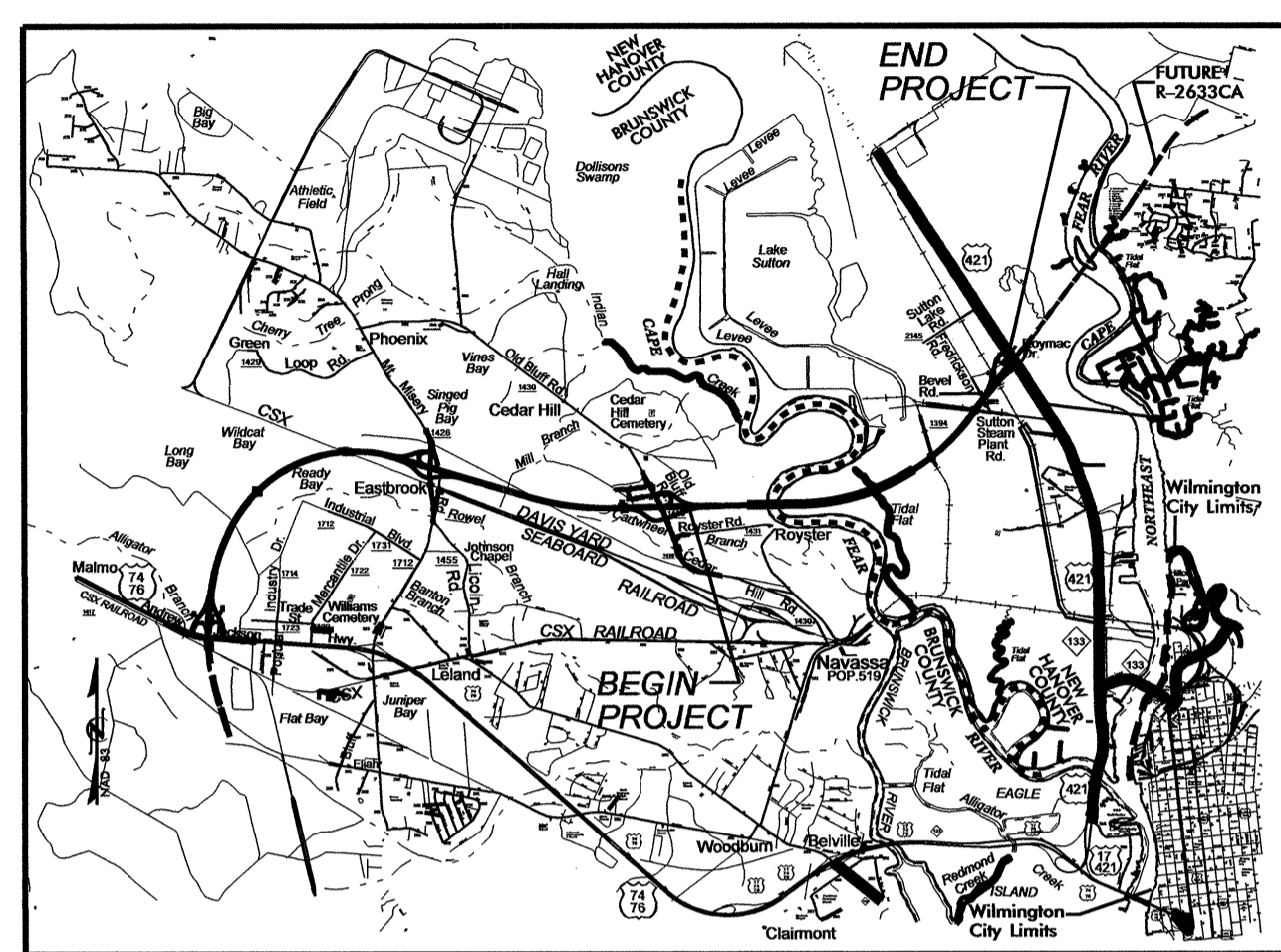


STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

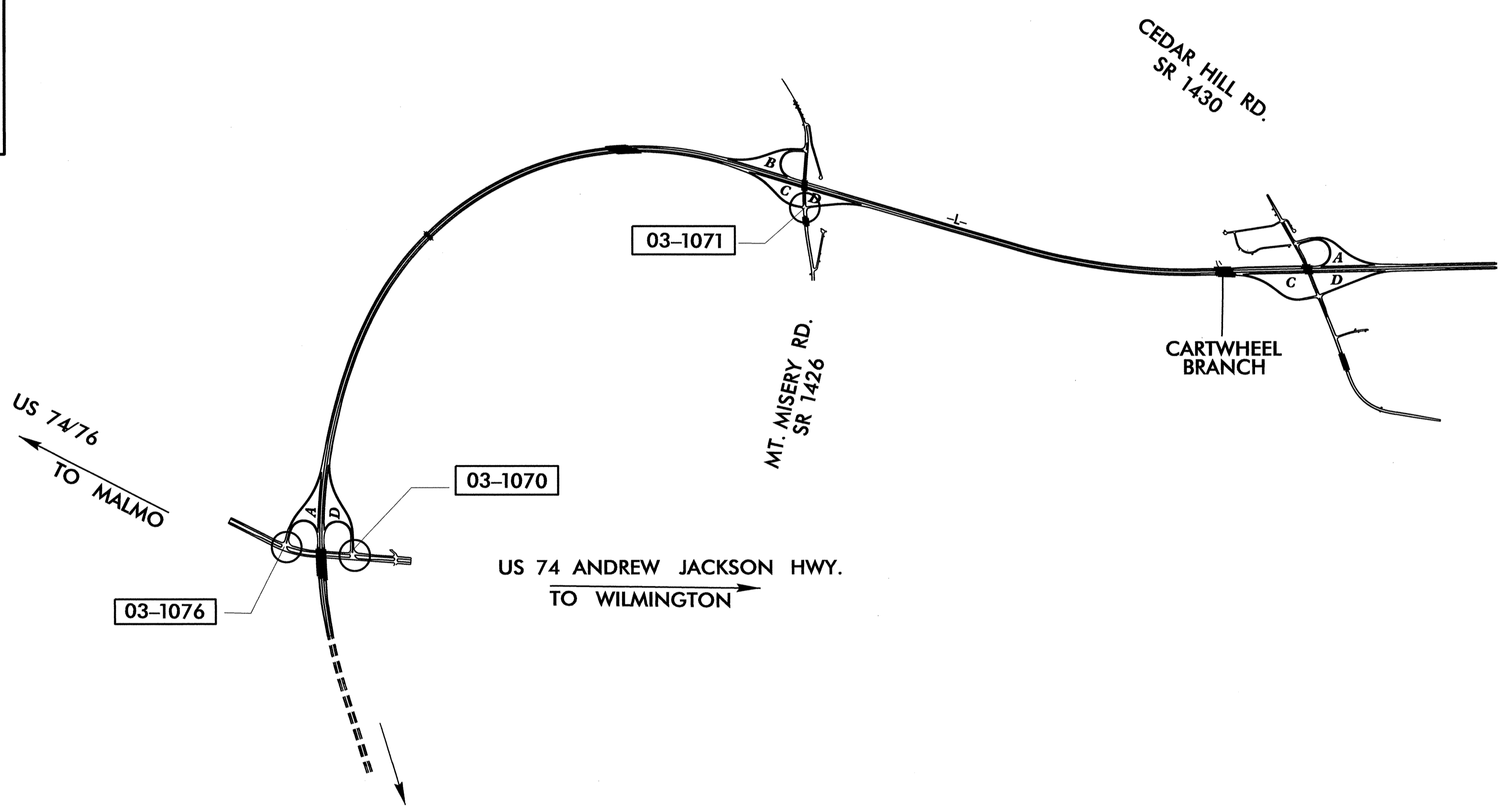
**BRUNSWICK
COUNTY**

Project: R-2633BA

Vicinity



**LOCATION: US 17 (WILMINGTON BYPASS) FROM US 74/76
EAST OF MALMO IN BRUNSWICK COUNTY TO
SR 1430 (CEDAR HILL ROAD)**
TYPE OF WORK: TRAFFIC SIGNAL



Refer to "Roadway Standard Drawings
NCDOT" dated January 2012 and
"Standard Specifications for Roads
and Structures" dated January 2012.

| Sheet # | Reference # | Location/Description |
|------------|-------------|--|
| Sig. 1 | | Title Sheet |
| Sig. 2-6 | 03-1070 | US 74-76 at US 17 NB Ramp |
| Sig. 7-11 | 03-1076 | US 74-76 at US 17 SB Ramp |
| Sig. 12-16 | 03-1071 | US 17 NB Ramp at SR 1426 (Mt. Misery Road) |
| Sig. 17-19 | N/A | Communications Cable and Conduit Routing |
| Sig. 20-24 | N/A | Standard Metal Pole Details |

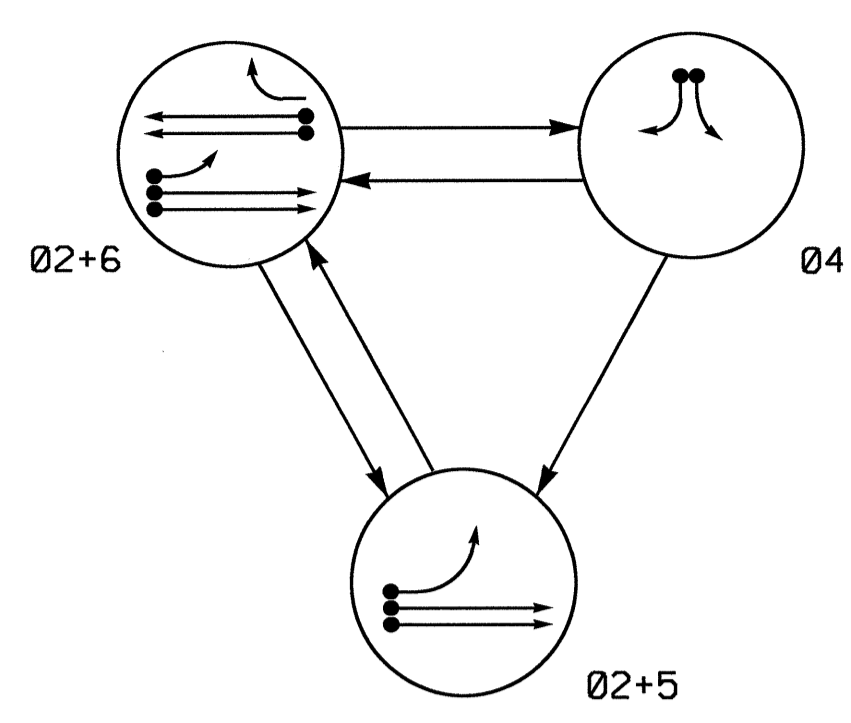
INTELLIGENT TRANSPORTATION AND SIGNALS UNIT
Contacts:
Greg Fuller, PE - ITS and Signals Engineer
Jason Galloway, PE - East Region Signals Project Engineer
John Rowe Jr., PE - Signal Equipment Design Engineer

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

750 N. Greefield Parkway, Garner, NC 27529

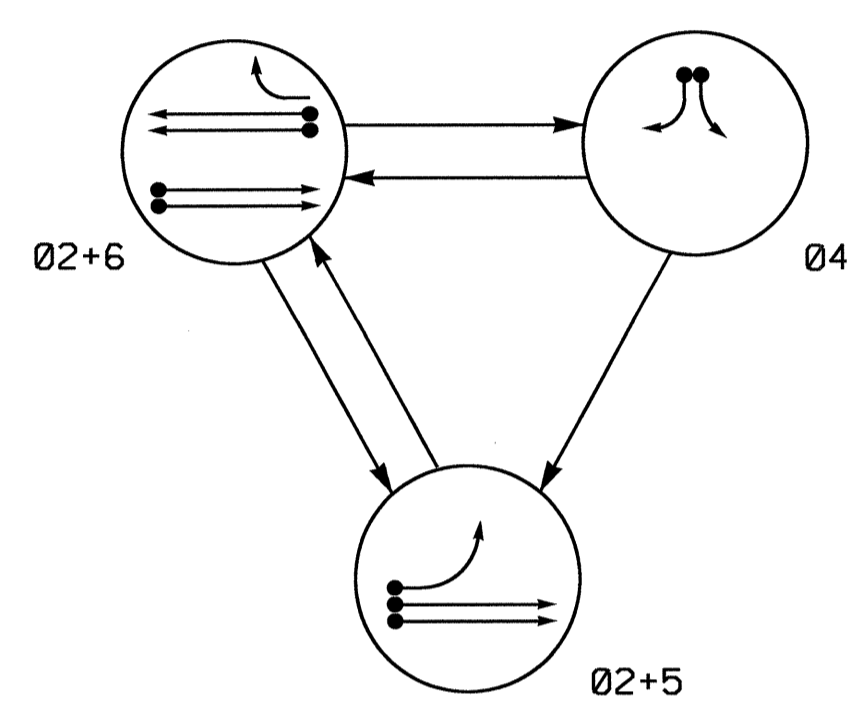
29-AUG-2013 12:44
R:\Traffic\Signals\Design\Titlesheet\R-2633BB_FDY_TSH.dgn

PHASING DIAGRAM



| SIGNAL FACE | PHASE | | | | FLASH |
|-------------|-------|------|----|---|-------|
| | 02+5 | 02+6 | 04 | | |
| 21,22 | G | G | R | Y | |
| 41,42 | R | R | G | R | |
| 51 | - | - | - | - | - |
| 61,62 | R | G | R | Y | |

ALTERNATE PHASING DIAGRAM

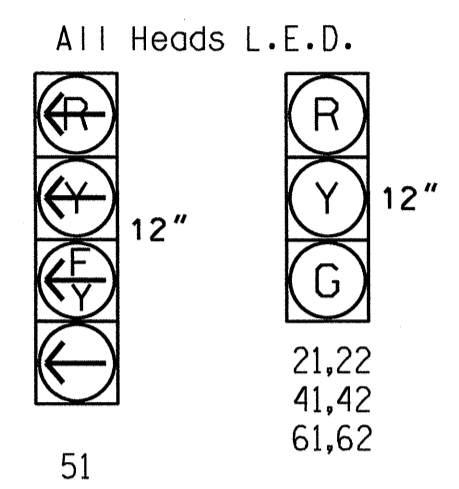


| SIGNAL FACE | PHASE | | | | FLASH |
|-------------|-------|------|----|---|-------|
| | 02+5 | 02+6 | 04 | | |
| 21,22 | G | G | R | Y | |
| 41,42 | R | R | G | R | |
| 51 | - | - | - | - | - |
| 61,62 | R | G | R | Y | |

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.



OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

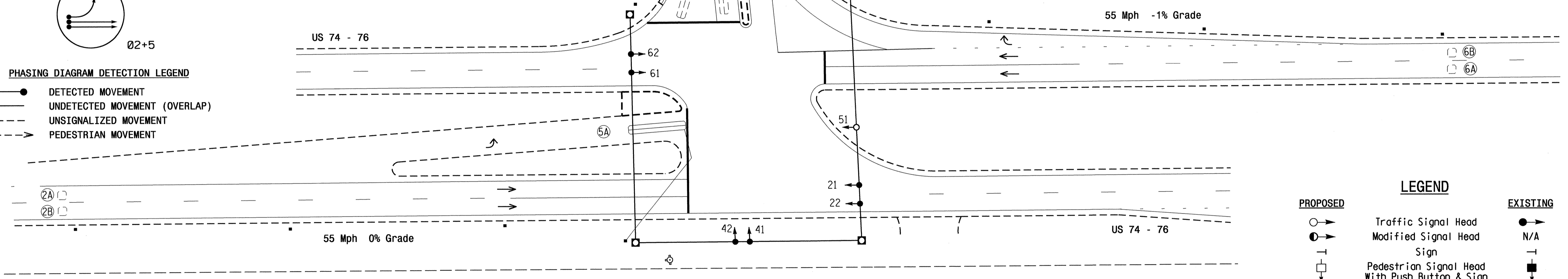
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | | | | |
|------|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD |
| 2A | 6X6 | 420 | 5 | - | 2 | Y | Y | - | - | - | - | - |
| 2B | 6X6 | 420 | 5 | - | 2 | Y | Y | - | - | - | - | - |
| 4A | 6X40 | 0 | 2-4-2 | - | 4 | Y | Y | - | - | - | - | - |
| 4B | 6X40 | 0 | 2-4-2 | - | 4 | Y | Y | - | - | 15 | - | - |
| 5A | 6X40 | 0 | 2-4-2 | Y | 5 | Y | Y | - | - | 15* | - | - |
| 6A | 6X6 | 420 | 5 | - | 6 | Y | Y | - | - | - | - | - |
| 6B | 6X6 | 420 | 5 | - | 6 | Y | Y | - | - | - | - | - |

* Disable Delay During Alternate Phasing Operation.
 ** Disable Phase 2 CallFor Loop 5A During Alternate Phasing Operation.

3 Phase Fully Actuated US 74-76 (Malmo) CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. The Division Traffic Engineer will determine the hours of use for each phasing plan.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Closed loop system data: Master Asset #10330, Controller Asset #1070.



| FEATURE | PHASE | | | |
|-------------------------|------------|-----|-----|------------|
| | 2 | 4 | 5 | 6 |
| Min Green 1 * | 14 | 7 | 7 | 14 |
| Extension 1 * | 6.0 | 2.0 | 2.0 | 6.0 |
| Max Green 1 * | 90 | 20 | 15 | 90 |
| Yellow Clearance | 5.3 | 3.0 | 3.0 | 5.3 |
| Red Clearance | 1.5 | 3.7 | 2.6 | 1.5 |
| Walk 1 * | - | - | - | - |
| Don't Walk 1 | - | - | - | - |
| Seconds Per Actuation * | 1.5 | - | - | 1.5 |
| Max Variable Initial * | 46 | - | - | 46 |
| Time Before Reduction * | 15 | - | - | 15 |
| Time To Reduce * | 30 | - | - | 30 |
| Minimum Gap | 3.4 | - | - | 3.4 |
| Recall Mode | MIN RECALL | - | - | MIN RECALL |
| Vehicle Call Memory | YELLOW | - | - | YELLOW |
| Dual Entry | - | - | - | - |
| Simultaneous Gap | - | 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 | |
|----------|--|----------|-----|
| ○ | Traffic Signal Head | ● | N/A |
| ○ | Modified Signal Head | - | - |
| ○ | Sign | - | - |
| ○ | Pedestrian Signal Head With Push Button & Sign | ○ | - |
| ○ | Signal Pole with Guy | ○ | - |
| ○ | Signal Pole with Sidewalk Guy | ○ | - |
| ○ | Inductive Loop Detector | ○ | - |
| □ | Master Controller & Cabinet | □ | - |
| □ | Junction Box | □ | - |
| - - - | 2-in Underground Conduit | - - - | - |
| - - - | Right of Way | - - - | - |
| → | Directional Arrow | → | - |
| - - - | Directional Drill | - - - | N/A |
| ○ | Metal Strain Pole | ○ | - |
| △ | "YIELD" Sign (R1-2) | △ | - |

Signal Upgrade

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

US 74 - 76 at US 17 NB Ramp
 Malmo

Division 3 Brunswick County

PLAN DATE: March 2013 REVIEWED BY: JPG
 PREPARED BY: Jeff Spence REVIEWED BY:

REVISIONS: INIT. DATE

SCALE: 1" = 40'

SEAL: JASON P. GALLAGHER, PROFESSIONAL ENGINEER, No. 29904

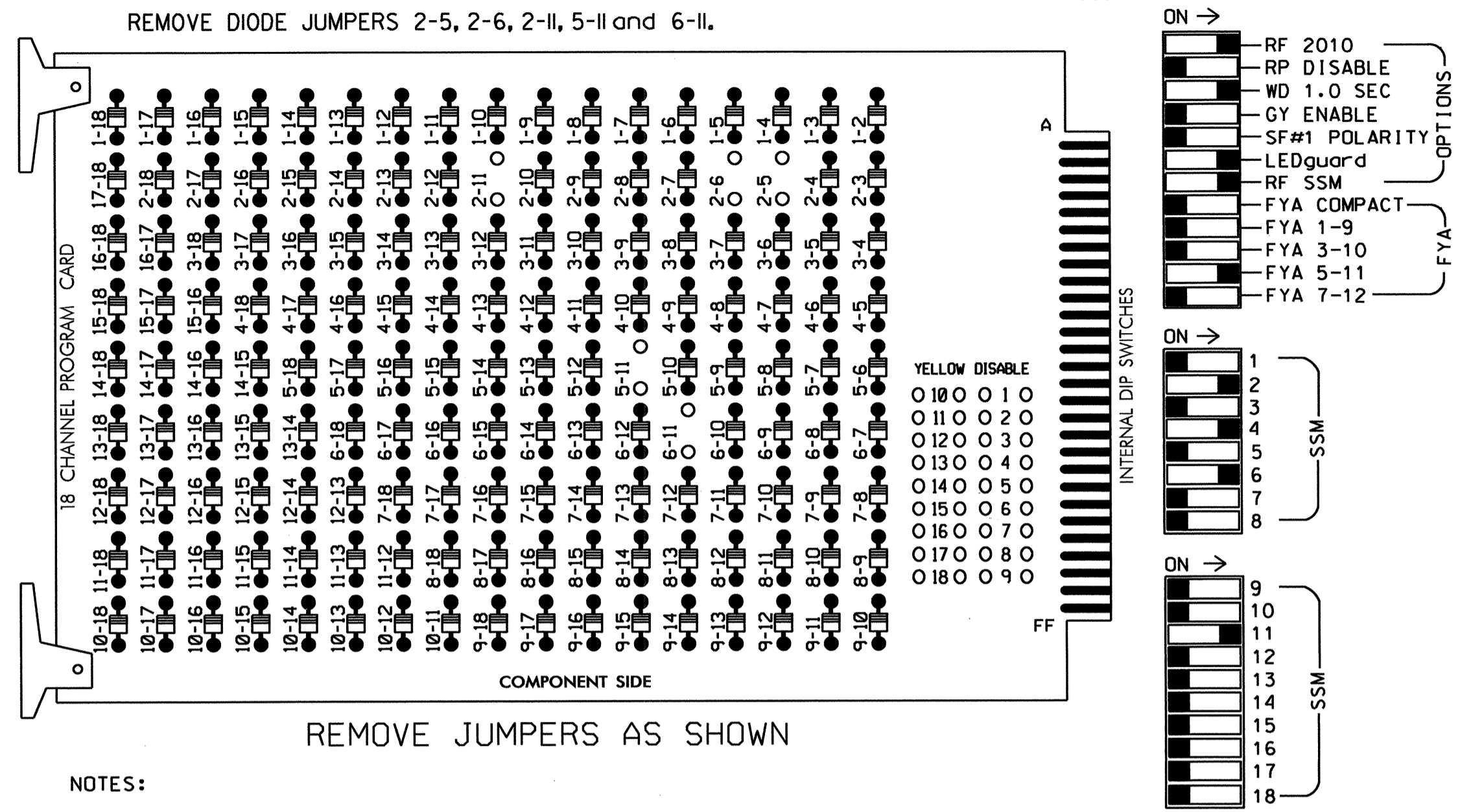
SIGNATURE: Jeff Spence DATE: 03-10-13

SIG. INVENTORY NO. 03-1070

25-AUG-2013 11:29
 R:\projects\2013\03\030826\030826.dgn
 1:00:11.000

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the US 74-76 (Malmo) CLS.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332 /W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8,AUX S4.
 PHASES USED.....2,4,5,6.
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 | |
|-----------------------|----|-------|-------|----|-------|-------|----|-------|-------|-----|-----|-------|--------|--------|--------|--------|--------|--------|------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 | |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE | |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | NU | 51 | 61,62 | NU | NU | NU | NU | NU | NU | NU | 51 | NU | NU | |
| RED | | 128 | | | 101 | | | 134 | | | | | | | | | | | |
| YELLOW | | 129 | | | 102 | | * | 135 | | | | | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | | | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | | | | | A114 | |
| YELLOW ARROW | | | | | | | | | | | | | | | | | | | A115 |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | | A116 |
| GREEN ARROW | | | | | | | | 133 | | | | | | | | | | | |

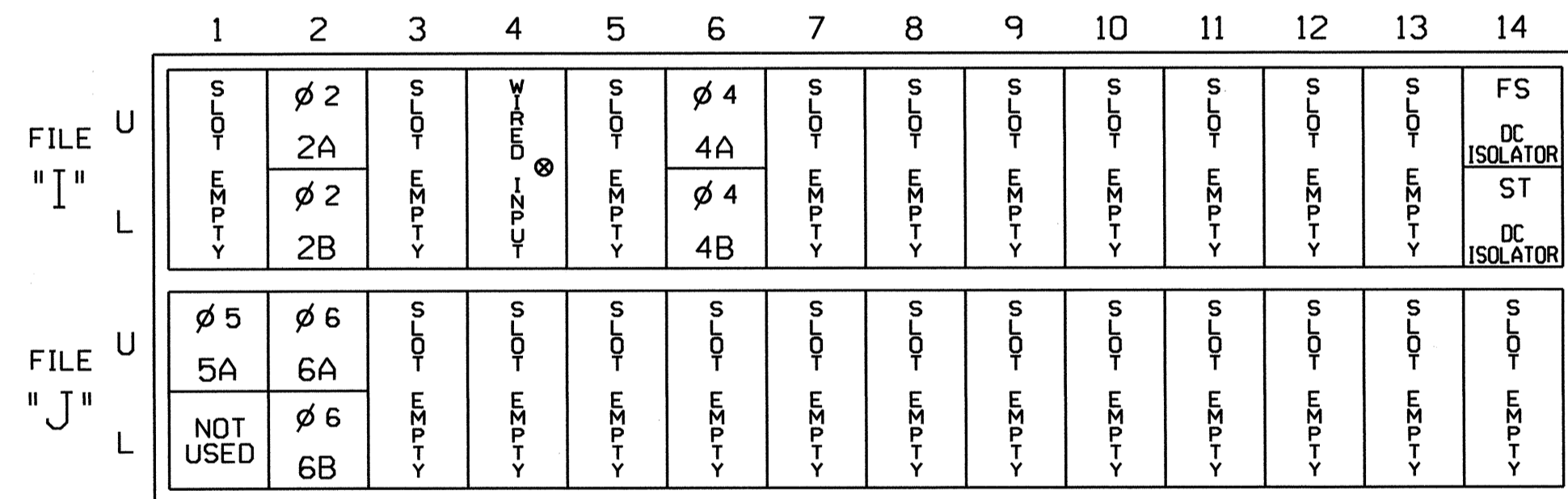
NU = Not Used

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

* See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

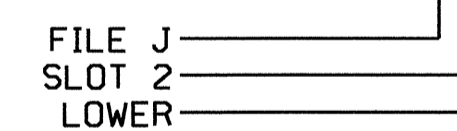
⊗ Wired Input - Do not populate slot with detector card

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 | | | |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | 15 |
| 5A ¹ | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 15 |
| | | I4U | 47 | 9 | 22 | 2 | Y | Y | Y | | 3 |
| 6A | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |
| 6B | TB3-7,8 | J2L | 44 | 6 | 16 | 6 | Y | Y | | | |

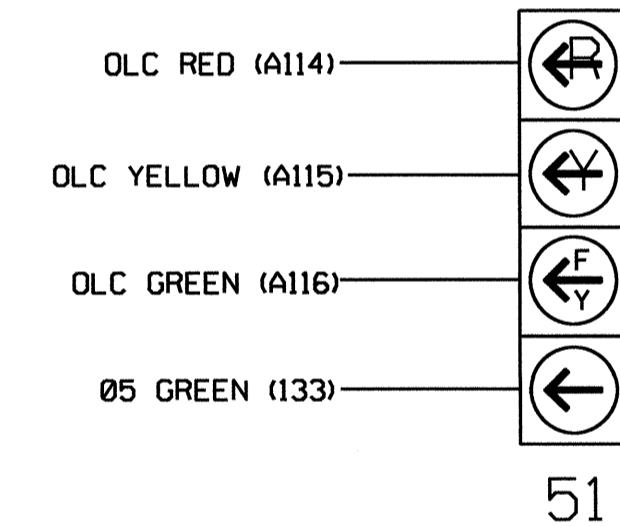
¹Add jumper from J1-W to I4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L



4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal heads as shown)



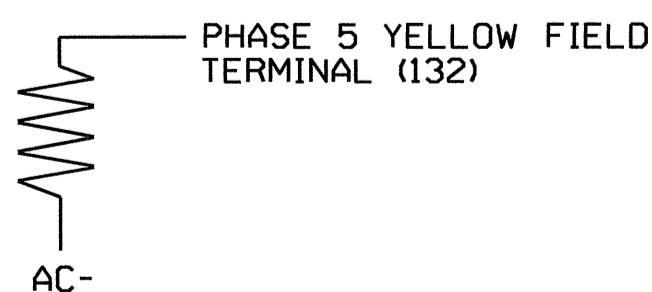
NOTE

1. The sequence display for this signal requires special logic programming. See sheet 2 for programming instructions.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

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



ELECTRICAL DETAIL SHEET 1 OF 4

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared In the Offices of:



750 N. Greenfield Pkwy, Garner, NC 27529

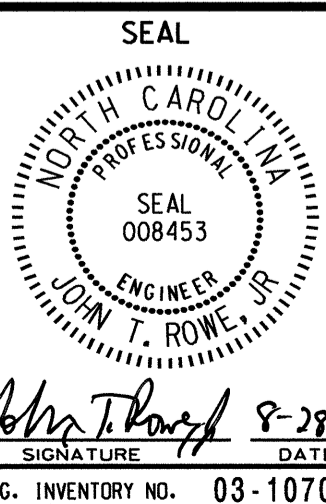
US 74 - 76
 at
 US 17 NB Ramps

Division 3 Brunswick County Walmo

PLAN DATE: August 2013 REVIEWED BY: JTR

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS INIT. DATE

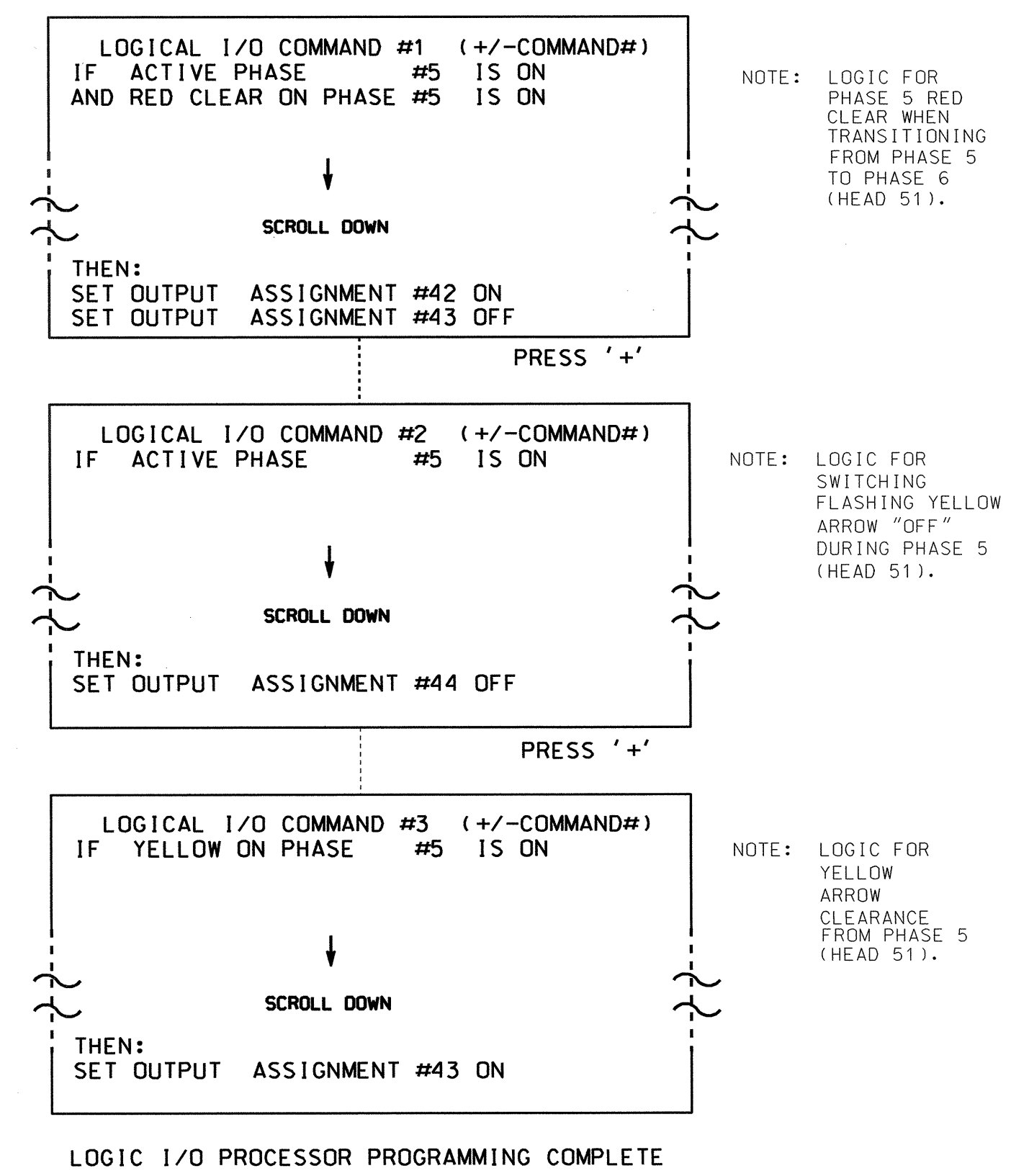


SIG. INVENTORY NO. 03-1070

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS), SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2 AND 3.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



| <u>OUTPUT REFERENCE SCHEDULE</u> | |
|----------------------------------|--------------------|
| OUTPUT 42 | = Overlap C Red |
| OUTPUT 43 | = Overlap C Yellow |
| OUTPUT 44 | = Overlap C Green |

OVERLAP PROGRAMMING DETAIL (program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PRESS '+' TWICE

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
 PHASE: |12345678910111213141516
 VEH OVL PARENTS: | XX
 VEH OVL NOT VEH: |
 VEH OVL NOT PED: |
 VEH OVL GRN EXT: |
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW X GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 GREEN EXTENSION (0-255 SEC)...0.0
 YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
 RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
 OUTPUT AS PHASE # (0=NONE, 1-16)...0

OVERLAP PROGRAMMING COMPLETE

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING (program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).
PRESS 'NEXT' TO ADVANCE TO PAGE 2.

PRESS '+' TWICE

NOTICE PAGE 2 →

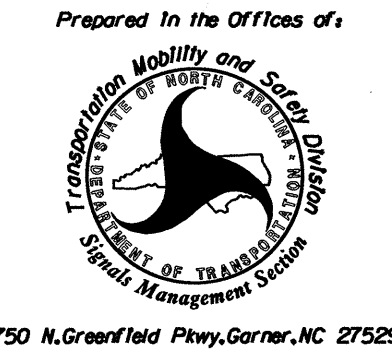
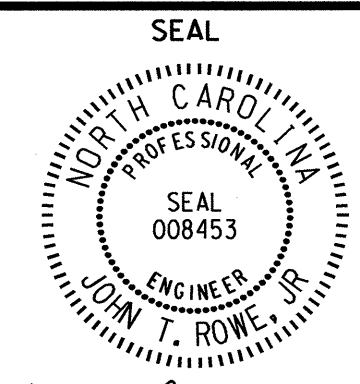
PAGE 2: VEHICLE OVERLAP 'C' SETTINGS
 PHASE: |12345678910111213141516
 VEH OVL PARENTS: | X
 VEH OVL NOT VEH: |
 VEH OVL NOT PED: |
 VEH OVL GRN EXT: |
 STARTUP COLOR: - RED - YELLOW - GREEN
 FLASH COLORS: - RED - YELLOW GREEN
 SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
 FLASH YELLOW IN CONTROLLER FLASH?...Y
 GREEN EXTENSION (0-255 SEC)...0.0
 YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
 RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
 OUTPUT AS PHASE # (0=NONE, 1-16)...0

OVERLAP PROGRAMMING COMPLETE

← NOTICE GREEN FLASH

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-1070
 DESIGNED: March 2013
 SEALED: 8-26-13
 REVISED: N/A

ELECTRICAL DETAIL SHEET 2 OF 4

| | | |
|---|--|---|
|  | <p>US 74 - 76 at US 17 NB Ramp</p> <p>Division 3 Brunswick County Waldo</p> <p>PLAN DATE: August 2013 REVIEWED BY: JTR</p> <p>PREPARED BY: James Peterson REVIEWED BY:</p> | <p>SEAL</p>  |
| <p>750 N. Greenfield Pkwy, Garner, NC 27529</p> | | <p>John T. Rowland 8-28-13</p> <p>SIGNATURE DATE</p> |

SIG. INVENTORY NO. 03-1070

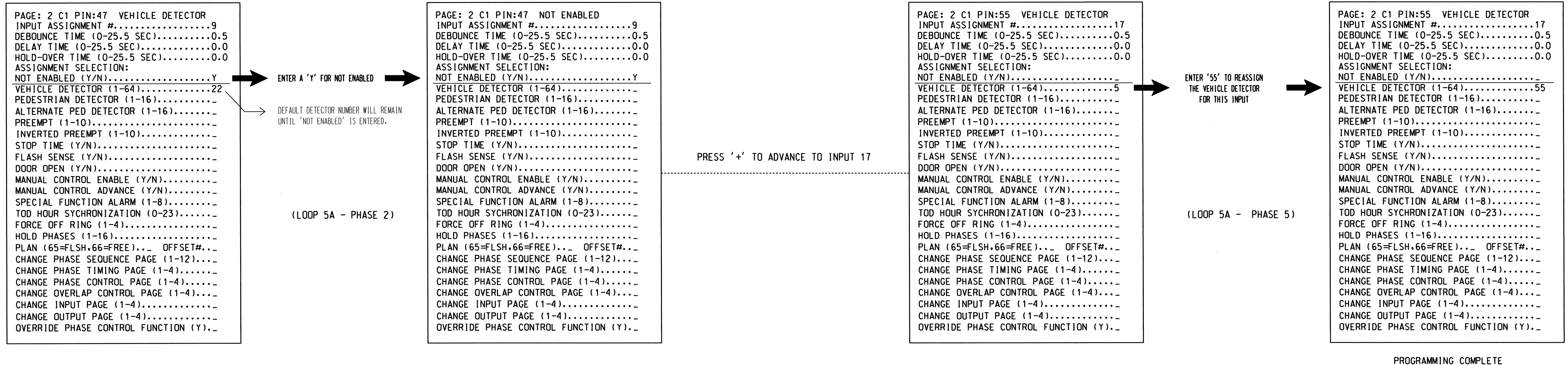
27-AUG-2013 09:29 S:\41153504\15 Signal\work\groups\51g_MattPeterson\031070_sht.e16_xxx.dgn

INPUT PAGE 2 ASSIGNMENT PROGRAMMING DETAIL FOR ALTERNATE PHASING - LOOP 5A

(program controller as shown below)

- NOTES: 1. THIS PROGRAMMING APPLIES FOR INPUT PAGE 2 ONLY. INPUT PAGE 1 WILL USE STANDARD DEFAULT SETTINGS. THIS PROGRAMMING IS NECESSARY FOR PROPER DETECTOR OPERATION DURING ALTERNATE PHASING OPERATION.
2. THE FIRST TASK THIS PROGRAMMING ACCOMPLISHES IS THE DISABLING OF INPUT #9 (DETECTOR 22) SO THAT A VEHICLE CALL WILL NOT BE PLACED TO PHASE 2 DURING ALTERNATE PHASING OPERATION. THE SECOND TASK THIS PROGRAMMING ACCOMPLISHES IS THAT IT REASSIGNS DETECTOR 55 TO INPUT #17 SO THAT THE DELAY ON LOOP 5A CAN BE REDUCED FROM 15 SECONDS TO 0 SECONDS.

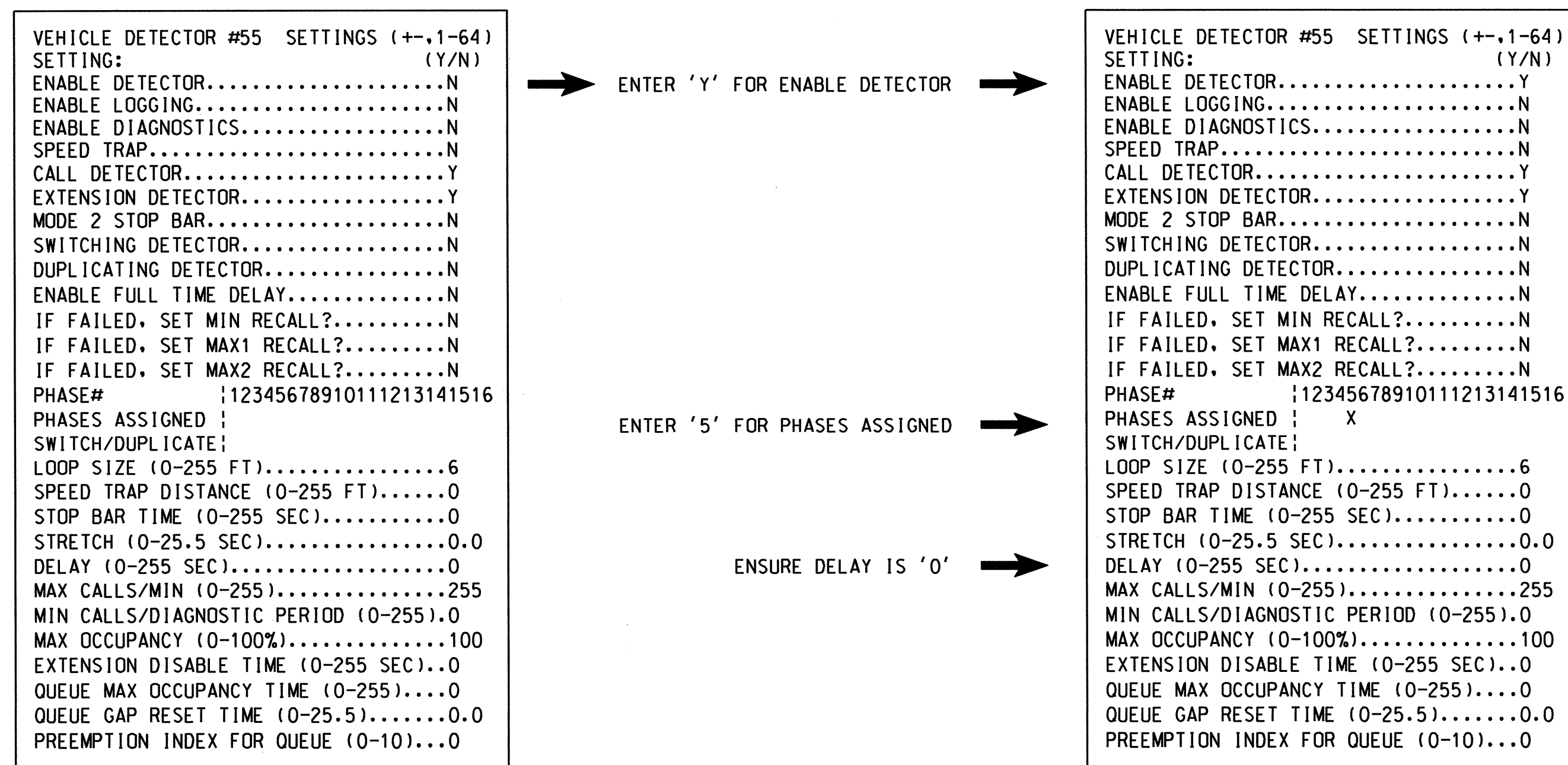
FROM MAIN MENU PRESS '5' (INPUTS). THEN PRESS 'NEXT' TO GET TO INPUT PAGE '2'. PRESS THE '+' KEY UNTIL INPUT 9 IS REACHED.



SPECIAL DETECTOR PROGRAMMING DETAIL - LOOP 5A (ALT.)

(program controller as shown below)

FROM MAIN MENU PRESS '7' (DETECTORS). THEN PRESS '1' FOR VEHICLE DETECTORS. PRESS THE '-' KEY TO GET TO VEHICLE DETECTOR #55.



NOTE: DETECTOR IS PROGRAMMED PER THE INPUT FILE CONNECTION AND PROGRAMMING CHART SHOWN ON SHEET 1.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-1070
DESIGNED: March 2013
SEALED: 8-26-13
REVISED: N/A

DETECTOR PROGRAMMING COMPLETE

ELECTRICAL DETAIL SHEET 3 OF 4

Prepared In the Offices of:

US 74 -76
at
US 17 NB Ramps

Division 3 Brunswick County Waino

PLAN DATE: August 2013 REVIEWED BY: JTR

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS

INIT. DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 008453
JOHN T. ROWE, JR.
SIGNATURE DATE 8-28-13
SIG. INVENTORY NO. 03-1070

750 N. Greenfield Pkwy, Garner, NC 27529

27-AUG-2013 09:30
T:\11553\JTR\11553\DWG\11553.dwg
11553.dwg

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING COORDINATION - SELECT ALL PAGE CHANGES (AS SHOWN BELOW)
WITHIN COORDINATION PLAN PROGRAMMING.

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM PAGE CHANGES (SHOWN BELOW) IN SEPARATE TIME OF DAY
EVENTS. IF PAGE 1 IS USED, NO EVENT PROGRAMMING IS NECESSARY
FOR THAT PARTICULAR PAGE.

| <u>PHASING</u> | <u>INPUTS PAGE</u> | <u>OVERLAPS PAGE</u> |
|---|--------------------|----------------------|
| ACTIVE PAGES REQUIRED TO RUN <u>NORMAL PHASING</u> | 1 | 1 |
| ACTIVE PAGES REQUIRED TO RUN <u>ALTERNATE PHASING</u> | 2 | 2 |

NOTE: PAGES NOT SHOWN (i.e. sequence, phase control, etc.) SHOULD REMAIN AS '1', OR AS DEFINED BY TIMING ENGINEER.

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY
PAGE CHANGE EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER.
(EX. FREE RUN PAGE CHANGE EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND
VICE-VERSA).

ALTERNATE PHASING PAGE CHANGE SUMMARY

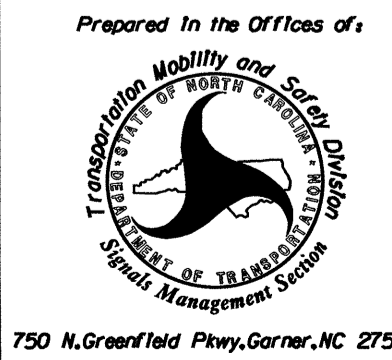
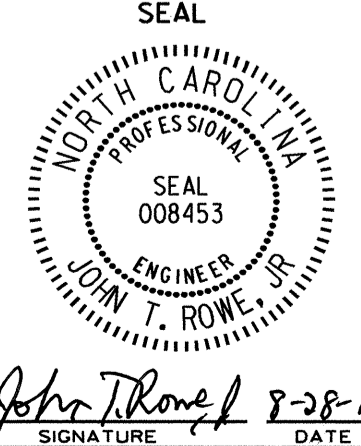
THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN
THESE OUTPUT/INPUT PAGE CHANGES ACTIVATE TO CALL THE
"ALTERNATE PHASING":

OVERLAPS PAGE 2: Modifies overlap parent phases for head 51
to run protected turns only.

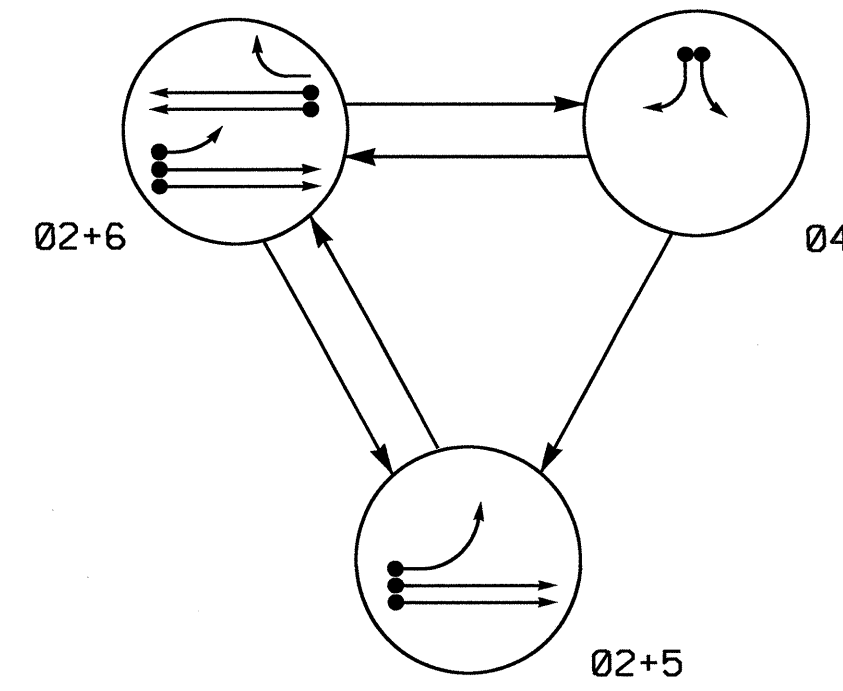
INPUTS PAGE 2: Disables phase 2 call on
loop 5A and modifies delay time.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 03-1070
DESIGNED: March 2013
SEALED: 8-26-13
REVISED: N/A

ELECTRICAL DETAIL SHEET 4 OF 4

|  <p style="font-size: 8px;">750 N. Greenfield Pkwy, Garner, NC 27529</p> | <p>US 74 -76 at US 17 NB Ramps</p> <p>Division 3 Brunswick County Waino</p> <p>PLAN DATE: August 2013 REVIEWED BY: JTR</p> <p>PREPARED BY: James Peterson REVIEWED BY:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table> | REVISIONS | INIT. | DATE | | | | | | | | | | <p>SEAL</p>  <p>SEAL 008453 ENGINEER JOHN T. ROWE, P.E.</p> <p style="font-size: 10px;">Signature: <i>John T. Rowe</i> 8-28-13 DATE</p> <p style="font-size: 8px;">SIG. INVENTORY NO. 03-1070</p> |
|---|---|-----------|-------|------|--|--|--|--|--|--|--|--|--|--|
| REVISIONS | INIT. | DATE | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | |

PHASING DIAGRAM

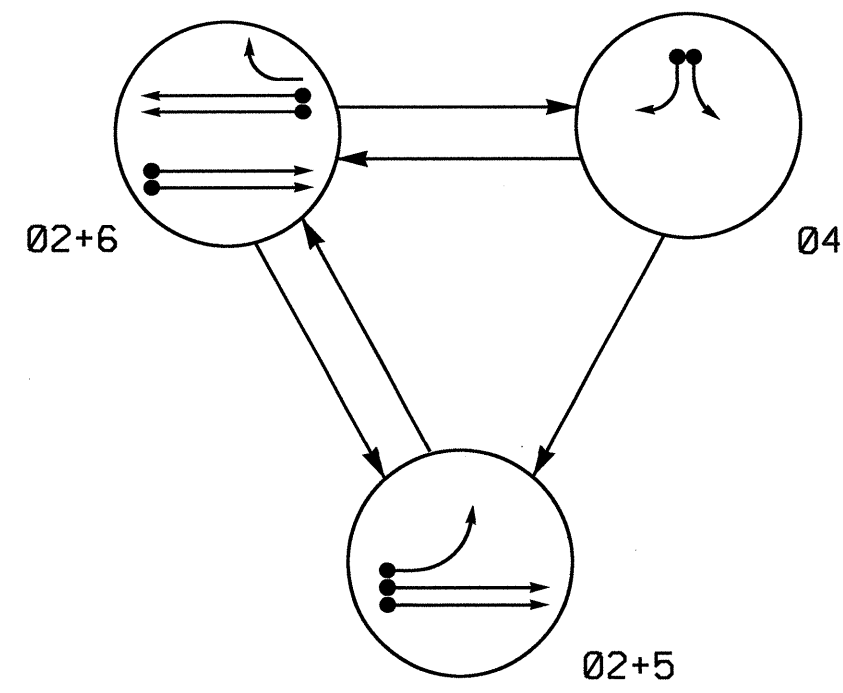


| SIGNAL FACE | PHASE | | | |
|-------------|-------|------|----|-------|
| | 02+5 | 02+6 | 04 | FLASH |
| 21,22 | G | G | R | Y |
| 41,42 | R | R | G | R |
| 51 | - | - | - | - |
| 61,62 | R | G | R | Y |

PHASING DIAGRAM DETECTION LEGEND

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

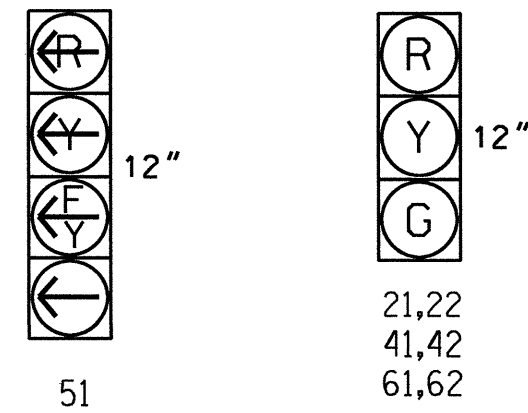
ALTERNATE PHASING DIAGRAM



| SIGNAL FACE | PHASE | | | |
|-------------|-------|------|----|-------|
| | 02+5 | 02+6 | 04 | FLASH |
| 21,22 | G | G | R | Y |
| 41,42 | R | R | G | R |
| 51 | - | - | - | - |
| 61,62 | R | G | R | Y |

SIGNAL FACE I.D.

All Heads L.E.D.



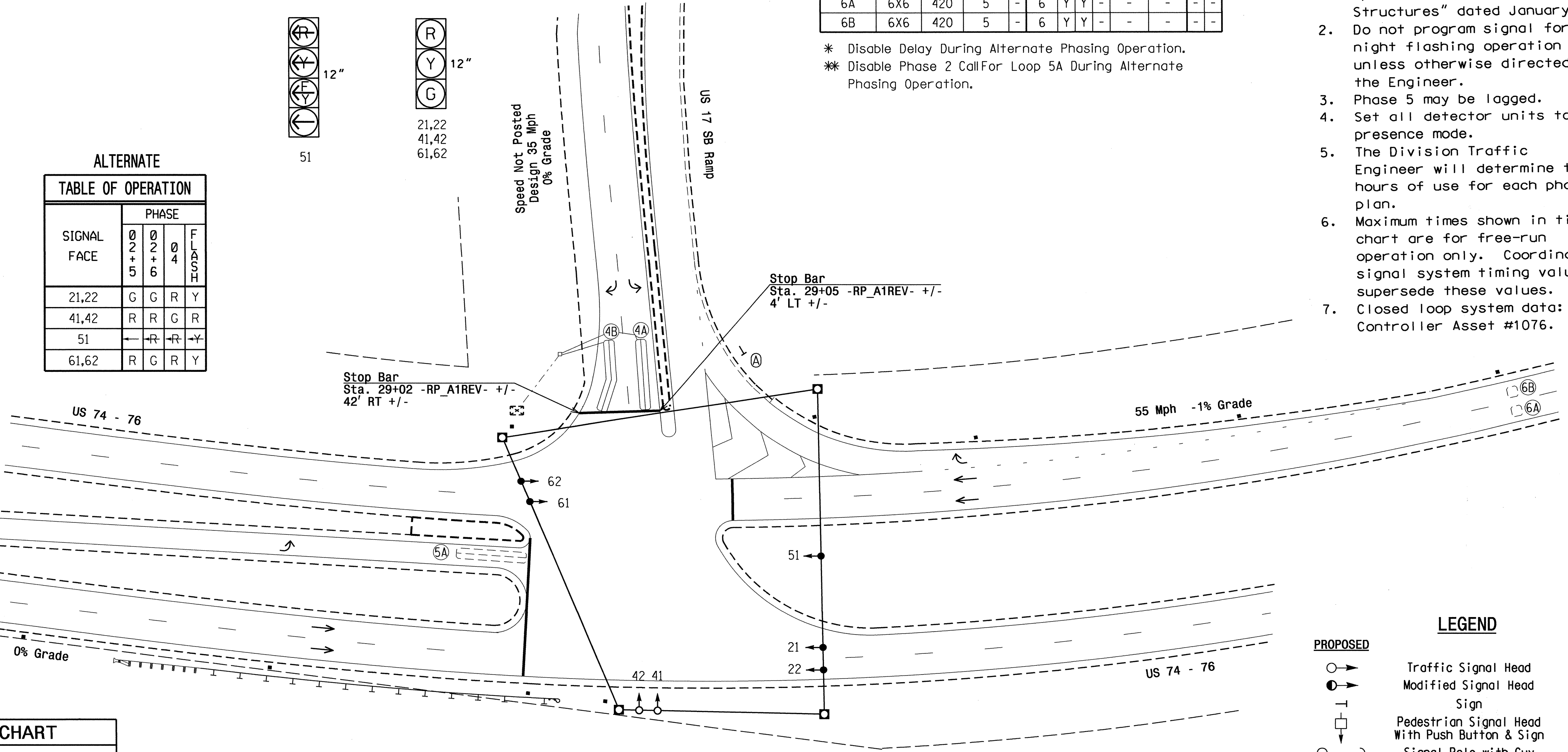
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | |
|------|-----------|----------------------------|-------|----------|----------------------|-------------------|--------------|------------|
| | | | | | PHASE | CALLING EXTENSION | STRETCH TIME | DELAY TIME |
| 2A | 6X6 | 420 | 5 | - | 2 | Y | Y | - |
| 2B | 6X6 | 420 | 5 | - | 2 | Y | Y | - |
| 4A | 6X40 | 0 | 2-4-2 | Y | 4 | Y | Y | - |
| 4B | 6X40 | 0 | 2-4-2 | Y | 4 | Y | Y | - |
| 5A | 6X40 | 0 | 2-4-2 | - | 5 | Y | Y | 15* |
| 6A | 6X6 | 420 | 5 | - | 6 | Y | Y | - |
| 6B | 6X6 | 420 | 5 | - | 6 | Y | Y | - |

- * Disable Delay During Alternate Phasing Operation.
- ** Disable Phase 2 CallFor Loop 5A During Alternate Phasing Operation.

3 Phase Fully Actuated US 74-76 (Malmo) CLS

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. The Division Traffic Engineer will determine the hours of use for each phasing plan.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Closed loop system data: Controller Asset #1076.



| FEATURE | PHASE | | | |
|-------------------------|------------|-----|-----|------------|
| | 2 | 4 | 5 | 6 |
| Min Green 1 * | 14 | 7 | 7 | 14 |
| Extension 1 * | 6.0 | 2.0 | 2.0 | 6.0 |
| Max Green 1 * | 90 | 20 | 15 | 90 |
| Yellow Clearance | 5.3 | 3.0 | 3.0 | 5.3 |
| Red Clearance | 1.7 | 3.9 | 3.3 | 1.7 |
| Walk 1 * | - | - | - | - |
| Don't Walk 1 | - | - | - | - |
| Seconds Per Actuation * | 1.5 | - | - | 1.5 |
| Max Variable Initial * | 46 | - | - | 46 |
| Time Before Reduction * | 15 | - | - | 15 |
| Time To Reduce * | 30 | - | - | 30 |
| Minimum Gap | 3.4 | - | - | 3.4 |
| Recall Mode | MIN RECALL | - | - | MIN RECALL |
| Vehicle Call Memory | YELLOW | - | - | YELLOW |
| Dual Entry | - | - | - | - |
| 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 |
|----------|----------|
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Signal Upgrade

750 N. Greenfield Pkwy, Garner, NC 27529

**US 74 - 76
at
US 17 SB Ramp**

Division 3 Brunswick County Malmo

| | |
|--------------------------|------------------|
| PLAN DATE: March 2013 | REVIEWED BY: JPG |
| PREPARED BY: Jeff Spence | REVIEWED BY: |
| REVISIONS | INIT. DATE |

SCALE: 1"=40'

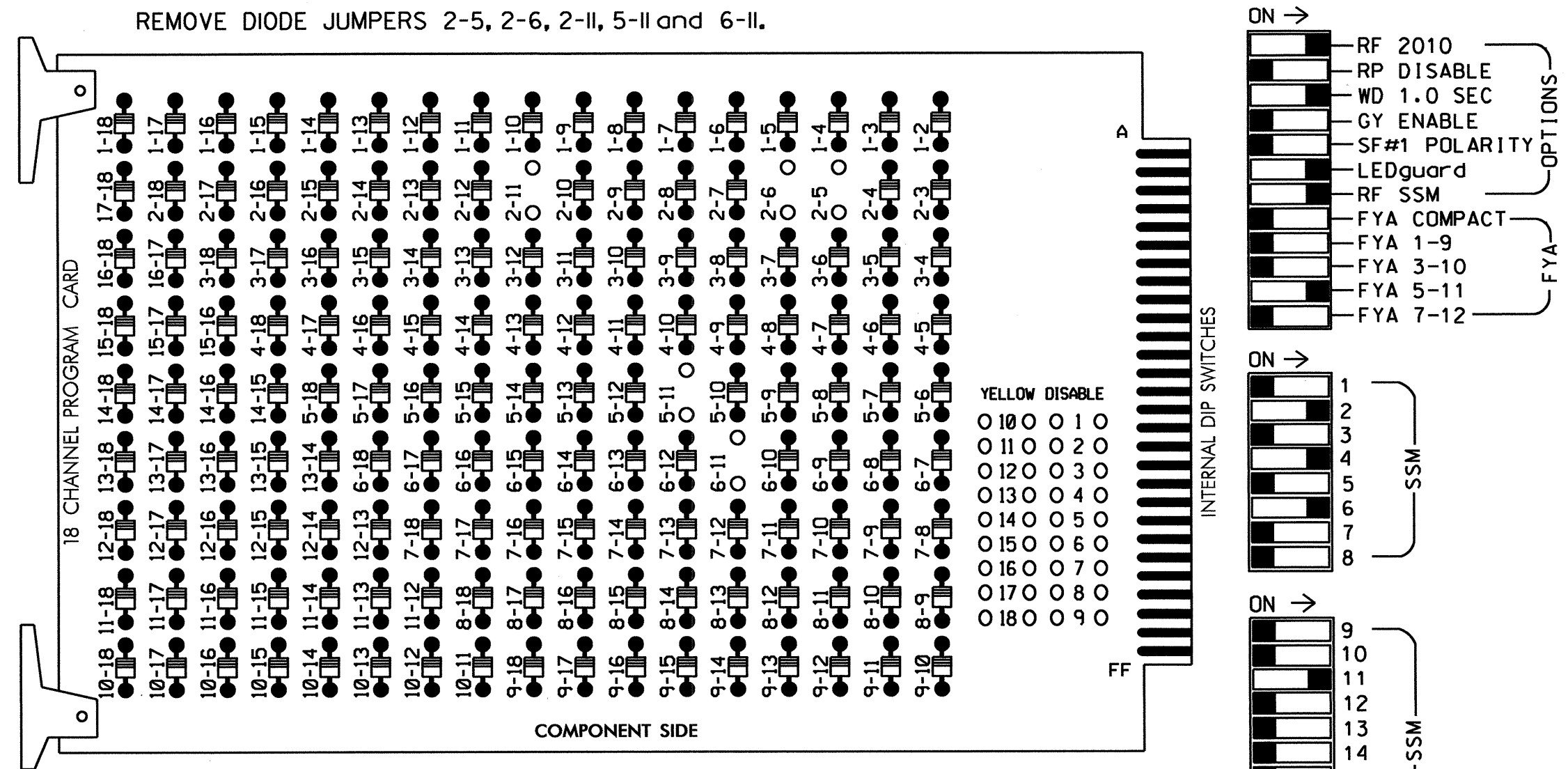
SEAL

8/26/13

SIG. INVENTORY NO. 03-1076

EDI MODEL 2018ECL-NC CONFLICT MONITOR
PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the US 74-76 (Malmo) CLS.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332 /W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8,AUX S4.
 PHASES USED.....2,4,5,6.
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 | |
|-----------------------|----|-------|-------|----|-------|-------|-----|-------|-------|-----|-----|-------|--------|--------|--------|--------|--------|--------|------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 | |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE | |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | NU | 51* | 61,62 | NU | NU | NU | NU | NU | NU | NU | 51* | NU | NU | |
| RED | | 128 | | | 101 | | | 134 | | | | | | | | | | | |
| YELLOW | | 129 | | | 102 | | * | 135 | | | | | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | | | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | | | | | A114 | |
| YELLOW ARROW | | | | | | | | | | | | | | | | | | | A115 |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | | A116 |
| GREEN ARROW | | | | | | | | 133 | | | | | | | | | | | |

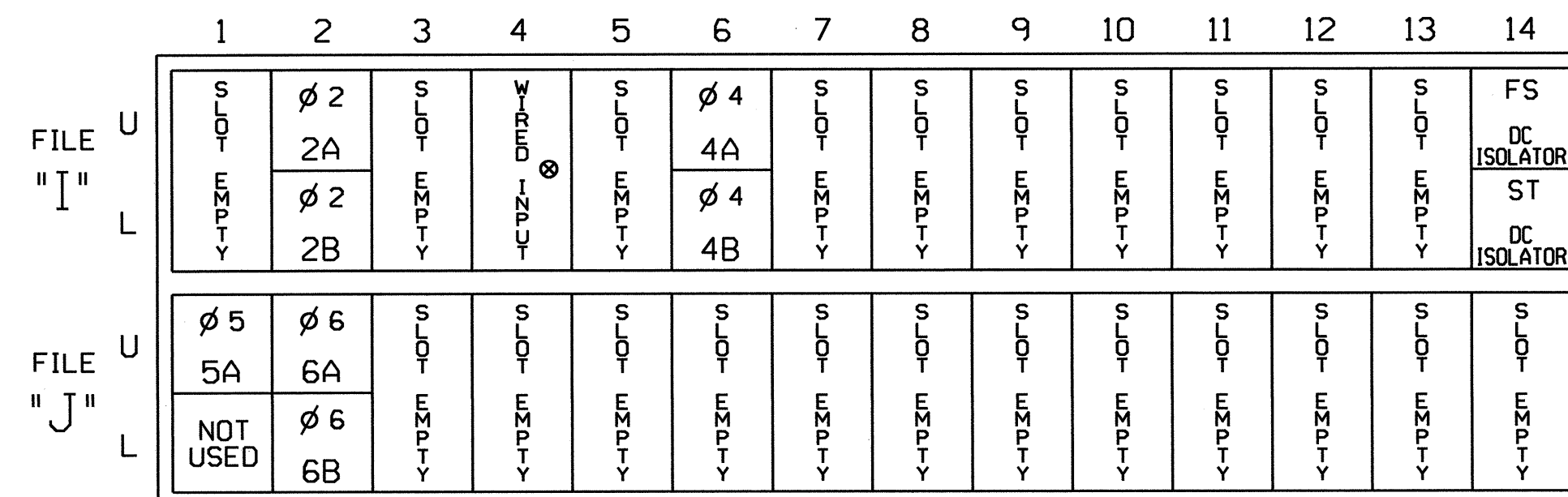
NU = Not Used

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

* See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
 ST = STOP TIME

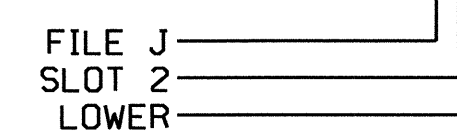
⊗ Wired Input - Do not populate slot with detector card

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 | | | |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | 15 |
| 5A ¹ | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 15 |
| | | I4U | 47 | 9 | 22 | 2 | Y | Y | Y | | 3 |
| 6A | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | |
| 6B | TB3-7,8 | J2L | 44 | 6 | 16 | 6 | Y | Y | | | |

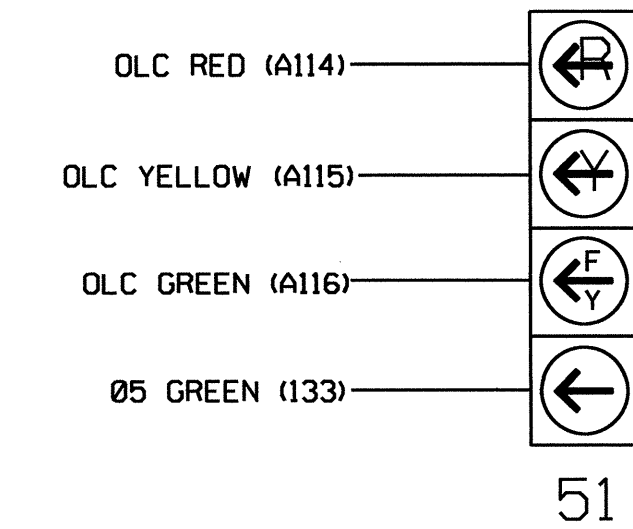
¹Add jumper from J1-W to I4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L



4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

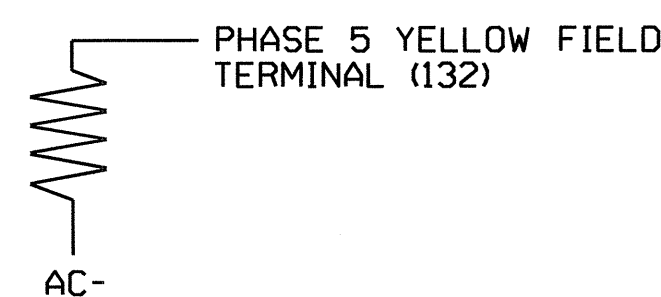
1. The sequence display for this signal requires special logic programming. See sheet 2 for programming instructions.

THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 03-1076
 DESIGNED: March 2013
 SEALED: 8-26-13
 REVISED: N/A

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

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



ELECTRICAL DETAIL SHEET 1 OF 4

Electrical and Programming Details For:

Prepared In the Offices of:
 Transportation Mobility and Safety Solutions
 DIVISION OF TRANSPORTATION
 Signal Management Section
 750 N. Greenfield Pkwy, Garner, NC 27529

US 74 - 76
 at
 US 17 SB Ramps

Division 3 Brunswick County Malmo

PLAN DATE: August 2013 REVIEWED BY: JTR

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS INIT. DATE

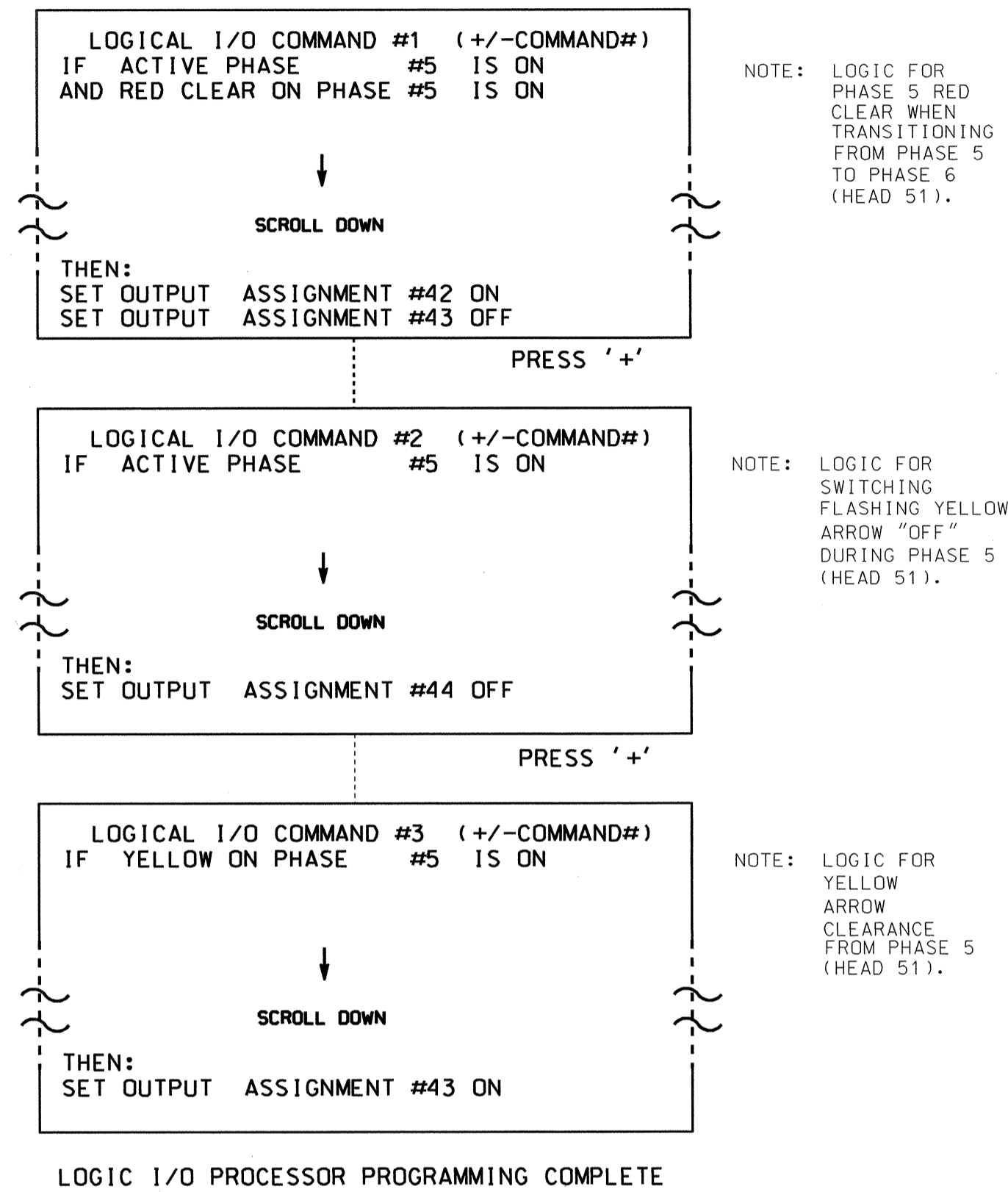
SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 008453
 JOHN T. ROWE, P.E.

Signature: John T. Rowe DATE: 8-28-13
 SIG. INVENTORY NO. 03-1076

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS), SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2 AND 3.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



OUTPUT REFERENCE SCHEDULE

OUTPUT 42 = Overlap C Red
OUTPUT 43 = Overlap C Yellow
OUTPUT 44 = Overlap C Green

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PRESS '+' TWICE

```

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE:      :12345678910111213141516
VEH OVL PARENTS:  XX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR:  _ RED _ YELLOW _ GREEN
FLASH COLORS:  _ RED _ YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).
PRESS 'NEXT' TO ADVANCE TO PAGE 2.

PRESS '+' TWICE

NOTICE PAGE 2 →

```

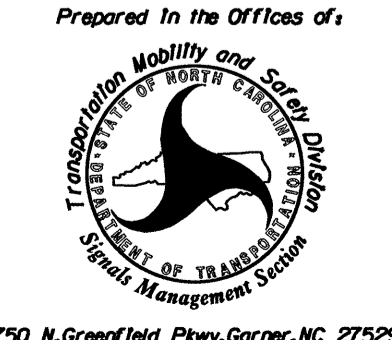
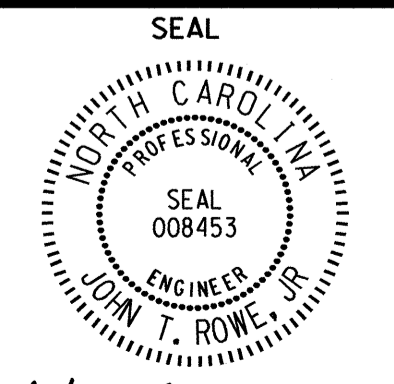
PAGE 2: VEHICLE OVERLAP 'C' SETTINGS
PHASE:      :12345678910111213141516
VEH OVL PARENTS:  X
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR:  _ RED _ YELLOW _ GREEN
FLASH COLORS:  _ RED _ YELLOW GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 03-1076
DESIGNED: March 2013
SEALED: 8-26-13
REVISED: N/A

ELECTRICAL DETAIL SHEET 2 OF 4

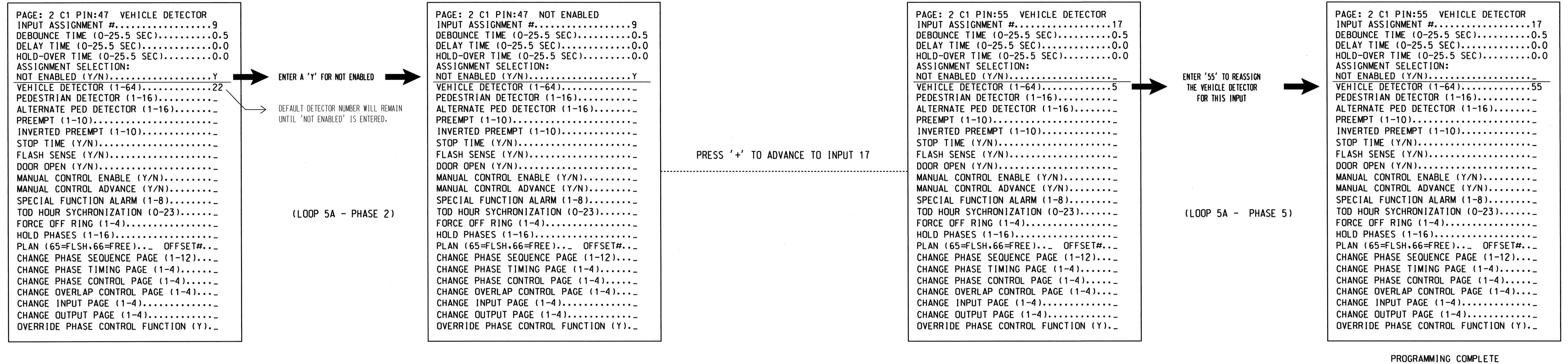
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|--|--|---|-----------|-------|------|--|--|--|
|  | <p>US 74 - 76 at US 17 SB Ramp</p> <p>Division 3 Brunswick County Walno</p> <p>PLAN DATE: August 2013 REVIEWED BY: JTR</p> <p>PREPARED BY: James Peterson REVIEWED BY:</p> | <p>SEAL</p>  | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">REVISIONS</td> <td style="width: 20%;">INIT.</td> <td style="width: 30%;">DATE</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table> | | | REVISIONS | INIT. | DATE | | | |
| REVISIONS | INIT. | DATE | | | | | | |
| | | | | | | | | |
| <p>750 N. Greenfield Pkwy, Garner, NC 27529</p> | | <p><i>John T. Rowe</i> 8-28-13</p> <p>SIGNATURE DATE</p> <p>SIG. INVENTORY NO. 03-1076</p> | | | | | | |

INPUT PAGE 2 ASSIGNMENT PROGRAMMING DETAIL FOR ALTERNATE PHASING - LOOP 5A

(program controller as shown below)

- NOTES: 1. THIS PROGRAMMING APPLIES FOR INPUT PAGE 2 ONLY. INPUT PAGE 1 WILL USE STANDARD DEFAULT SETTINGS. THIS PROGRAMMING IS NECESSARY FOR PROPER DETECTOR OPERATION DURING ALTERNATE PHASING OPERATION.
2. THE FIRST TASK THIS PROGRAMMING ACCOMPLISHES IS THE DISABLING OF INPUT #9 (DETECTOR 22) SO THAT A VEHICLE CALL WILL NOT BE PLACED TO PHASE 2 DURING ALTERNATE PHASING OPERATION. THE SECOND TASK THIS PROGRAMMING ACCOMPLISHES IS THAT IT REASSIGNS DETECTOR 55 TO INPUT #17 SO THAT THE DELAY ON LOOP 5A CAN BE REDUCED FROM 15 SECONDS TO 0 SECONDS.

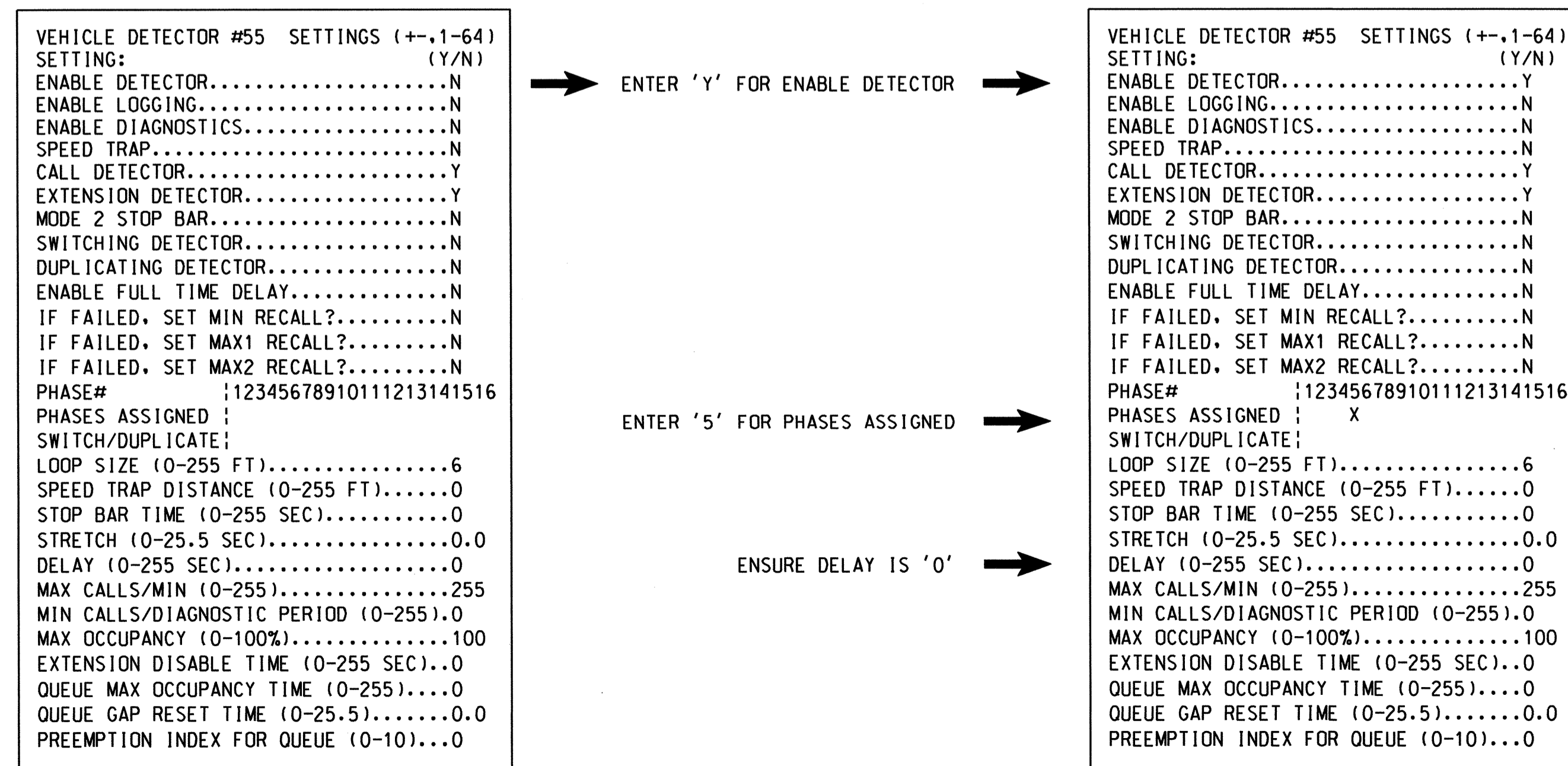
FROM MAIN MENU PRESS '5' (INPUTS), THEN PRESS 'NEXT' TO GET TO INPUT PAGE '2'. PRESS THE '+' KEY UNTIL INPUT 9 IS REACHED.



SPECIAL DETECTOR PROGRAMMING DETAIL - LOOP 5A (ALT.)

(program controller as shown below)

FROM MAIN MENU PRESS '7' (DETECTORS), THEN PRESS '1' FOR VEHICLE DETECTORS. PRESS THE '-' KEY TO GET TO VEHICLE DETECTOR #55.



NOTE: DETECTOR IS PROGRAMMED PER THE INPUT FILE CONNECTION AND PROGRAMMING CHART SHOWN ON SHEET 1.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-1076
DESIGNED: March 2013
SEALED: 8-26-13
REVISED: N/A

ELECTRICAL DETAIL SHEET 3 OF 4

Prepared In the Offices of:

 750 N. Greenfield Pkwy, Garner, NC 27529

US 74 -76
at
US 17 SB Ramps

Division 3 Brunswick County Waino
 PLAN DATE: August 2013 REVIEWED BY: JTR
 PREPARED BY: James Peterson REVIEWED BY:
 REVISIONS INIT. DATE

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 008453
 JAMES T. ROWE, JR.
 SIGNATURE DATE 8-28-13
 SIG. INVENTORY NO. 03-1076

27-AUG-2013 09:25 S:\ITSS\SUM\ITS_Sig\01\work\outputs\19_MattPeterson\031076_sml_e_03xx.dgn Peterson

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING COORDINATION - SELECT ALL PAGE CHANGES (AS SHOWN BELOW) WITHIN COORDINATION PLAN PROGRAMMING.

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM PAGE CHANGES (SHOWN BELOW) IN SEPARATE TIME OF DAY EVENTS. IF PAGE 1 IS USED, NO EVENT PROGRAMMING IS NECESSARY FOR THAT PARTICULAR PAGE.

| <u>PHASING</u> | <u>INPUTS PAGE</u> | <u>OVERLAPS PAGE</u> |
|---|--------------------|----------------------|
| ACTIVE PAGES REQUIRED TO RUN <u>NORMAL PHASING</u> | 1 | 1 |
| ACTIVE PAGES REQUIRED TO RUN <u>ALTERNATE PHASING</u> | 2 | 2 |

NOTE: PAGES NOT SHOWN (i.e. sequence, phase control, etc.) SHOULD REMAIN AS '1', OR AS DEFINED BY TIMING ENGINEER.

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY PAGE CHANGE EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN PAGE CHANGE EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING PAGE CHANGE SUMMARY

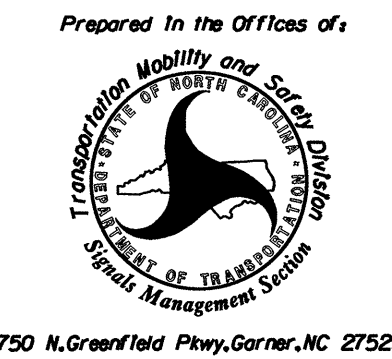
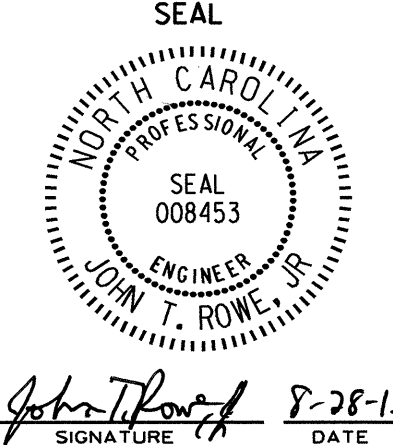
THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN THESE OUTPUT/INPUT PAGE CHANGES ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAPS PAGE 2: Modifies overlap parent phases for head 51 to run protected turns only.

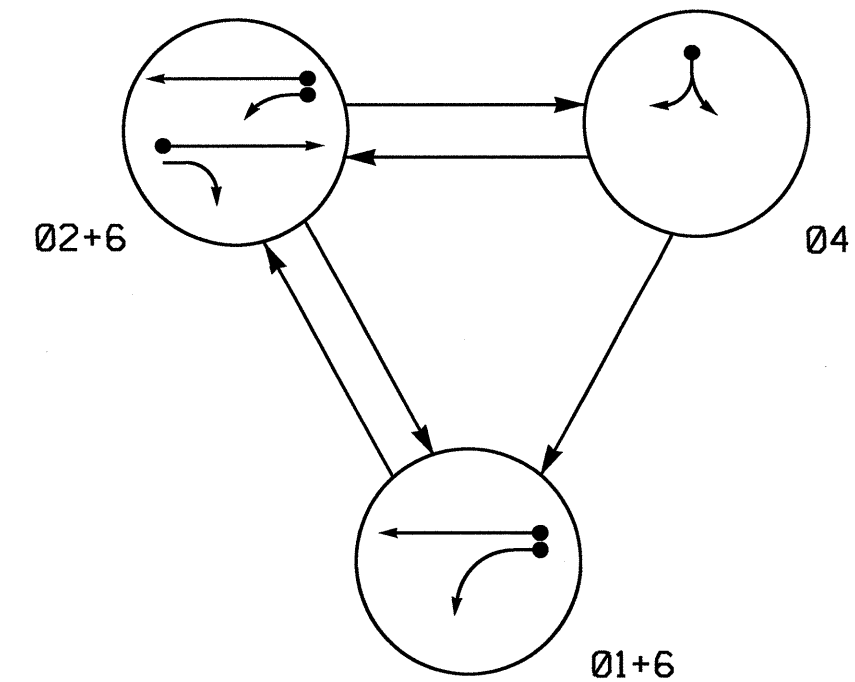
INPUTS PAGE 2: Disables phase 2 call on loop 5A and modifies delay time.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 03-1076
 DESIGNED: March 2013
 SEALED: 8-26-13
 REVISED: N/A

ELECTRICAL DETAIL SHEET 4 OF 4

| ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of:  | US 74 -76 at US 17 SB Ramps Division 3 Brunswick County Wsimo PLAN DATE: August 2013 REVIEWED BY: JTR PREPARED BY: James Peterson REVIEWED BY: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table> | REVISIONS | INIT. | DATE | | | | SEAL  SIGNATURE: <i>John T. Rowle</i> DATE: 8-28-13 SIG. INVENTORY NO. 03-1076 |
|---|---|-----------|-------|------|--|--|--|--|
| REVISIONS | INIT. | DATE | | | | | | |
| | | | | | | | | |

PHASING DIAGRAM

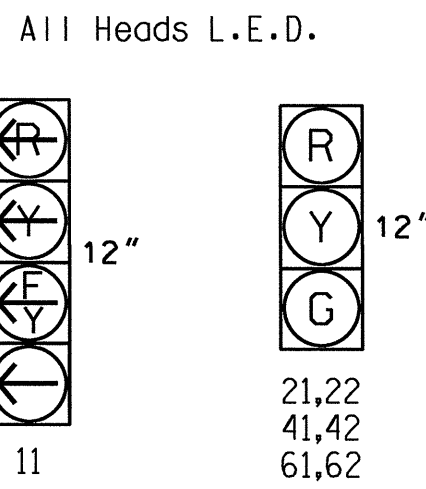


| SIGNAL FACE | PHASE | | | |
|-------------|-------|------|----|-------|
| | 01+6 | 02+6 | 04 | FLASH |
| 11 | ← | ← | ← | ← |
| 21,22 | R | G | R | Y |
| 41,42 | R | R | G | R |
| 61,62 | G | G | R | Y |

PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.



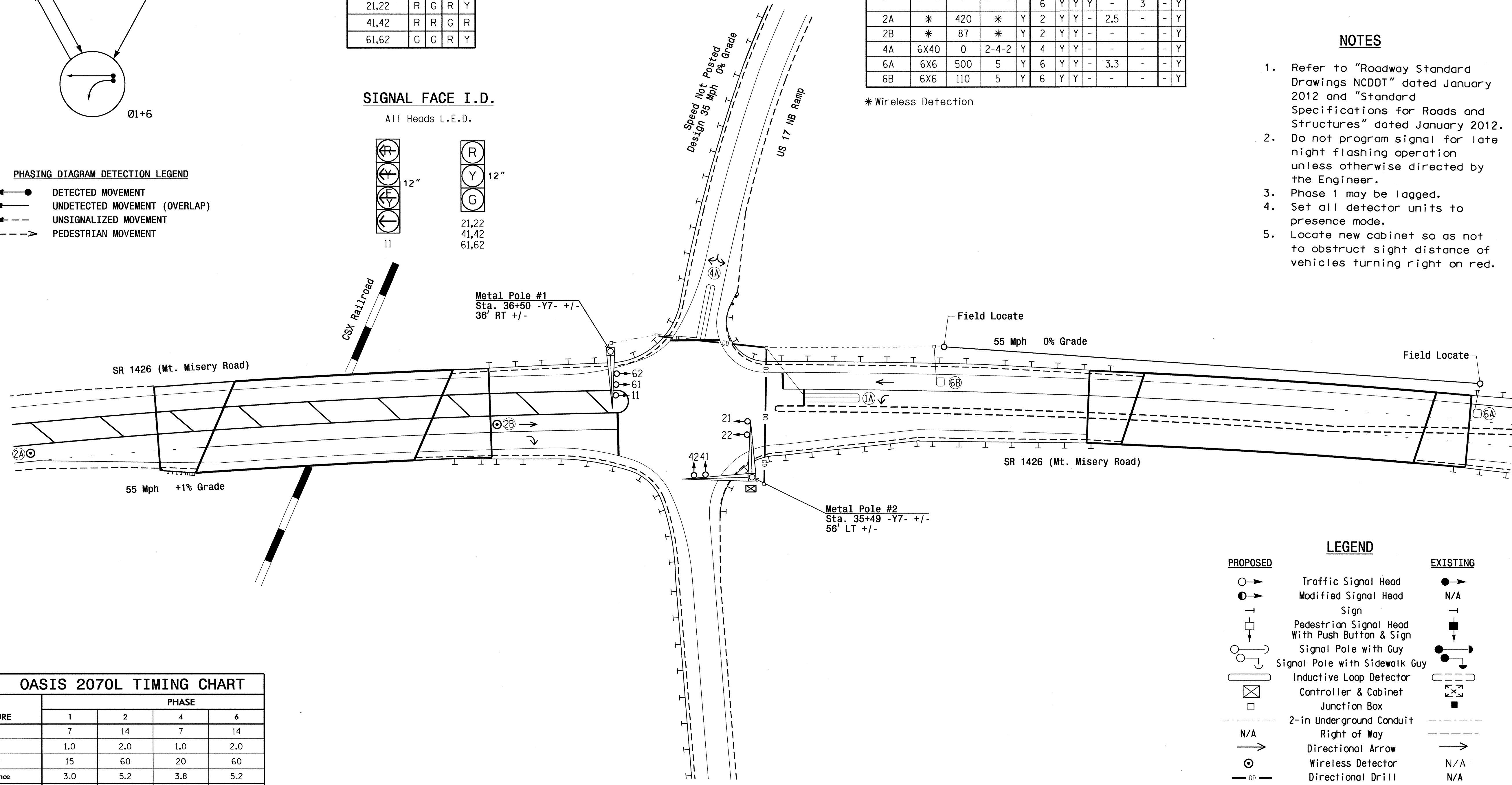
| OASIS 2070L LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | | | |
|--|-----------|----------------------------|-------|----------------------|-------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| INDUCTIVE LOOPS | | | | DETECTOR PROGRAMMING | | | | | | | | |
| LOOP | 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 |
| | | | | | 6 | Y | Y | Y | - | 3 | - | Y |
| 2A | * | 420 | * | Y | 2 | Y | Y | - | 2.5 | - | - | Y |
| 2B | * | 87 | * | Y | 2 | Y | Y | - | - | - | - | Y |
| 4A | 6X40 | 0 | 2-4-2 | Y | 4 | Y | Y | - | - | - | - | Y |
| 6A | 6X6 | 500 | 5 | Y | 6 | Y | Y | - | 3.3 | - | - | Y |
| 6B | 6X6 | 110 | 5 | Y | 6 | Y | Y | - | - | - | - | Y |

* Wireless Detection

3 Phase Fully Actuated Isolated

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 may be lagged.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.



| OASIS 2070L TIMING CHART | | | | |
|--------------------------|-------|------------|-----|------------|
| FEATURE | PHASE | | | |
| | 1 | 2 | 4 | 6 |
| Min Green 1 * | 7 | 14 | 7 | 14 |
| Extension 1 * | 1.0 | 2.0 | 1.0 | 2.0 |
| Max Green 1 * | 15 | 60 | 20 | 60 |
| Yellow Clearance | 3.0 | 5.2 | 3.8 | 5.2 |
| Red Clearance | 3.3 | 1.1 | 1.7 | 1.1 |
| 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 |
| Dual Entry | - | - | - | - |
| 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.

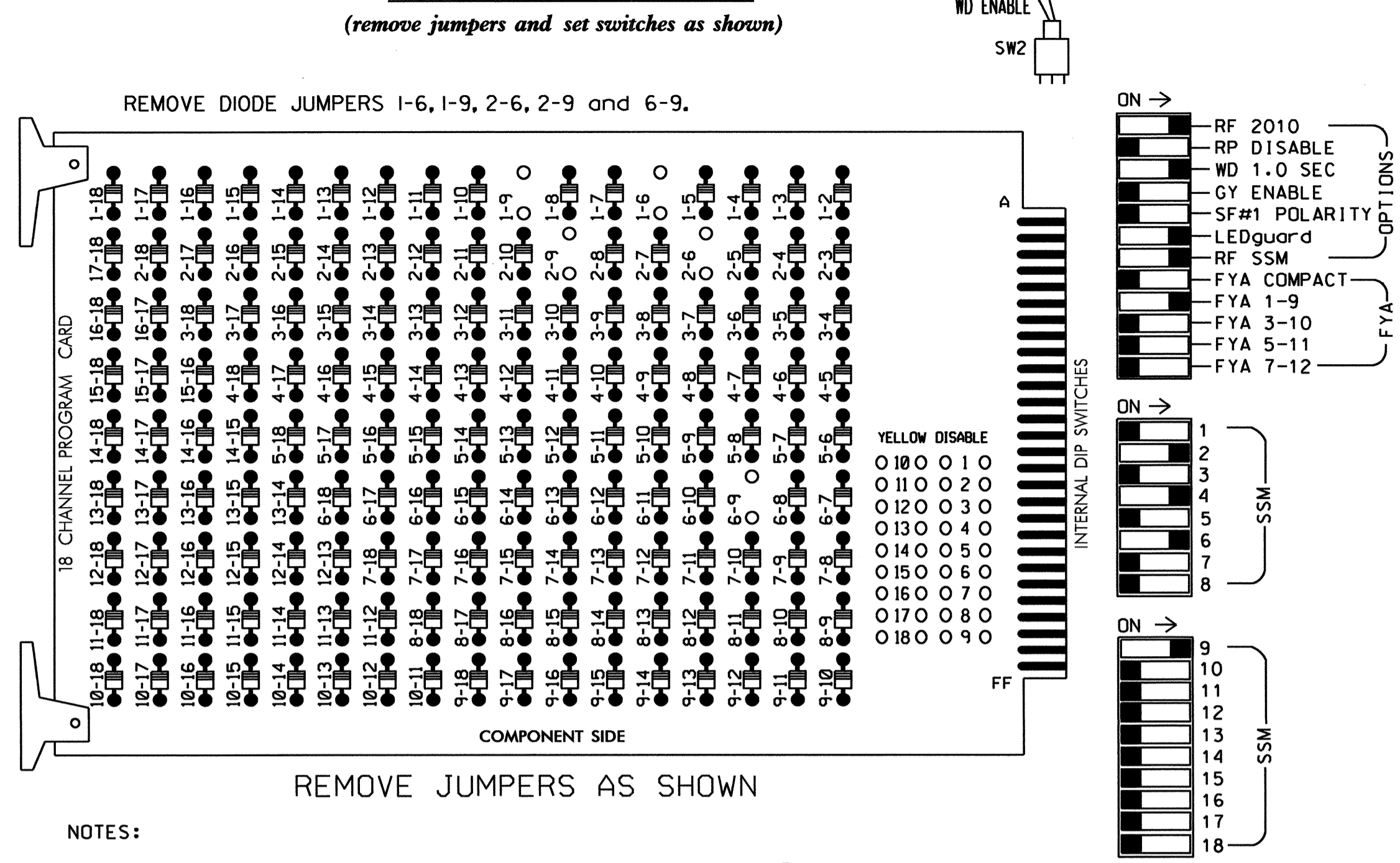
| PROPOSED | EXISTING |
|----------|----------|
| | |
| | N/A |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| N/A | |
| | |
| | N/A |
| | N/A |
| | |

New Installation

| | | | |
|--|--|----------------------------------|--|
| | US 17 NB Ramp at SR 1426 (Mt. Misery Road) Division 3 Brunswick County Malmø | | |
| | PLAN DATE: February 2013 PREPARED BY: Jeff Spence | REVIEWED BY: JPG REVIEWED BY: | |

23-JUL-2013 14:16
 R:\Traffic\OASIS\gn01\gn01.dgn
 R:\Traffic\OASIS\gn01\gn01.dgn
 R:\Traffic\OASIS\gn01\gn01.dgn

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL
(remove jumpers and set switches as shown)



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

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.

SIGNAL HEAD HOOK-UP CHART

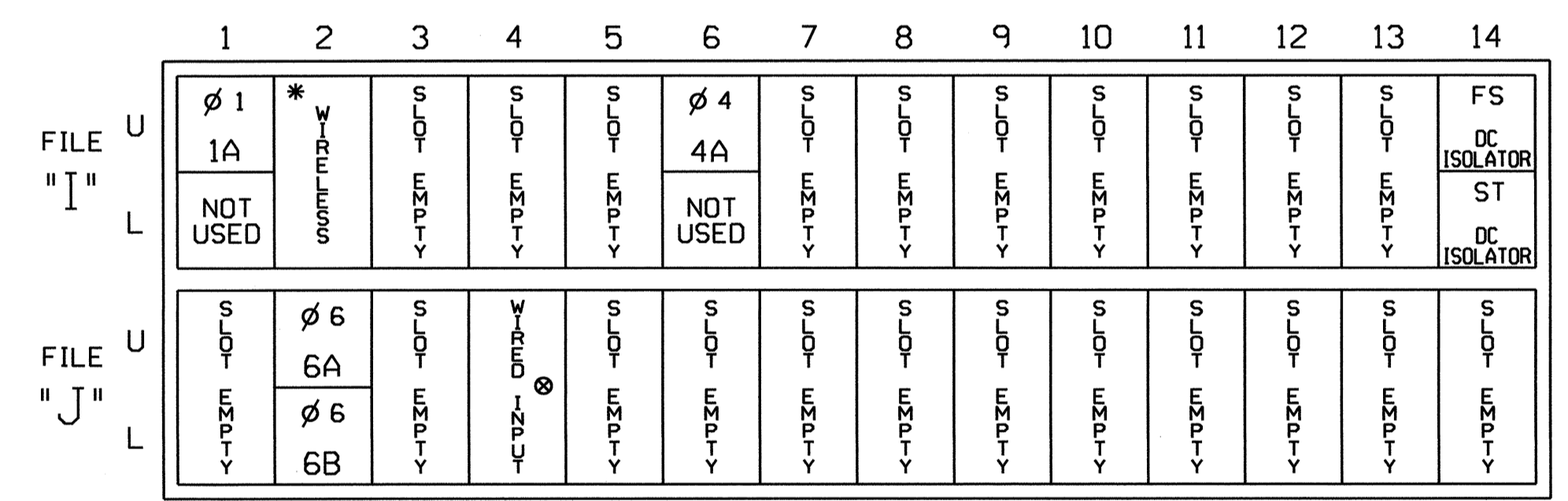
| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------------|-----|-------|-------|----|-------|-------|----|-------|-------|-----|-----|-------|--------|--------|--------|--------|--------|--------|
| CMJ CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11 | 21,22 | NU | NU | 41,42 | NU | NU | 61,62 | NU | NU | NU | NU | 11 | NU | NU | NU | NU | NU |
| RED | | 128 | | | 101 | | | 134 | | | | | | | | | | |
| YELLOW | * | 129 | | | 102 | | | 135 | | | | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | | | | | | | | |
| RED ARROW | | | | | | | | | | | | | A121 | | | | | |
| YELLOW ARROW | | | | | | | | | | | | | A122 | | | | | |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | A123 | | | | | |
| GREEN ARROW | 127 | | | | | | | | | | | | | | | | | |

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail below.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 /W/ AUX
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S5,S8,AUX S1.
PHASES USED.....1,2,4,6.
OVERLAP "A".....1+2
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

INPUT FILE POSITION LAYOUT
(front view)



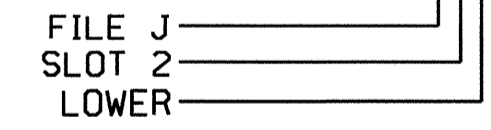
EX.: 1A, 2A, ETC. = LOOP NO.'S
* Wireless Detection
⊗ Wired Input - Do not populate slot with detector card
FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

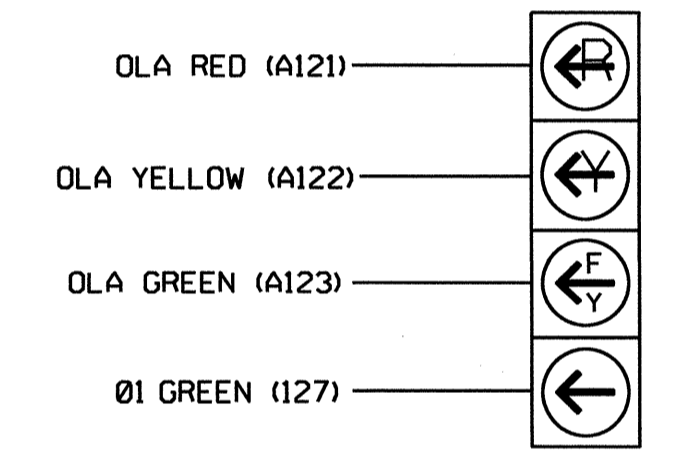
| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|-----------------|--------------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A ¹ | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | 15 |
| | | J4U | 48 | 10 | 26 | 6 | Y | Y | Y | | 3 |
| * 2A | WIRELESS DETECTION | | | | | 2 | Y | Y | | | 2.5 |
| * 2B | WIRELESS DETECTION | | | | | 2 | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| 6A | TB3-5,6 | J2U | 40 | 2 | 6 | 6 | Y | Y | | | 3.3 |
| 6B | TB3-7,8 | J2L | 44 | 6 | 16 | 6 | Y | Y | | | |

¹Add jumper from I1-W to J4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L



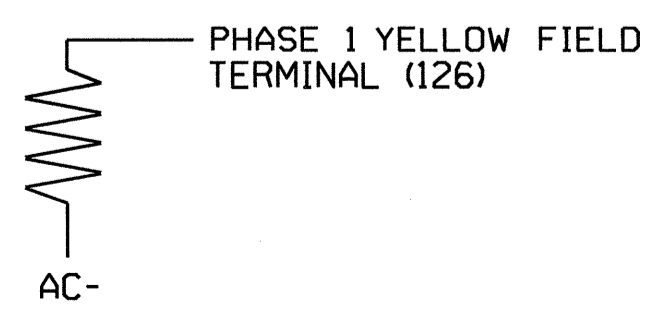
4 SECTION FYA PPLT SIGNAL WIRING DETAIL
(wire signal heads as shown)



NOTE
1. The sequence display for this signal requires special logic programming. See sheet 2 for programming instructions.

LOAD RESISTOR INSTALLATION DETAIL
(install resistors as shown below)

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



INSTALL A WIRELESS DETECTION SYSTEM FOR VEHICLE DETECTION. PERFORM INSTALLATION ACCORDING TO MANUFACTURER'S DIRECTIONS AND NCDOT ENGINEER-APPROVED MOUNTING LOCATIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.

*** WIRELESS DETECTION**

Prepared in the Office of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
750 N. Greenfield Pkwy, Garner, NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
JOHN T. ROWE, P.E.
SEAL 008453

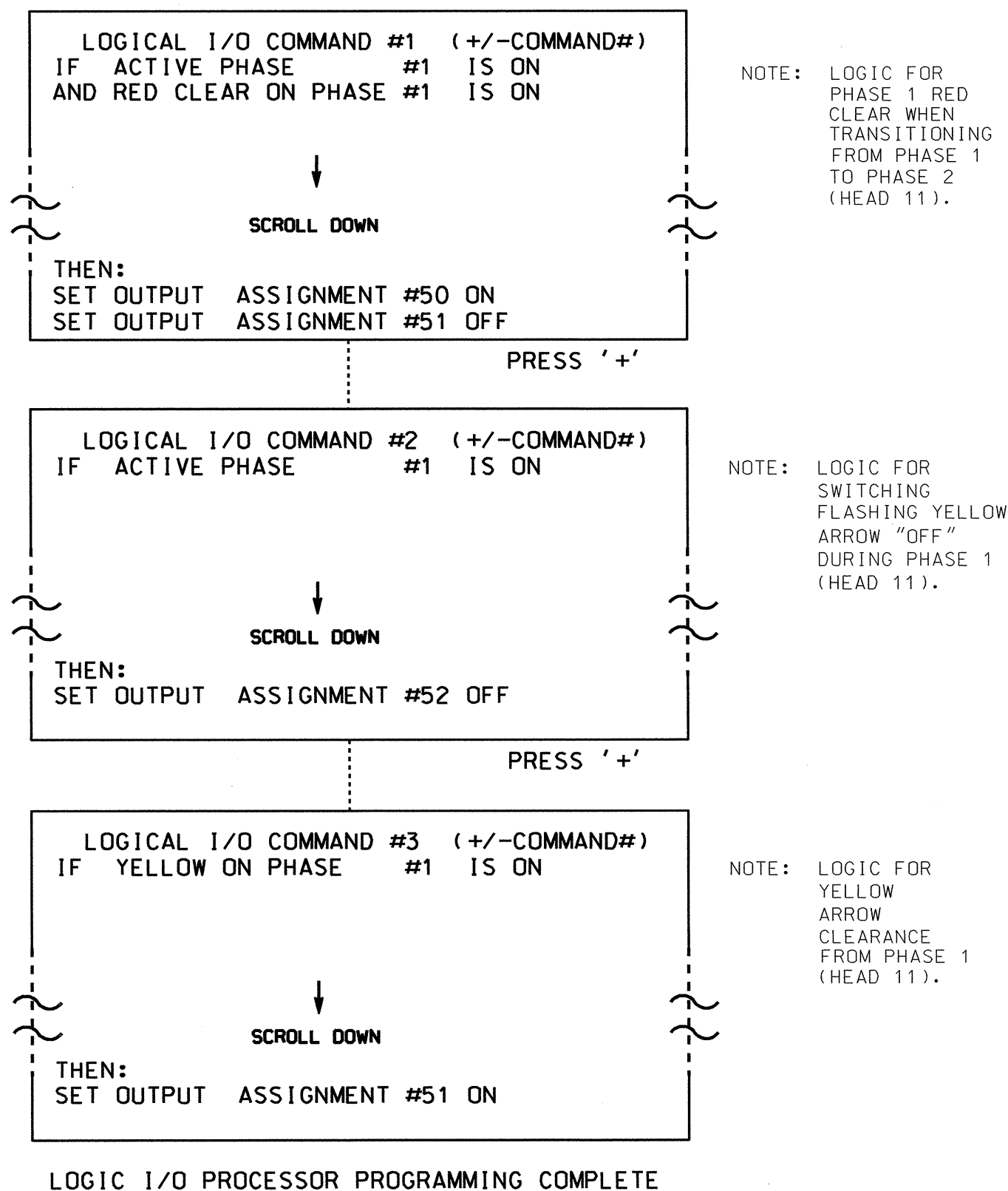
US 17 NB Ramp at SR 1426 (Mt. Misery Road)
Division 3 Brunswick County Waino
PLAN DATE: August 2013 REVIEWED BY: JTR
PREPARED BY: James Peterson REVIEWED BY:
REVISIONS: INIT. DATE
DATE: 8-22-13
SIGNATURE: John T. Rowe
DATE: 8-22-13
SIC INVENTORY NO. 03-1071

15-AUG-2013 14:19 S:\ITS\SUMITS\SIGNALS\WORKGROUPS\619\MonPeterson\031071.sm.ele...xxx.dgn J.Peterson

**LOGICAL I/O PROCESSOR PROGRAMMING DETAIL
TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE**

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS), SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2 AND 3.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



| |
|----------------------------------|
| OUTPUT REFERENCE SCHEDULE |
| OUTPUT 50 = Overlap A Red |
| OUTPUT 51 = Overlap A Yellow |
| OUTPUT 52 = Overlap A Green |

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```

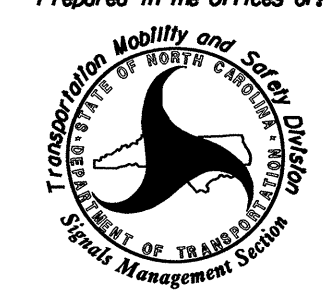
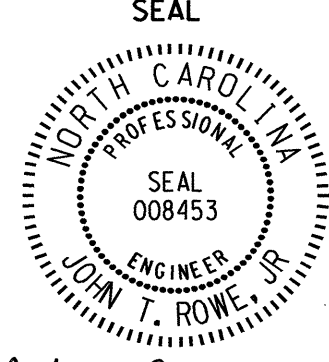
PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE:           12345678910111213141516
VEH OVL PARENTS: XX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR:  - RED  - YELLOW  - GREEN
FLASH COLORS:   - RED  - YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0.0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
  
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

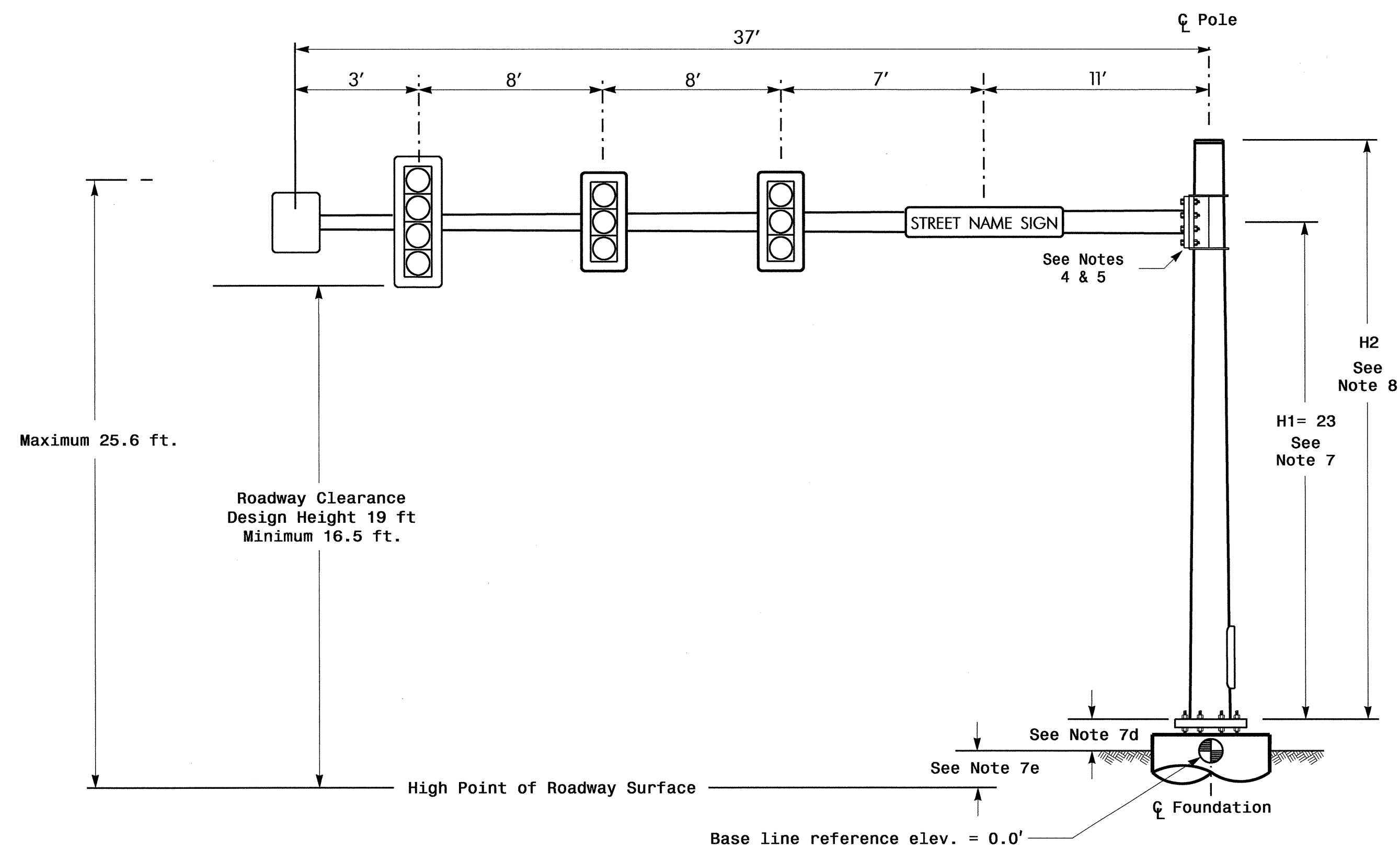
THIS ELECTRICAL DETAIL IS FOR
 THE SIGNAL DESIGN: 03-1071
 DESIGNED: February 2013
 SEALED: 7-25-13
 REVISED: N/A

ELECTRICAL DETAIL SHEET 2 OF 2

| Prepared In the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529 | US 17 NB Ramp at SR 1426 (Mt. Misery Road) Division 3 Brunswick County MaImo PLAN DATE: August 2013 REVIEWED BY: JTR PREPARED BY: James Peterson REVIEWED BY: | SEAL  ENGINEER JOHN T. ROWE, JR. | | | | | | |
|--|--|--|-------|------|--|--|--|---|
| | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> | REVISIONS | INIT. | DATE | | | | SIGNATURE: <i>John T. Rowe</i> 8-22-13 DATE: 8-22-13 SIG. INVENTORY NO. 03-1071 |
| REVISIONS | INIT. | DATE | | | | | | |
| | | | | | | | | |

15-AUG-2013 14:26
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 J.peterson

Design Loading for METAL POLE NO.1



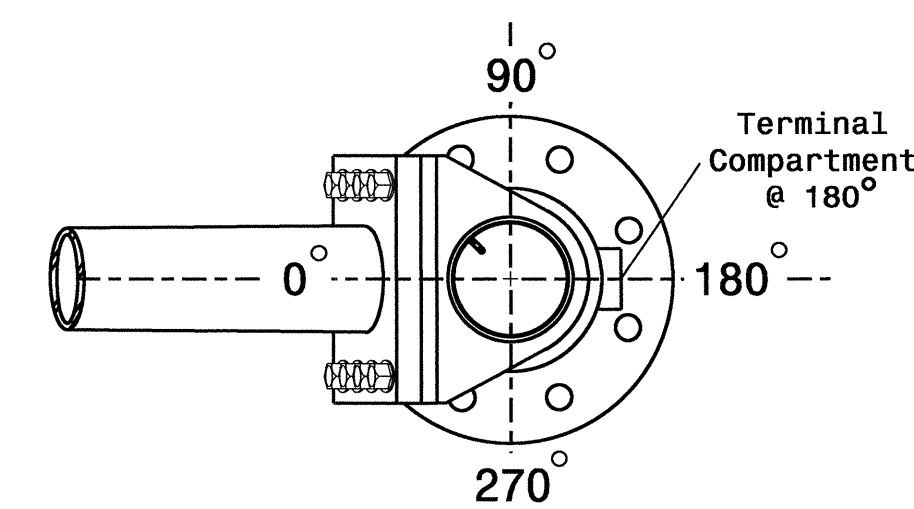
Elevation View

SPECIAL NOTE

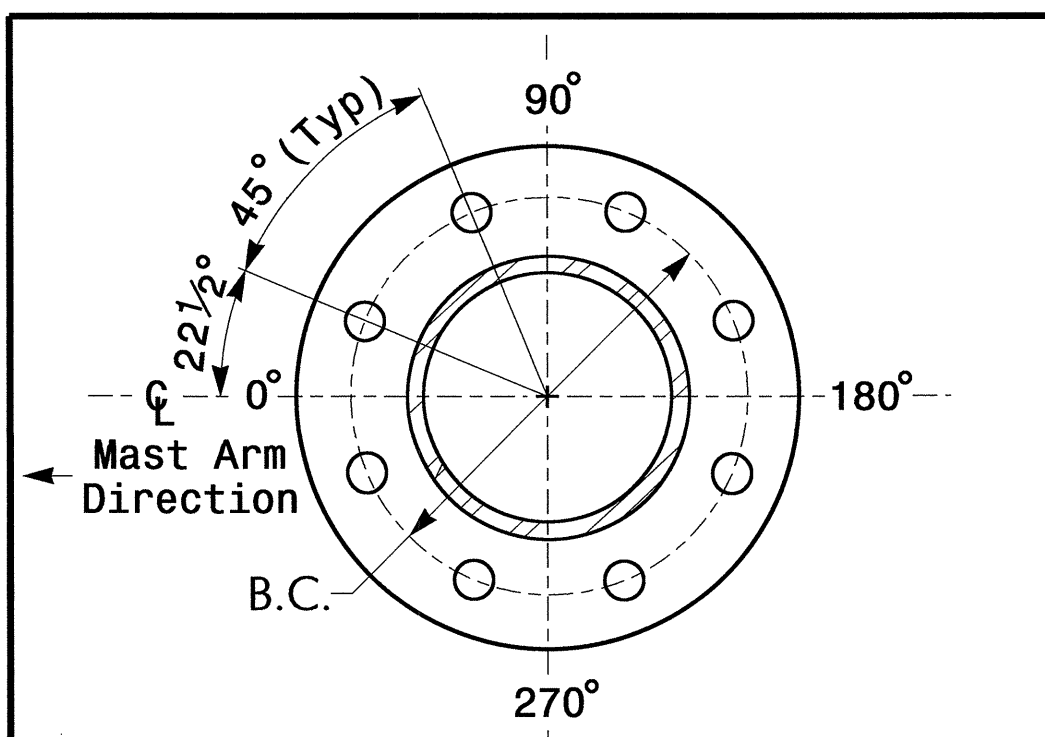
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

| Elevation Differences for: | Pole 1 | |
|--|-----------|-----|
| Baseline reference point at ϕ Foundation @ ground level | 0.0 ft. | --- |
| Elevation difference at High point of roadway surface | + 2.0 ft. | --- |
| Elevation difference at Edge of travelway or face of curb | N/A | --- |

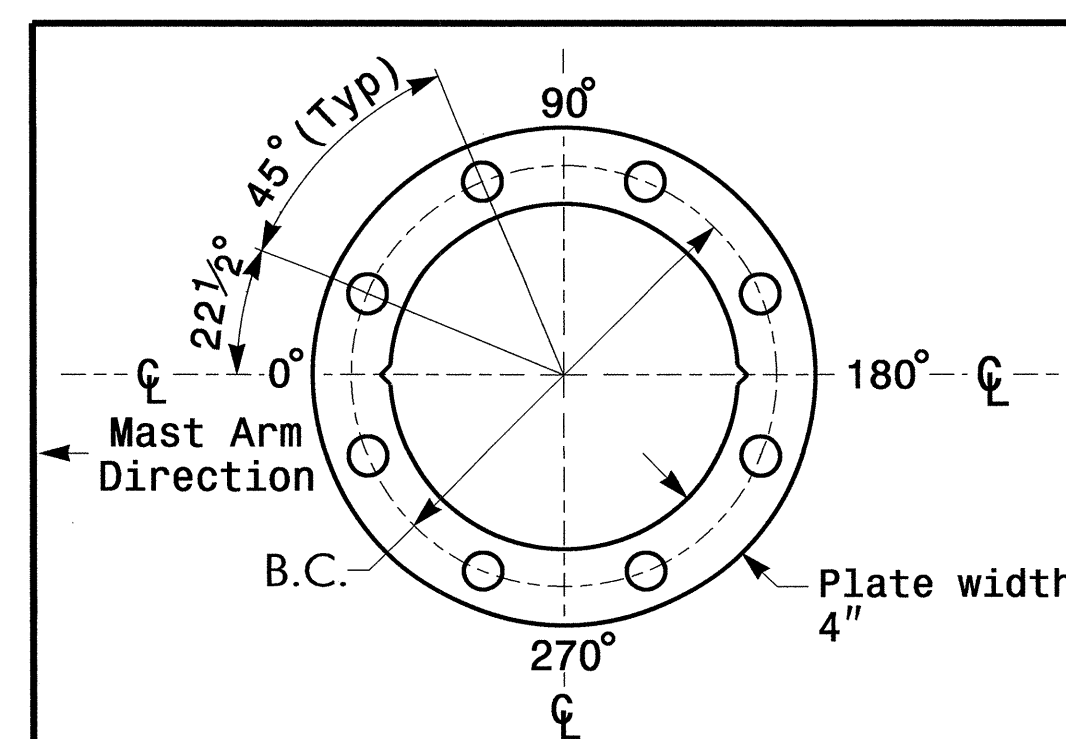


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

NCDOT Wind Zone 2 (130 mph)

| 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"-4 SECTION-WITH BACKPLATE AND ASTRO-BRAC | 11.5 S.F. | 25.5" W X 66.0" L | 74 LBS |
| | SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC | 9.3 S.F. | 25.5" W X 52.5" L | 60 LBS |
| | SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC | 5.0 S.F. | 24.0" W X 30.0" L | 11 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

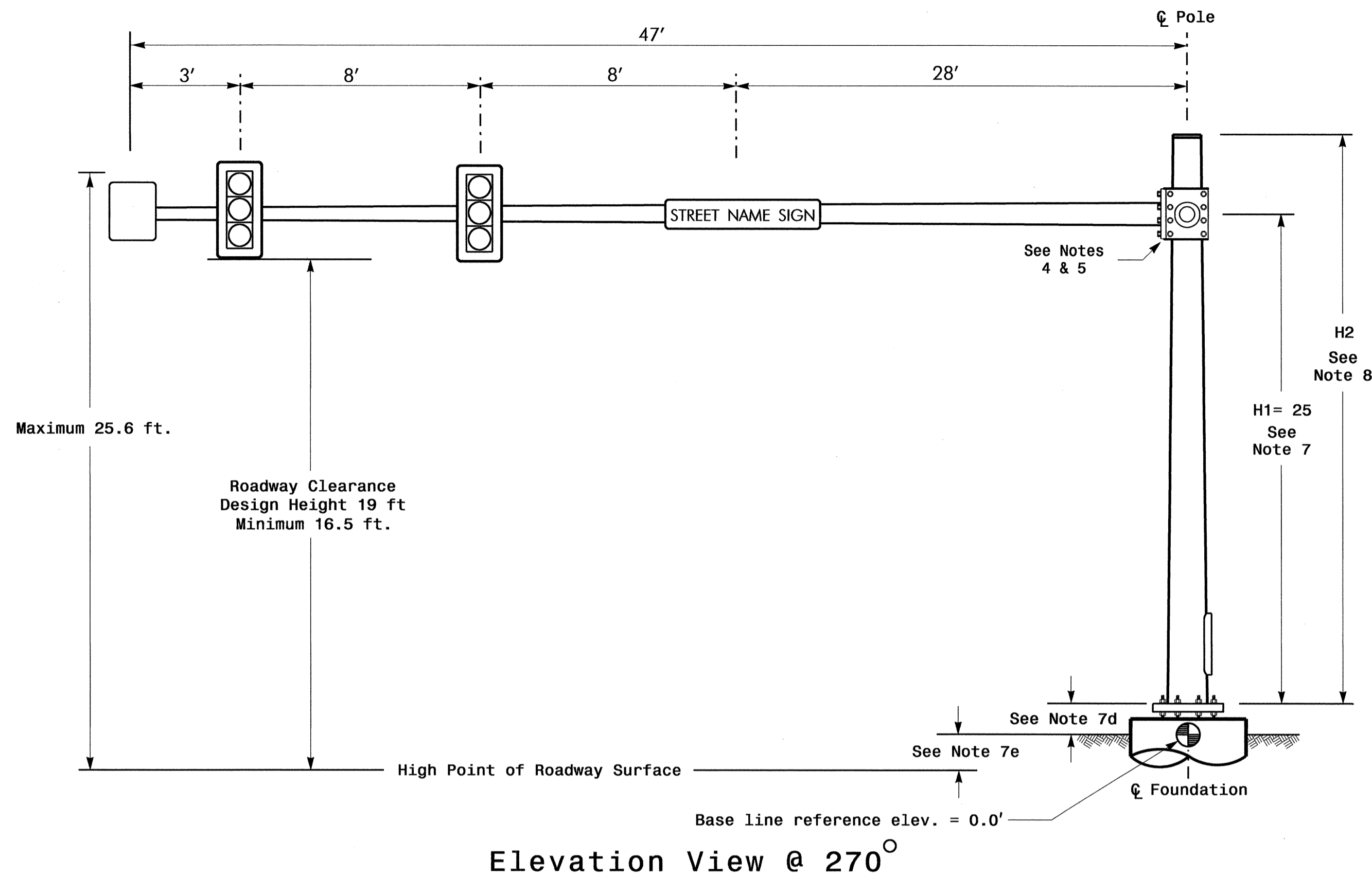
- Design the traffic signal structure and foundation in accordance with:
 - The 5th Edition 2009 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2012 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/ITS-Design-Resources.aspx>

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.
- Design all signal supports using stress ratios that do not exceed 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.
- 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 ITS and Signals Structural Engineer for assistance at (919) 661-4830.
- 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. Pole #1 is in a slope greater than 8:1.

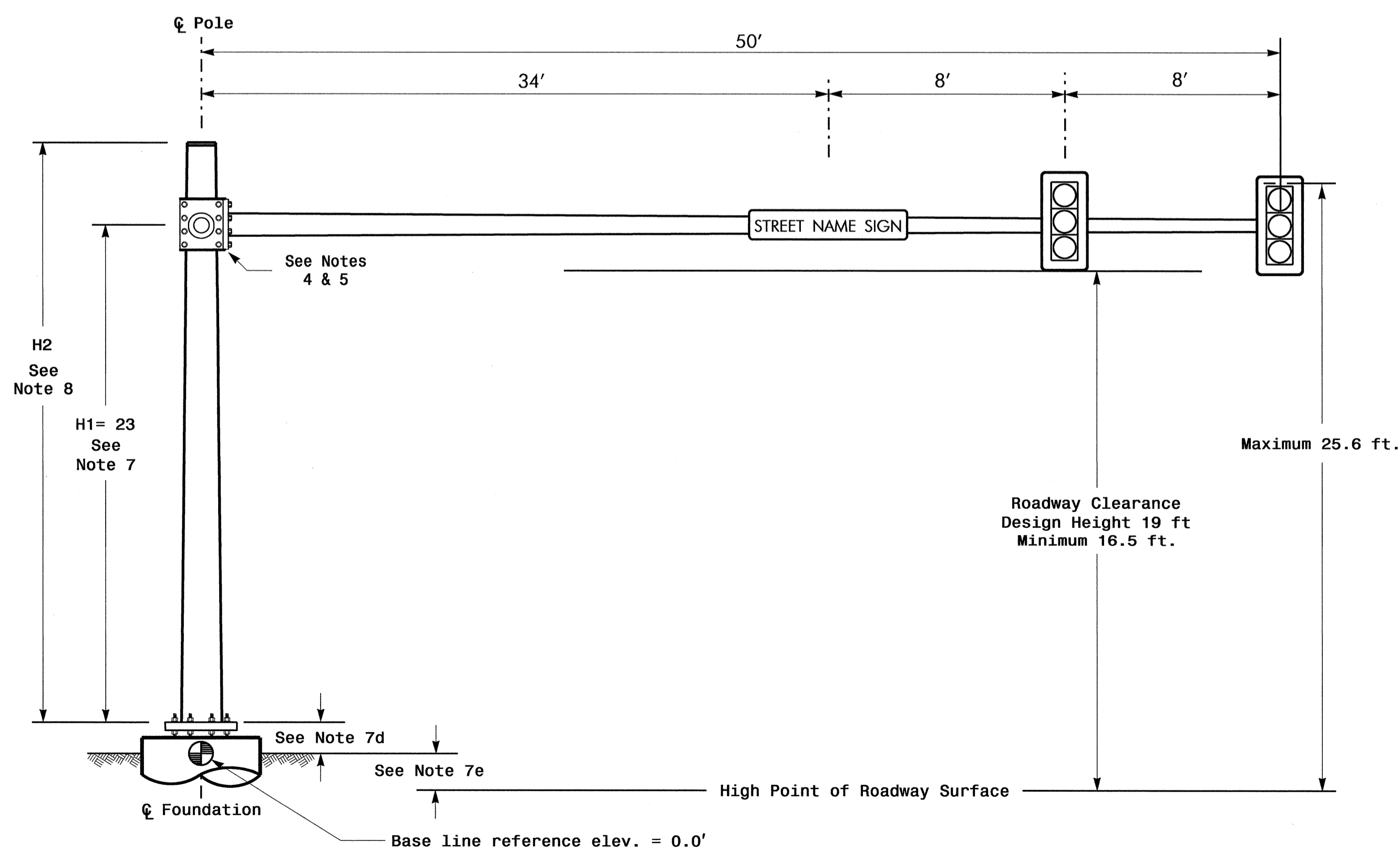
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|-----------------------|---|-------------------------|--|
| | US 17 NB Ramp at SR 1426 (Mt. Misery Road) | | SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 29904 J. GALLON 8/22/13 |
| | Division 3 Brunswick County MaImo PLAN DATE: August 2013 REVIEWED BY: JPG PREPARED BY: Jeff Spence REVIEWED BY: | REVISIONS INIT. DATE | |
| SCALE 0 N/A N/A | SIGNATURE DATE 8/22/13 | | SIG. INVENTORY NO. 03-1071 |

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



Elevation View @ 270°

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



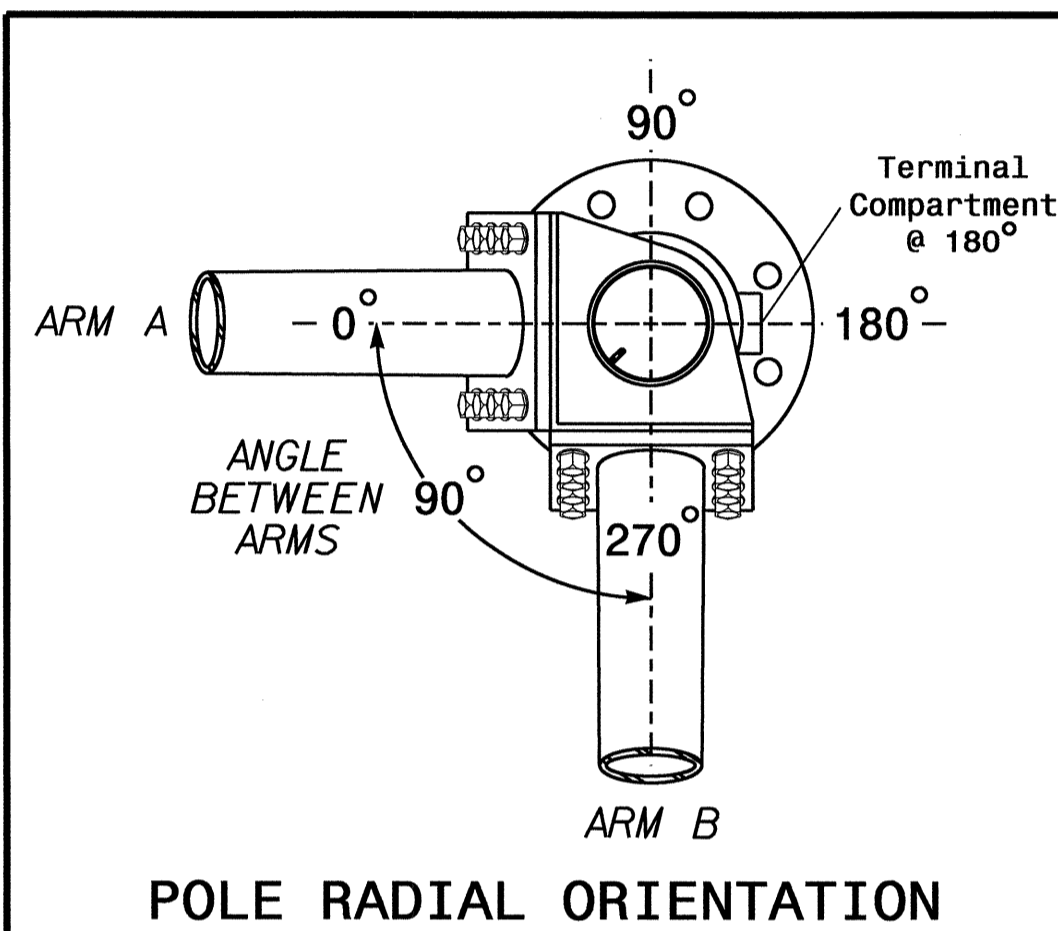
Elevation View @ 0°

SPECIAL NOTE

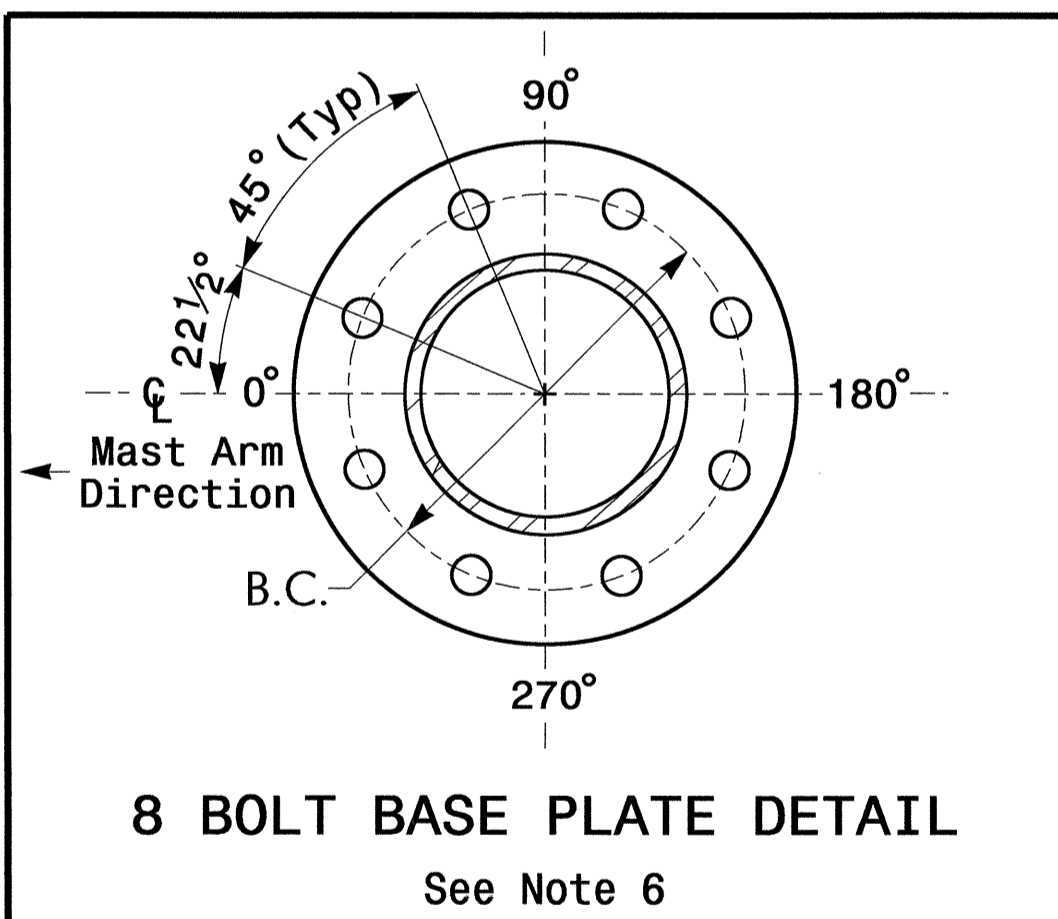
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

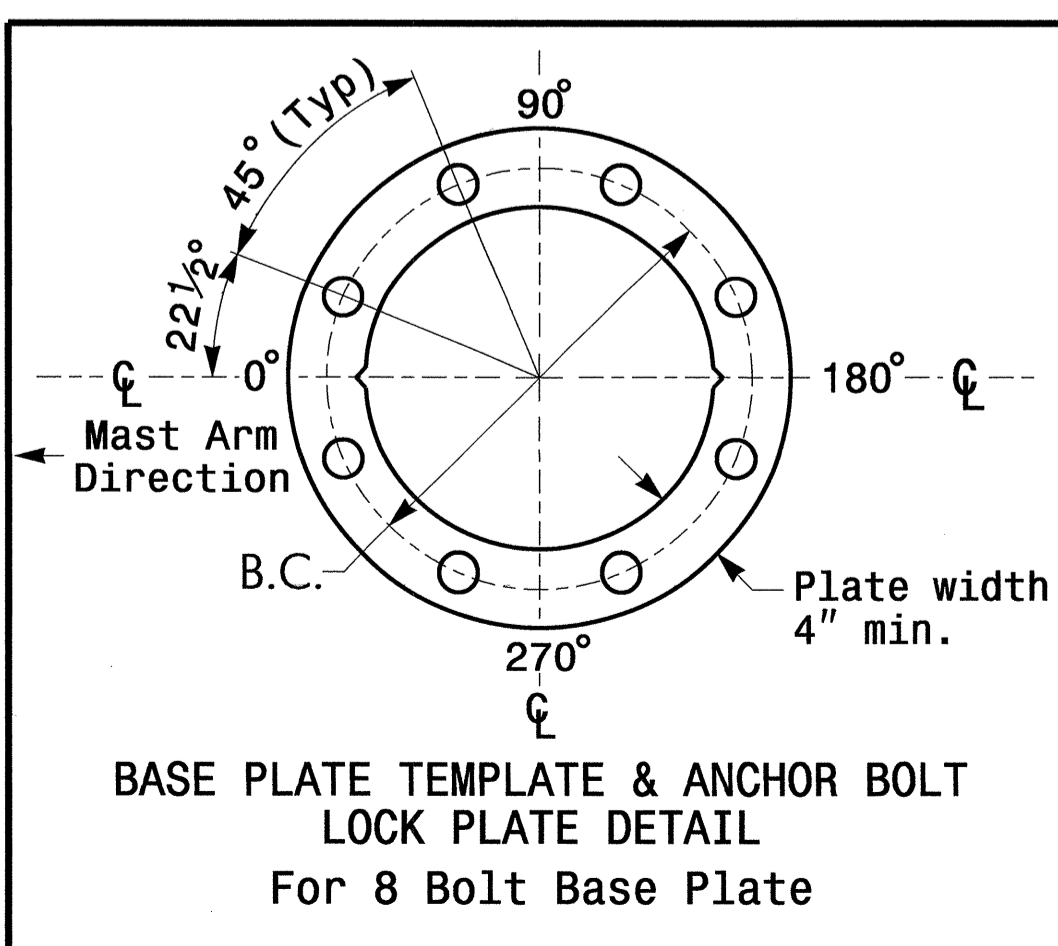
| Elevation Differences for: | Arm "A" | Arm "B" |
|---|-----------|-----------|
| Baseline reference point at Foundation @ ground level | 0.0 ft. | 0.0 ft. |
| Elevation difference at High point of roadway surface | + 4.0 ft. | + 1.6 ft. |
| Elevation difference at Edge of travelway or face of curb | 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

METAL POLE No. 2

PROJECT REFERENCE NO. R-26338A SHEET NO. Sig-16

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"-4 SECTION-WITH BACKPLATE AND ASTRO-BRAC | 11.5 S.F. | 25.5" W X 66.0" L | 74 LBS |
| | SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC | 9.3 S.F. | 25.5" W X 52.5" L | 60 LBS |
| | SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC | 5.0 S.F. | 24.0" W X 30.0" L | 11 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 5th Edition 2009 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2012 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2012 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/ITS-Design-Resources.aspx>

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.
- Design all signal supports using stress ratios that do not exceed 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 requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.
- 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 the 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 ITS and Signals Structural Engineer for assistance at (919) 661-4830.
- The contractor is responsible for verifying that the mast arm lengths 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. Pole #2 is in a slope greater than 8:1.

NCDOT Wind Zone 2 (130 mph)

| | | | |
|--|---|--|---|
| | Prepared In the Offices of: US 17 NB Ramp at SR 1426 (Mt. Misery Road) | | SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 29904 JASON P. GALLOWAY 8/22/13 |
| | Division 3 Brunswick County Walmo PLAN DATE: August 2013 REVIEWED BY: | PREPARED BY: Jeff Spence REVIEWED BY: | |
| 750 N. Greenfield Pkwy, Garner, NC 27529 | | SIGNATURE DATE SIG. INVENTORY NO. 03-1071 | |

22-AUG-2013 09:23 R:\trch\c65\p01\sig\045\045\045-1071-Double Mast Arm.dgn

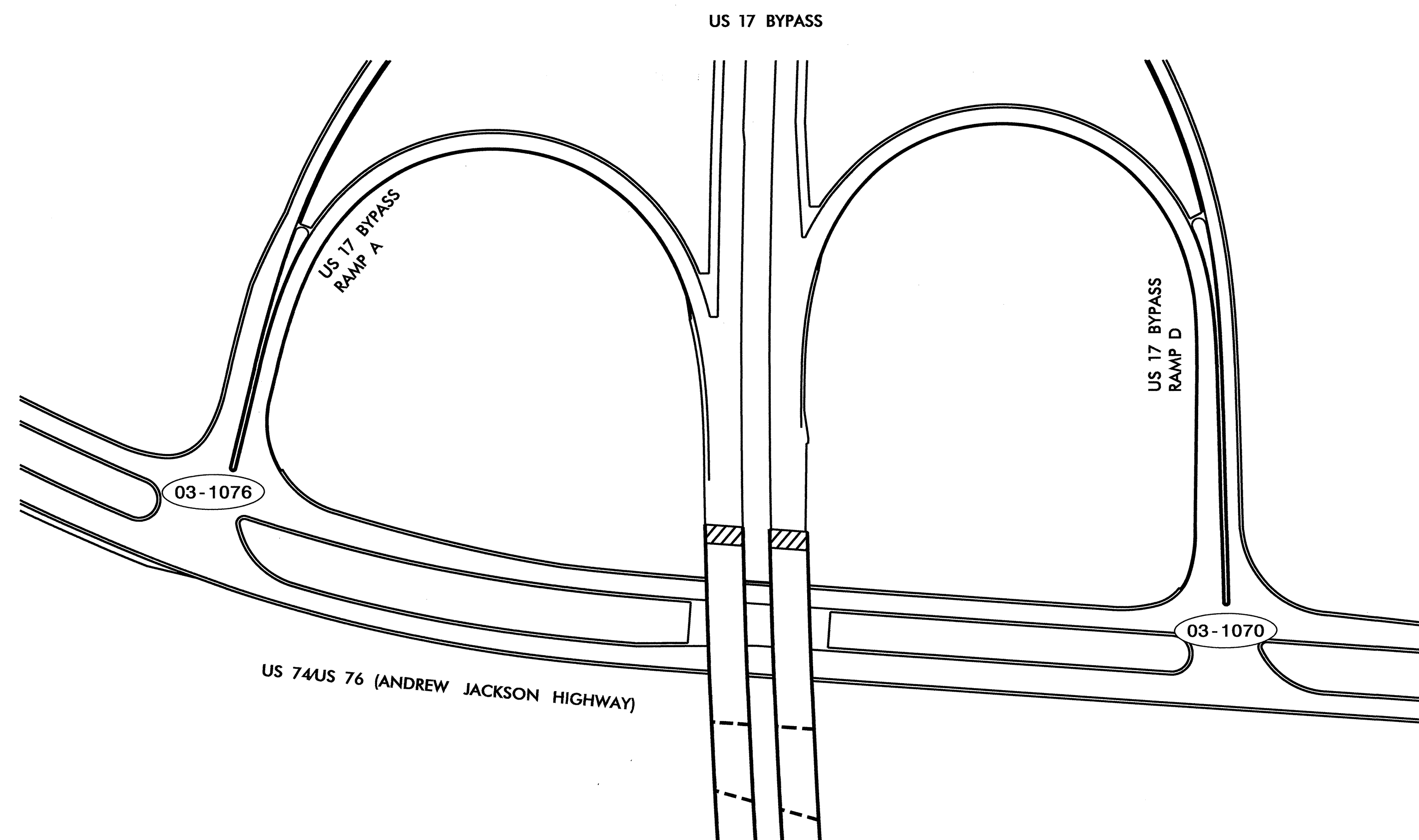
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

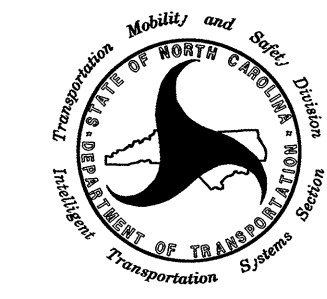
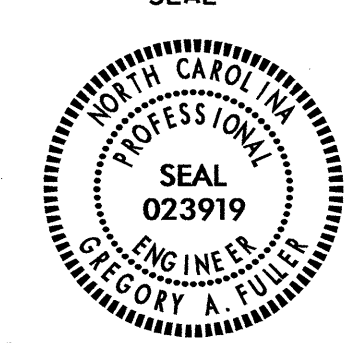
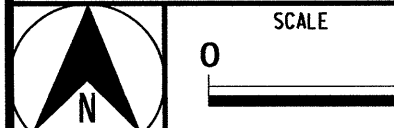


BRUNSWICK COUNTY

LOCATION: I-140/US 17 WILMINGTON BYPASS
AT US 74/US 76 EAST OF MALMO

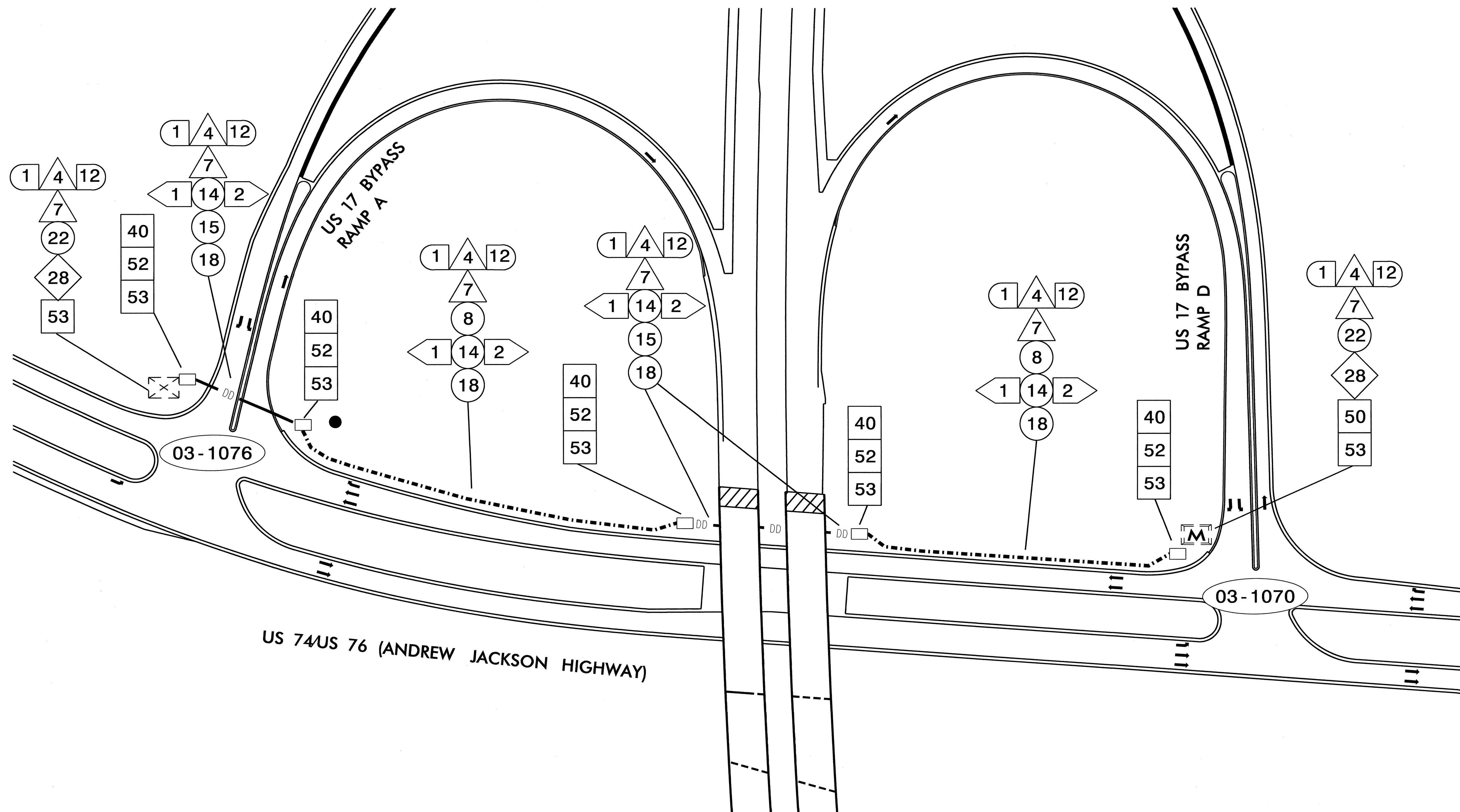
TYPE OF WORK: CLOSED LOOP SYSTEM FOR
NEW TRAFFIC SIGNALS

PROJECT: R-2633BA



| | | | |
|---|--|---------------------|---|
|  Prepared in the Offices of: Mobility and Safety Division 750 N. Greenfield Pkwy., Garner, NC 27529 | COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS | | SEAL  GREGORY A. FULLER ENGINEER CATEGORY A FULLER |
| | DIVISION 03 BRUNSWICK CO. LELAND | | |
| PLAN DATE: AUGUST 2013 PREPARED BY: B.A. STOCHKO | REVIEWED BY: I.N. AVERY REVIEWED BY: G.A. FULLER | | |
| SCALE  | REVISIONS | INIT. DATE _____ | |
|  | SIGNATURE  | DATE 8/19/13 | |
| CADD FILE NAME | | | |

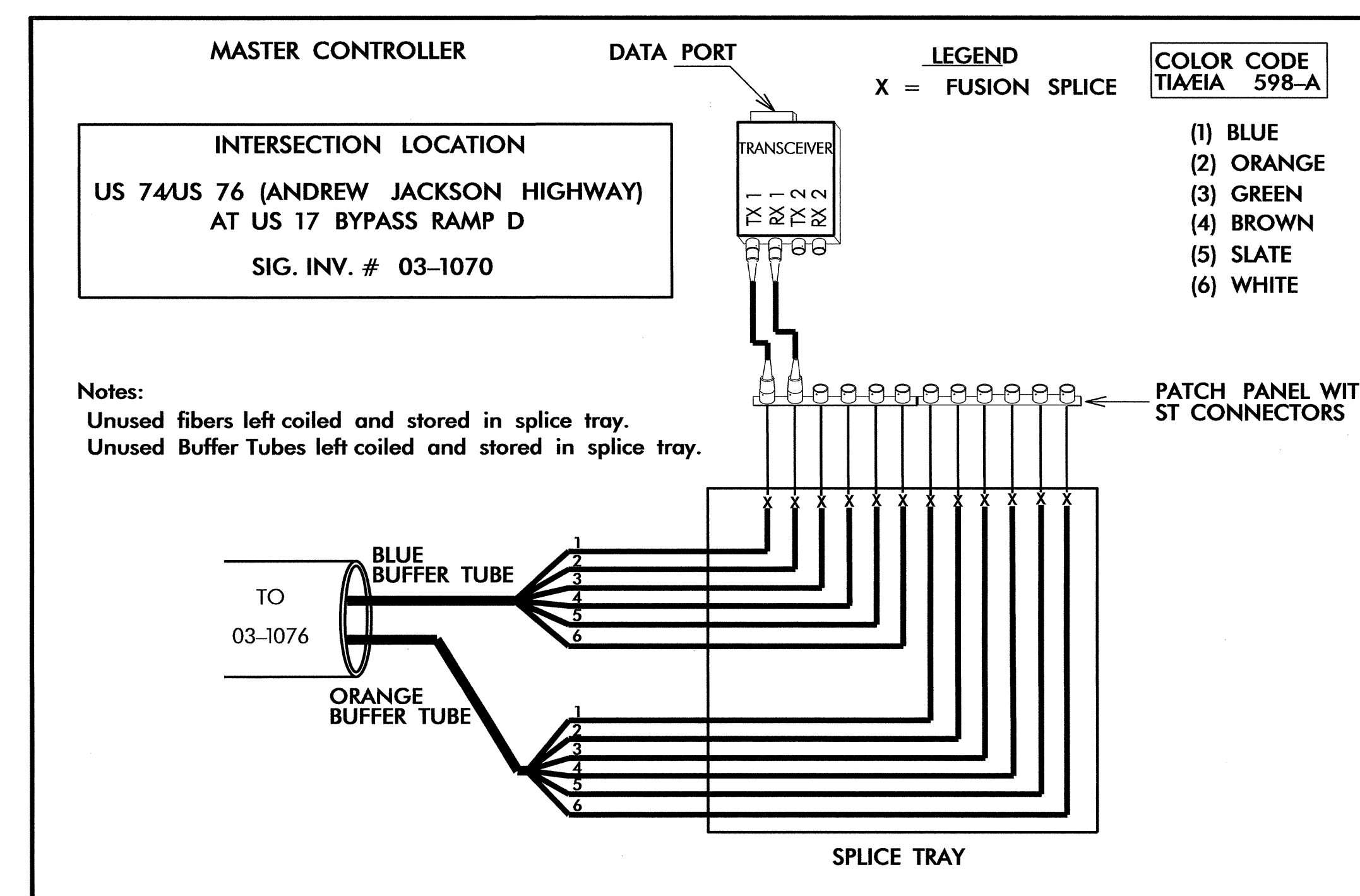
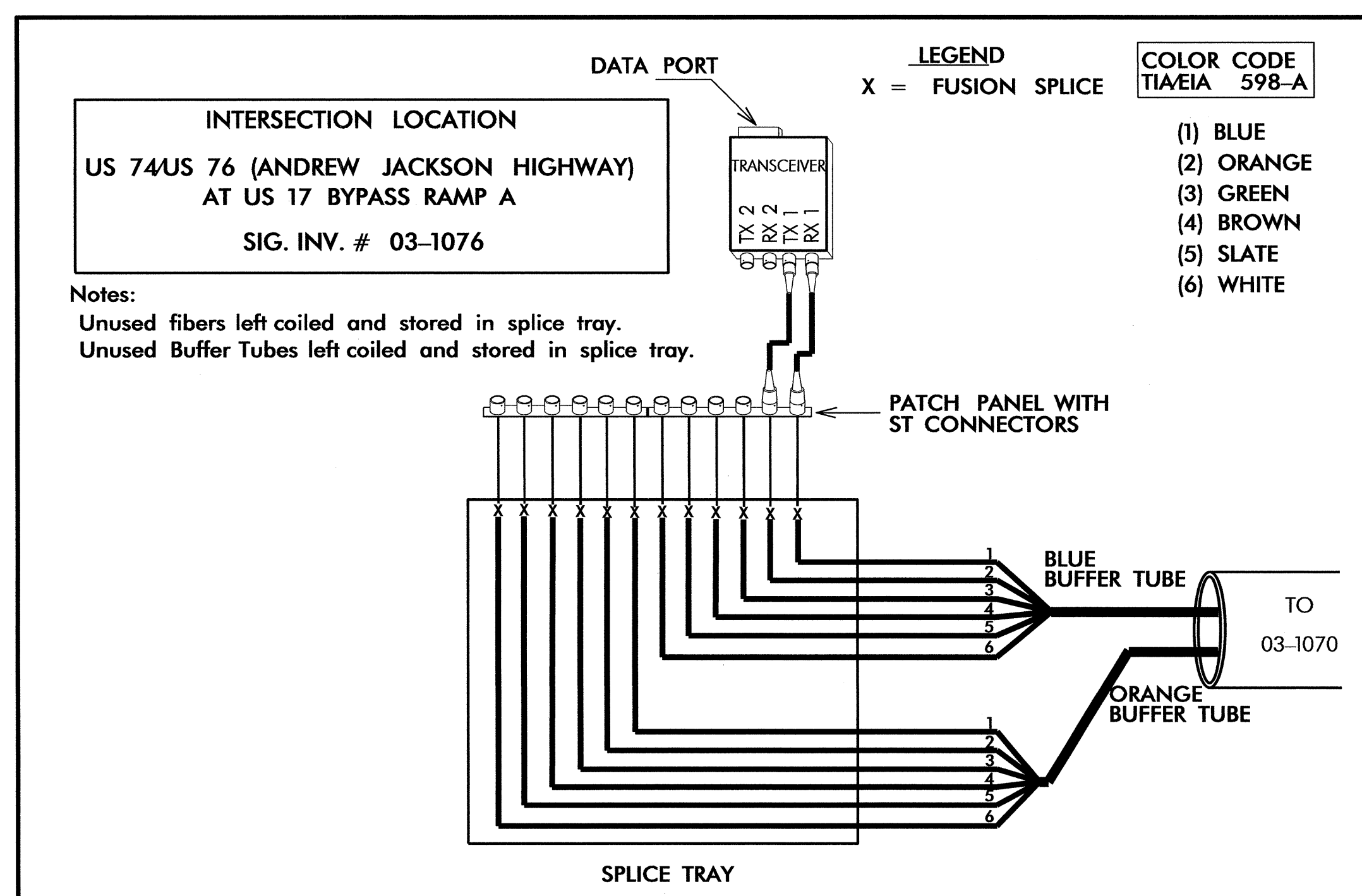
US 17 BYPASS



GENERAL NOTE:
 SEAL ALL CONDUITS CONTAINING
 FIBER-OPTIC COMMUNICATIONS CABLE WITH
 DUCT AND CONDUIT SEALER.

| | COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS | | | | | | | | | | |
|--|---|------|--|-----------|-------|------|--|--|--|--|--|
| | DIVISION 03 BRUNSWICK CO. LELAND | | | | | | | | | | |
| PLAN DATE: AUGUST 2013 PREPARED BY: B.A. STOCHKO | REVIEWED BY: I.N. AVERY REVIEWED BY: G.A. FULLER | | SIGNATURE: <i>Gregory A. Fuller</i> DATE: 8/19/13 | | | | | | | | |
| <table border="1"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> | | | | REVISIONS | INIT. | DATE | | | | | |
| REVISIONS | INIT. | DATE | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

FIBER OPTIC CABLE



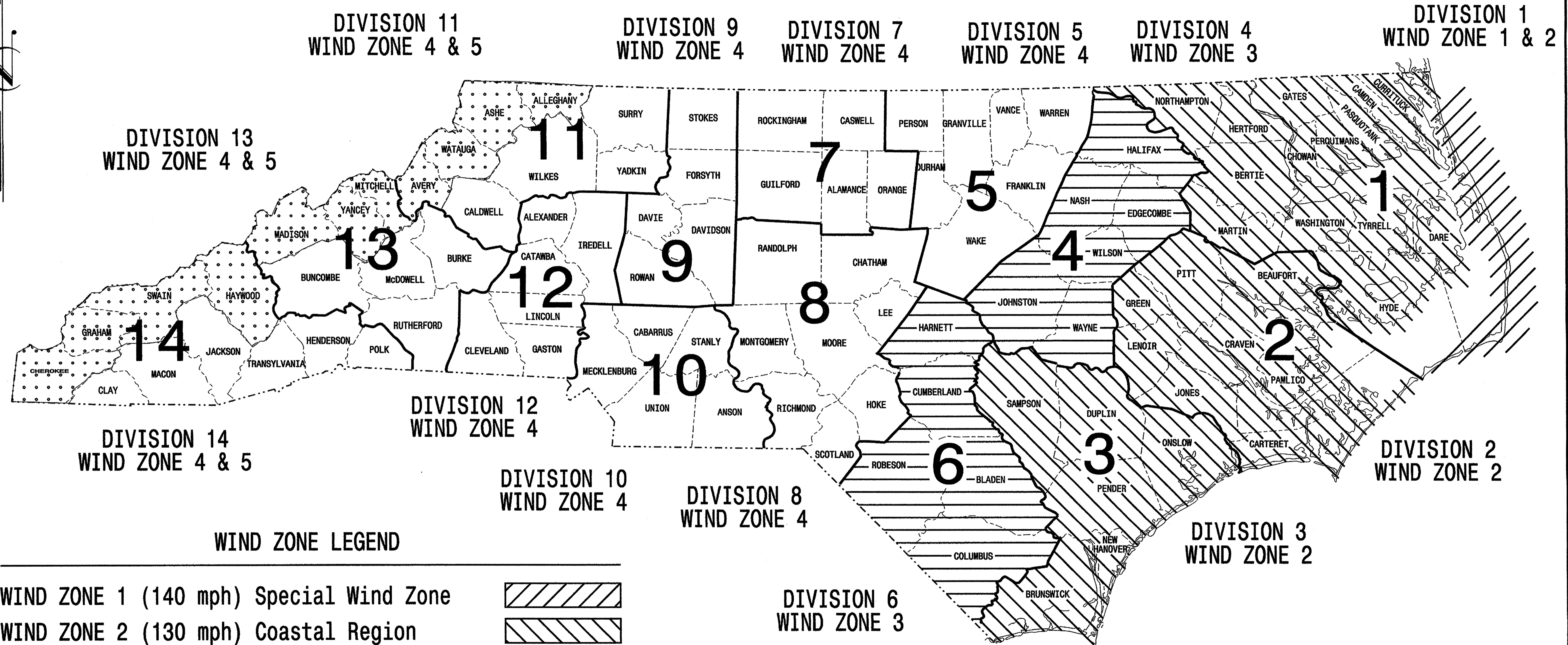
TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING \ ENSURING PROPER TERMINATIONS

| | | | |
|--|--|--------|---------------|
| | COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS | | |
| | DIVISION 03 BRUNSWICK CO. LELAND PLAN DATE: AUGUST 2013 REVIEWED BY: I.N. AVERY PREPARED BY: B.A. STOCHKO REVIEWED BY: G.A. FULLER | | |
| 122 N. McDowell St., Raleigh, NC 27603 SCALE: 0 | REVISIONS: | INIT.: | DATE: |
| Signature: <i>Gregory A. Fuller</i> | | | DATE: 8/19/13 |

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

| | | |
|-----------------|-------------|-----------|
| STATE | PROJECT NO. | SHEET NO. |
| N.C. | R-2633BA | Sig-20 |
| 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/ITSS/ws/mpoles/poles.html>

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

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 |

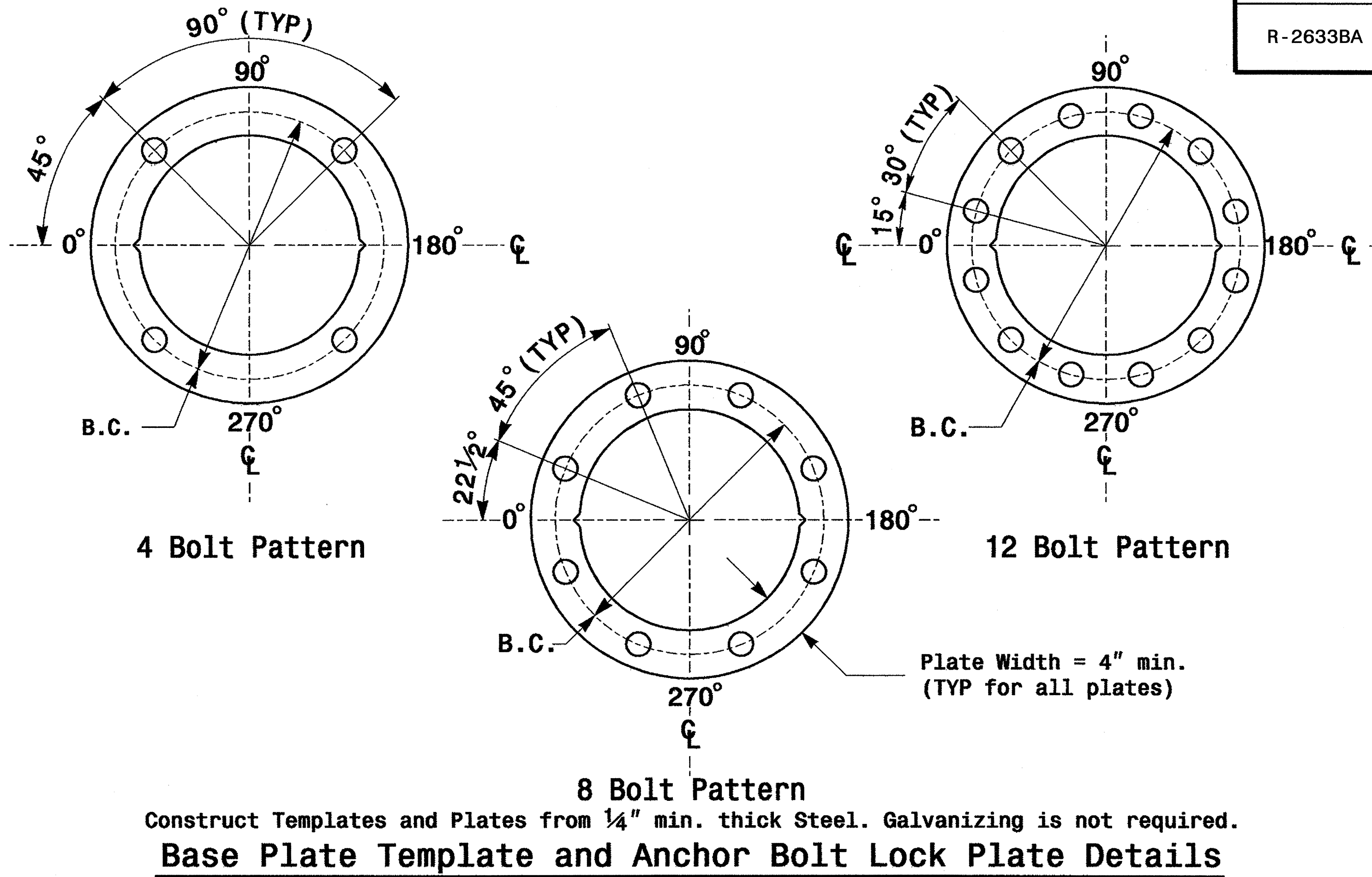
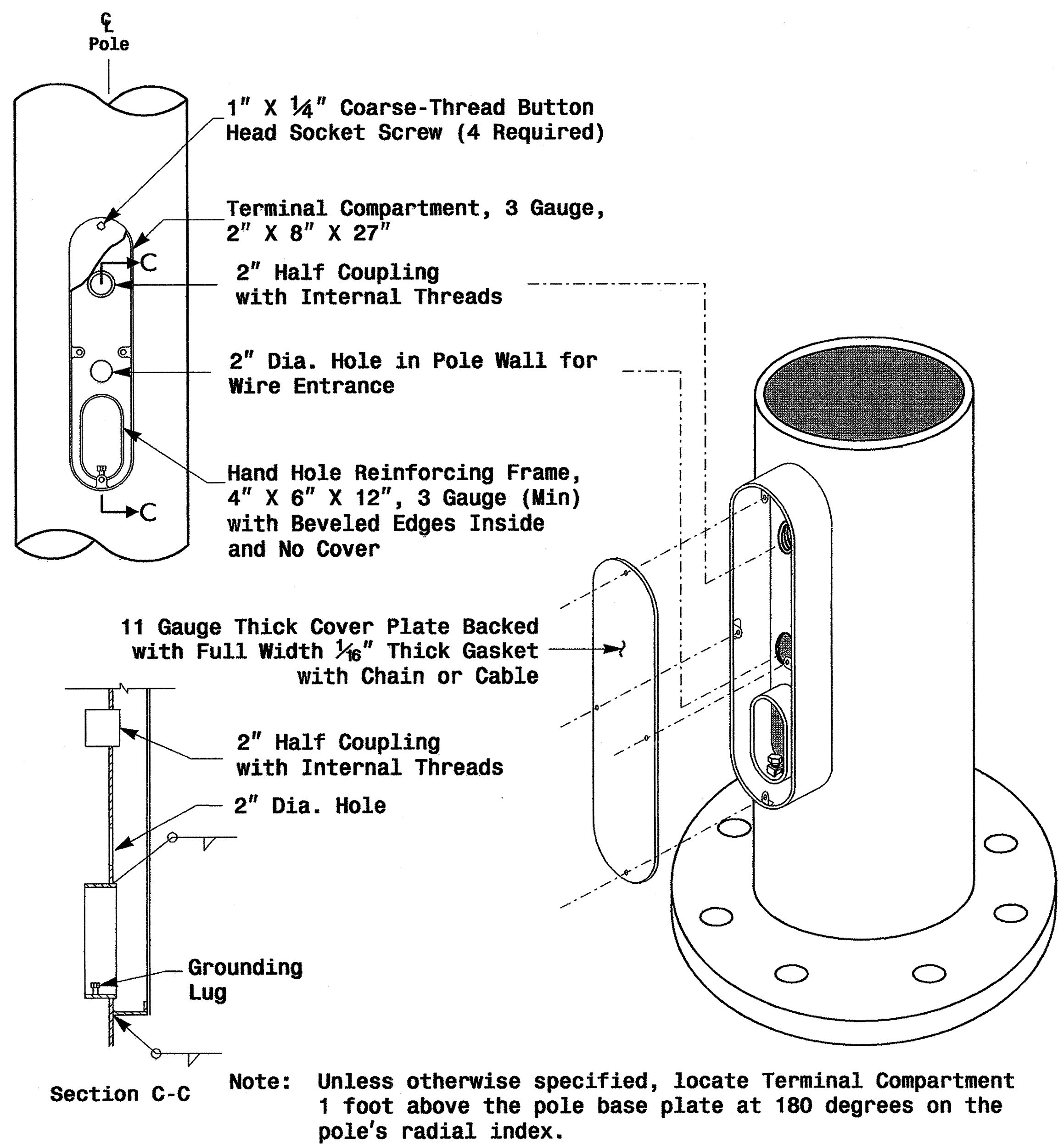
NCDOT CONTACTS:

MOBILITY AND SAFETY DIVISION - ITS and SIGNALS UNIT

G. A. Fuller, P.E. - State ITS and Signals Engineer
 G. G. Murr, Jr., P.E. - State Signals Engineer
 D. C. Sarkar, P.E. - ITS and Signals Senior Structural Engineer
 C. F. Andrews, Jr. - ITS and Signals Structural Project Engineer
 M. Aslam - ITS and Signals Structural Project Engineer
 N. Bitting, P.E. - ITS and Signals Structural Project Engineer

SEAL

7-21-2009
 SIGNATURE DATE



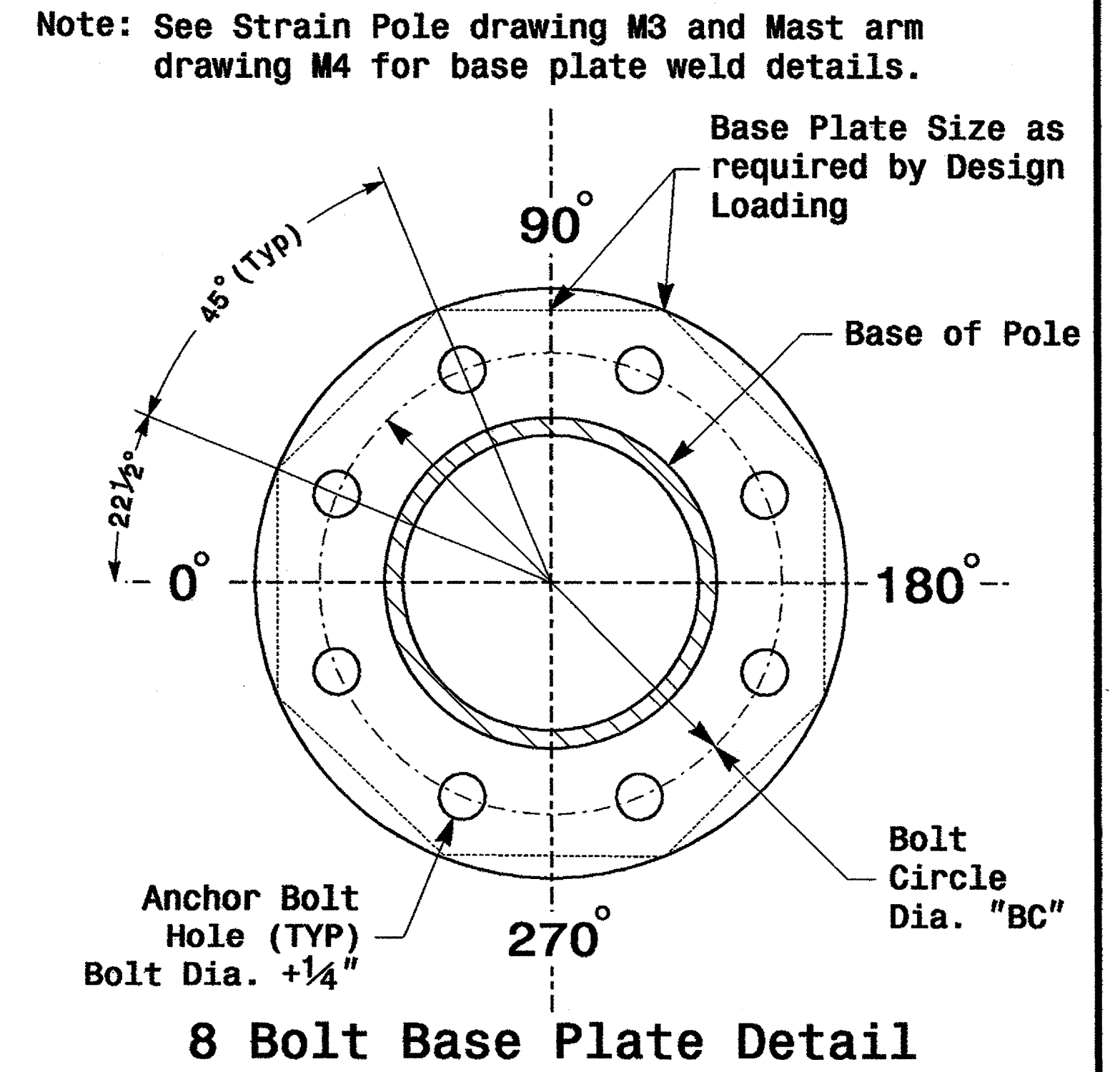
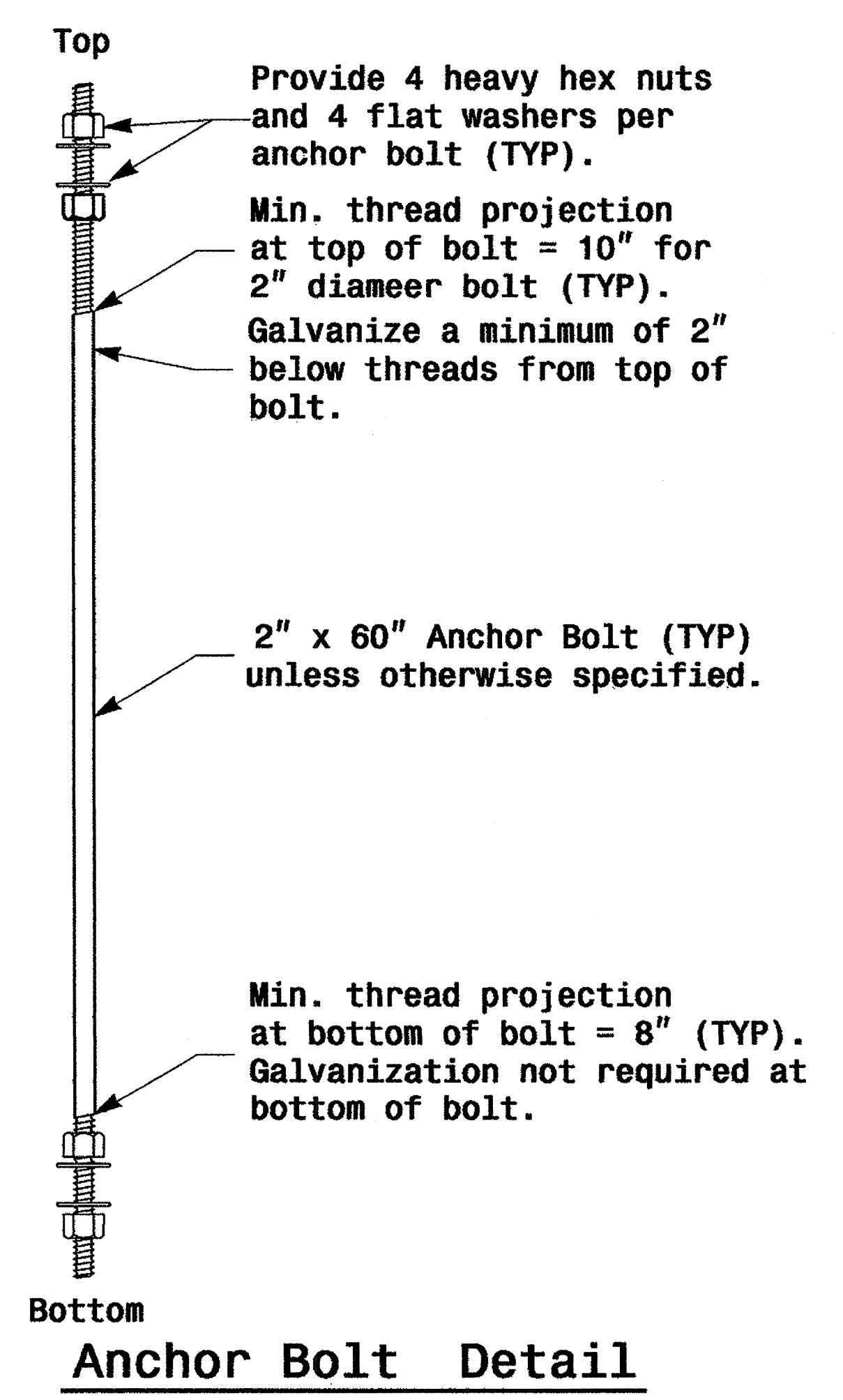
| | |
|----------------------------|----------------------------|
| MFG _____ MFG. DATE: MM/YY | MFG _____ MFG. DATE: MM/YY |
| SHAFT D/T/L/Y _____ | SECTION D/T/L/Y _____ |
| ARM-A D/T/L/Y _____ | NCDOT STANDARD _____ |
| ARM-B D/T/L/Y _____ | |
| A.B. DIA./B.C./L/Y _____ | |
| NCDOT STANDARD _____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

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

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.

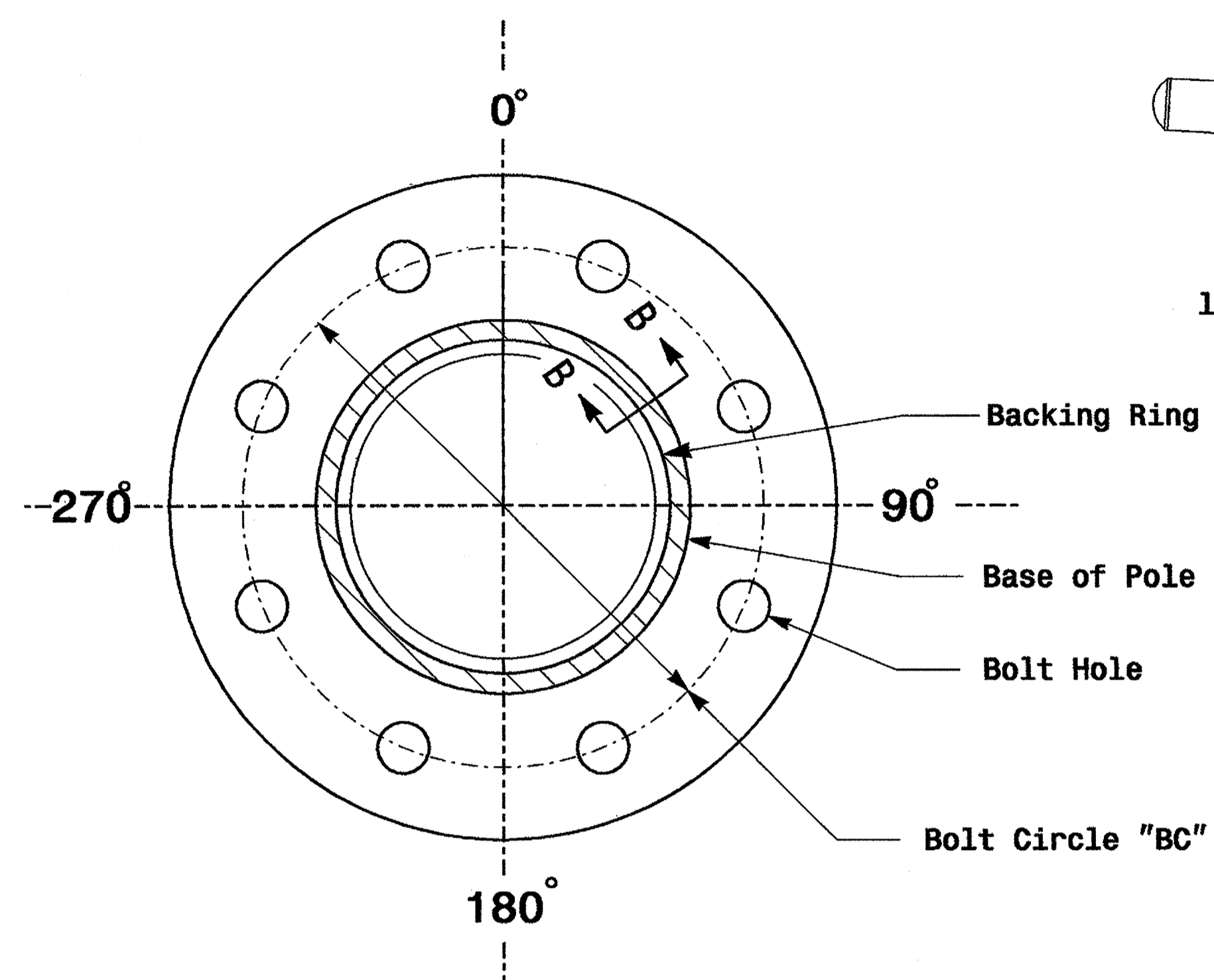
Identification Tag Details



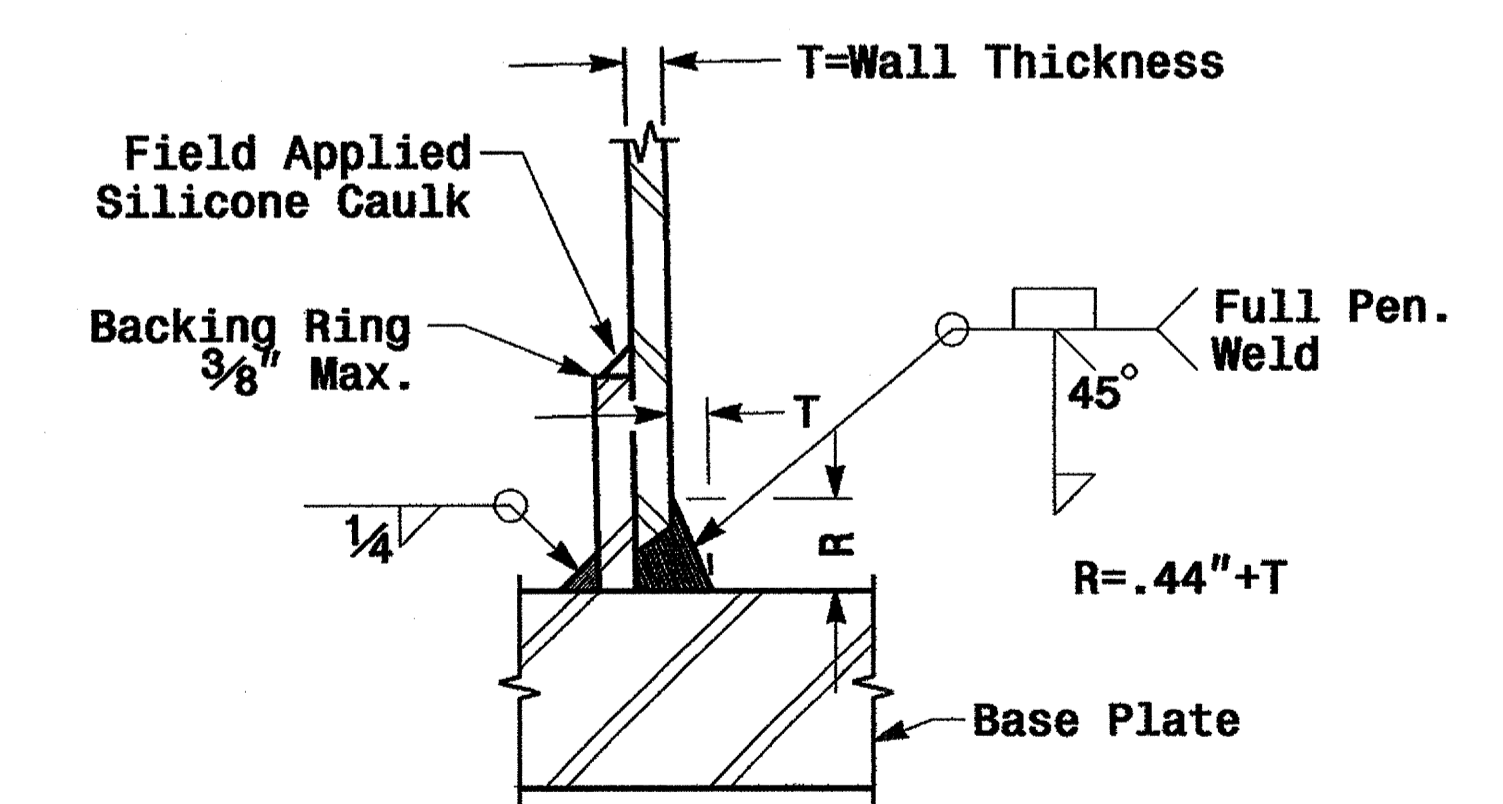
| | | | |
|--|--|---|-------------------------|
| | Typical Fabrication Details Common To All Metal Poles | | SEAL |
| | PLAN DATE: May 2005 PREPARED BY: P.L. Alexander SCALE: 0 NA NONE | REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito | REVISIONS INIT. DATE |

Fabrication Details - All Poles

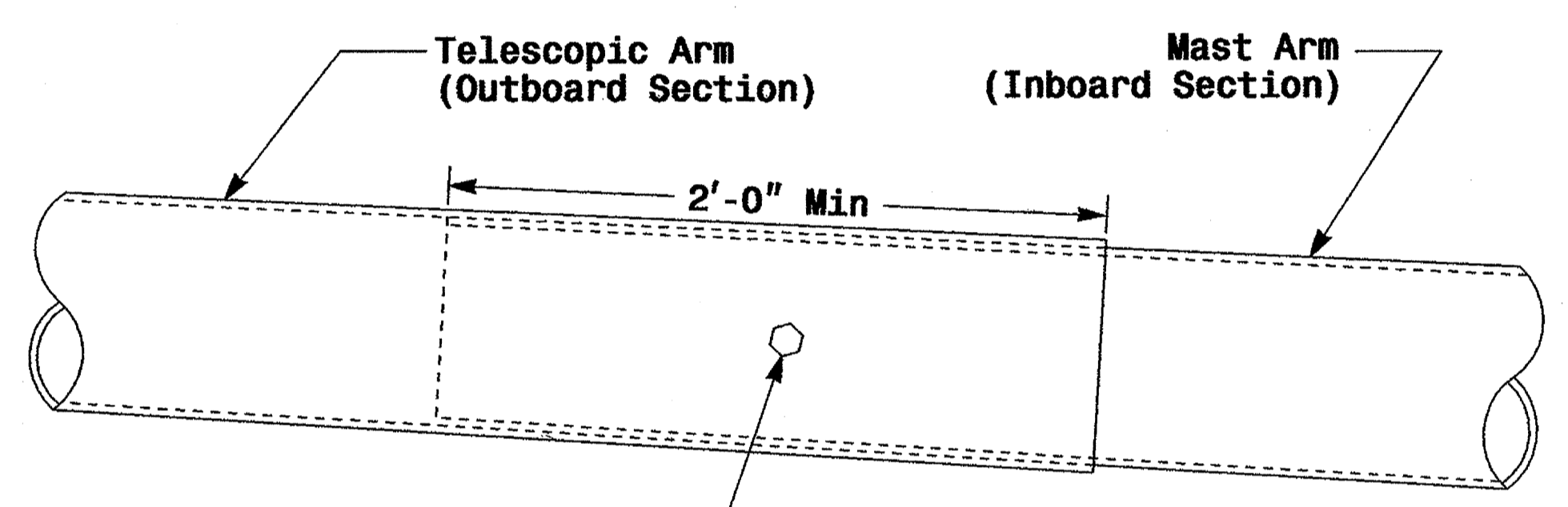
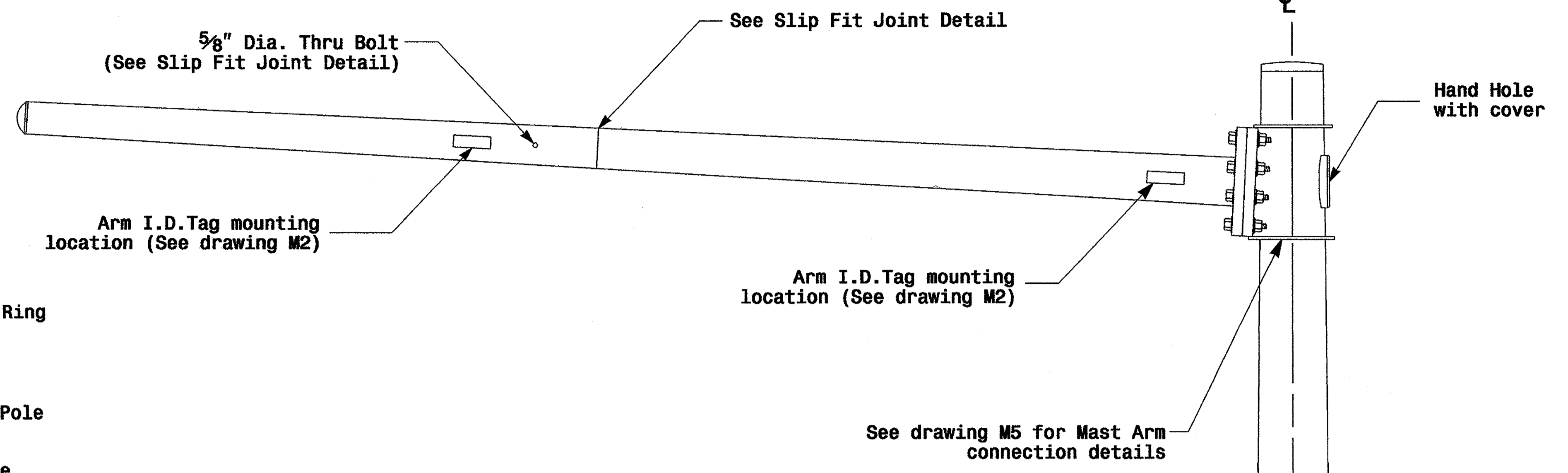
01-SEP-2005 16:22 01-SEP-2005 16:22 Pole Standard 004 rev thru m5-dgn



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

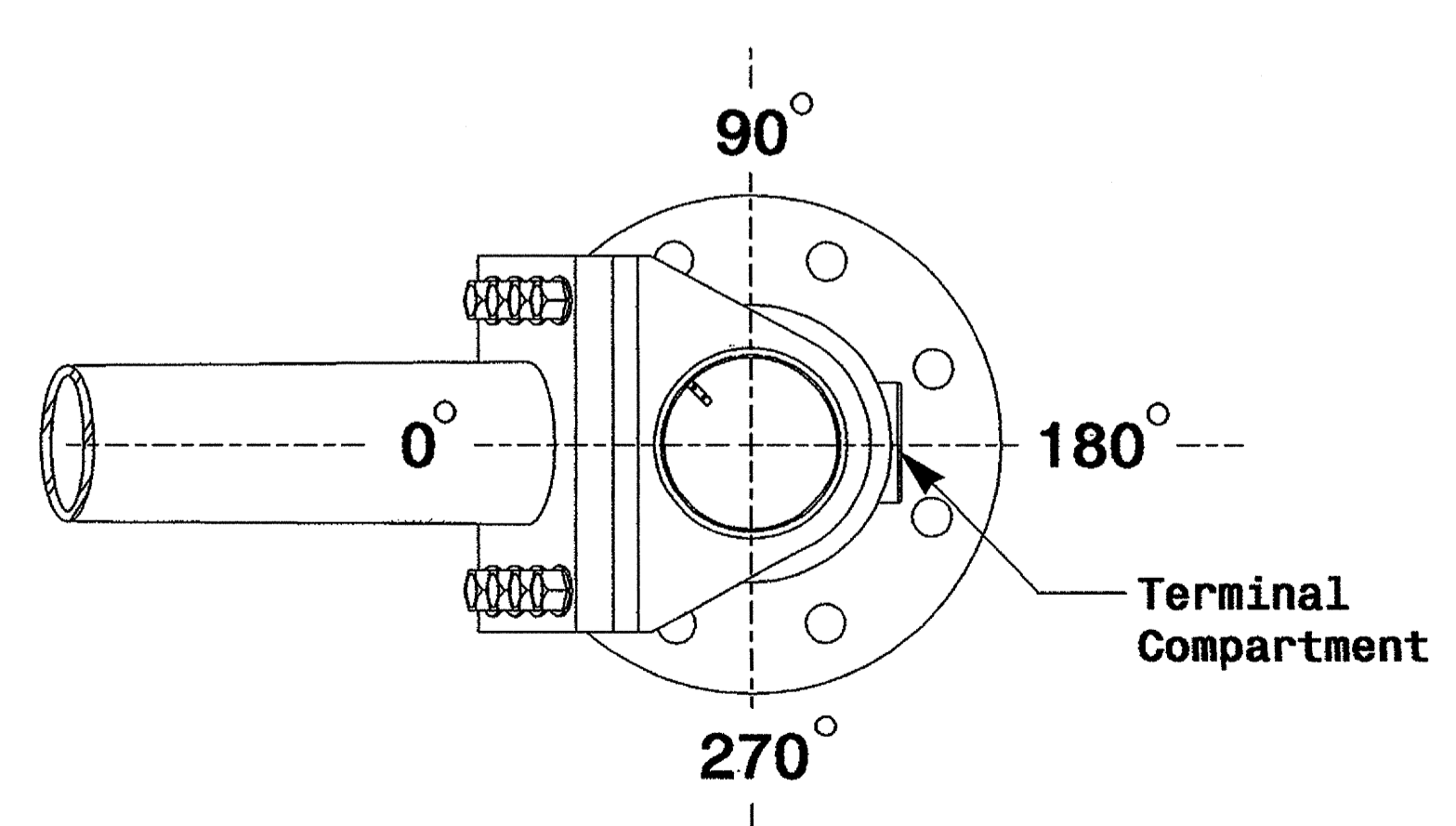


Section B-B
(Pole Attachment to Base Plate)
Full-Penetration Groove Weld Detail

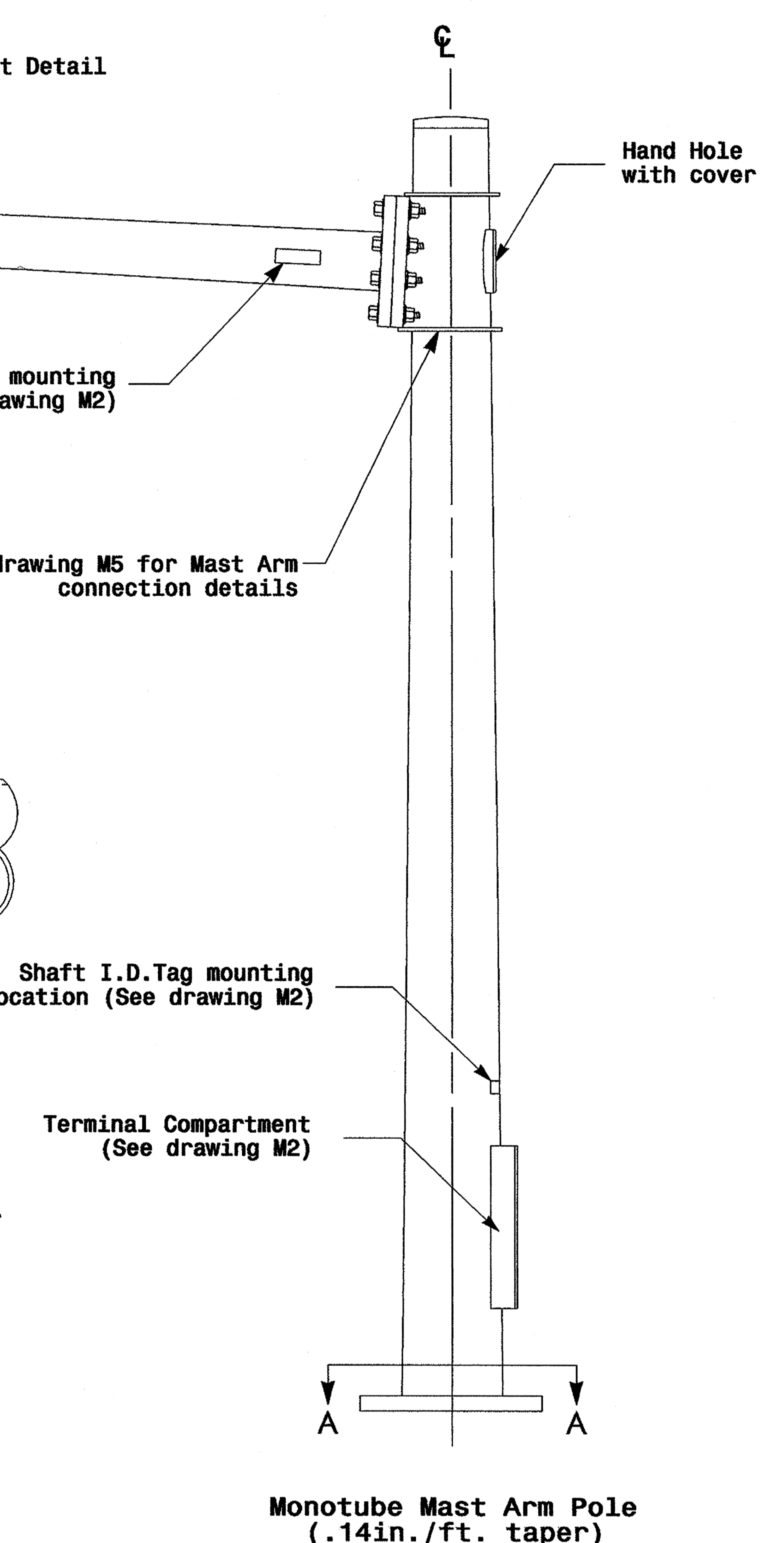


3/4" Factory Drilled Hole in Outboard Tube.
Field Drill Inboard Tube.
5/8" Galvanized Thru Stud with (2) Hex. Locknuts Ea.

Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation

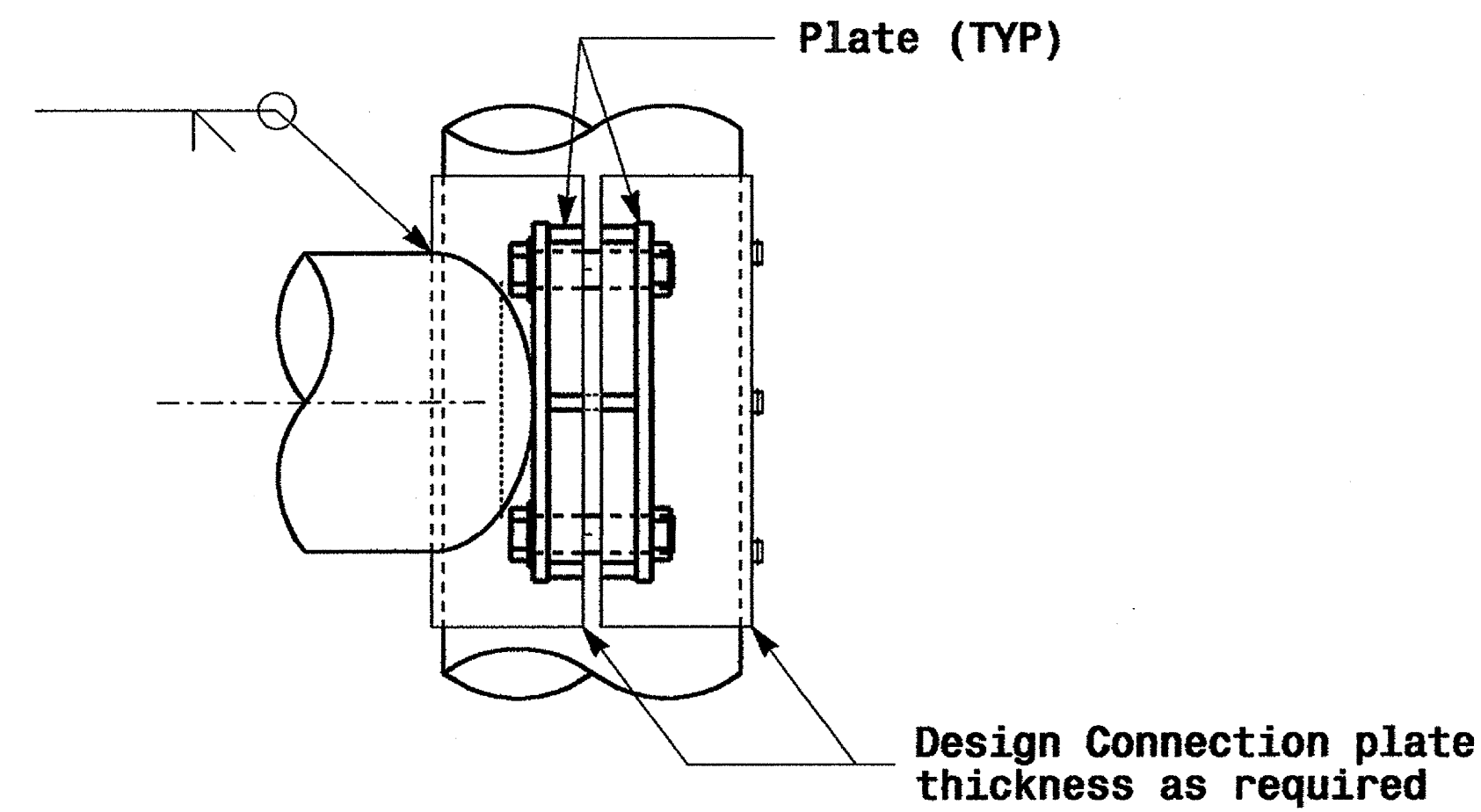


| | | | |
|--|--|---|--|
| | Typical Fabrication Details for Mast Arm Poles | | |
| | PLAN DATE: May 2005 PREPARED BY: P.L. Alexander SCALE: 0 NA NONE | REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito | |

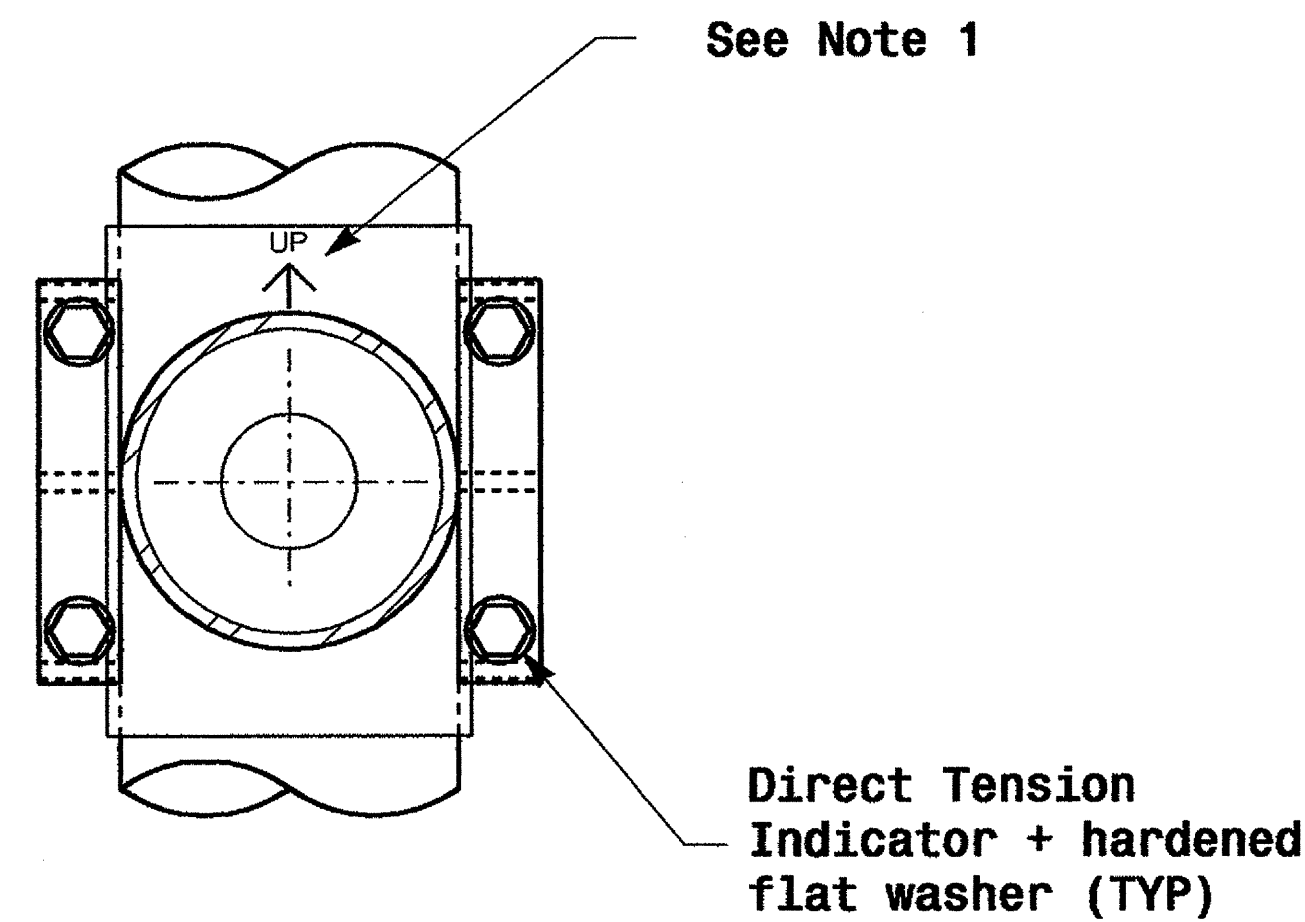
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 vs:nccep01 (see-ent) h:\work\groups\2004 metal pole standard\2004 mt.dgn
 pol alexander

Fabrication Details - Mast Arm Poles

Adjustable Clamp Type Bolted Mast Arm Connection

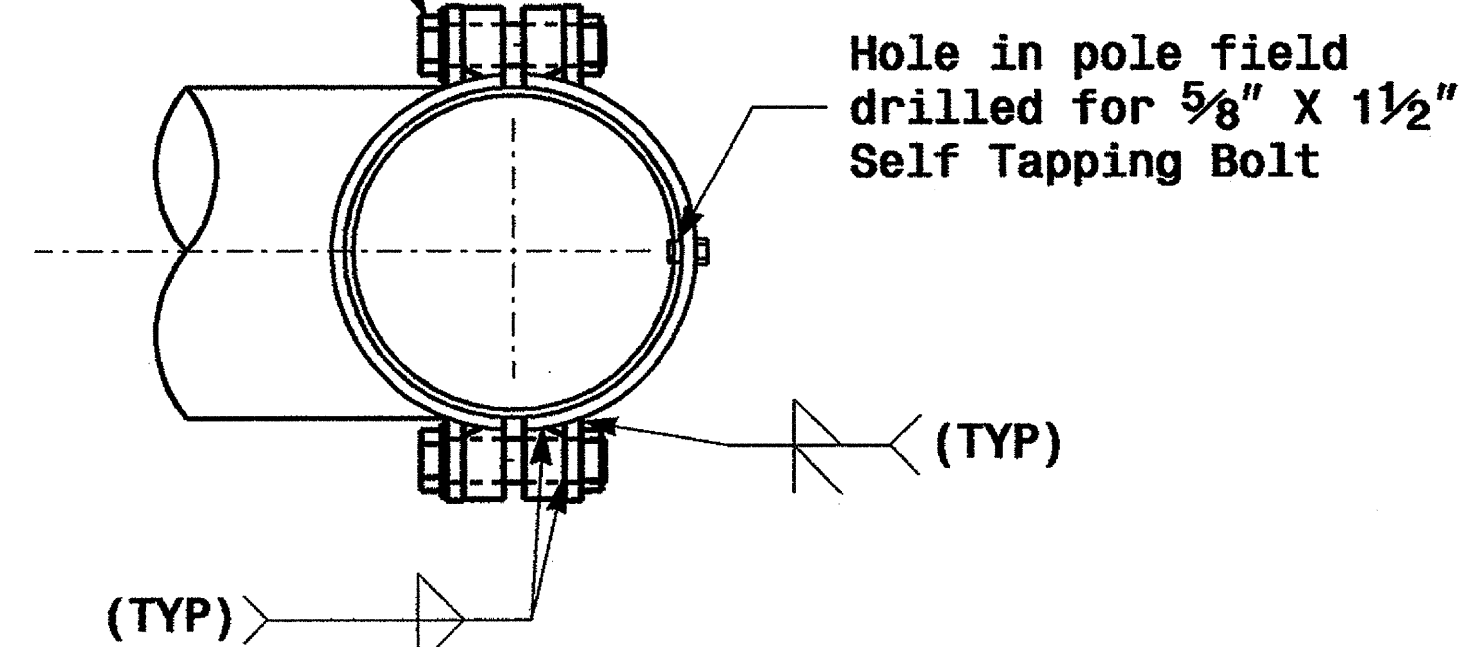


Side Elevation View



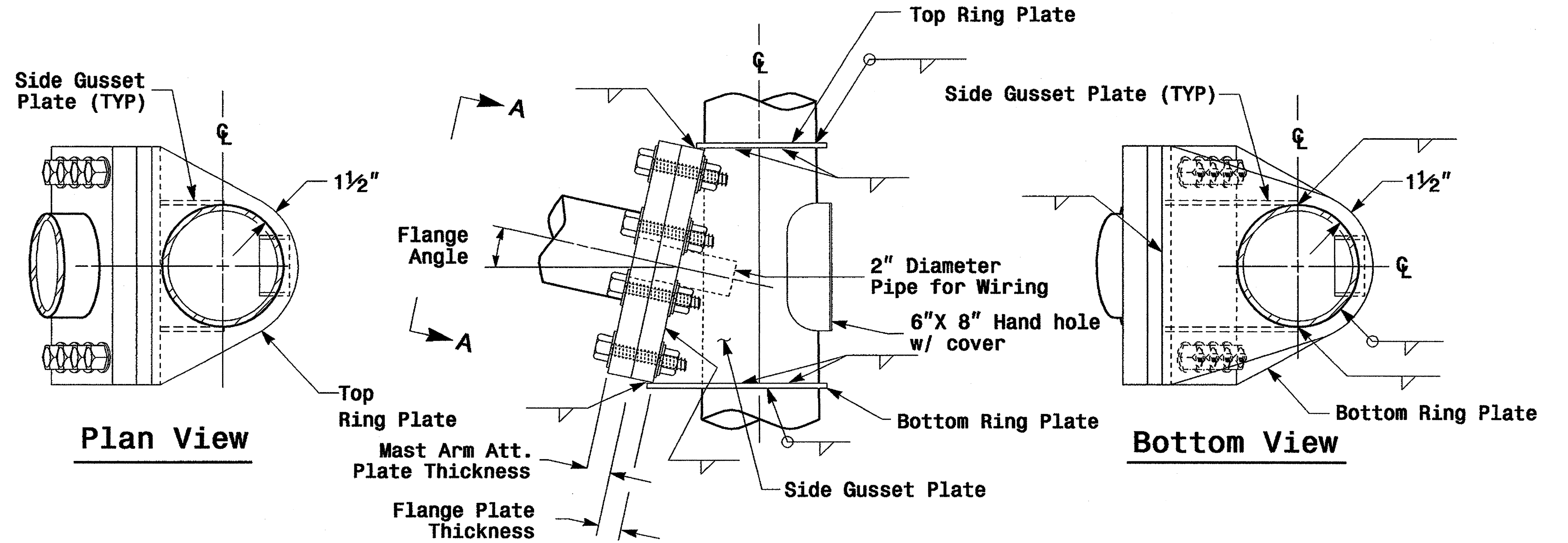
Front Elevation View

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

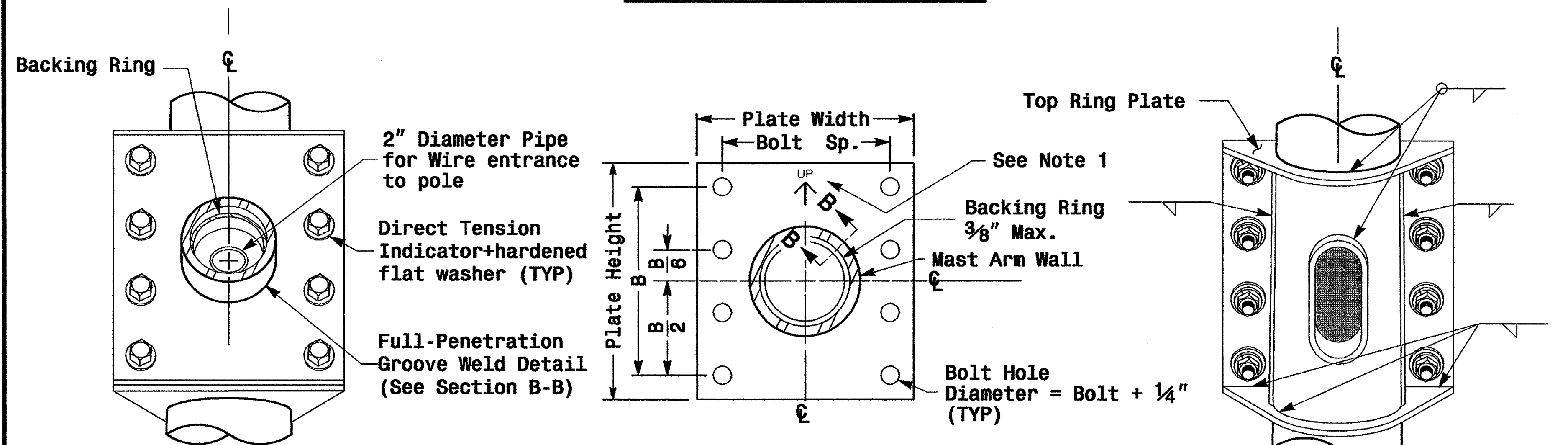


Plan View

Welded Ring Stiffened Mast Arm Connection



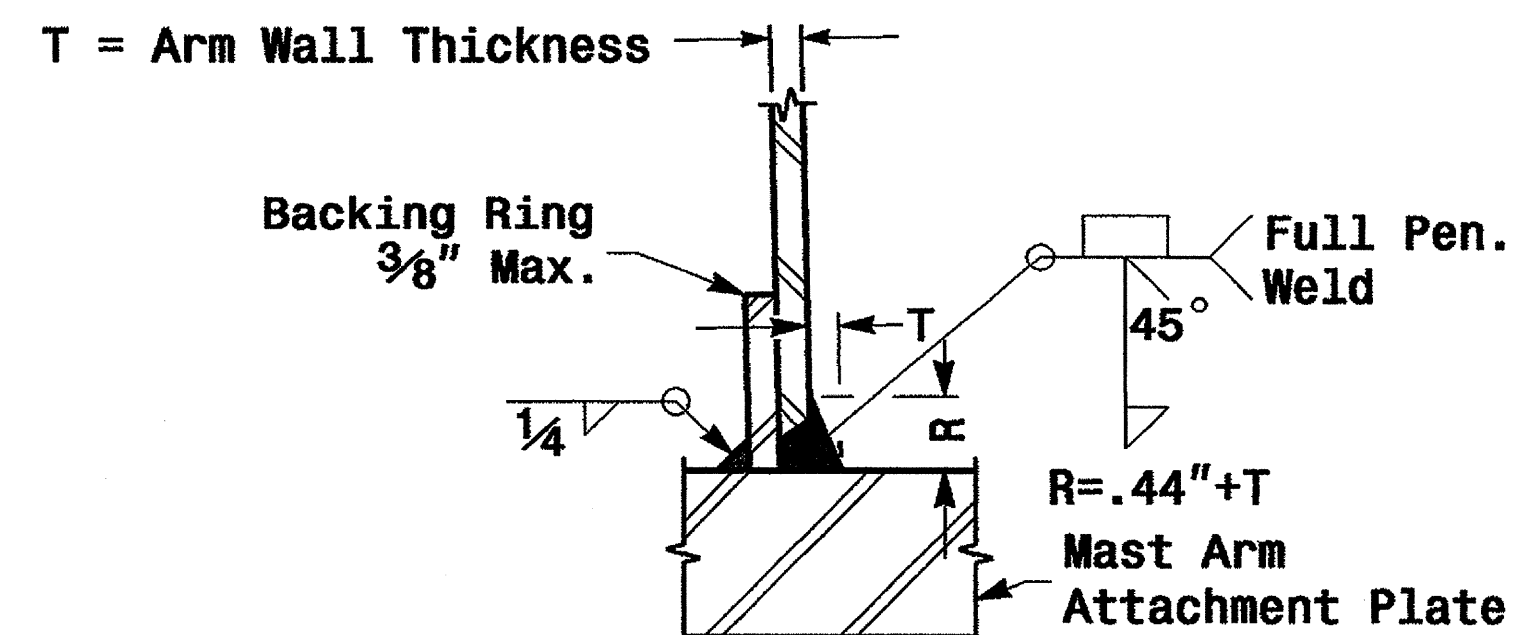
Side Elevation View



Front Elevation View

Mast Arm Attachment Plate

Back Elevation View



Section B-B Full-Penetration Groove Weld Detail

Notes:

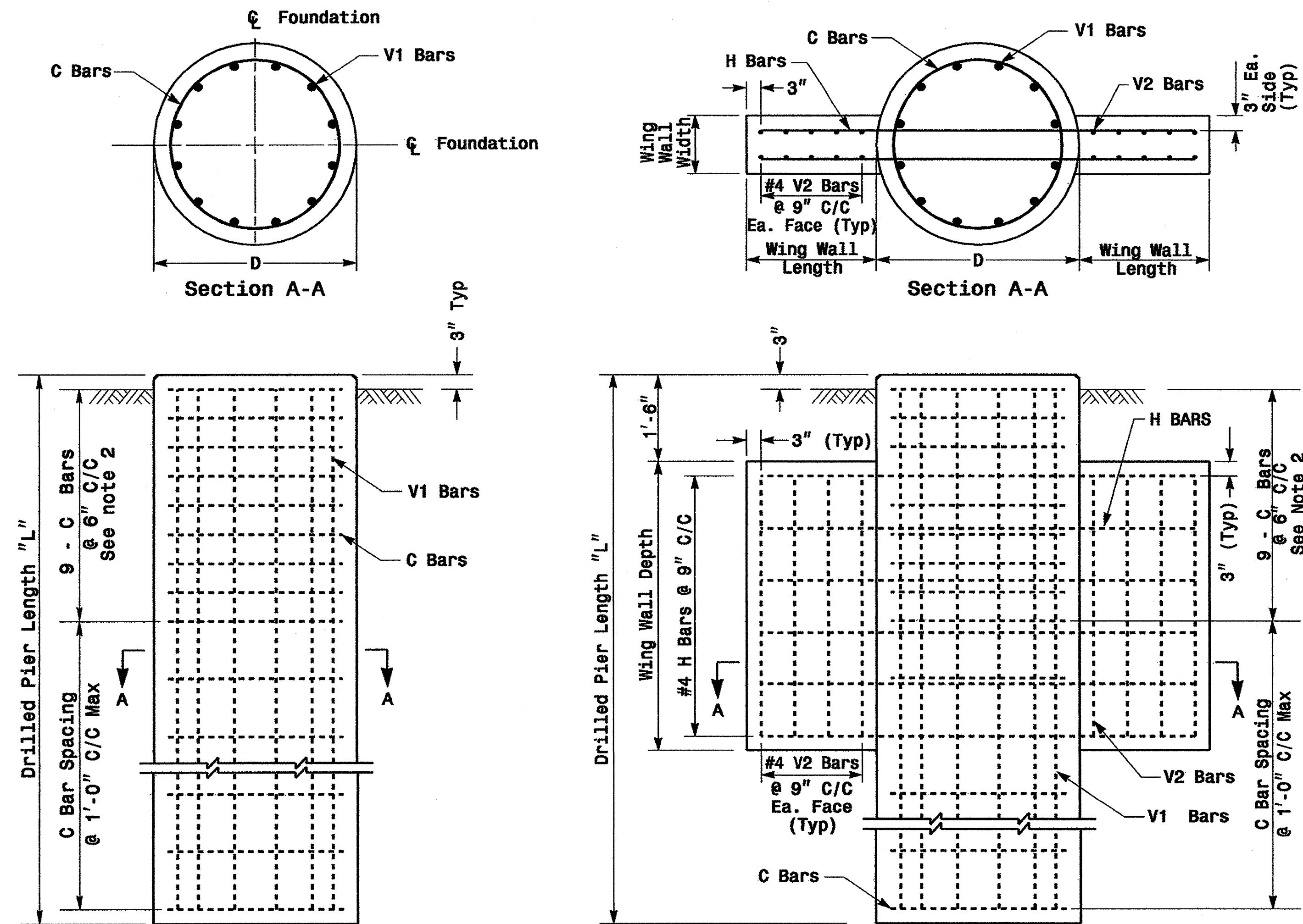
1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
3. Designer is responsible for providing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

01-SEP-2005 14:11 W:\p0001\ees-un1\work\groups\2004\metrol pole standard\2004_m5.dgn p01\alexander

Fabrication Details - Mast Arm Poles

| | | | |
|-------------------------|--|-----------------------------------|--------------------------------------|
| | <p>Fabrication Details For Mast Arm Connection To Pole</p> | | |
| | <p>PLAN DATE: May 2005</p> | <p>REVIEWED BY: C.F. Andrews</p> | |
| <p>SCALE: 0 NA NONE</p> | <p>PREPARED BY: P.L. Alexander</p> | <p>REVIEWED BY: A.M. Esposito</p> | <p>SIGNATURE: D. Barker 9.2.2005</p> |
| <p>REVISIONS:</p> | <p>INIT.</p> | <p>DATE</p> | <p>SIG. INVENTORY NO.</p> |

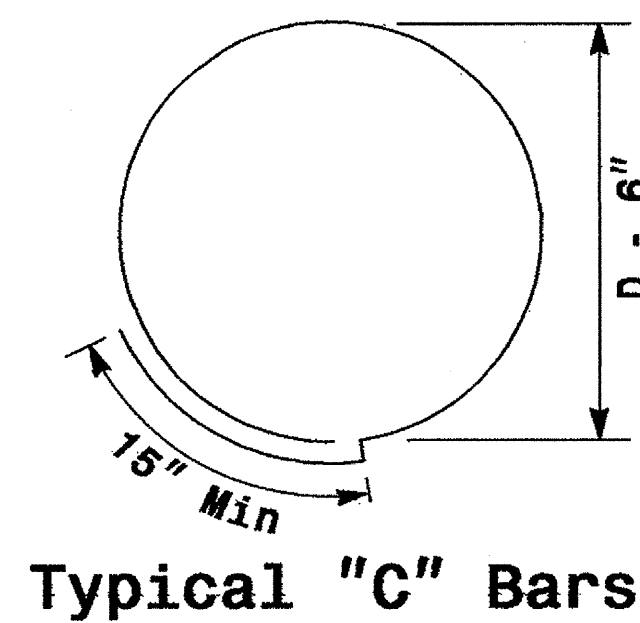
Reinforcing Steel Bars



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



Typical "C" Bars

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

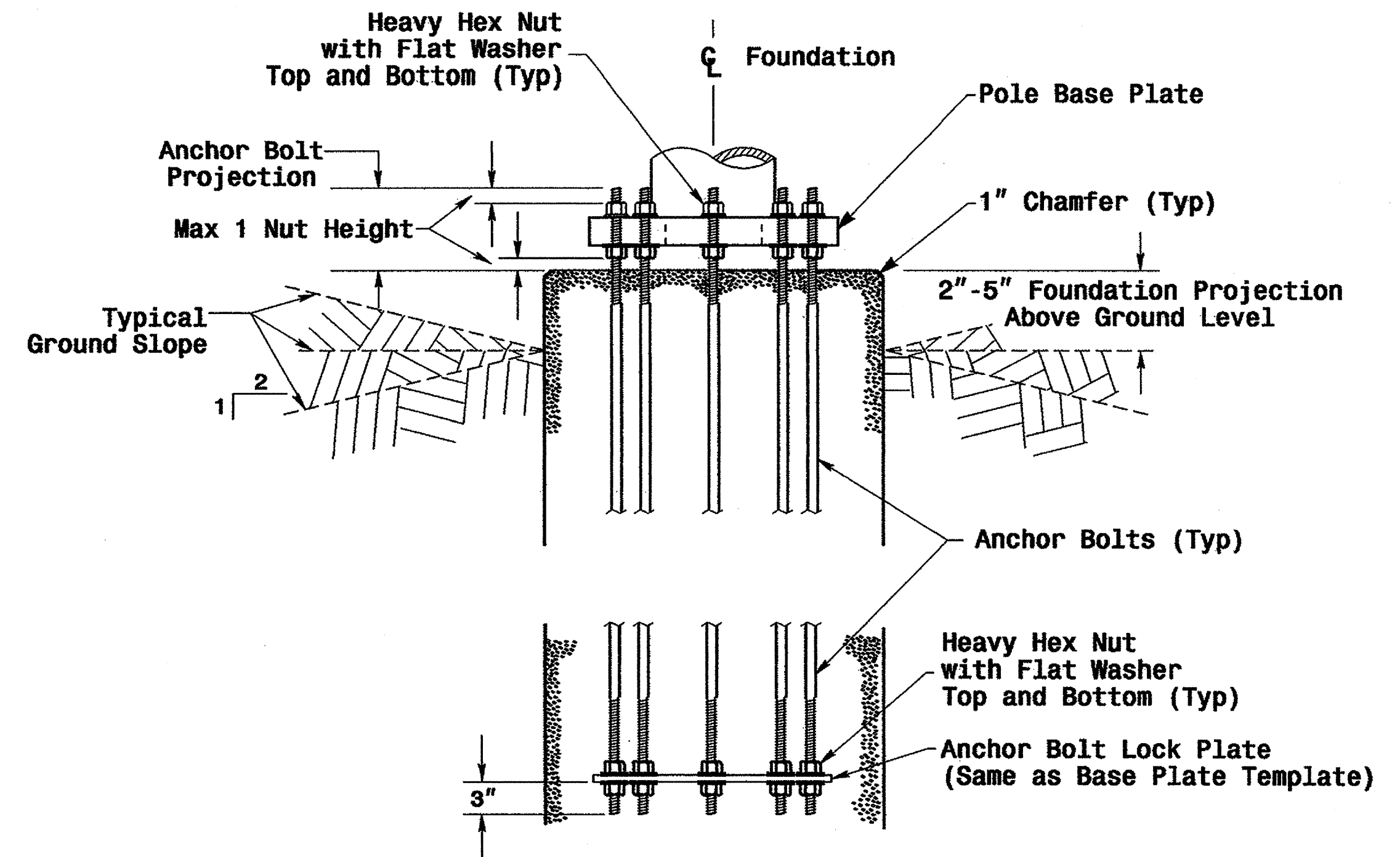
WING WALL DETAILS

| 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 |

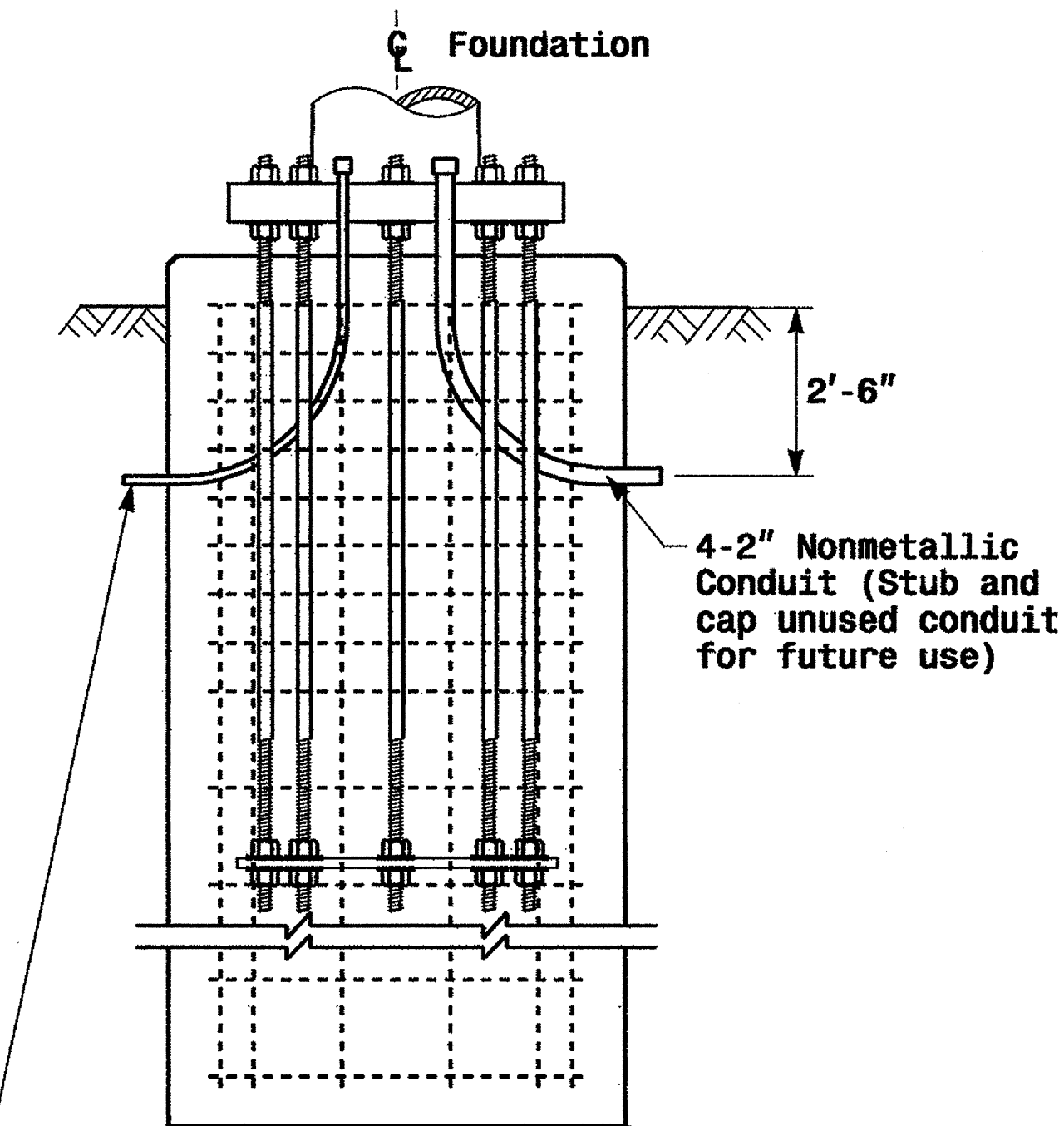
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



2-1" Nonmetallic Conduits for Electrical Service and Grounding Electrode Conductor

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.)

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: NONE

SIGNATURE: D. Sarkar 9.2.2005 DATE: _____
 SIG. INVENTORY NO. _____