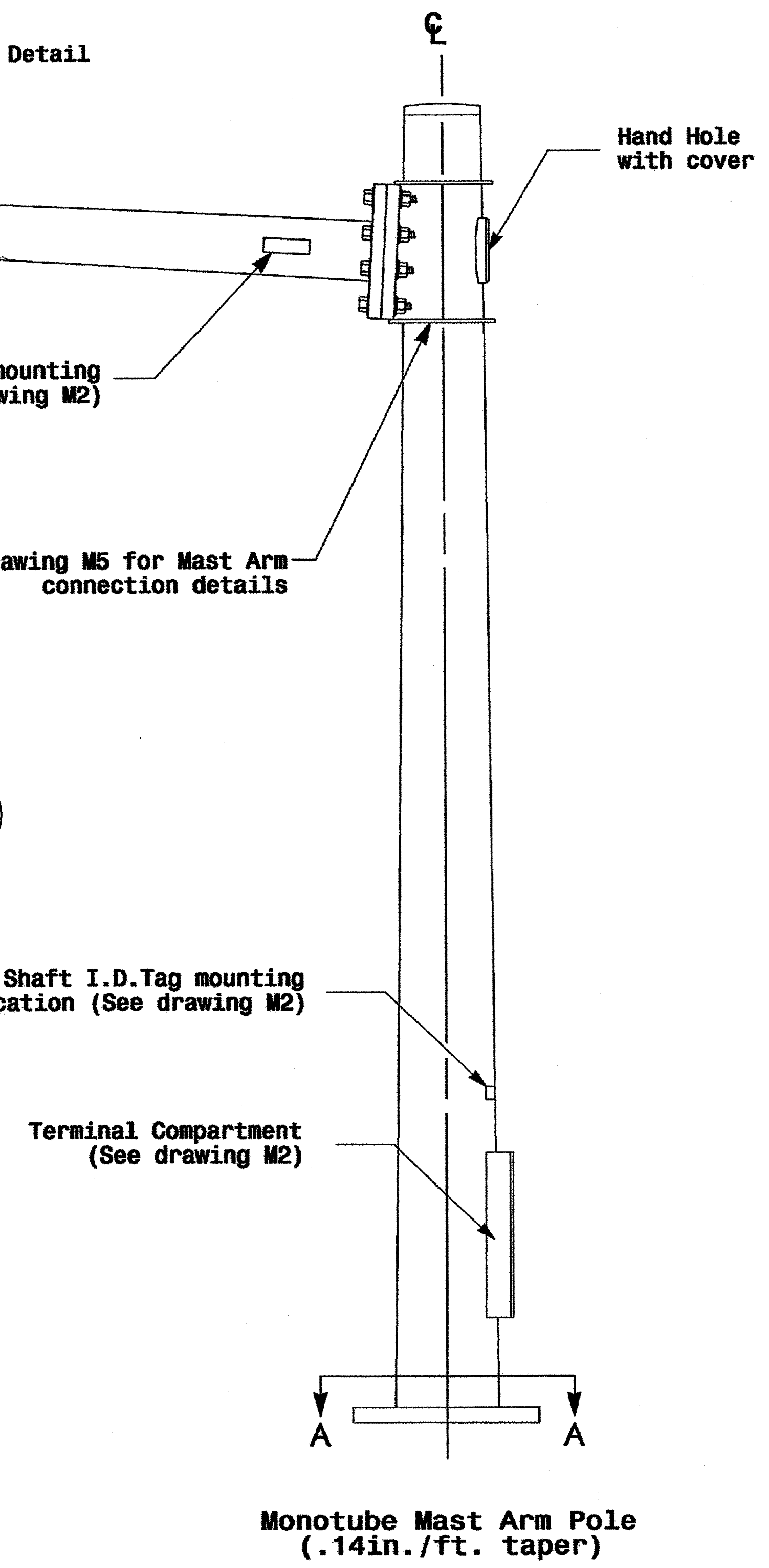


3/4" Factory Drilled Hole in Outboard Tube. Field Drill Inboard Tube. 5/8" Galvanized Thru Stud with (2) Hex. Locknuts Ea.

Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation

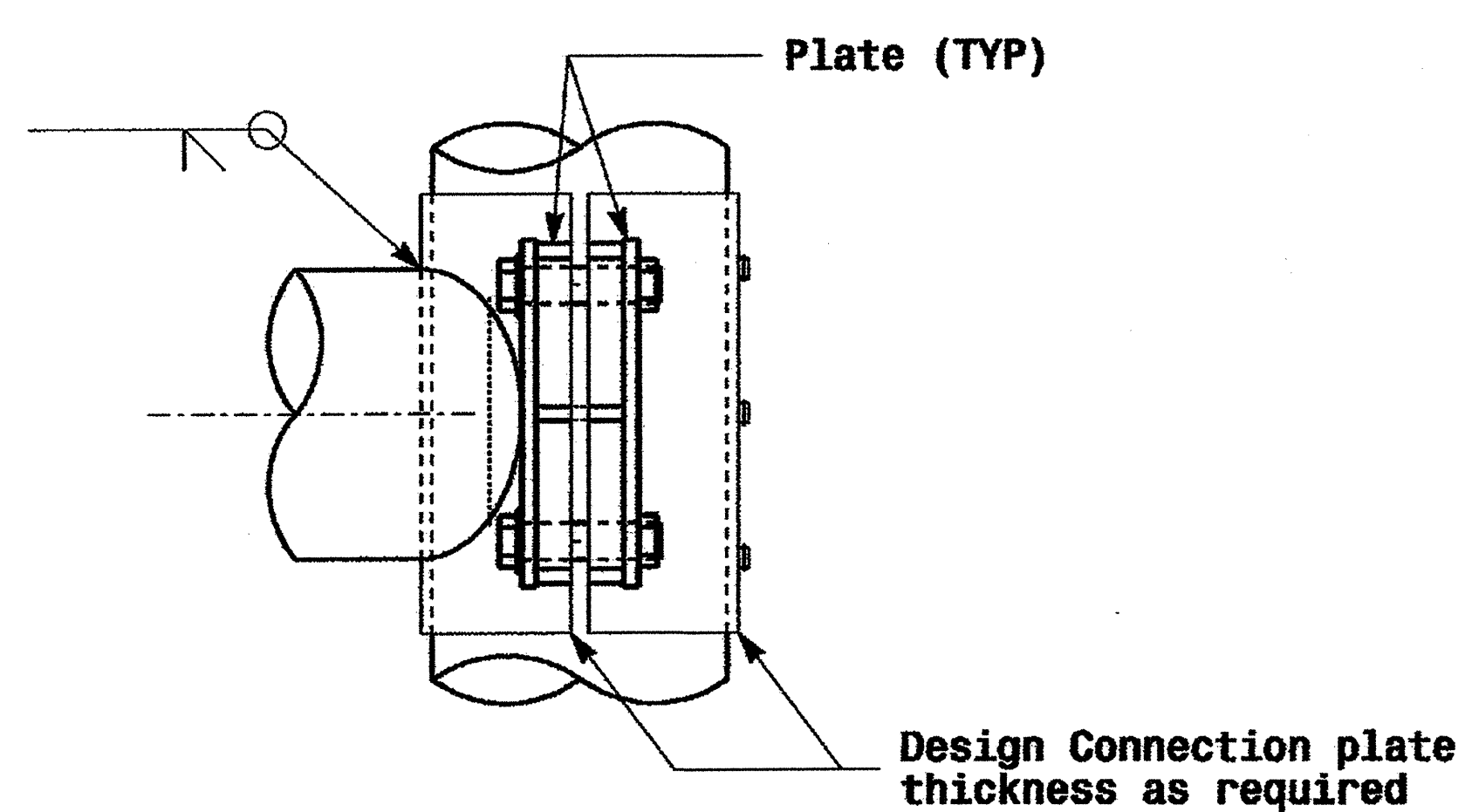


Fabrication Details - Mast Arm Poles

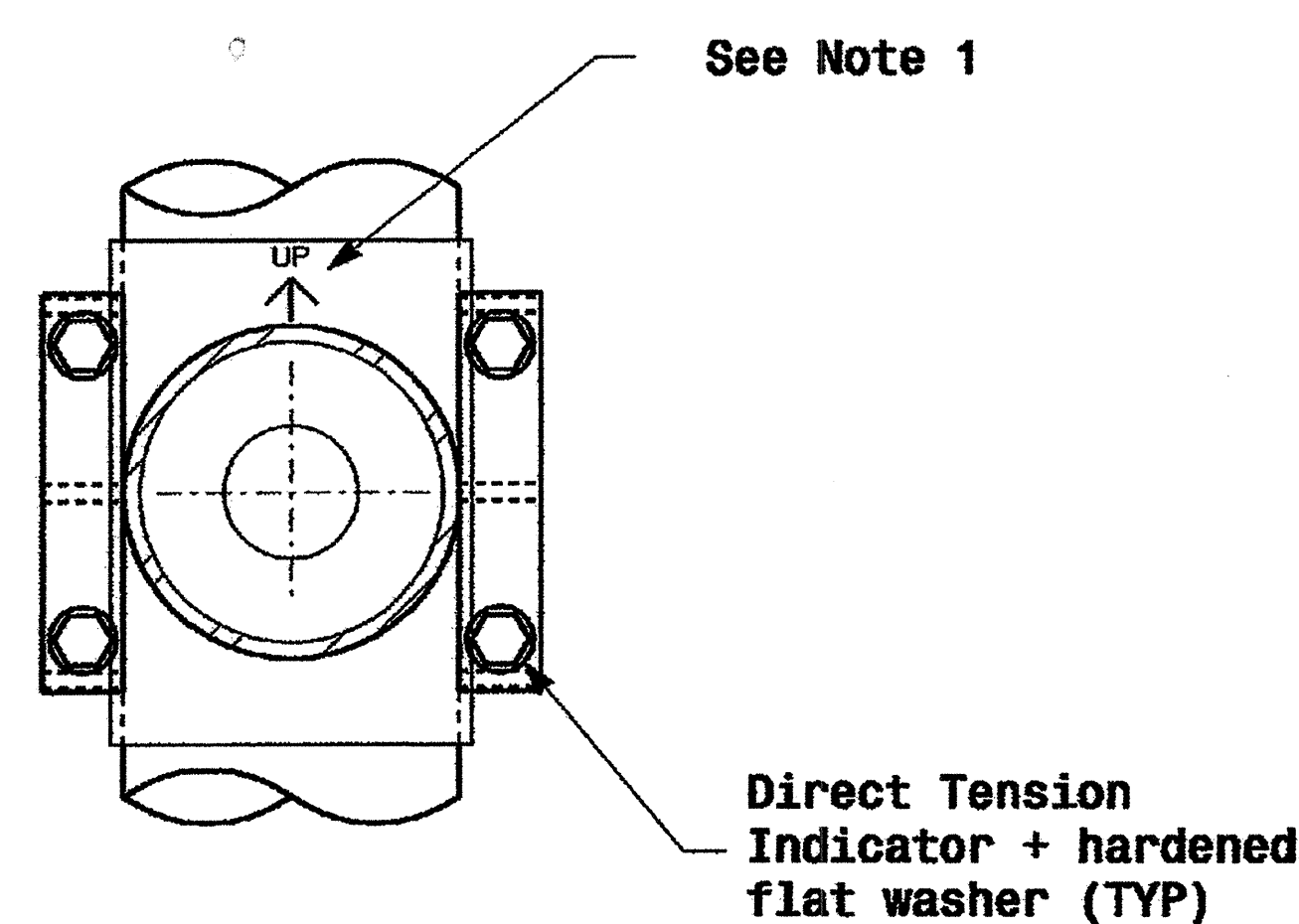
01-SEP-2005 14:08 w:\taco\es-un1\workgroups\2004 metal pole etf\m204\m4.dgn

	Typical Fabrication Details for Mast Arm Poles		
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander SCALE: NONE	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito REVISIONS:	

Adjustable Clamp Type Bolted Mast Arm Connection

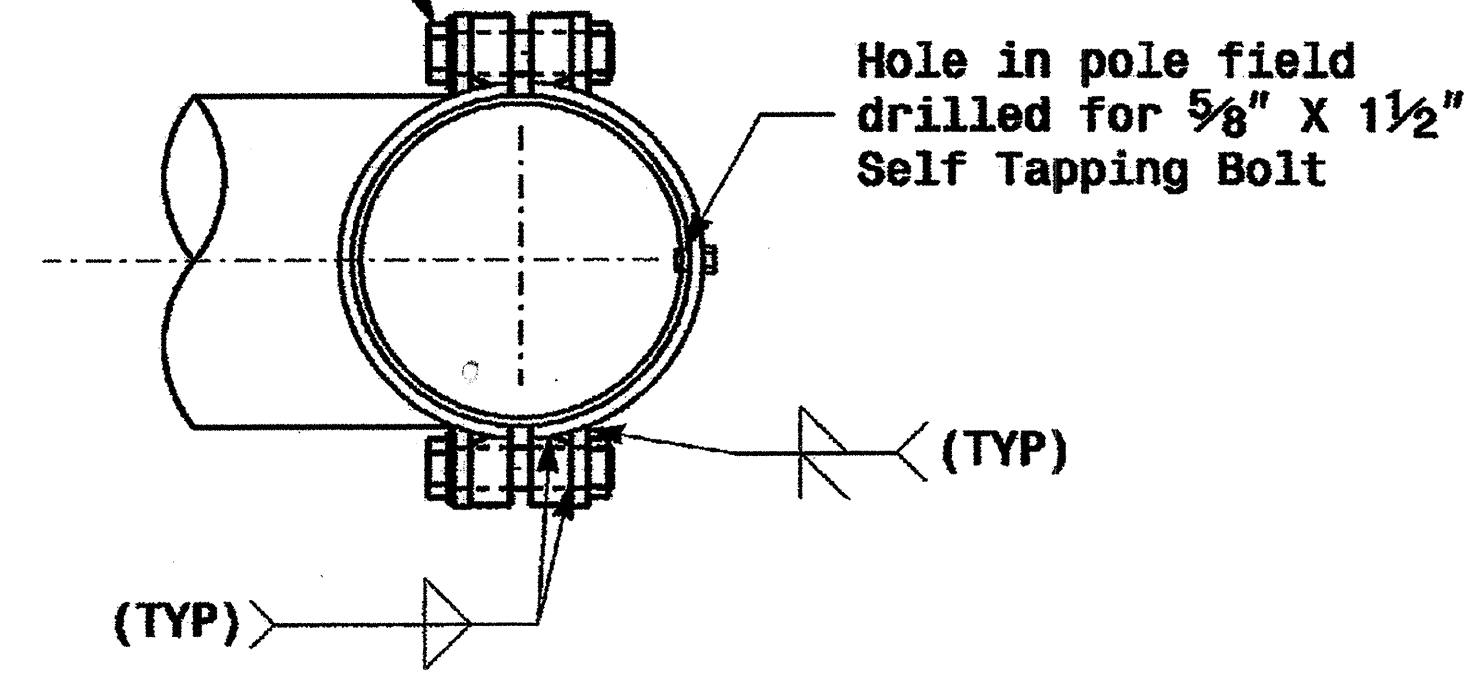


Side Elevation View



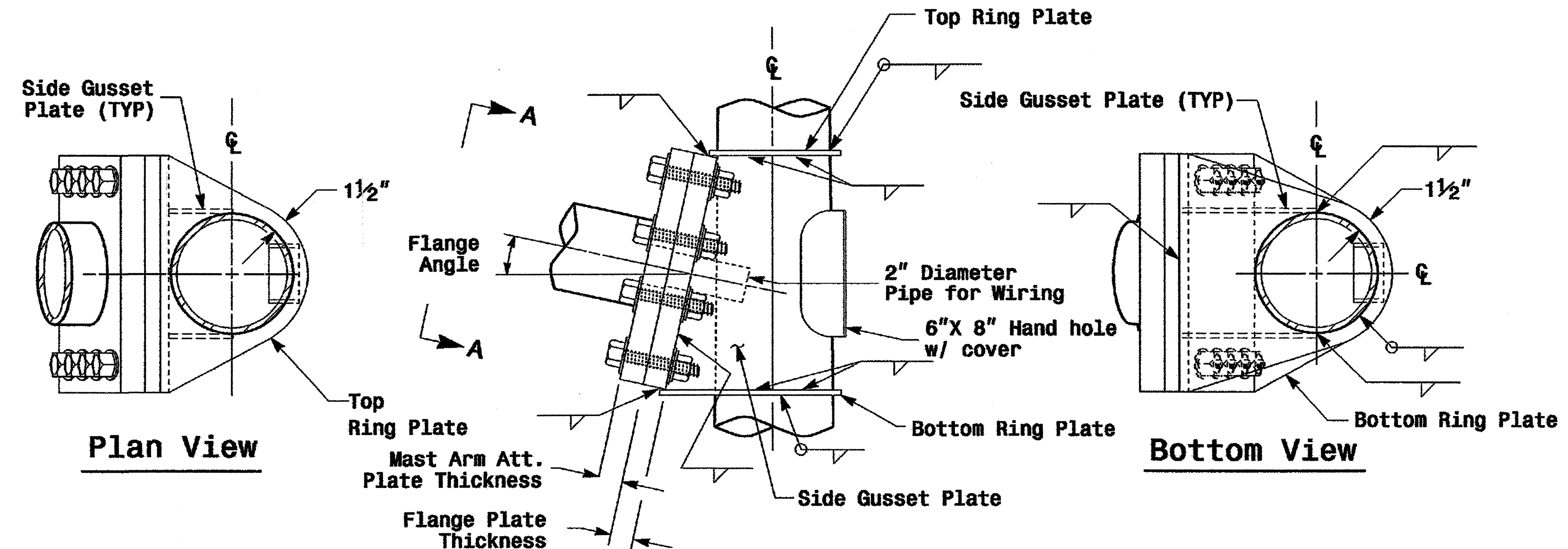
Front Elevation View

(4) - Size "E" Hex Head Bolts with (1) Hex Nuts & Washers



Plan View

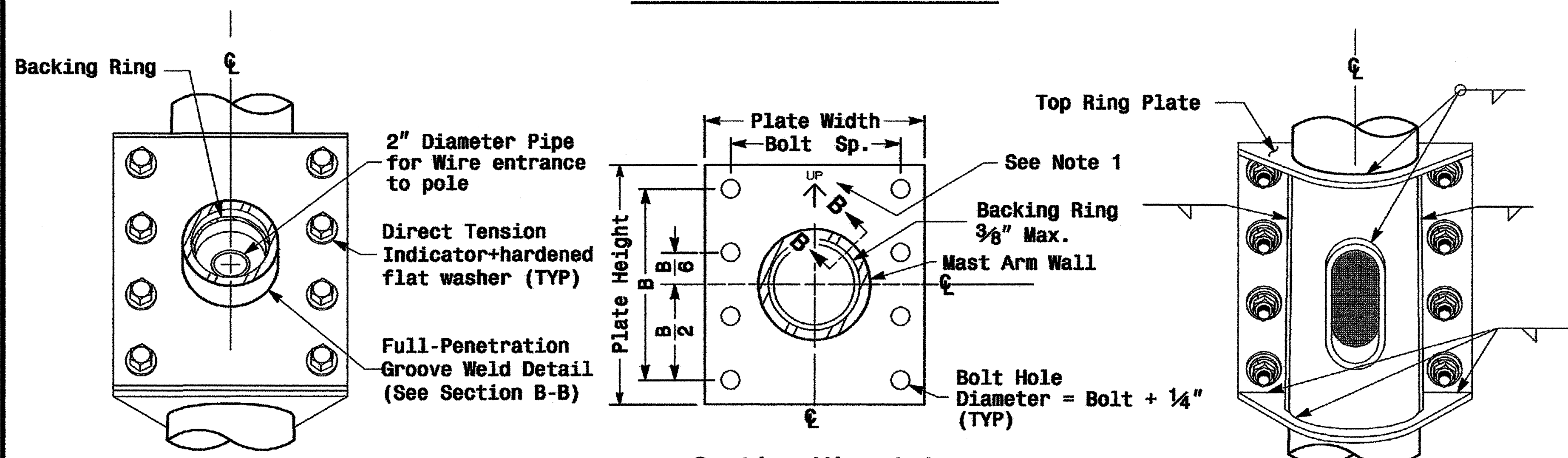
Welded Ring Stiffened Mast Arm Connection



Plan View

Side Elevation View

Bottom View

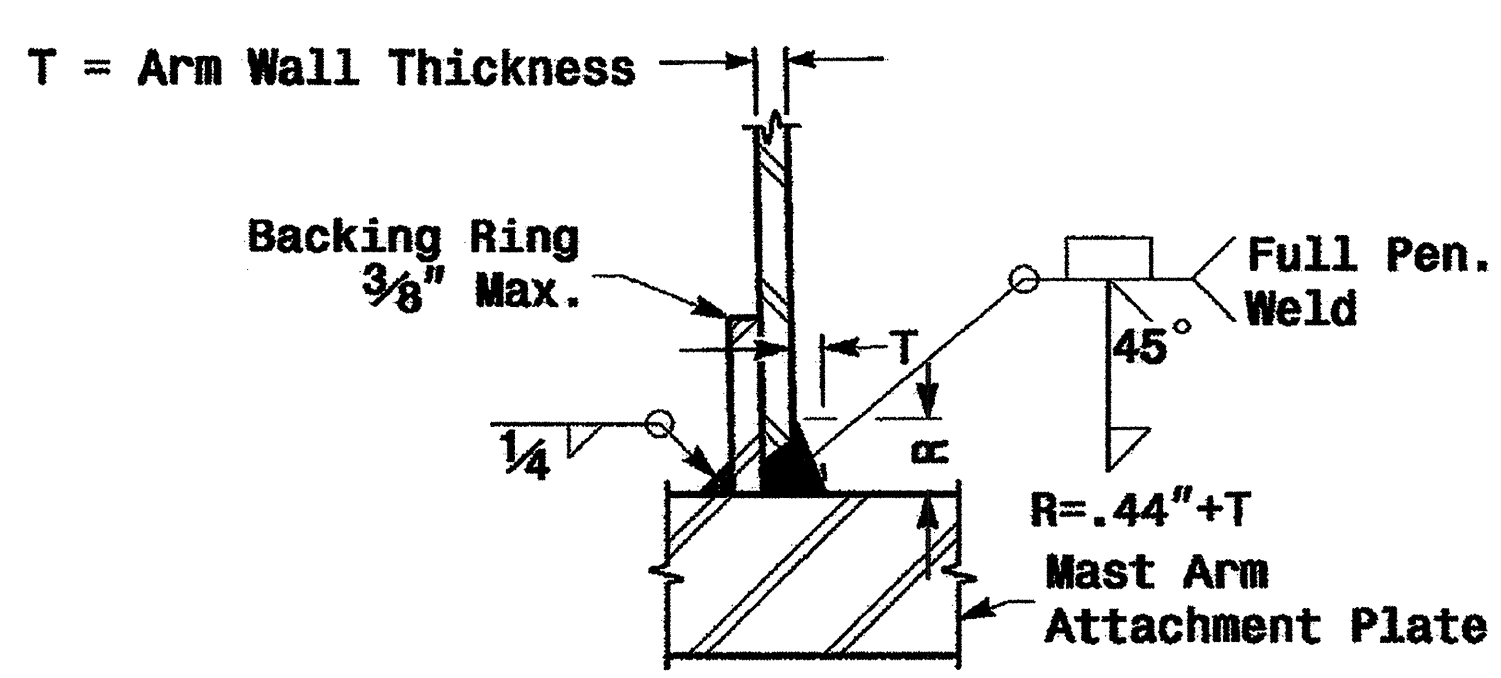


Front Elevation View

Section View A-A

Mast Arm Attachment Plate

Back Elevation View



Section B-B

Full-Penetration Groove Weld Detail

Notes:

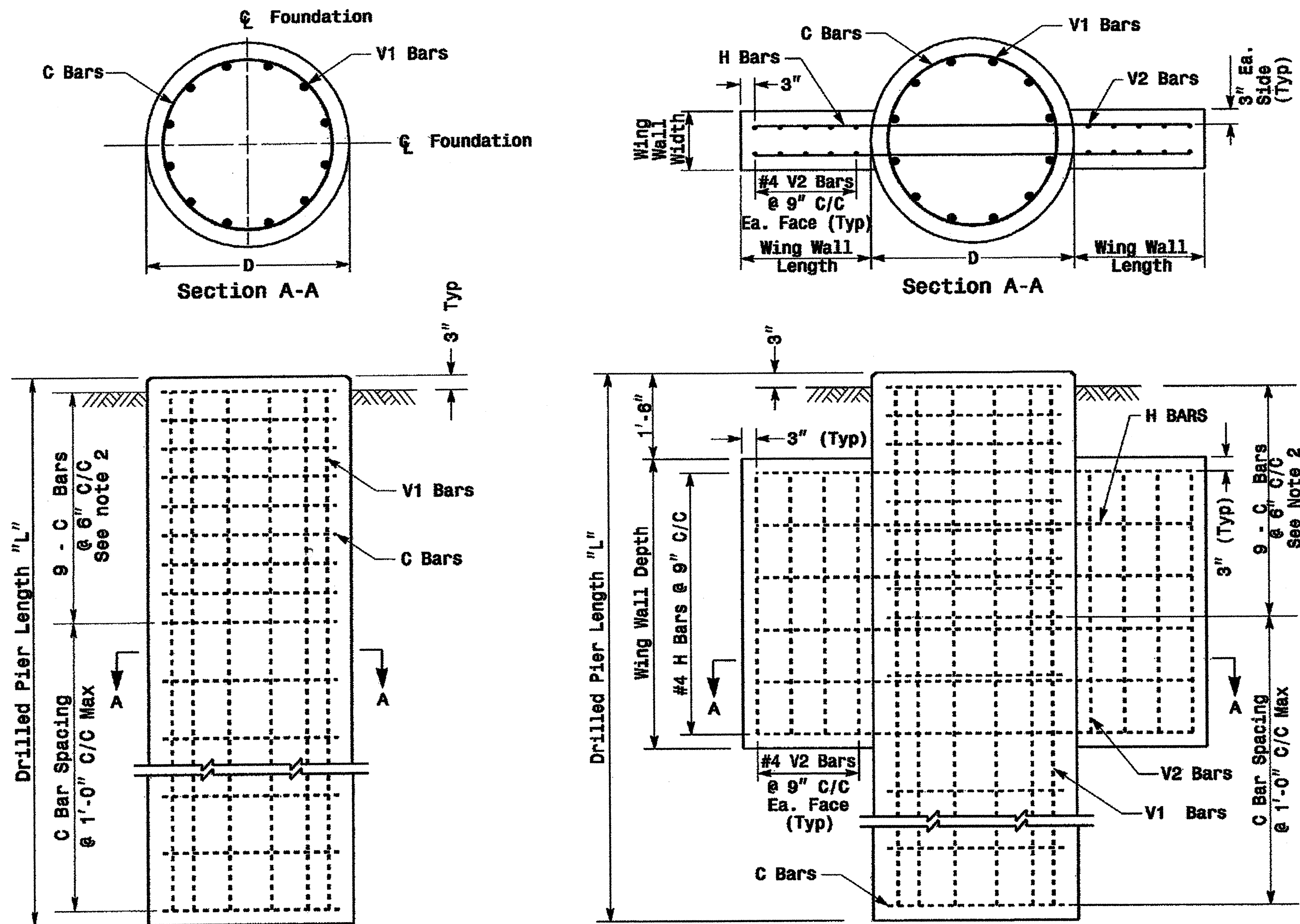
1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
3. Designer is responsible for providing appropriate drainage points.

	<p>Prepared in the Office of:</p> <p>Fabrication Details For Mast Arm Connection To Pole</p>								
	<p>PLAN DATE: May 2005</p> <p>PREPARED BY: P.L. Alexander</p>	<p>REVIEWED BY: C.F. Andrews</p> <p>REVIEWED BY: A.M. Esposito</p>		<p>SCALE: NONE</p>					
<p>REVISIONS</p> <table border="1"> <thead> <tr> <th>NO.</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		NO.	INIT.	DATE				<p>SIGNATURE: D. Sarker</p> <p>DATE: 9.2.2005</p>	<p>SIG. INVENTORY NO.</p>
NO.	INIT.	DATE							

Fabrication Details - Mast Arm Poles

01-SEP-2005 14:11 v:\wcp\lss-jun1\work\groups\2004 metal pole standards\2004_05.dgn p.l.alexander

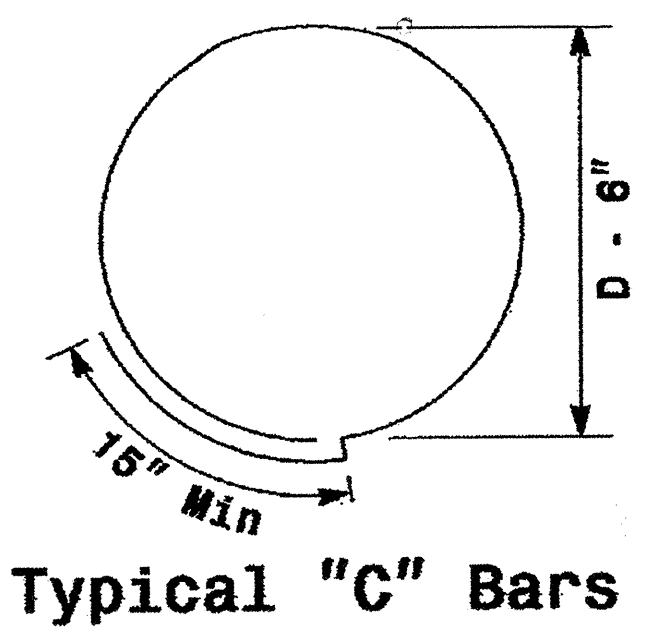
Reinforcing Steel Bars



REINFORCING STEEL TABLE FOR STANDARD DRILL PIER SHAFT (42" & 48" DIAMETER)

Shaft Dia (in.)	Conc. Volume (cu. yds.)	Bar Name	No.	Size	Type	Length
42"	.356 x L	V1	9	#8	STR.	**
		C	*	#4	CIR.	10'-9"
48"	.465 x L	V1	12	#8	STR.	**
		C	*	#4	CIR.	12'-6"

* See Note No. 1
** See Note No. 3



REINFORCING STEEL TABLE FOR STANDARD 42" and 48" DRILL PIER SHAFT WITH TYPE 1 AND TYPE 2 WING WALLS

Wing Wall Type	Drill Pier Shaft Dia. (in.)	Reinforcing Steel					
		Bar Name	No.	Size	Type	Length	
TYPE 1	42"	V1	9	#8	STR.	**	
		V2	12	#4	STR.	2'-6"	
		H	8	#4	STR.	6'-0"	
		C	*	#4	CIR.	10'-9"	
TYPE 2	42"	V1	9	#8	STR.	**	
		V2	16	#4	STR.	4'-6"	
		H	12	#4	STR.	9'-0"	
		C	*	#4	CIR.	10'-9"	
TYPE 2	48"	V1	12	#8	STR.	**	
		V2	16	#4	STR.	4'-6"	
		H	12	#4	STR.	9'-6"	
		C	*	#4	CIR.	12'-6"	

* See Note No. 1
** See Note No. 3

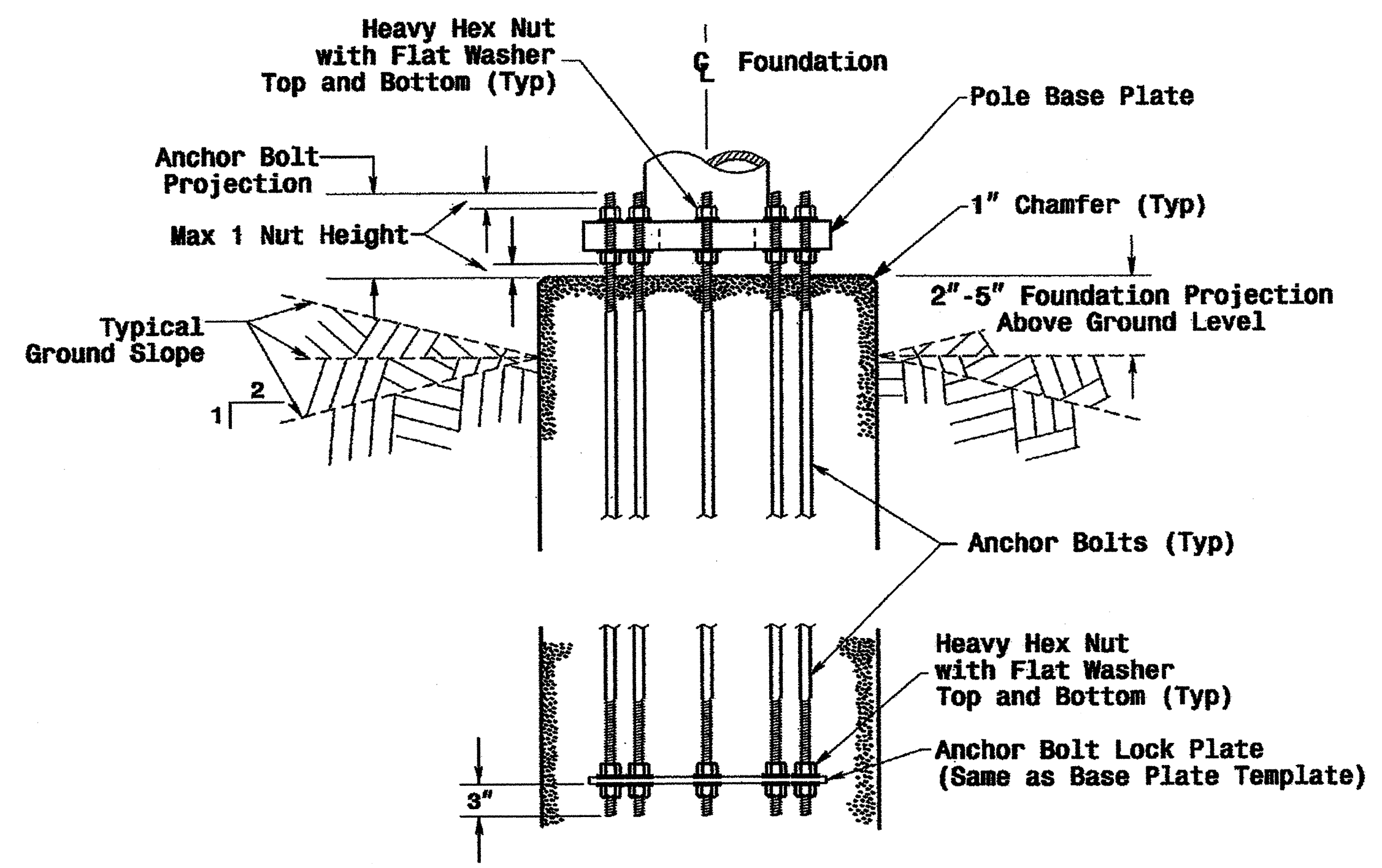
WING WALL DETAILS

Wing Wall Type	Wing Wall Length (Ft.)	Wing Wall Width (Ft.)	Wing Wall Depth (Ft.)	Concrete Volume (Cu. Yds.)
TYPE 1	1'-6"	1'-0"	3'-0"	.4
TYPE 2	3'-0"	1'-0"	5'-0"	1.2

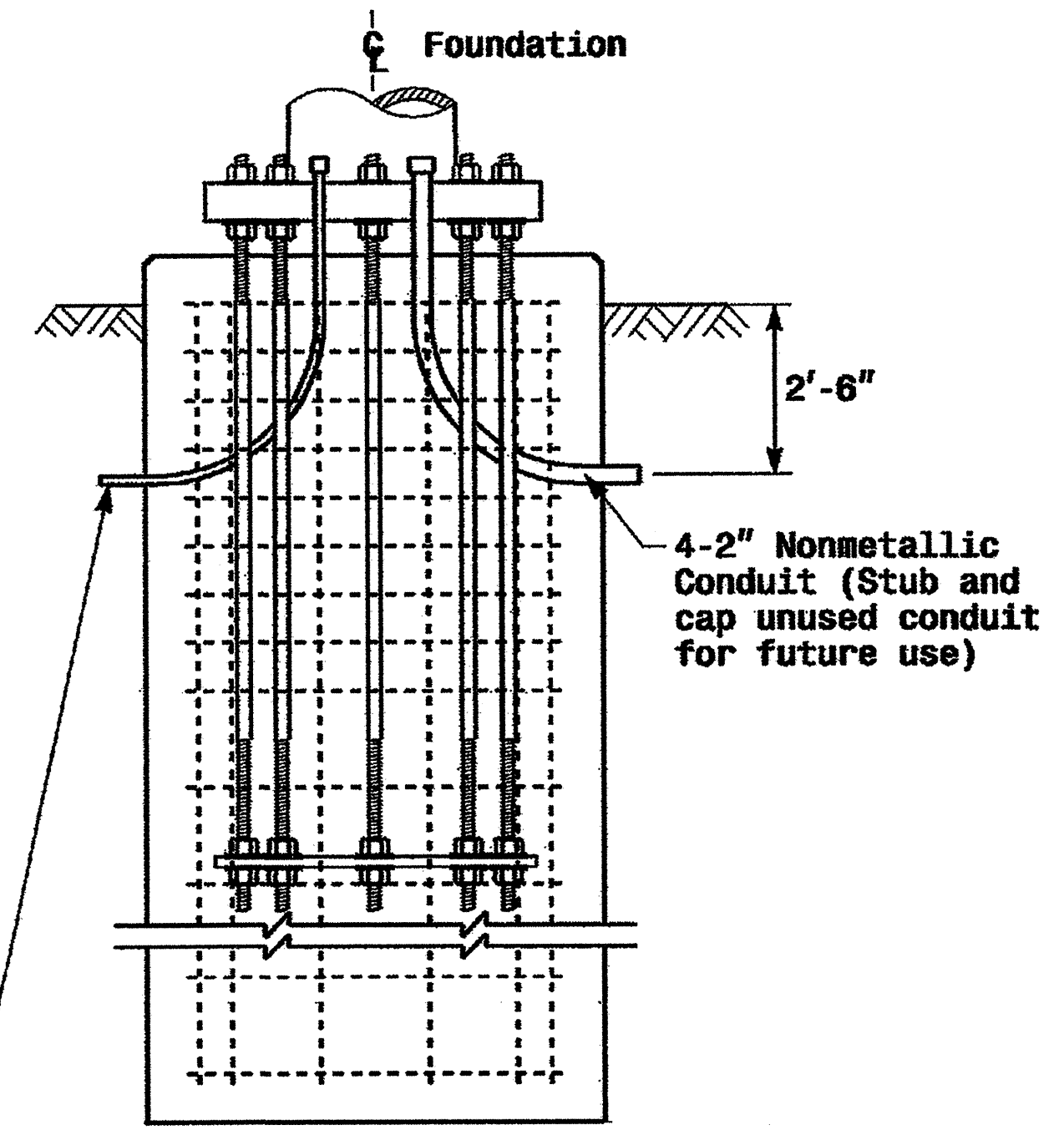
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



Notes

- The number of C-bars is based on foundation depth. For standard foundations, see sheet M 8.
- 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.
- The length of V1-bars is based on foundation depth. For standard foundations, see sheet M 8.
- The quantities for steel and concrete shown in the Wing Wall Details Chart reflect the amount of material for 1 pair of wing walls (2 wing walls per drilled pier shaft.)

Construction Details - Foundations

01-SEP-2005 11:48 ac:\eeop\lee-un1\hwork\groups\c04_mech\pols_etf\ndcrs001.mt.dgn

Prepared in the Office of

Construction Details Foundations
 PLAN DATE: May 2005 REVIEWED BY: P.L. ALEXANDER
 PREPARED BY: C.F. ANDREWS REVIEWED BY: A.M. ESPOSITO
 SCALE: 0 NA NONE
 REVISIONS: INIT. DATE
 SIGNATURE: *A. Sarkar* 9.2.2005
 SIG. INVENTORY NO.