



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS

BEVERLY EAVES PERDUE  
GOVERNOR

May 7, 2012

EUGENE A. CONTI, JR.  
SECRETARY

TO: Prospective Bidders

FROM: Randy Bowers, DDC Engineer *Randy Bowers*

SUBJECT: Addendum 1 - WBS 43071 - Additional Line Items and Signal Plans

The following revisions to the Bid Sheet are to be reviewed and attached to the back of the contract. The new bid sheet shall be completed and attached to the contract when it is returned to be opened on Wednesday May 16<sup>th</sup>, 2012 at 10:00 AM. The old bid sheet shall be removed and replaced with the revised sheet. Signal plans (sheets Sig1 – Sig5) are to be included in the roadway plans.

1. A line item for WORK ZONE SIGNS (STATIONARY) has been added to the Bid Sheet
2. A line item for DRUMS has been added to the Bid Sheet
3. Revised Bid Sheet must replace the old bid sheet. If the contract is returned with the old bid sheet completed this bid will be invalid.
4. Signal plans (sheets Sig1 - Sig5) are also included in this addendum

CC: Mr. Ritchie Hearne, PE  
Ms. Kellie Crump  
Mr. Louis Mitchell, PE  
Mr. Jeff D'Arruda



REVISED MAY 7, 2012

WBS #	43071	FA #	N/A
Type of Work	Grading, Paving, Curb & Gutter, Drainage, and Thermoplastic Pavement Markings		
County	Cabarrus		
Location	Intersection of International Dr. (SR-1429) and Enterprise Dr.		

LINE NO.	DESC. NO.	MASTER ITEM NO.	SEC. NO.	ITEM DESCRIPTION	EST. QTY.	UNIT	UNIT PRICE	TOTAL AMOUNT
1	1	0000100000-N	800	MOBILIZATION	1	LS		
2	32	0043000000-N	226	GRADING	1	LS		
3	34	0057000000-E	226	UNDERCUT EXCAVATION	20	CY		
4	70	0318000000-E	300	FOUNDATION CONDITIONING MATERIAL, MINOR STRUCTURES	10	TON		
5	71	0320000000-E	300	FOUNDATION CONDITIONING GEOTEXTILE	10	SY		
6	93	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	8	LF		
7	161	0995000000-E	340	PIPE REMOVAL	105	LF		
8	189	1220000000-E	545	INCIDENTAL STONE BASE	10	TON		
9	197	1297000000-E	607	MILLING ASPHALT PAVEMENT, 1.5" DEPTH	4200	SY		
10	205	1491000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0C	160	TON		
11	208	1503000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	580	TON		
12	212	1523000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5C	2100	TON		
13	221	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	160	TON		
14	228	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	500	TON		
15	300	2253000000-E	840	PIPE COLLARS	1	CY		
16	303	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	1	EA		
17	316	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE E	1	EA		
18	341	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	240	LF		
19	375	2830000000-N	858	ADJUSTMENT OF MANHOLES	1	EA		
20	376	2845000000-N	858	ADJUSTMENT OF METER BOXES OR VALVE BOXES	4	EA		
21	633	4685000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)	12500	LF		
22	634	4686000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (4", 120 MILS)	14000	LF		
23	637	4695000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (8", 90 MILS)	300	LF		
24	642	4710000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 120 MILS)	120	LF		
25	645	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	12	EA		
26	693	4900000000-N	1251	PERMANENT RAISED PAVEMENT MARKERS	110	EA		
27	990	6009000000-E	1610	STONE FOR EROSION CONTROL, CLASS B	10	TON		
28	991	6012000000-E	1610	SEDIMENT CONTROL STONE	5	TON		
29	998	6036000000-E	1631	MATTING FOR EROSION CONTROL	10	SY		

30	1002	6042000000-E	1632	1/4" HARDWARE CLOTH	20	LF		
31	1014	6071010000-E	SP	WATTLE	100	LF		
32	1016	6071020000-E	SP	POLYACRYLAMIDE (PAM)	1	LB		
33	1023	6084000000-E	1660	SEEDING & MULCHING	1	ACR		
34	1189	7060000000-E	1705	SIGNAL CABLE (16-7 CABLE)	1100	LF		
35	1194	7120000000-E	1705	VEHICLE SIGNAL HEAD (12", 3 SECTION)	5	EA		
36	1195	7132000000-E	1705	VEHICLE SIGNAL HEAD (12", 4 SECTION)	1	EA		
37	1196	7144000000-E	1705	VEHICLE SIGNAL HEAD (12", 5 SECTION)	1	EA		
38	1211	7300000000-E	1715	UNPAVED TRENCHING (1 CONDUIT, 2")	700	LF		
39	1214	7301000000-E	1715	DIRECTIONAL DRILL (2 CONDUIT, 2")	125	LF		
40	1216	7324000000-N	1716	JUNCTION BOX (STANDARD SIZE)	8	EA		
41	1226	7444000000-E	1725	INDUCTIVE LOOP SAW CUT	600	LF		
42	1227	7456000000-E	1726	LEAD-IN CABLE (14-2)	1200	LF		
43	1263	7588000000-N	SP	METAL POLE WITH SINGLE MAST ARM	3	EA		
44	1265	7613000000-N	SP	SOIL TEST	3	EA		
45	1266	7614100000-E	SP	DRILLED PIER FOUNDATION	24	CY		
46	1271	7631000000-N	SP	MAST ARM WITH METAL POLE DESIGN	3	EA		
47	1279	7684000000-N	1750	SIGNAL CABINET FOUNDATION	1	EA		
48	1282	7696000000-N	1751	CONTROLLER WITH CABINET (2070L, 332 W/AUX)	1	EA		
49	1283	7708000000-N	1751	DETECTOR CARD (2 CHANNEL INDUCTIVE LOOP)	4	EA		
50	1295	7901000000-N	1753	CABINET BASE EXTENDER	1	EA		
51	597	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	72	SF		
52	603	4430000000-N	1130	DRUMS	25	EA		

Total Cost for Project

CONTRACTOR \_\_\_\_\_

ADDRESS \_\_\_\_\_

Federal ID No. \_\_\_\_\_

Contr. License No. \_\_\_\_\_

Telephone No. \_\_\_\_\_

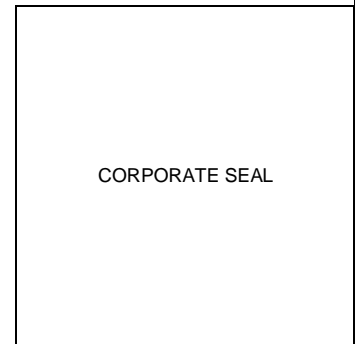
Vendor No. \_\_\_\_\_

Authorized Agent \_\_\_\_\_

Signature \_\_\_\_\_

Witness \_\_\_\_\_

Signature \_\_\_\_\_



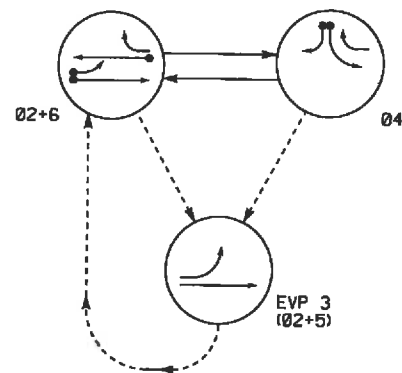
Title \_\_\_\_\_

Date \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_

**PHASING DIAGRAM**



**PHASING DIAGRAM DETECTION LEGEND**

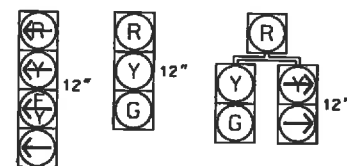
- ← ● → DETECTED MOVEMENT
- ← ○ → UNDETECTED MOVEMENT (OVERLAP)
- ← ○ → UNSIGNALIZED MOVEMENT
- ← ○ → PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE			
	Ø 2 + 6	Ø 4	EVP 3	FLASH
21, 22	G	R	G	Y
51	←	←	←	←
41, 42	R	G	R	R
61	G	R	R	Y
62	G	R	R	Y

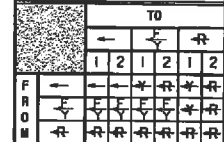
← = Flashing Yellow Arrow

**SIGNAL FACE I.D.**

All Heads L.E.D.



**STANDARD SIGNAL FACE CLEARANCES FOR FLASHING LEFT TURN SIGNAL**



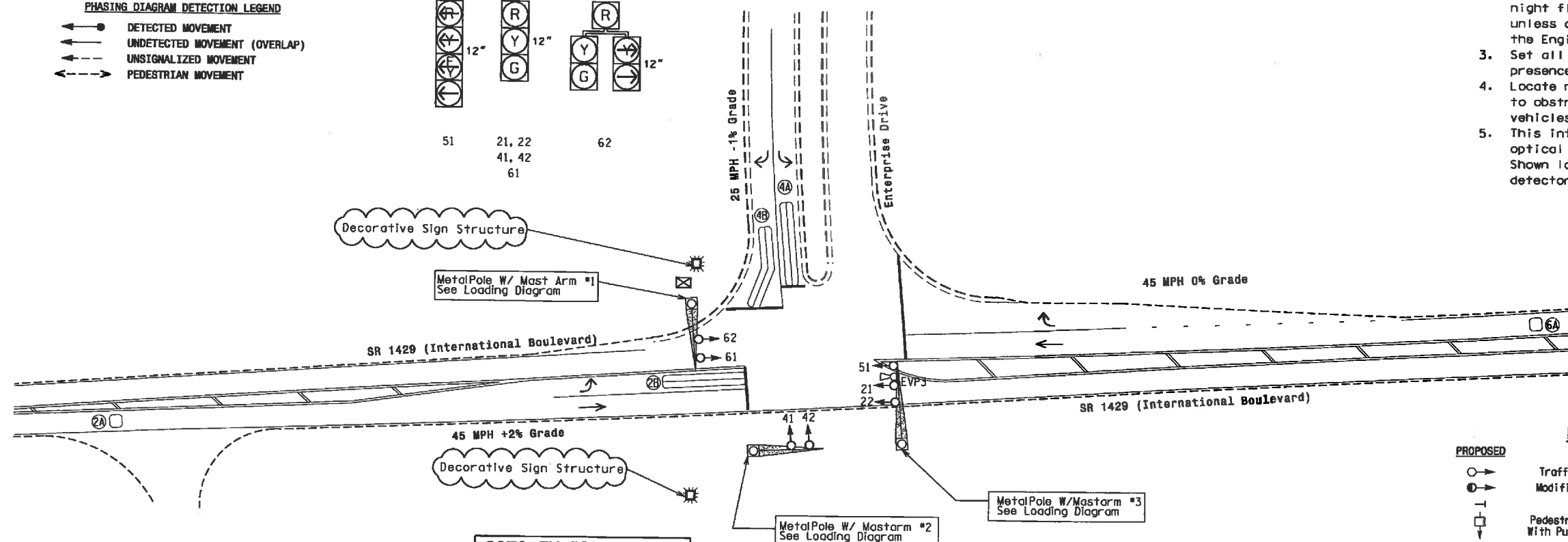
← = Flashing Yellow Arrow

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
2A	6X6	300	5	Y	2	Y	Y	-	-	-	Y
2B	6X40	0	2-4-2	Y	2	Y	Y	Y	-	3	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	300	5	Y	6	Y	Y	-	-	-	Y

2 Phase w/ EVP 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. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.



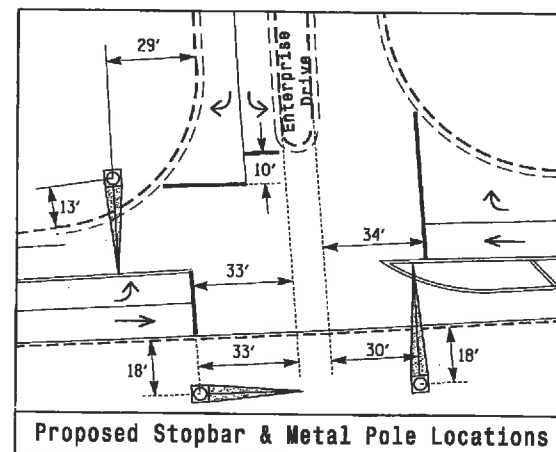
FEATURE	PHASE			
	2	4	5	6
Min Green 1*	12	7	-	12
Extension 1*	6.0	2.0	-	6.0
Max Green 1*	90	35	-	90
Yellow Clearance	4.5	3.0	3.0	4.5
Red Clearance	1.3	2.1	2.3	1.3
Walk 1*	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation*	2.5	-	-	2.5
Max Variable Initial*	34	-	-	34
Time Before Reduction*	15	-	-	15
Time To Reduce*	40	-	-	40
Minimum Gap	3.0	-	-	3.0
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.

**2070 EV PREEMPTION**

FUNCTION	PRE 3
Interval 1 - Dwell Green	255
Interval 1 - Dwell Yellow	0.0*
Interval 1 - Dwell Red	0.0*
Interval 5 - Exit Green	1
Interval 5 - Yellow	0.0
Interval 5 - Red	0.0
Interval 5 - Exit Phase	2, 6
Priority	Med
Delay Time	0.0
Min Green Before Pre	1
Ped Clear Before Pre	0
Yellow Clear Before Pre	0.0*
Red Clear Before Pre	0.0*
Dwell Min Time	12
Enable Backup Protection	N
Ped Clear Through Yellow	N
Preempt Extend**	2
Onset Overlaps	-

\* Time defaults to time used for phase during normal operation  
\*\* Program Timing on Optical Detection Unit



LEGEND	
PROPOSED	EXISTING
○ → Traffic Signal Head	● → Traffic Signal Head
○ → Modified Signal Head	N/A
○ → Sign	N/A
○ → Pedestrian Signal Head With Push Button & Sign	○ → Pedestrian Signal Head
○ → Signal Pole with Guy	○ → Signal Pole with Guy
○ → Signal Pole with Sidewalk Guy	○ → Signal Pole with Sidewalk Guy
○ → Inductive Loop Detector	○ → Inductive Loop Detector
○ → Controller & Cabinet	○ → Controller & Cabinet
○ → Junction Box	○ → Junction Box
○ → 2-in Underground Conduit	○ → 2-in Underground Conduit
○ → Right of Way	○ → Right of Way
○ → Directional Arrow	○ → Directional Arrow
○ → Out of Pavement Detector	○ → Out of Pavement Detector
○ → Metal Pole with Mastarm	○ → Metal Pole with Mastarm

This plan shall supersede the plan sealed on 9/8/2011

**New Installation**

SR 1429 (International Blvd) at Enterprise Drive

Division 10 Cabarrus County Concord

PLAN DATE: December 2011 REVIEWED BY: [Signature]

PREPARED BY: M. Wahbaoba REVIEWED BY: [Signature]

SCALE: 1"=30'

Signature: [Signature] DATE: 12/12/11

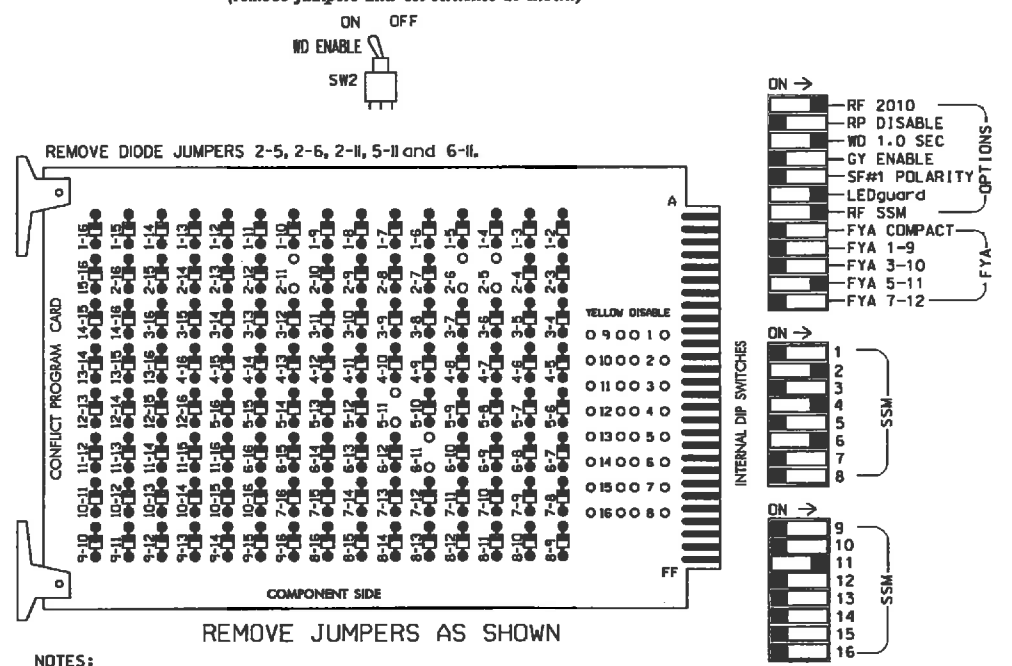
SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24393

SIG. INVENTORY NO. 10-2111

20-DEC-2011 11:46 5147TASAWHITS Signal and Sign Design - Reg (cont) v=1 0410-2111 02:11 - s1.g.dwg\_20110908.dgn

### EDI MODEL 2010ECL-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.
- Make sure jumpers SEL2-SEL5 are present on the monitor board.

■ = DENOTES POSITION OF SWITCH

### 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 1,3,5,7,8, 9,10,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash.

### SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14	
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	62	NU	51	61,62	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						102													A115
FLASHING YELLOW ARROW																			A116
GREEN ARROW						103		133											

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

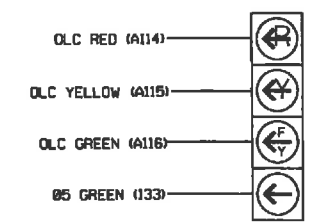
### EQUIPMENT INFORMATION

CONTROLLER.....2070L  
 CABINET.....332 /W/ AUX  
 SOFTWARE.....ECONOLITE OASIS  
 CABINET MOUNT.....BASE  
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE  
 LOAD SWITCHES USED.....S2,S4,S5,S6,S12.  
 PHASES USED.....2,4,5\*,6.  
 OVERLAP "A".....NOT USED  
 OVERLAP "B".....NOT USED  
 OVERLAP "C".....5+6  
 OVERLAP "D".....NOT USED

\* Used during preemption only.

### 4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal head as shown)



**NOTE**

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

### INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	2A	U	U	U	4A	U	U	U	U	U	U	U	FS DC ISOLATOR
	L	2B	U	U	4B	U	U	U	U	U	U	U	U	ST DC ISOLATOR
FILE "J"	U	6A	U	U	U	U	U	U	U	U	U	U	U	PRE3
	L	NOT USED	U	U	U	U	U	U	U	U	U	U	U	2 Di Card * Opticom UNUSED PRE3

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

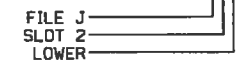
FS = FLASH SENSE  
 ST = STOP TIME

\* See Opticom Field Wire Detail below.

### INPUT FILE CONNECTION & PROGRAMMING CHART

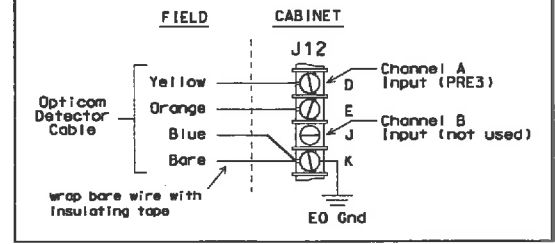
LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y	Y		3
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			15
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			

### INPUT FILE POSITION LEGEND: J2L



### TYPICAL OPTICOM FIELD WIRE DETAIL

(typical file, rear view)

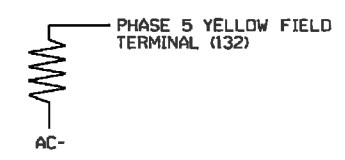


### LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

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



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2111  
 DESIGNED: December 2011  
 SEALED: 12-20-11  
 REVISED: N/A

This detail shell supersede the detail sealed on 9-22-11.

New Installation ELECTRICAL DETAIL SHEET 1 OF 2

SR 1429 (International Blvd) at Enterprise Drive

Division 10 Cabarrus County Concord

PLAN DATE: 12-15-11 REVIEWED BY: T. Uja

PREPARED BY: D.H. Spaulding REVIEWED BY:

750 N. Greenfield Pkwy, Garner, NC 27529

Signature: D.H. Spaulding 12/21/11

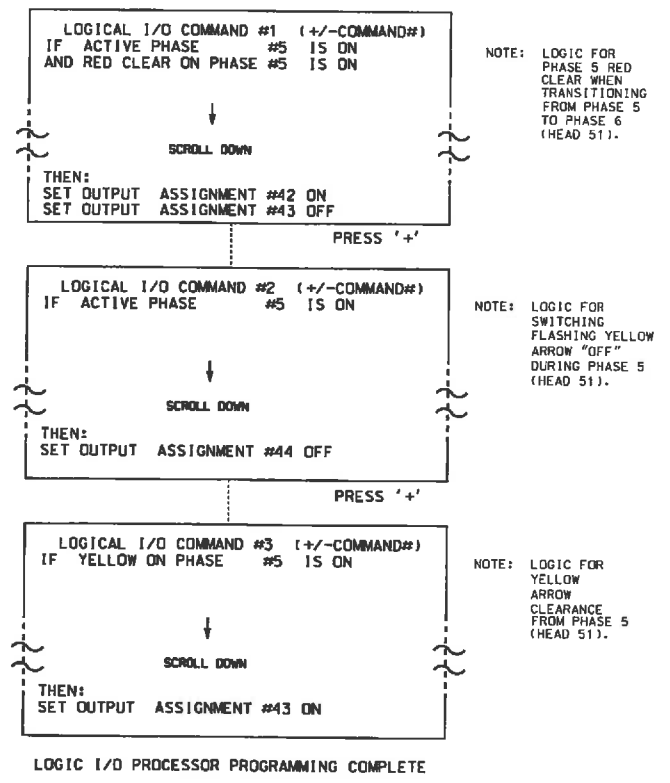
SIG. INVENTORY NO. 10-2111

20-DEC-2011 15:13 S:\TAS\1115 51\p1\sewark\groups\51\name\paul.dingler\in-progress\102111.dwg (a-2011) (x.dgn)

**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

**EMERGENCY VEHICLE PREEMPTION PROGRAMMING DETAIL**

(program controller as shown below)

From Main Menu press 'A' (Preemption), then '1' (Standard Preemptions). Press 'NEXT' as needed to advance to Preempt 3.

PREEMPTION #3	INTERVAL/TIMING	GRN	YEL	RED	SETTINGS (NEXT:1-10)	CLEAR/DWELL PHASES
1	255 0.0 0.0				X X	12345678910111213141516
2	0 0.0 0.0					
3	0 0.0 0.0					
4	0 0.0 0.0					
5	1 0.0 0.0				X X	

EXIT CALLS

OPTIONS

PRIORITY (Y/N TO SELECT) .....MED

DELAY TIMER (0-255 SEC) .....0

MIN GREEN BEFORE PRE (0= DEFAULT)....1

PED CLEAR BEFORE PRE (0= DEFAULT)....0

YELLOW CLEAR BEFORE PRE (0= DEFAULT)....0

RED CLEAR BEFORE PRE (0= DEFAULT)....0

DWELL MIN TIMER (0-255 SEC) .....12

DWELL MAX TIMER (0-OFF,1-255MIN) ....0

DWELL HOLD-OVER TIMER (0-255) .....0

LATCH CALL? .....N

LINK TO NEXT PREEMPT? .....N

ENABLE BACKUP PROTECTION? .....N

HOLD CLEAR 1 PHASES DURING DELAY? ..N

FAST GREEN FLASH DWELL PHASES? .....N

PED CLEARANCE THROUGH YELLOW? .....N

INHIBIT OVERLAP GREEN EXTENSION? ..N

SERVICE DURING SOFTWARE FLASH? .....N

REST IN RED DURING DWELL INTERVAL? ..N

FLASH DWELL INTERVAL? .....N

ALLOW PEDS IN DWELL INTERVAL? .....N

RE-TIME DWELL INTERVAL? .....N

OVERLAPS: ABCDEFGHIJKLMNPO

DWELL INT FLASH YELLOW

OMIT OVERLAPS:

PROGRAMMING COMPLETE

Program extend time on optical detector unit for 2.0 seconds.

**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: XX

VEH OVL NOT PED: XX

VEH OVL GRN EXT: XX

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

This detail shell supersede the detail sealed on 9-22-11.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-2111  
DESIGNED: December 2011  
SEALED: 12-20-11  
REVISED: N/A

New Installation ELECTRICAL DETAIL SHEET 2 OF 2

SR 1429 (International Blvd) at Enterprise Drive

Division 10 Cabarrus County Concord

PLAN DATE: 12-16-11 REVIEWED BY: T. J. Spaulding

PREPARED BY: D.H. Spaulding REVIEWED BY:

REVISIONS

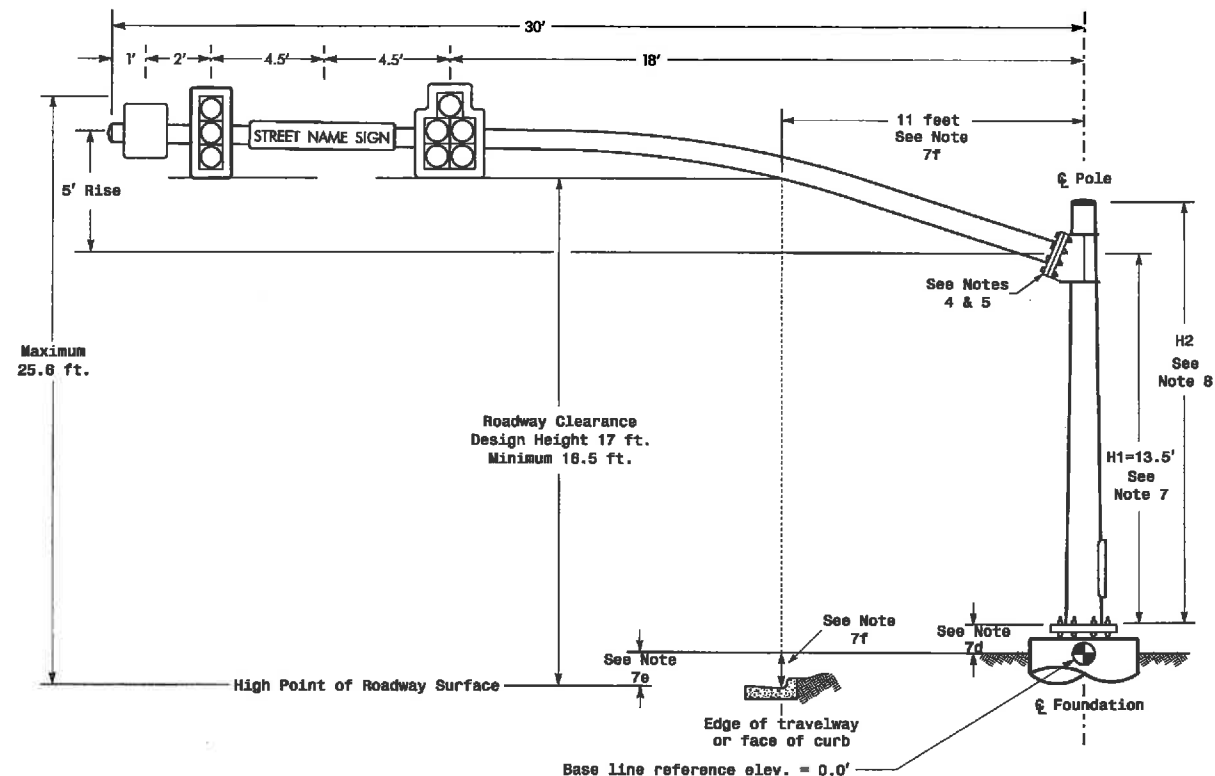
INIT. DATE

Signature: *George C. Brown* DATE: 12/21/11

SIG. INVENTORY NO. 10-2111

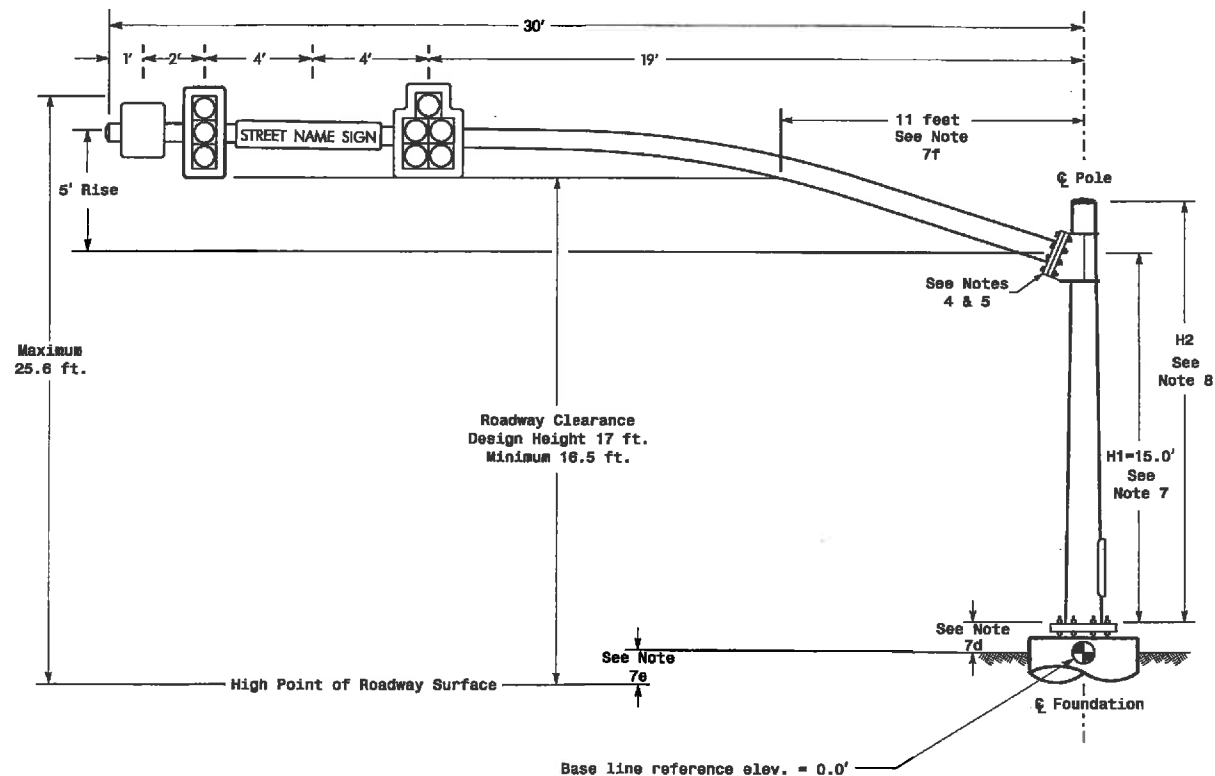
10-DEC-2011 1:53:54  
S:\PROJECTS\SIGNALS\SIGNALS\SIGNALS\PROGRAMMING\10-2111\sig\_3.dgn

**Design Loading for METAL POLE NO. 1**



**ELEVATION VIEW**

**Design Loading for METAL POLE NO. 2**



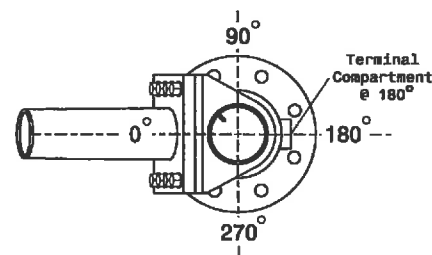
**Elevation View**

**SPECIAL NOTE**

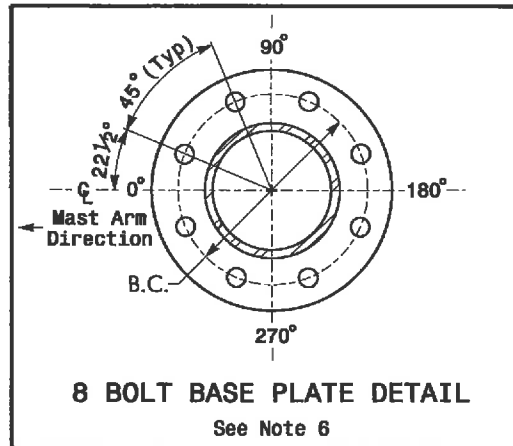
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

**Elevation Data for Mast Arm Attachment (H1)**

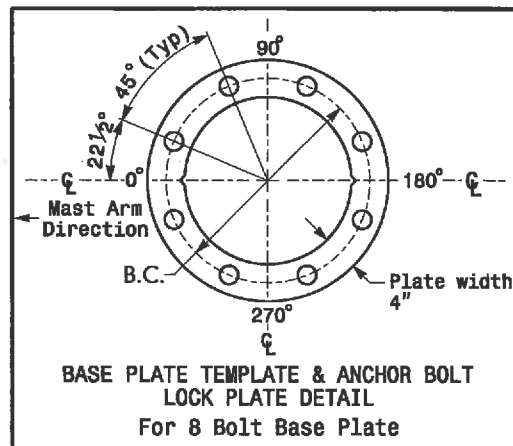
Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-0.7 ft.	+1.0 ft.
Elevation difference at Edge of travelway or face of curb	-0.9 ft.	0.0 ft.



**POLE RADIAL ORIENTATION**



**8 BOLT BASE PLATE DETAIL**  
See Note 6



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

**METAL POLE No. 1 and 2**

PROJECT REFERENCE NO.	SHEET NO.
N/A	Sig. A

**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
	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 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.

**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.
- 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 80 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
  - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
  - 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.
  - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
- 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 Design Structural Engineer for assistance at (919) 773-2800.
- 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 4 (90 MPH)

	SR 1429 (International Blvd) at Enterprise Drive	
	Division 10 Cabarrus County PLAN DATE: December 2011 PREPARED BY: N. Mahdooba	Concord REVIEWED BY: REVIEWED BY:
SCALE: 0 N/A N/A	REVISIONS:	SIGNATURE: <i>T. Williams</i> 12/20/11 DATE: 12/20/11 SIG. INVENTORY NO.: 10-2111

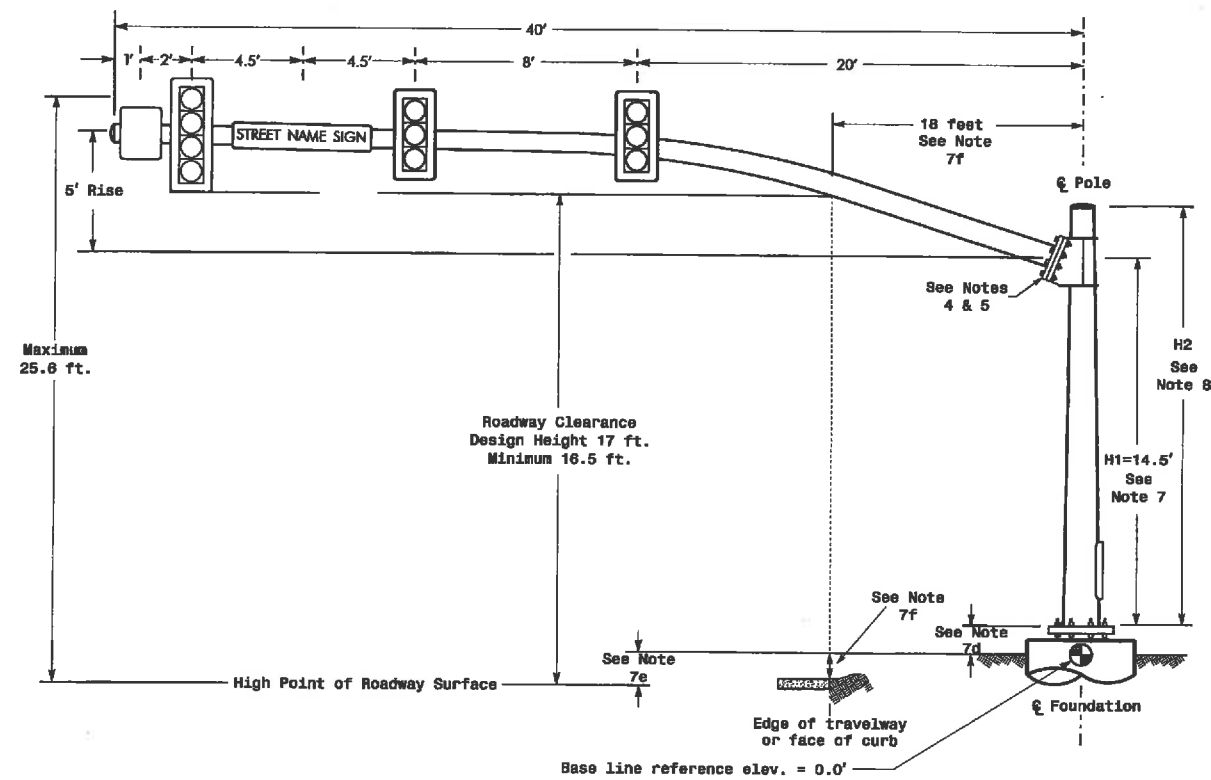
20-DEC-2011 15:13  
 C:\Users\j5\OneDrive\Documents\Design\Section\Western Region\010-1040-2114\02111\_IP\_21111220.dgn  
 mahdooba

**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.

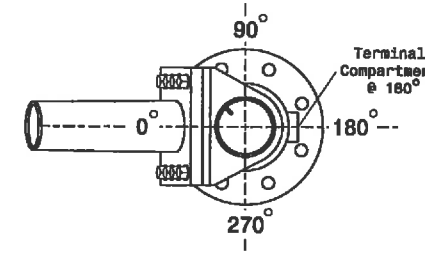
Elevation Data for Mast Arm Attachment (H1)	
Elevation Differences for:	Pole 3
Baseline reference point at $\phi$ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+0.4 ft.
Elevation difference at Edge of travelway or face of curb	-

MAST ARM LOADING SCHEDULE				
LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	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

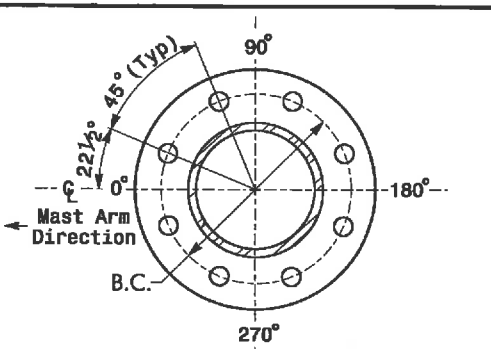
**Design Loading for METAL POLE NO. 3**



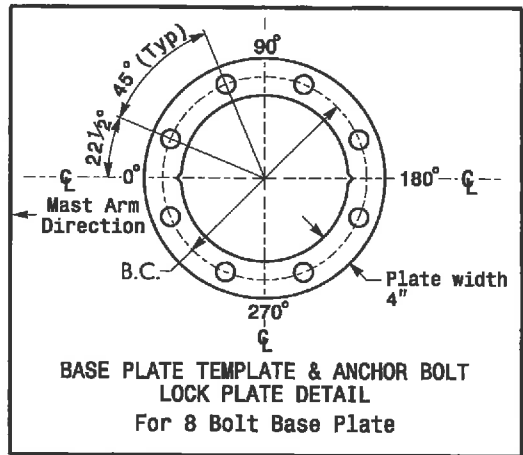
**ELEVATION VIEW**



**POLE RADIAL ORIENTATION**



**8 BOLT BASE PLATE DETAIL**  
See Note 6



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

**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 2008 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
    - The 2008 NCDOT Roadway Standard Drawings.
    - The traffic signal project plans and special provisions.
  - 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.
  - 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:
    - a. Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
    - b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
    - c. The roadway clearance height for design is as shown in the elevation views.
    - d. The top of the pole base plate is .75 feet above the ground elevation.
    - e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
    - f. Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
  - The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
    - 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 Design Structural Engineer for assistance at (919) 773-2800.
  - 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 4 (90 MPH)

	SR 1429 (International Blvd) at Enterprise Drive	
	Division 10 Cabarrus County Concord	PLAN DATE: December 2011
PREPARED BY: M. Mahbooba	REVIEWED BY:	SIGNATURE: <i>M. Mahbooba</i> DATE: 12/20/11
SCALE: N/A	REVISIONS:	INIT. DATE
N/A	N/A	SIG. INVENTORY NO. 10-2111

20-DEC-2011 15:15  
 20-DEC-2011 15:15 Signals/eng/1001 Design Section/astm/eng/1001/10-2111/10-2111.dgn  
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