Project No.	Sheet No.
U–3613 B	Sig. 1

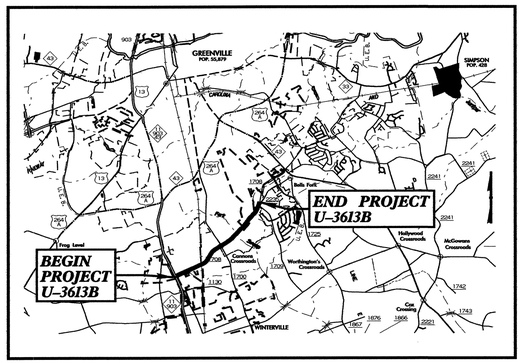
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

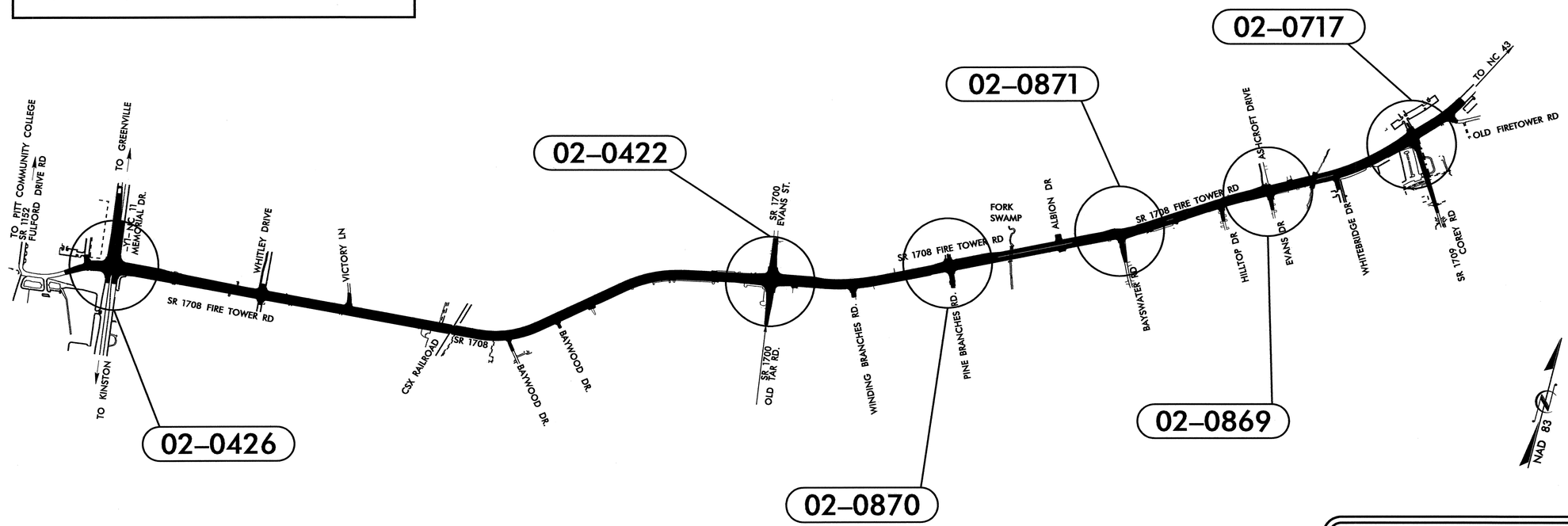
PITT COUNTY

LOCATION: GREENVILLE– SR 1708 (FIRE TOWER ROAD) FROM WEST OF NC 11–903 TO EAST OF SR 1709 (COREY ROAD

TYPE OF WORK: TRAFFIC SIGNALS AND FIBER OPTIC COMMUNICATIONS CABLE

Vicinity





Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.

Index of Plans

Sheet #	Signal Inventory #	Location/Description
Sig. 1	--------	Title Sheet
Sig. 2	02–0426	NC 11–903 (Memorial Drive) at SR 1152 (Dr. Fulford Drive Road)/SR 1708 (Fire Tower Road)
Sig. 10	02–0422	SR 1708 (Fire Tower Road) at SR 1700 (Old Tar Road/Evans Street)
Sig. 18	02–0870	SR 1708 (Fire Tower Road) at Pine Branches Road and Entrance to Paramore Farms
Sig. 22	02–0871	SR 1708 (Fire Tower Road) at Bayswater Road
Sig. 26	02–0869	SR 1708 (Fire Tower Road) at Evans Drive/Ashcroft Drive
Sig. 30	02–0717	SR 1708 (Fire Tower Road) at SR 1709 (Corey Road) and Entrance to Apartments
Sig. 40	--------	Communications Cable Routing Plans
Sig. 51	--------	Metal Pole Details

TRAFFIC MANAGEMENT AND SIGNAL SYSTEMS UNIT

Contacts:

D. Y. Ishak – Signals and Geometrics Contracts Engineer
G. C. Brown, PE – Signal Equipment Design Engineer
G. G. Murr, Jr., PE – Traffic Management Systems Engineer

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

Traffic Management and Signal Systems Unit — State of North Carolina — Department of Transportation

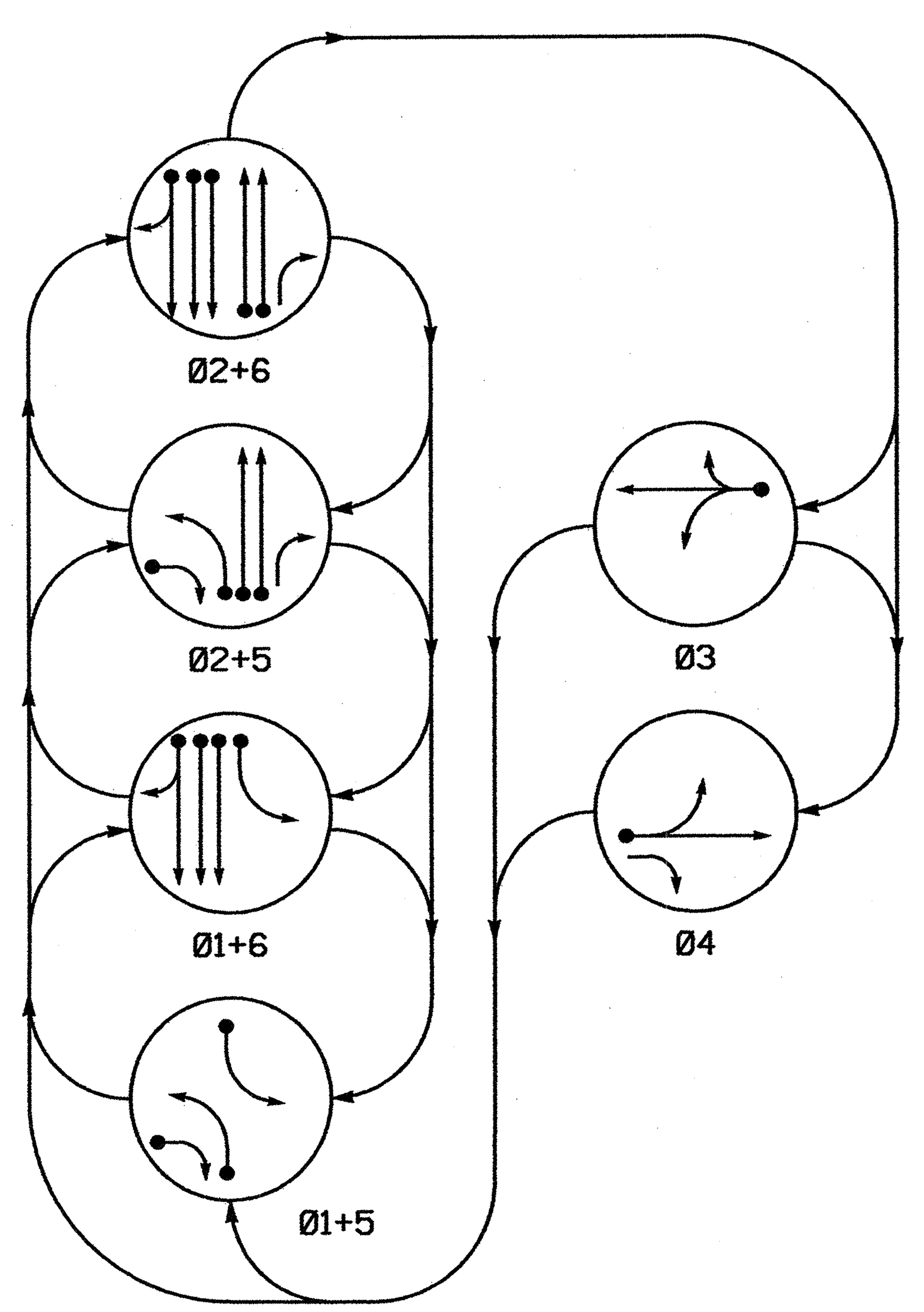
122 N. McDowell St., Raleigh, NC 27603

Project: U–3613 B

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.2

6 Phase Fully Actuated (Greenville City System)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

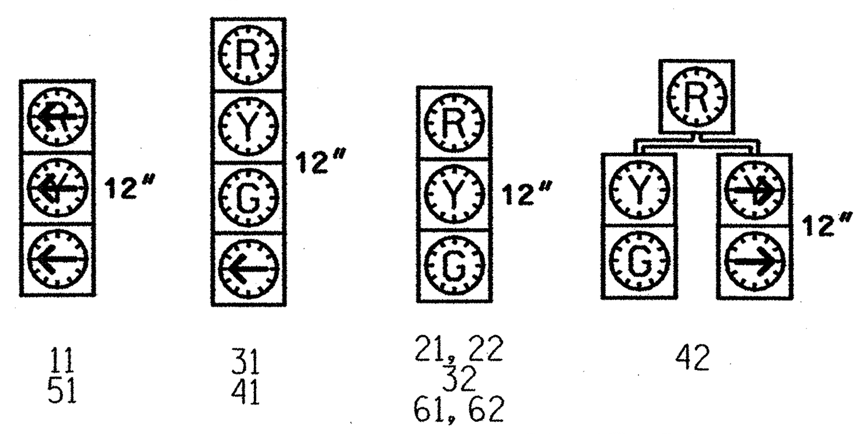
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←	←	←R	←R	←R	←R	←R
21, 22	R	R	G	G	R	R	Y
31	R	R	R	R	G ←	R	R
32	R	R	R	R	G	R	R
41	R	R	R	R	R	G ←	R
42	R / →	R	R / →	R	R	G	R
51	←	←R	←	←R	←R	←R	←R
61, 62	R	G	R	G	R	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.



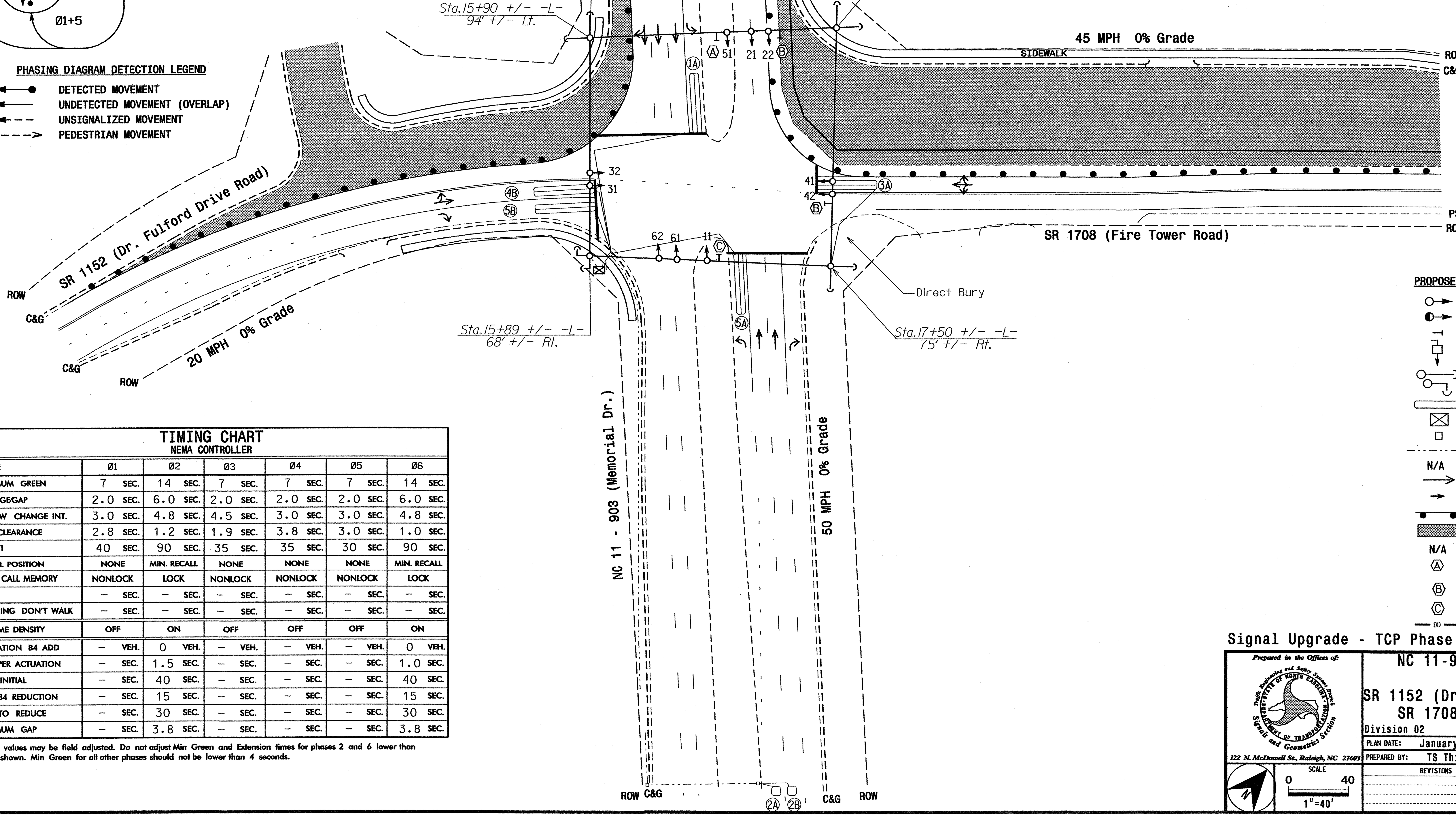
LOOP & DETECTOR UNIT INSTALLATION CHART

NEMA CONTROLLER WITH TS-2 CABINET

INDUCTIVE LOOPS: LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	DETECTOR UNITS: NEMA PHASE	NEW	EXISTING	TIMING: FEATURE	TIMING: TIME	PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?
1A	6X40	2-4-2	0	X		1	X		–	– SEC.	ALL	NO
2A	6X6	6	355	X		2	X		–	– SEC.	ALL	NO
2B	6X6	6	355	X		2	X		–	– SEC.	ALL	NO
3A	6X40	2-4-2	0	X		3	X		DELAY	5 SEC.	ALL	YES
4B	6X40	2-4-2	0	X		4	X		DELAY	3 SEC.	ALL	YES
5A	6X40	2-4-2	0	X		5	X		–	– SEC.	ALL	NO
5B	6X40	2-4-2	0	X		5	X		DELAY	15 SEC.	ALL	YES
6A	6X6	6	355	X		6	X		–	– SEC.	ALL	NO
6B	6X6	6	355	X		6	X		–	– SEC.	ALL	NO
6C	6X6	6	355	X		6	X		–	– SEC.	ALL	NO

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Set all detector units to presence mode.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Intersection Zone Number: 13, System Address Number: 63



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone Drums	
	Construction Zone	
N/A	Wheelchair Ramp	
Ⓐ	"U-TURN SIGNAL TO RIGHT TURN" (R10-16)	Ⓐ
Ⓑ	Right Arrow "ONLY" Sign (R3-5R)	Ⓑ
Ⓒ	Left Turn "ONLY" Sign (R3-5L)	Ⓒ
— DD —	Directional Drill	N/A

TIMING CHART

NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6
MINIMUM GREEN	7 SEC.	14 SEC.	7 SEC.	7 SEC.	7 SEC.	14 SEC.
PASSAGE/GAP	2.0 SEC.	6.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	6.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.8 SEC.	4.5 SEC.	3.0 SEC.	3.0 SEC.	4.8 SEC.
RED CLEARANCE	2.8 SEC.	1.2 SEC.	1.9 SEC.	3.8 SEC.	3.0 SEC.	1.0 SEC.
MAX. 1	40 SEC.	90 SEC.	35 SEC.	35 SEC.	30 SEC.	90 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL
VEHI. CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	NONLOCK	LOCK
WALK	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
FLASHING DON'T WALK	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
VOLUME DENSITY	OFF	ON	OFF	OFF	OFF	ON
ACTUATION B4 ADD	– VEH.	0 VEH.	– VEH.	– VEH.	– VEH.	0 VEH.
SEC. PER ACTUATION	– SEC.	1.5 SEC.	– SEC.	– SEC.	– SEC.	1.0 SEC.
MAX. INITIAL	– SEC.	40 SEC.	– SEC.	– SEC.	– SEC.	40 SEC.
TIME B4 REDUCTION	– SEC.	15 SEC.	– SEC.	– SEC.	– SEC.	15 SEC.
TIME TO REDUCE	– SEC.	30 SEC.	– SEC.	– SEC.	– SEC.	30 SEC.
MINIMUM GAP	– SEC.	3.8 SEC.	– SEC.	– SEC.	– SEC.	3.8 SEC.

* 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.

Signal Upgrade - TCP Phase I - Temporary Design 1

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, 122 N. McDowell St., Raleigh, NC 27603

NC 11-903 (Memorial Drive)/ at SR 1152 (Dr. Fulford Drive Rd.) SR 1708 (Fire Tower Rd.)

Division 02 Pitt County Greenville

PLAN DATE:	January 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL: North Carolina Professional Engineer, Richard E. Mullinax

SIGNATURE DATE

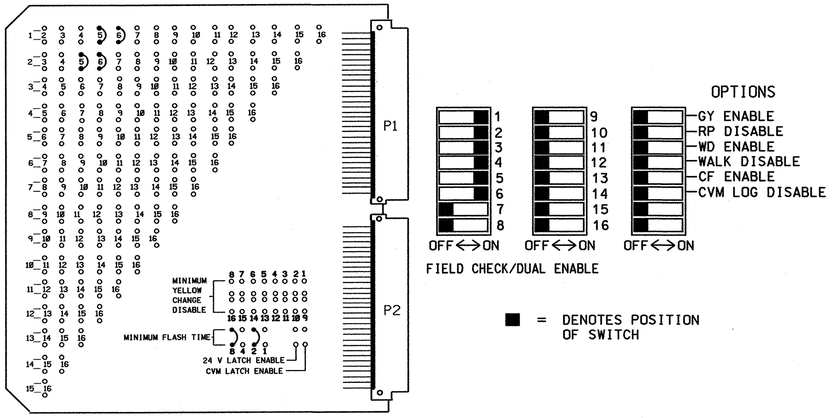
SIG. INVENTORY NO. 02-0426 T1

28-FEB-2006 14:42
s:#its signals#workgroups#tip projects#u-3613b#0426#020426_sig_dsn_2005xxxx.dgn
#thigpen

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.3

EDI MODEL MMU-16E MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and set switches as shown below)



■ = DENOTES POSITION OF SWITCH

MMU PROGRAMMING CARD

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 7, 8, 9, 10, 11, 12, 13, 14, 15 AND 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
10. THE CABINET AND CONTROLLER ARE A PART OF THE GREENVILLE CITY SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	1	2	3		4		5		6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	11	21,22	31	32	41	42	42	51	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		2R	3R	3R	4R	4R			6R										
YELLOW		2Y	3Y	3Y	4Y	4Y			6Y										
GREEN		2G	3G	3G	4G	4G			6G										
RED ARROW	1R							5R											
YELLOW ARROW	1Y						5Y	5Y											
GREEN ARROW	1G		3G		4G		5G	5G											

NU = Not Used

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
	L2A,L2B
	L3A,L3B
	L4A,L4B
2A	L5A,L5B
2B	L6A,L6B
	L7A,L7B
	L8A,L8B
3A	L9A,L9B
	L10A,L10B
	L11A,L11B
4B	L12A,L12B
5A	L13A,L13B
5B	L14A,L14B
6A	L15A,L15B
6B	L16A,L16B
6C	L17A,L17B
	L18A,L18B
	L19A,L19B
	L20A,L20B
	L21A,L21B
	L22A,L22B
	L23A,L23B
	L24A,L24B

NOTE
BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø 1		
2			
3			
4			
5	ø 2		
6	ø 2		
7			
8			
9	ø 3	DELAY	5
10			
11			
12	ø 4	DELAY	3
13	ø 5		
14	ø 5	DELAY	15
15	ø 6		
16	ø 6		
17	ø 6		
18			
19			
20			
21			
22			
23			
24			

* THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE TIMING REQUIRED FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED
CABINET .....CONTRACTOR SUPPLIED TS-2 NC-8A
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....1,2,3,4,5,6
PHASES USED.....1,2,3,4,5,6
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

DETECTOR RACK #1

BIU	SLOT EMPTY	CH1 L1 ø1 / CH2 NOT USED	SLOT EMPTY	CH1 L5 ø2 / CH2 L6 ø2	CH1 NOT USED / CH2 L12 ø4	CH1 L9 ø3 / CH2 NOT USED	CH1 L15 ø6 / CH2 L16 ø6	CH1 L13 ø5 / CH2 L14 ø5	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY

DETECTOR RACK #2

BIU	SLOT EMPTY	CH1 L17 ø6 / CH2 NOT USED	SLOT EMPTY	SLOT EMPTY	

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0426 T1
DESIGNED: January 2006
SEALED: 03-03-06
REVISED: NA

Signal Upgrade - Temporary 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation
Traffic Management Section
122 N. McDowell St., Raleigh, NC 27603

NC 11 - 903 (Memorial Drive)
at
SR 1152 (Dr. Fulford Drive Rd.)
SR 1708 (Fire Tower Rd.)

Division 2 | Pitt County | Greenville

PLAN DATE: February 2006 | REVIEWED BY: JWH
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.
John T Rowe Jr 3-8-06
SIGNATURE DATE
SIG. INVENTORY NO. 02-0426 T1

07-MAR-2006 07:36
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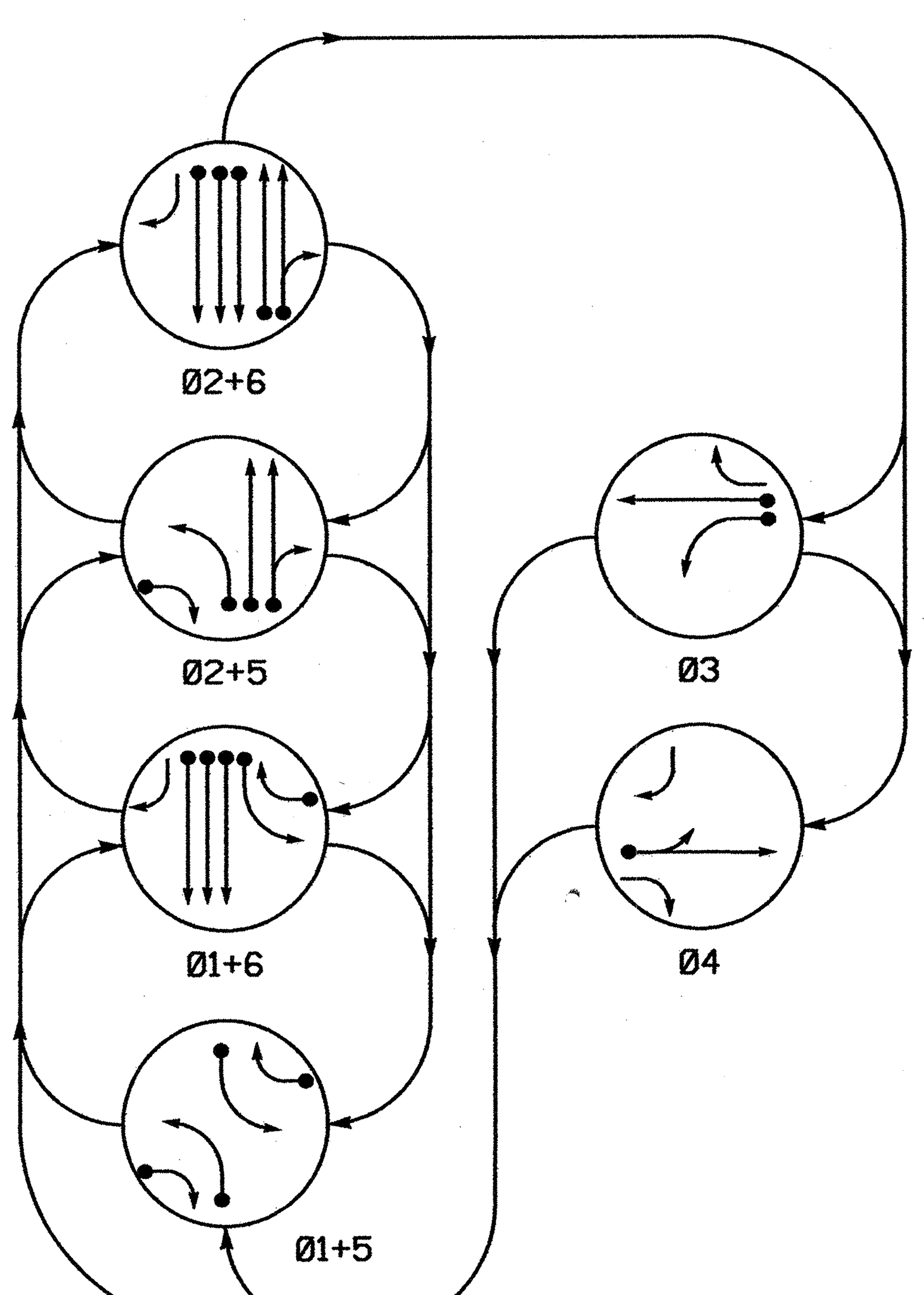
jpeterson

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.4

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

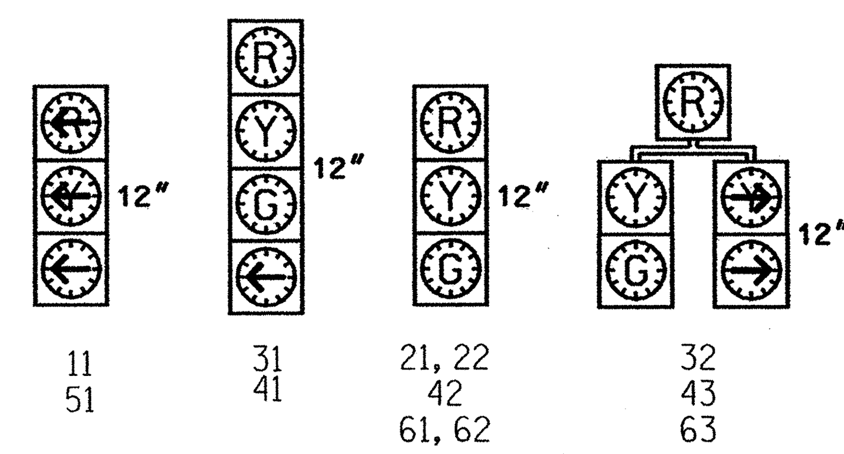
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←	←	←R	←R	←R	←R	←R
21, 22	R	R	G	G	R	R	Y
31	R	R	R	R	G←	R	R
32	R/→	R/→	R	R	G	R	R
41	R	R	R	R	R	G←	R
42	R	R	R	R	R	G	R
43	R/→	R	R/→	R	R	G	R
51	←	←R	←	←R	←R	←R	←R
61, 62	R	G	R	G	R	R	Y
63	R	G	R	G	R	R/→	Y

SIGNAL FACE I.D.

Denotes L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART

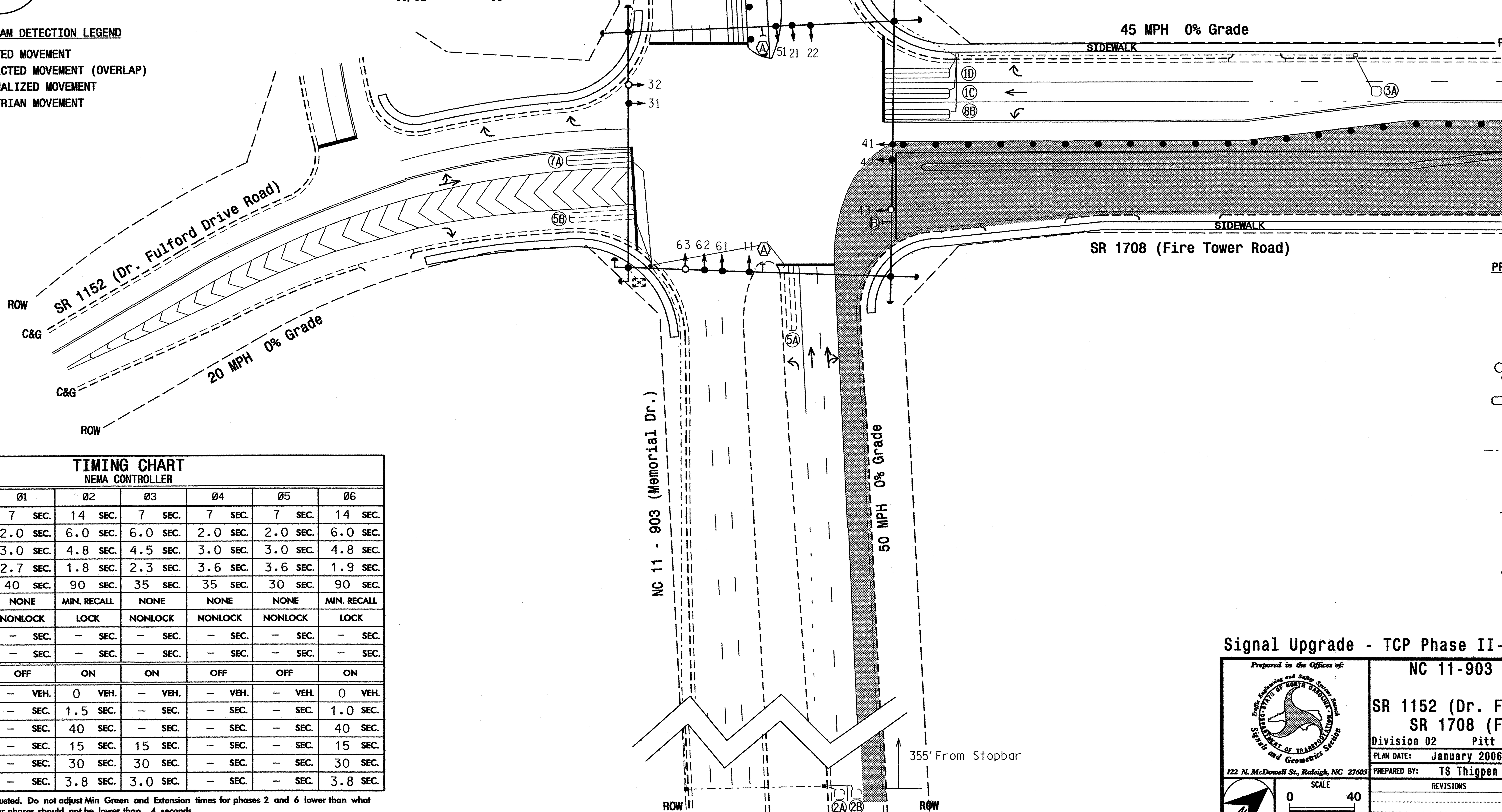
NEMA CONTROLLER WITH TS-2 CABINET

INDUCTIVE LOOPS: LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	DETECTOR UNITS: NEMA PHASE	NEW	EXISTING	TIMING: FEATURE	TIMING: TIME	PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?
1B	6X40	2-4-2	0	X		1		X	-	- SEC.	ALL	NO
1C	6X40	2-4-2	0		X	3	X		DC/EC	5/2 SEC.	ALL	NO
1D	6X40	2-4-2	0		X	3	X		DELAY	15 SEC.	ALL	YES
2A	6X6	6	355	X		2		X	-	- SEC.	ALL	NO
2B	6X6	6	355	X		2		X	-	- SEC.	ALL	NO
3A	6X40	2-4-2	300	X		3		X	DELAY	100 SEC.	ALL	YES
5A	6X40	2-4-2	0		X	5		X	-	- SEC.	ALL	NO
5B	6X40	2-4-2	0		X	5		X	DELAY	15 SEC.	ALL	YES
6A	6X6	6	355	X		6		X	-	- SEC.	ALL	NO
6B	6X6	6	355	X		6		X	-	- SEC.	ALL	NO
6C	6X6	6	355	X		6		X	-	- SEC.	ALL	NO
7A	6X40	2-4-2	0	X		4		X	DELAY	3 SEC.	ALL	YES
8B	6X40	2-4-2	0	X		3		X	DELAY	3 SEC.	ALL	YES

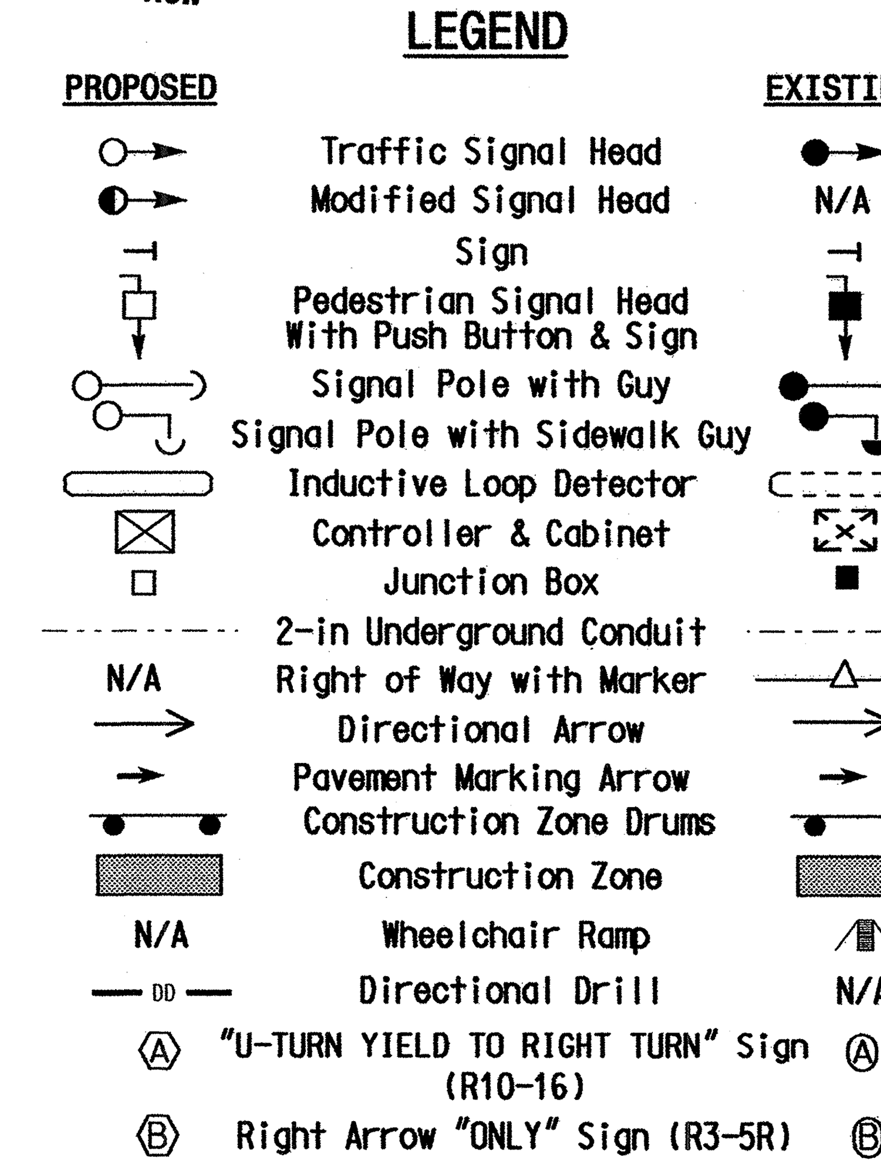
6 Phase
Fully Actuated
(Greenville City System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 or phase 5 may be lagged.
4. The order of phase 3 and phase 4 may be reversed.
5. Reposition existing signal heads as needed.
6. Set all detector units to presence mode.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Intersection Zone Number: 13, System Address Number: 63



LEGEND



TIMING CHART

NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6
MINIMUM GREEN	7 SEC.	14 SEC.	7 SEC.	7 SEC.	7 SEC.	14 SEC.
PASSAGE/GAP	2.0 SEC.	6.0 SEC.	6.0 SEC.	2.0 SEC.	2.0 SEC.	6.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.8 SEC.	4.5 SEC.	3.0 SEC.	3.0 SEC.	4.8 SEC.
RED CLEARANCE	2.7 SEC.	1.8 SEC.	2.3 SEC.	3.6 SEC.	3.6 SEC.	1.9 SEC.
MAX. 1	40 SEC.	90 SEC.	35 SEC.	35 SEC.	30 SEC.	90 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL
VEHI. CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	NONLOCK	LOCK
WALK	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
FLASHING DON'T WALK	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
VOLUME DENSITY	OFF	ON	ON	OFF	OFF	ON
ACTUATION B4 ADD	– VEH.	0 VEH.	– VEH.	– VEH.	– VEH.	0 VEH.
SEC. PER ACTUATION	– SEC.	1.5 SEC.	– SEC.	– SEC.	– SEC.	1.0 SEC.
MAX. INITIAL	– SEC.	40 SEC.	– SEC.	– SEC.	– SEC.	40 SEC.
TIME B4 REDUCTION	– SEC.	15 SEC.	15 SEC.	– SEC.	– SEC.	15 SEC.
TIME TO REDUCE	– SEC.	30 SEC.	30 SEC.	– SEC.	– SEC.	30 SEC.
MINIMUM GAP	– SEC.	3.8 SEC.	3.0 SEC.	– SEC.	– SEC.	3.8 SEC.

* 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.

Signal Upgrade - TCP Phase II- Temporary Design 2

NC 11-903 (Memorial Drive)/
at
SR 1152 (Dr. Fulford Drive Rd.)
SR 1708 (Fire Tower Rd.)

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, North Carolina Department of Transportation
122 N. McDowell St., Raleigh, NC 27603

Division 02	Pitt County	Greenville
PLAN DATE: January 2006	REVIEWED BY: RM Duffy	
PREPARED BY: TS Thigpen	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS | INIT. | DATE

SEAL: North Carolina Professional Engineer, Seal 10027, Richard E. Mullinax — 3 MARCH 2006

SIGNATURE | DATE

SIG. INVENTORY NO. 02-0426 T2

28-FEB-2006 14:43
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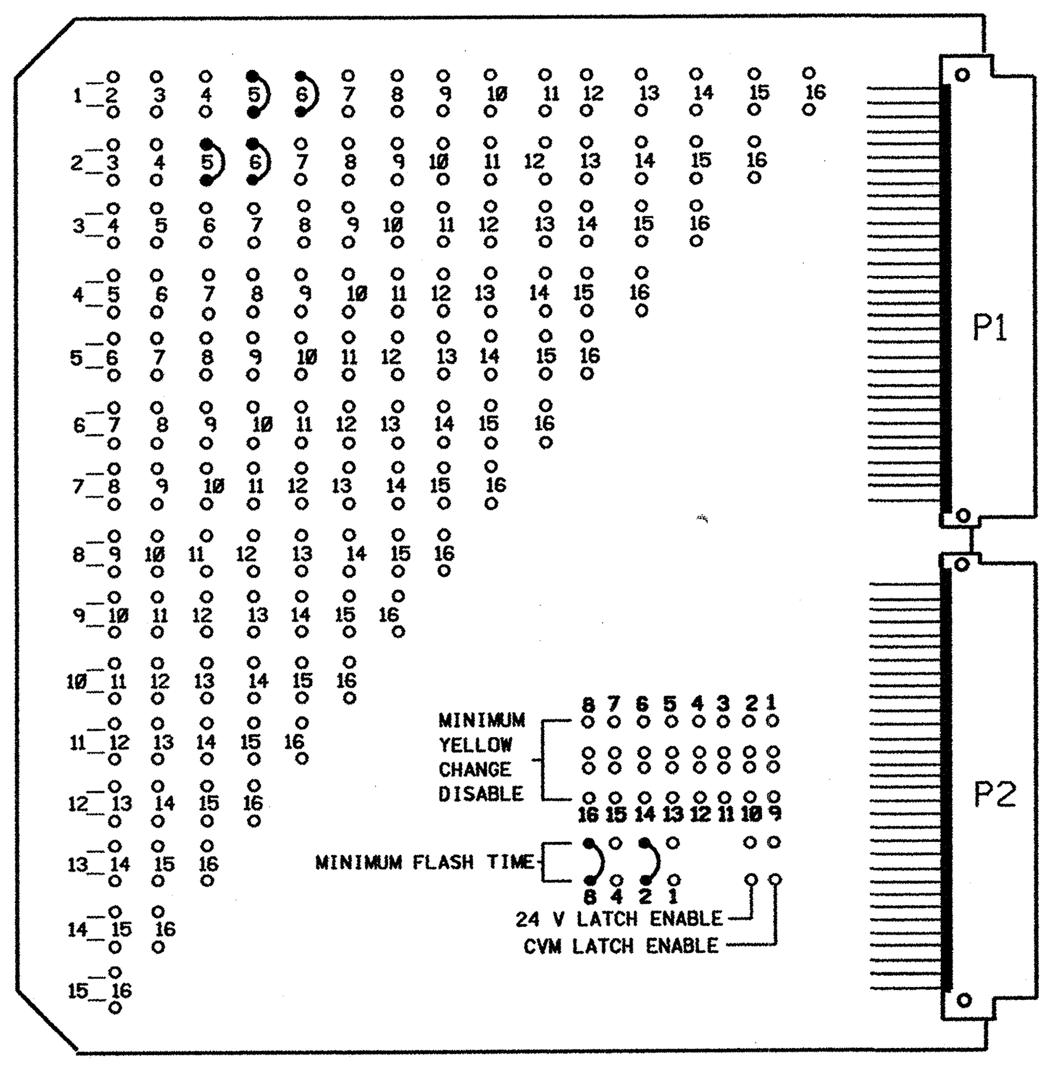
tthigpen

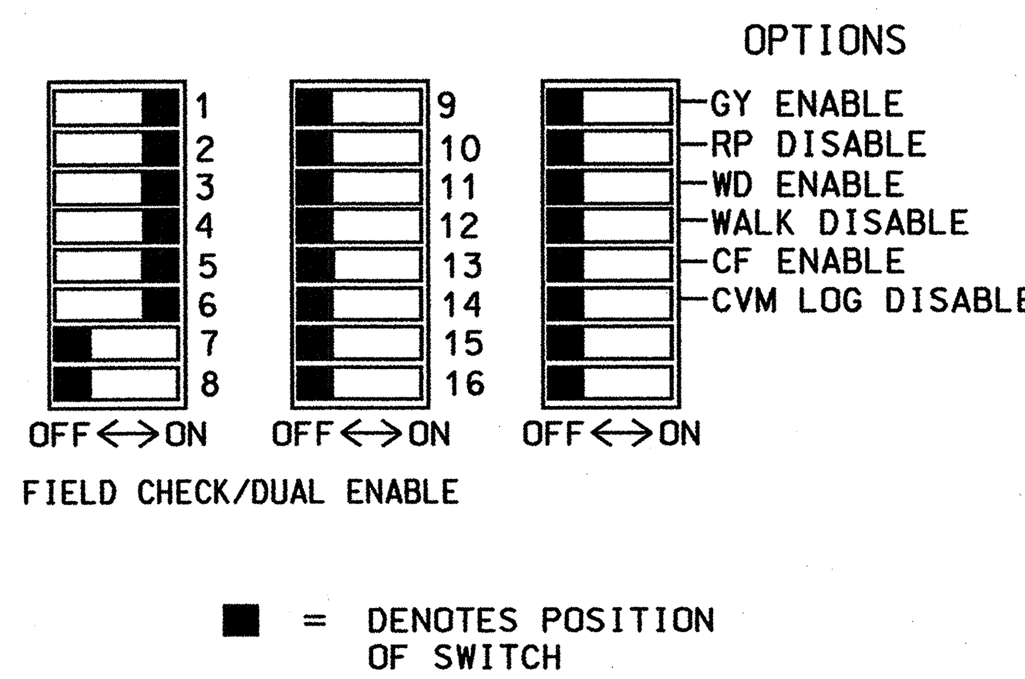
PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.5

EDI MODEL MMU-16E MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and set switches as shown below)



MMU PROGRAMMING CARD



NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 7, 8, 9, 10, 11, 12, 13, 14, 15 AND 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
10. THE CABINET AND CONTROLLER ARE A PART OF THE GREENVILLE CITY SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	1		2	3		4			5		6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	11	32	21,22	31	32	41	42,43	63	43	51	61 62,63	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED			2R	3R	3R	4R	4R				6R										
YELLOW			2Y	3Y	3Y	4Y	4Y				6Y										
GREEN			2G	3G	3G	4G	4G				6G										
RED ARROW	1R									5R											
YELLOW ARROW	1Y	1Y						4Y	5Y	5Y											
GREEN ARROW	1G	1G		3G		4G		4G	5G	5G											

NU = Not Used

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

LOOP NO.	LOOP PANEL TERMINALS
	L1A,L1B
1B	L2A,L2B
1C	L3A,L3B
1D	L4A,L4B
2A	L5A,L5B
2B	L6A,L6B
	L7A,L7B
	L8A,L8B
3A	L9A,L9B
	L10A,L10B
	L11A,L11B
	L12A,L12B
5A	L13A,L13B
5B	L14A,L14B
6A	L15A,L15B
6B	L16A,L16B
6C	L17A,L17B
7A	L18A,L18B
	L19A,L19B
8B	L20A,L20B
	L21A,L21B
	L22A,L22B
	L23A,L23B
	L24A,L24B

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1			
2	ø 1		
* 3	ø 3	DC/EC	5/2
4	ø 3	DELAY	15
5	ø 2		
6	ø 2		
7			
8			
9	ø 3	DELAY	100
10			
11			
12			
13	ø 5		
14	ø 5	DELAY	15
15	ø 6		
16	ø 6		
17	ø 6		
18	ø 4	DELAY	3
19			
20	ø 3	DELAY	3
21			
22			
23			
24			

* THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE TIMING REQUIRED FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

EQUIPMENT INFORMATION

CONTROLLER.............CONTRACTOR SUPPLIED
CABINET ....CONTRACTOR SUPPLIED TS-2 NC-8A
CABINET MOUNT..........BASE
LOADBAY POSITIONS.......16
LOAD SWITCHES USED......1,2,3,4,5,6
PHASES USED............1,2,3,4,5,6
OLA....................NOT USED
OLB....................NOT USED
OLC....................NOT USED
OLD....................NOT USED

DETECTOR RACK #1

BIU											
BIU	CH1 L3 ø 3 *	CH1 NOT USED	SLOT EMPTY	CH1 L5 ø 2	SLOT EMPTY	CH1 L9 ø 3	CH1 L15 ø 6	CH1 L13 ø 5	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	CH2 L4 ø 3	CH2 L2 ø 1		CH2 L6 ø 2		CH2 NOT USED	CH2 L16 ø 6	CH2 L14 ø 5			

DETECTOR RACK #2

BIU	CH1 NOT USED	CH1 L17 ø 6	SLOT EMPTY	SLOT EMPTY
	CH2 L20 ø 3	CH2 L18 ø 4		

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 02-0426 T2
DESIGNED: January 2006
SEALED: 03-03-06
REVISED: NA

Signal Upgrade - Temporay 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 11 - 903 (Memorial Drive) at SR 1152 (Dr. Fulford Drive Rd.) SR 1708 (Fire Tower Rd.)

Division 2 Pitt County Greenville

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, State of North Carolina Department of Transportation, Signals Management Section
122 N. McDowell St., Raleigh, NC 27603

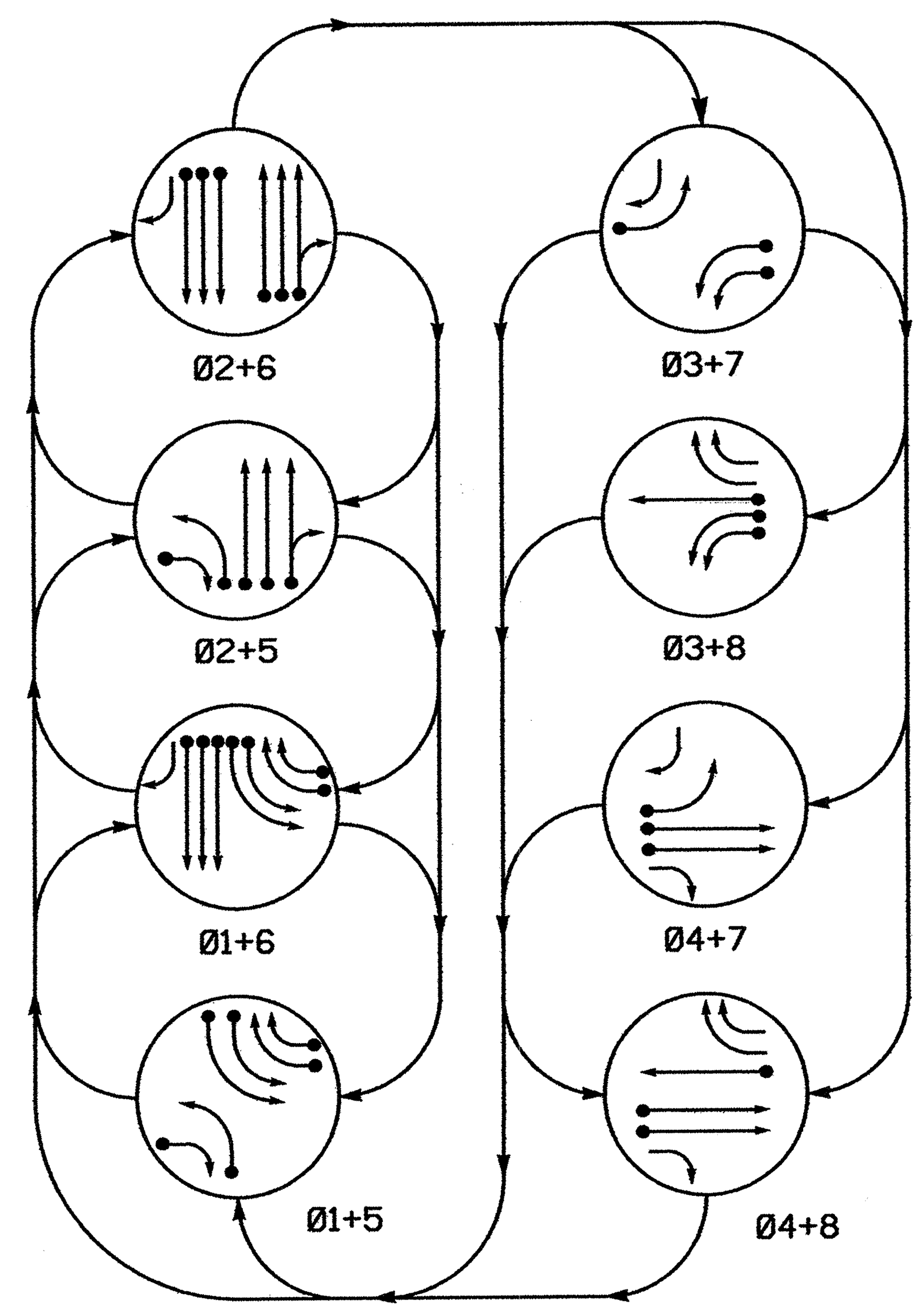
PLAN DATE: February 2006	REVIEWED BY: MWH
PREPARED BY: James Peterson	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR
John T. Rowe Jr. 3-8-06
SIGNATURE DATE

SIG. INVENTORY NO. 02-0426 T2

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

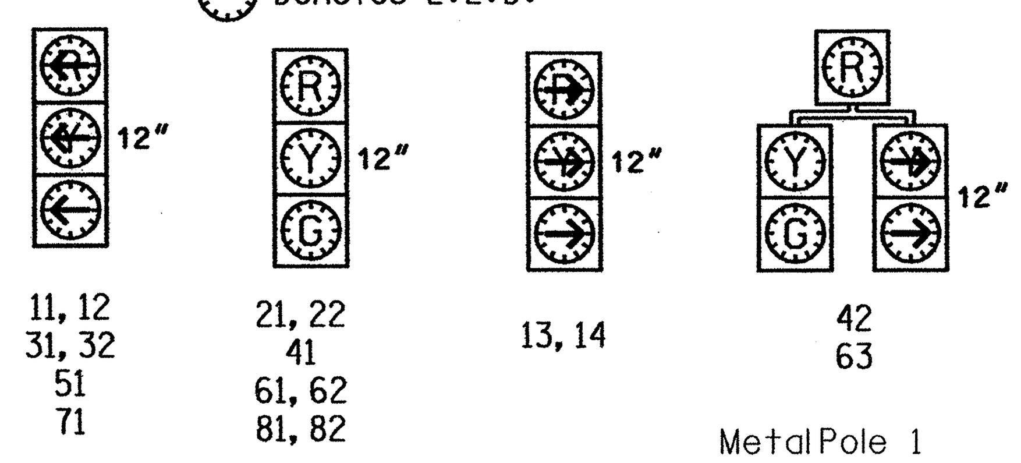
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11, 12	←	←	←R	←R	←R	←R	←R	←R	←R
13, 14	→	→	R→	R→	R→	→	R→	→	R→
21, 22	R	R	G	G	R	R	R	R	Y
31, 32	←R	←R	←R	←R	←	←	←R	←R	←R
41	R	R	R	R	R	R	G	G	R
42	R/→	R	R/→	R	R	R	G	G	R
51	←	←R	←	←R	←R	←R	←R	←R	←R
61, 62	R	G	R	G	R	R	R	R	Y
63	R	G	R	G	R/→	R	R/→	R	Y
71	←R	←R	←R	←R	←	←R	←	←R	←R
81, 82	R	R	R	R	R	G	R	G	R

SIGNAL FACE I.D.

Denotes L.E.D.



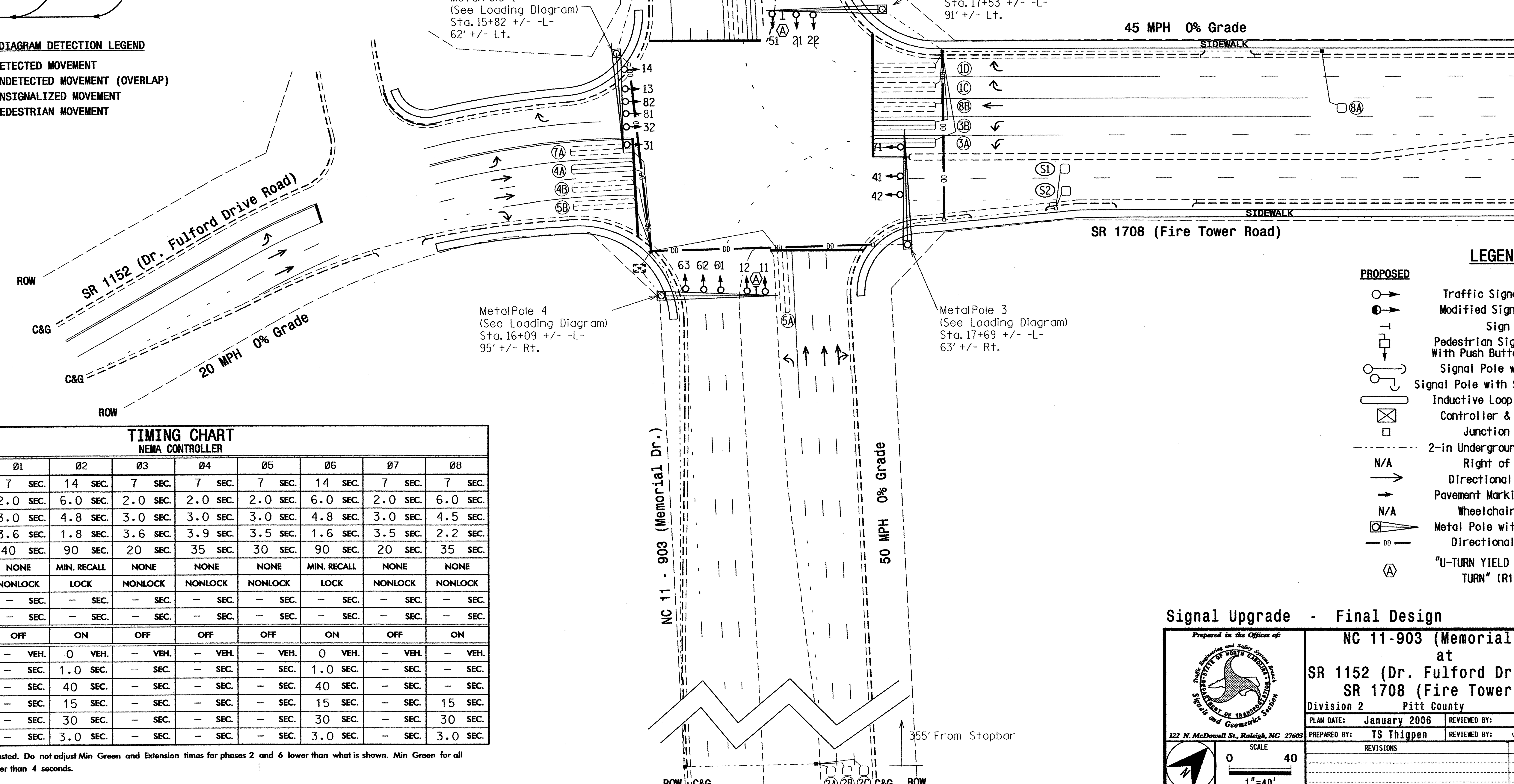
LOOP & DETECTOR UNIT INSTALLATION CHART
NEMA CONTROLLER WITH TS-2 CABINET

LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?
1A	6X40	2-4-2	0	X		1	X		–	– SEC.	ALL	NO
1B	6X40	2-4-2	0		X	1		X	–	– SEC.	ALL	NO
1C	6X40	2-4-2	0		X	1		X	DELAY	15 SEC.	ALL	YES
1D	6X40	2-4-2	0		X	1		X	DELAY	15 SEC.	ALL	YES
2A	6X6	6	355		X	2		X	–	– SEC.	ALL	NO
2B	6X6	6	355		X	2		X	–	– SEC.	ALL	NO
2C	6X6	6	355	X		2	X		–	– SEC.	ALL	NO
3A	6X40	2-4-2	0	X		3	X		–	– SEC.	ALL	NO
3B	6X40	2-4-2	0	X		3	X		–	– SEC.	ALL	NO
4A	6X40	2-4-2	0	X		4	X		–	– SEC.	ALL	NO
4B	6X40	2-4-2	0		X	4		X	–	– SEC.	ALL	NO
5A	6X40	2-4-2	0		X	5		X	–	– SEC.	ALL	NO
5B	6X40	2-4-2	0		X	5		X	DELAY	15 SEC.	ALL	YES
6A	6X6	6	355		X	6		X	–	– SEC.	ALL	NO
6B	6X6	6	355		X	6		X	–	– SEC.	ALL	NO
6C	6X6	6	355		X	6		X	–	– SEC.	ALL	NO
7A	6X40	2-4-2	0		X	7		X	DELAY	3 SEC.	ALL	YES
8A	6X6	6	300	X		8	X		DELAY	100 SEC.	ALL	YES
8B	6X40	2-4-2	0		X	8		X	DC/EC	5/2 SEC.	ALL	NO
S1	6X6	4	+275	X		-	X		System Detector			
S2	6X6	4	+275	X		-	X		System Detector			

8 Phase
Fully Actuated
(Greenville City System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 or phase 5 may be lagged.
4. Phase 3 or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
7. Intersection Zone Number: 13, System Address Number: 63



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Pavement Marking Arrow	
N/A	Wheelchair Ramp	
	Metal Pole with Mastarm	
	Directional Drill	N/A
Ⓐ	"U-TURN YIELD TO RIGHT TURN" (R10-16)	Ⓐ

TIMING CHART
NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM GREEN	7 SEC.	14 SEC.	7 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.	7 SEC.
PASSAGE/GAP	2.0 SEC.	6.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	6.0 SEC.	2.0 SEC.	6.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.8 SEC.	3.0 SEC.	3.0 SEC.	3.0 SEC.	4.8 SEC.	3.0 SEC.	4.5 SEC.
RED CLEARANCE	3.6 SEC.	1.8 SEC.	3.6 SEC.	3.9 SEC.	3.5 SEC.	1.6 SEC.	3.5 SEC.	2.2 SEC.
MAX. 1	40 SEC.	90 SEC.	20 SEC.	35 SEC.	30 SEC.	90 SEC.	20 SEC.	35 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL	NONE	NONE
VEHI. CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	NONLOCK	LOCK	NONLOCK	NONLOCK
WALK	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
FLASHING DON'T WALK	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
VOLUME DENSITY	OFF	ON	OFF	OFF	OFF	ON	OFF	ON
ACTUATION B4 ADD	– VEH.	0 VEH.	– VEH.	– VEH.	– VEH.	0 VEH.	– VEH.	– VEH.
SEC. PER ACTUATION	– SEC.	1.0 SEC.	– SEC.	– SEC.	– SEC.	1.0 SEC.	– SEC.	– SEC.
MAX. INITIAL	– SEC.	40 SEC.	– SEC.	– SEC.	– SEC.	40 SEC.	– SEC.	– SEC.
TIME B4 REDUCTION	– SEC.	15 SEC.	– SEC.	– SEC.	– SEC.	15 SEC.	– SEC.	15 SEC.
TIME TO REDUCE	– SEC.	30 SEC.	– SEC.	– SEC.	– SEC.	30 SEC.	– SEC.	30 SEC.
MINIMUM GAP	– SEC.	3.0 SEC.	– SEC.	– SEC.	– SEC.	3.0 SEC.	– SEC.	3.0 SEC.

* 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.

Signal Upgrade - Final Design

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, North Carolina Department of Transportation
122 N. McDowell St., Raleigh, NC 27603

SCALE 0 40
1"=40'

NC 11-903 (Memorial Drive)/ at SR 1152 (Dr. Fulford Drive Rd.) SR 1708 (Fire Tower Rd.)

Division 2	Pitt County	Greenville
PLAN DATE: January 2006	REVIEWED BY: RM Duffy	
PREPARED BY: TS Thigpen	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
RICHARD E. MULLINAX
SIGNATURE 3 MARCH 2006 DATE

SIG. INVENTORY NO. 02-0426

09-MAY-2006 11:03
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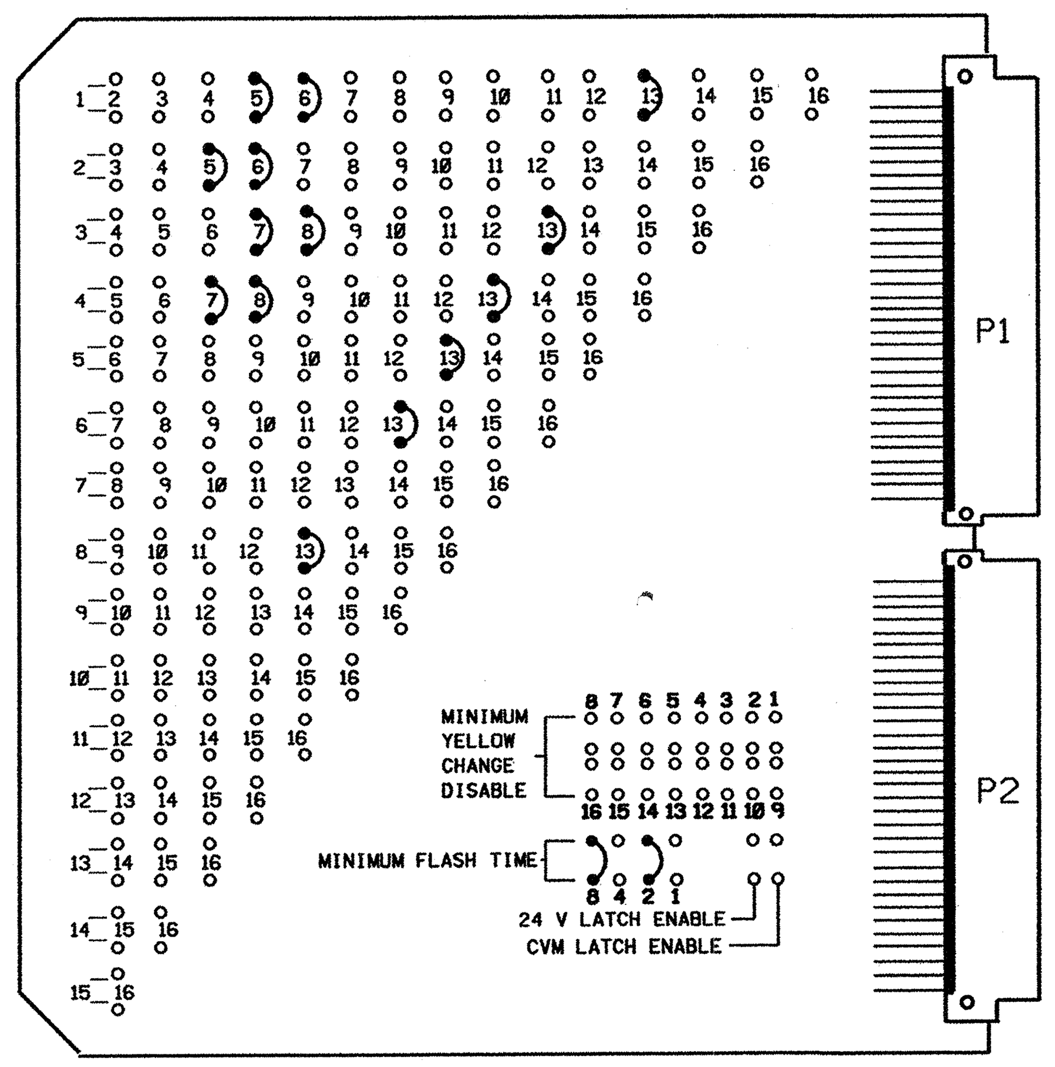
rduffy

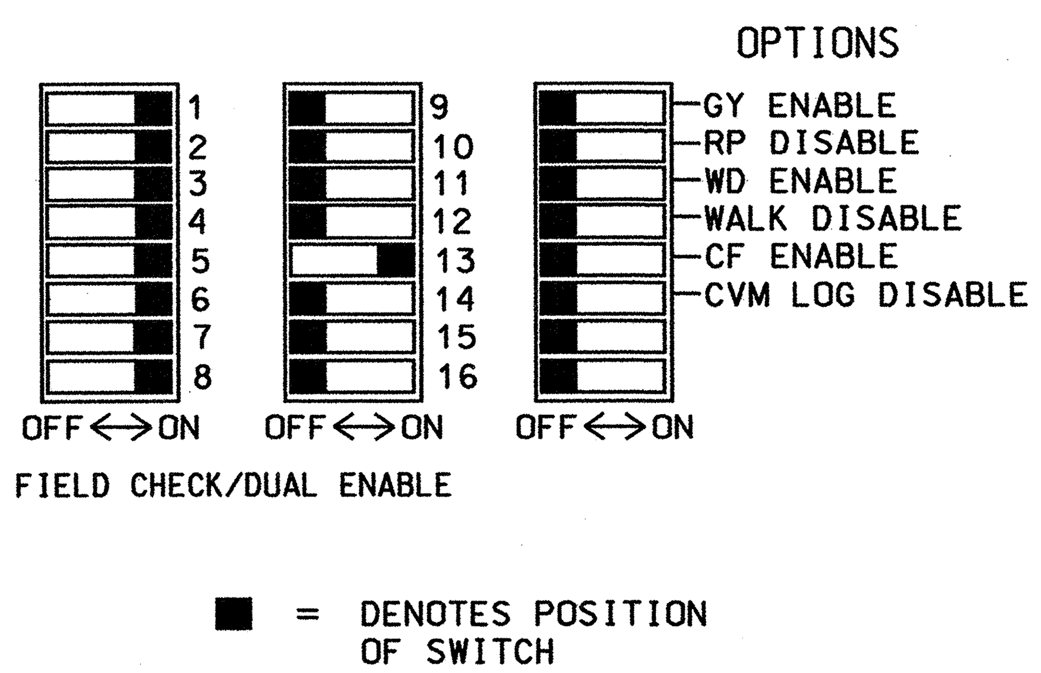
PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig. 7

EDI MODEL MMU-16E MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and set switches as shown below)



MMU PROGRAMMING CARD



NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 9,10,11,12,14,15 & 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
10. THE CABINET AND CONTROLLER ARE A PART OF THE GREENVILLE CITY SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	1	2	3	4	5		6	7		8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	11,12	21,22	31,32	41,42	42	51	61, 62,63	63	71	81,82	NU	NU	NU	NU	13,14	NU	NU	NU
RED		2R		4R			6R			8R								
YELLOW		2Y		4Y			6Y			8Y								
GREEN		2G		4G			6G			8G								
RED ARROW	1R		3R			5R			7R						13R			
YELLOW ARROW	1Y		3Y		5Y	5Y		7Y	7Y						13Y			
GREEN ARROW	1G		3G		5G	5G		7G	7G						13G			

NU = Not Used

ECONOLITE ASC/2-2100 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

FROM MAIN MENU SELECT 2 (CONTROLLER) AND THEN 5 (OVERLAP DATA)

OVERLAP A

CONTROLLER OVERLAP DATA

OVERLAP A.	1	2	3	4	5	6	7	8	9	10	11	12
STANDARD.	X	.	.	.	.	.	.	X	.	.	.	.
PROTECTED.	.	.	.	.	.	.	.	.	.	.	.	.
PERMITTED.	.	.	.	.	.	.	.	.	.	.	.	.
ENABLE LAG	.	.	.	.	.	.	.	.	.	.	.	.
ENABLE LEAD. . . .	.	.	.	.	.	.	.	.	.	.	.	.
SPARE.	.	.	.	.	.	.	.	.	.	.	.	.

ADVANCE GREEN TIMER 0.0
LAG/LEAD GREEN TIMER 0.0
LAG/LEAD YELLOW TIMER 0.0
LAG/LEAD RED TIMER 0.0
ADDITIONAL PAGE(S)

END OF PROGRAMMING

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
1B	L2A,L2B
1C	L3A,L3B
1D	L4A,L4B
2A	L5A,L5B
2B	L6A,L6B
2C	L7A,L7B
	L8A,L8B
3A	L9A,L9B
3B	L10A,L10B
4A	L11A,L11B
4B	L12A,L12B
5A	L13A,L13B
5B	L14A,L14B
6A	L15A,L15B
6B	L16A,L16B
6C	L17A,L17B
7A	L18A,L18B
8A	L19A,L19B
8B	L20A,L20B
S1	L21A,L21B
S2	L22A,L22B
	L23A,L23B
	L24A,L24B

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

ASSIGN CONTROLLER SYSTEM DETECTOR TO LOCAL CONT. DET. NUMBERS AS SHOWN IN CHART BELOW

CONTROLLER SYS. DET. NO.	LOCAL CONT. DETECTOR NO.
1	21
2	22
3	
4	
5	
6	
7	
8	

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
1	Ø 1		
2	Ø 1		
3	Ø 1	DELAY	15
4	Ø 1	DELAY	15
5	Ø 2		
6	Ø 2		
7	Ø 2		
8			
9	Ø 3		
10	Ø 3		
11	Ø 4		
12	Ø 4		
13	Ø 5		
14	Ø 5	DELAY	15
15	Ø 6		
16	Ø 6		
17	Ø 6		
18	Ø 7	DELAY	3
19	Ø 8	DELAY	100
* 20	Ø 8	DC/EC	5/2
21	SYS		
22	SYS		
23			
24			

DETECTOR RACK #1

BIU	CH1 L3 Ø 1	CH1 L1 Ø 1	CH1 L7 Ø 2	CH1 L5 Ø 2	CH1 L11 Ø 4	CH1 L9 Ø 3	CH1 L15 Ø 6	CH1 L13 Ø 5	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	CH2 L4 Ø 1	CH2 L2 Ø 1	CH2 NOT USED	CH2 L6 Ø 2	CH2 L12 Ø 4	CH2 L10 Ø 3	CH2 L16 Ø 6	CH2 L14 Ø 5			

DETECTOR RACK #2

BIU	CH1 L19 Ø 8	CH1 L17 Ø 6	SLOT EMPTY	CH1 L21 SYS DET
	CH2 L20 Ø 8 *	CH2 L18 Ø 7		CH2 L22 SYS DET

* THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE TIMING REQUIRED FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

EQUIPMENT INFORMATION

CONTROLLER.............CONTRACTOR SUPPLIED
CABINET ....CONTRACTOR SUPPLIED TS-2 NC-8A
CABINET MOUNT...........BASE
LOADBAY POSITIONS.......16
LOAD SWITCHES USED......1,2,3,4,5,6,7,8,13
PHASES USED.............1,2,3,4,5,6,7,8
OLA.....................1+8
OLB.....................NOT USED
OLC.....................NOT USED
OLD.....................NOT USED

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	Ø1
2	Ø2
3	Ø3
4	Ø4
5	Ø5
6	Ø6
7	Ø7
8	Ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0426
DESIGNED: January 2006
SEALED: 03-03-06
REVISED: NA

Signal Upgrade - Final

ELECTRICAL AND PROGRAMMING DETAILS FOR:

NC 11 - 903 (Memorial Drive)
at
SR 1152 (Dr. Fulford Drive Rd.)
SR 1708 (Fire Tower Rd.)

Division 2 Pitt County Greenville

PLAN DATE: February 2006 REVIEWED BY: MWH
PREPARED BY: James Peterson REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, State of North Carolina Department of Transportation, Signals Management Section
122 N. McDowell St., Raleigh, NC 27603

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 008453 JOHN T. ROWE, JR

John T. Rowe Jr 3-8-06
SIGNATURE DATE

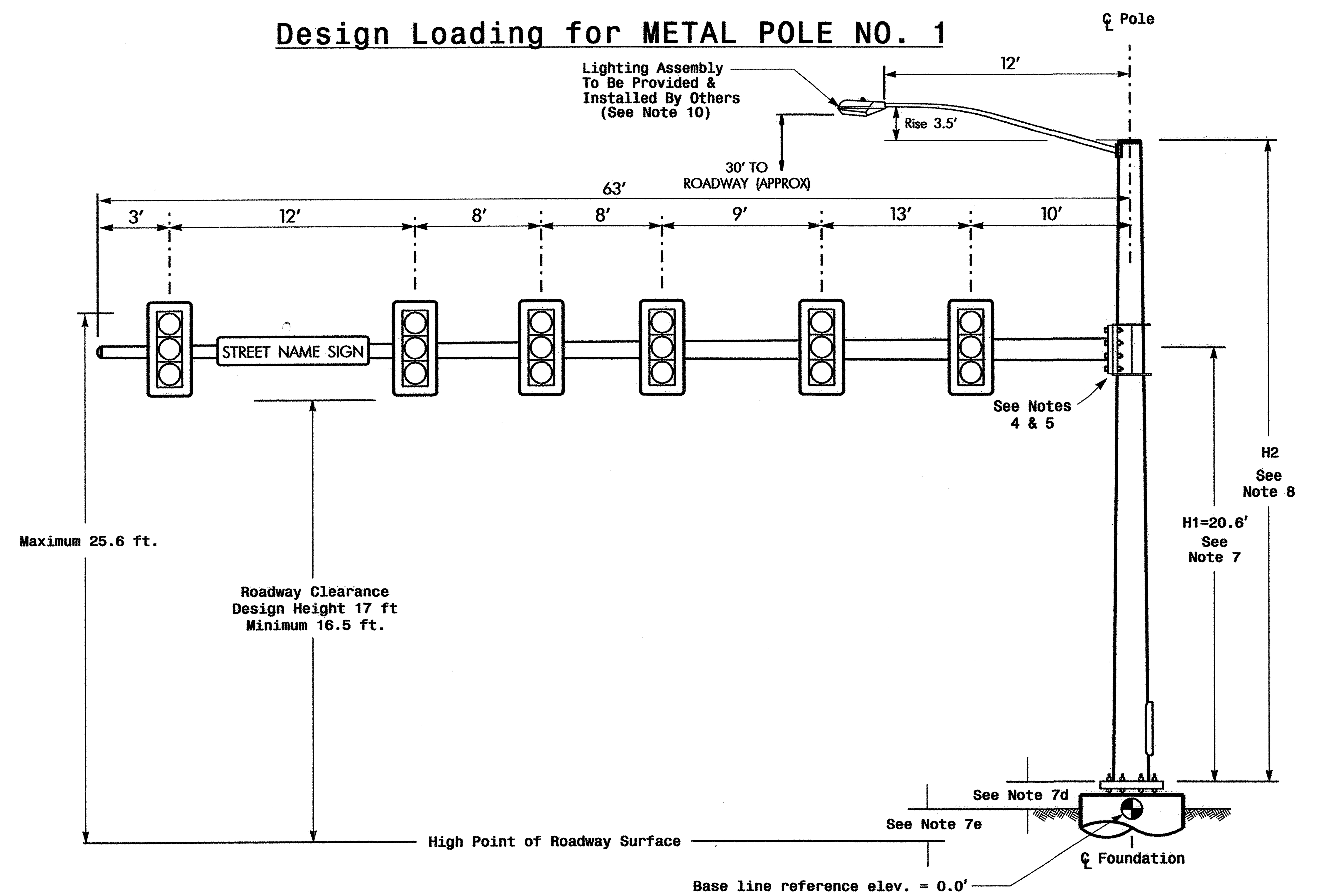
SIG. INVENTORY NO. 02-0426

08-MAR-2006 08:33
u:*020426_sm_ele_xxx.dgn
jtpeterson

METAL POLE No. 1 and 2

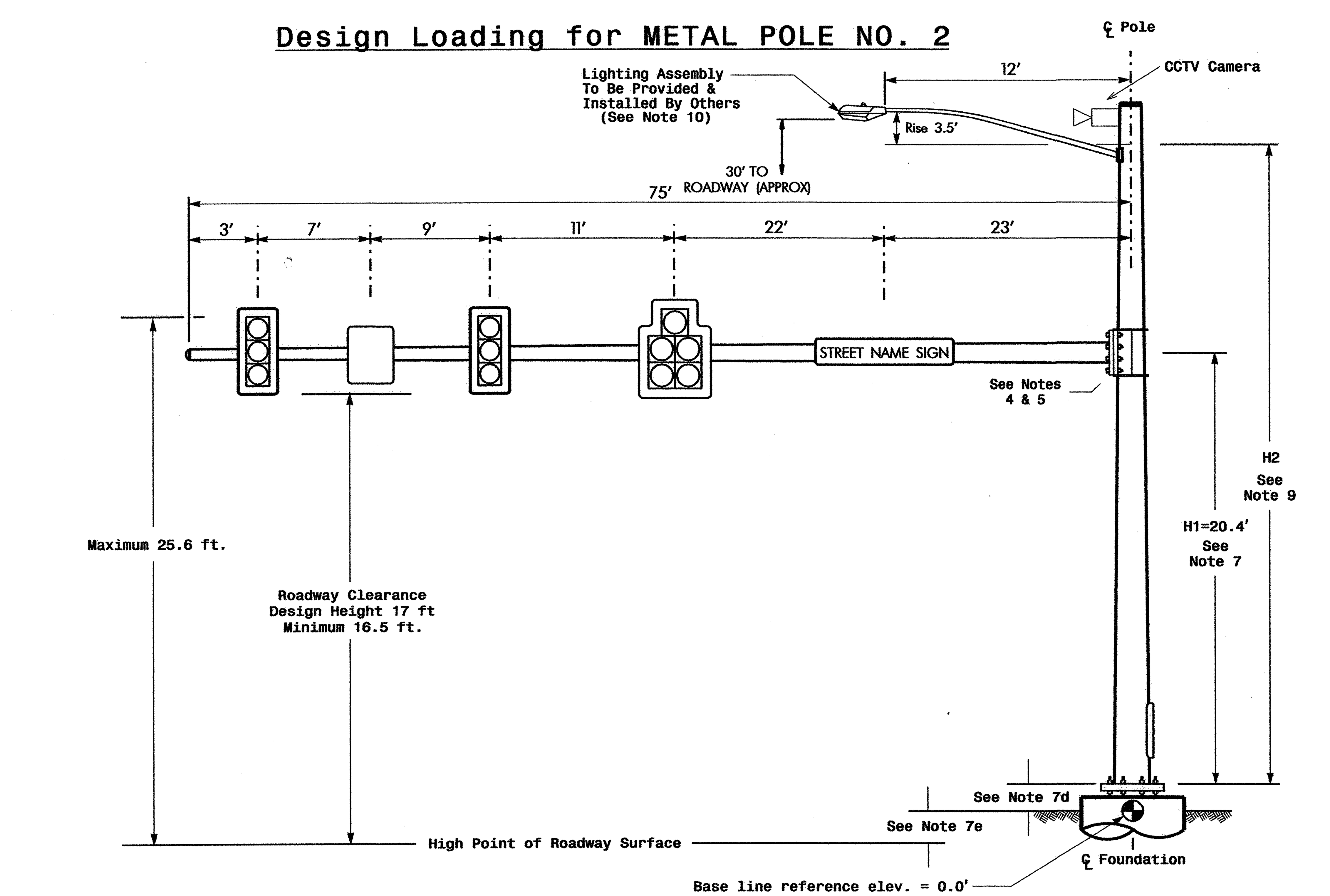
PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig. 8

Design Loading for METAL POLE NO. 1



Elevation View

Design Loading for METAL POLE NO. 2



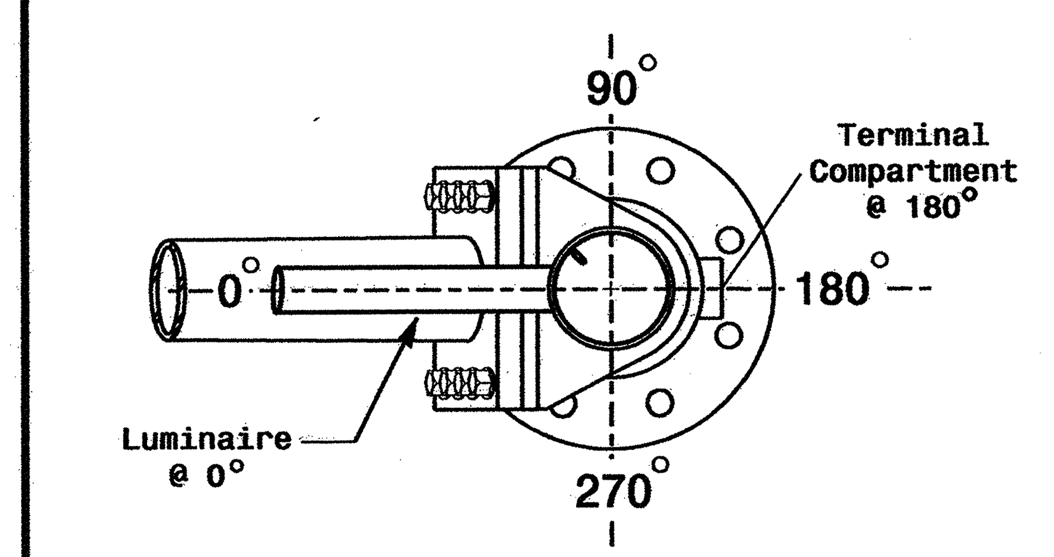
Elevation View

SPECIAL NOTE

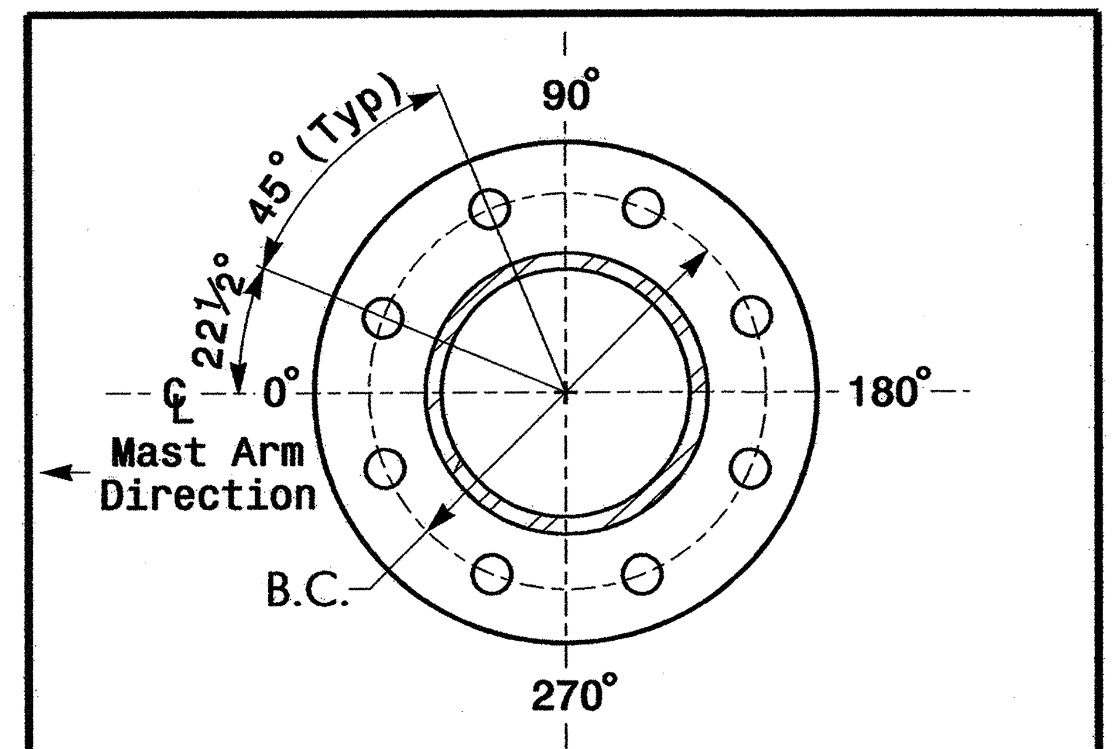
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

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	+2.1 ft.	+1.8 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

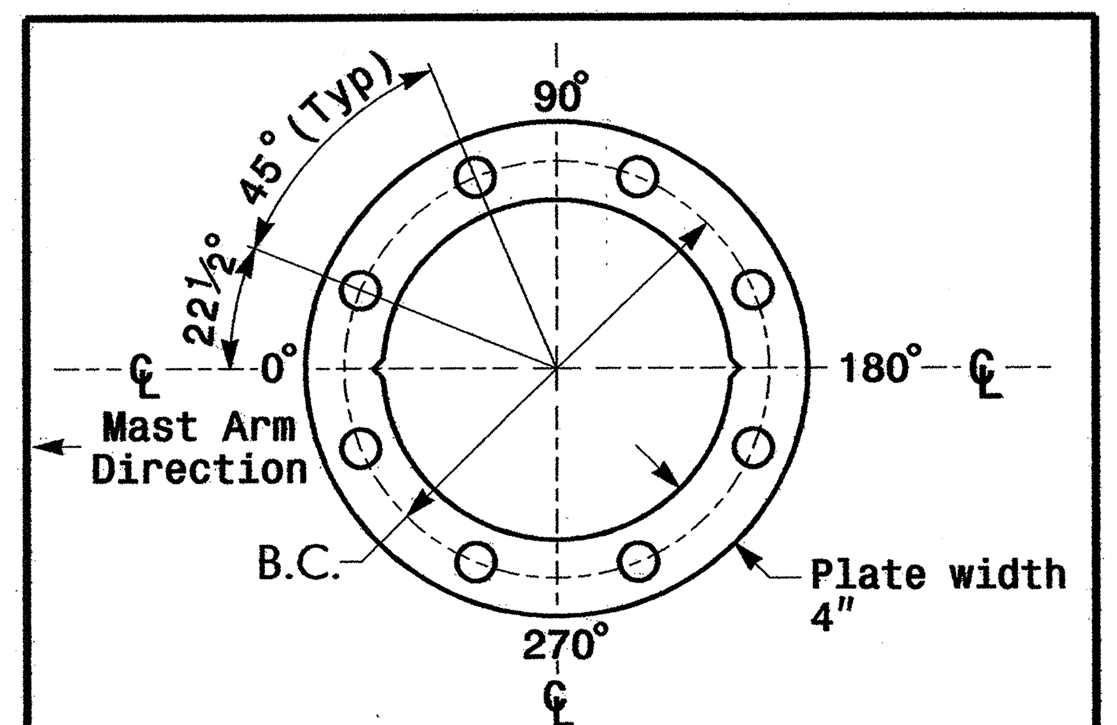


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS

	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

NOTES

Design Reference Material

1. 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 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   The 2002 NCDOT Roadway Standard Drawings.
   The traffic signal project plans and special provisions.
   The NCDOT "Metal Pole Standards" located at the following NCDOT website:
   http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Maximum allowable CSR for all signal supports is 0.9.
4. 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.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads 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.
8. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
9. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet plus 40 inches for the CCTV Camera.
10. Design the luminaire support arm using design dimensions as shown on elevation views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.
11. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
12. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
13. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 2 (130 mph)

Prepared in the Offices of: Signals and Geometrics Section, 122 N. McDowell St., Raleigh, NC 27603

NC 11-903 (Memorial Drive) at SR 1152(Dr. Fulford Drive Rd.)/ SR 1708 (Fire Tower Rd.)

Division 2 Pitt County Greenville

PLAN DATE:	March 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

SCALE 0 N/A

N/A

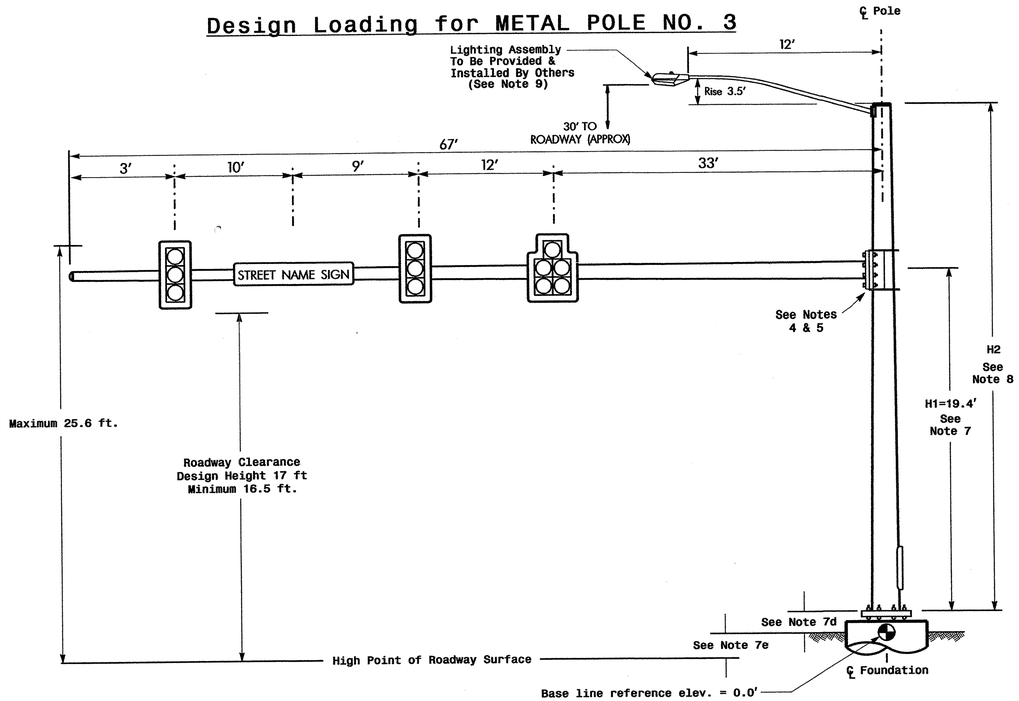
REVISIONS | INIT. | DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20... RICHARD E. MULLINAX 10 MAY 2006

SIGNATURE DATE

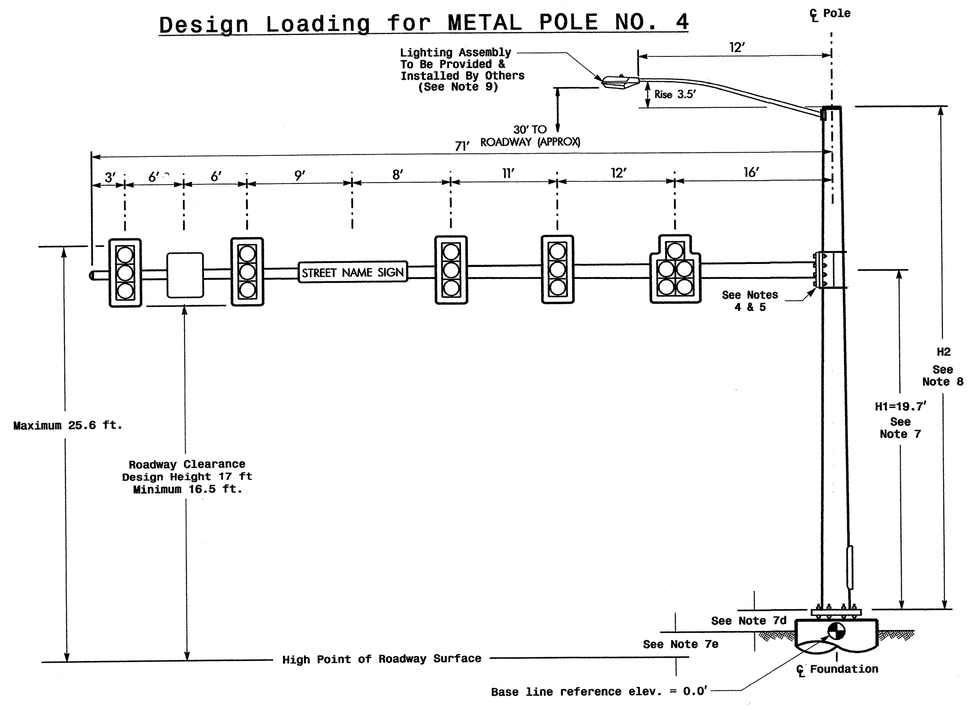
SIG. INVENTORY NO. 02-0426

Design Loading for METAL POLE NO. 3



Elevation View

Design Loading for METAL POLE NO. 4



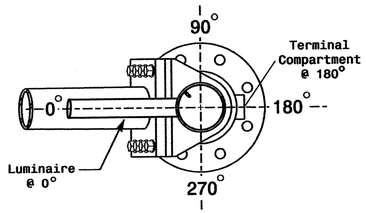
Elevation View

SPECIAL NOTE

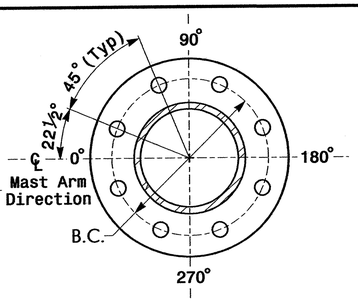
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+0.8 ft.	+1.1 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

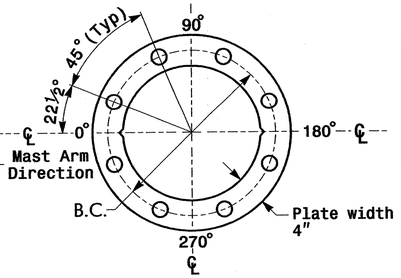


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12″-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0″ W X 56.0″ L	103 LBS
	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0″ W X 30.0″ L	11 LBS
	SIGNAL HEAD 12″-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5″ W X 52.5″ L	60 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0″ W X 96.0″ L	27 LBS
	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25″ W X 26.25″ L	35 LBS

NOTES

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1. 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 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
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   The traffic signal project plans and special provisions.
   The NCDOT "Metal Pole Standards" located at the following NCDOT website:
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Design Requirements

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3. Maximum allowable CSR for all signal supports is 0.9.
4. 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.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads 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.
8. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
9. Design the luminaire support arm using design dimensions as shown on elevation views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.
10. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
11. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
12. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 2 (130 mph)

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signals and Geometrics Section
122 N. McDowell St., Raleigh, NC 27603

NC 11-903 (Memorial Drive) at SR 1152(Dr. Fulford Drive Rd.)/ SR 1708 (Fire Tower Rd.)

Division 2 | Pitt County | Greenville

PLAN DATE:	February 2006	REVIEWED BY:	RW Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

REVISIONS	INIT.	DATE

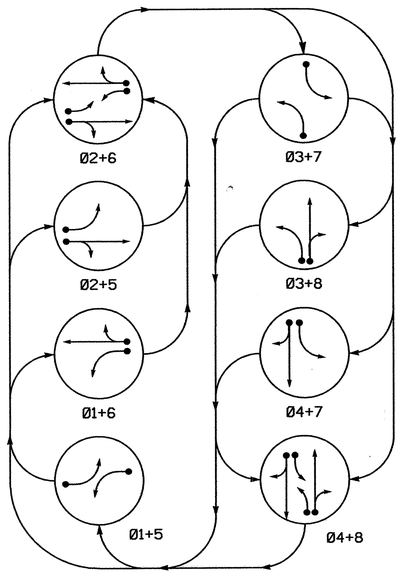
SCALE: 0 N/A N/A

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 22027 ENGINEER E. MULLINAX
11 May 2006
SIGNATURE | DATE

SIG. INVENTORY NO. 02-0426

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.10

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

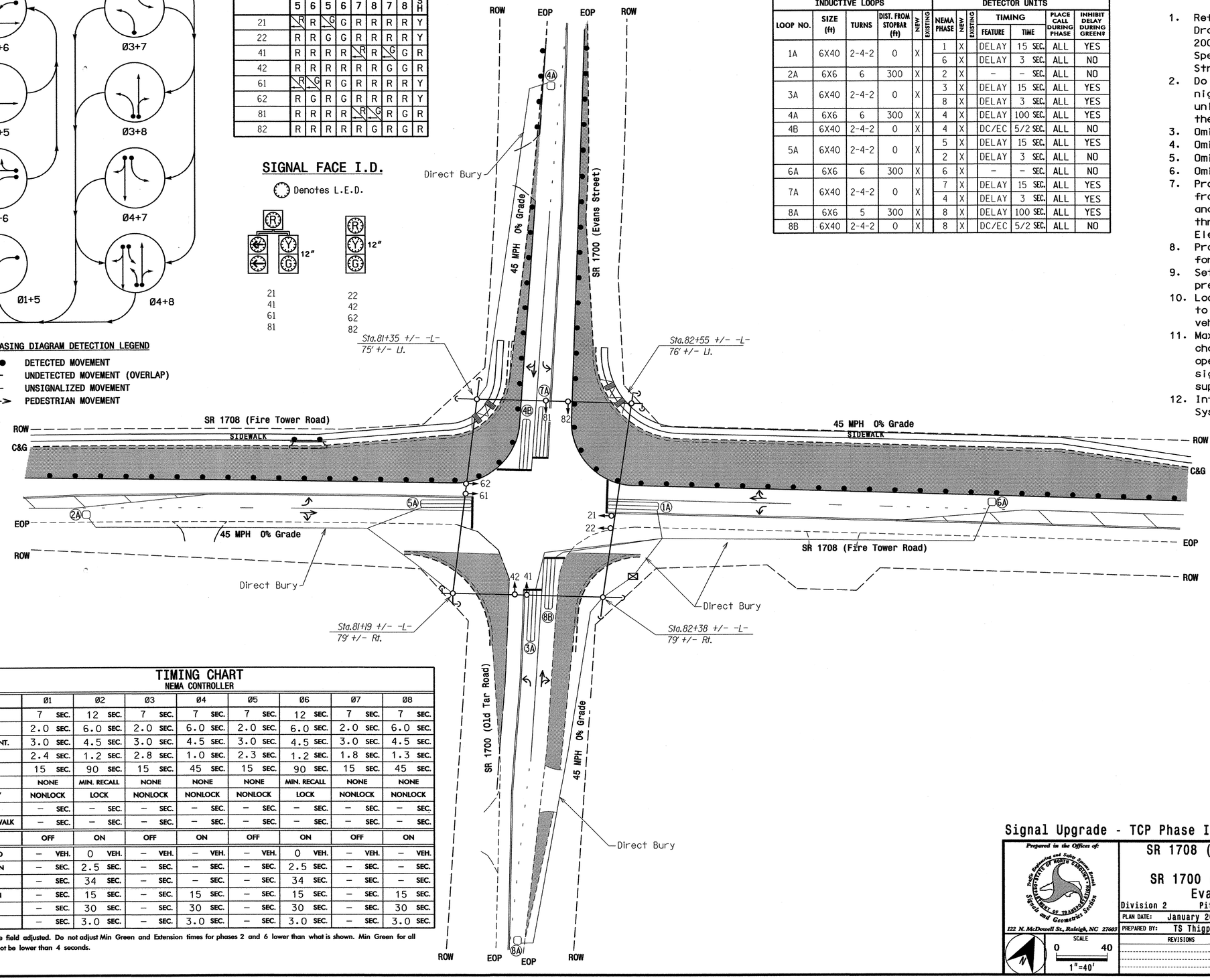
SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
21	R/←	R	G/←	G	R	R	R	R	Y
22	R	R	G	G	R	R	R	R	Y
41	R	R	R	R	R/←	R	G/←	G	R
42	R	R	R	R	R	R	G	G	R
61	R/←	G/←	R	G	R	R	R	R	Y
62	R	G	R	G	R	R	R	R	Y
81	R	R	R	R	R/←	G/←	R	G	R
82	R	R	R	R	R	G	R	G	R

SIGNAL FACE I.D.

Denotes L.E.D.

21
41
61
81

22
42
62
82



LOOP & DETECTOR UNIT INSTALLATION CHART

NEMA CONTROLLER WITH TS-2 CABINET

INDUCTIVE LOOPS					DETECTOR UNITS						
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?
1A	6X40	2-4-2	0	X		1	X		DELAY	15 SEC.	ALL	YES
						6	X		DELAY	3 SEC.	ALL	NO
2A	6X6	6	300	X		2	X		–	– SEC.	ALL	NO
3A	6X40	2-4-2	0	X		3	X		DELAY	15 SEC.	ALL	YES
						8	X		DELAY	3 SEC.	ALL	YES
4A	6X6	6	300	X		4	X		DELAY	100 SEC.	ALL	YES
4B	6X40	2-4-2	0	X		4	X		DC/EC	5/2 SEC.	ALL	NO
5A	6X40	2-4-2	0	X		5	X		DELAY	15 SEC.	ALL	YES
						2	X		DELAY	3 SEC.	ALL	NO
6A	6X6	6	300	X		6	X		–	– SEC.	ALL	NO
7A	6X40	2-4-2	0	X		7	X		DELAY	15 SEC.	ALL	YES
						4	X		DELAY	3 SEC.	ALL	YES
8A	6X6	5	300	X		8	X		DELAY	100 SEC.	ALL	YES
8B	6X40	2-4-2	0	X		8	X		DC/EC	5/2 SEC.	ALL	NO

TIMING CHART

NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM GREEN	7 SEC.	12 SEC.	7 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.	7 SEC.
PASSAGE/GAP	2.0 SEC.	6.0 SEC.	2.0 SEC.	6.0 SEC.	2.0 SEC.	6.0 SEC.	2.0 SEC.	6.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.5 SEC.	3.0 SEC.	4.5 SEC.	3.0 SEC.	4.5 SEC.	3.0 SEC.	4.5 SEC.
RED CLEARANCE	2.4 SEC.	1.2 SEC.	2.8 SEC.	1.0 SEC.	2.3 SEC.	1.2 SEC.	1.8 SEC.	1.3 SEC.
MAX. 1	15 SEC.	90 SEC.	15 SEC.	45 SEC.	15 SEC.	90 SEC.	15 SEC.	45 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL	NONE	NONE
VEHI. CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	NONLOCK	LOCK	NONLOCK	NONLOCK
WALK	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
FLASHING DON'T WALK	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
VOLUME DENSITY	OFF	ON	OFF	ON	OFF	ON	OFF	ON
ACTUATION B4 ADD	– VEH.	0 VEH.	– VEH.	– VEH.	– VEH.	0 VEH.	– VEH.	– VEH.
SEC. PER ACTUATION	– SEC.	2.5 SEC.	– SEC.	– SEC.	– SEC.	2.5 SEC.	– SEC.	– SEC.
MAX. INITIAL	– SEC.	34 SEC.	– SEC.	– SEC.	– SEC.	34 SEC.	– SEC.	– SEC.
TIME B4 REDUCTION	– SEC.	15 SEC.	– SEC.	15 SEC.	– SEC.	15 SEC.	– SEC.	15 SEC.
TIME TO REDUCE	– SEC.	30 SEC.	– SEC.	30 SEC.	– SEC.	30 SEC.	– SEC.	30 SEC.
MINIMUM GAP	– SEC.	3.0 SEC.	– SEC.	3.0 SEC.	– SEC.	3.0 SEC.	– SEC.	3.0 SEC.

* 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.

8 Phase Fully Actuated (Greenville City System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 1 during phase 2 on.
4. Omit phase 5 during phase 6 on.
5. Omit phase 3 during phase 4 on.
6. Omit phase 7 during phase 8 on.
7. Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4+8 (see Electrical Details).
8. Program phase 4 and phase 8 for dual entry.
9. Set all detector units to presence mode.
10. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
12. Intersection Zone Number: 7, System Address Number: 81

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone	
	Construction Zone Drums	

Signal Upgrade - TCP Phase I - Temporary Design 1

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, NCDEPARTMENT OF TRANSPORTATION, Roads and Geometrics Section
122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road) at SR 1700 (Old Tar Road)/ Evans Street

Division 2 | Pitt County | Greenville

PLAN DATE: January 2006 | REVIEWED BY: RW Duffy

PREPARED BY: TS Thigpen | REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL — NORTH CAROLINA — PROFESSIONAL ENGINEER — RICHARD E. MULLINAX — 3 MARCH 2006

SIGNATURE | DATE

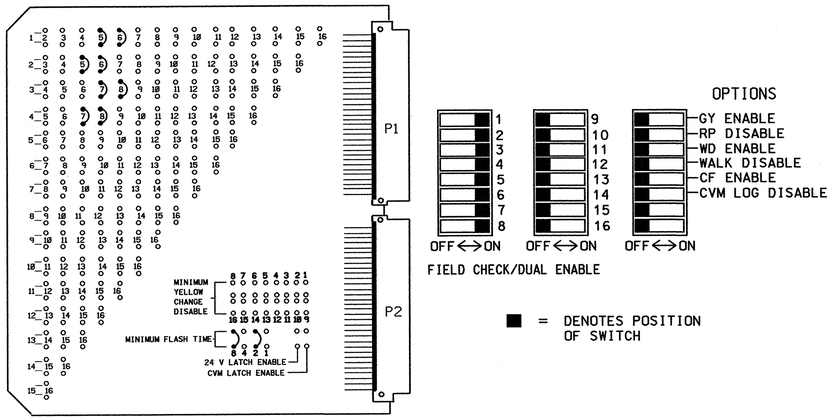
SIG. INVENTORY NO. 02-0422 T1

10-MAY-2006 16:00
s:\its signals\workgroups\tip projects\u-3613b\m0422\m020422_sig_dsn_2005xxxx.dgn
rduffy

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.11

EDI MODEL MMU-16E
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and set switches as shown below)



MMU PROGRAMMING CARD

■ = DENOTES POSITION OF SWITCH

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 9, 10, 11, 12, 13, 14, 15 AND 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
10. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
11. THE CABINET AND CONTROLLER ARE A PART OF THE GREENVILLE CITY SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	61	21,22	81	41,42	21	61,62	41	81,82	NU	NU	NU	NU	NU	NU	NU	NU
RED	✳	2R	✳	4R	✳	6R	✳	8R								
YELLOW		2Y		4Y		6Y		8Y								
GREEN		2G		4G		6G		8G								
RED ARROW																
YELLOW ARROW	1Y		3Y		5Y		7Y									
GREEN ARROW	1G		3G		5G		7G									
✋																
🚶																

NU = NOT USED

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

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED
CABINET .....CONTRACTOR SUPPLIED TS-2 NC-8A
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....1,2,3,4,5,6,7,8
PHASES USED.....1,2,3,4,5,6,7,8
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

SPECIAL BACK-UP PROTECTION NOTES

1. PROGRAM CONTROLLER TO OMIT PHASE 1 DURING PHASE 2 ON,
   AND TO OMIT PHASE 5 DURING PHASE 6 ON.
   AND TO OMIT PHASE 3 DURING PHASE 7 ON.
   AND TO OMIT PHASE 7 DURING PHASE 8 ON.
2. TO ACCOMPLISH BACK-UP FEATURE DESCRIBED IN NOTE 1, ENABLE 'BACK-UP PROTECTION GROUP 1' AND 'BACK-UP PROTECTION GROUP 2' UNDER CONTROLLER SUBMENU 9: 'OPTION DATA'.
3. IT IS REQUIRED FOR THE CONTROLLER TO BE PROGRAMMED SUCH THAT IF IT IS IN PHASE 2+6, THEN PHASE 1 AND/OR 5 CANNOT BE SERVED NEXT WITHOUT FIRST PROGRESSING THROUGH PHASE 4. THIS ADDITIONAL BACK-UP PROTECTION FEATURE SHALL BE IMPLEMENTED IN THE WRITE-PROTECT AREA OF THE CONTROLLER SOFTWARE. FOR DIRECTIONS ON HAVING THIS FEATURE INSTALLED, CONTACT THE NCDOT TRAFFIC ELECTRONICS REPAIR CENTER AT: (919) 233-0884.

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW.
PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

BIU	CH1 L3 ø2	CH1 L1 ø1	CH1 L7 ø4	CH1 L5 ø3	CH1 L11 ø6	CH1 L9 ø5	CH1 L15 ø8	CH1 L13 ø7	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	CH2 NOT USED	CH2 L2 ø6 *	CH2 L8 ø4 *	CH2 L6 ø8	CH2 NOT USED	CH2 L10 ø2 *	CH2 L16 ø8 *	CH2 L14 ø4			

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

	LOOP NO.	LOOP PANEL TERMINALS
ADD JUMPERS FROM: L1A TO L2A, AND L1B TO L2B	1A	L1A,L1B
		L2A,L2B
	2A	L3A,L3B
		L4A,L4B
ADD JUMPERS FROM: L5A TO L6A, AND L5B TO L6B	3A	L5A,L5B
		L6A,L6B
	4A	L7A,L7B
	4B	L8A,L8B
ADD JUMPERS FROM: L9A TO L10A, AND L9B TO L10B	5A	L9A,L9B
		L10A,L10B
	6A	L11A,L11B
		L12A,L12B
ADD JUMPERS FROM: L13A TO L14A, AND L13B TO L14B	7A	L13A,L13B
		L14A,L14B
	8A	L15A,L15B
	8B	L16A,L16B

NOTE
BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

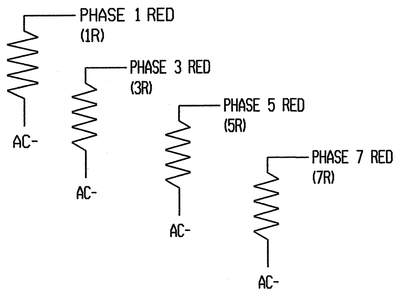
PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø1	DELAY	15
* 2	ø6	DELAY	3
3	ø2		
4			
5	ø3	DELAY	15
6	ø8	DELAY	3
7	ø4	DELAY	100
* 8	ø4	DC/EC	5/2
9	ø5	DELAY	15
* 10	ø2	DELAY	3
11	ø6		
12			
13	ø7	DELAY	15
14	ø4	DELAY	3
15	ø8	DELAY	100
* 16	ø8	DC/EC	5/2

* THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE TIMING REQUIRED FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

LOAD RESISTOR INSTALLATION DETAIL

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



NOTE: THE PURPOSE OF THIS RESISTOR IS TO LOAD THE CHANNEL RED MONITOR INPUT IN ORDER FOR THE MALFUNCTION MANAGEMENT UNIT TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON PHASES THAT DO NOT USE THE RED DISPLAY IN THE FIELD.

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0422 T1
DESIGNED: January 2006
SEALED: 03-03-06
REVISED: NA

Signal Upgrade - Temporary 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation
Signals Management Section
122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road)
at
SR 1700 (Old Tar Road/ Evans Street)

Division 2 | Pitt County | Greenville
PLAN DATE: February 2006 | REVIEWED BY: WHW
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL 008453
ENGINEER
JOHN T. ROWE, JR.

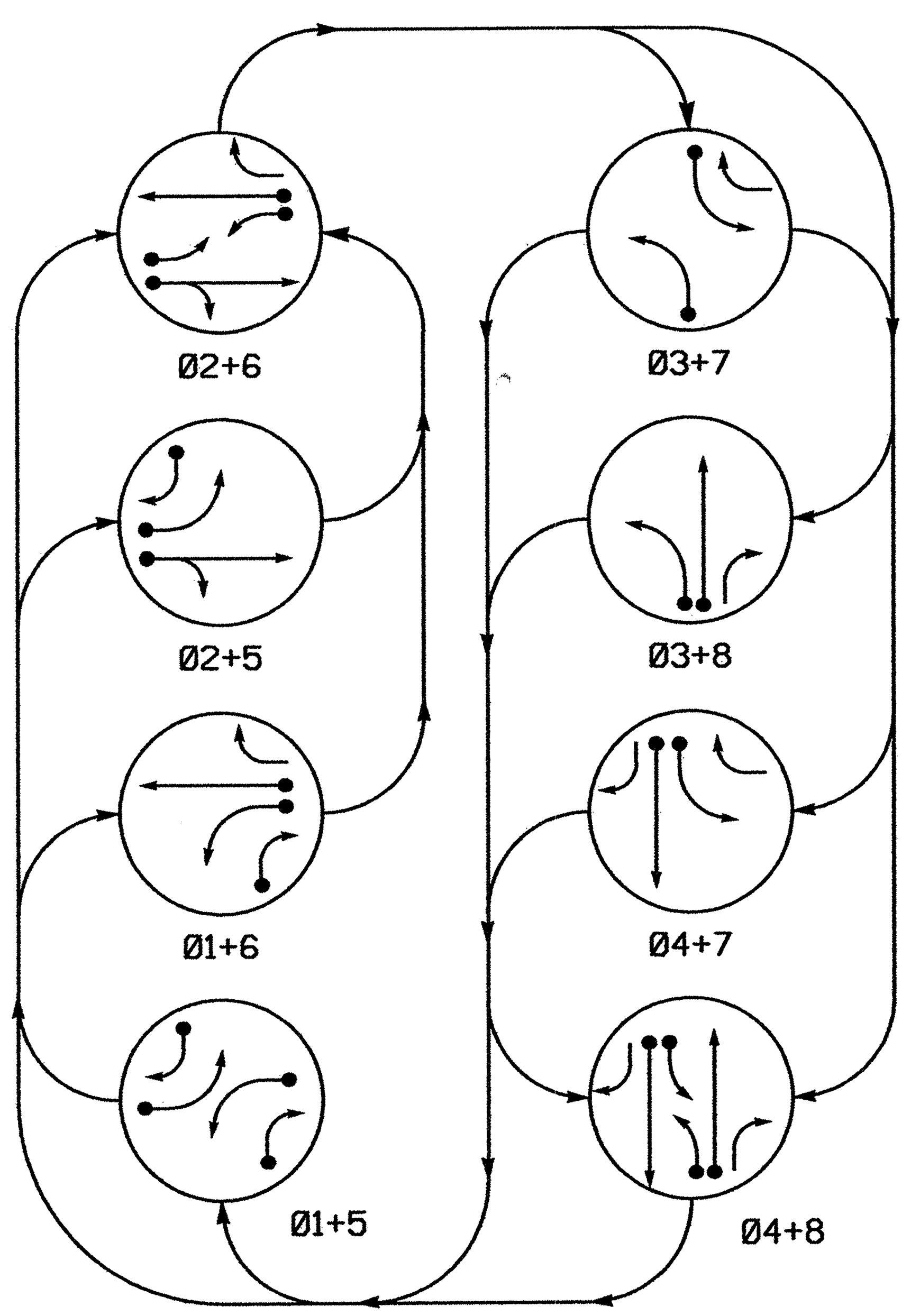
SIGNATURE | DATE: 3-7-06

SIG. INVENTORY NO. 02-0422 T1

07-MAR-2006 07:22
u:\420\22_sm_ele_xxx.dgn
jtreiterson

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.12

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

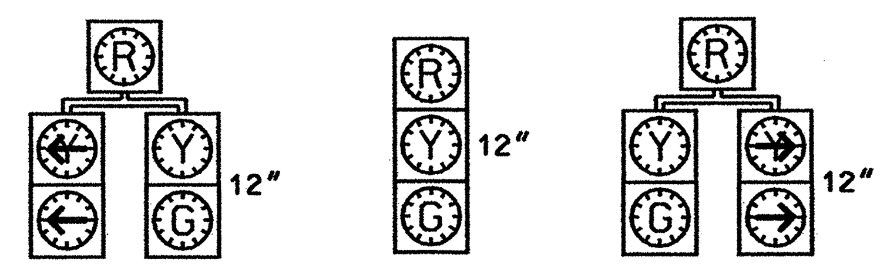
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
21	R / ←	R	G / ←	G	R	R	R	R	Y
22	R	R	G	G	R	R	R	R	Y
41	R	R	R	R	R / ←	R	G / ←	G	R
42	R / →	R	R / →	R	R	R	G	G	R
61	R / ←	G / ←	R	G	R	R	R	R	Y
62	R	G	R	G	R / →	R	R / →	R	Y
81	R	R	R	R	R / ←	G / ←	R	G	R
82	R / →	R / →	R	R	R	G	R	G	R

SIGNAL FACE I.D.

Denotes L.E.D.



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

LOOP & DETECTOR UNIT INSTALLATION CHART

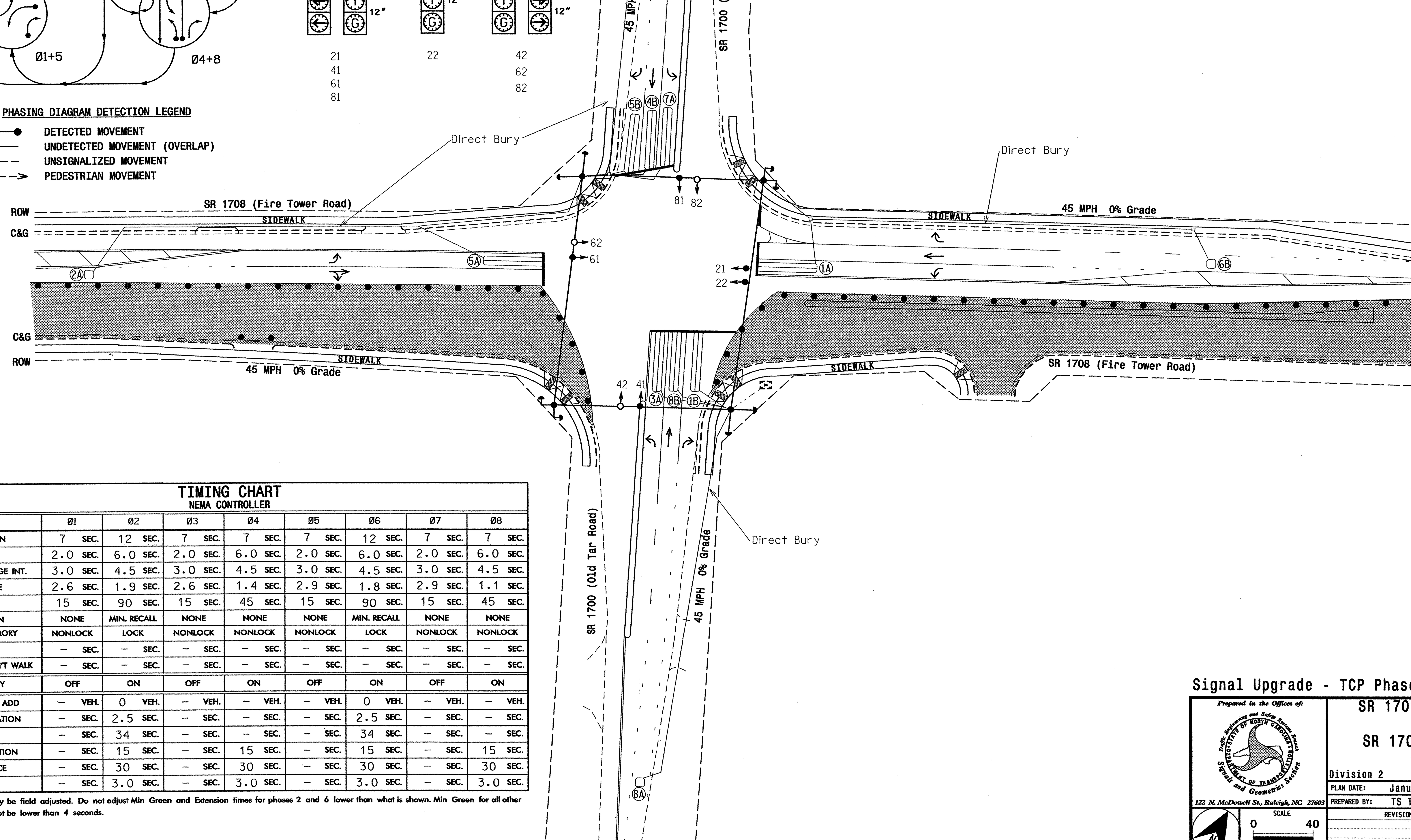
NEMA CONTROLLER WITH TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS						
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?
1A	6X40	2-4-2	0	X		1		X	DELAY	15 SEC.	ALL	YES
						6		X	DELAY	3 SEC.	ALL	NO
1B	6X40	2-4-2	0	X		1	X		DELAY	15 SEC.	ALL	YES
2A	6X6	6	300	X		2		X	–	– SEC.	ALL	NO
3A	6X40	2-4-2	0	X		3		X	DELAY	15 SEC.	ALL	YES
						8		X	DELAY	3 SEC.	ALL	YES
4A	6X6	6	300	X		4		X	DELAY	100 SEC.	ALL	YES
4B	6X40	2-4-2	0	X		4		X	DC/EC	5/2 SEC.	ALL	NO
5A	6X40	2-4-2	0	X		5		X	DELAY	15 SEC.	ALL	YES
						2		X	DELAY	3 SEC.	ALL	NO
5B	6X40	2-4-2	0	X		5	X		DELAY	15 SEC.	ALL	YES
6B	6X6	6	300	X		6		X	–	– SEC.	ALL	NO
7A	6X40	2-4-2	0	X		7		X	DELAY	15 SEC.	ALL	YES
						4		X	DELAY	3 SEC.	ALL	YES
8A	6X6	5	300	X		8		X	DELAY	100 SEC.	ALL	YES
8B	6X40	2-4-2	0	X		8		X	DC/EC	5/2 SEC.	ALL	NO

8 Phase Fully Actuated (Greenville City System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 1 during phase 2 on.
4. Omit phase 5 during phase 6 on.
5. Omit phase 3 during phase 4 on.
6. Omit phase 7 during phase 8 on.
7. Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4+8 (see Electrical Details).
8. Program phase 4 and phase 8 for dual entry.
9. Reposition existing signal heads as needed.
10. Set all detector units to presence mode.
11. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
12. Intersection Zone Number: 7, System Address Number: 81



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone	
	Construction Zone Drums	

TIMING CHART

NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM GREEN	7 SEC.	12 SEC.	7 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.	7 SEC.
PASSAGE/GAP	2.0 SEC.	6.0 SEC.	2.0 SEC.	6.0 SEC.	2.0 SEC.	6.0 SEC.	2.0 SEC.	6.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.5 SEC.	3.0 SEC.	4.5 SEC.	3.0 SEC.	4.5 SEC.	3.0 SEC.	4.5 SEC.
RED CLEARANCE	2.6 SEC.	1.9 SEC.	2.6 SEC.	1.4 SEC.	2.9 SEC.	1.8 SEC.	2.9 SEC.	1.1 SEC.
MAX. 1	15 SEC.	90 SEC.	15 SEC.	45 SEC.	15 SEC.	90 SEC.	15 SEC.	45 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL	NONE	NONE
VEHI. CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	NONLOCK	LOCK	NONLOCK	NONLOCK
WALK	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
FLASHING DON'T WALK	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
VOLUME DENSITY	OFF	ON	OFF	ON	OFF	ON	OFF	ON
ACTUATION B4 ADD	– VEH.	0 VEH.	– VEH.	– VEH.	– VEH.	0 VEH.	– VEH.	– VEH.
SEC. PER ACTUATION	– SEC.	2.5 SEC.	– SEC.	– SEC.	– SEC.	2.5 SEC.	– SEC.	– SEC.
MAX. INITIAL	– SEC.	34 SEC.	– SEC.	– SEC.	– SEC.	34 SEC.	– SEC.	– SEC.
TIME B4 REDUCTION	– SEC.	15 SEC.	– SEC.	15 SEC.	– SEC.	15 SEC.	– SEC.	15 SEC.
TIME TO REDUCE	– SEC.	30 SEC.	– SEC.	30 SEC.	– SEC.	30 SEC.	– SEC.	30 SEC.
MINIMUM GAP	– SEC.	3.0 SEC.	– SEC.	3.0 SEC.	– SEC.	3.0 SEC.	– SEC.	3.0 SEC.

* 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.

Signal Upgrade - TCP Phase II - Temporary Design 2

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, 122 N. McDowell St., Raleigh, NC 27603

SCALE 0 40 1"=40'

SR 1708 (Fire Tower Road) at SR 1700 (Old Tar Road)/ Evans Street

Division 2 Pitt County Greenville

PLAN DATE:	January 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER 22002 ... D E. MULLINAX — 3 MARCH 2006

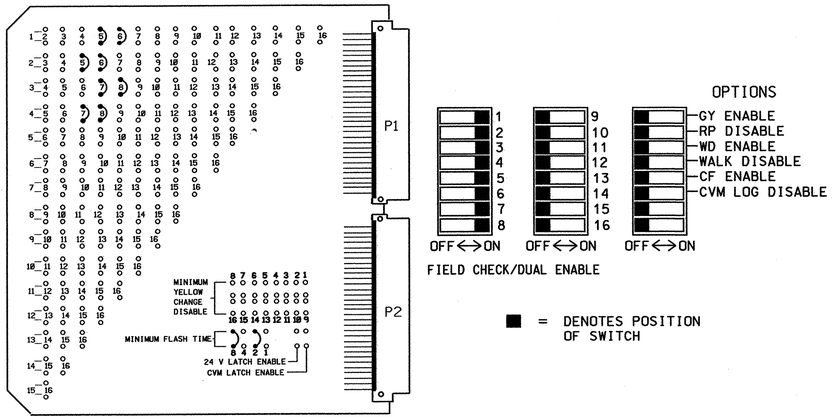
SIGNATURE DATE

SIG. INVENTORY NO. 02-0422 T2

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.13

EDI MODEL MMU-16E
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and set switches as shown below)



MMU PROGRAMMING CARD

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 9, 10, 11, 12, 13, 14, 15 AND 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
10. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
11. THE CABINET AND CONTROLLER ARE A PART OF THE GREENVILLE CITY SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	61,82	21,22	81	41,42	21,42	61,62	41,62	81,82	NU	NU	NU	NU	NU	NU	NU	NU
RED	✳	2R	✳	4R	✳	6R	✳	8R								
YELLOW		2Y		4Y		6Y		8Y								
GREEN		2G		4G		6G		8G								
RED ARROW																
YELLOW ARROW	1Y		3Y		5Y		7Y									
GREEN ARROW	1G		3G		5G		7G									
✋																
🚶																

NU = NOT USED

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

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED
CABINET .....CONTRACTOR SUPPLIED TS-2 NC-8A
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....1,2,3,4,5,6,7,8
PHASES USED.....1,2,3,4,5,6,7,8
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW.
PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

BIU	CH1 L3 ø2	CH1 L1 ø1	CH1 L7 ø4	CH1 L5 ø3	CH1 L11 ø5	CH1 L9 ø5	CH1 L15 ø8	CH1 L13 ø7	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	CH2 L4 ø1	CH2 L2 ø6 ✳	CH2 L8 ø4 ✳	CH2 L6 ø8	CH2 L12 ø6	CH2 L10 ø2 ✳	CH2 L16 ø8 ✳	CH2 L14 ø4			

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

	LOOP NO.	LOOP PANEL TERMINALS
ADD JUMPERS FROM: L1A TO L2A, AND L1B TO L2B	1A	L1A,L1B
		L2A,L2B
	2A	L3A,L3B
	1B	L4A,L4B
ADD JUMPERS FROM: L5A TO L6A, AND L5B TO L6B	3A	L5A,L5B
		L6A,L6B
	4A	L7A,L7B
	4B	L8A,L8B
ADD JUMPERS FROM: L9A TO L10A, AND L9B TO L10B	5A	L9A,L9B
		L10A,L10B
	5B	L11A,L11B
	6B	L12A,L12B
ADD JUMPERS FROM: L13A TO L14A, AND L13B TO L14B	7A	L13A,L13B
		L14A,L14B
	8A	L15A,L15B
	8B	L16A,L16B

NOTE
BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

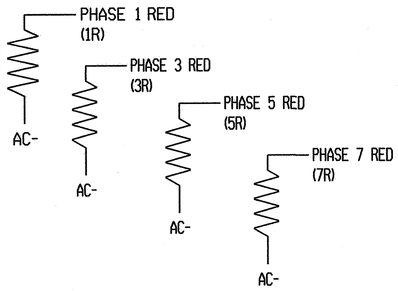
PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø1	DELAY	15
✳ 2	ø6	DELAY	3
3	ø2		
4	ø1	DELAY	15
5	ø3	DELAY	15
6	ø8	DELAY	3
7	ø4	DELAY	100
✳ 8	ø4	DC/EC	5/2
9	ø5	DELAY	15
✳ 10	ø2	DELAY	3
11	ø5	DELAY	15
12	ø6		
13	ø7	DELAY	15
14	ø4	DELAY	3
15	ø8	DELAY	100
✳ 16	ø8	DC/EC	5/2

✳ THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE TIMING REQUIRED FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

LOAD RESISTOR INSTALLATION DETAIL

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



NOTE: THE PURPOSE OF THIS RESISTOR IS TO LOAD THE CHANNEL RED MONITOR INPUT IN ORDER FOR THE MALFUNCTION MANAGEMENT UNIT TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON PHASES THAT DO NOT USE THE RED DISPLAY IN THE FIELD.

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0422 T2
DESIGNED: January 2006
SEALED: 03-03-06
REVISED: NA

SPECIAL BACK-UP PROTECTION NOTES

1. PROGRAM CONTROLLER TO OMIT PHASE 1 DURING PHASE 2 ON,
   AND TO OMIT PHASE 5 DURING PHASE 6 ON.
   AND TO OMIT PHASE 3 DURING PHASE 7 ON.
   AND TO OMIT PHASE 7 DURING PHASE 8 ON.
2. TO ACCOMPLISH BACK-UP FEATURE DESCRIBED IN NOTE 1, ENABLE 'BACK-UP PROTECTION GROUP 1' AND 'BACK-UP PROTECTION GROUP 2' UNDER CONTROLLER SUBMENU 9: 'OPTION DATA'.
3. IT IS REQUIRED FOR THE CONTROLLER TO BE PROGRAMMED SUCH THAT IF IT IS IN PHASE 2+6, THEN PHASE 1 AND/OR 5 CANNOT BE SERVED NEXT WITHOUT FIRST PROGRESSING THROUGH PHASE 4. THIS ADDITIONAL BACK-UP PROTECTION FEATURE SHALL BE IMPLEMENTED IN THE WRITE-PROTECT AREA OF THE CONTROLLER SOFTWARE. FOR DIRECTIONS ON HAVING THIS FEATURE INSTALLED, CONTACT THE NCDOT TRAFFIC ELECTRONICS REPAIR CENTER AT: (919) 233-0884.

Signal Upgrade - Temporary 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation
Signal Management Section
122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road)
at
SR 1700 (Old Tar Road/
Evans Street)

Division 2 | Pitt County | Greenville
PLAN DATE: February 2006 | REVIEWED BY: [illegible]
PREPARED BY: James Peterson | REVIEWED BY:

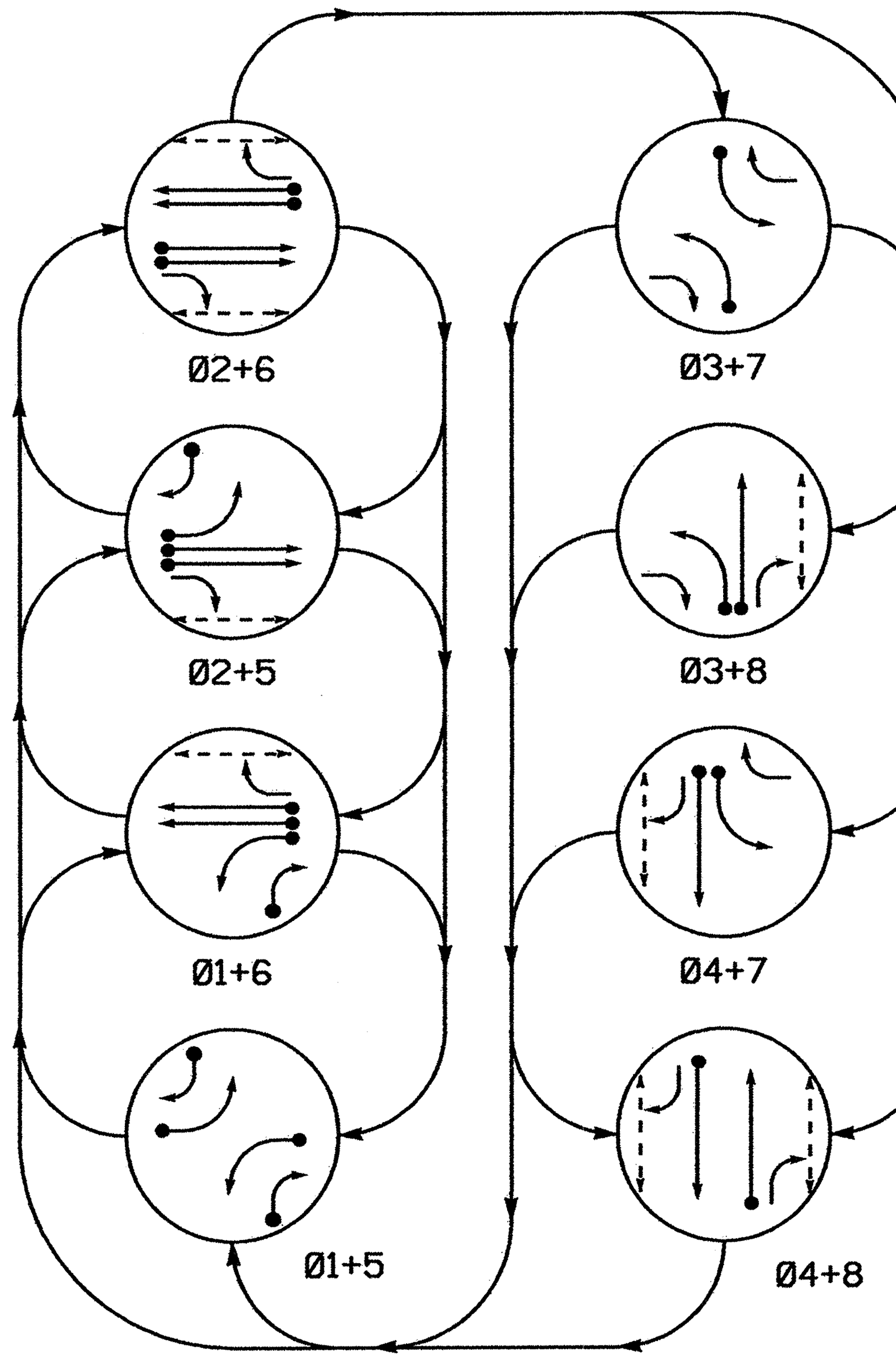
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.
SIGNATURE 3-7-06 DATE
SIG. INVENTORY NO. 02-0422 T2

06-MAR-2006 14:54
u:#02422_sm_sig_xxx.dgn
jpeterson

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.14

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

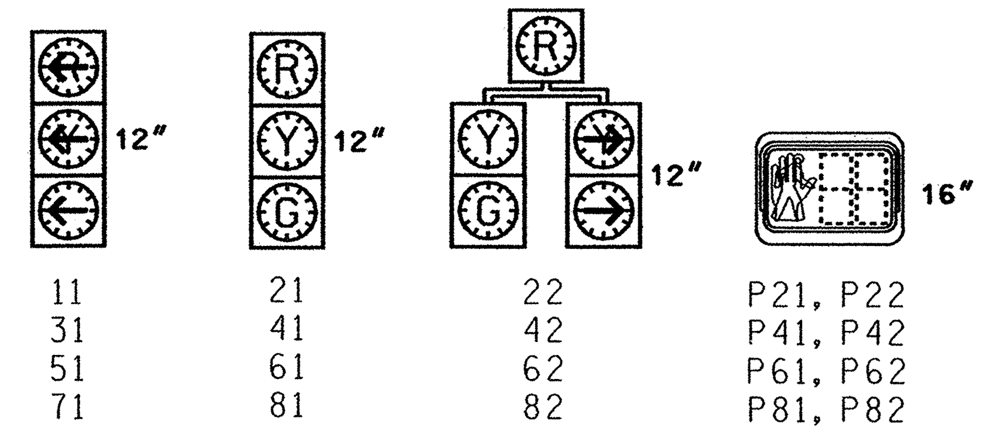
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3+7	Ø3+8	Ø4+7	Ø4+8	FLASH
11	←	←	←R	←R	←R	←R	←R	←R	←R
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R/→	R/→	R	R	Y
31	←R	←R	←R	←R	←	←	←R	←R	←R
41	R	R	R	R	R	R	G	G	R
42	R/→	R	R/→	R	R	R	G	G	R
51	←	←R	←	←R	←R	←R	←R	←R	←R
61	R	G	R	G	R	R	R	R	Y
62	R	G	R	G	R/→	R	R/→	R	Y
71	←R	←R	←R	←R	←	←R	←	←R	←R
81	R	R	R	R	R	G	R	G	R
82	R/→	R/→	R	R	R	G	R	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DRK

SIGNAL FACE I.D.

Denotes L.E.D.



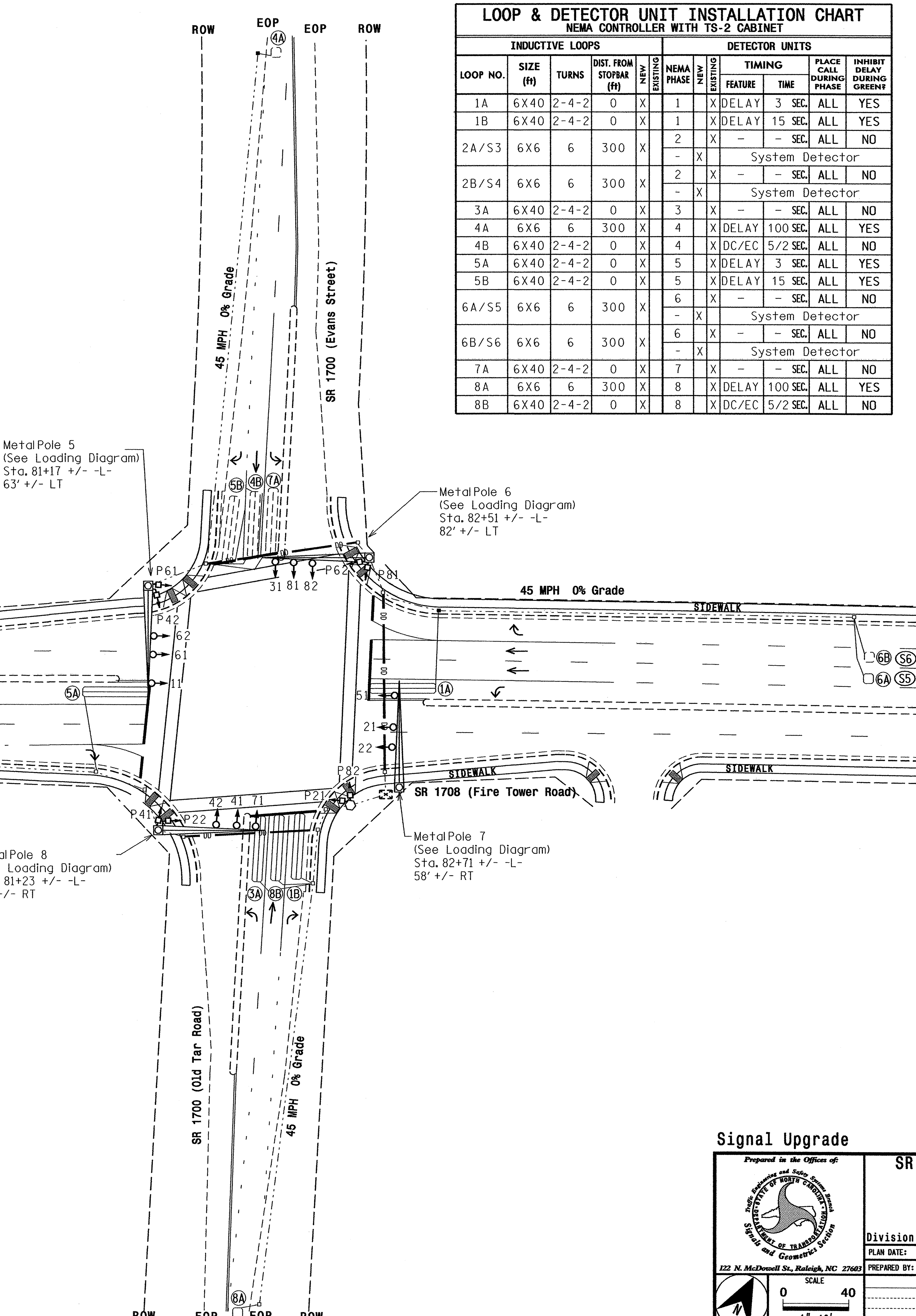
LOOP & DETECTOR UNIT INSTALLATION CHART
NEMA CONTROLLER WITH TS-2 CABINET

INDUCTIVE LOOPS: LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	DETECTOR UNITS: NEMA PHASE	NEW	EXISTING	TIMING: FEATURE	TIME	PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?
1A	6X40	2-4-2	0	X		1		X	DELAY	3 SEC.	ALL	YES
1B	6X40	2-4-2	0	X		1		X	DELAY	15 SEC.	ALL	YES
2A/S3	6X6	6	300	X		2		X	–	– SEC.	ALL	NO
						–	X		System Detector			
2B/S4	6X6	6	300	X		2		X	–	– SEC.	ALL	NO
						–	X		System Detector			
3A	6X40	2-4-2	0	X		3		X	–	– SEC.	ALL	NO
4A	6X6	6	300	X		4		X	DELAY	100 SEC.	ALL	YES
4B	6X40	2-4-2	0	X		4		X	DC/EC	5/2 SEC.	ALL	NO
5A	6X40	2-4-2	0	X		5		X	DELAY	3 SEC.	ALL	YES
5B	6X40	2-4-2	0	X		5		X	DELAY	15 SEC.	ALL	YES
6A/S5	6X6	6	300	X		6		X	–	– SEC.	ALL	NO
						–	X		System Detector			
6B/S6	6X6	6	300	X		6		X	–	– SEC.	ALL	NO
						–	X		System Detector			
7A	6X40	2-4-2	0	X		7		X	–	– SEC.	ALL	NO
8A	6X6	6	300	X		8		X	DELAY	100 SEC.	ALL	YES
8B	6X40	2-4-2	0	X		8		X	DC/EC	5/2 SEC.	ALL	NO

8 Phase
Fully Actuated
(Greenville City System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 or phase 5 may be lagged.
4. Phase 3 or phase 7 may be lagged.
5. Install backplates for all new signal heads.
6. Set all detector units to presence mode.
7. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Intersection Zone Number: 7, System Address Number: 81



TIMING CHART
NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM GREEN	7 SEC.	12 SEC.	7 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.	7 SEC.
PASSAGE/GAP	2.0 SEC.	6.0 SEC.	2.0 SEC.	6.0 SEC.	2.0 SEC.	6.0 SEC.	2.0 SEC.	6.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.6 SEC.	3.0 SEC.	4.5 SEC.	3.0 SEC.	4.5 SEC.	3.0 SEC.	4.5 SEC.
RED CLEARANCE	3.3 SEC.	1.9 SEC.	3.3 SEC.	2.3 SEC.	3.5 SEC.	2.0 SEC.	3.3 SEC.	2.3 SEC.
MAX. 1	20 SEC.	90 SEC.	20 SEC.	45 SEC.	20 SEC.	90 SEC.	20 SEC.	45 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	NONE	MIN. RECALL	NONE	NONE
VEHI. CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	NONLOCK	LOCK	NONLOCK	NONLOCK
WALK	– SEC.	7 SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.
FLASHING DON'T WALK	– SEC.	21 SEC.	– SEC.	27 SEC.	– SEC.	16 SEC.	– SEC.	25 SEC.
VOLUME DENSITY	OFF	ON	OFF	ON	OFF	ON	OFF	ON
ACTUATION B4 ADD	– VEH.	0 VEH.	– VEH.	– VEH.	– VEH.	0 VEH.	– VEH.	– VEH.
SEC. PER ACTUATION	– SEC.	1.5 SEC.	– SEC.	– SEC.	– SEC.	1.5 SEC.	– SEC.	– SEC.
MAX. INITIAL	– SEC.	34 SEC.	– SEC.	– SEC.	– SEC.	34 SEC.	– SEC.	– SEC.
TIME B4 REDUCTION	– SEC.	15 SEC.	– SEC.	0 SEC.	– SEC.	15 SEC.	– SEC.	0 SEC.
TIME TO REDUCE	– SEC.	30 SEC.	– SEC.	15 SEC.	– SEC.	30 SEC.	– SEC.	15 SEC.
MINIMUM GAP	– SEC.	3.0 SEC.	– SEC.	3.0 SEC.	– SEC.	3.0 SEC.	– SEC.	3.0 SEC.

* 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.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Pavement Marking Arrow	
N/A	Wheelchair Ramp	
	Metal Pole with Mastarm	
DD	Directional Drill (3) 2-in Polyethylene Conduits	N/A

Signal Upgrade

Final Design

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, State of North Carolina Department of Transportation, Signals and Geometrics Section

122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road) at SR 1700 (Old Tar Road/ Evans Street)

Division 2 Pitt County Greenville

PLAN DATE:	January 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL: North Carolina Professional Engineer Seal 22027 Richard E. Mullinax

SIGNATURE 3 MARCH 2006 DATE

SIG. INVENTORY NO. 02-0422

10-MAY-2006 16:15
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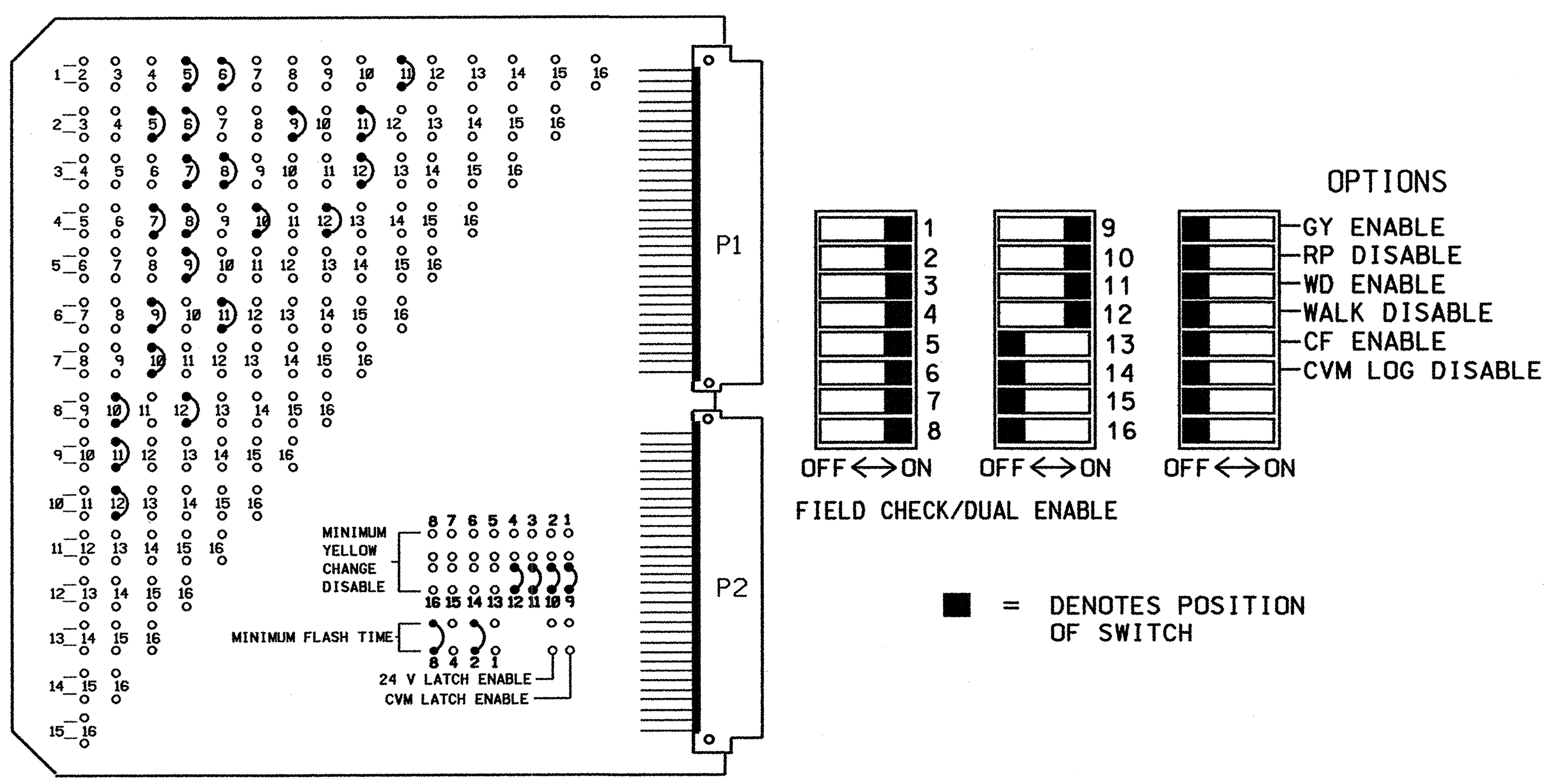
rduffy

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	Sig.15

EDI MODEL MMU-16E MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and set switches as shown below)



MMU PROGRAMMING CARD

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 13, 14, 15 AND 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
10. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
11. BE SURE 'BACK-UP PROTECTION GROUP 1' AND 'BACK-UP PROTECTION GROUP 2' UNDER SUBMENU 9: 'OPTION DATA' ARE DISABLED.
12. THE CABINET AND CONTROLLER ARE A PART OF THE GREENVILLE CITY SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	1	1	2	3	3	4	5	5	6	7	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	11	82	21,22	22	31	41,42	42	51	61,62	62	71	81,82	P21, P22	P41, P42	P61, P62	P81, P82	NU	NU	NU	NU
RED			2R			4R			6R			8R								
YELLOW			2Y			4Y			6Y			8Y	*	*	*	*				
GREEN			2G			4G			6G			8G								
RED ARROW	1R				3R			5R			7R									
YELLOW ARROW	1Y	1Y		3Y	3Y		5Y	5Y		7Y	7Y									
GREEN ARROW	1G	1G		3G	3G		5G	5G		7G	7G									
(DON'T WALK)													9R	10R	11R	12R				
(WALK)													9G	10G	11G	12G				

NU = NOT USED

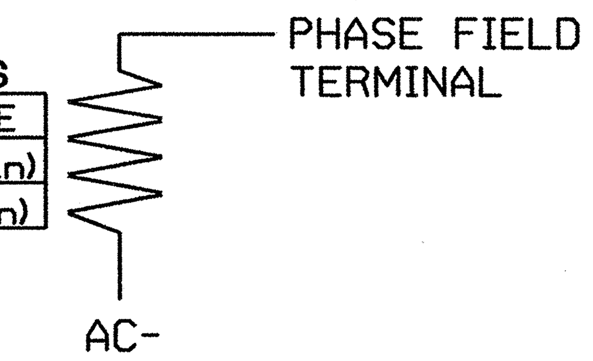
* INSTALL LOAD RESISTORS TO UNUSED FIELD TERMINALS 9Y, 10Y, 11Y AND 12Y, IF NOT ALREADY PRESENT. SEE LOAD RESISTOR INSTALLATION DETAIL THIS PAGE.

TYPICAL LOAD RESISTOR INSTALLATION DETAIL

REMOVE LOAD RESISTORS ON FIELD TERMINALS 1R, 3R, 5R AND 7R.

ACCEPTABLE VALUES

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



DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

BIU											
	CH1 L3 ø2/SYS	CH1 L1 ø 1	CH1 L7 ø 4	CH1 L5 ø 3	CH1 L11 ø6/SYS	CH1 L9 ø 5	CH1 L15 ø 8	CH1 L13 ø 7	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	CH2 L4 ø2/SYS	CH2 L2 ø 1	CH2 L8 ø 4 *	CH2 NOT USED	CH2 L12 ø6/SYS *	CH2 L10 ø 5	CH2 L16 ø 8 *	CH2 NOT USED			

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
1B	L2A,L2B
2A/S3	L3A,L3B
2B/S4	L4A,L4B
3A	L5A,L5B
	L6A,L6B
4A	L7A,L7B
4B	L8A,L8B
5A	L9A,L9B
5B	L10A,L10B
6A/S5	L11A,L11B
6B/S6	L12A,L12B
7A	L13A,L13B
	L14A,L14B
8A	L15A,L15B
8B	L16A,L16B

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

ASSIGN CONTROLLER SYSTEM DETECTOR TO LOCAL CONT. DET. NUMBERS AS SHOWN IN CHART BELOW

CONTROLLER SYS. DET. NO.	LOCAL CONT. DETECTOR NO.
1	3
2	4
3	11
4	12
5	
6	
7	
8	

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
1	ø1	DELAY	3
2	ø1	DELAY	15
3	ø2		
4	ø2		
5	ø3		
6			
7	ø4	DELAY	100
* 8	ø4	DC/EC	5/2
9	ø5	DELAY	3
10	ø5	DELAY	15
11	ø6		
12	ø6		
13	ø7		
14			
15	ø8	DELAY	100
* 16	ø8	EC/DC	5/2

* THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE TIMING REQUIRED FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

EQUIPMENT INFORMATION

CONTROLLER..............CONTRACTOR SUPPLIED
CABINET ....CONTRACTOR SUPPLIED [TS-2] NC-8A
CABINET MOUNT...........BASE
LOADBAY POSITIONS.......16
LOAD SWITCHES USED......1,2,3,4,5,6,7,8,9,10,11,12
PHASES USED.............1,2,3,4,5,6,7,8,2 PED,4 PED,6 PED,8 PED
OLA.....................NOT USED
OLB.....................NOT USED
OLC.....................NOT USED
OLD.....................NOT USED

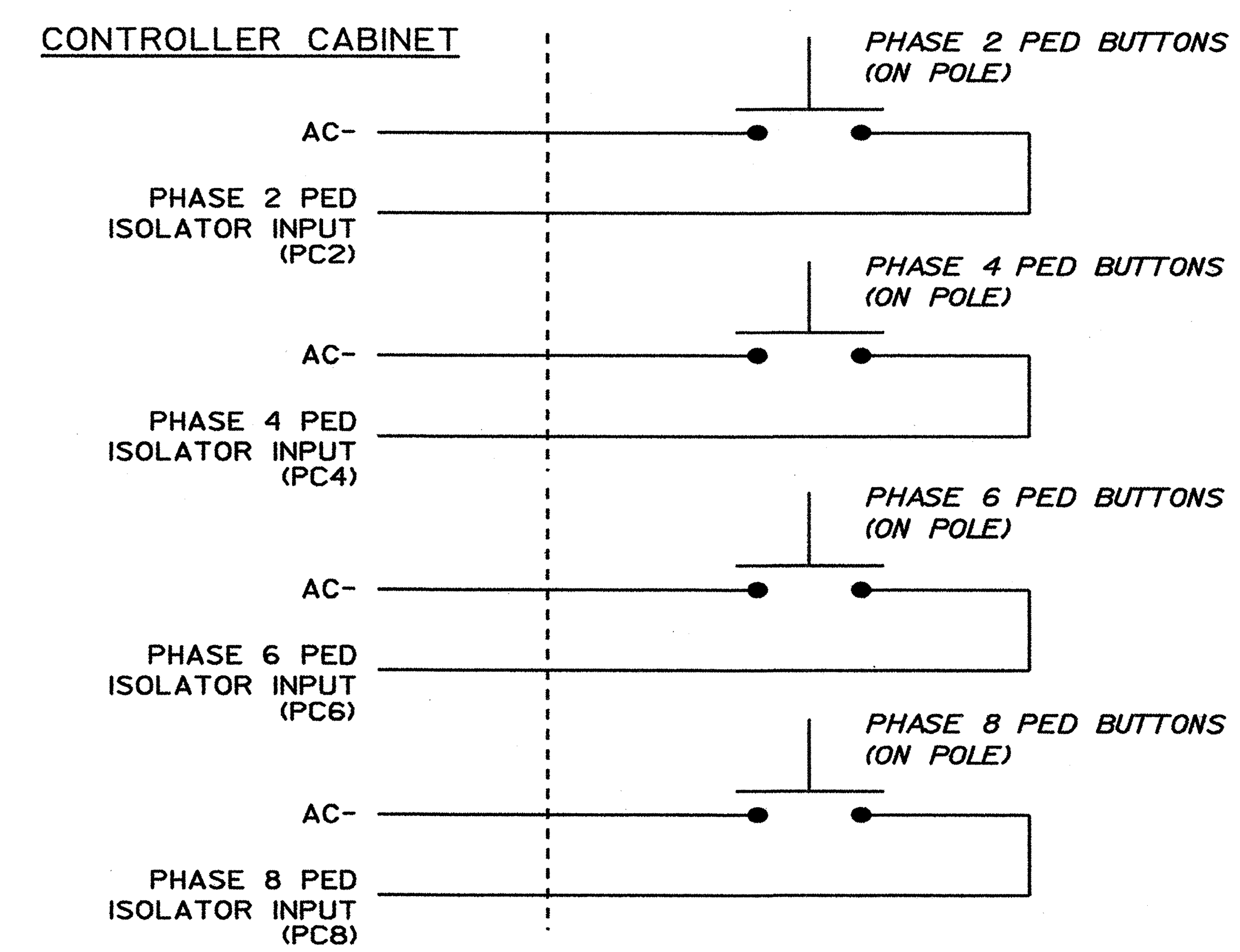
LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

PEDESTRIAN PUSH-BUTTON WIRING DETAIL

(wire push-buttons as shown below)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 02-0422
DESIGNED: January 2006
SEALED: 03-03-06
REVISED: NA

Signal Upgrade - Final

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1708 (Fire Tower Road) at SR 1700 (Old Tar Road/ Evans Street)

Division 2 Pitt County Greenville

PLAN DATE: February 2006 REVIEWED BY: MWH

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals Management Section, State of North Carolina Department of Transportation

122 N. McDowell St., Raleigh, NC 27603

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 008453 JOHN T. ROWE, JR.

SIGNATURE John T. Rowe, Jr. DATE 3-7-06

SIG. INVENTORY NO. 02-0422

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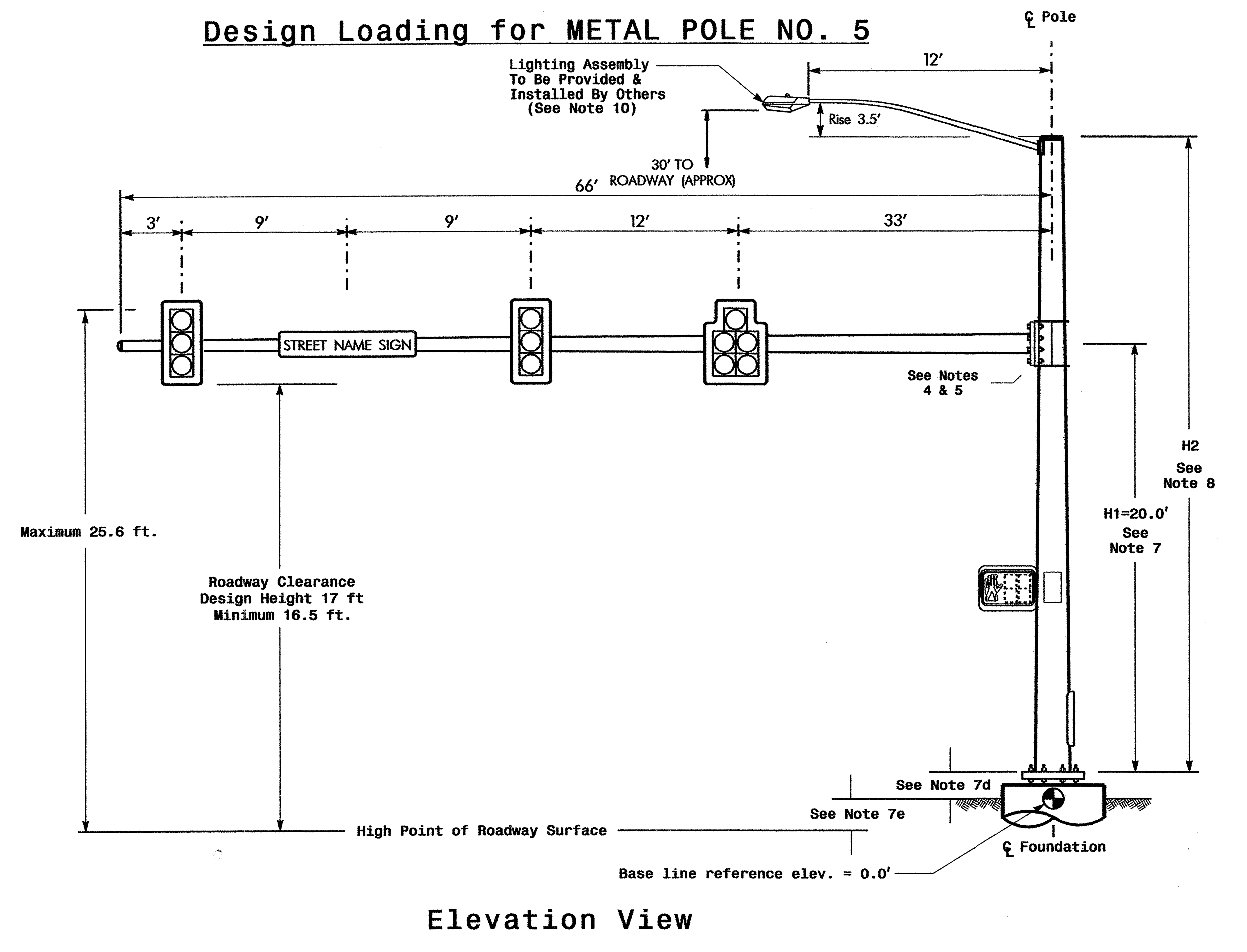
jlpeterson

METAL POLE No. 5 and 6

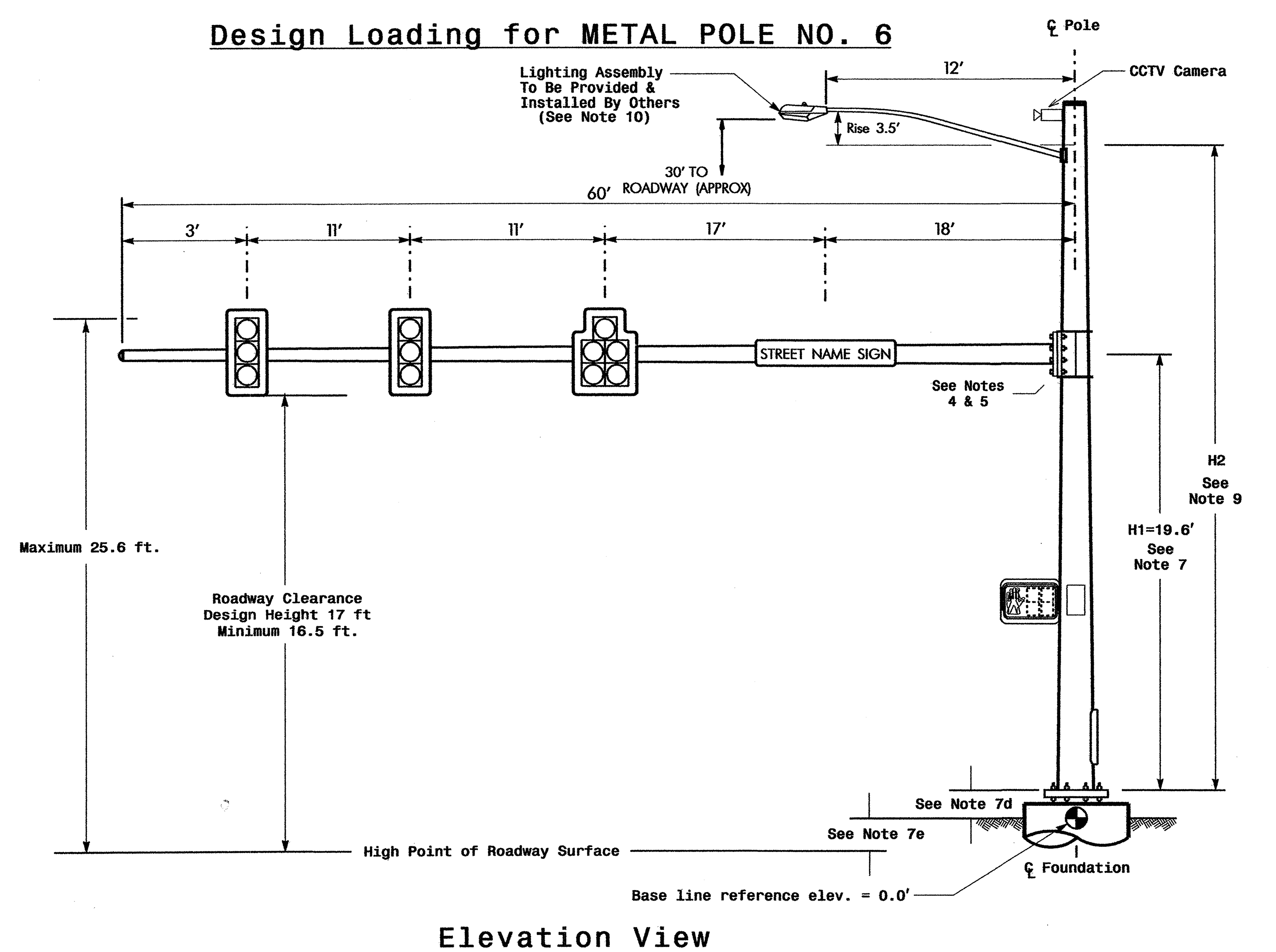
PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.16

Design Loading for METAL POLE NO. 5



Elevation View

Design Loading for METAL POLE NO. 6



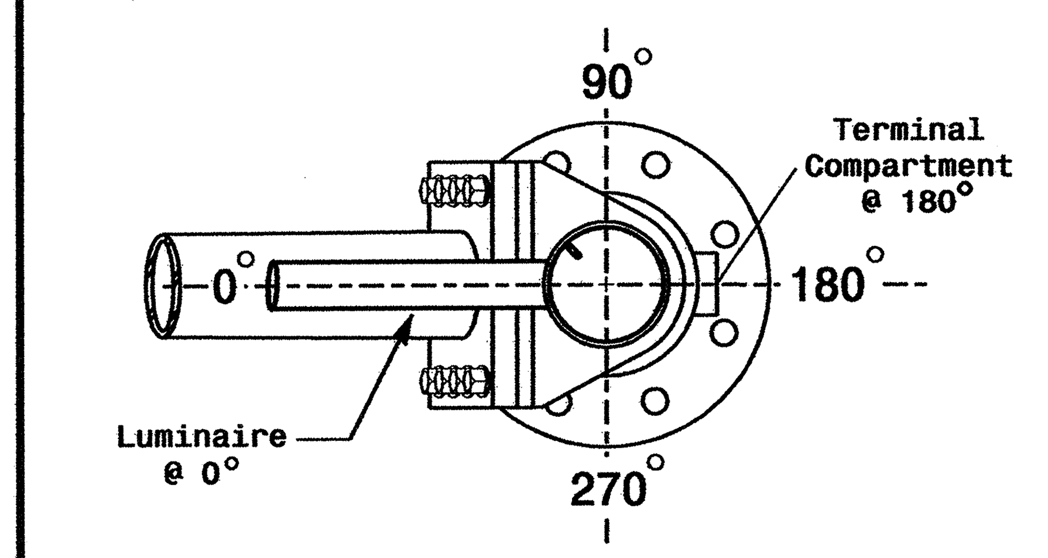
Elevation View

SPECIAL NOTE

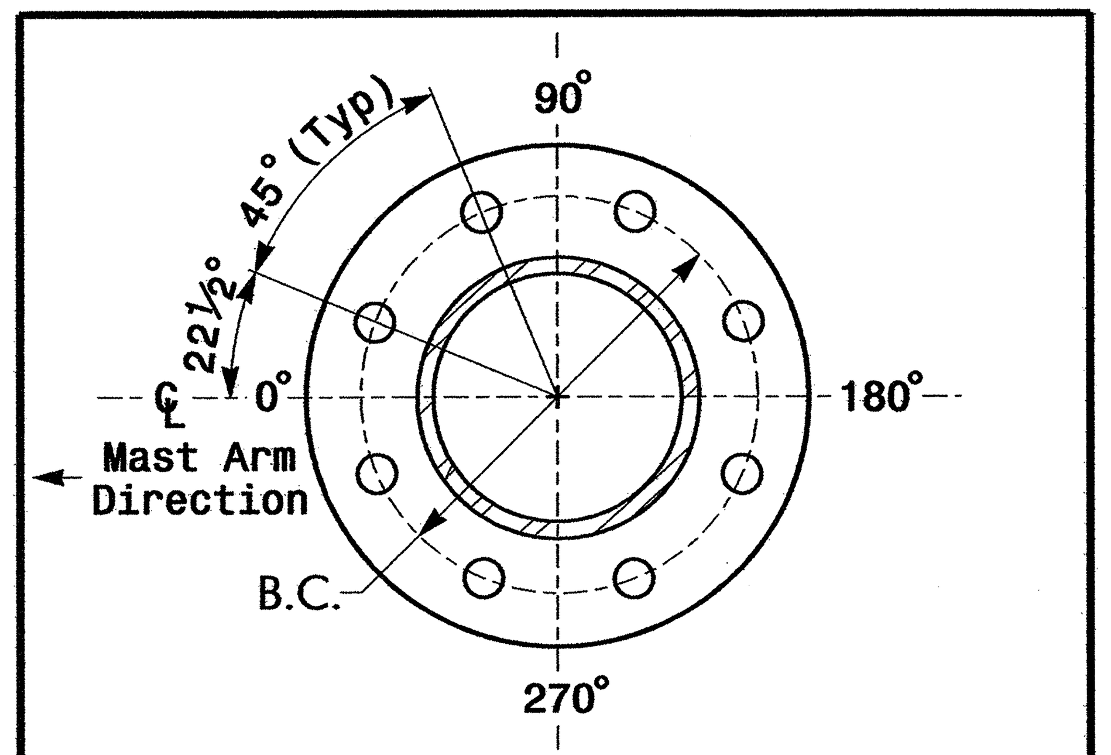
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 5	Pole 6
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.4 ft.	+1.1 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

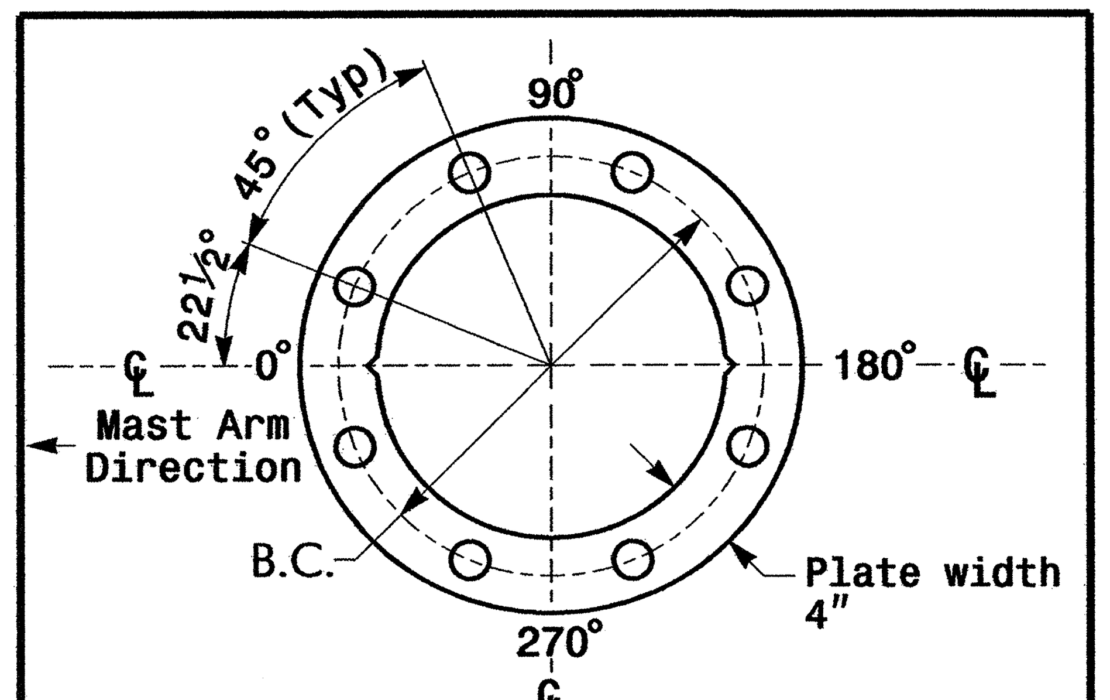


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS
	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

NOTES

Design Reference Material

1. 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 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   The 2002 NCDOT Roadway Standard Drawings.
   The traffic signal project plans and special provisions.
   The NCDOT "Metal Pole Standards" located at the following NCDOT website:
   http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Maximum allowable CSR for all signal supports is 0.9.
4. 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.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads 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.
8. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
9. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet plus 40 inches for the CCTV Camera.
10. Design the luminaire support arm using design dimensions as shown on elevation views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.
11. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
12. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
13. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 2 (130 mph)

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, 122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road) at SR 1700 (Old Tar Road)/ Evans Street

Division 2 | Pitt County | Greenville

PLAN DATE:	March 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

SCALE: 0 N/A

N/A

REVISIONS | INIT. | DATE

SEAL: North Carolina Professional Engineer, Richard E. Mullinax — 10 MAY 2006

SIGNATURE | DATE

SIG. INVENTORY NO. 02-0422

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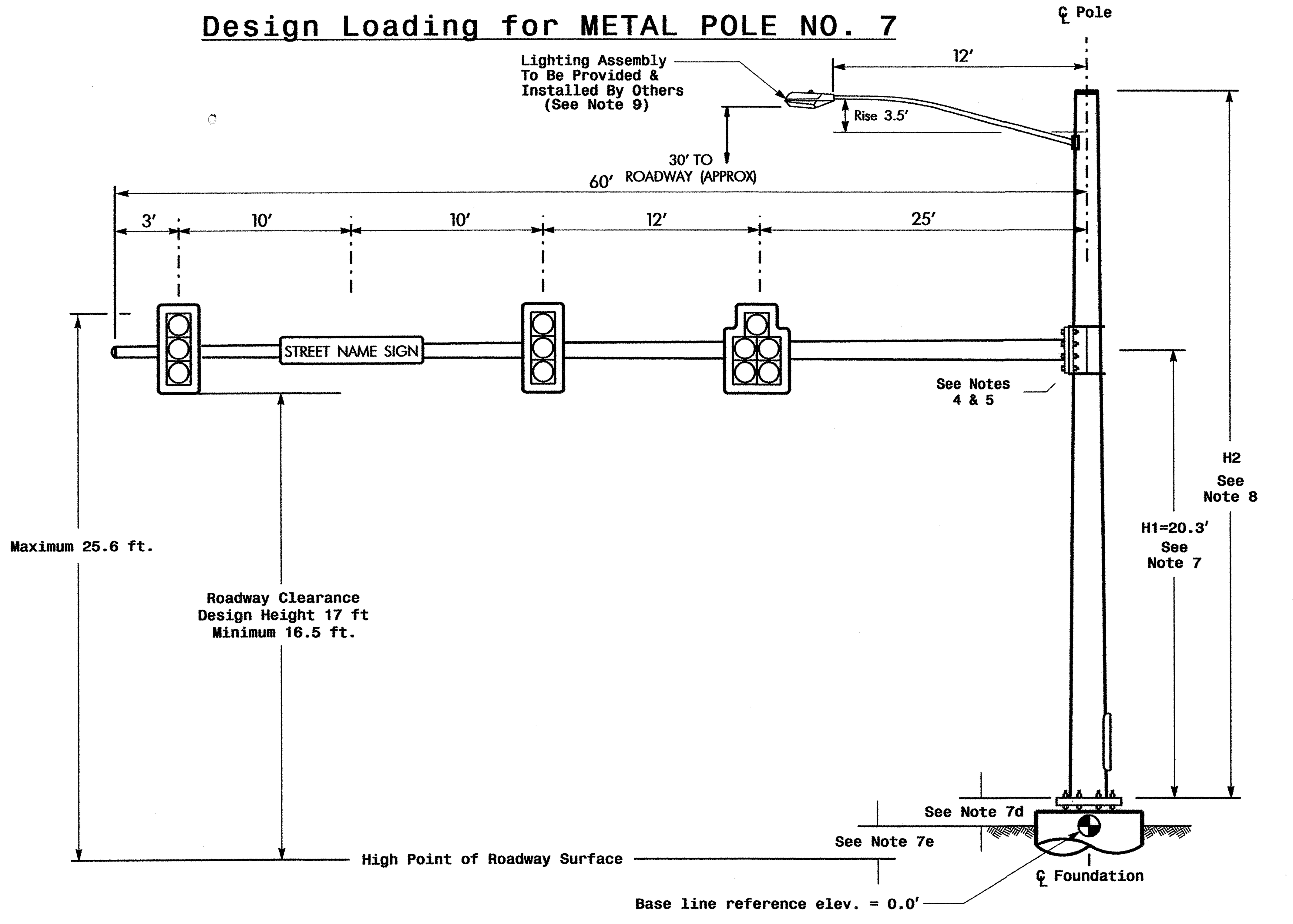
PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.17

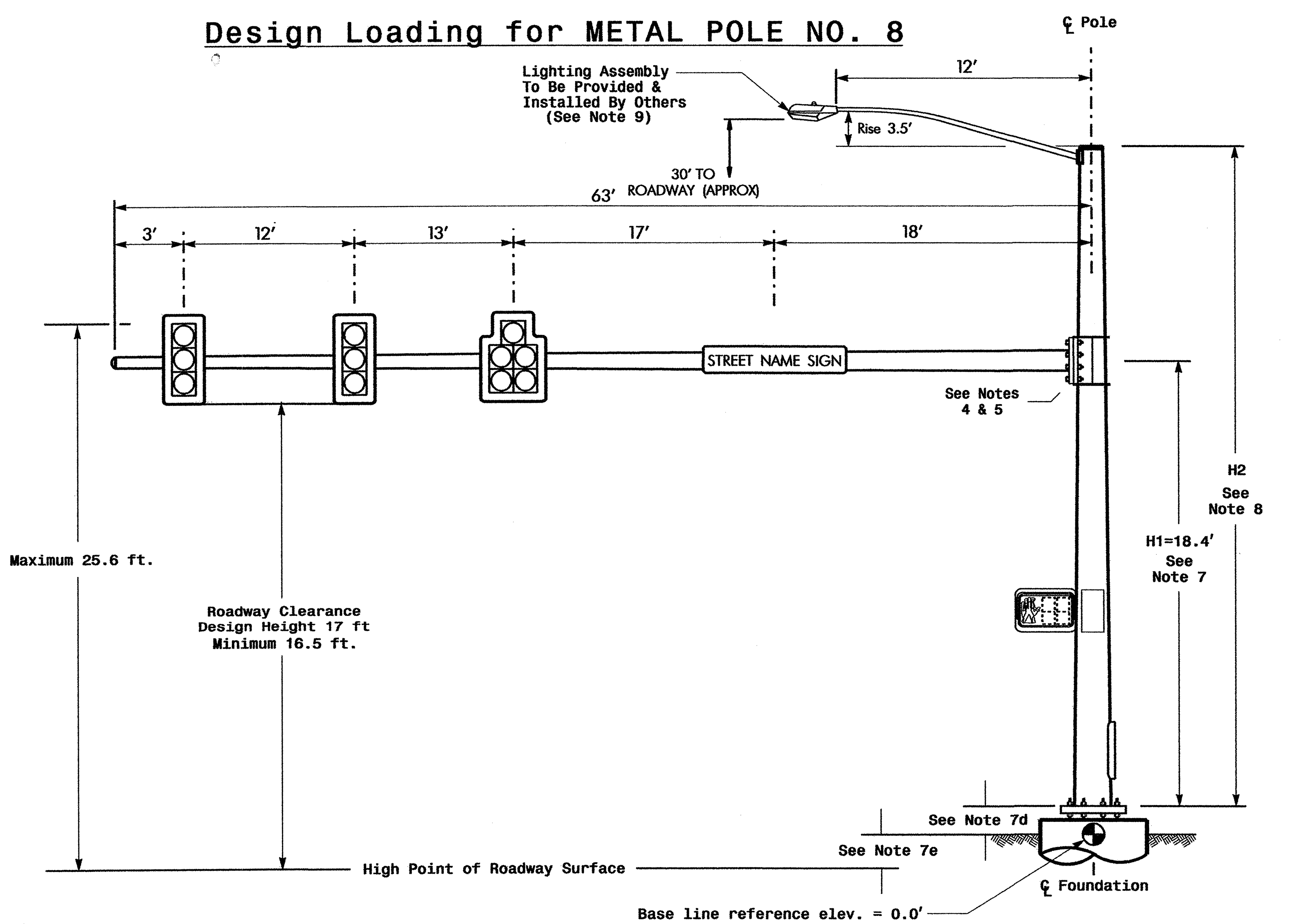
METAL POLE No. 7 and 8

Design Loading for METAL POLE NO. 7



Elevation View

Design Loading for METAL POLE NO. 8



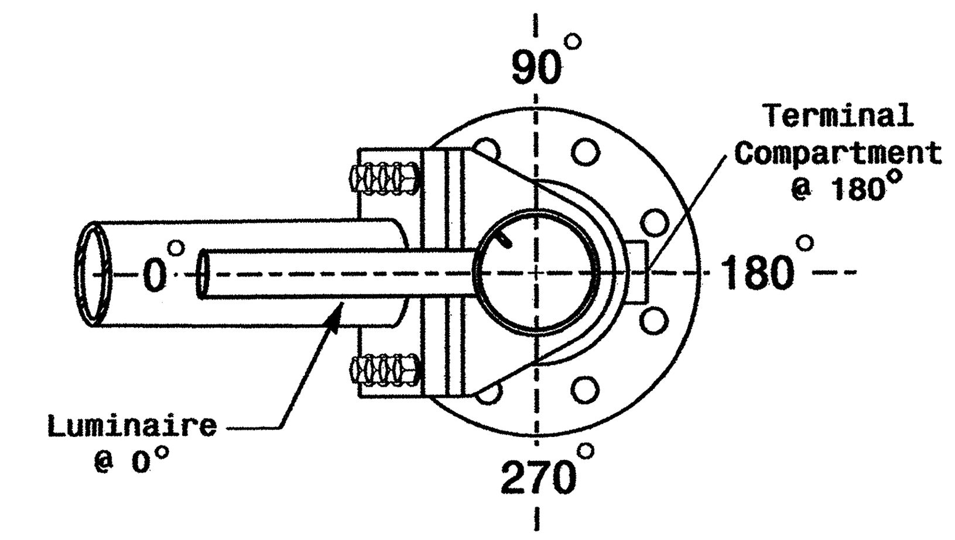
Elevation View

SPECIAL NOTE

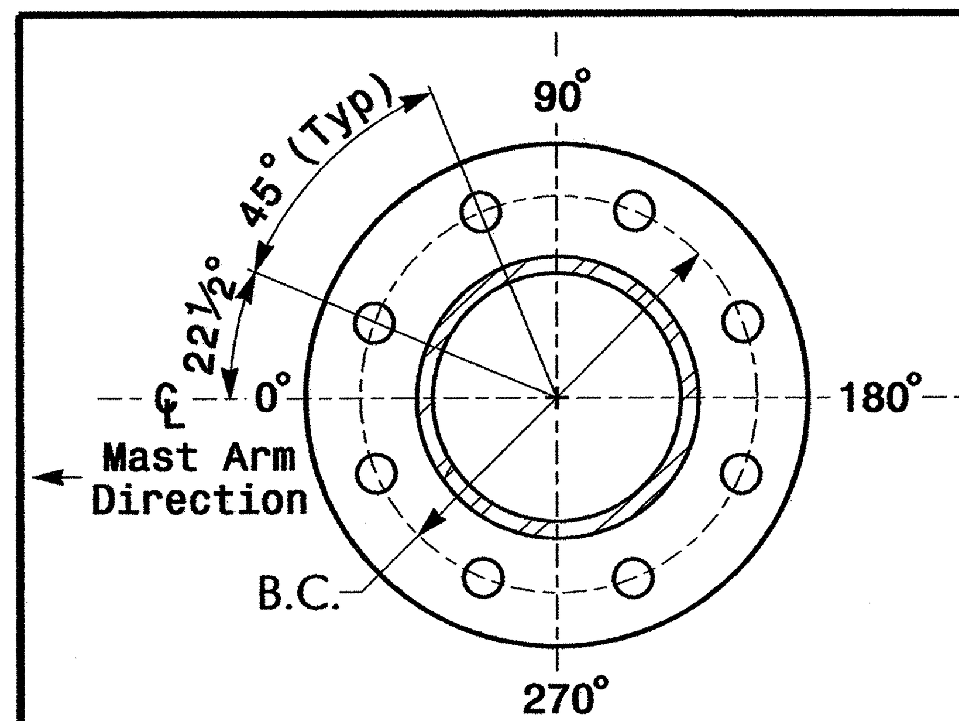
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 7	Pole 8
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.7 ft.	-0.2 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

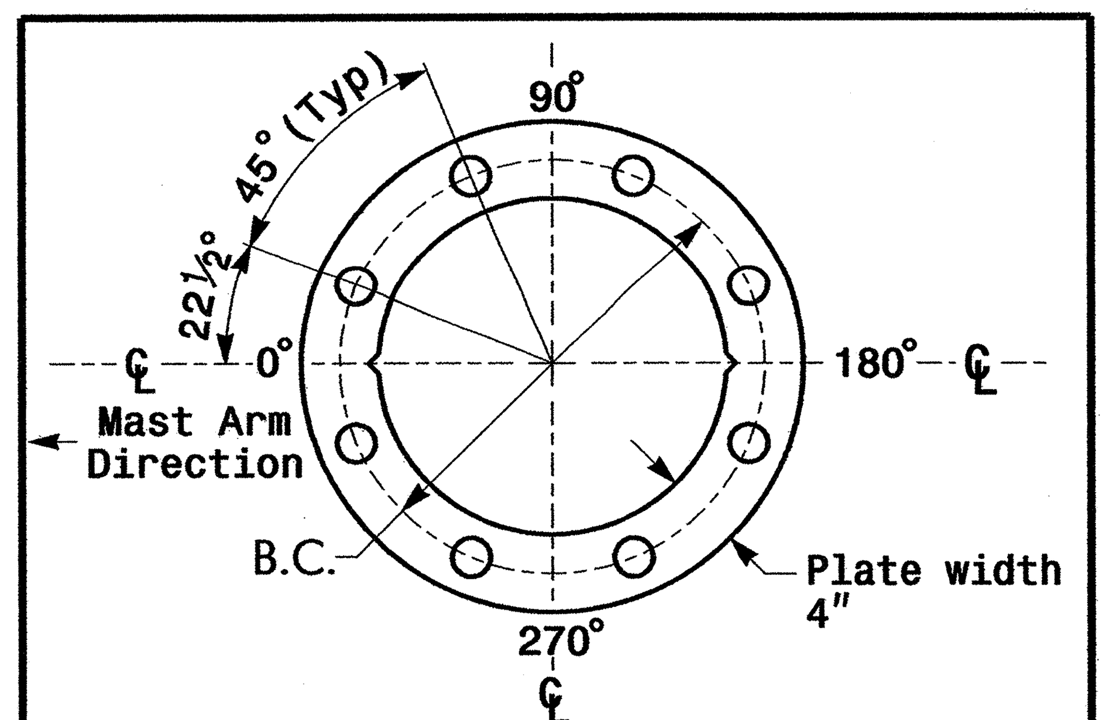


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

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STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS

	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

NOTES

Design Reference Material

1. 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 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   The 2002 NCDOT Roadway Standard Drawings.
   The traffic signal project plans and special provisions.
   The NCDOT "Metal Pole Standards" located at the following NCDOT website:
   http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Maximum allowable CSR for all signal supports is 0.9.
4. 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.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads 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.
8. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
9. Design the luminaire support arm using design dimensions as shown on elevation views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.
10. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
11. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
12. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 2 (130 mph)

Prepared in the Offices of: Signals and Geometrics Section, 122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road) at SR 1700 (Old Tar Road/ Evans Street)

Division 2 | Pitt County | Greenville

PLAN DATE:	March 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

SCALE: 0 N/A — N/A

REVISIONS | INIT. | DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER RICHARD E. MULLINAX — 11 MAY 2006

SIGNATURE | DATE

SIG. INVENTORY NO. 02-0422

11-MAY-2006 09:13
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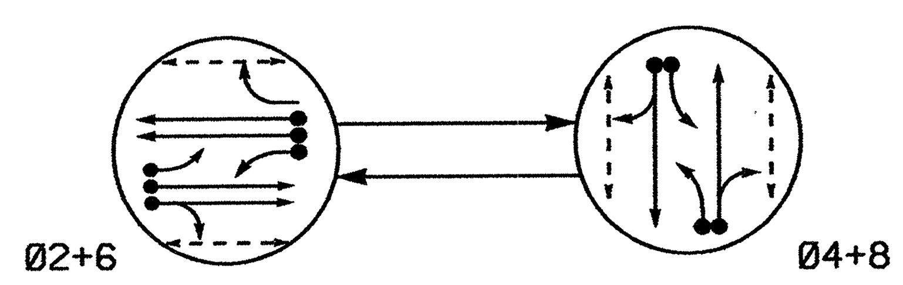
rduffy

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.18

2 Phase
Fully Actuated
(Greenville City System)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

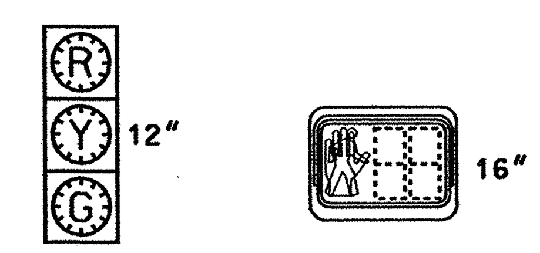
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62, 63	G	R	Y
81, 82	R	G	R
P21, P22	W	DW	DRK
P41, P42	DW	W	DRK
P61, P86	W	DW	DRK
P81, P82	DW	W	DRK

SIGNAL FACE I.D.

Denotes L.E.D.



21, 22
41, 42
61, 62, 63
81, 82

P21, P22
P41, P42
P61, P62
P81, P82

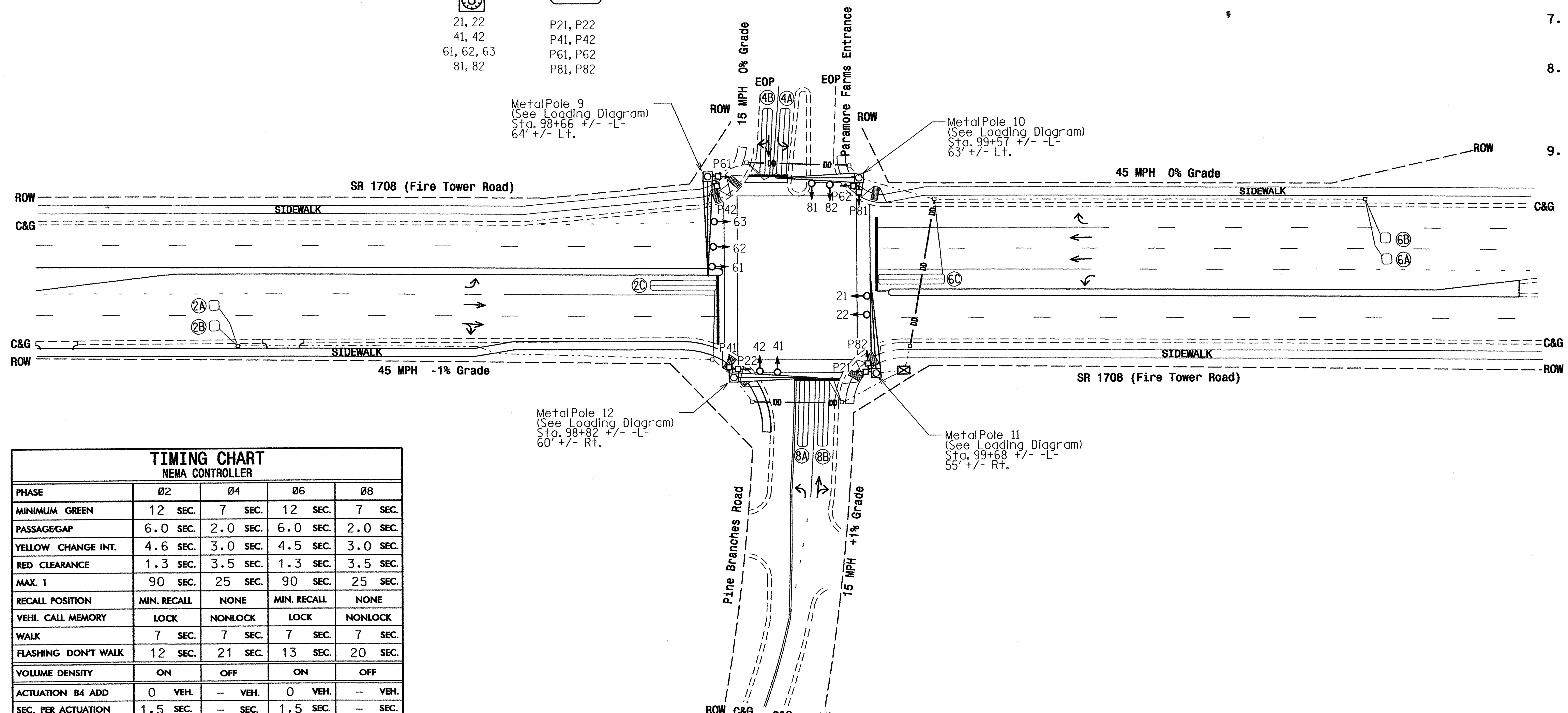
LOOP & DETECTOR UNIT INSTALLATION CHART

NEMA CONTROLLER WITH TS-2 CABINET

LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?
2A	6X6	6	300	X		2	X		-	- SEC.	ALL	NO
2B	6X6	6	300	X		2	X		-	- SEC.	ALL	NO
2C	6X40	2-4-2	0	X		2	X		DELAY	3 SEC.	ALL	NO
4A	6X40	2-4-2	0	X		4	X		-	- SEC.	ALL	NO
4B	6X40	2-4-2	0	X		4	X		DELAY	10 SEC.	ALL	YES
6A	6X6	6	300	X		6	X		-	- SEC.	ALL	NO
6B	6X6	6	300	X		6	X		-	- SEC.	ALL	NO
6C	6X40	6	0	X		6	X		DELAY	3 SEC.	ALL	NO
8A	6X40	2-4-2	0	X		8	X		DELAY	3 SEC.	ALL	YES
8B	6X40	2-4-2	0	X		8	X		DELAY	10 SEC.	ALL	YES

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Program phase 4 and phase 8 for dual entry.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Intersection Zone Number: 7, System Address Number: 122



TIMING CHART

NEMA CONTROLLER

PHASE	Ø2	Ø4	Ø6	Ø8
MINIMUM GREEN	12 SEC.	7 SEC.	12 SEC.	7 SEC.
PASSAGE/GAP	6.0 SEC.	2.0 SEC.	6.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	4.6 SEC.	3.0 SEC.	4.5 SEC.	3.0 SEC.
RED CLEARANCE	1.3 SEC.	3.5 SEC.	1.3 SEC.	3.5 SEC.
MAX. 1	90 SEC.	25 SEC.	90 SEC.	25 SEC.
RECALL POSITION	MIN. RECALL	NONE	MIN. RECALL	NONE
VEH. CALL MEMORY	LOCK	NONLOCK	LOCK	NONLOCK
WALK	7 SEC.	7 SEC.	7 SEC.	7 SEC.
FLASHING DON'T WALK	12 SEC.	21 SEC.	13 SEC.	20 SEC.
VOLUME DENSITY	ON	OFF	ON	OFF
ACTUATION B4 ADD	0 VEH.	- VEH.	0 VEH.	- VEH.
SEC. PER ACTUATION	1.5 SEC.	- SEC.	1.5 SEC.	- SEC.
MAX. INITIAL	34 SEC.	- SEC.	34 SEC.	- SEC.
TIME B4 REDUCTION	15 SEC.	- SEC.	15 SEC.	- SEC.
TIME TO REDUCE	30 SEC.	- SEC.	30 SEC.	- SEC.
MINIMUM GAP	3.0 SEC.	- SEC.	3.0 SEC.	- SEC.

* 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.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Pavement Marking Arrow	
N/A	Wheelchair Ramp	
	Metal Pole with Mastarm	
	Directional Drill (2) 2-in Polyethylene Conduits	N/A

New Installation

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section
122 N. McDowell St., Raleigh, NC 27603

SCALE 0 40 1"=40'

SR 1708 (Fire Tower Road)
at
Pine Branches Road/
Paramore Farms Entrance

Division 02 | Pitt County | Greenville

PLAN DATE:	January 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

REVISIONS | INIT. | DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
D. E. MULLINAX
3 MARCH 2006

SIGNATURE | DATE

SIG. INVENTORY NO. 02-0870

09-MAY-2006 11:10
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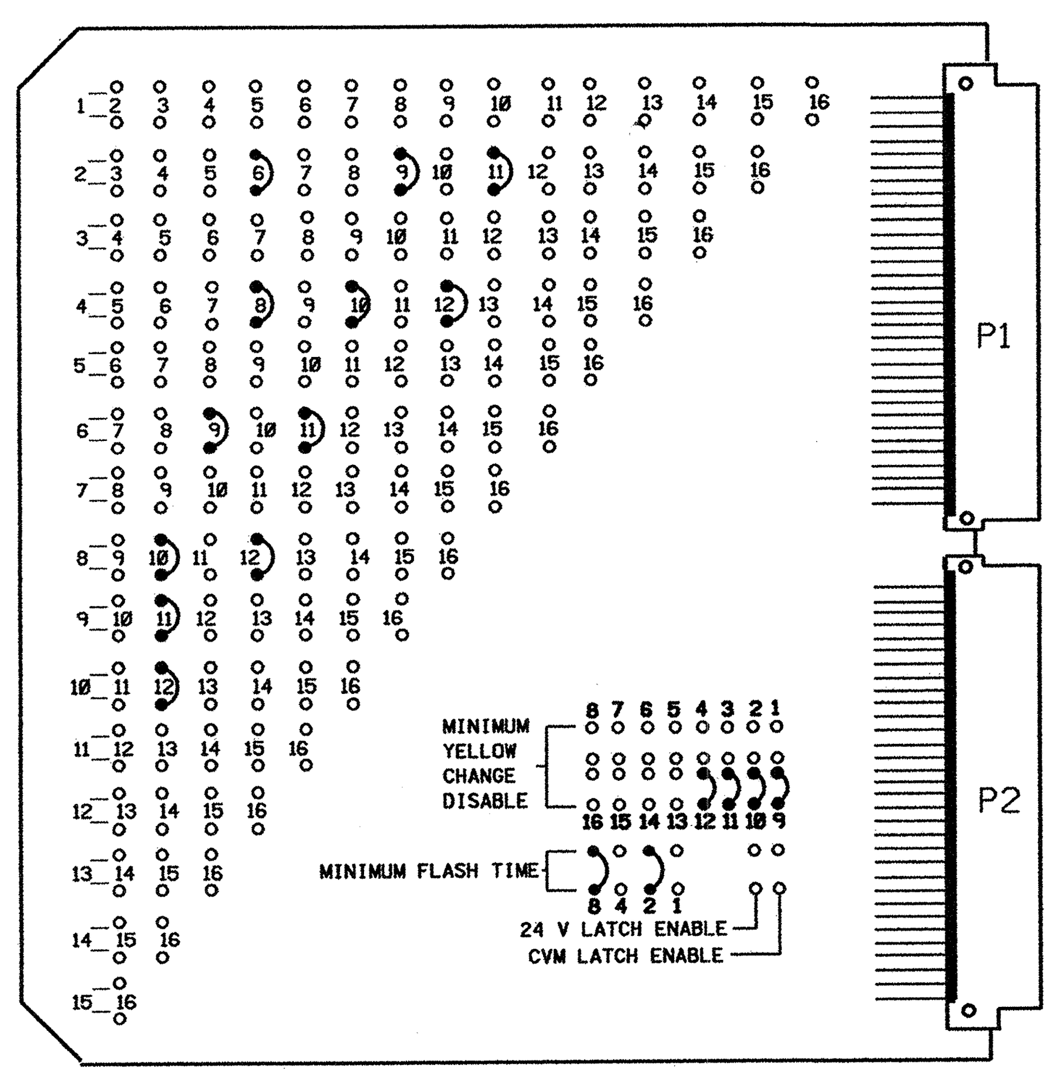
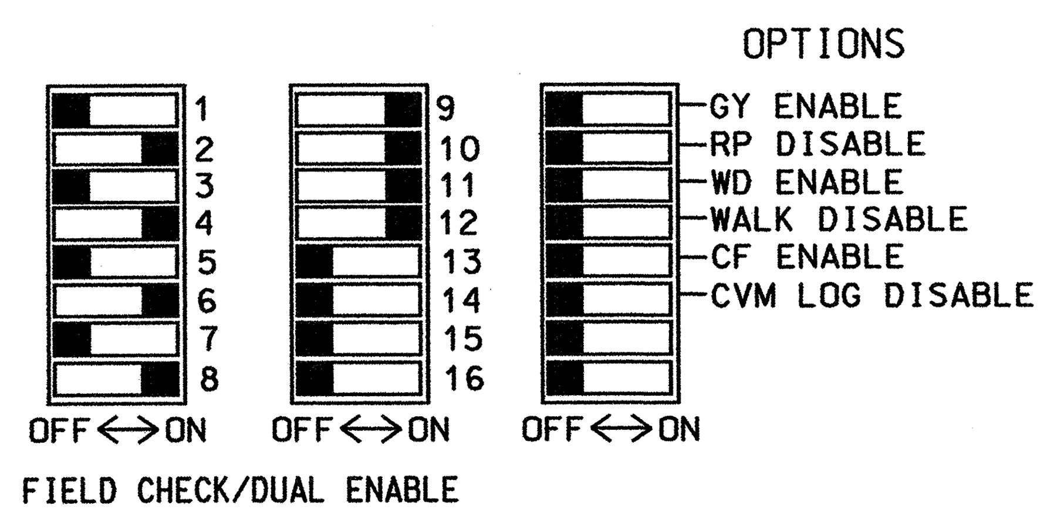
rduffy

EDI MODEL MMU-16E MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and set switches as shown below)



MMU PROGRAMMING CARD



NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 1, 3, 5, 7, 13, 14, 15 AND 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
10. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
11. THE CABINET AND CONTROLLER ARE A PART OF THE GREENVILLE CITY SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	NU	21,22	NU	41,42	NU	61 62,63	NU	81,82	P21, P22	P41, P42	P61, P62	P81, P82	NU	NU	NU	NU
RED		2R		4R		6R		8R								
YELLOW		2Y		4Y		6Y		8Y	*	*	*	*				
GREEN		2G		4G		6G		8G								
RED ARROW																
YELLOW ARROW																
GREEN ARROW																
(hand)									9R	10R	11R	12R				
(walking person)									9G	10G	11G	12G				

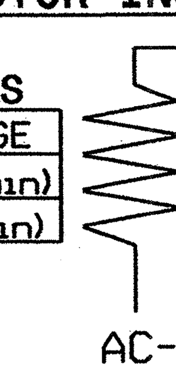
NU = NOT USED

* INSTALL LOAD RESISTORS TO UNUSED FIELD TERMINALS 9Y, 10Y, 11Y AND 12Y, IF NOT ALREADY PRESENT. SEE LOAD RESISTOR INSTALLATION DETAIL THIS PAGE.

TYPICAL LOAD RESISTOR INSTALLATION DETAIL

ACCEPTABLE VALUES

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



DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

BIU	CH1 L3 ∅2 *	CH1 L1 ∅2	CH1 L7 ∅6	CH1 L5 ∅4	SLOT EMPTY	CH1 L9 ∅8	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	CH2 L4 ∅4	CH2 L2 ∅2	CH2 L8 ∅6 *	CH2 L6 ∅6		CH2 L10 ∅8					

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

LOOP NO.	LOOP PANEL TERMINALS
2A	L1A,L1B
2B	L2A,L2B
2C	L3A,L3B
4A	L4A,L4B
4B	L5A,L5B
6A	L6A,L6B
6B	L7A,L7B
6C	L8A,L8B
8A	L9A,L9B
8B	L10A,L10B
	L11A,L11B
	L12A,L12B
	L13A,L13B
	L14A,L14B
	L15A,L15B
	L16A,L16B

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
1	∅2		
2	∅2		
* 3	∅2	DELAY	3
4	∅4		
5	∅4	DELAY	10
6	∅6		
7	∅6		
* 8	∅6	DELAY	3
9	∅8	DELAY	3
10	∅8	DELAY	10
11			
12			
13			
14			
15			
16			

* THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE TIMING REQUIRED FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

EQUIPMENT INFORMATION

CONTROLLER..............CONTRACTOR SUPPLIED
CABINET ....CONTRACTOR SUPPLIED TS-2 NC-8A
CABINET MOUNT...........BASE
LOADBAY POSITIONS.......16
LOAD SWITCHES USED......2,4,6,8,9,10,11,12
PHASES USED.............2,4,6,8,2 PED,4 PED,6 PED,8 PED
OLA.....................NOT USED
OLB.....................NOT USED
OLC.....................NOT USED
OLD.....................NOT USED

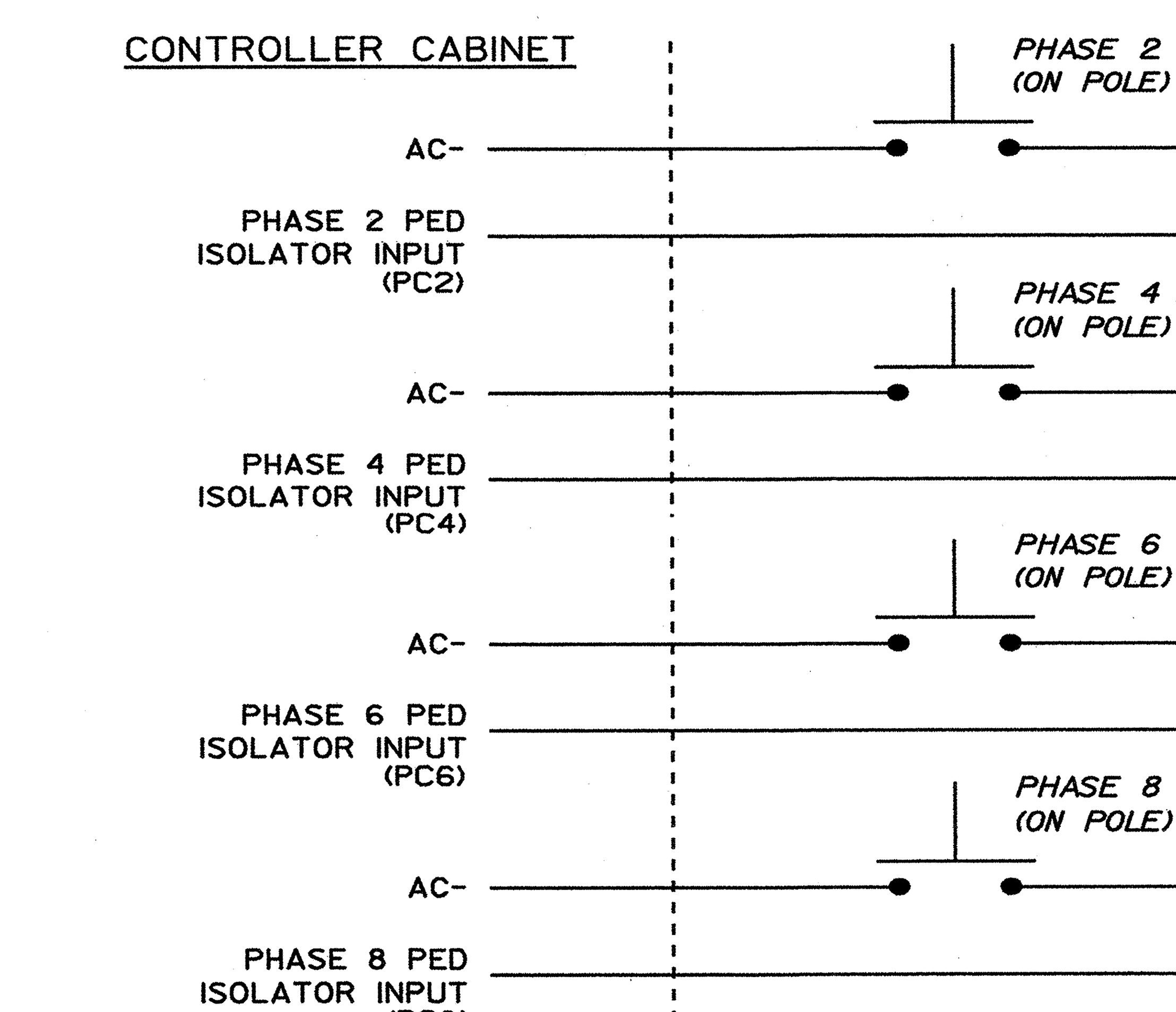
LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	∅1
2	∅2
3	∅3
4	∅4
5	∅5
6	∅6
7	∅7
8	∅8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

PEDESTRIAN PUSH-BUTTON WIRING DETAIL

(wire push-buttons as shown below)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0870
DESIGNED: January 2006
SEALED: 03-03-06
REVISED: NA

New Installation

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1708 (Fire Tower Road) at Pine Branches Road/ Pinemore Farms Entrance

Division 2 Pitt County Greenville

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, State of North Carolina Department of Transportation, Signals Management Section
122 N. McDowell St., Raleigh, NC 27603

PLAN DATE: February 2006	REVIEWED BY: MWH
PREPARED BY: James Peterson	REVIEWED BY:

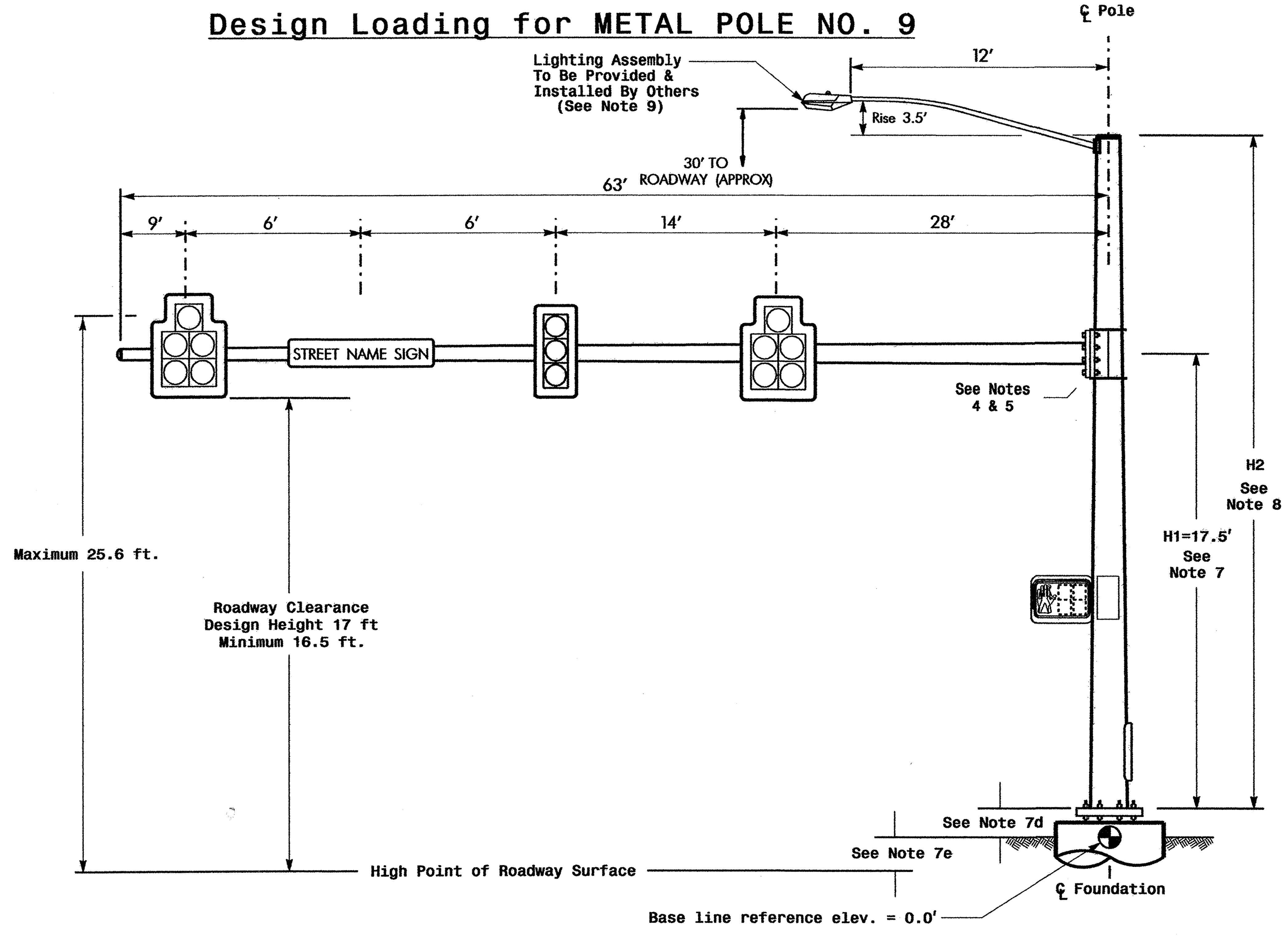
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR
SIGNATURE John T. Rowe Jr DATE 3-7-06
SIG. INVENTORY NO. 02-0870

METAL POLE No. 9 and 10

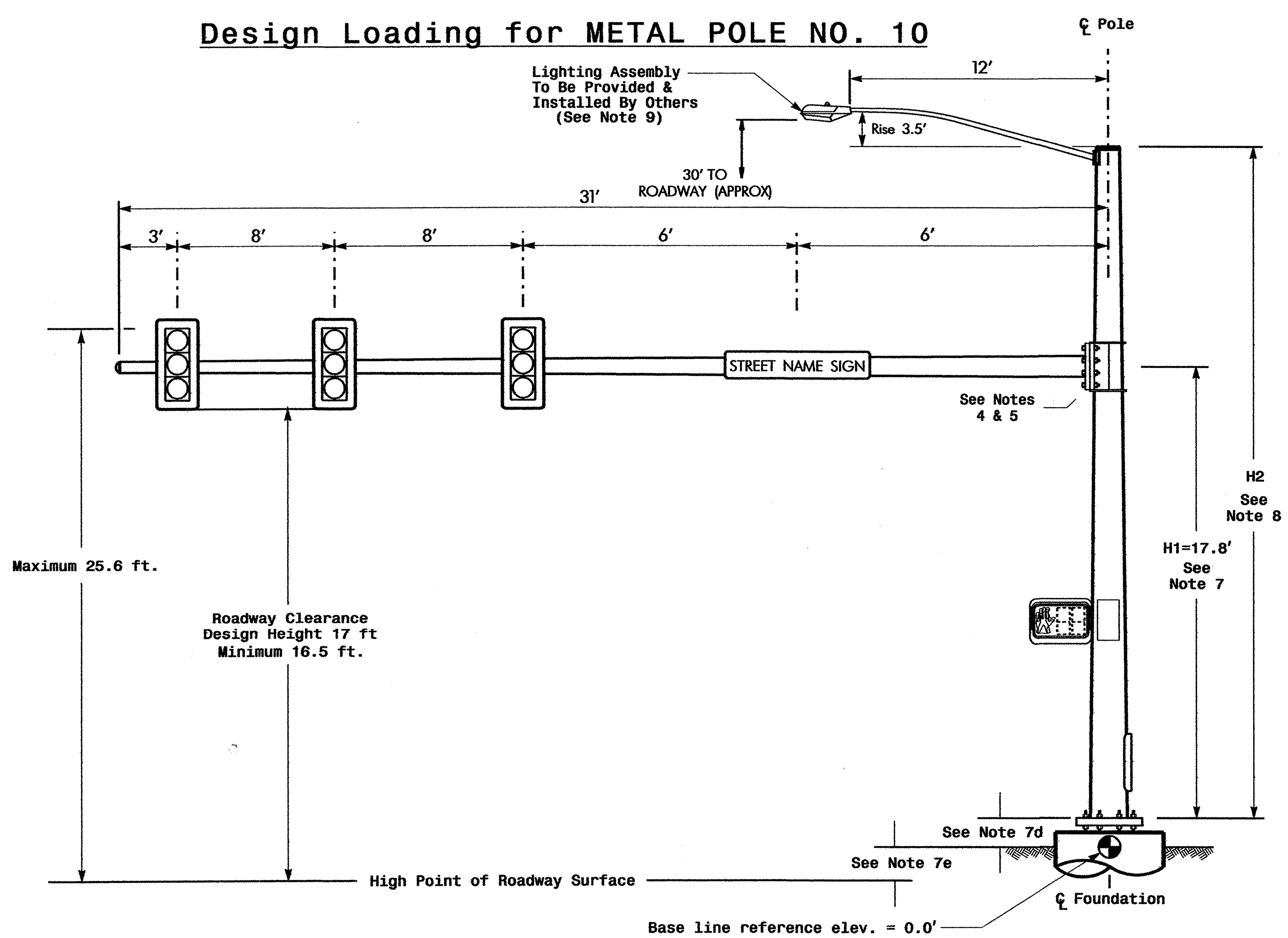
PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.20

Design Loading for METAL POLE NO. 9



Elevation View

Design Loading for METAL POLE NO. 10



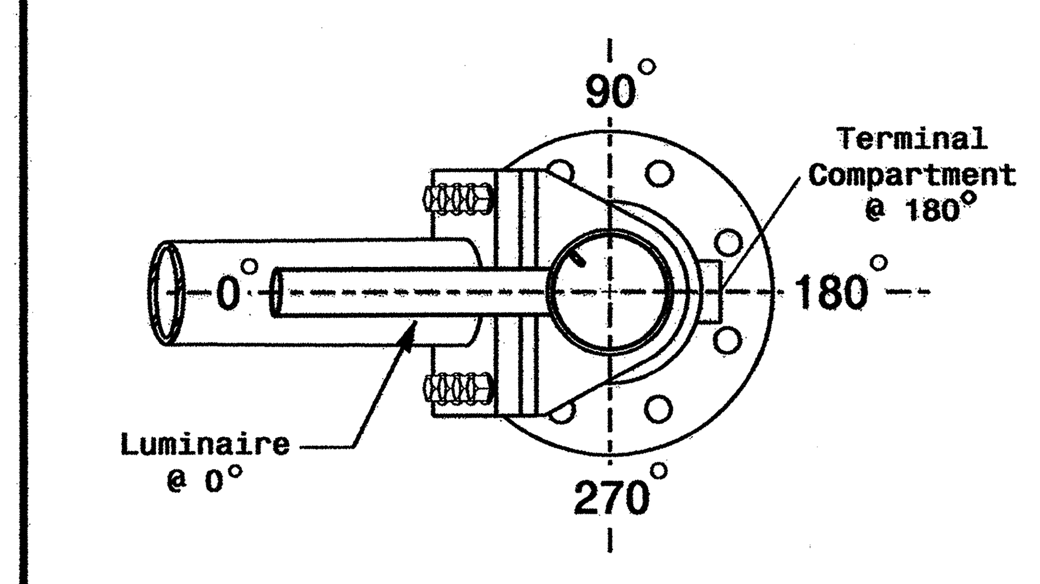
Elevation View

SPECIAL NOTE

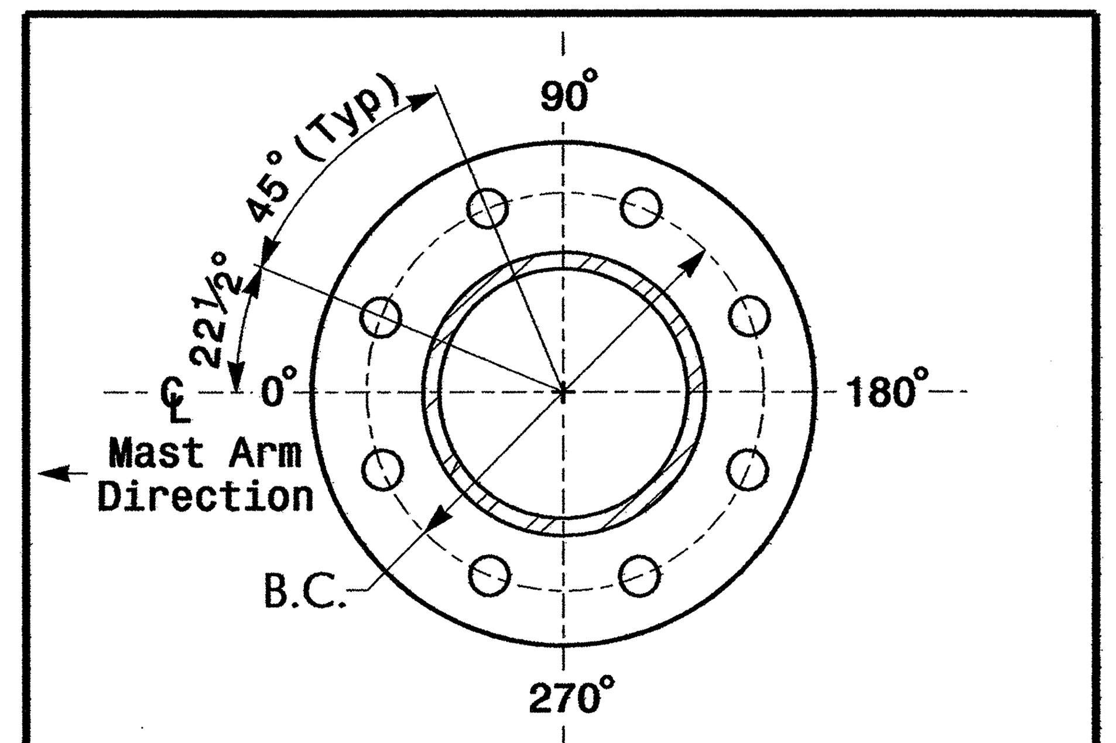
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 9	Pole 10
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-1.0 ft.	-0.8 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

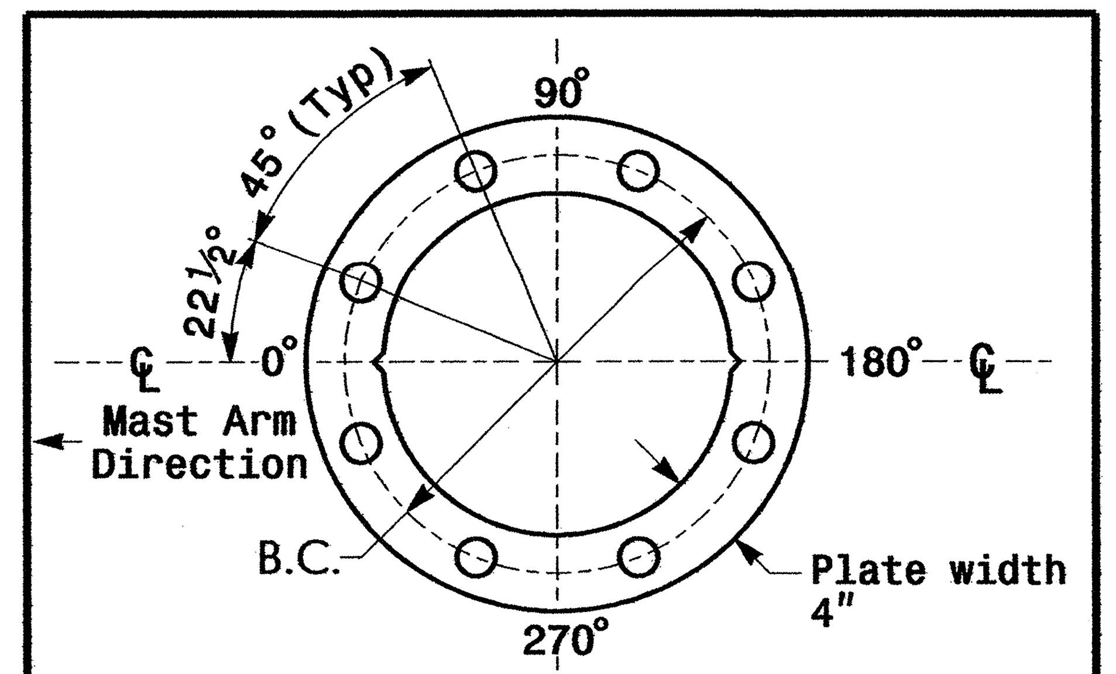


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS

	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

NOTES

Design Reference Material

1. Design the traffic signal structure and foundation in accordance with:
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   The 2002 NCDOT Roadway Standard Drawings.
   The traffic signal project plans and special provisions.
   The NCDOT "Metal Pole Standards" located at the following NCDOT website:
   http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Maximum allowable CSR for all signal supports is 0.9.
4. 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.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads 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.
8. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
9. Design the luminaire support arm using design dimensions as shown on elevation views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.
10. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
11. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
12. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 2 (130 mph)

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, State of North Carolina Department of Transportation

122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road) at Pine Branches Road Paramore Farms Entrance

Division 2 | Pitt County | Greenville

PLAN DATE:	March 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

SCALE: 0 N/A — N/A

REVISIONS | INIT. | DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22002 RICHARD E. MULLINAX — 10 MAY 2006

SIGNATURE | DATE

SIG. INVENTORY NO. 02-0870

10-MAY-2006 10:45
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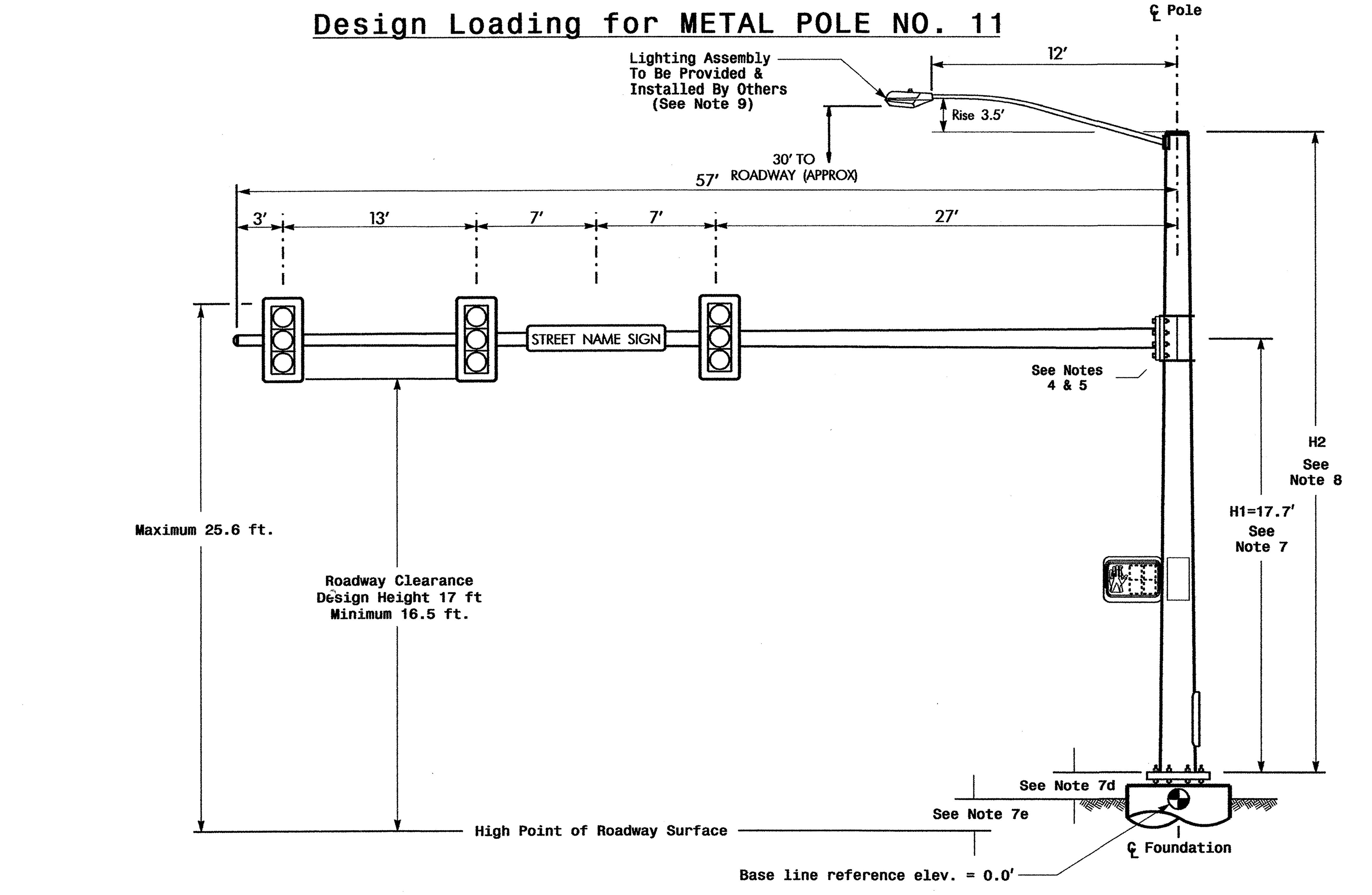
METAL POLE No. 11 and 12

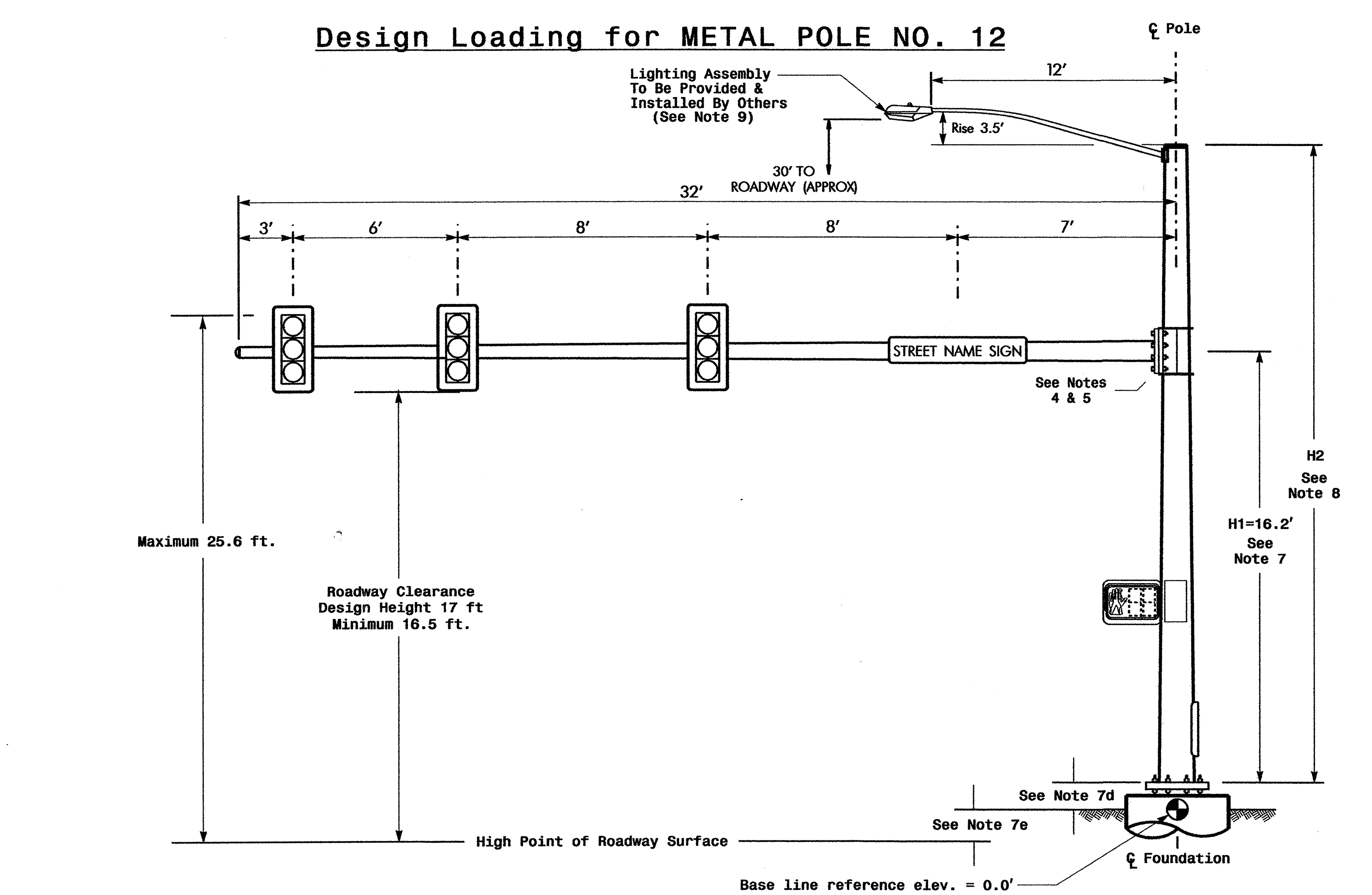
PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.21

Design Loading for METAL POLE NO. 11



Elevation View

Design Loading for METAL POLE NO. 12



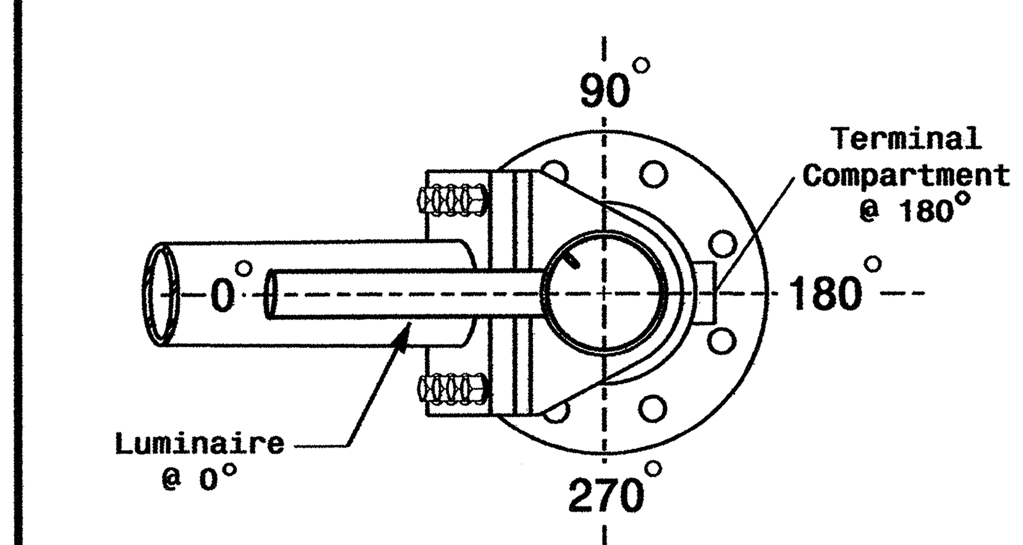
Elevation View

SPECIAL NOTE

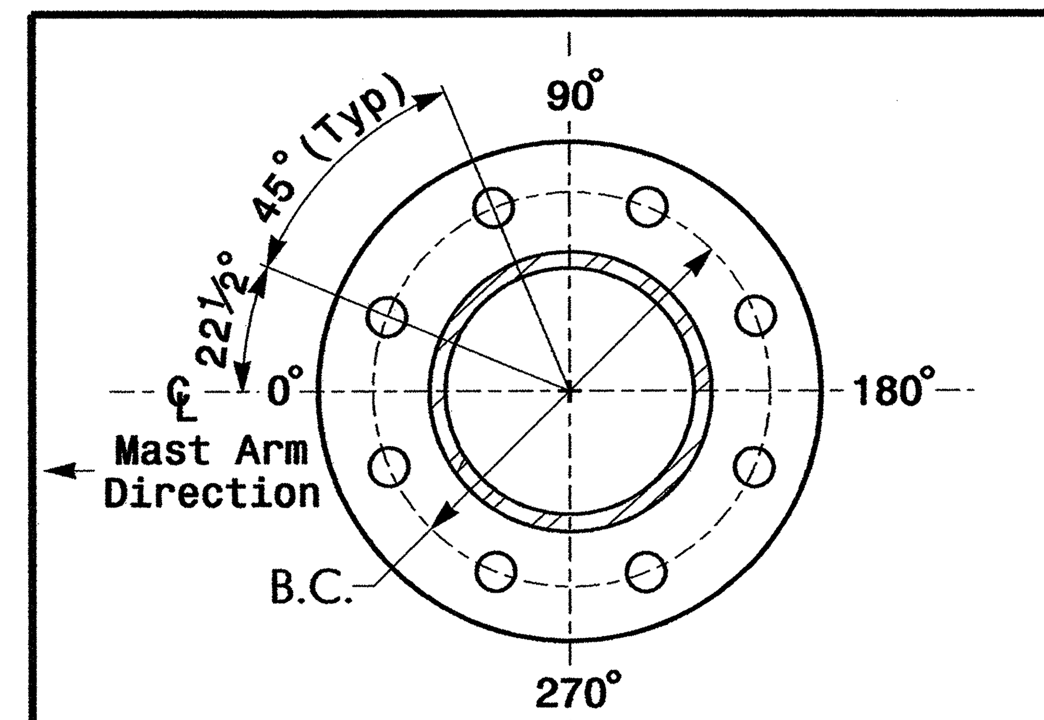
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 11	Pole 12
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-0.9 ft.	-2.4 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

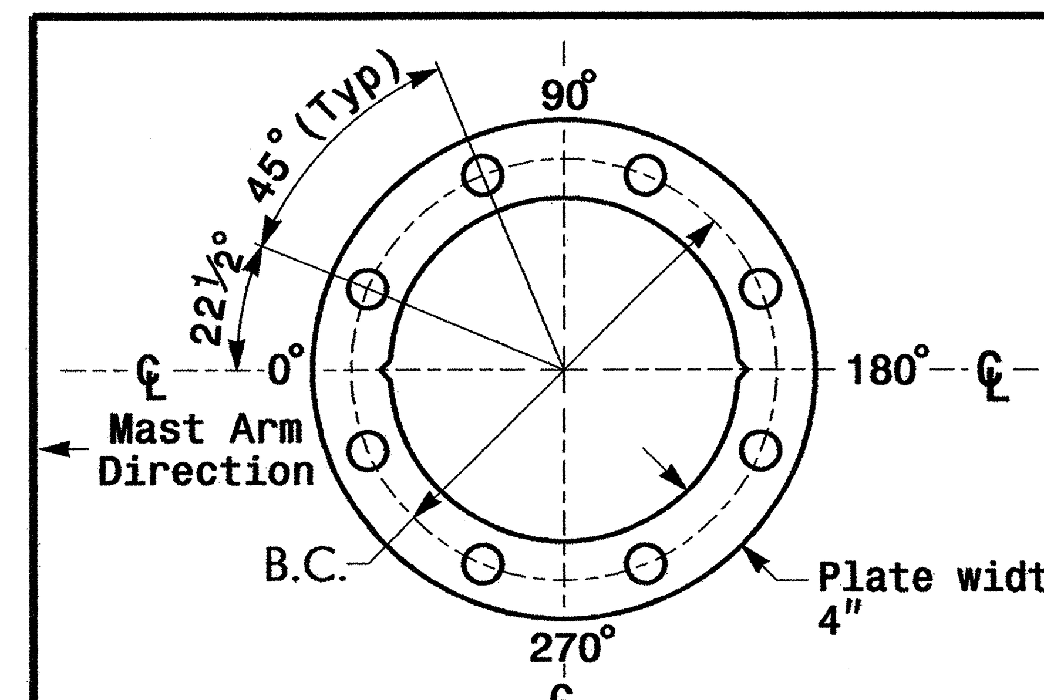


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRAIN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS

	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

NOTES

Design Reference Material

1. 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 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   - The 2002 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Maximum allowable CSR for all signal supports is 0.9.
4. 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.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads 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.
8. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
9. Design the luminaire support arm using design dimensions as shown on elevation views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.
10. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
11. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
12. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 2 (130 mph)

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, 122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road) at Pine Branches Road Paramore Farms Entrance

Division 2 | Pitt County | Greenville

PLAN DATE:	March 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

SCALE: 0 N/A — N/A

REVISIONS | INIT. | DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER RICHARD E. MULLINAX

SIGNATURE | DATE

SIG. INVENTORY NO. 02-0870

11-MAY-2006 09:20
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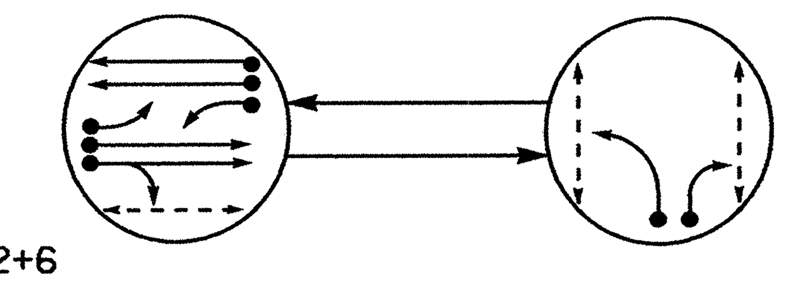
PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

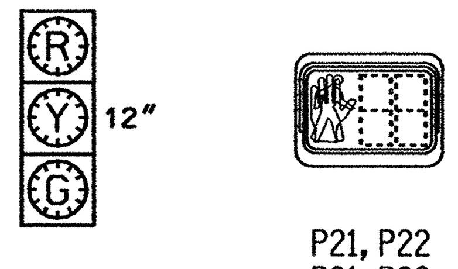
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	Ø8	FLASH
21, 22	G	R	Y
61, 62	G	R	Y
81, 82	R	G	R
P21, P22	W	DW	DRK
P81, P82	DW	W	DRK
P83, P84	DW	W	DRK

SIGNAL FACE I.D.

Denotes L.E.D.



21, 22
61, 62
81, 82

P21, P22
P81, P82
P83, P84

LOOP & DETECTOR UNIT INSTALLATION CHART

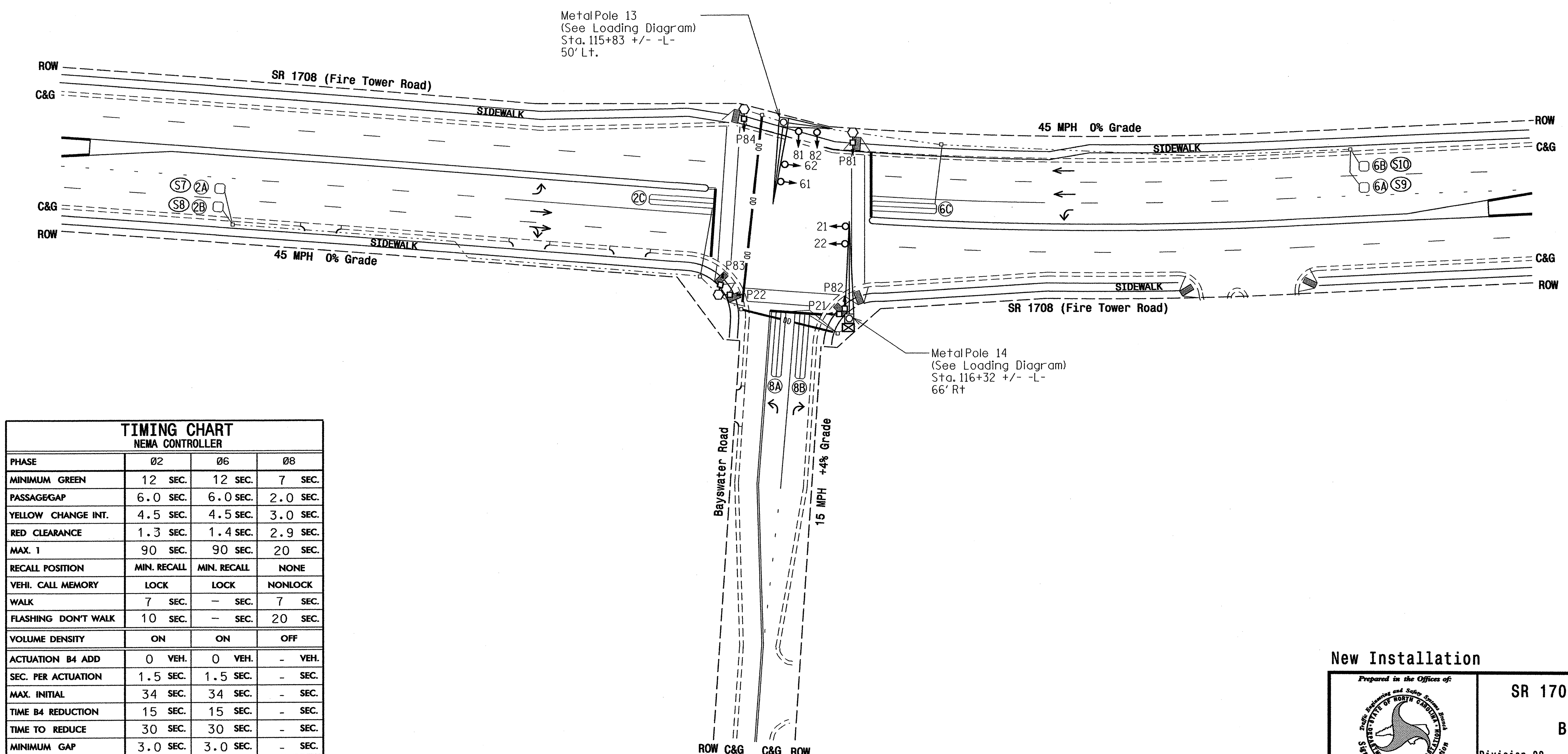
NEMA CONTROLLER WITH TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS						
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?
2A/S7	6X6	6	300	X		2	X		-	- SEC.	ALL	NO
						-	X		System Detector			
2B/S8	6X6	6	300	X		2	X		-	- SEC.	ALL	NO
						-	X		System Detector			
2C	6X40	2-4-2	0	X		2	X		DELAY	3 SEC.	ALL	NO
6A/S9	6X6	6	300	X		6	X		-	- SEC.	ALL	NO
						-	X		System Detector			
6B/S10	6X6	6	300	X		6	X		-	- SEC.	ALL	NO
						-	X		System Detector			
6C	6X40	2-4-2	0	X		6	X		DELAY	3 SEC.	ALL	NO
8A	6X40	2-4-2	0	X		8	X		DELAY	3 SEC.	ALL	YES
8B	6X40	2-4-2	0	X		8	X		DELAY	15 SEC.	ALL	YES

2 Phase
Fully Actuated
(Greenville City System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
6. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
8. Intersection Zone Number: 7, System Address Number: 123



TIMING CHART

NEMA CONTROLLER

PHASE	Ø2	Ø6	Ø8
MINIMUM GREEN	12 SEC.	12 SEC.	7 SEC.
PASSAGE/GAP	6.0 SEC.	6.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	4.5 SEC.	4.5 SEC.	3.0 SEC.
RED CLEARANCE	1.3 SEC.	1.4 SEC.	2.9 SEC.
MAX. 1	90 SEC.	90 SEC.	20 SEC.
RECALL POSITION	MIN. RECALL	MIN. RECALL	NONE
VEHI. CALL MEMORY	LOCK	LOCK	NONLOCK
WALK	7 SEC.	- SEC.	7 SEC.
FLASHING DON'T WALK	10 SEC.	- SEC.	20 SEC.
VOLUME DENSITY	ON	ON	OFF
ACTUATION B4 ADD	0 VEH.	0 VEH.	- VEH.
SEC. PER ACTUATION	1.5 SEC.	1.5 SEC.	- SEC.
MAX. INITIAL	34 SEC.	34 SEC.	- SEC.
TIME B4 REDUCTION	15 SEC.	15 SEC.	- SEC.
TIME TO REDUCE	30 SEC.	30 SEC.	- SEC.
MINIMUM GAP	3.0 SEC.	3.0 SEC.	- SEC.

* 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.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Pavement Marking Arrow	
N/A	Wheelchair Ramp	
	Pedestrian Signal Pedestal	
	Metal Pole with Mastarm	
	Directional Drill (2) 2-in Polyethylene Conduit	N/A

New Installation

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, 122 N. McDowell St., Raleigh, NC 27603

SCALE 0 40 1"=40'

SR 1708 (Fire Tower Road) at Bayswater Road

Division 02 Pitt County Greenville

PLAN DATE:	January 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

REVISIONS | INIT. | DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER 22006 RICHARD E. MULLINAX

SIGNATURE 3 MARCH 2006 DATE

SIG. INVENTORY NO. 02-0871

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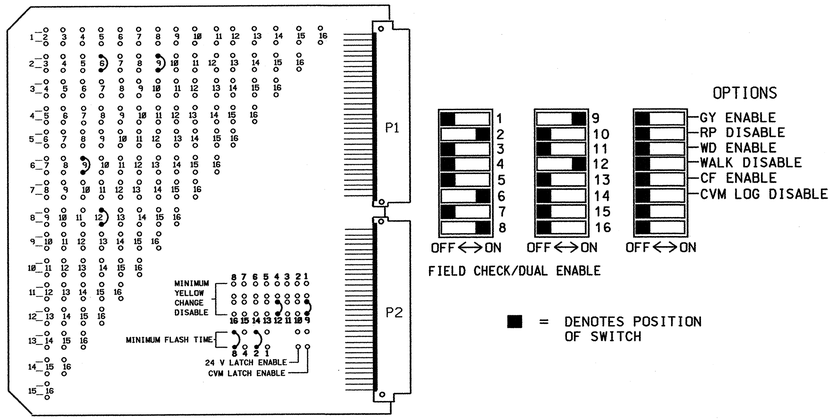
PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.23

EDI MODEL MMU-16E
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and set switches as shown below)



MMU PROGRAMMING CARD

OPTIONS
- GY ENABLE
- RP DISABLE
- WD ENABLE
- WALK DISABLE
- CF ENABLE
- CVM LOG DISABLE

■ = DENOTES POSITION OF SWITCH

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 1, 3, 4, 5, 7, 10, 11, 13, 14, 15 AND 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
10. THE CABINET AND CONTROLLER ARE A PART OF THE GREENVILLE CITY SYSTEM.

FIELD CONNECTION HOOK-UP CHART

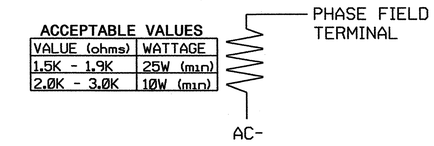
PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	NU	21,22	NU	NU	NU	61,62	NU	81,82	P21, P22	NU	NU	P81,P82 P83,P84	NU	NU	NU	NU
RED		2R				6R		8R								
YELLOW		2Y				6Y		8Y	*			*				
GREEN		2G				6G		8G								
RED ARROW																
YELLOW ARROW																
GREEN ARROW																
✋									9R			12R				
🚶									9G			12G				

NU = NOT USED

* INSTALL LOAD RESISTORS TO UNUSED FIELD TERMINALS 9Y AND 12Y, IF NOT ALREADY PRESENT. SEE LOAD RESISTOR INSTALLATION DETAIL THIS PAGE.

TYPICAL LOAD RESISTOR INSTALLATION DETAIL

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



DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

BIU	CH1 L3 ø2 *	CH1 L1 ø2/SYS	CH1 L7 ø8	CH1 L5 ø6/SYS	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	CH2 L4 ø6/SYS	CH2 L2 ø2/SYS	CH2 L8 ø8	CH2 L6 ø6 *							

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

LOOP NO.	LOOP PANEL TERMINALS
2A/S7	L1A,L1B
2B/S8	L2A,L2B
2C	L3A,L3B
6A/S9	L4A,L4B
6B/S10	L5A,L5B
6C	L6A,L6B
8A	L7A,L7B
8B	L8A,L8B
	L9A,L9B
	L10A,L10B
	L11A,L11B
	L12A,L12B
	L13A,L13B
	L14A,L14B
	L15A,L15B
	L16A,L16B

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

ASSIGN CONTROLLER SYSTEM DETECTOR TO LOCAL CONT. DET. NUMBERS AS SHOWN IN CHART BELOW

CONTROLLER SYS. DET. NO.	LOCAL CONT. DETECTOR NO.
1	1
2	2
3	4
4	5
5	
6	
7	
8	

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø2		
2	ø2		
* 3	ø2	DELAY	3
4	ø6		
5	ø6		
* 6	ø6	DELAY	3
7	ø8	DELAY	3
8	ø8	DELAY	15
9			
10			
11			
12			
13			
14			
15			
16			

* THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE TIMING REQUIRED FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED
CABINET .....CONTRACTOR SUPPLIED TS-2 NC-8A
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....2,6,8,9,12
PHASES USED.....2,6,8,2 PED,8 PED
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

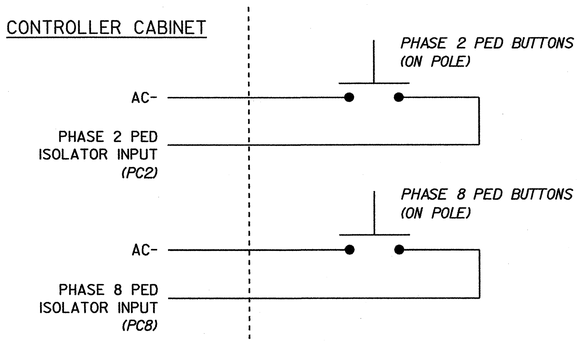
LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

PEDESTRIAN PUSH-BUTTON WIRING DETAIL

(wire push-buttons as shown below)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0871
DESIGNED: January 2006
SEALED: 03-03-06
REVISED: NA

New Installation

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section
122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road)
at
Evans Drive / Ashcroft Drive

Division 2 | Pitt County | Greenville

PLAN DATE: February 2006 | REVIEWED BY:
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.
SIGNATURE DATE 3-8-06
SIG. INVENTORY NO. 02-0871

08-MAR-2006 07:43
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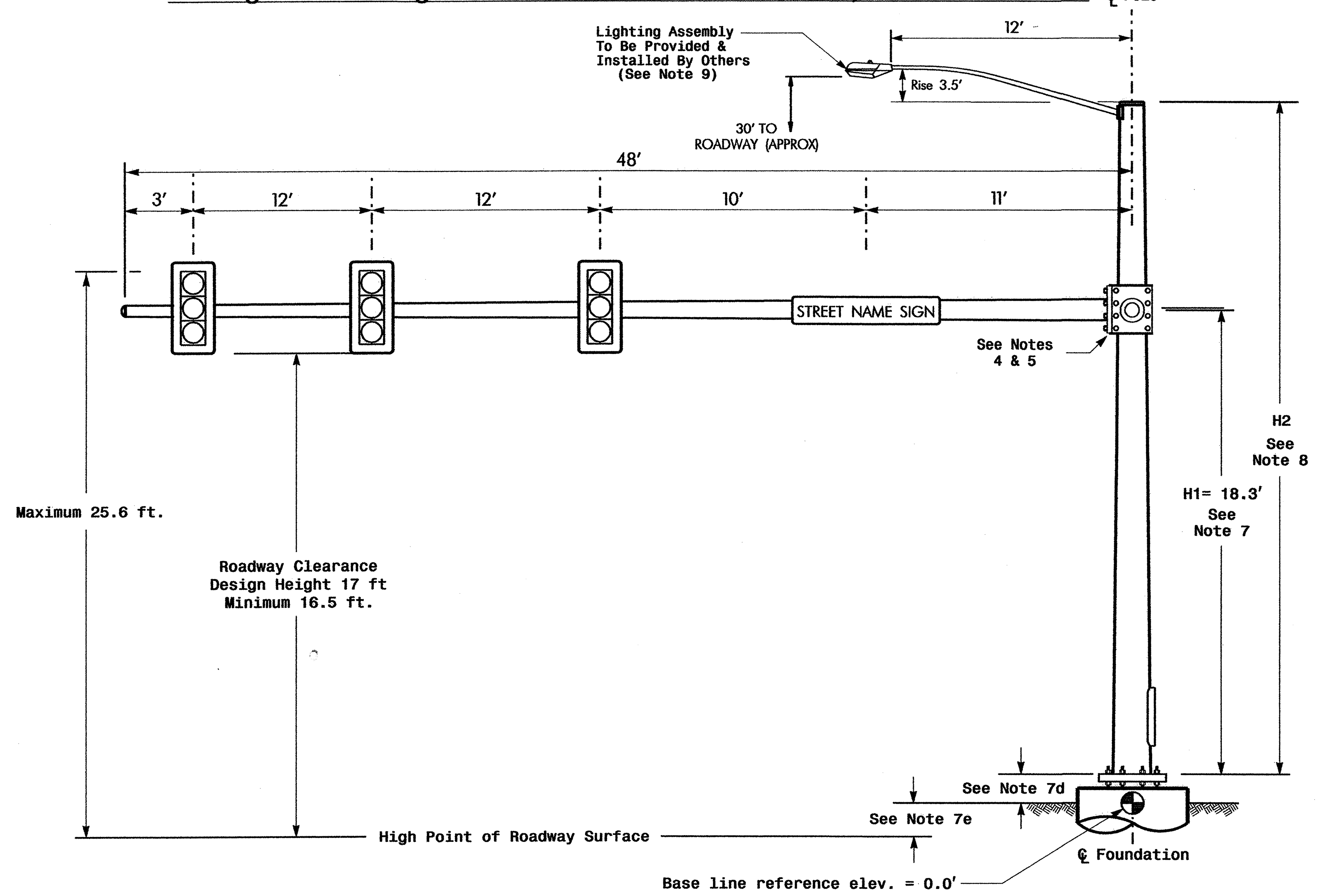
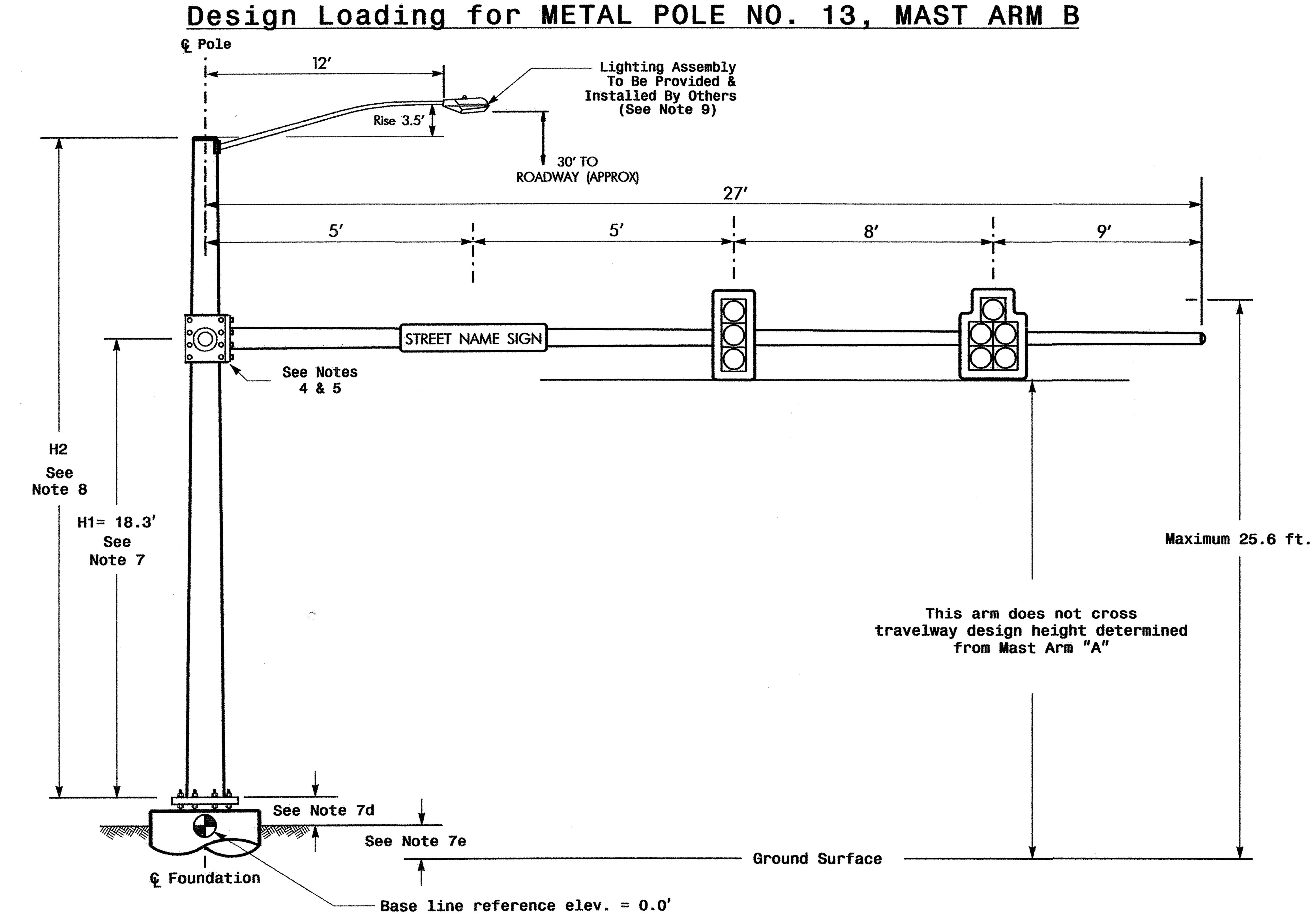
jtpeterson

Design Loading for METAL POLE NO. 13, MAST ARM A



Elevation View @ 270°

Design Loading for METAL POLE NO. 13, MAST ARM B



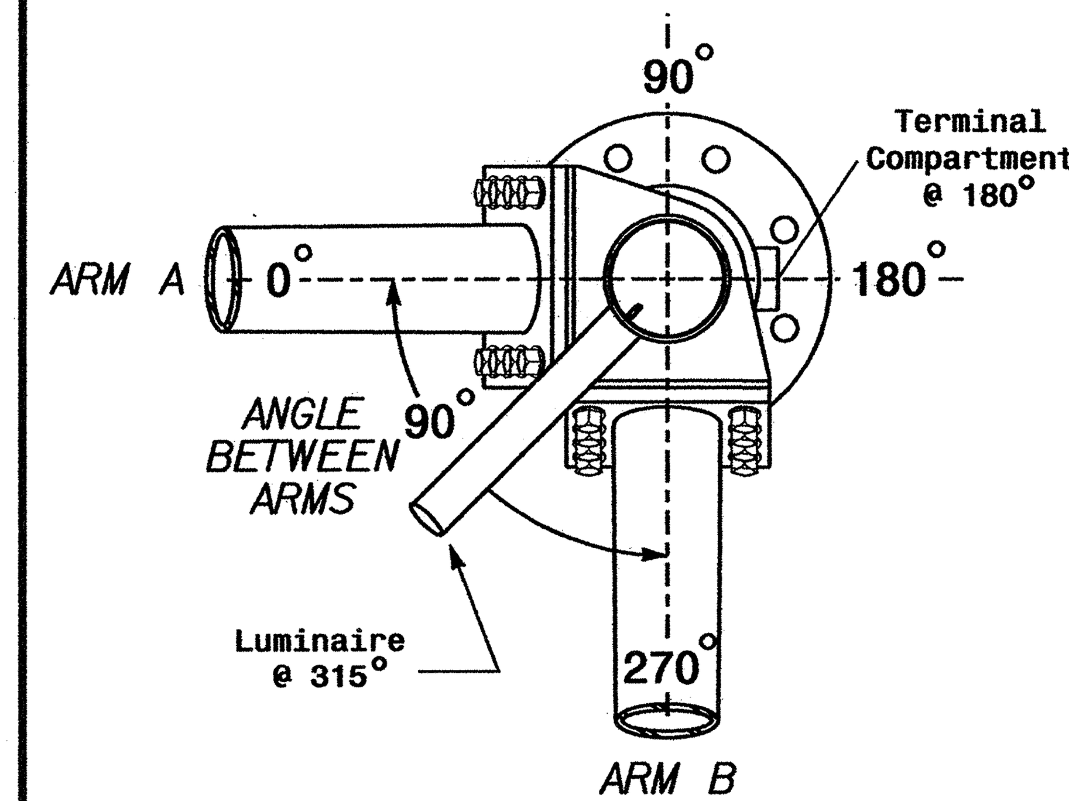
Elevation View @ 0°

SPECIAL NOTE

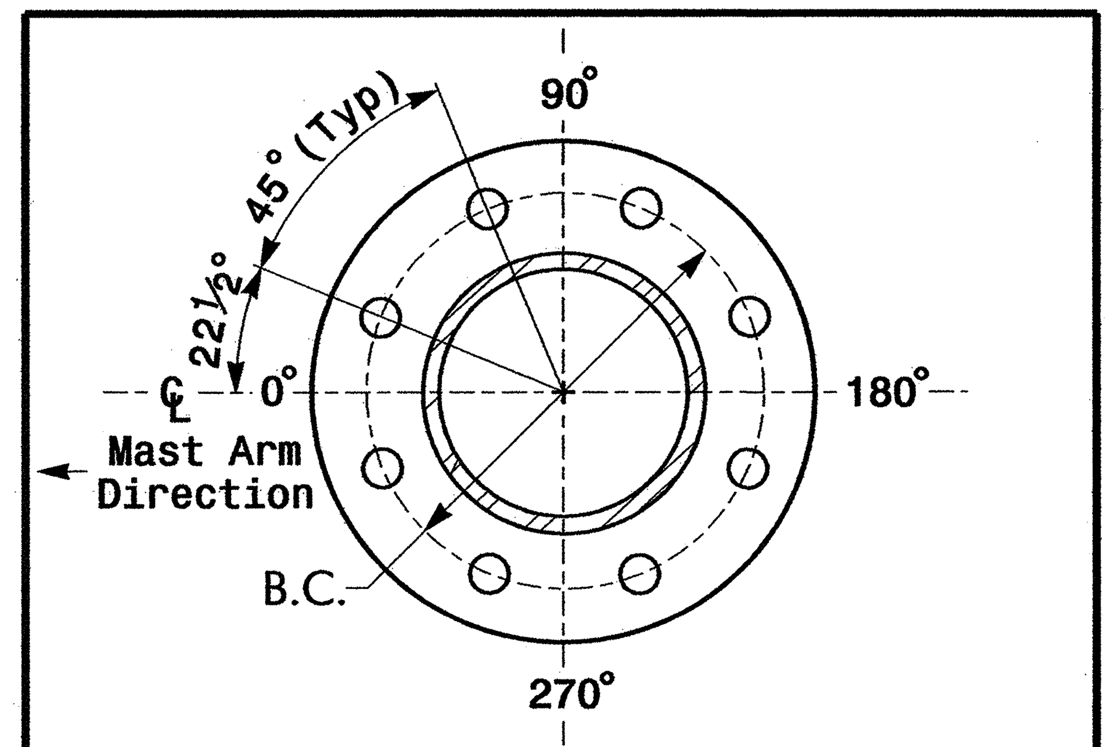
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

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

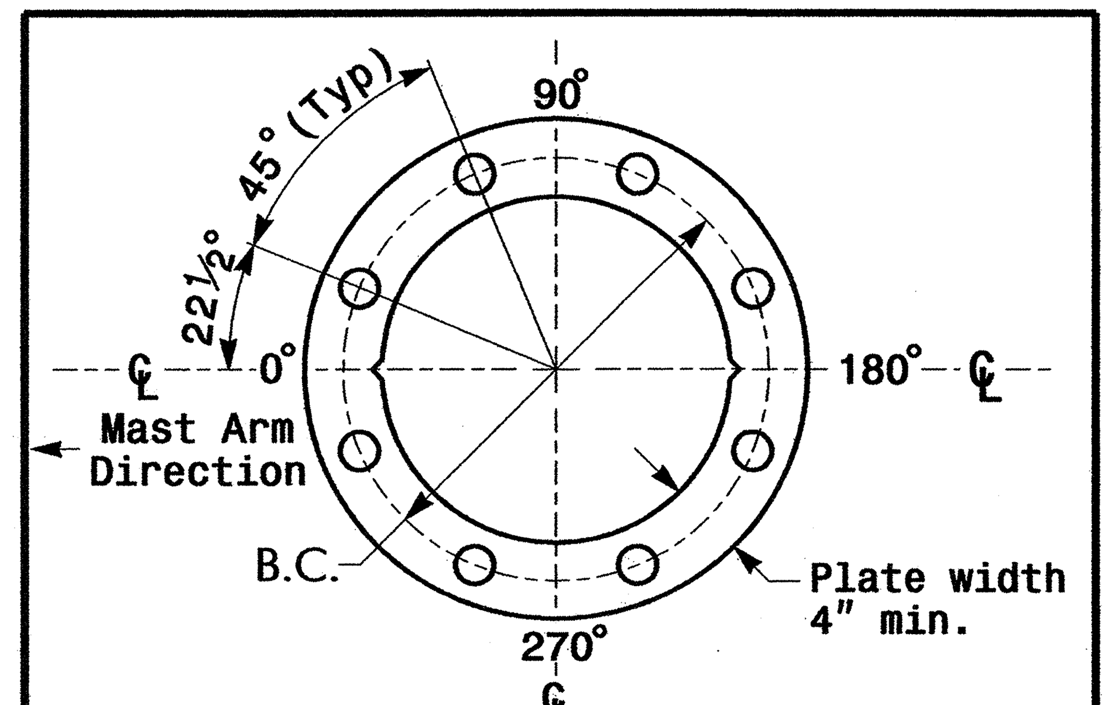


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

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

	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	0.87 S.F.	13.25" W X 26.25" L	35 LBS

NOTES

Design Reference Material

1. 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 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   - The 2002 NCDOT Roadway Standard Drawings.
   - The traffic signal project plans and special provisions.
   - The NCDOT "Metal Pole Standards" located at the following NCDOT website: http://www.ncdot.org/doh/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Maximum allowable CSR for all signal supports is 0.9.
4. 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.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points. The arm-to-pole attachment is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads 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.
8. The pole manufacturer will determine the total height (H2) of the pole based on the luminaire height required of 30 feet.
9. Design the luminaire support arm using design dimensions as shown on elevaiton views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.
10. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
11. The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway.
12. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 2 (130 mph)

Prepared in the Offices of:
122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road) at Bayswater Road

Division 2 Pitt County Greenville

PLAN DATE:	March 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

SCALE 0 N/A

N/A

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL RICHARD E. MULLINAX

10 MAY 2006

SIGNATURE DATE

SIG. INVENTORY NO. 02-0871

10-MAY-2006 15:13
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rduffy

METAL POLE No. 14

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.25

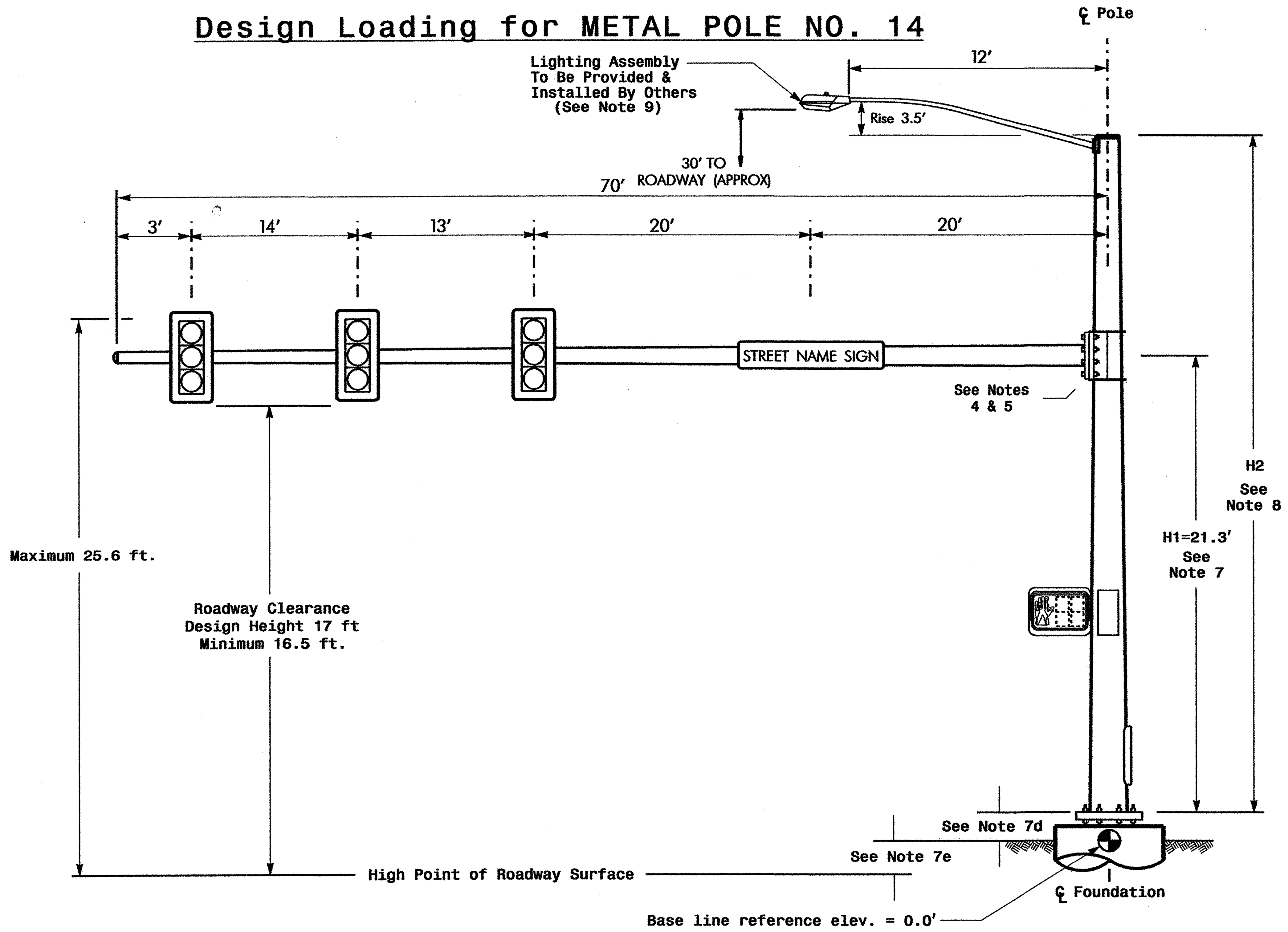
SPECIAL NOTE

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.

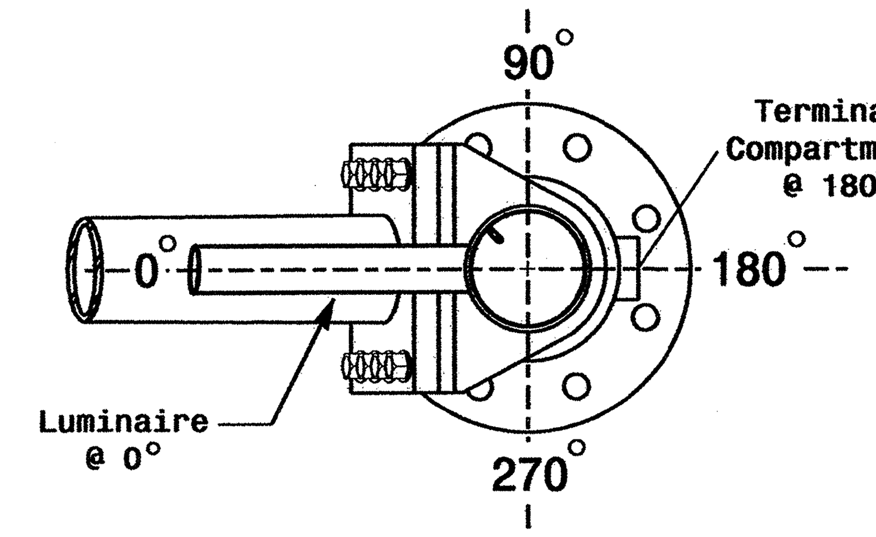
Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 14
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.
Elevation difference at High point of roadway surface	+2.7 ft.
Elevation difference at Edge of travelway or face of curb	N/A

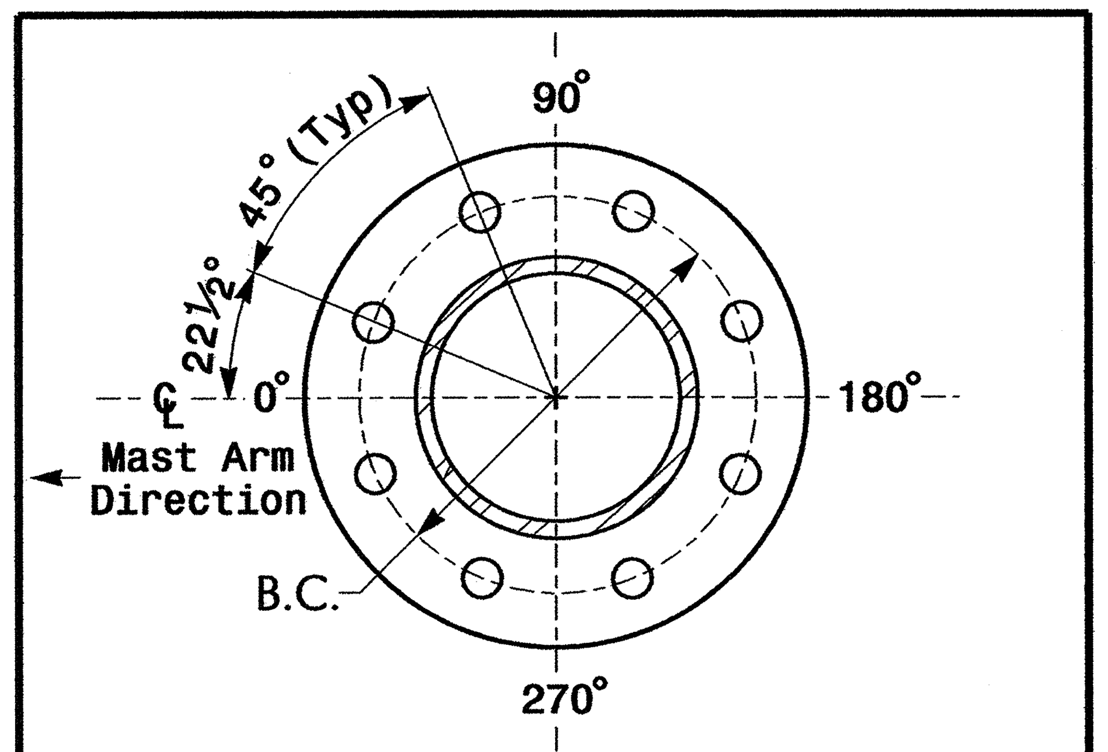
Design Loading for METAL POLE NO. 14



Elevation View

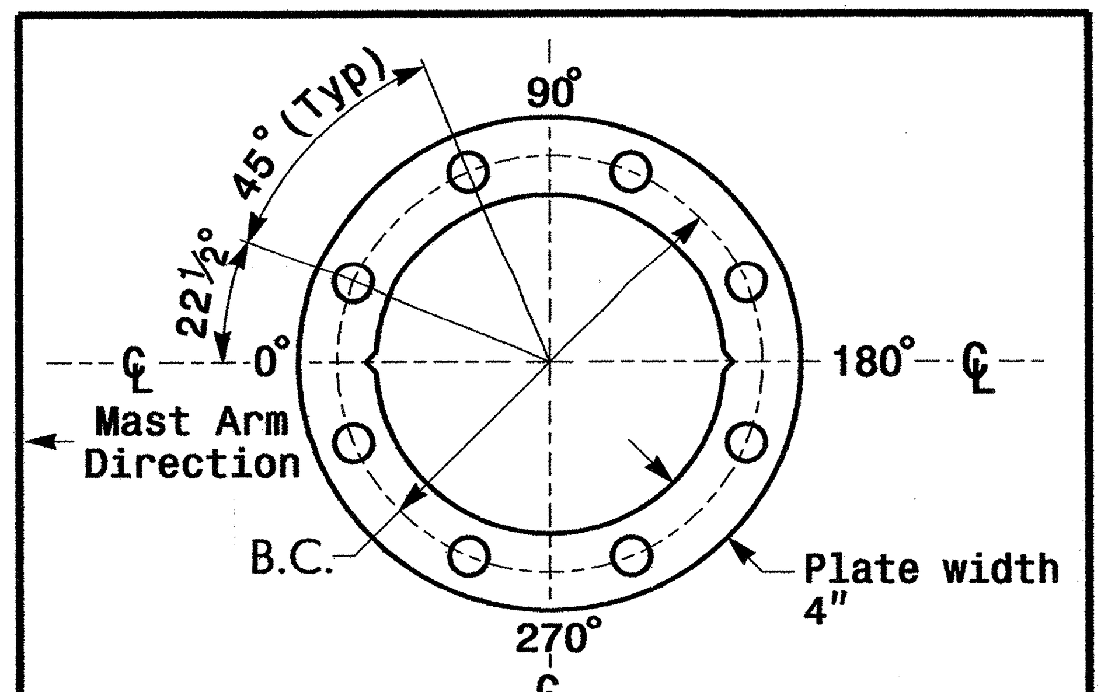


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS

	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

NOTES

Design Reference Material

1. 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 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   The 2002 NCDOT Roadway Standard Drawings.
   The traffic signal project plans and special provisions.
   The NCDOT "Metal Pole Standards" located at the following NCDOT website:
   http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Maximum allowable CSR for all signal supports is 0.9.
4. 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.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads 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.
8. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
9. Design the luminaire support arm using design dimensions as shown on elevation views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.
10. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
11. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
12. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 2 (130 mph)

Prepared in the Offices of:
Signals and Geometrics Section
122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road)
at
Bayswater Road

Division 2	Pitt County		Greenville
PLAN DATE:	March 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

SCALE: 0 N/A — N/A

REVISIONS | INIT. | DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER — RICHARD E. MULLINAX — 10 MAY 2006

SIGNATURE | DATE

SIG. INVENTORY NO. 02-0871

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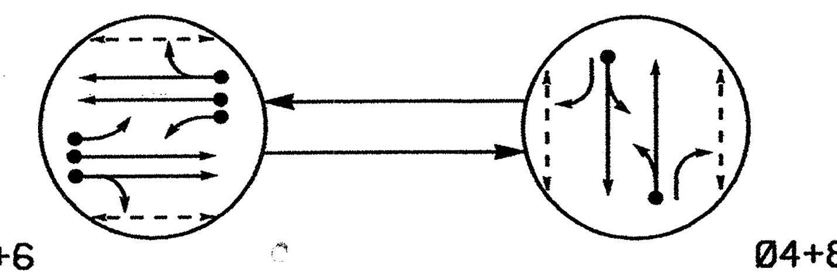
PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

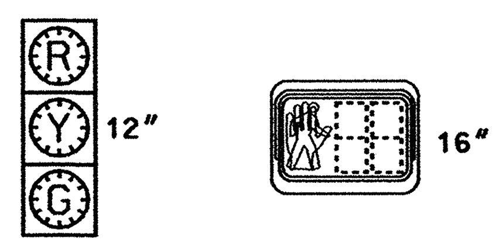
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+6	PHASE Ø4+8	FLASH
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R
P21, P22	W	DW	DRK
P41, P42	DW	W	DRK
P61, P62	W	DW	DRK
P81, P82	DW	W	DRK

SIGNAL FACE I.D.

Denotes L.E.D.



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

P21, P22 / P41, P42 / P61, P62 / P81, P82

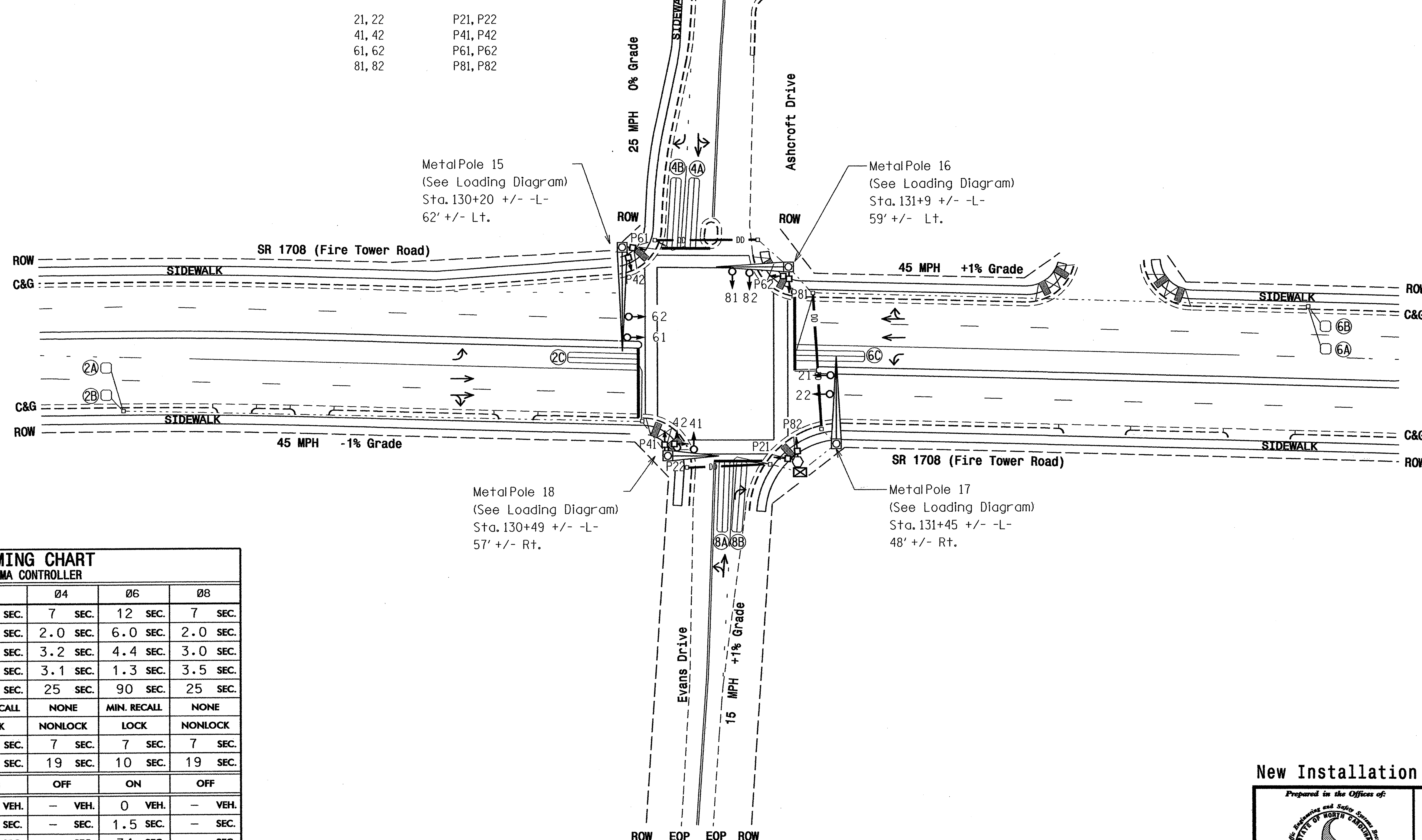
LOOP & DETECTOR UNIT INSTALLATION CHART
NEMA CONTROLLER WITH TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS						
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?
2A	6X6	6	300	X		2	X		–	– SEC.	ALL	NO
2B	6X6	6	300	X		2	X		–	– SEC.	ALL	NO
2C	6X40	2-4-2	0	X		2	X		DELAY	3 SEC.	ALL	NO
4A	6X40	2-4-2	0	X		4	X		–	– SEC.	ALL	NO
4B	6X40	2-4-2	0	X		4	X		DELAY	10 SEC.	ALL	YES
6A	6X6	6	300	X		6	X		–	– SEC.	ALL	NO
6B	6X6	6	300	X		6	X		–	– SEC.	ALL	NO
6C	6X40	2-4-2	0	X		6	X		DELAY	3 SEC.	ALL	NO
8A	6X40	2-4-2	0	X		8	X		DELAY	3 SEC.	ALL	YES
8B	6X40	2-4-2	0	X		8	X		DELAY	10 SEC.	ALL	YES

2 Phase
Fully Actuated
(Greenville City System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Program phase 4 and phase 8 for dual entry.
4. Set all detector units to presence mode.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Intersection Zone Number: 7, System Address Number: 124



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Pavement Marking Arrow	
N/A	Wheelchair Ramp	
—DD—	Directional Drill (2) 2-in Poly. Conduit	N/A
	Metal Pole with Mastarm	

TIMING CHART
NEMA CONTROLLER

PHASE	Ø2	Ø4	Ø6	Ø8
MINIMUM GREEN	12 SEC.	7 SEC.	12 SEC.	7 SEC.
PASSAGE/GAP	6.0 SEC.	2.0 SEC.	6.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	4.6 SEC.	3.2 SEC.	4.4 SEC.	3.0 SEC.
RED CLEARANCE	1.3 SEC.	3.1 SEC.	1.3 SEC.	3.5 SEC.
MAX. 1	90 SEC.	25 SEC.	90 SEC.	25 SEC.
RECALL POSITION	MIN. RECALL	NONE	MIN. RECALL	NONE
VEHI. CALL MEMORY	LOCK	NONLOCK	LOCK	NONLOCK
WALK	7 SEC.	7 SEC.	7 SEC.	7 SEC.
FLASHING DON'T WALK	8 SEC.	19 SEC.	10 SEC.	19 SEC.
VOLUME DENSITY	ON	OFF	ON	OFF
ACTUATION B4 ADD	0 VEH.	– VEH.	0 VEH.	– VEH.
SEC. PER ACTUATION	1.5 SEC.	– SEC.	1.5 SEC.	– SEC.
MAX. INITIAL	34 SEC.	– SEC.	34 SEC.	– SEC.
TIME B4 REDUCTION	15 SEC.	– SEC.	15 SEC.	– SEC.
TIME TO REDUCE	30 SEC.	– SEC.	30 SEC.	– SEC.
MINIMUM GAP	3.0 SEC.	– SEC.	3.0 SEC.	– SEC.

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

New Installation

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section
122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road) at Evans Drive /Ashcroft Drive

Division 2 Pitt County Greenville

PLAN DATE:	January 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

REVISIONS | INIT. | DATE

SCALE 0 40 1"=40'

SEAL 22022 ENGINEER
3 MARCH 2006
SIGNATURE DATE
SIG. INVENTORY NO. 02-0869

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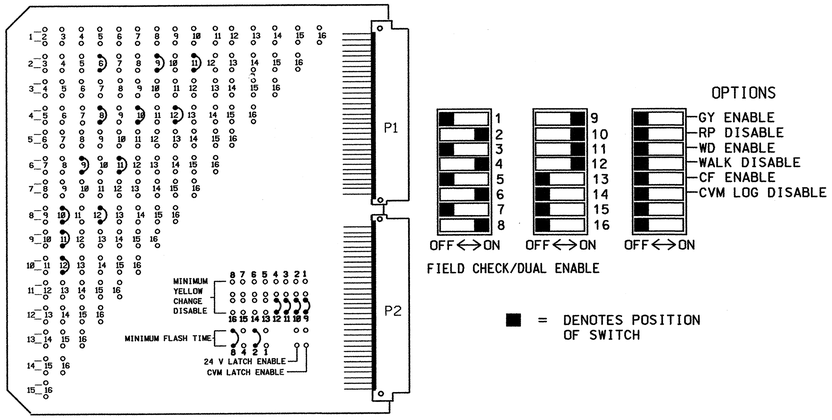
PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.27

EDI MODEL MMU-16E
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and set switches as shown below)



MMU PROGRAMMING CARD

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 1, 3, 5, 7, 13, 14, 15 AND 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
10. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
11. THE CABINET AND CONTROLLER ARE A PART OF THE GREENVILLE CITY SYSTEM.

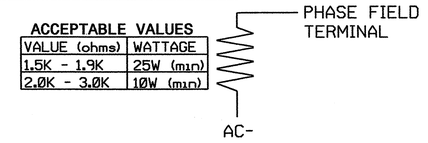
FIELD CONNECTION HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	NU	21,22	NU	41,42	NU	61,62	NU	81,82	P21, P22	P41, P42	P61, P62	P81, P82	NU	NU	NU	NU
RED		2R		4R		6R		8R								
YELLOW		2Y		4Y		6Y		8Y	*	*	*	*				
GREEN		2G		4G		6G		8G								
RED ARROW																
YELLOW ARROW																
GREEN ARROW																
✋									9R	10R	11R	12R				
🚶									9G	10G	11G	12G				

NU = NOT USED

* INSTALL LOAD RESISTORS TO UNUSED FIELD TERMINALS 9Y, 10Y, 11Y AND 12Y, IF NOT ALREADY PRESENT. SEE LOAD RESISTOR INSTALLATION DETAIL THIS PAGE.

TYPICAL LOAD RESISTOR INSTALLATION DETAIL



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

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

BIU	CH1 L3 ø2 *	CH1 L1 ø2	CH1 L7 ø6	CH1 L5 ø4	SLOT EMPTY	CH1 L9 ø8	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	CH2 L4 ø4	CH2 L2 ø2	CH2 L8 ø6 *	CH2 L6 ø6		CH2 L10 ø8				

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

LOOP NO.	LOOP PANEL TERMINALS
2A	L1A,L1B
2B	L2A,L2B
2C	L3A,L3B
4A	L4A,L4B
4B	L5A,L5B
6A	L6A,L6B
6B	L7A,L7B
6C	L8A,L8B
8A	L9A,L9B
8B	L10A,L10B
	L11A,L11B
	L12A,L12B
	L13A,L13B
	L14A,L14B
	L15A,L15B
	L16A,L16B

NOTE
BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø2		
2	ø2		
* 3	ø2	DELAY	3
4	ø4		
5	ø4	DELAY	10
6	ø6		
7	ø6		
* 8	ø6	DELAY	3
9	ø8	DELAY	3
10	ø8	DELAY	10
11			
12			
13			
14			
15			
16			

* THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE TIMING REQUIRED FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED
CABINET .....CONTRACTOR SUPPLIED TS-2 NC-8A
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....2,4,6,8,9,10,11,12
PHASES USED.....2,4,6,8,2 PED,4 PED,6 PED,8 PED
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

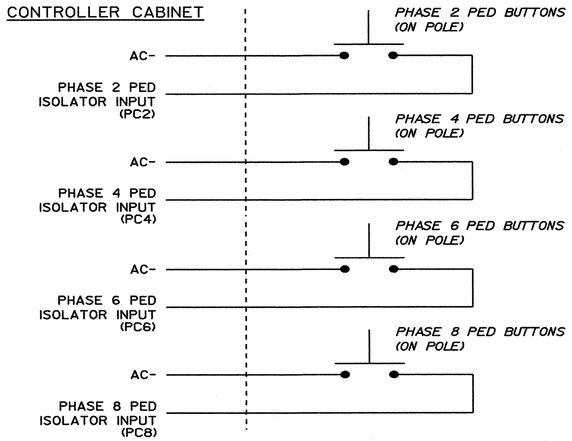
LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

PEDESTRIAN PUSH-BUTTON WIRING DETAIL

(wire push-buttons as shown below)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0869
DESIGNED: January 2006
SEALED: 03-03-06
REVISED: NA

New Installation

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1708 (Fire Tower Road) at Evans Drive / Ashcroft Drive

Division 2 | Pitt County | Greenville

PLAN DATE: February 2006 | REVIEWED BY:

PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Management Section
122 N. McDowell St., Raleigh, NC 27603

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.

SIGNATURE | DATE: 3-7-06

SIG. INVENTORY NO. 02-0869

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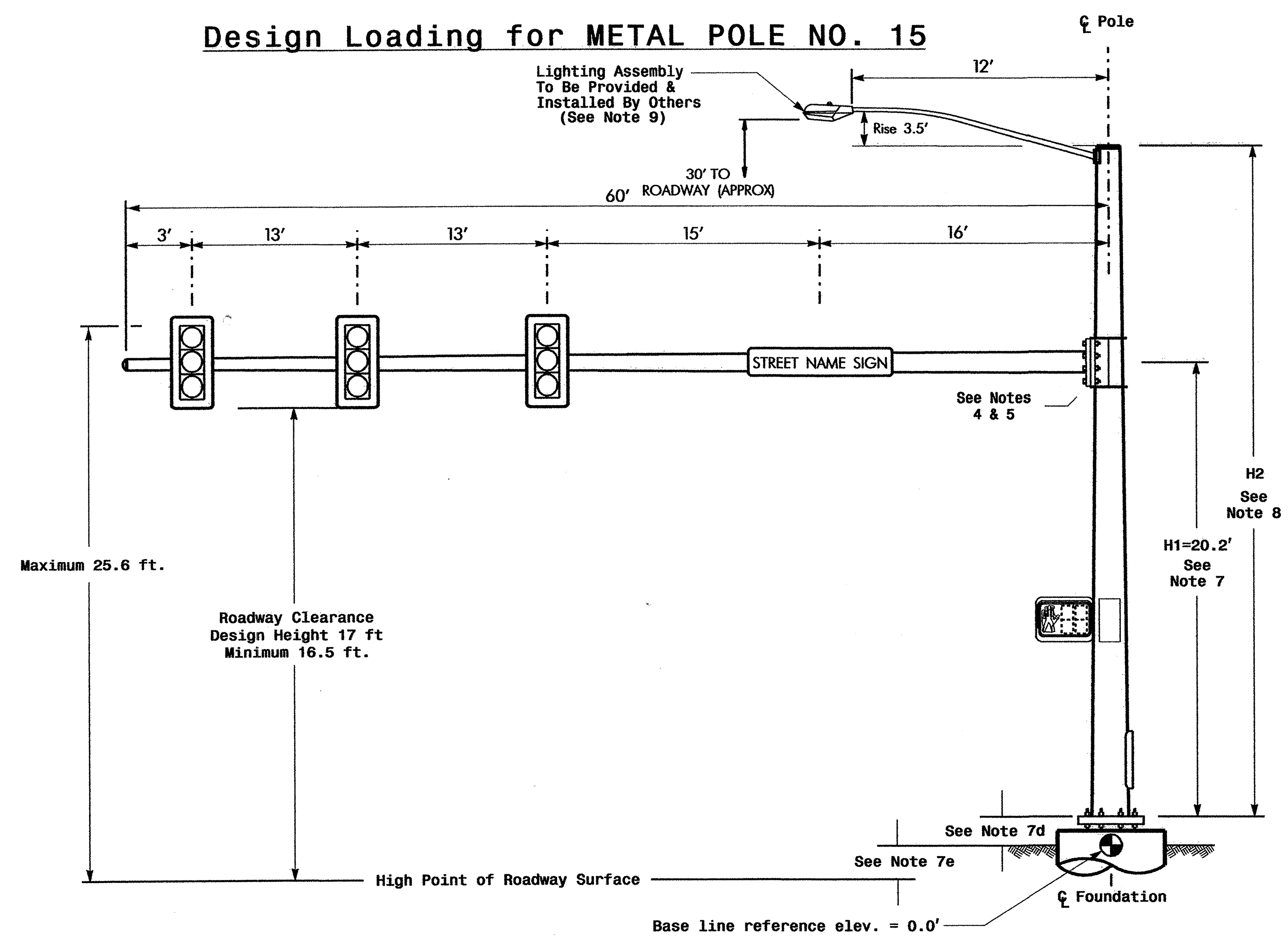
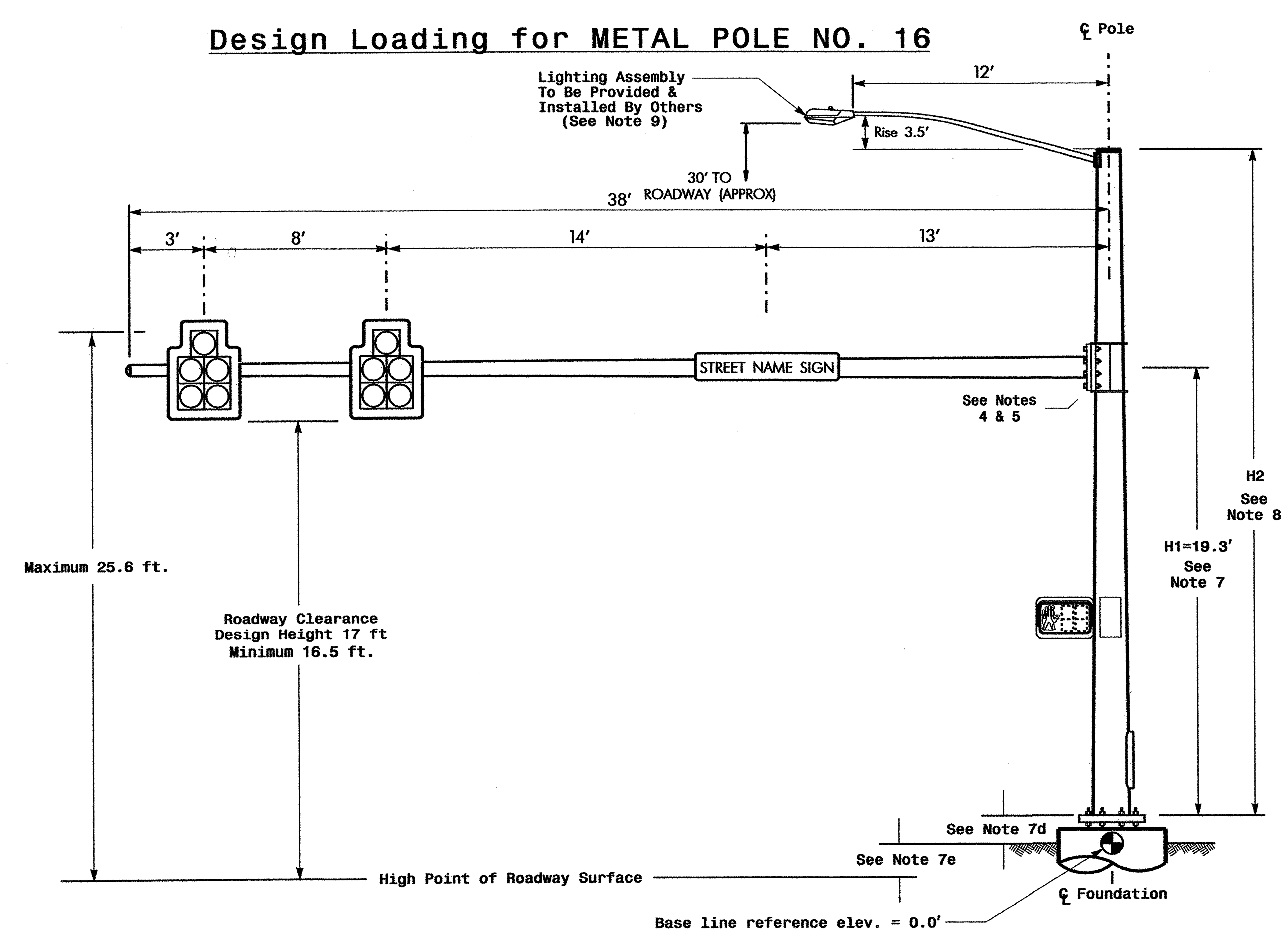
jtpeterson

Design Loading for METAL POLE NO. 15



Elevation View

Design Loading for METAL POLE NO. 16



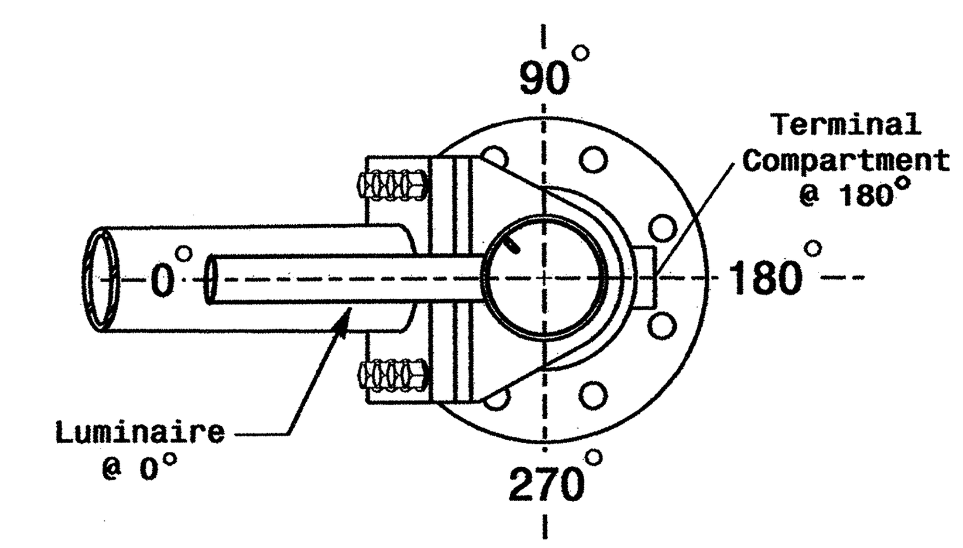
Elevation View

SPECIAL NOTE

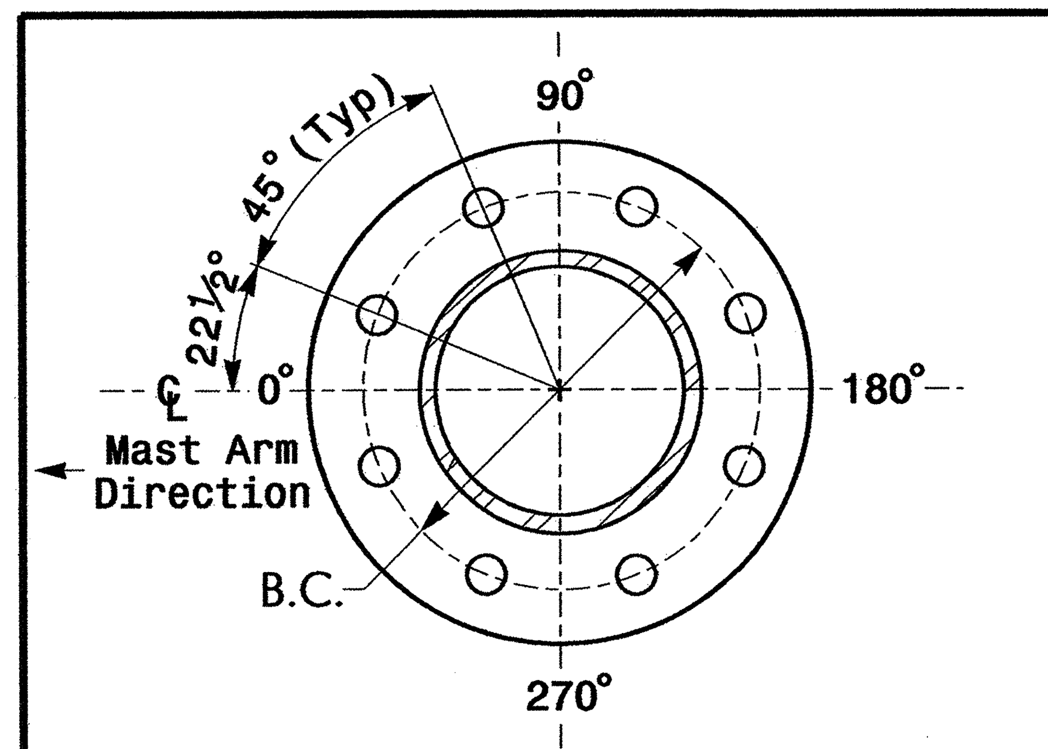
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 15	Pole 16
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.6 ft.	+0.8 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

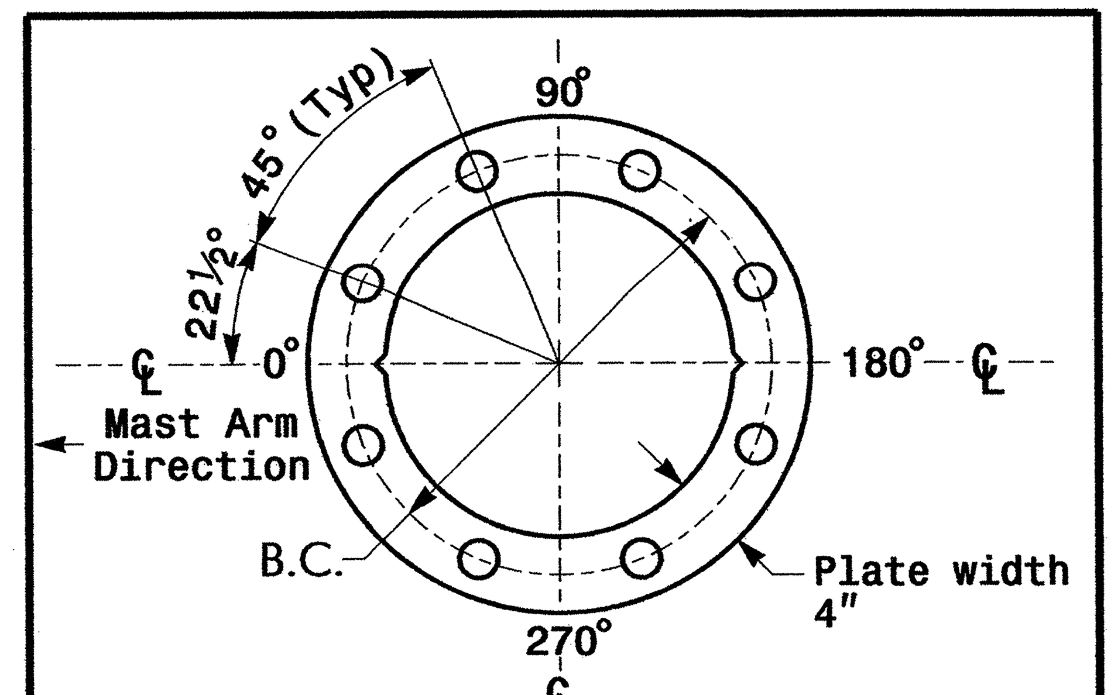


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS

	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

NOTES

Design Reference Material

1. 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 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   The 2002 NCDOT Roadway Standard Drawings.
   The traffic signal project plans and special provisions.
   The NCDOT "Metal Pole Standards" located at the following NCDOT website:
   http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Maximum allowable CSR for all signal supports is 0.9.
4. 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.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads 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.
8. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
9. Design the luminaire support arm using design dimensions as shown on elevation views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.
10. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
11. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
12. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 2 (130 mph)

Prepared in the Offices of:
122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road) at Evans Drive/Ashcroft Drive

Division 2 Pitt County Greenville

PLAN DATE:	March 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thiggen	REVIEWED BY:	

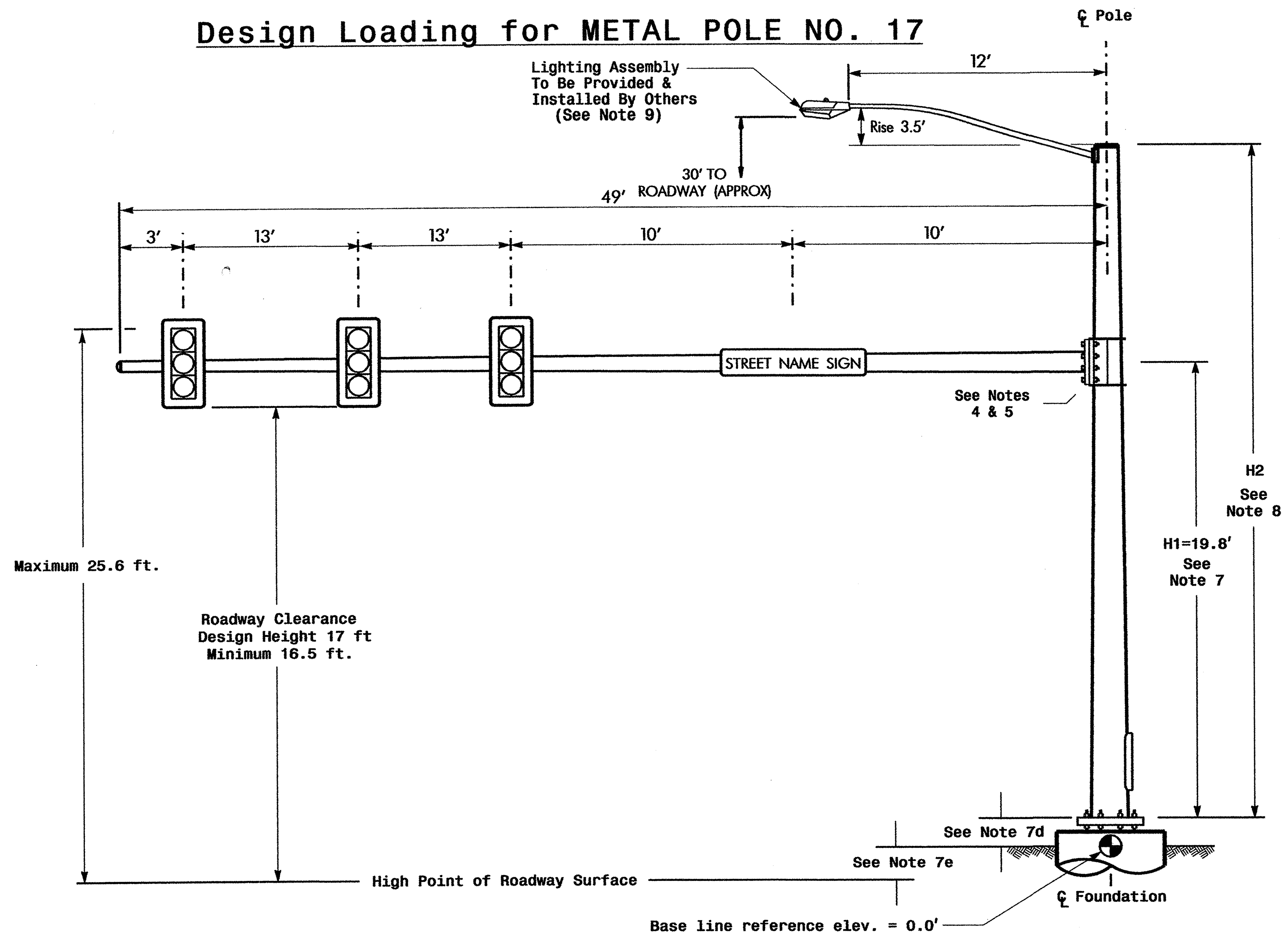
SCALE 0 N/A
N/A

REVISIONS | INIT. | DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22022 RICHARD E. MULLINAX
10 MAY 2006
SIGNATURE DATE
SIG. INVENTORY NO. 02-0869

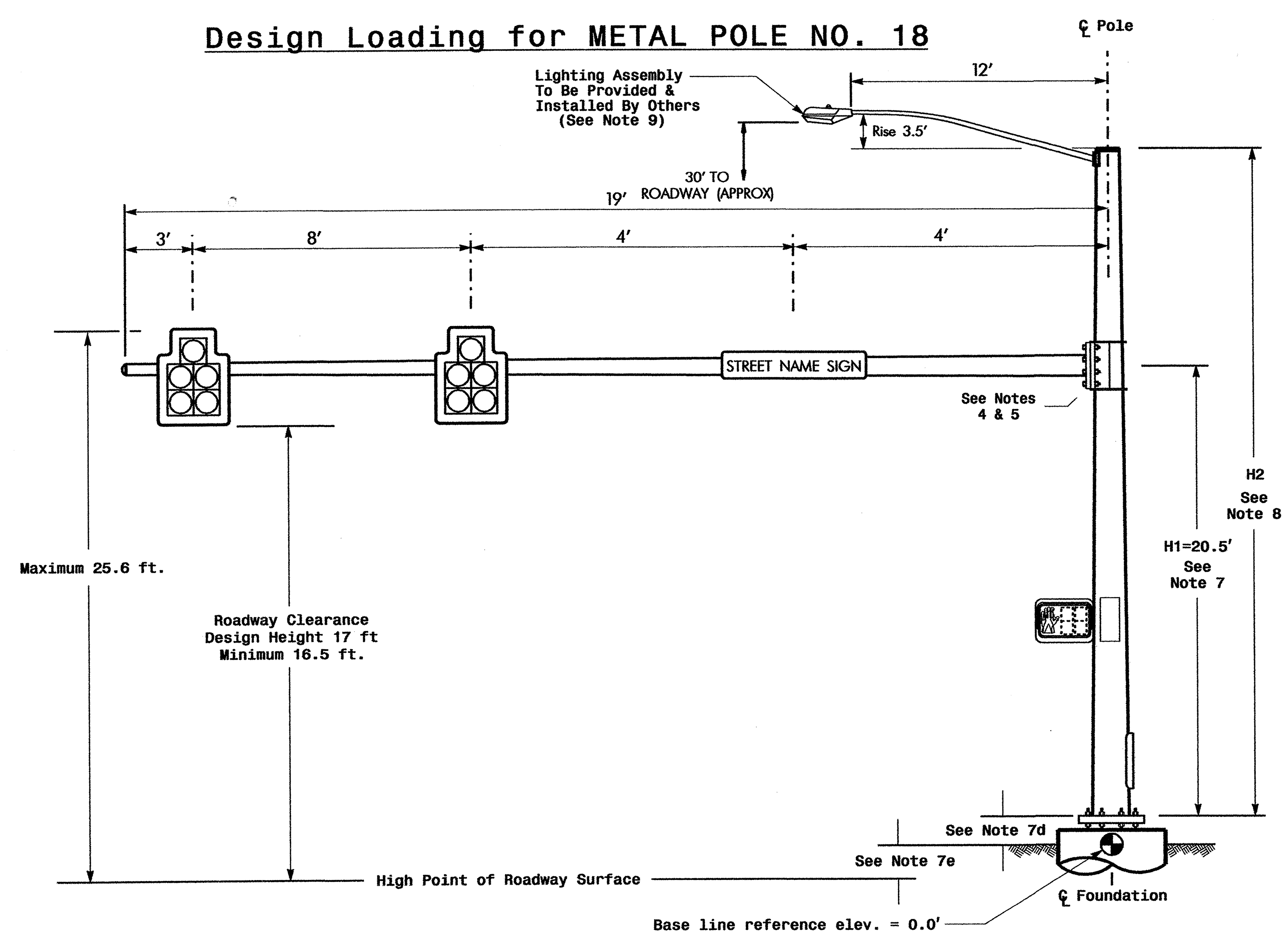
10-MAY-2006 13:35
s:*its signals*workgroups*tip projects*u-3613b*0869*02069_sig_mp1_2006xxxx.dgn
rduffy

Design Loading for METAL POLE NO. 17



Elevation View

Design Loading for METAL POLE NO. 18



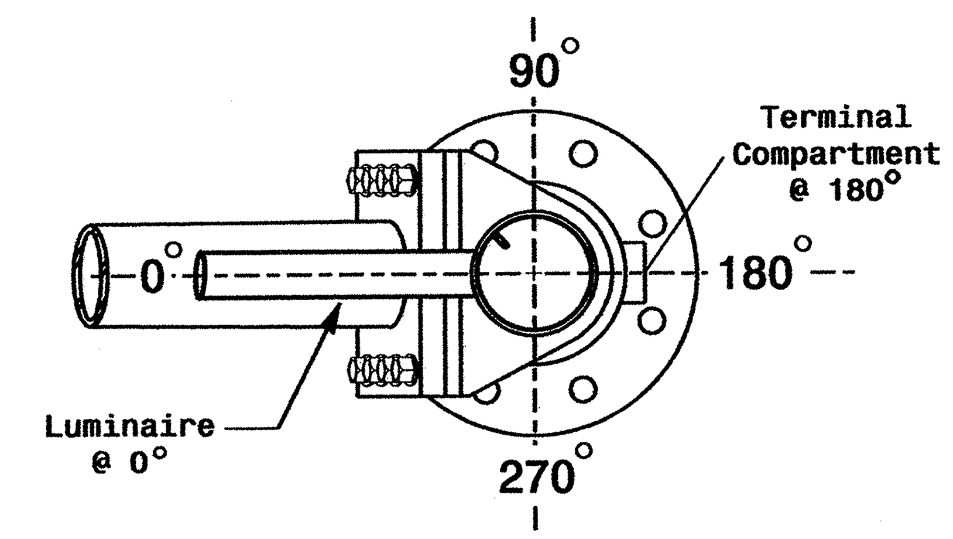
Elevation View

SPECIAL NOTE

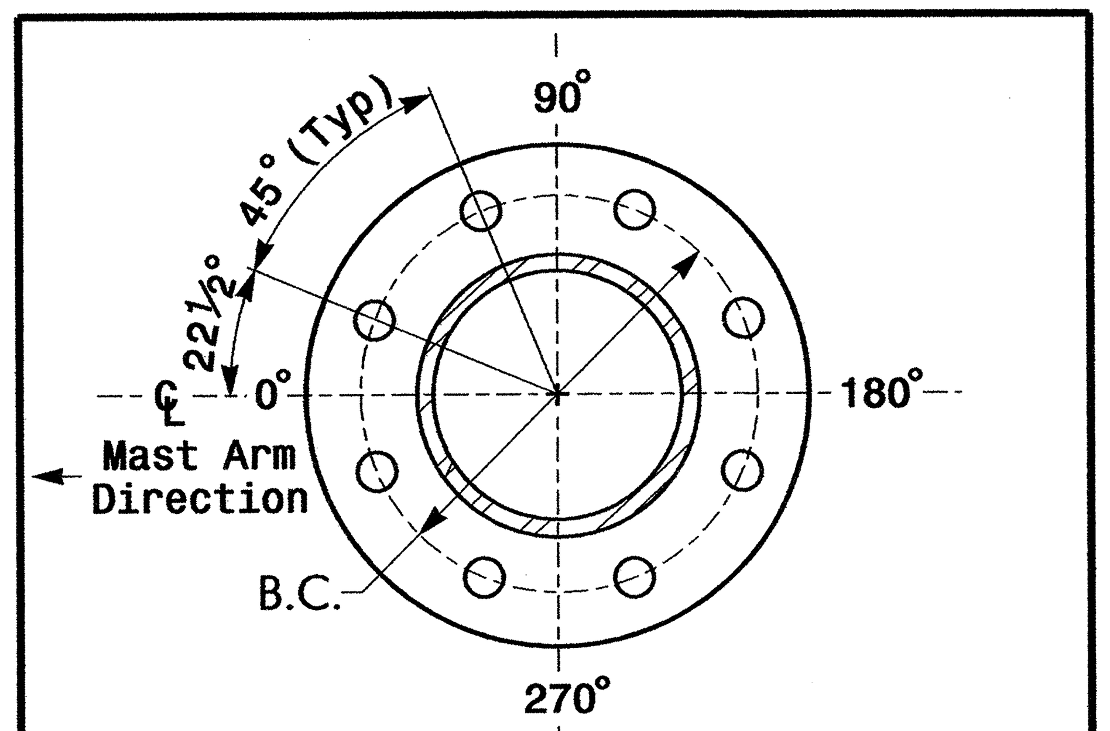
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

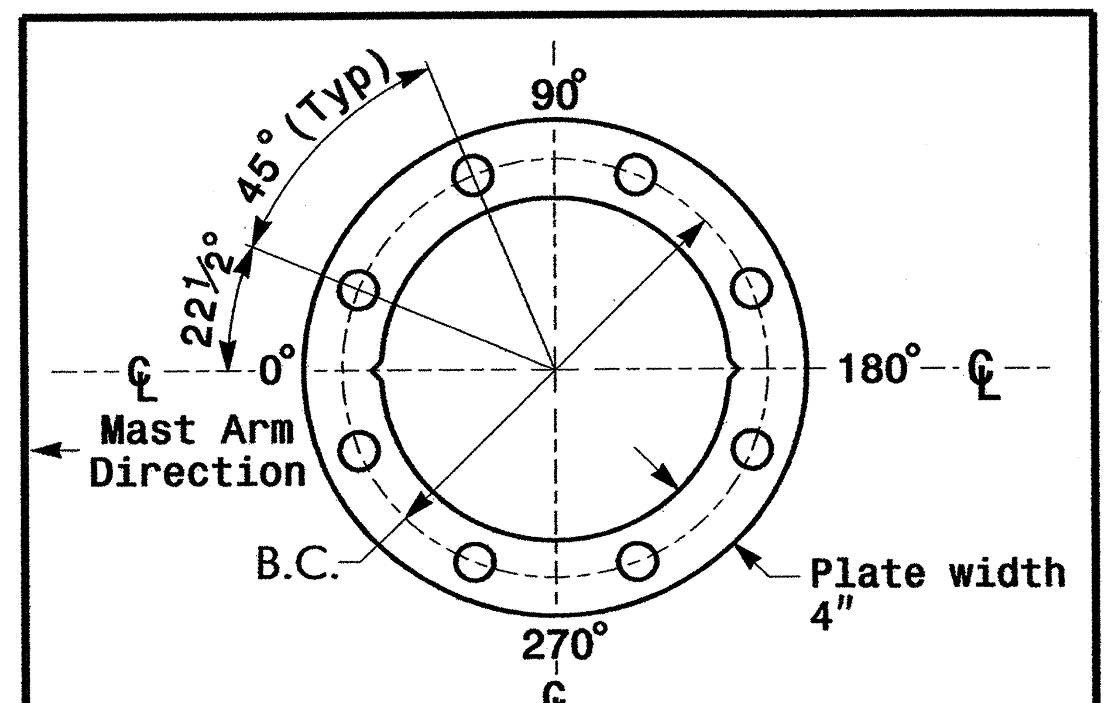
Elevation Differences for:	Pole 17	Pole 18
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+1.2 ft.	+1.9 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 6



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

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS

	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

NOTES

Design Reference Material

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NCDOT Wind Zone 2 (130 mph)

Prepared in the Offices of:
Signals and Geometrics Section
122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road)
at
Evans Drive/Ashcroft Drive

Division 2 | Pitt County | Greenville

PLAN DATE:	March 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

SCALE: 0 N/A
N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL
RICHARD E. MULLINAX
11 MAY 2006
SIGNATURE | DATE
SIG. INVENTORY NO. 02-0869

11-MAY-2006 09:22
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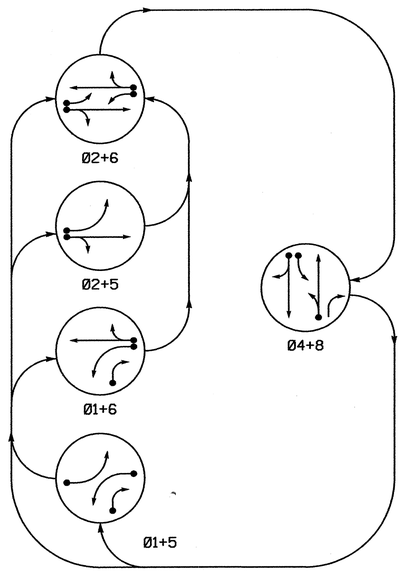
PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig 30

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

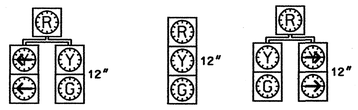
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	FLASH
21	R/G	R	G/R	G	R	Y
22	R	R	G	G	R	Y
41, 42	R	R	R	R	G	R
61	R/G	G	R	G	R	Y
62	R	G	R	G	R	Y
81	R	R	R	R	G	R
82	R/G	R/G	R	R	G	R

SIGNAL FACE I.D.

Denotes L.E.D.



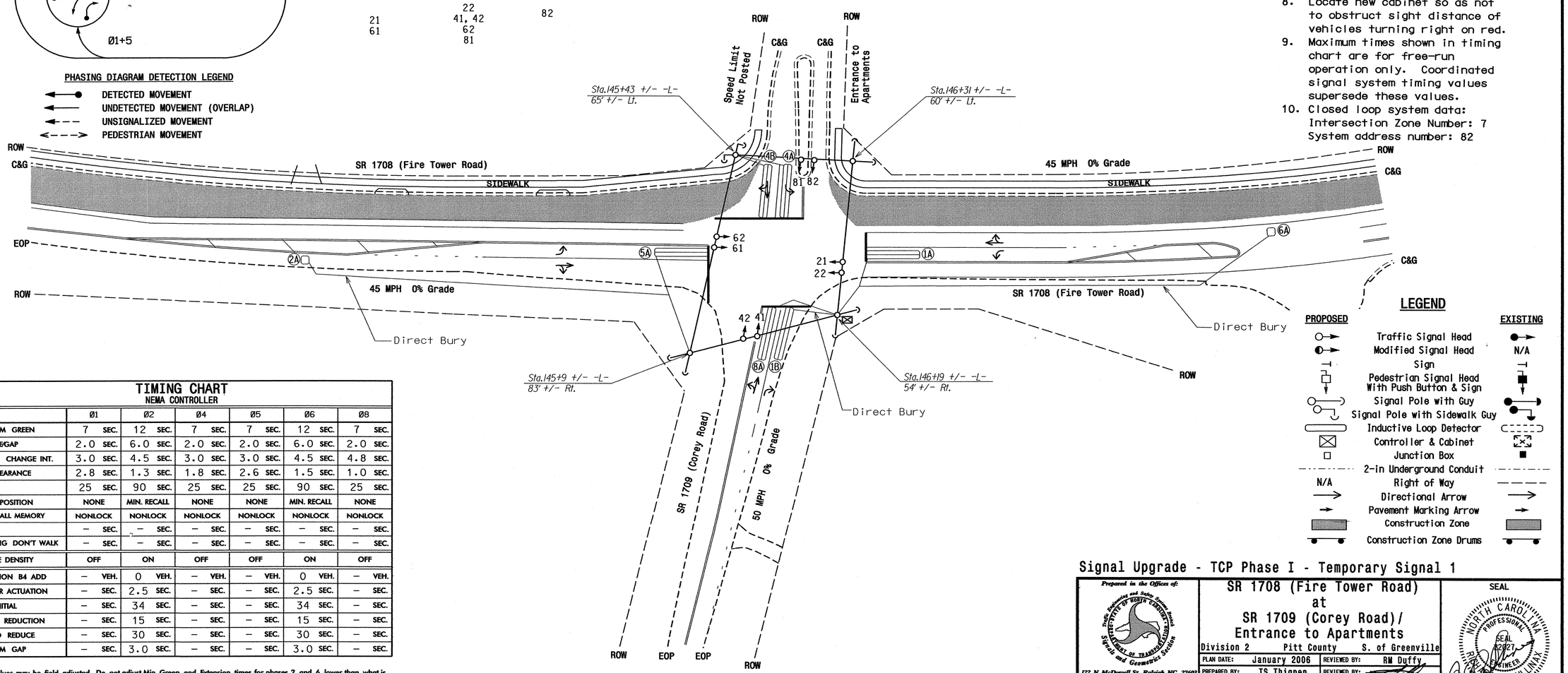
NEMA LOOP & DETECTOR INSTALLATION CHART
with TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS				
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	INHIBIT DELAY DURING GREEN?
1A	6X40	0	2-4-2	X		1	X		DELAY	15	YES
						6	X		DELAY	3	NO
1B	6X40	0	2-4-2	X		1	X		DELAY	15	YES
2A	6X6	300	6	X		2	X		-	-	NO
4A	6X40	0	2-4-2	X		4	X		DELAY	3	YES
4B	6X40	0	2-4-2	X		4	X		DELAY	10	YES
5A	6X40	0	2-4-2	X		5	X		DELAY	15	YES
						2	X		DELAY	3	NO
6A	6X6	300	6	X		6	X		-	-	NO
8A	6X40	0	2-4-2	X		8	X		DELAY	3	YES

5 Phase Fully Actuated (Greenville City System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 1 during phase 2 on.
4. Omit phase 5 during phase 6 on.
5. Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4+8 (see Electrical Details).
6. Program phase 4 and phase 8 for dual entry.
7. Set all detector units to presence mode.
8. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Closed loop system data: Intersection Zone Number: 7 System address number: 82



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone	
	Construction Zone Drums	

TIMING CHART
NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø4	Ø5	Ø6	Ø8
MINIMUM GREEN	7 SEC.	12 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.
PASSAGE/GAP	2.0 SEC.	6.0 SEC.	2.0 SEC.	2.0 SEC.	6.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.5 SEC.	3.0 SEC.	3.0 SEC.	4.5 SEC.	4.8 SEC.
RED CLEARANCE	2.8 SEC.	1.3 SEC.	1.8 SEC.	2.6 SEC.	1.5 SEC.	1.0 SEC.
MAX. 1	25 SEC.	90 SEC.	25 SEC.	25 SEC.	90 SEC.	25 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
VEHI. CALL MEMORY	NONLOCK	NONLOCK	NONLOCK	NONLOCK	NONLOCK	NONLOCK
WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	OFF	ON	OFF	OFF	ON	OFF
ACTUATION B4 ADD	- VEH.	0 VEH.	- VEH.	- VEH.	0 VEH.	- VEH.
SEC. PER ACTUATION	- SEC.	2.5 SEC.	- SEC.	- SEC.	2.5 SEC.	- SEC.
MAX. INITIAL	- SEC.	34 SEC.	- SEC.	- SEC.	34 SEC.	- SEC.
TIME B4 REDUCTION	- SEC.	15 SEC.	- SEC.	- SEC.	15 SEC.	- SEC.
TIME TO REDUCE	- SEC.	30 SEC.	- SEC.	- SEC.	30 SEC.	- SEC.
MINIMUM GAP	- SEC.	3.0 SEC.	- SEC.	- SEC.	3.0 SEC.	- SEC.

* 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.

Signal Upgrade - TCP Phase I - Temporary Signal 1

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation
Signals and Geometrics Section
122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road) at SR 1709 (Corey Road)/ Entrance to Apartments

Division 2 Pitt County S. of Greenville

PLAN DATE: January 2006 REVIEWED BY: RM Duffy

PREPARED BY: TS Thigpen REVIEWED BY:

REVISIONS | INIT. | DATE

SCALE 0 40 1"=40'

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 029271 ENGINEER RICHARD E. MULLINAX
3 MARCH 2006
SIGNATURE DATE

SIG. INVENTORY NO. 02-0717 T1

03-MAR-2006 07:45
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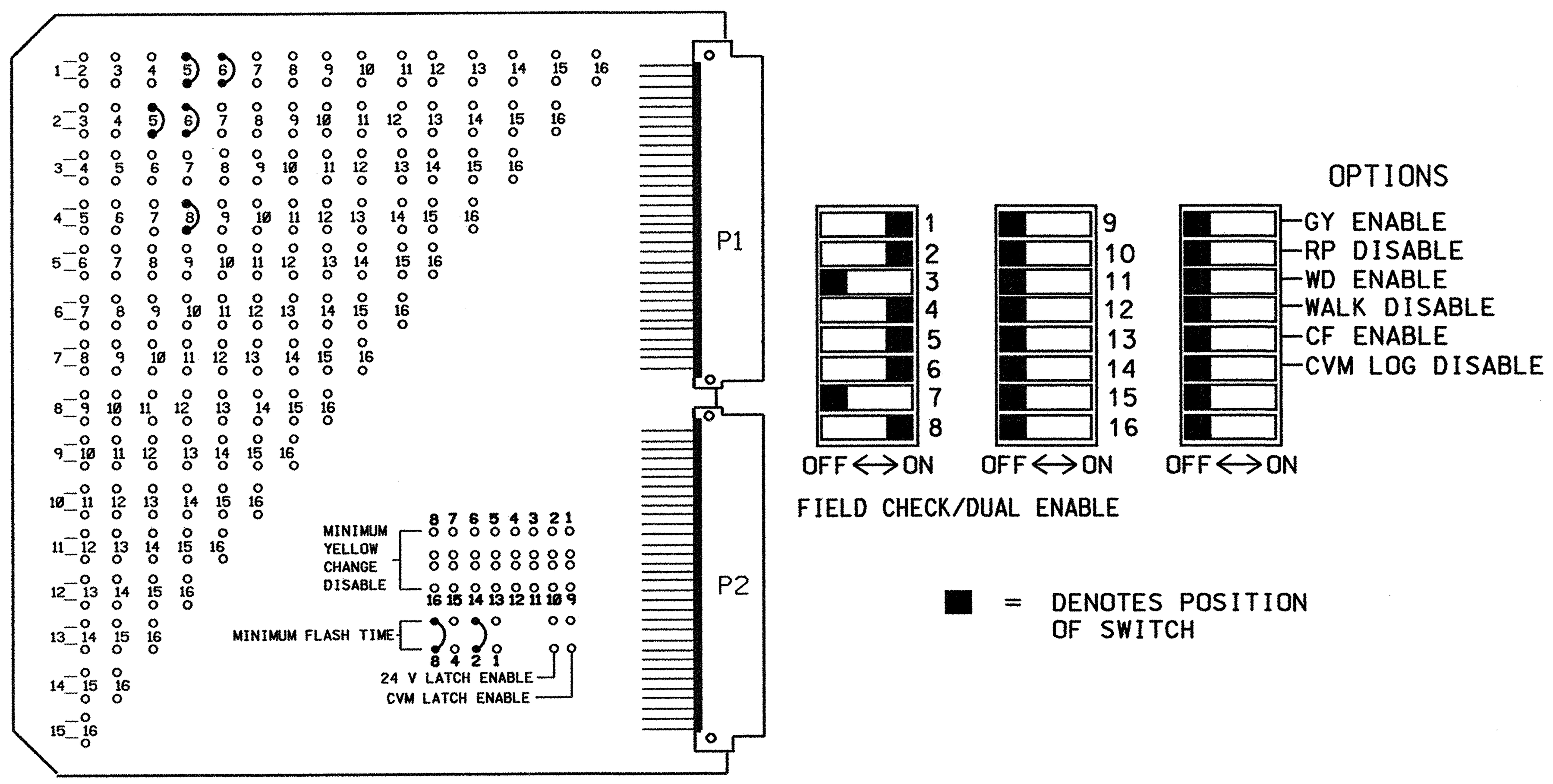
rduffy

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	Sig.31

EDI MODEL MMU-16E MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and set switches as shown below)



MMU PROGRAMMING CARD

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 3, 7, 9, 10, 11, 12, 13, 14, 15 AND 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
10. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
11. THE CABINET AND CONTROLLER ARE A PART OF THE GREENVILLE CITY SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	61,82	21,22	NU	41,42	21	61,62	NU	81,82	NU	NU	NU	NU	NU	NU	NU	NU
RED	*	2R		4R	*	6R		8R								
YELLOW		2Y		4Y		6Y		8Y								
GREEN		2G		4G		6G		8G								
RED ARROW																
YELLOW ARROW	1Y				5Y											
GREEN ARROW	1G				5G											

NU = NOT USED

* DENOTES INSTALL LOAD RESISTOR. SEE LOAD RESISTOR INSTALLATION DETAIL THIS PAGE.

SPECIAL BACK-UP PROTECTION NOTES

1. PROGRAM CONTROLLER TO OMIT PHASE 1 DURING PHASE 2 ON, AND TO OMIT PHASE 5 DURING PHASE 6 ON.
2. TO ACCOMPLISH BACK-UP FEATURE DESCRIBED IN NOTE 1, ENABLE 'BACK-UP PROTECTION GROUP 1' UNDER CONTROLLER SUBMENU 9: 'OPTION DATA'.
3. IT IS REQUIRED FOR THE CONTROLLER TO BE PROGRAMMED SUCH THAT IF IT IS IN PHASE 2+6, THEN PHASE 1 AND/OR 5 CANNOT BE SERVED NEXT WITHOUT FIRST PROGRESSING THROUGH PHASE 4. THIS ADDITIONAL BACK-UP PROTECTION FEATURE SHALL BE IMPLEMENTED IN THE WRITE-PROTECT AREA OF THE CONTROLLER SOFTWARE. FOR DIRECTIONS ON HAVING THIS FEATURE INSTALLED, CONTACT THE NCDOT TRAFFIC ELECTRONICS REPAIR CENTER AT: (919) 233-0884.

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

BIU	CH1 L3 Ø1	CH1 L1 Ø1	CH1 L7 Ø4	CH1 L5 Ø2	CH1 L11 Ø6	CH1 L9 Ø5	SLOT EMPTY	CH1 L13 Ø8	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	CH2 NOT USED	CH2 L2 Ø6 *	CH2 L8 Ø4	CH2 NOT USED	CH2 NOT USED	CH2 L10 Ø2 *		CH2 NOT USED			

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

	LOOP NO.	LOOP PANEL TERMINALS
ADD JUMPERS FROM: L1A TO L2A, AND L1B TO L2B	1A	L1A,L1B
		L2A,L2B
	1B	L3A,L3B
		L4A,L4B
	2A	L5A,L5B
		L6A,L6B
	4A	L7A,L7B
	4B	L8A,L8B
ADD JUMPERS FROM: L9A TO L10A, AND L9B TO L10B	5A	L9A,L9B
		L10A,L10B
	6A	L11A,L11B
		L12A,L12B
	8A	L13A,L13B
		L14A,L14B
		L15A,L15B
		L16A,L16B

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
1	Ø1	DELAY	15
* 2	Ø6	DELAY	3
3	Ø1	DELAY	15
4			
5	Ø2		
6			
7	Ø4	DELAY	3
8	Ø4	DELAY	10
9	Ø5	DELAY	15
* 10	Ø2	DELAY	3
11	Ø6		
12			
13	Ø8	DELAY	3
14			
15			
16			

* THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE TIMING REQUIRED FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

EQUIPMENT INFORMATION

CONTROLLER.............CONTRACTOR SUPPLIED ECONOLITE
CABINET ....CONTRACTOR SUPPLIED TS-2 NC-3
CABINET MOUNT..........BASE
LOADBAY POSITIONS......16
LOAD SWITCHES USED.....1,2,4,5,6,8
PHASES USED............1,2,4,5,6,8
OLA....................NOT USED
OLB....................NOT USED
OLC....................NOT USED
OLD....................NOT USED

LOAD SWITCH ASSIGNMENT DETAIL

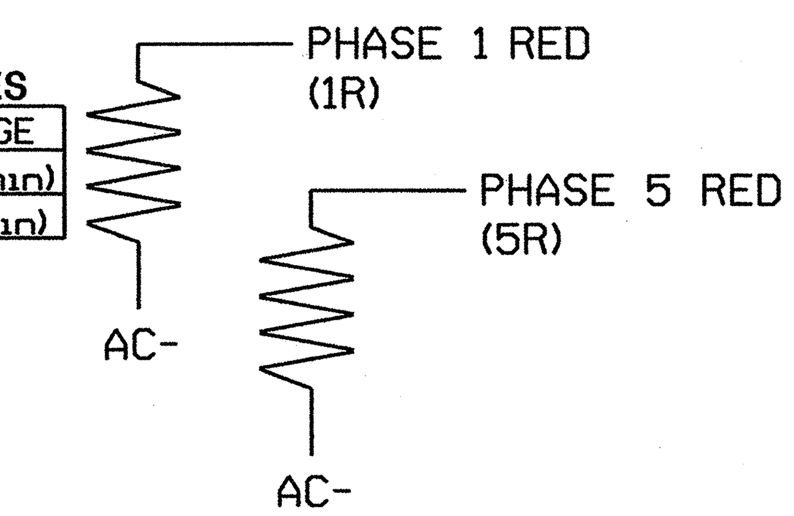
(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	Ø1
2	Ø2
3	Ø3
4	Ø4
5	Ø5
6	Ø6
7	Ø7
8	Ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

LOAD RESISTOR INSTALLATION DETAIL

ACCEPTABLE VALUES

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



NOTE: THE PURPOSE OF THESE RESISTORS IS TO LOAD THE CHANNEL RED MONITOR INPUTS IN ORDER FOR THE MALFUNCTION MANAGEMENT UNIT TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON PHASES THAT DO NOT USE THE RED DISPLAY IN THE FIELD.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 02-0717 T1
DESIGNED: January 2006
SEALED: 03-03-06
REVISED: NA

Signal Upgrade - Temporary 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1708 (Fire Tower Road) at SR 1709 (Corey Road)/ Entrance to Apartments

Division 2 Pitt County S. of Greenville

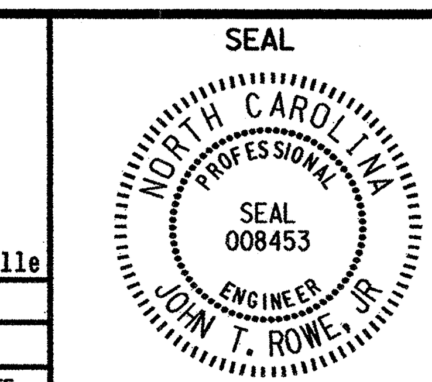
PLAN DATE: February 2006 REVIEWED BY: [signature]

PREPARED BY: James Peterson REVIEWED BY:

REVISIONS INIT. DATE

Prepared in the Offices of: Signals Management Section, 122 N. McDowell St., Raleigh, NC 27603

SEAL



SIGNATURE 3-8-06 DATE

SIG. INVENTORY NO. 02-0717 T1

08-MAR-2006 13:06
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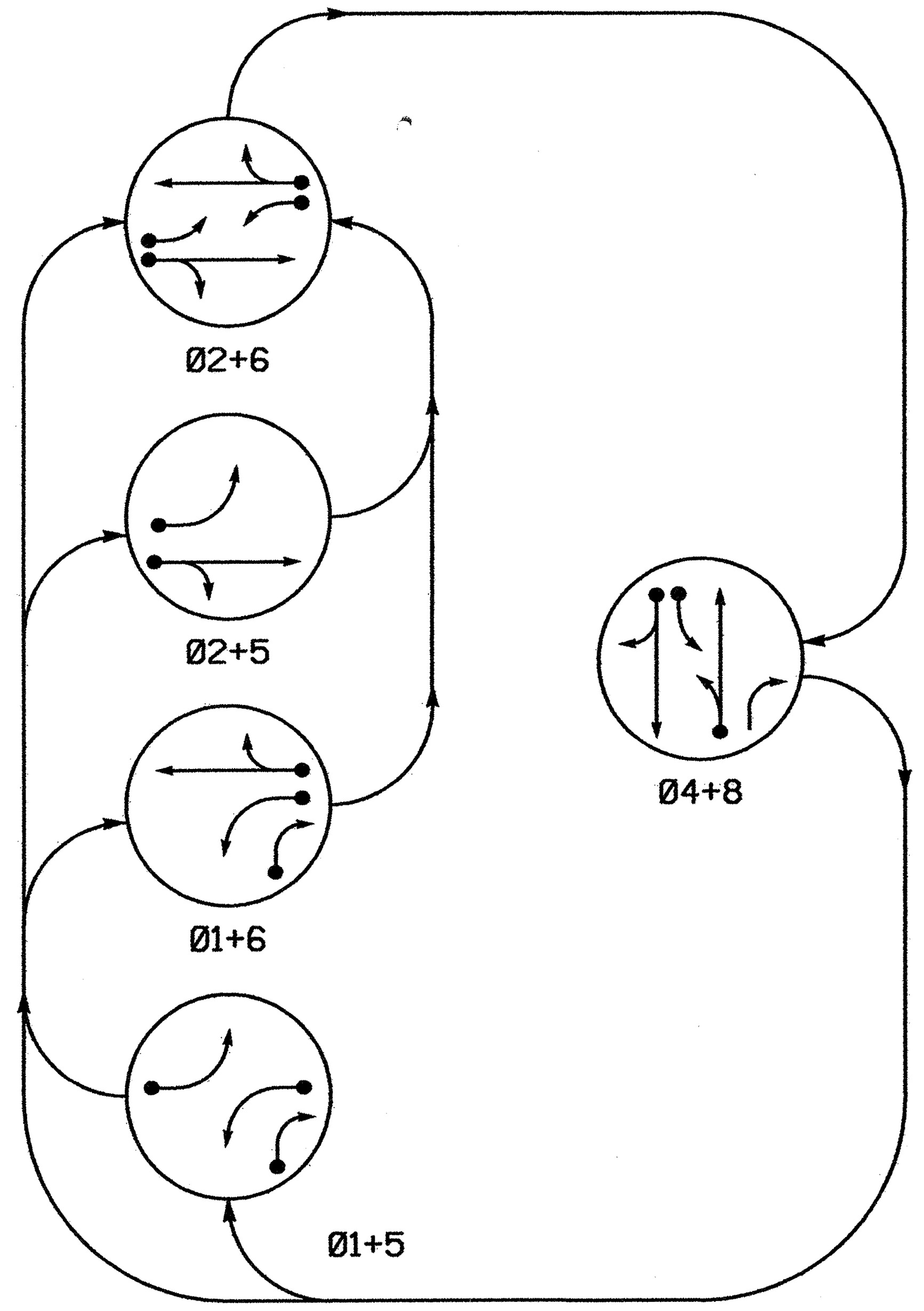
jtpeterson

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig32

5 Phase
Fully Actuated
(Greenville City System)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

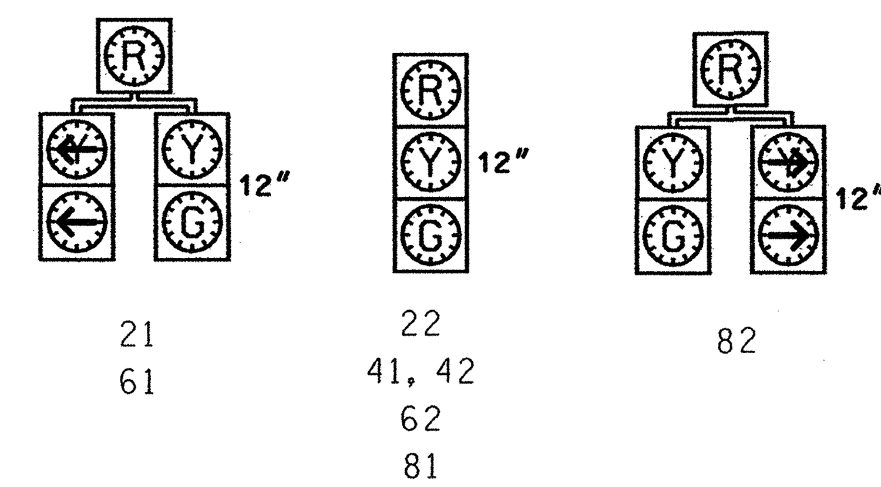
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	FLASH
21	←R	R	←G	G	R	Y
22	R	R	G	G	R	Y
41, 42	R	R	R	R	G	R
61	←R	←G	R	G	R	Y
62	R	G	R	G	R	Y
81	R	R	R	R	G	R
82	R→	R→	R	R	G	R

SIGNAL FACE I.D.

Denotes L.E.D.

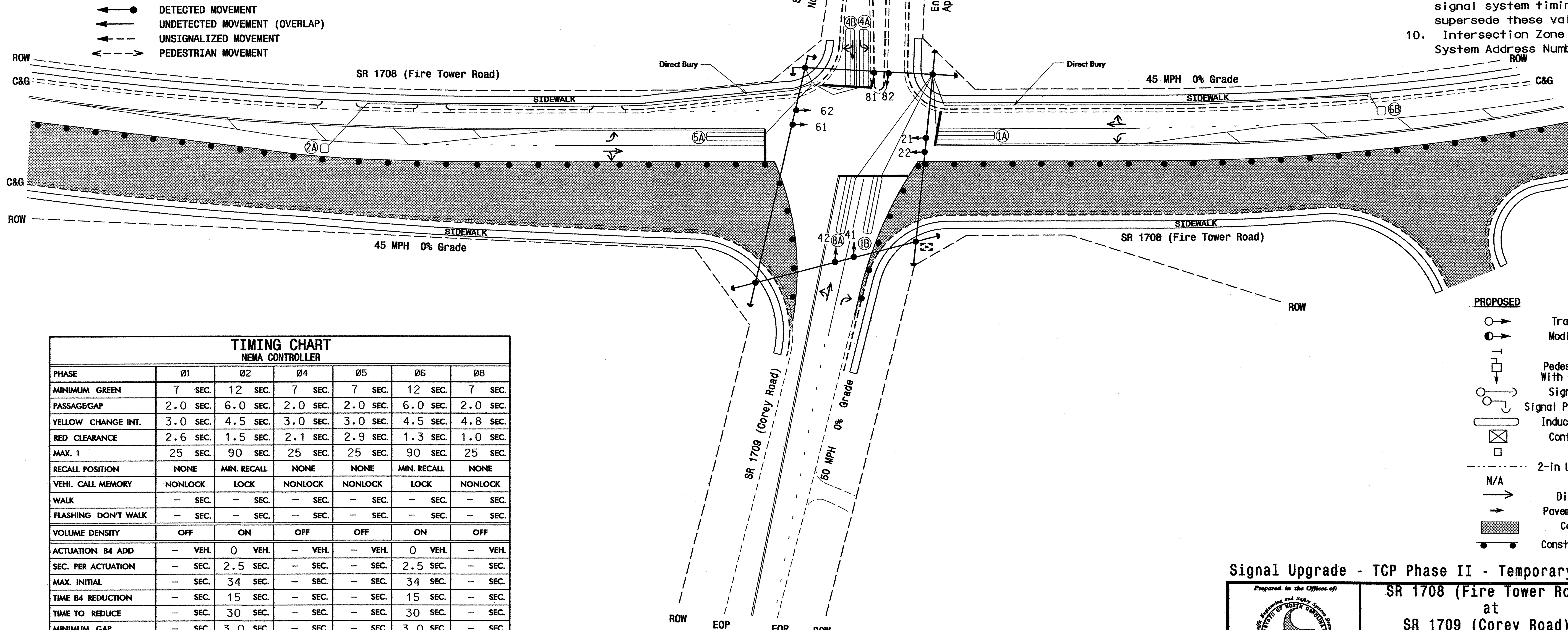


NEMA LOOP & DETECTOR INSTALLATION CHART
with TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS					
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	INHIBIT DELAY DURING GREEN?
1A	6X40	0	2-4-2	X		1		X	DELAY	15	YES
						6		X	DELAY	3	NO
1B	6X40	0	2-4-2	X		1		X	DELAY	15	YES
2A	6X6	300	6	X		2		X	-	-	NO
4A	6X40	0	2-4-2	X		4		X	-	-	NO
4B	6X40	0	2-4-2	X		4		X	DELAY	10	YES
5A	6X40	0	2-4-2	X		5		X	DELAY	15	YES
						2		X	DELAY	3	NO
6B	6X6	300	6	X		6	X		-	-	NO
8A	6X40	0	2-4-2	X		8		X	DELAY	3	YES

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Omit phase 1 during phase 2 on.
4. Omit phase 5 during phase 6 on.
5. Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4+8 (see Electrical Details).
6. Program phase 4 and phase 8 for dual entry.
7. Reposition existing signal heads as needed.
8. Set all detector units to presence mode.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Intersection Zone Number: 7. System Address Number: 82



TIMING CHART
NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø4	Ø5	Ø6	Ø8
MINIMUM GREEN	7 SEC.	12 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.
PASSAGE/GAP	2.0 SEC.	6.0 SEC.	2.0 SEC.	2.0 SEC.	6.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.5 SEC.	3.0 SEC.	3.0 SEC.	4.5 SEC.	4.8 SEC.
RED CLEARANCE	2.6 SEC.	1.5 SEC.	2.1 SEC.	2.9 SEC.	1.3 SEC.	1.0 SEC.
MAX. 1	25 SEC.	90 SEC.	25 SEC.	25 SEC.	90 SEC.	25 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
VEHI. CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	LOCK	NONLOCK
WALK	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
FLASHING DON'T WALK	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
VOLUME DENSITY	OFF	ON	OFF	OFF	ON	OFF
ACTUATION B4 ADD	– VEH.	0 VEH.	– VEH.	– VEH.	0 VEH.	– VEH.
SEC. PER ACTUATION	– SEC.	2.5 SEC.	– SEC.	– SEC.	2.5 SEC.	– SEC.
MAX. INITIAL	– SEC.	34 SEC.	– SEC.	– SEC.	34 SEC.	– SEC.
TIME B4 REDUCTION	– SEC.	15 SEC.	– SEC.	– SEC.	15 SEC.	– SEC.
TIME TO REDUCE	– SEC.	30 SEC.	– SEC.	– SEC.	30 SEC.	– SEC.
MINIMUM GAP	– SEC.	3.0 SEC.	– SEC.	– SEC.	3.0 SEC.	– SEC.

* 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.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone	
	Construction Zone Drums	

Signal Upgrade - TCP Phase II - Temporary Signal 2

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, 122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road)
at
SR 1709 (Corey Road)/
Entrance to Apartments

Division 2 | Pitt County | S. of Greenville

PLAN DATE: January 2006 | REVIEWED BY: RM Duffy
PREPARED BY: TS Thigpen | REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS | INIT. | DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER 027... ...RD E. MULLINAX
3 MARCH 2006
SIGNATURE | DATE

SIG. INVENTORY NO. 02-0717 T2

02-MAR-2006 15:43
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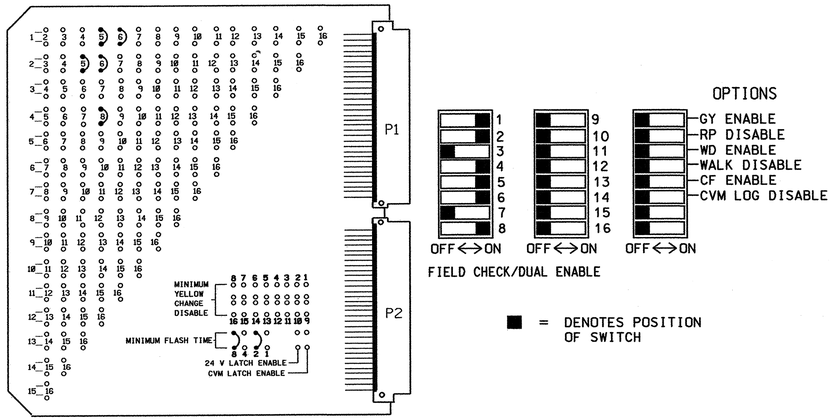
rduffy

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	Sig.33

EDI MODEL MMU-16E
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and set switches as shown below)



MMU PROGRAMMING CARD

■ = DENOTES POSITION OF SWITCH

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 3, 7, 9, 10, 11, 12, 13, 14, 15 AND 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
10. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
11. THE CABINET AND CONTROLLER ARE A PART OF THE GREENVILLE CITY SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	61,82	21,22	NU	41,42	21	61,62	NU	81,82	NU	NU	NU	NU	NU	NU	NU	NU
RED	*	2R		4R	*	6R		8R								
YELLOW		2Y		4Y		6Y		8Y								
GREEN		2G		4G		6G		8G								
RED ARROW																
YELLOW ARROW	1Y				5Y											
GREEN ARROW	1G				5G											

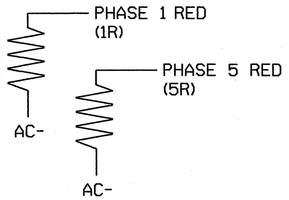
NU = NOT USED
* DENOTES INSTALL LOAD RESISTOR. SEE LOAD RESISTOR INSTALLATION DETAIL THIS PAGE.

SPECIAL BACK-UP PROTECTION NOTES

1. PROGRAM CONTROLLER TO OMIT PHASE 1 DURING PHASE 2 ON, AND TO OMIT PHASE 5 DURING PHASE 6 ON.
2. TO ACCOMPLISH BACK-UP FEATURE DESCRIBED IN NOTE 1, ENABLE 'BACK-UP PROTECTION GROUP 1' UNDER CONTROLLER SUBMENU 9: 'OPTION DATA'.
3. IT IS REQUIRED FOR THE CONTROLLER TO BE PROGRAMMED SUCH THAT IF IT IS IN PHASE 2+6, THEN PHASE 1 AND/OR 5 CANNOT BE SERVED NEXT WITHOUT FIRST PROGRESSING THROUGH PHASE 4. THIS ADDITIONAL BACK-UP PROTECTION FEATURE SHALL BE IMPLEMENTED IN THE WRITE-PROTECT AREA OF THE CONTROLLER SOFTWARE. FOR DIRECTIONS ON HAVING THIS FEATURE INSTALLED, CONTACT THE NCDOT TRAFFIC ELECTRONICS REPAIR CENTER AT: (919) 233-0884.

LOAD RESISTOR INSTALLATION DETAIL

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



NOTE: THE PURPOSE OF THESE RESISTORS IS TO LOAD THE CHANNEL RED MONITOR INPUTS IN ORDER FOR THE MALFUNCTION MANAGEMENT UNIT TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON PHASES THAT DO NOT USE THE RED DISPLAY IN THE FIELD.

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

BIU	CH1 L3 ø1	CH1 L1 ø1	CH1 L7 ø4	CH1 L5 ø2	CH1 NOT USED	CH1 L9 ø5	SLOT EMPTY	CH1 L13 ø8	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	CH2 NOT USED	CH2 L2 ø6 *	CH2 L8 ø4	CH2 NOT USED	CH2 L12 ø6	CH2 L10 ø2 *		CH2 NOT USED			

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

	LOOP NO.	LOOP PANEL TERMINALS
ADD JUMPERS FROM: L1A TO L2A, AND L1B TO L2B	1A	L1A,L1B
		L2A,L2B
	1B	L3A,L3B
		L4A,L4B
	2A	L5A,L5B
		L6A,L6B
	4A	L7A,L7B
	4B	L8A,L8B
ADD JUMPERS FROM: L9A TO L10A, AND L9B TO L10B	5A	L9A,L9B
		L10A,L10B
		L11A,L11B
	6B	L12A,L12B
	8A	L13A,L13B
		L14A,L14B
		L15A,L15B
		L16A,L16B

NOTE
BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø1	DELAY	15
* 2	ø6	DELAY	3
3	ø1	DELAY	15
4			
5	ø2		
6			
7	ø4		
8	ø4	DELAY	10
9	ø5	DELAY	15
* 10	ø2	DELAY	3
11			
12	ø6		
13	ø8	DELAY	3
14			
15			
16			

* THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE TIMING REQUIRED FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED ECONOLITE
CABINET .....CONTRACTOR SUPPLIED TS-2 NC-3
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....1,2,4,5,6,8
PHASES USED.....1,2,4,5,6,8
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0717 T2
DESIGNED: January 2006
SEALED: 03-03-06
REVISED: NA

Signal Upgrade - Temporary 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1708 (Fire Tower Road)
at
SR 1709 (Corey Road)/
Entrance to Apartments

Division 2 | Pitt County | S. of Greenville

PLAN DATE: February 2006 | REVIEWED BY:
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation
Signal Management Section
122 N. McDowell St., Raleigh, NC 27603

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.
SIGNATURE
DATE
SIG. INVENTORY NO. 02-0717 T2

06-MAR-2006 09:03
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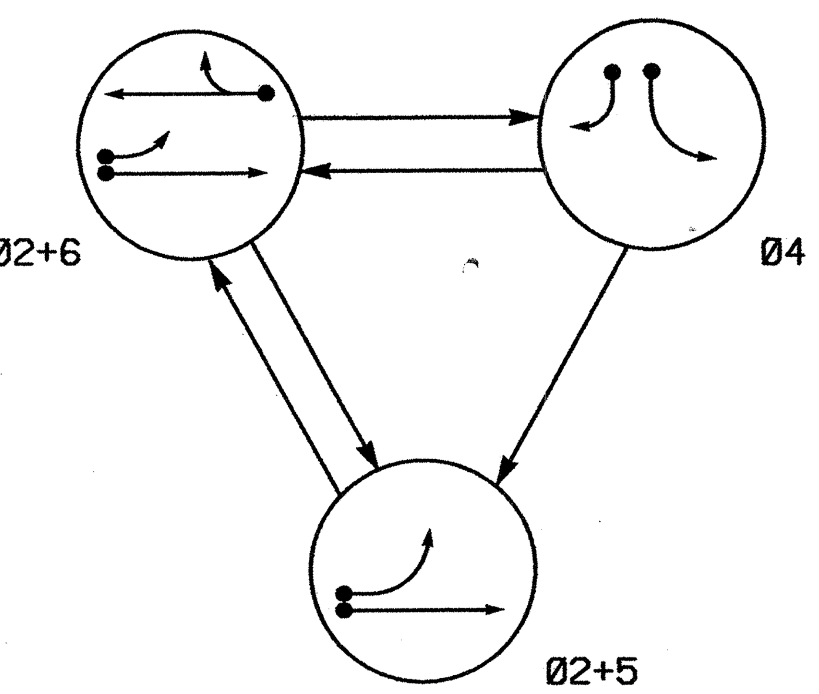
tpeterson

PHASING DIAGRAM



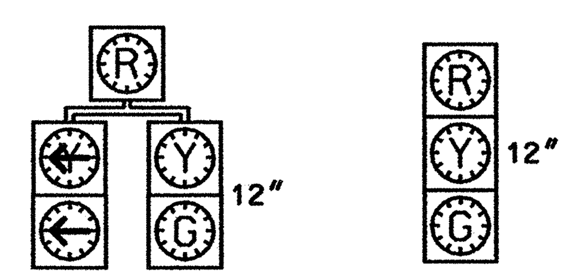
PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION				
SIGNAL FACE	PHASE			
	Ø2+5	Ø2+6	Ø4	FLASH
21	←/G	G	R	Y
22	G	G	R	Y
41, 42	R	R	G	R
61, 62	R	G	R	Y

SIGNAL FACE I.D.

Denotes L.E.D.



21

22
41, 42
61, 62

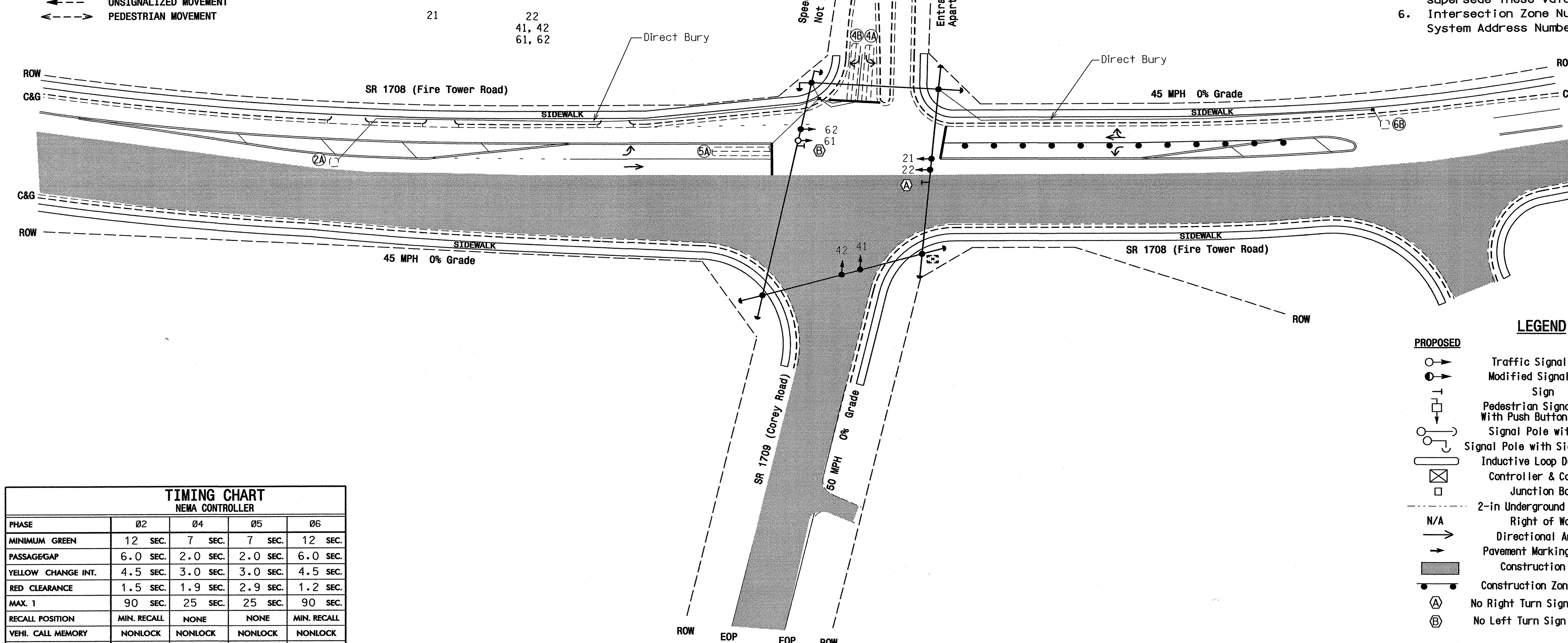
NEMA LOOP & DETECTOR INSTALLATION CHART
with TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS					
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	INHIBIT DELAY DURING GREEN?
2A	6X6	300	6		X	2		X	-	-	NO
4A	6X40	0	2-4-2		X	4		X	-	-	NO
4B	6X40	0	2-4-2		X	4		X	DELAY	15	YES
5A	6X40	0	2-4-2		X	5		X	DELAY	15	YES
						2		X	DELAY	3	NO
6B	6X6	300	6		X	6		X	-	-	NO

3 Phase
Fully Actuated
(Greenville City System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads as needed.
4. Set all detector units to presence mode.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
6. Intersection Zone Number: 7. System Address Number: 82



LEGEND

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

TIMING CHART
NEMA CONTROLLER

PHASE	Ø2	Ø4	Ø5	Ø6
MINIMUM GREEN	12 SEC.	7 SEC.	7 SEC.	12 SEC.
PASSAGE/GAP	6.0 SEC.	2.0 SEC.	2.0 SEC.	6.0 SEC.
YELLOW CHANGE INT.	4.5 SEC.	3.0 SEC.	3.0 SEC.	4.5 SEC.
RED CLEARANCE	1.5 SEC.	1.9 SEC.	2.9 SEC.	1.2 SEC.
MAX. 1	90 SEC.	25 SEC.	25 SEC.	90 SEC.
RECALL POSITION	MIN. RECALL	NONE	NONE	MIN. RECALL
VEHI. CALL MEMORY	NONLOCK	NONLOCK	NONLOCK	NONLOCK
WALK	– SEC.	– SEC.	– SEC.	– SEC.
FLASHING DON'T WALK	– SEC.	– SEC.	– SEC.	– SEC.
VOLUME DENSITY	ON	OFF	OFF	ON
ACTUATION B4 ADD	0 VEH.	– VEH.	– VEH.	0 VEH.
SEC. PER ACTUATION	2.5 SEC.	– SEC.	– SEC.	2.5 SEC.
MAX. INITIAL	34 SEC.	– SEC.	– SEC.	34 SEC.
TIME B4 REDUCTION	15 SEC.	– SEC.	– SEC.	15 SEC.
TIME TO REDUCE	30 SEC.	– SEC.	– SEC.	30 SEC.
MINIMUM GAP	3.0 SEC.	– SEC.	– SEC.	3.0 SEC.

* 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.

Signal Upgrade - TCP Phase II - Temporary Signal 3

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
State of North Carolina Department of Transportation
Signals and Geometrics Section
122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road) at SR 1709 (Corey Road)/ Entrance to Apartments

Division 2 | Pitt County | S. of Greenville

PLAN DATE:	January 2006	REVIEWED BY:	RM Duffy
PREPARED BY:	TS Thigpen	REVIEWED BY:	

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL: North Carolina Professional Engineer Seal 22027 Richard E. Mullinax — 3 MARCH 2006

SIGNATURE DATE

SIG. INVENTORY NO. 02-0717 T3

02-MAR-2006 15:44
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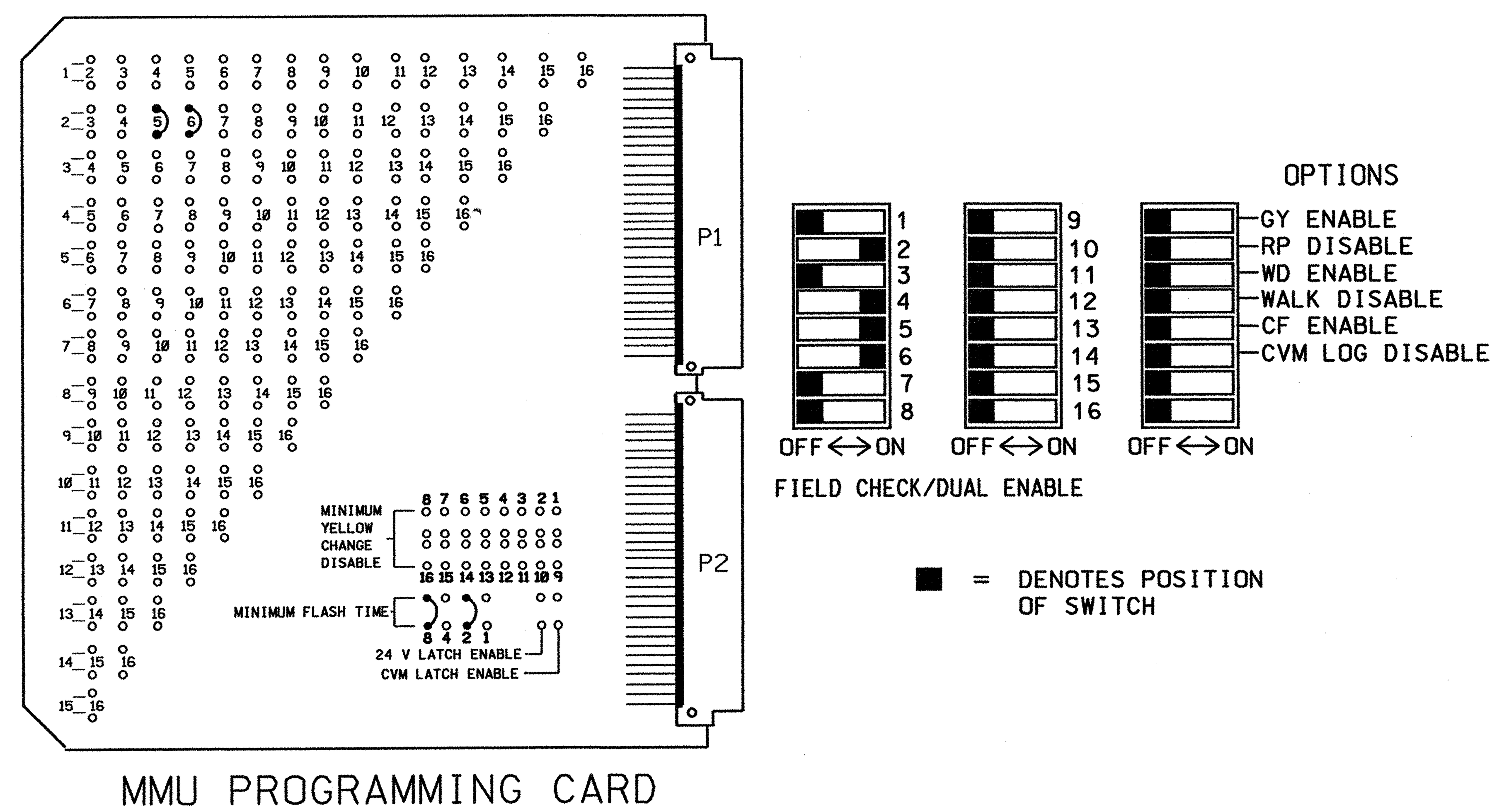
r.duffy

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	Sig.35

EDI MODEL MMU-16E MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and set switches as shown below)



MMU PROGRAMMING CARD

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 1,3,7,8,9,10,11,12,13,14, 15 AND 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
10. BE SURE THAT 'BACK-UP PROTECTION GROUP 1' UNDER CONTROLLER SUB-MENU 9: 'OPTION DATA' IS DISABLED.
11. THE CABINET AND CONTROLLER ARE A PART OF THE GREENVILLE CITY SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	NU	21,22	NU	41,42	21	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		2R		4R	*	6R										
YELLOW		2Y		4Y		6Y										
GREEN		2G		4G		6G										
RED ARROW																
YELLOW ARROW					5Y											
GREEN ARROW					5G											

NU = NOT USED

* DENOTES INSTALL LOAD RESISTOR. SEE LOAD RESISTOR INSTALLATION DETAIL THIS PAGE.

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

BIU	SLOT EMPTY	SLOT EMPTY	CH1 L7 ø4	CH1 L5 ø2	CH1 NOT USED	CH1 L9 ø5	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
			CH2 L8 ø4	CH2 NOT USED	CH2 L12 ø6	CH2 L10 ø2 *					

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

LOOP NO.	LOOP PANEL TERMINALS
	L1A,L1B
	L2A,L2B
	L3A,L3B
	L4A,L4B
2A	L5A,L5B
	L6A,L6B
4A	L7A,L7B
4B	L8A,L8B
5A	L9A,L9B
	L10A,L10B
	L11A,L11B
6B	L12A,L12B
	L13A,L13B
	L14A,L14B
	L15A,L15B
	L16A,L16B

ADD JUMPERS FROM: L9A TO L10A, AND L9B TO L10B

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
1			
2			
3			
4			
5	ø2		
6			
7	ø4		
8	ø4	DELAY	15
9	ø5	DELAY	15
* 10	ø2	DELAY	3
11			
12	ø6		
13			
14			
15			
16			

* THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE TIMING REQUIRED FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

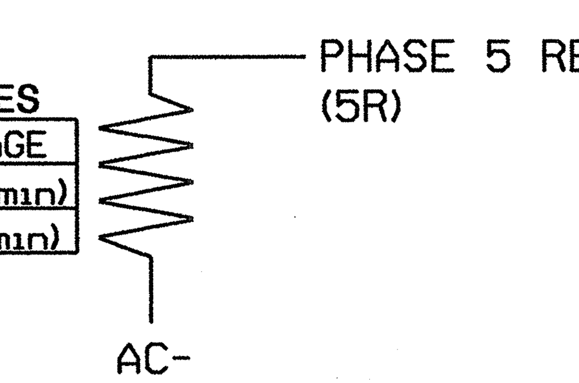
EQUIPMENT INFORMATION

CONTROLLER..............CONTRACTOR SUPPLIED ECONOLITE
CABINET ....CONTRACTOR SUPPLIED TS-2
CABINET MOUNT...........BASE
LOADBAY POSITIONS.......16
LOAD SWITCHES USED......2,4,5,6
PHASES USED.............2,4,5,6
OLA.....................NOT USED
OLB.....................NOT USED
OLC.....................NOT USED
OLD.....................NOT USED

LOAD RESISTOR INSTALLATION DETAIL

ACCEPTABLE VALUES

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



NOTE: THE PURPOSE OF THIS RESISTOR IS TO LOAD THE CHANNEL RED MONITOR INPUT IN ORDER FOR THE MALFUNCTION MANAGEMENT UNIT TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON PHASES THAT DO NOT USE THE RED DISPLAY IN THE FIELD.

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 02-0717 T3
DESIGNED: January 2006
SEALED: 03-03-06
REVISED: NA

Signal Upgrade - Temporary 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1708 (Fire Tower Road) at SR 1709 (Corey Road)/ Entrance to Apartments

Division 2 Pitt County S. of Greenville

PLAN DATE: February 2006 REVIEWED BY: [signature]
PREPARED BY: James Peterson REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, State of North Carolina Department of Transportation, Signals Management Section
122 N. McDowell St., Raleigh, NC 27603

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 008453 JOHN T. ROWE, JR.

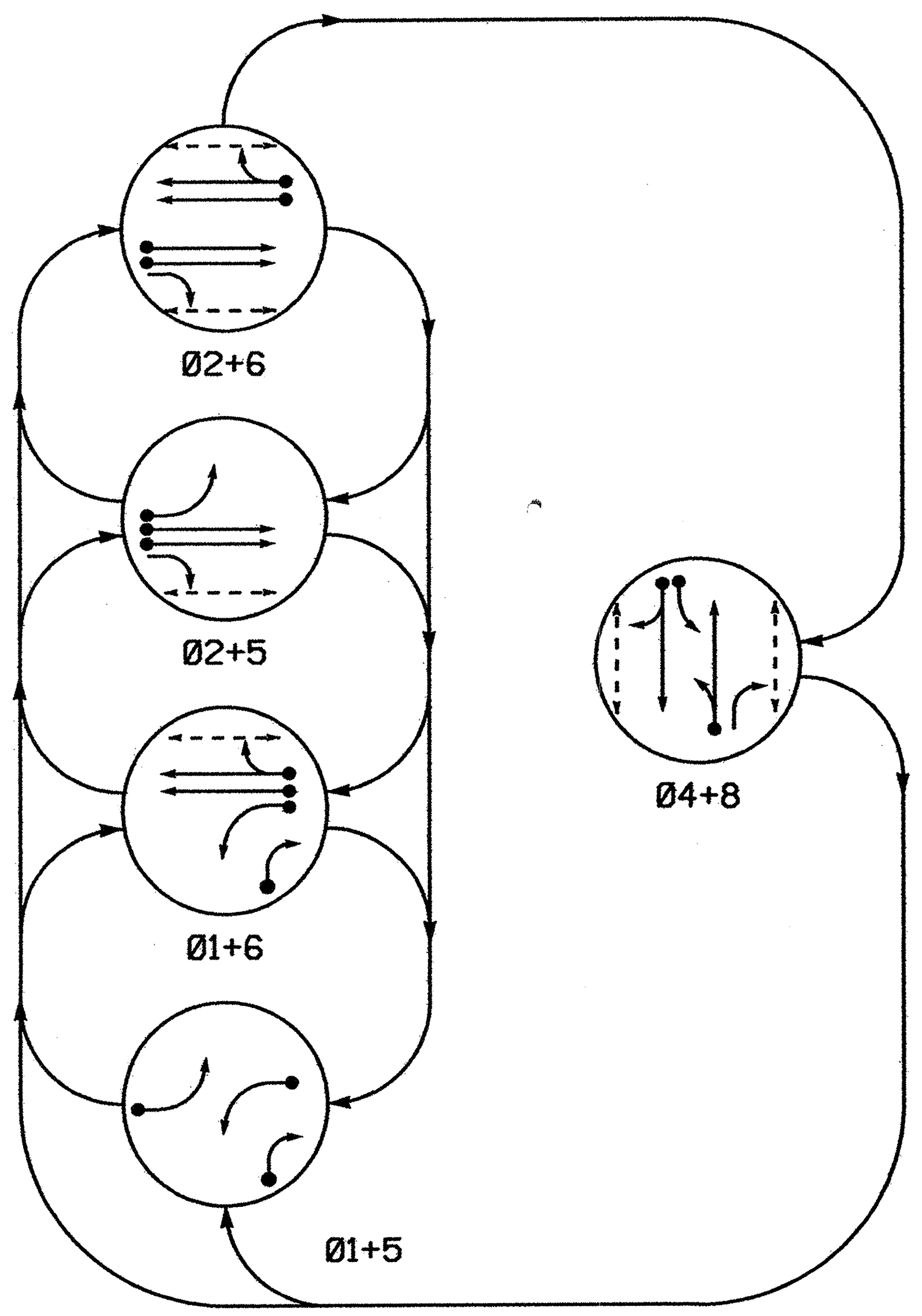
SIGNATURE: John T. Rowe Jr. DATE: 3-8-06

SIG. INVENTORY NO. 02-0717 T3

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.36

5 Phase
Fully Actuated
(Greenville City System)

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

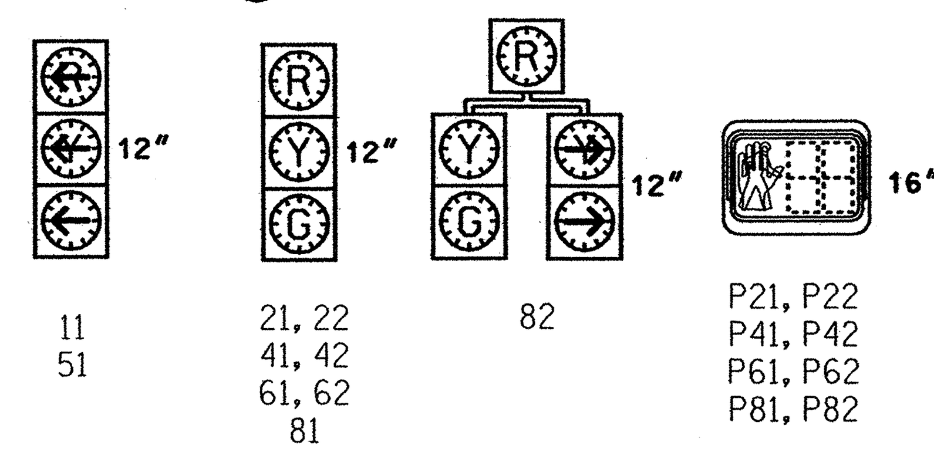
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	FLASH
11	←	←	←R	←R	←R	←R
21, 22	R	R	G	G	R	Y
41, 42	R	R	R	R	G	R
51	←	←R	←	←R	←R	←R
61, 62	R	G	R	G	R	Y
81	R	R	R	R	G	R
82	R/→	R/→	R	R	G	R
P21, P22	DW	DW	W	W	DW	DRK
P41, P42	DW	DW	DW	DW	W	DRK
P61, P62	DW	W	DW	W	DW	DRK
P81, P82	DW	DW	DW	DW	W	DRK

SIGNAL FACE I.D.

Denotes L.E.D.

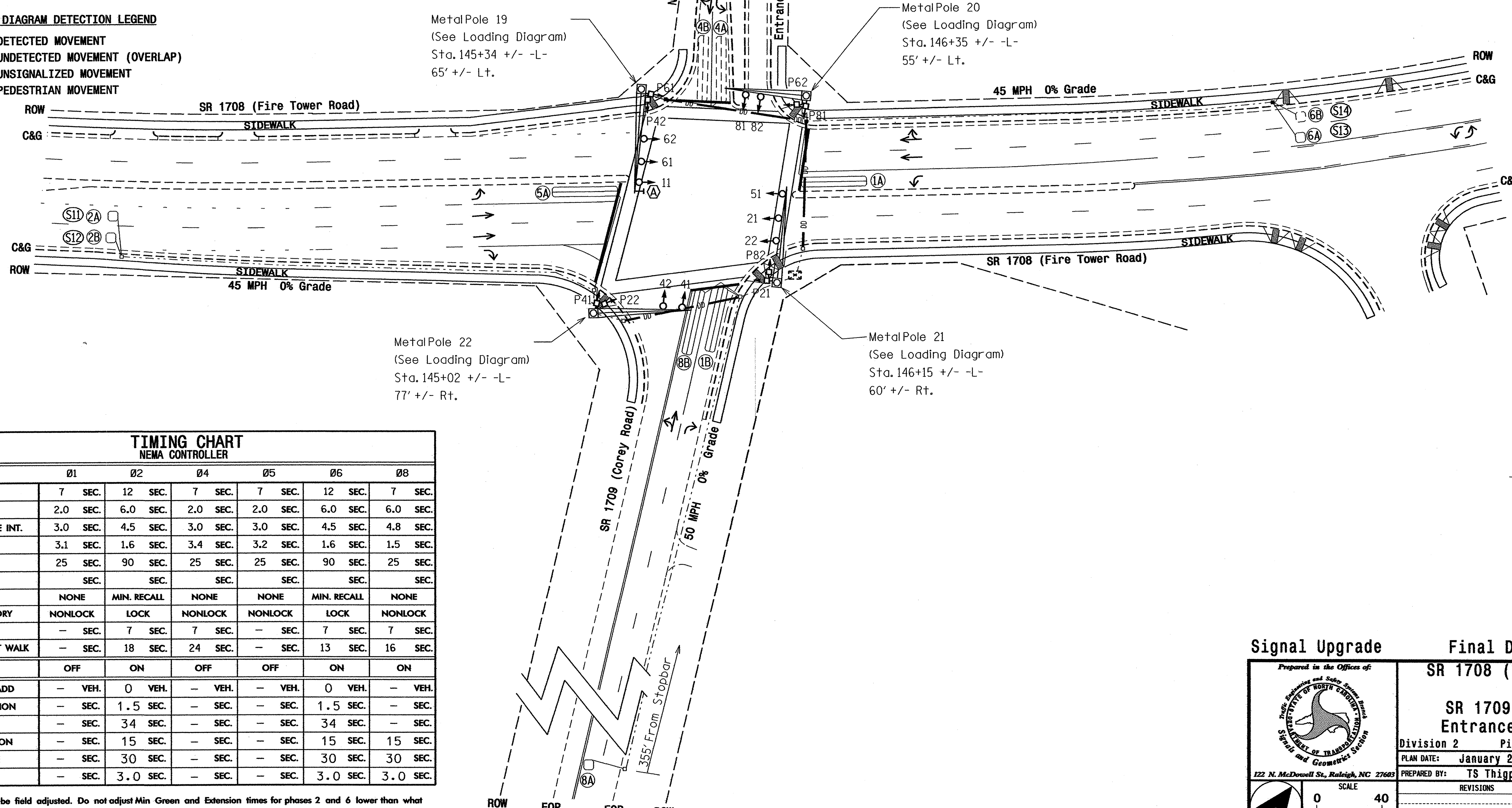


LOOP & DETECTOR UNIT INSTALLATION CHART
NEMA CONTROLLER WITH TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS						
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?
1A	6X40	2-4-2	0	X		1	X		-	- SEC.	ALL	NO
1B	6X40	2-4-2	0	X		1	X		DELAY	15 SEC.	ALL	YES
2A/S11	6X6	6	300	X		2	X		-	- SEC.	ALL	NO
						-	X		System Detector			
2B/S12	6X6	6	300	X		2	X		-	- SEC.	ALL	NO
						-	X		System Detector			
4A	6X40	2-4-2	0		X	4		X	-	- SEC.	ALL	NO
4B	6X40	2-4-2	0		X	4		X	DELAY	10 SEC.	ALL	YES
5A	6X40	2-4-2	0	X		5	X		-	- SEC.	ALL	NO
6A/S13	6X6	6	300	X		6	X		-	- SEC.	ALL	NO
						-	X		System Detector			
6B/S14	6X6	6	300		X	6		X	-	- SEC.	ALL	NO
						-	X		System Detector			
8A	6X6	6	355	X		8	X		DELAY	100 SEC.	ALL	YES
8B	6X40	2-4-2	0	X		8	X		DC/EC	5/2 SEC.	ALL	NO

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2002 and "Standard Specifications for Roads and Structures" dated January 2002.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 or phase 5 may be lagged.
4. Program phase 4 and phase 8 for dual entry.
5. Set all detector units to presence mode.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
9. Intersection Zone Number: 7. System Address Number: 82



TIMING CHART
NEMA CONTROLLER

PHASE	Ø1	Ø2	Ø4	Ø5	Ø6	Ø8
MINIMUM GREEN	7 SEC.	12 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.
PASSAGE/GAP	2.0 SEC.	6.0 SEC.	2.0 SEC.	2.0 SEC.	6.0 SEC.	6.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.5 SEC.	3.0 SEC.	3.0 SEC.	4.5 SEC.	4.8 SEC.
RED CLEARANCE	3.1 SEC.	1.6 SEC.	3.4 SEC.	3.2 SEC.	1.6 SEC.	1.5 SEC.
MAX. 1	25 SEC.	90 SEC.	25 SEC.	25 SEC.	90 SEC.	25 SEC.
MAX. 2	SEC.	SEC.	SEC.	SEC.	SEC.	SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
VEHI. CALL MEMORY	NONLOCK	LOCK	NONLOCK	NONLOCK	LOCK	NONLOCK
WALK	– SEC.	7 SEC.	7 SEC.	– SEC.	7 SEC.	7 SEC.
FLASHING DON'T WALK	– SEC.	18 SEC.	24 SEC.	– SEC.	13 SEC.	16 SEC.
VOLUME DENSITY	OFF	ON	OFF	OFF	ON	ON
ACTUATION B4 ADD	– VEH.	0 VEH.	– VEH.	– VEH.	0 VEH.	– VEH.
SEC. PER ACTUATION	– SEC.	1.5 SEC.	– SEC.	– SEC.	1.5 SEC.	– SEC.
MAX. INITIAL	– SEC.	34 SEC.	– SEC.	– SEC.	34 SEC.	– SEC.
TIME B4 REDUCTION	– SEC.	15 SEC.	– SEC.	– SEC.	15 SEC.	15 SEC.
TIME TO REDUCE	– SEC.	30 SEC.	– SEC.	– SEC.	30 SEC.	30 SEC.
MINIMUM GAP	– SEC.	3.0 SEC.	– SEC.	– SEC.	3.0 SEC.	3.0 SEC.

* 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.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Pavement Marking Arrow	
N/A	Wheelchair Ramp	
	Metal Pole with Mastarm	
	Directional Drill	N/A
Ⓐ	"U-TURN YIELD TO RIGHT TURN" Sign (R10-16)	Ⓐ

Signal Upgrade   Final Design

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, North Carolina Department of Transportation
122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road)
at
SR 1709 (Corey Road)/
Entrance to Apartments

Division 2   Pitt County   Greenville

PLAN DATE:	January 2006	REVIEWED BY:	RW Duffy
PREPARED BY:	TS Thiggen	REVIEWED BY:	

SCALE 0 40
1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022027
E. MULLINAX
3 MARCH 2006
SIGNATURE   DATE
SIG. INVENTORY NO. 02-0717

02-MAR-2006 15:42
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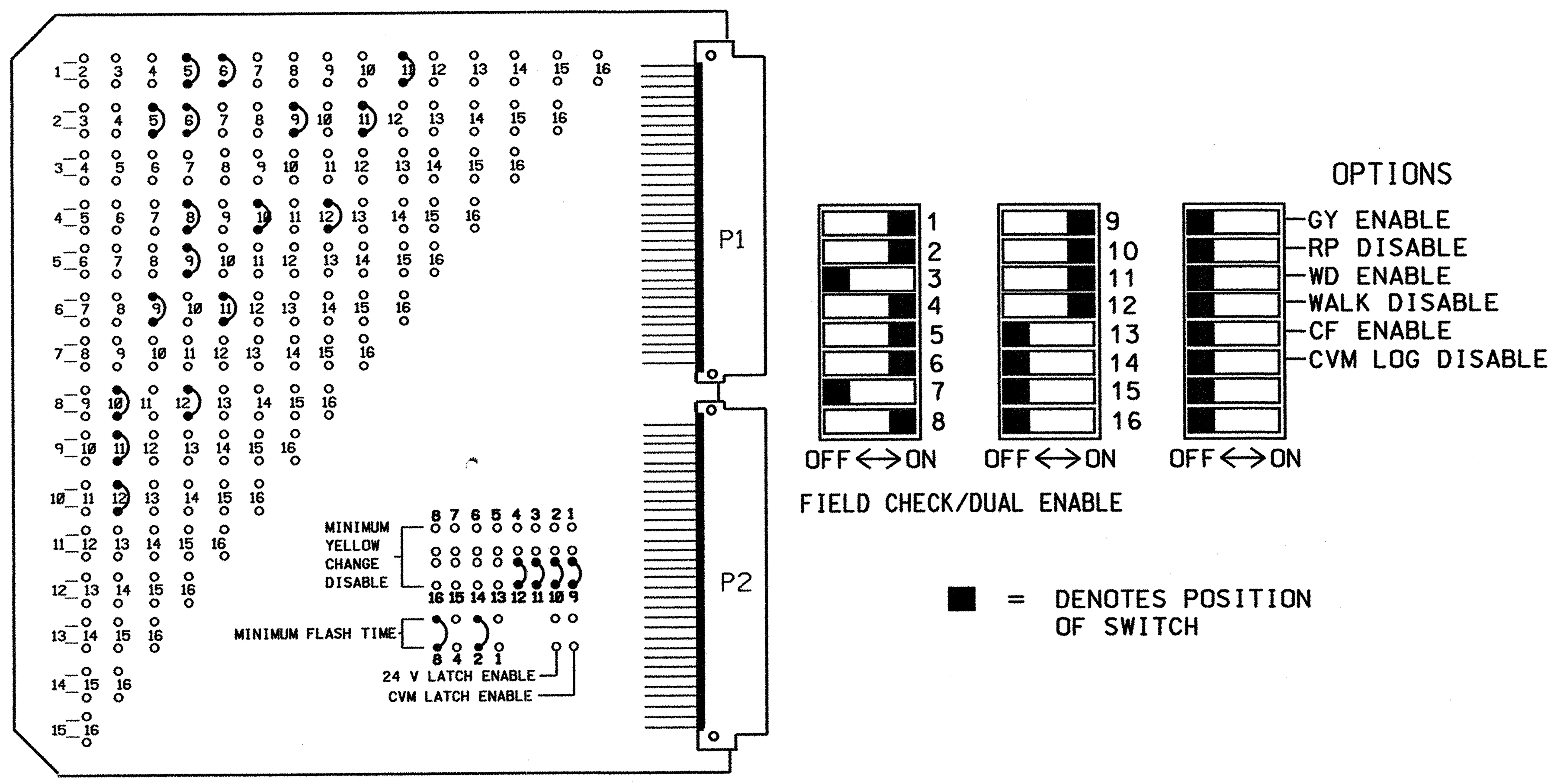
rduffy

EDI MODEL MMU-16E MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and set switches as shown below)



MMU PROGRAMMING CARD

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 3, 7, 13, 14, 15 AND 16 TO LOAD SWITCH AC+ BY INSERTING A JUMPER PLUG IN THE UNUSED LOAD SWITCH SOCKET FROM PIN 1 (LS AC+) TO PIN 3 (RED OUT). MAKE SURE ALL FLASH TRANSFER RELAYS ARE IN PLACE.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
7. PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
8. SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
9. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
10. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
11. THE CABINET AND CONTROLLER ARE A PART OF THE GREENVILLE CITY SYSTEM.

FIELD CONNECTION HOOK-UP CHART

PHASE	1	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	11	82	21,22	NU	41,42	51	61,62	NU	81,82	P21, P22	P41, P42	P61, P62	P81, P82	NU	NU	NU	NU
RED			2R		4R		6R		8R								
YELLOW			2Y		4Y		6Y		8Y	*	*	*	*				
GREEN			2G		4G		6G		8G								
RED ARROW	1R					5R											
YELLOW ARROW	1Y	1Y				5Y											
GREEN ARROW	1G	1G				5G											
(Don't Walk hand)										9R	10R	11R	12R				
(Walk person)										9G	10G	11G	12G				

NU = NOT USED

* INSTALL LOAD RESISTORS TO UNUSED FIELD TERMINALS 9Y, 10Y, 11Y AND 12Y, IF NOT ALREADY PRESENT. SEE LOAD RESISTOR INSTALLATION DETAIL THIS PAGE.

TYPICAL LOAD RESISTOR INSTALLATION DETAIL

REMOVE LOAD RESISTORS ON FIELD TERMINAL 1R AND 5R.

ACCEPTABLE VALUES

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

PHASE FIELD TERMINAL

AC-

DETECTOR RACK SET-UP DETAIL

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW. PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

BIU	SLOT EMPTY						SLOT EMPTY		SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
		CH1 L1 ø 1	CH1 L7 ø 4	CH1 L5 ø2/SYS	CH1 L11 ø6/SYS	CH1 L9 ø 5		CH1 L13 ø 8			
		CH2 L2 ø 1	CH2 L8 ø 4	CH2 L6 ø2/SYS	CH2 L12 ø6/SYS	CH2 NOT USED		CH2 L14 ø 8 *			

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
1B	L2A,L2B
	L3A,L3B
	L4A,L4B
2A/S11	L5A,L5B
2B/S12	L6A,L6B
4A	L7A,L7B
4B	L8A,L8B
5A	L9A,L9B
	L10A,L10B
6A/S13	L11A,L11B
6B/S14	L12A,L12B
8A	L13A,L13B
8B	L14A,L14B
	L15A,L15B
	L16A,L16B

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

ASSIGN CONTROLLER SYSTEM DETECTOR TO LOCAL CONT. DET. NUMBERS AS SHOWN IN CHART BELOW

CONTROLLER SYS. DET. NO.	LOCAL CONT. DETECTOR NO.
1	5
2	6
3	11
4	12
5	
6	
7	
8	

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1	ø 1		
2	ø 1	DELAY	15
3			
4			
5	ø 2		
6	ø 2		
7	ø 4		
8	ø 4	DELAY	10
9	ø 5		
10			
11	ø 6		
12	ø 6		
13	ø 8	DELAY	100
* 14	ø 8	DC/EC	5/2
15			
16			

* THIS DETECTOR IS EQUIPPED WITH DELAY AND EXTEND TIMERS. PROGRAM THE TIMING REQUIRED FOR THIS DETECTOR CHANNEL ON THE DETECTOR UNIT, NOT THE CONTROLLER.

EQUIPMENT INFORMATION

CONTROLLER..............CONTRACTOR SUPPLIED ECONOLITE
CABINET ....CONTRACTOR SUPPLIED TS-2
CABINET MOUNT...........BASE
LOADBAY POSITIONS.......16
LOAD SWITCHES USED......1,2,4,5,6,8,9,10,11,12
PHASES USED.............1,2,4,5,6,8,2 PED,4 PED,6 PED,8 PED
OLA.....................NOT USED
OLB.....................NOT USED
OLC.....................NOT USED
OLD.....................NOT USED

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

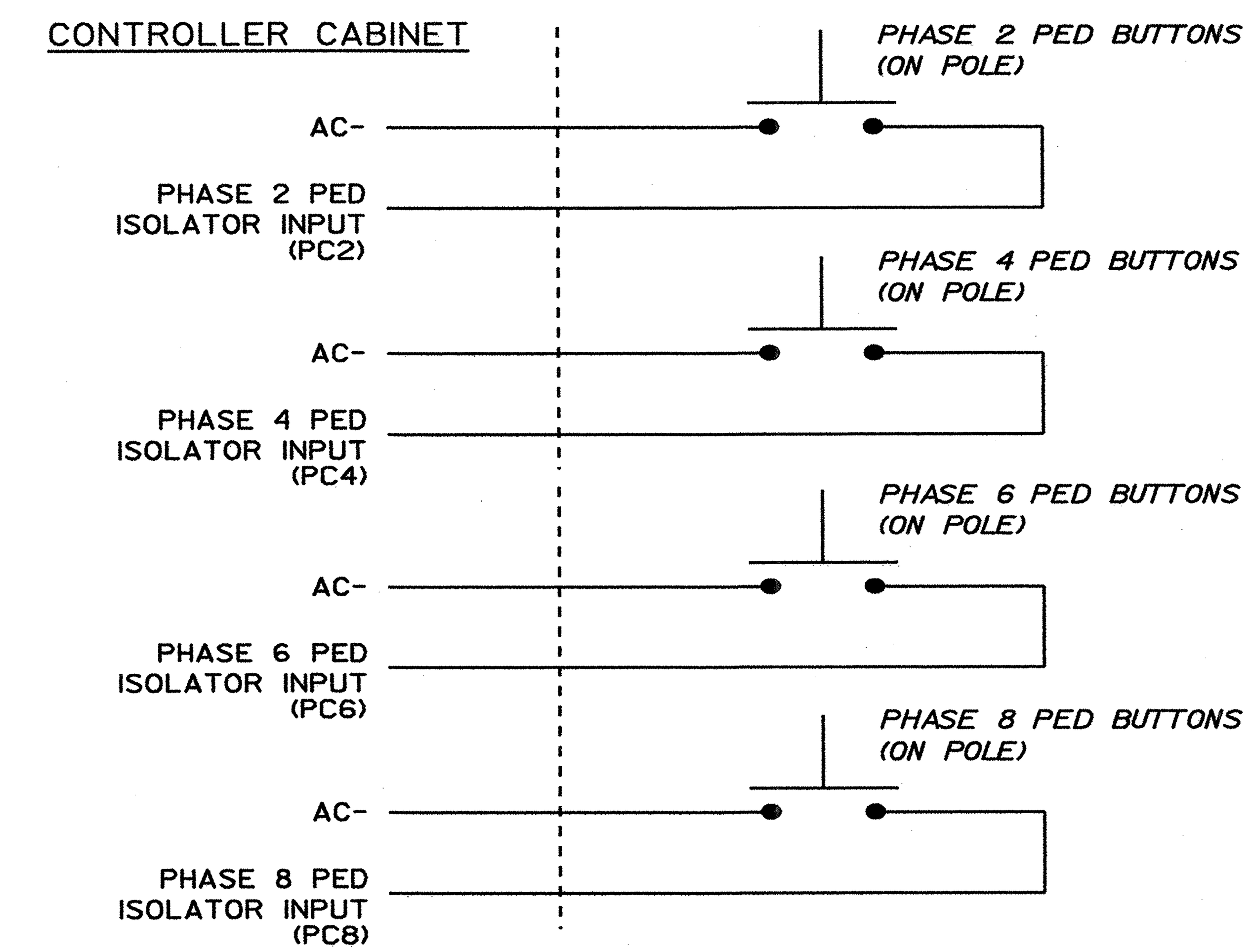
LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

PEDESTRIAN PUSH-BUTTON WIRING DETAIL

(wire push-buttons as shown below)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 02-0717
DESIGNED: January 2006
SEALED: 03-03-06
REVISED: NA

Signal Upgrade - Final

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, State of North Carolina Department of Transportation, Signals Management Section

122 N. McDowell St., Raleigh, NC 27603

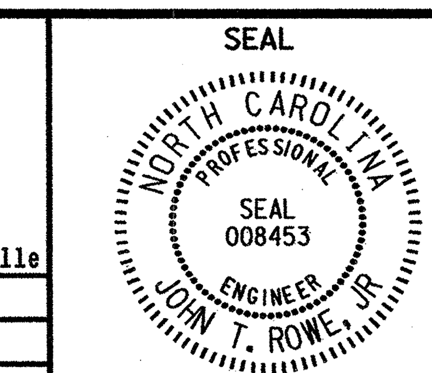
SR 1708 (Fire Tower Road) at SR 1709 (Corey Road)/ Entrance to Apartments

Division 2 | Pitt County | S. of Greenville

PLAN DATE: February 2006 | REVIEWED BY: MWH
PREPARED BY: James Peterson | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL



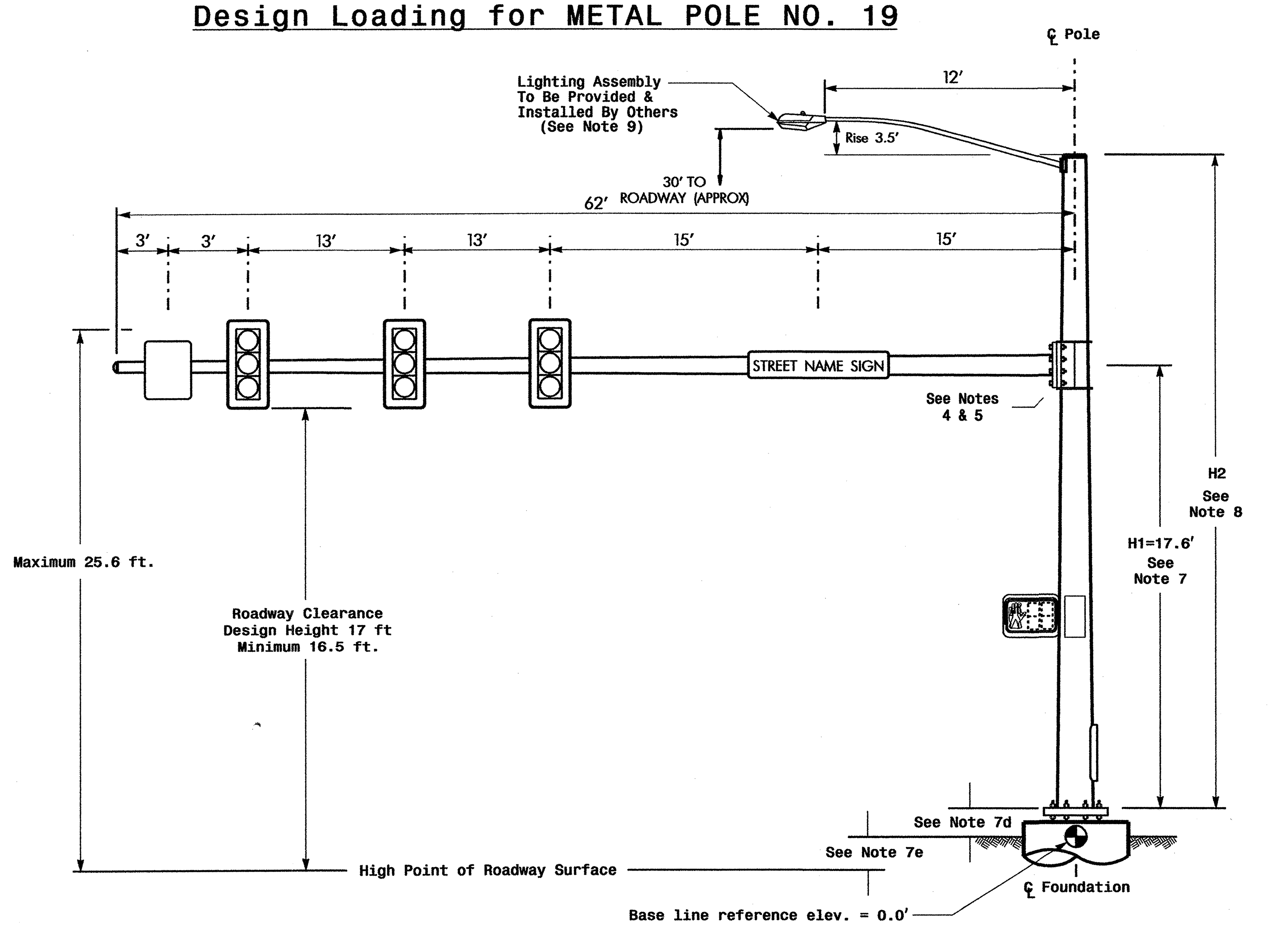
John T. Rowe, Jr. 3-8-06
SIGNATURE DATE

SIG. INVENTORY NO. 02-0717

METAL POLE No. 19 and 20

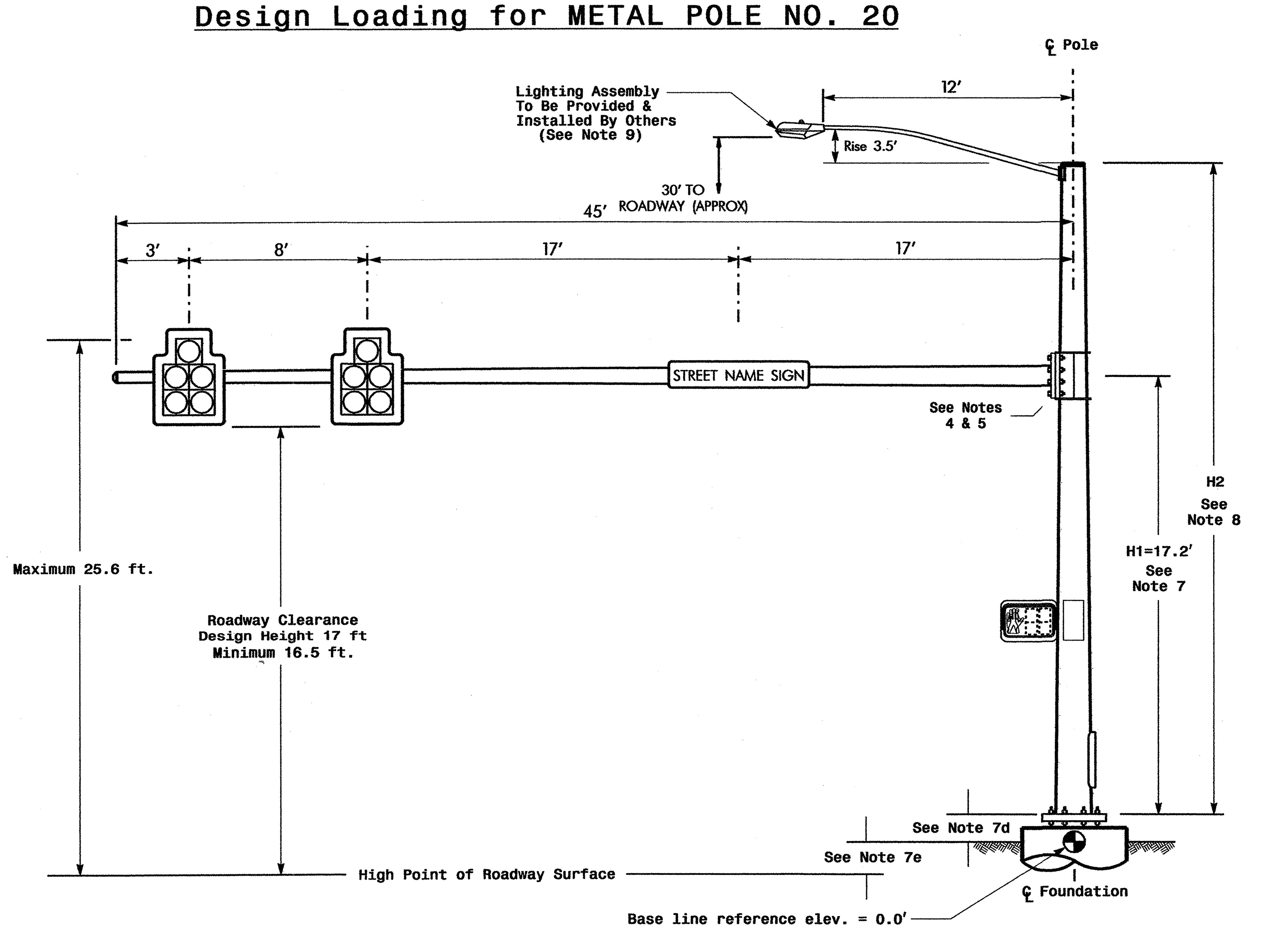
PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.38

Design Loading for METAL POLE NO. 19



Elevation View

Design Loading for METAL POLE NO. 20



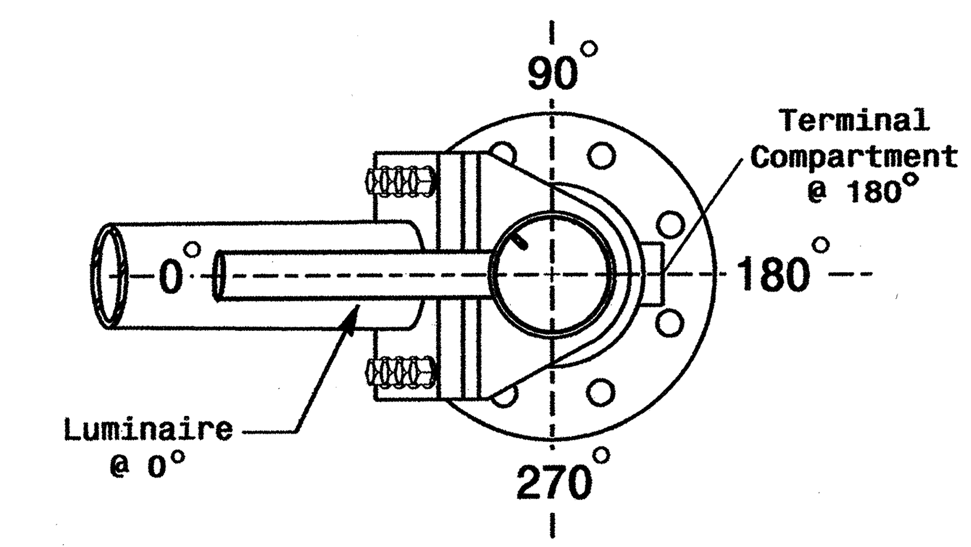
Elevation View

SPECIAL NOTE

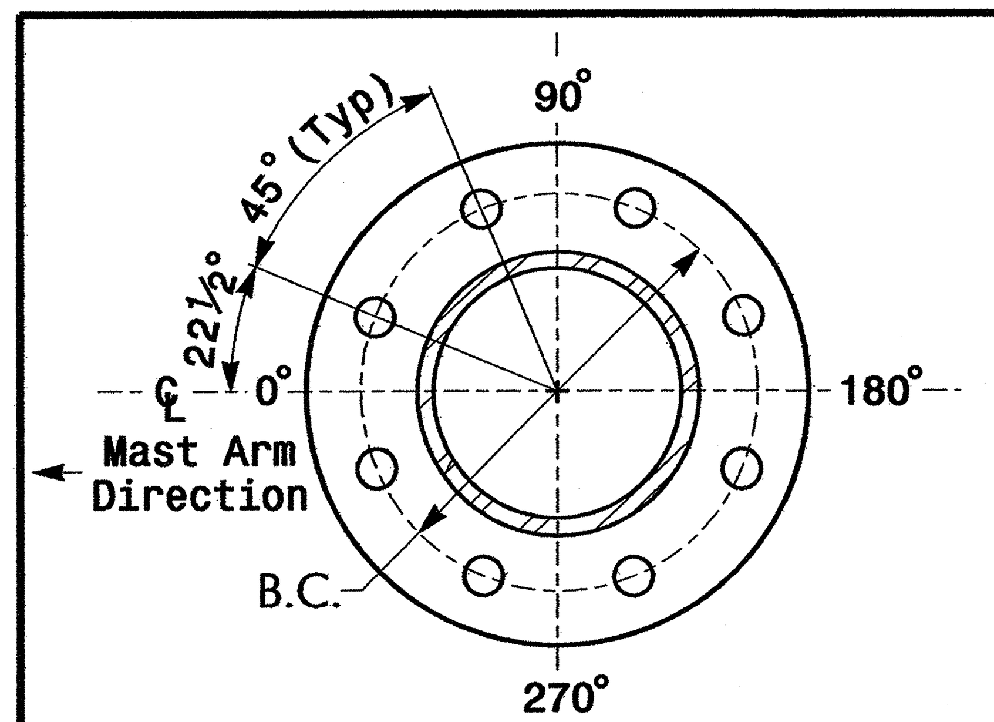
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 19	Pole 20
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	-0.9 ft.	-1.3 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

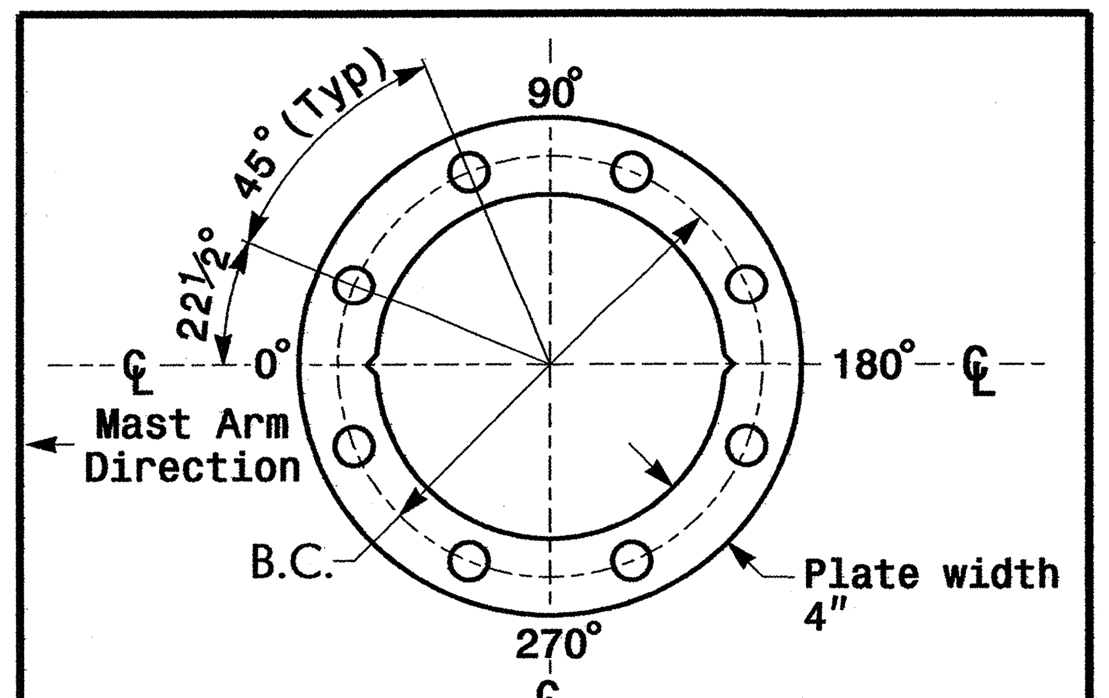


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	5.0 S.F.	24.0" W X 30.0" L	11 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS

	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

NOTES

Design Reference Material

1. 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 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   The 2002 NCDOT Roadway Standard Drawings.
   The traffic signal project plans and special provisions.
   The NCDOT "Metal Pole Standards" located at the following NCDOT website:
   http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Maximum allowable CSR for all signal supports is 0.9.
4. 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.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads 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.
8. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
9. Design the luminaire support arm using design dimensions as shown on elevation views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.
10. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
11. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
12. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 2 (130 mph)

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, State of North Carolina Department of Transportation

122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road) at SR 1709 (Corey Road)/ Entrance to Apartments

Division 2 | Pitt County | Greenville

PLAN DATE: March 2006 | REVIEWED BY: R M Duffy

PREPARED BY: TS Thigpen | REVIEWED BY:

SCALE 0 N/A

N/A

REVISIONS | INIT. | DATE

SEAL: North Carolina Professional Engineer, Richard E. Mullinax

SIGNATURE | DATE

SIG. INVENTORY NO. 02-0717

06-MAR-2006 09:06
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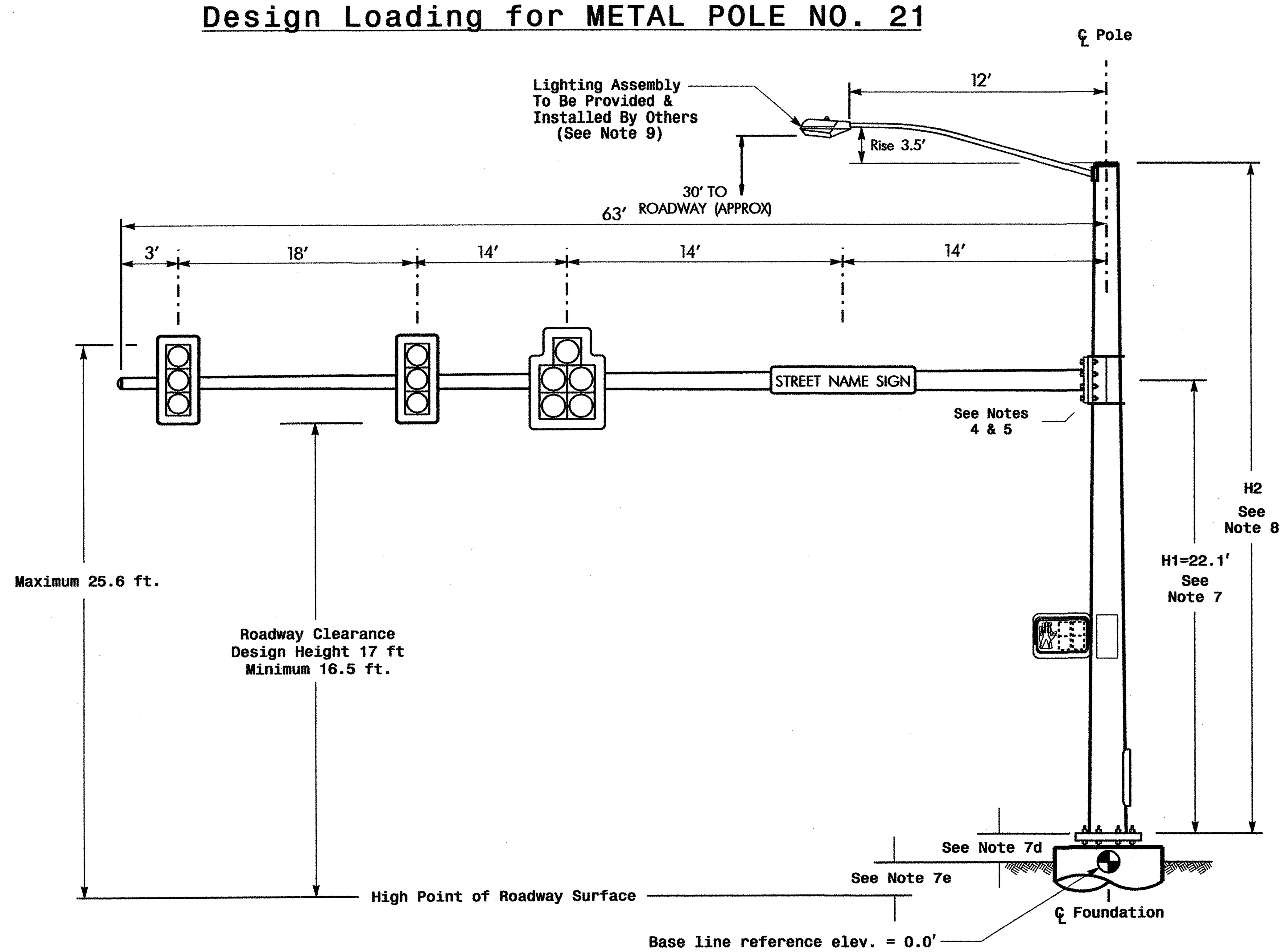
rduffy

METAL POLE No. 21 and 22

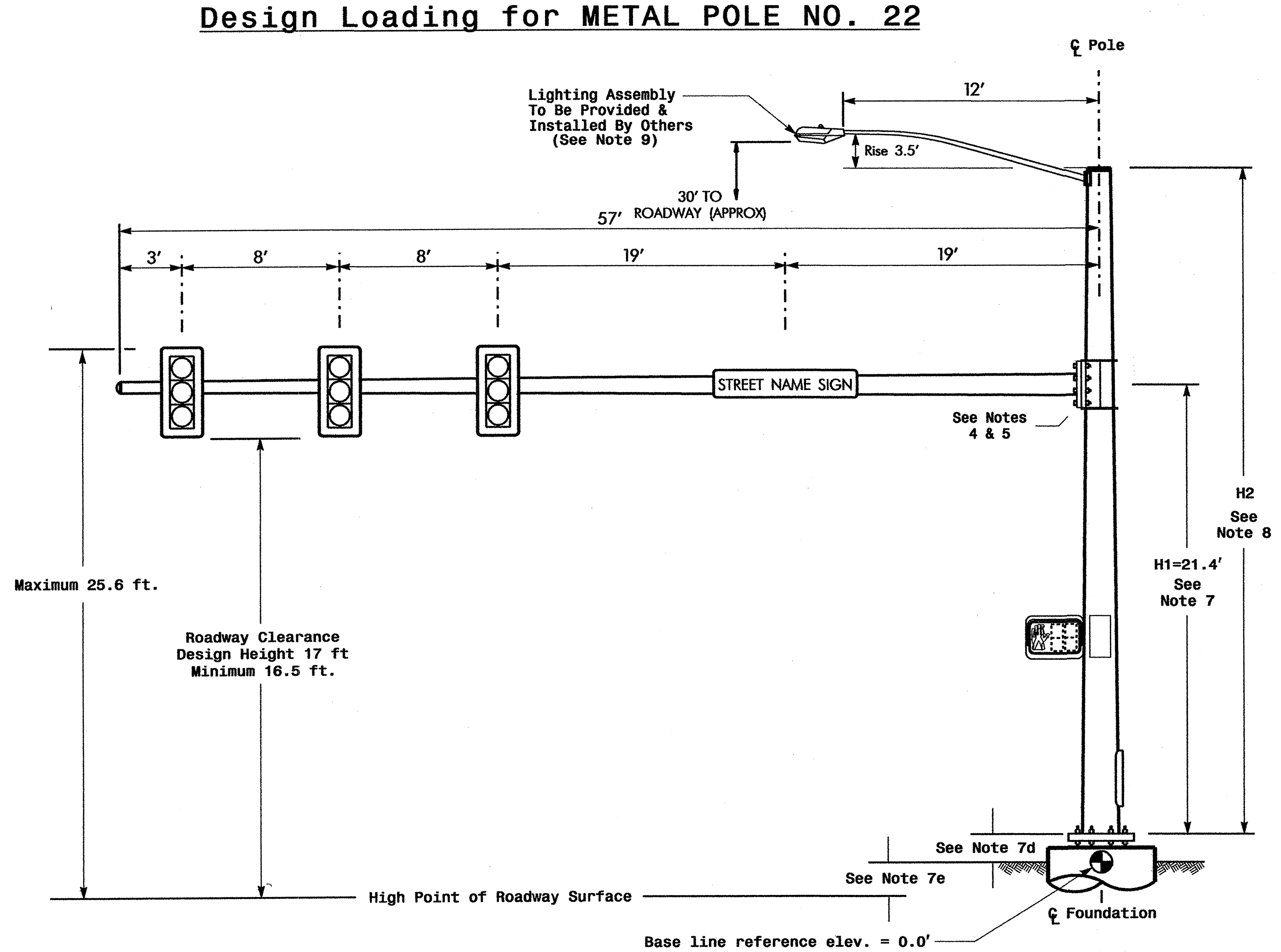
PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	Sig.39

Design Loading for METAL POLE NO. 21



Elevation View

Design Loading for METAL POLE NO. 22



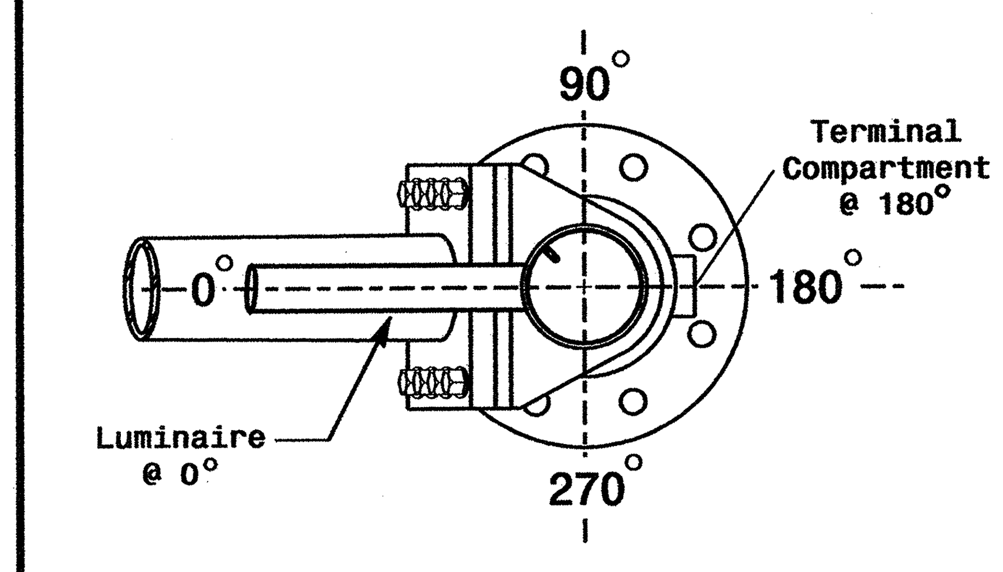
Elevation View

SPECIAL NOTE

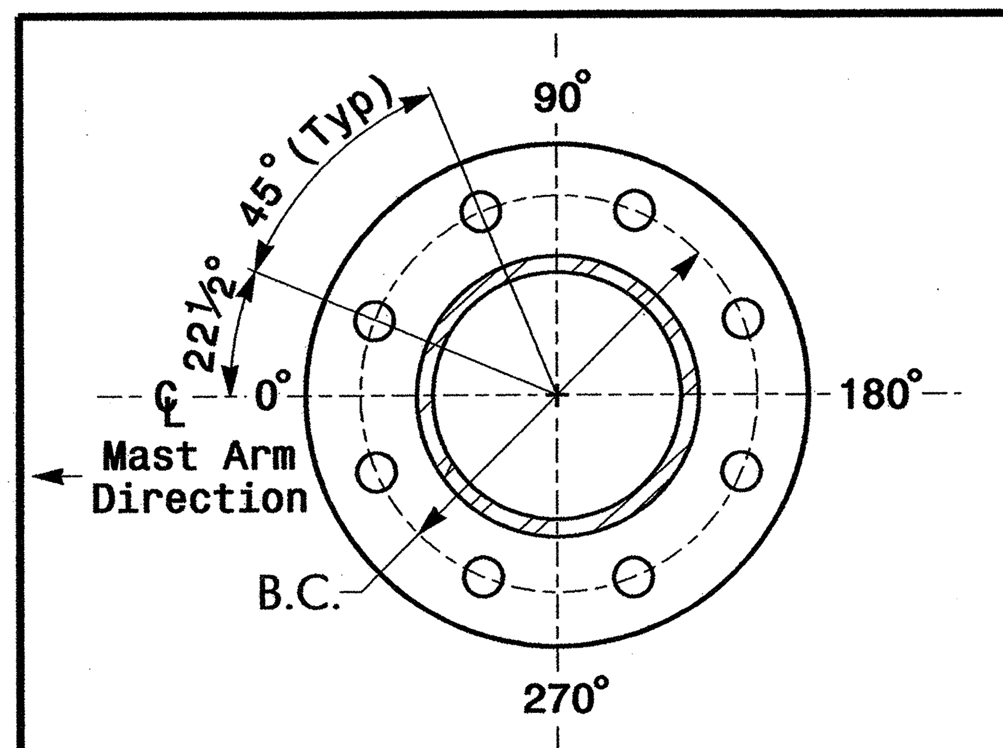
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 21	Pole 22
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+3.5 ft.	+2.9 ft.
Elevation difference at Edge of travelway or face of curb	N/A	N/A

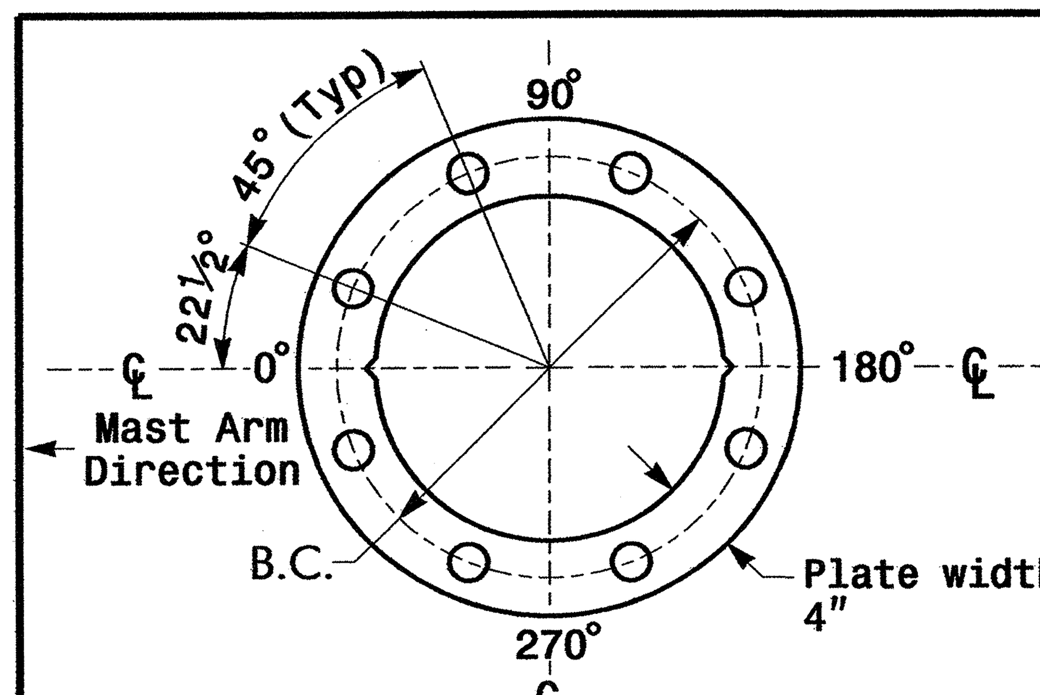


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	SIGNAL HEAD 12"-5 SECTION-WITH BACKPLATE AND ASTRO-BRAC	16.3 S.F.	42.0" W X 56.0" L	103 LBS
	SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE AND ASTRO-BRAC	9.3 S.F.	25.5" W X 52.5" L	60 LBS
STREET NAME SIGN	STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	12.0 S.F.	18.0" W X 96.0" L	27 LBS
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5" W X 17.0" L	21 LBS

	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

NOTES

Design Reference Material

1. 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 2002 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
   The 2002 NCDOT Roadway Standard Drawings.
   The traffic signal project plans and special provisions.
   The NCDOT "Metal Pole Standards" located at the following NCDOT website:
   http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/ws/mpoles/poles.htm

Design Requirements

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Maximum allowable CSR for all signal supports is 0.9.
4. 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.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
6. Design base plate with 8 anchor bolt holes. Provide 2 inch x 66 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
   a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
   b. Signal heads 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.
8. The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
9. Design the luminaire support arm using design dimensions as shown on elevation views. Refer to the Radial Orientation Detail for attachment to the signal pole. Design arm end for a nominal 2 inch slip fit socket connection for light assembly.
10. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
11. The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
12. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 2 (130 mph)

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, 122 N. McDowell St., Raleigh, NC 27603

SR 1708 (Fire Tower Road) at SR 1709 (Corey Road)/ Entrance to Apartments

Division 2	Pitt County	Greenville
PLAN DATE: March 2006	REVIEWED BY: R M Duffy	
PREPARED BY: TS Thigpen	REVIEWED BY:	

SCALE: 0 N/A — N/A

REVISIONS	INIT.	DATE

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22082 RICHARD E. MULLINAX — 6 March 2006

SIGNATURE / DATE

SIG. INVENTORY NO. 02-0717

06-MAR-2006 09:28
s:\its signals\workgroups\tip projects\u-3613b\0717\020717_sig_mp2_2006xxxx.dgn
rduffy

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	SIG.40

U - 3613B

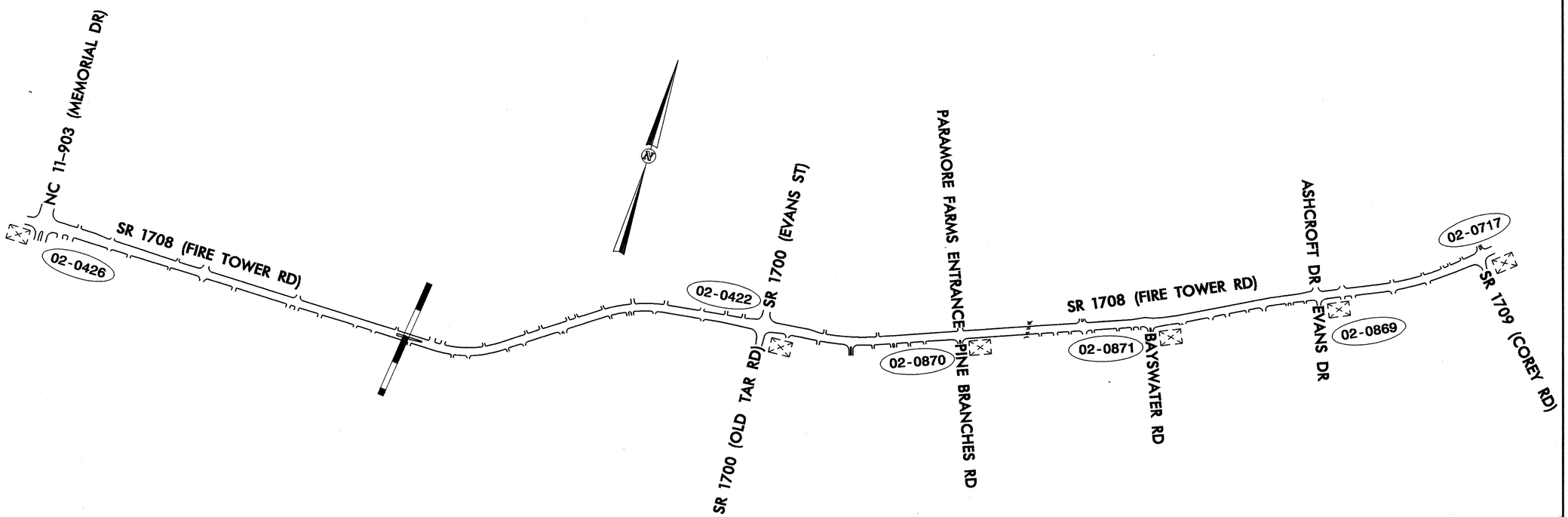
PROJECT:

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PITT COUNTY

LOCATION: SR 1708 (FIRE TOWER ROAD) FROM NC 11-903 (MEMORIAL DRIVE) TO SR 1709 (COREY DRIVE)

TYPE OF WORK: COMMUNICATIONS CABLE AND CONDUIT ROUTING



NCDOT CONTACT:

TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

G.G. MURR, JR., PE – INTELLIGENT TRANSPORTATION SYSTEMS ENGINEER

Prepared in the Offices of:

Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation
Traffic Management Systems

122 N. McDowell St., Raleigh, NC 27603

SCALE 0

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

DIVISION 02	PITT CO.		GREENVILLE
PLAN DATE: MARCH 2006		REVIEWED BY:	I.N. AVERY
PREPARED BY: S.C. WARDLE		REVIEWED BY:	G.G. MURR

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GENE G. MURR JR.

SIGNATURE 3-8-06 DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	SIG.41

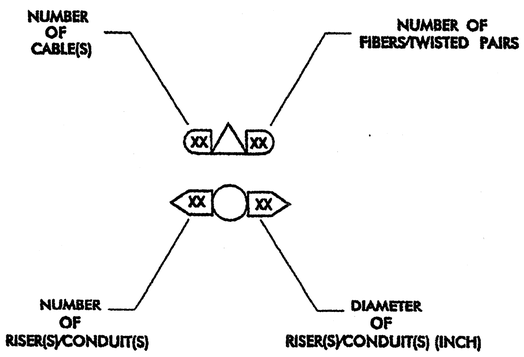
1. INSTALL REA, PE – 22, SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
2. INSTALL REA, PE – 38, (FIGURE 8) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
3. INSTALL REA, PE – 39, (UNDERGROUND) SHIELDED, TWISTED PAIR COMMUNICATIONS CABLE
4. INSTALL SMFO CABLE
5. INSTALL MMFO CABLE
6. INSTALL FIBER OPTIC DROP CABLE
7. INSTALL TRACER WIRE
8. TRENCH
9. INSTALL PVC CONDUIT
10. INSTALL RIGID, GALVANIZED STEEL CONDUIT
11. INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
12. INSTALL RIGID, GALVANIZED STEEL RISER WITH FIBER OPTIC CABLE SEAL
13. INSTALL OUTER-DUCT POLYETHYLENE CONDUIT
14. INSTALL POLYETHYLENE CONDUIT
15. DIRECTIONAL DRILL CONDUIT
16. BORE AND JACK CONDUIT
17. INSTALL CABLE(S) IN EXISTING CONDUIT
18. INSTALL CABLE(S) IN NEW CONDUIT
19. INSTALL CABLE(S) IN EXISTING RISER
20. INSTALL CABLE(S) IN NEW RISER
21. INSTALL CABLE(S) IN EXISTING CONDUIT STUB-OUTS
22. INSTALL NEW CONDUIT INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
23. INSTALL NEW RISER INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
24. INSTALL NEW CONDUIT INTO EXISTING POLE MOUNTED CABINET
25. INSTALL NEW RISER INTO EXISTING POLE MOUNTED CABINET
26. TERMINATE COMMUNICATIONS CABLE ON EXISTING TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
27. INSTALL NEW TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
28. INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS AND FUSION SPLICE CABLE IN CABINET
29. INSTALL UNDERGROUND SPLICE ENCLOSURE
30. INSTALL AERIAL SPLICE ENCLOSURE
31. INSTALL POLE MOUNTED SPLICE CABINET
32. INSTALL BASE MOUNTED SPLICE CABINET
33. REMOVE EXISTING SPLICE CABINET
34. INSTALL CABINET FOUNDATION
35. REMOVE EXISTING CABINET FOUNDATION
36. INSTALL CCTV CAMERA ASSEMBLY
37. INSTALL CCTV CAMERA WOOD POLE
38. INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
39. INSTALL JUNCTION BOX
40. INSTALL OVERSIZED JUNCTION BOX
41. REMOVE EXISTING JUNCTION BOX
42. INSTALL WOOD POLE
43. REMOVE EXISTING WOOD POLE
44. INSTALL AERIAL GUY ASSEMBLY
45. INSTALL STANDARD GUY ASSEMBLY
46. INSTALL SIDEWALK GUY ASSEMBLY
47. INSTALL MESSENGER CABLE
48. REMOVE EXISTING COMMUNICATIONS AND MESSENGER CABLE
49. REMOVE EXISTING MESSENGER CABLE
50. INSTALL TELEPHONE SERVICE
51. INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
52. INSTALL DELINEATOR MARKER
53. STORE 20 FEET OF COMMUNICATIONS CABLE
54. LASH CABLE(S) TO EXISTING SIGNAL/COMMUNICATIONS CABLE
55. LASH CABLE(S) TO EXISTING MESSENGER CABLE
56. LASH CABLE(S) TO NEW MESSENGER CABLE
57. MODIFY EXISTING ELECTRICAL SERVICE
58. INSTALL NEW ELECTRICAL SERVICE

LEGEND

- FO — NEW FIBER OPTIC COMMUNICATIONS CABLE
- TWIST PR — NEW TWISTED PAIR COMMUNICATIONS CABLE
- EXI — EXISTING COMMUNICATIONS CABLE
- REM — EXISTING COMMUNICATIONS CABLE TO BE REMOVED
- NEW AERIAL GUY ASSEMBLY
- NEW CONDUIT
- EXISTING CONDUIT
- DD — NEW DIRECTIONAL DRILLED CONDUIT
- B&J — NEW BORED AND JACKED CONDUIT
- NEW JUNCTION BOX
- EXISTING JUNCTION BOX
- NEW WOOD POLE
- EXISTING WOOD POLE
- AERIAL SPLICE ENCLOSURE
- NEW METAL POLE
- EXISTING METAL POLE
- NEW CCTV ASSEMBLY
- NEW STANDARD GUY ASSEMBLY
- NEW SIDEWALK GUY ASSEMBLY
- NEW CABLE STORAGE RACKS (SNOW SHOES)
- EXISTING CONTROLLER AND CABINET
- EXISTING SPLICE CABINET
- NEW SPLICE CABINET
- SP — SIGNAL POLE
- XX-XXXX — SIGNAL INVENTORY NUMBER

CONSTRUCTION NOTE SYMBOLOGY KEY

- XX — INDICATES NUMBER OF CABLES, LOOPS, ETC.
- XX — INDICATES NUMBER OF FIBERS PER CABLE, TWISTED PAIRS PER CABLE, ETC.
- XX — INDICATES NUMBER OF RISER(S)/CONDUIT(S)
- XX — INDICATES DIAMETER OF RISER(S)/CONDUIT(S) (INCH)



Prepared in the Office of
Traffic Engineering and Safety Systems Branch
NCDEPARTMENT OF TRANSPORTATION
Traffic Management Systems
322 N. McDowell St., Raleigh, NC 27603

CONSTRUCTION NOTES

PLAN DATE:
PREPARED BY:
REVIEWED BY:
REVIEWED BY: G. A. FULLER

SCALE: 0

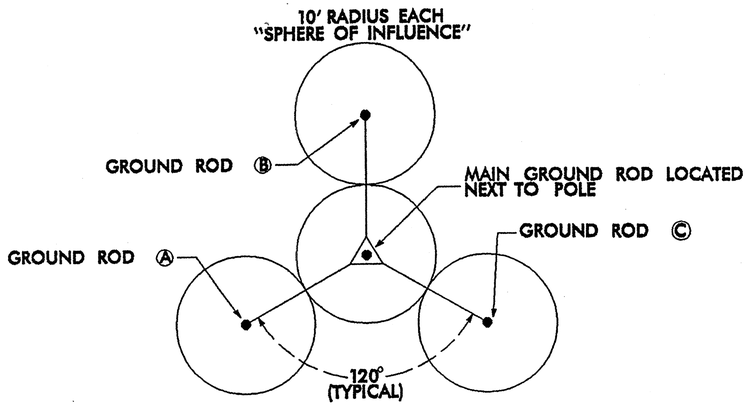
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 023919 ENGINEER GREGORY A. FULLER

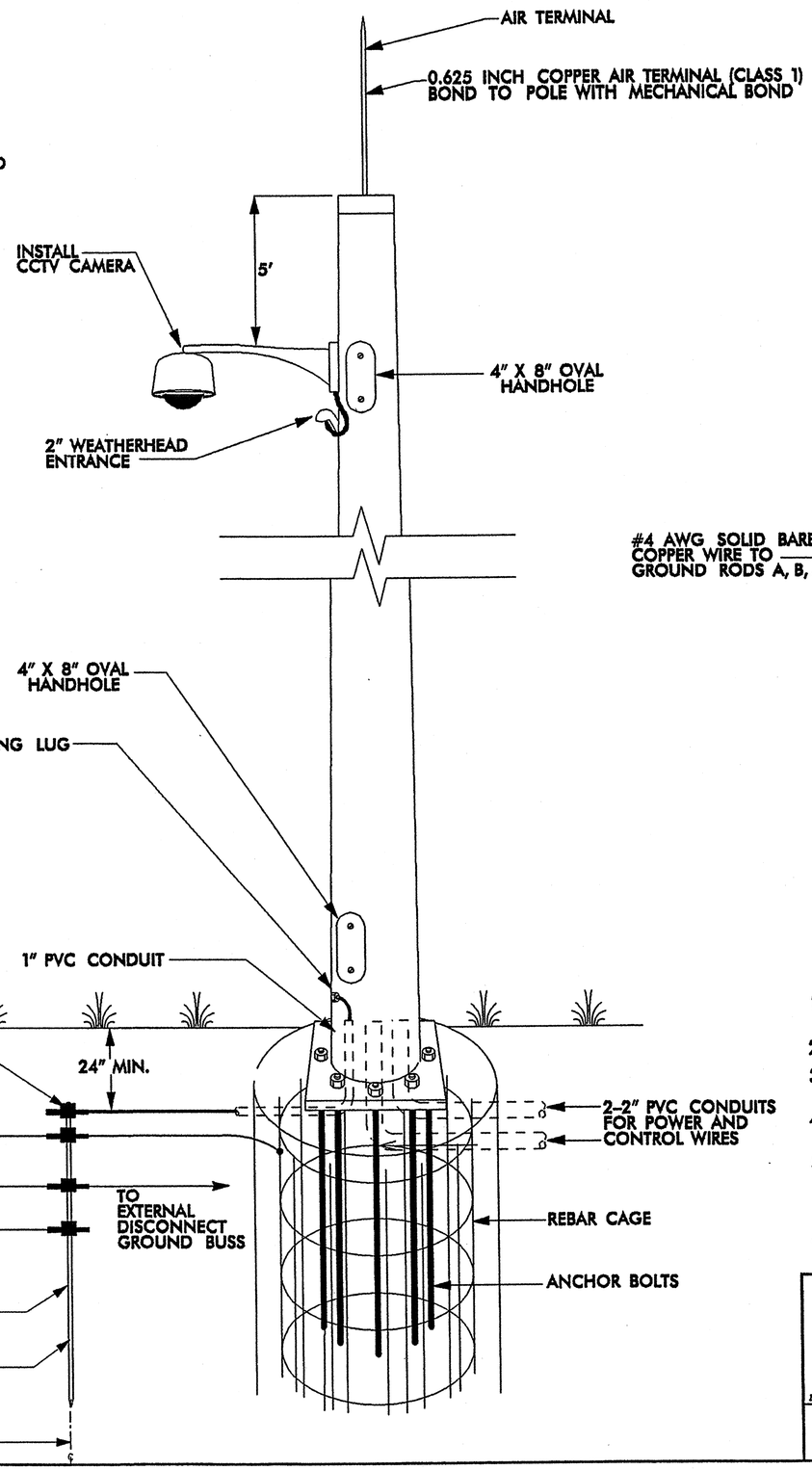
Gregory A Fuller 10/31/07
SIGNATURE DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
U-3613 B	SIG.42

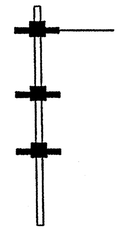


GROUND ROD PLACEMENT DETAIL
(TYPICAL EACH POLE)

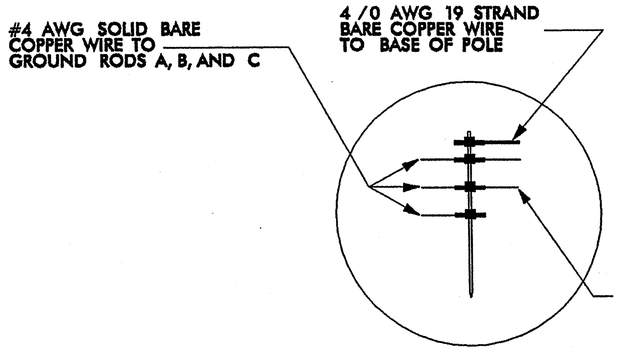


ALTERNATE GROUNDING METHOD

IF SPACE IS NOT AVAILABLE TO DRIVE MULTIPLE RODS, DRIVE SECTIONAL GROUND RODS A MINIMUM OF 30 FEET.



JOIN SECTIONAL GROUND RODS BY EXOTHERMIC WELDING CONNECTION



INSET 'A'

NOTES

1. BOND 4 /0 AWG 19 STRAND BARE COPPER WIRE TO THE MAIN GROUND ROD BY AN EXOTHERMIC WELD METHOD.
2. EXOTHERMICALLY WELD ALL CONNECTIONS TO GROUND RODS.
3. BOND #4 AWG SOLID BARE COPPER WIRE TO REBAR CAGE AND THE MAIN GROUND ROD BY AN EXOTHERMIC WELD METHOD
4. ENSURE CAMERA HOUSING, CAMERA, AND PAN –TILT UNIT ARE BONDED TO POLE
5. THE CONTRACTOR MAY, UPON APPROVAL OF THE ENGINEER, INSTALL A 30–FOOT SECTIONAL GROUND ROD WHEN CONDITIONS WILL NOT ALLOW FOR THE INSTALLATION OF THE 3–AUXILIARY GROUND RODS.
6. INSTALL MARKER TAPE DIRECTLY ABOVE ALL GROUNDING ELECTRODES AND CONDUCTORS AT A DEPTH OF 12".

Prepared in the Offices of
North Carolina Department of Transportation
Traffic Management Section
1722 N. McDowell St., Raleigh, NC 27603

CCTV CAMERA INSTALLATION FOR METAL POLES
TYPICAL DETAIL

PLAN DATE:	MARCH 2004	REVIEWED BY:	T. G. PARKER
PREPARED BY:	J. HOOKER	REVIEWED BY:	G. A. FULLER

SCALE: 0

REVISIONS	INIT.	DATE

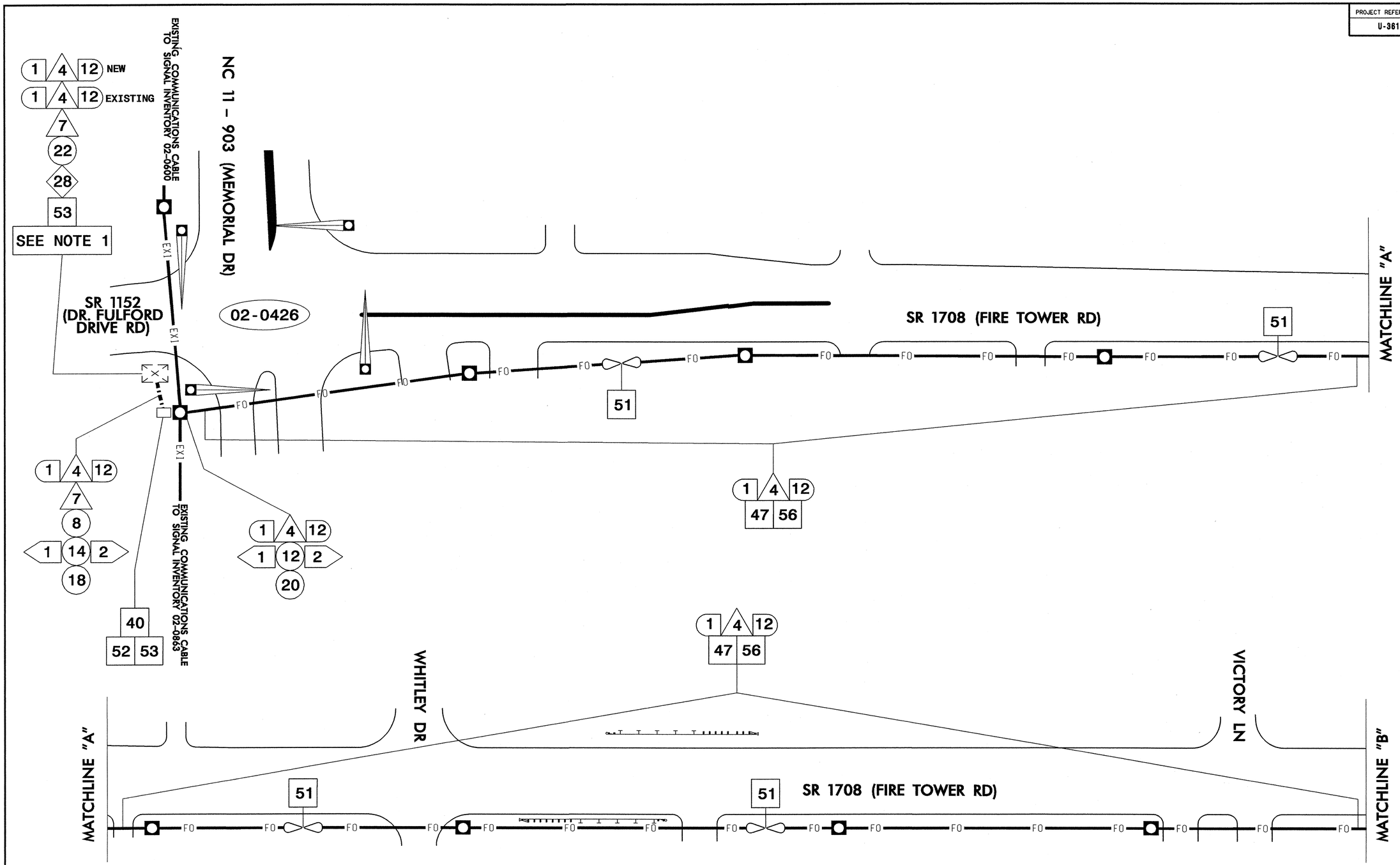
SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
023919
ENGINEER
GREGORY A FULLER

SIGNATURE DATE

CADD FILE NAME

Gregory A Fuller 3/10/04

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	SIG.43



NOTES:

1. BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

ALL NCDOT ATTACHMENT POINTS ARE 40" BELOW POWER, FRONT SIDE OF POLE, UNLESS OTHERWISE NOTED.
SEAL ALL CONDUIT ENDS WITH MECHANICAL SEALING DEVICES AT ALL JUNCTION BOX & SIGNAL CABINET ENTRANCES.

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
TRAFFIC ENGINEERING BRANCH
DEPARTMENT OF TRANSPORTATION
Traffic Management Systems
122 N. McDowell St., Raleigh, NC 27603

SCALE 0

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

DIVISION 02 PITT CO. GREENVILLE

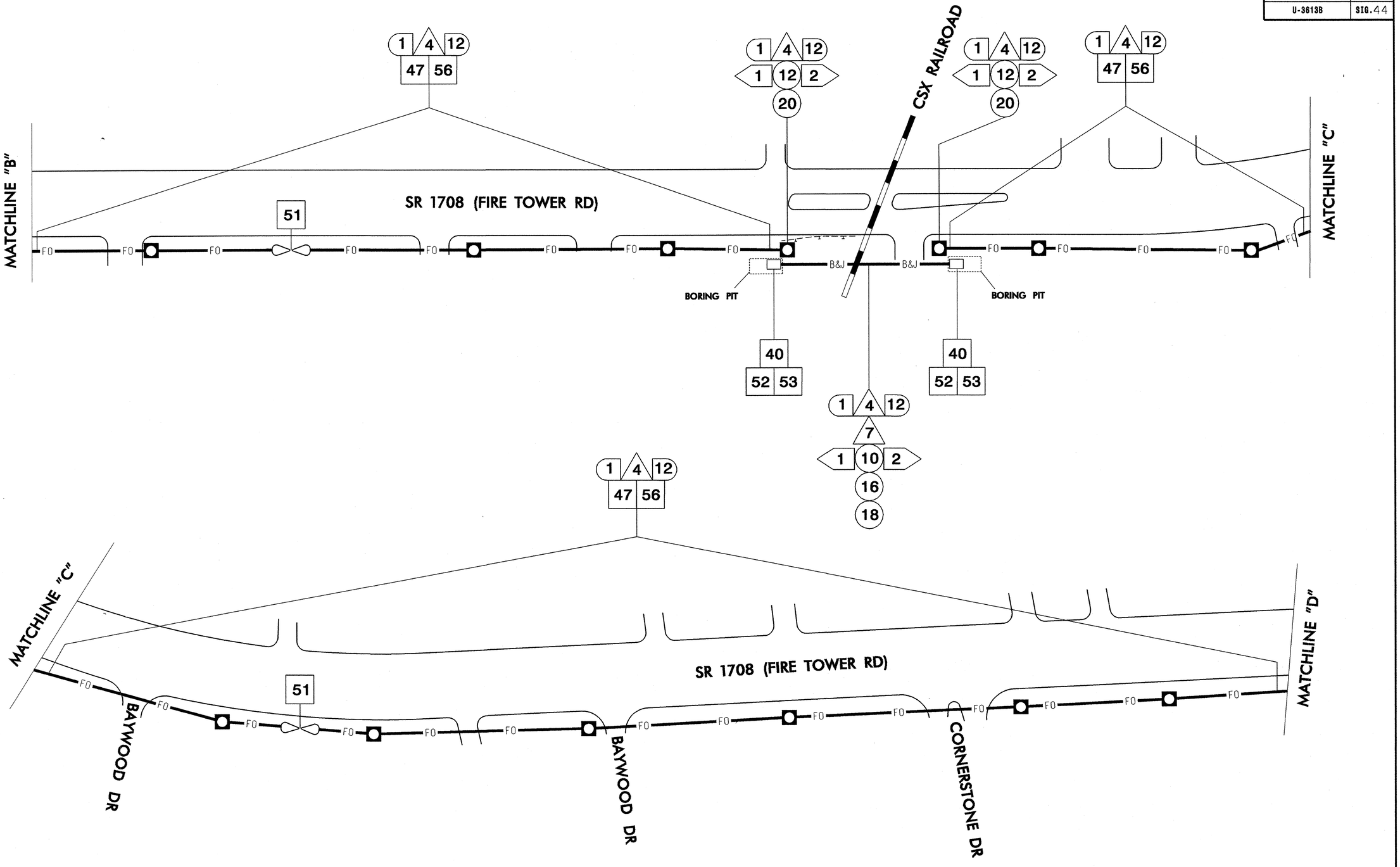
PLAN DATE:	MARCH 2006	REVIEWED BY:	I.N. AVERY
PREPARED BY:	S.C. WARDLE	REVIEWED BY:	G.G. MURR

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14543 GENE G. MURR, JR.
SIGNATURE 3-8-06 DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	SIG.44



NOTES:

1. BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

ALL NCDOT ATTACHMENT POINTS ARE 40" BELOW POWER, FRONT SIDE OF POLE, UNLESS OTHERWISE NOTED.
SEAL ALL CONDUIT ENDS WITH MECHANICAL SEALING DEVICES AT ALL JUNCTION BOX & SIGNAL CABINET ENTRANCES.

Prepared in the Office of:
Traffic Engineering and Safety Systems Branch
Traffic Management Systems
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
122 N. McDowell St., Raleigh, NC 27603

SCALE 0

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

DIVISION 02 PITT CO. GREENVILLE

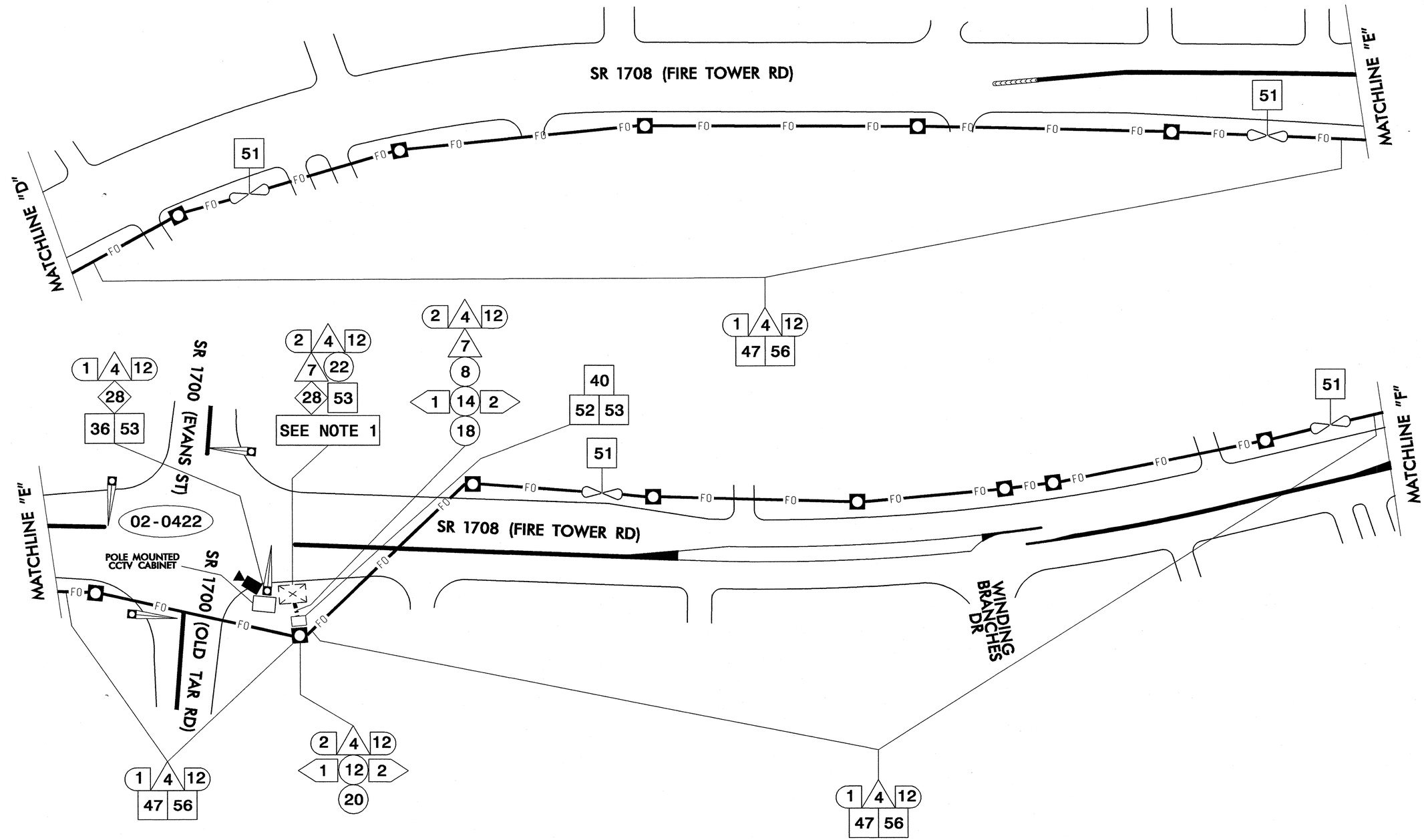
PLAN DATE:	MARCH 2006	REVIEWED BY:	I.N. AVERY
PREPARED BY:	S.C. WARDLE	REVIEWED BY:	G.G. MURR

REVISIONS	INIT.	DATE

CADD Filename:

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL 14543
ENGINEER
GENE G. MURR, JR.
SIGNATURE 3-8-06
DATE

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	SIG.45



NOTES:

1. BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

ALL NCDOT ATTACHMENT POINTS ARE 40" BELOW POWER, FRONT SIDE OF POLE, UNLESS OTHERWISE NOTED.
SEAL ALL CONDUIT ENDS WITH MECHANICAL SEALING DEVICES AT ALL JUNCTION BOX & SIGNAL CABINET ENTRANCES.

Prepared in the Offices of:
The Institute for Transportation Research and Education
NORTH CAROLINA STATE UNIVERSITY
NCDOT Traffic Management Systems
122 N. McDowell St., Raleigh, NC 27603

SCALE: 0

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

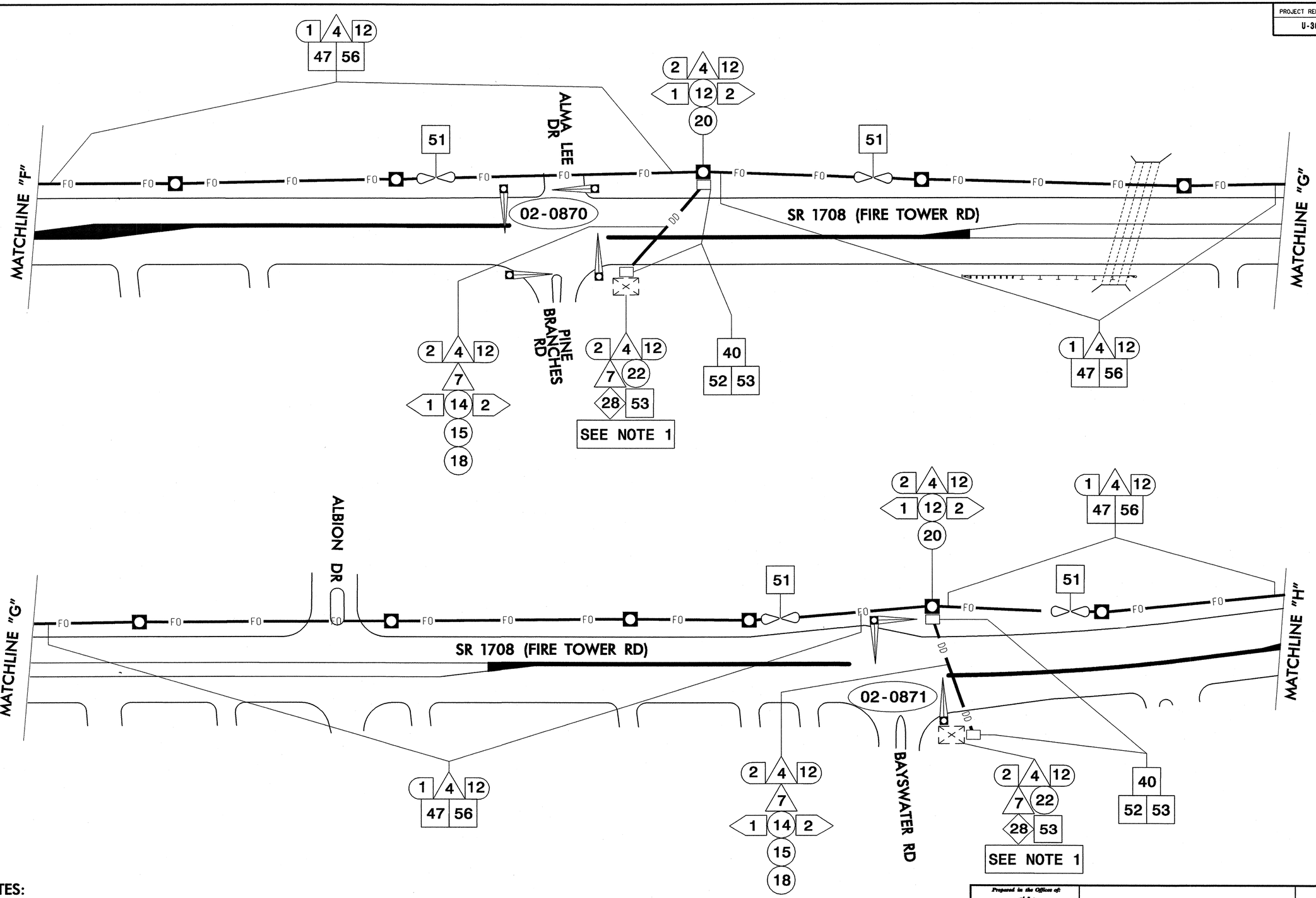
DIVISION 02 PITT CO. GREENVILLE

PLAN DATE:	MARCH 2006	REVIEWED BY:	I.N. AVERY
PREPARED BY:	S.C. WARDLE	REVIEWED BY:	G.G. MURR

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GENE G. MURR, JR.
SIGNATURE
3-8-06
DATE
CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	SIG. 46



NOTES:

1. BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

ALL NCDOT ATTACHMENT POINTS ARE 40" BELOW POWER, FRONT SIDE OF POLE, UNLESS OTHERWISE NOTED.
SEAL ALL CONDUIT ENDS WITH MECHANICAL SEALING DEVICES AT ALL JUNCTION BOX & SIGNAL CABINET ENTRANCES.

Prepared in the Offices of:
North Carolina Department of Transportation
Traffic Management Systems
122 N. McDowell St., Raleigh, NC 27603

SCALE: 0

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

DIVISION 02 PITT CO. GREENVILLE

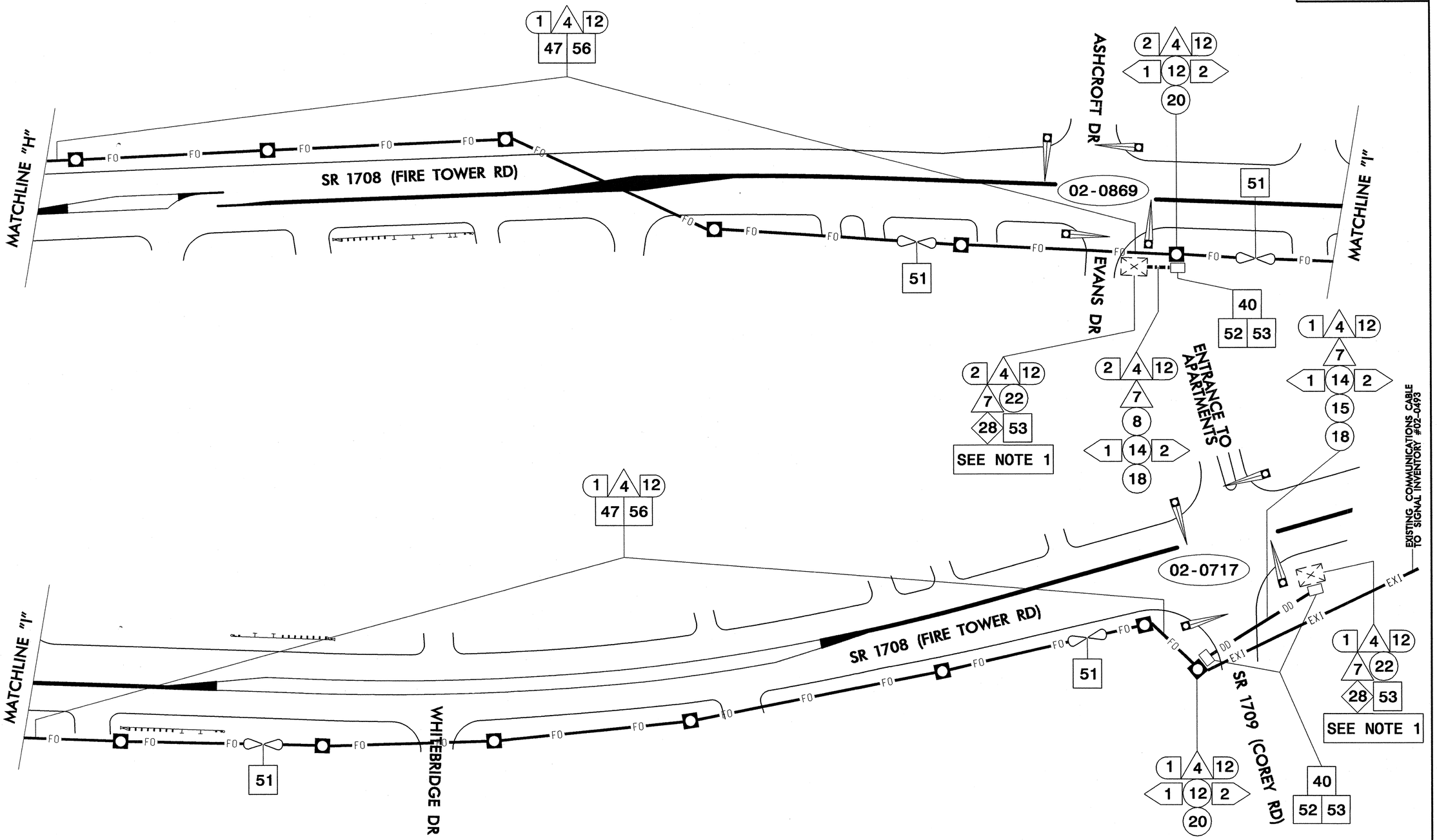
PLAN DATE:	MARCH 2006	REVIEWED BY:	I.N. AVERY
PREPARED BY:	S.C. WARDLE	REVIEWED BY:	G.G. MURR

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GENE C. MURR, JR.
SIGNATURE 3-8-06 DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	SIG.47



NOTES:

1. BOND TRACER WIRE TO EQUIPMENT GROUND BUS.

ALL NCDOT ATTACHMENT POINTS ARE 40" BELOW POWER, FRONT SIDE OF POLE, UNLESS OTHERWISE NOTED.
SEAL ALL CONDUIT ENDS WITH MECHANICAL SEALING DEVICES AT ALL JUNCTION BOX & SIGNAL CABINET ENTRANCES.

Prepared in the Office of:
Traffic Engineering and Safety Systems Branch
NC DEPARTMENT OF TRANSPORTATION
Traffic Management Systems
1122 N. McDowell St., Raleigh, NC 27603

COMMUNICATIONS CABLE AND CONDUIT ROUTING PLANS

DIVISION 02 PITT CO. GREENVILLE

PLAN DATE:	MARCH 2006	REVIEWED BY:	I.N. AVERY
PREPARED BY:	S.C. WARDLE	REVIEWED BY:	G.G. MURR

SCALE 0

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GENE G. MURR JR.
SIGNATURE 3-8-06 DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	SIG. 48

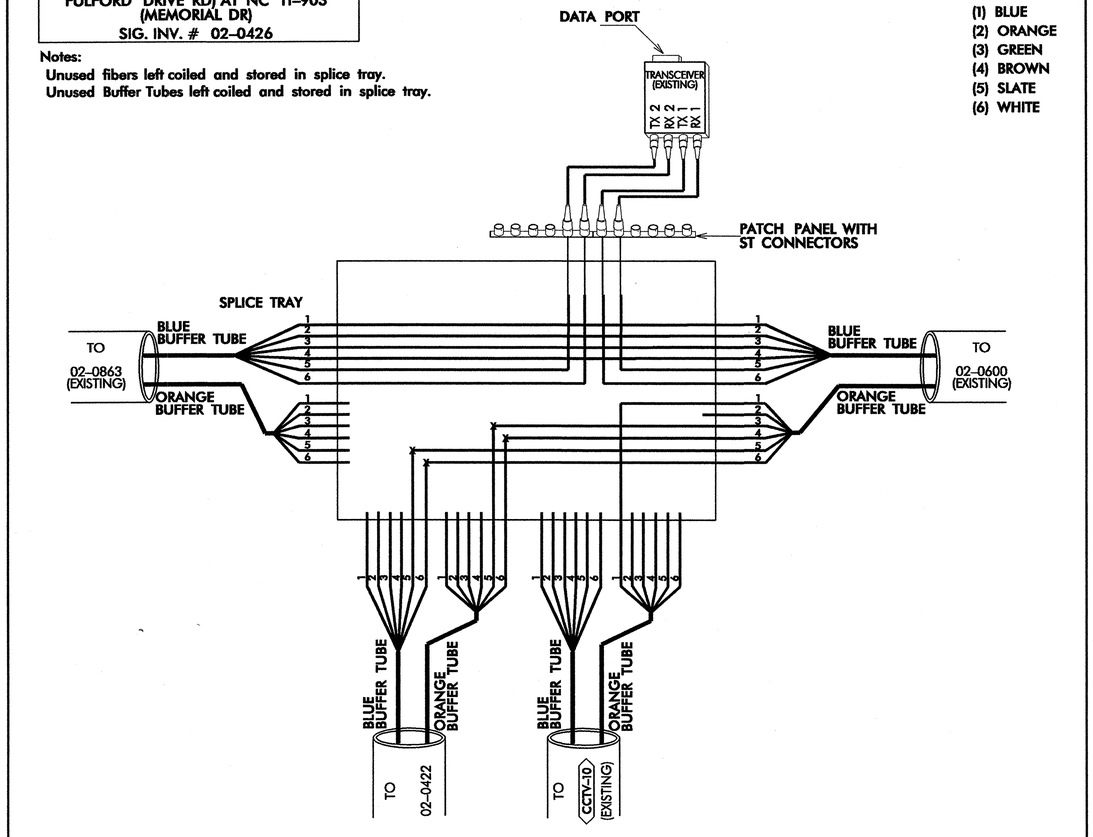
FIBER OPTIC CABLE

SR 1708 (FIRE TOWER RD)/SR 1152 (DR. FULFORD DRIVE RD) AT NC 11-903 (MEMORIAL DR)
SIG. INV. # 02-0426

Notes:
Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.

LEGEND
X = FUSION SPLICE

COLOR CODE TIA/EIA 598-A
(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE

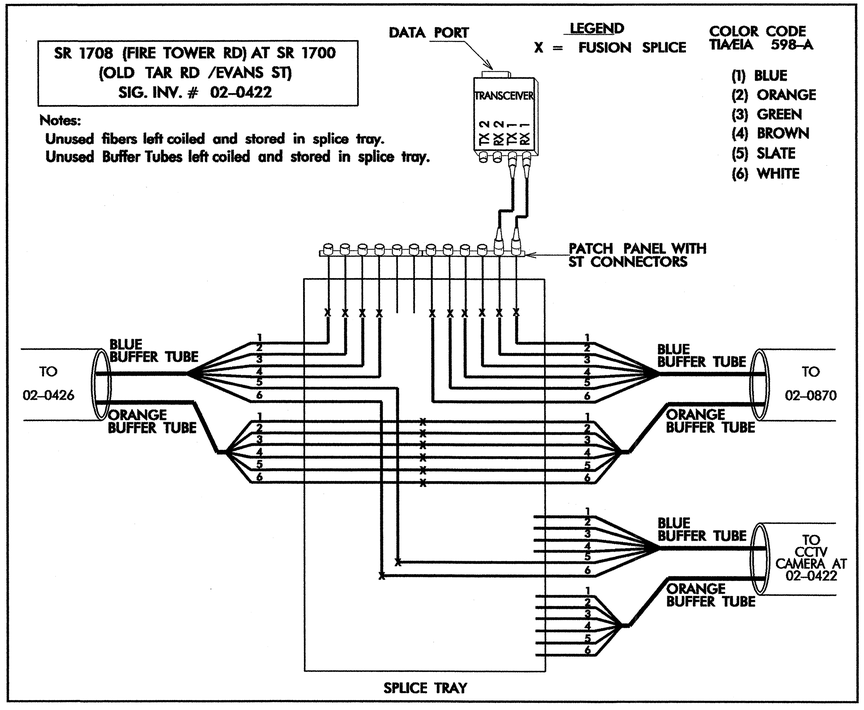


SR 1708 (FIRE TOWER RD) AT SR 1700
(OLD TAR RD /EVANS ST)
SIG. INV. # 02-0422

Notes:
Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.

LEGEND
X = FUSION SPLICE

COLOR CODE TIA/EIA 598-A
(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE

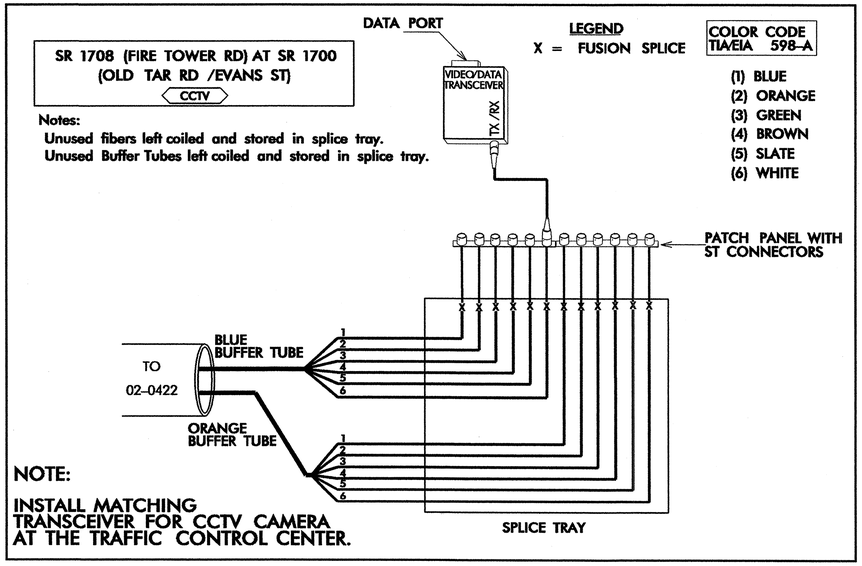


SR 1708 (FIRE TOWER RD) AT SR 1700
(OLD TAR RD /EVANS ST)
CCTV

Notes:
Unused fibers left coiled and stored in splice tray.
Unused Buffer Tubes left coiled and stored in splice tray.

LEGEND
X = FUSION SPLICE

COLOR CODE TIA/EIA 598-A
(1) BLUE
(2) ORANGE
(3) GREEN
(4) BROWN
(5) SLATE
(6) WHITE



NOTE:
INSTALL MATCHING TRANSCEIVER FOR CCTV CAMERA AT THE TRAFFIC CONTROL CENTER.

NOTE: FURNISH IFS D-9130 MODEL TRANSCEIVERS OR AN APPROVED EQUIVALENT.

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

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Traffic Management Systems
122 N. McDowell St., Raleigh, NC 27603

SCALE 0

SPLICE PLAN

DIVISION 02 PITT CO. GREENVILLE

PLAN DATE:	MARCH 2006	REVIEWED BY:	I.N. AVERY
PREPARED BY:	S.C. WARDLE	REVIEWED BY:	G.G. MURR

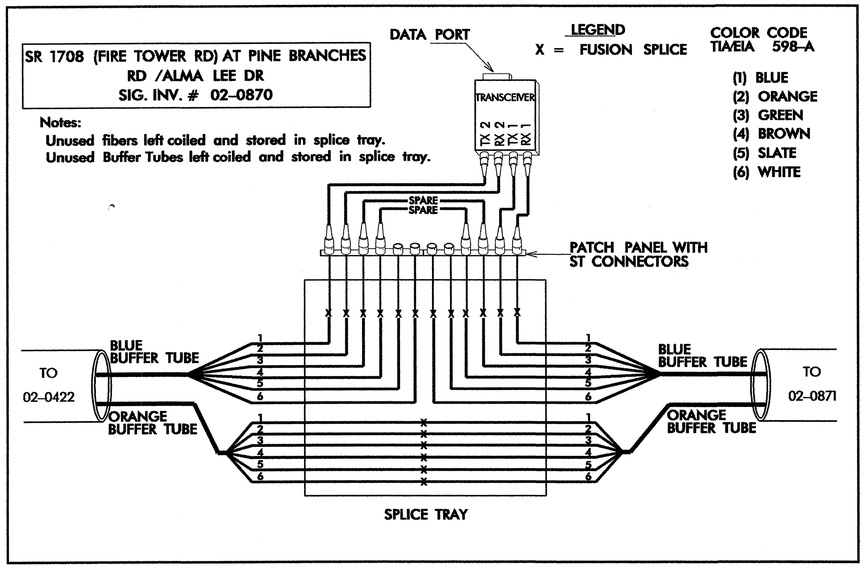
REVISIONS	INIT.	DATE

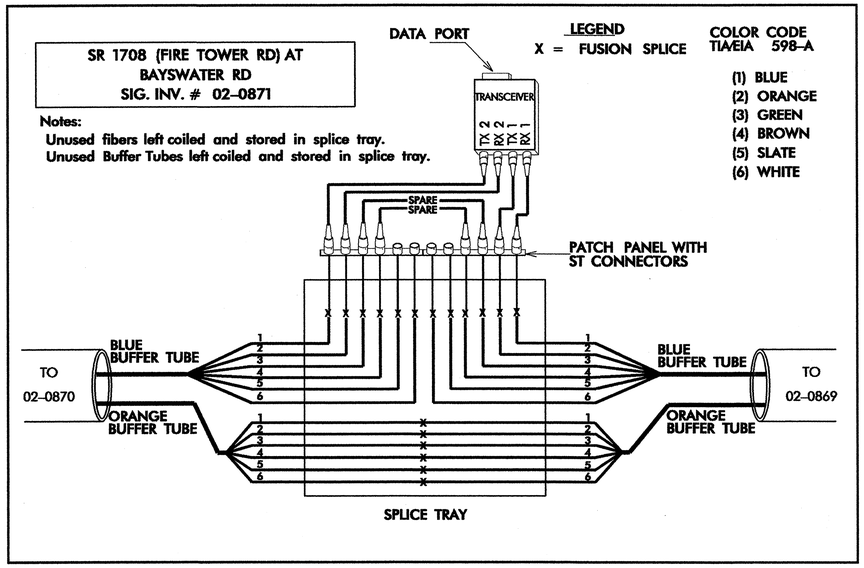
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GENE G. MURR, JR.
SIGNATURE 3-8-06 DATE

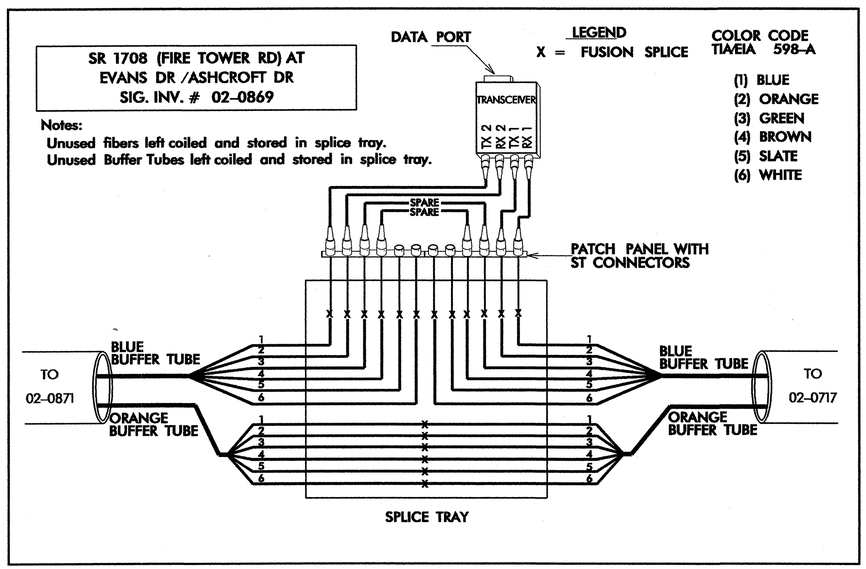
CADD Filename:

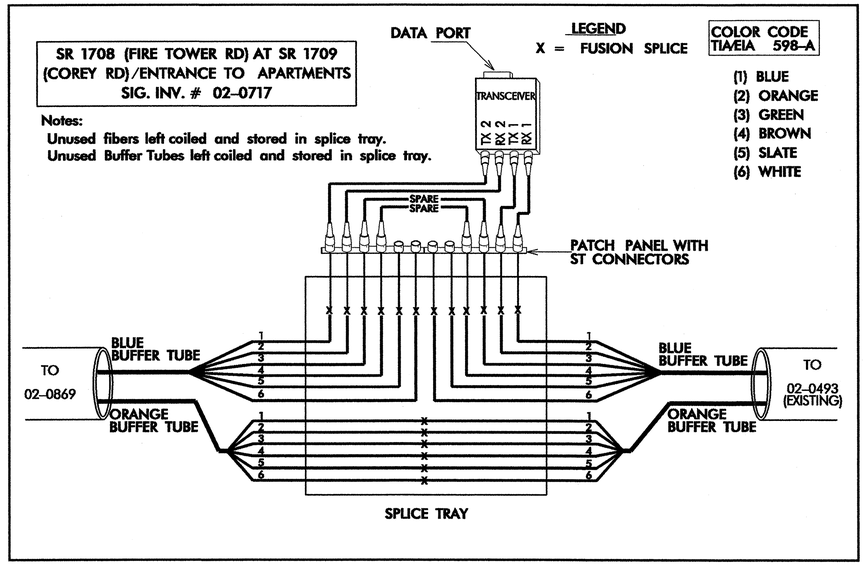
PROJECT REFERENCE NO.	SHEET NO.
U-3613B	SIG.49

FIBER OPTIC CABLE









NOTE:

02-0493 SPLICING NOT SHOWN. NO WORK REQUIRED AT THIS CABINET.

NOTE: FURNISH IFS D-9130 MODEL TRANSCEIVERS OR AN APPROVED EQUIVALENT.

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

Prepared in the Office of:
Traffic Engineering and Safety Systems Branch
NC DEPARTMENT OF TRANSPORTATION
Traffic Management Systems
122 N. McDowell St., Raleigh, NC 27603

SCALE: 0

SPLICE PLAN

DIVISION 02 PITT CO. GREENVILLE

PLAN DATE:	MARCH 2006	REVIEWED BY:	I.N. AVERY
PREPARED BY:	S.C. WARDLE	REVIEWED BY:	G.G. MURR

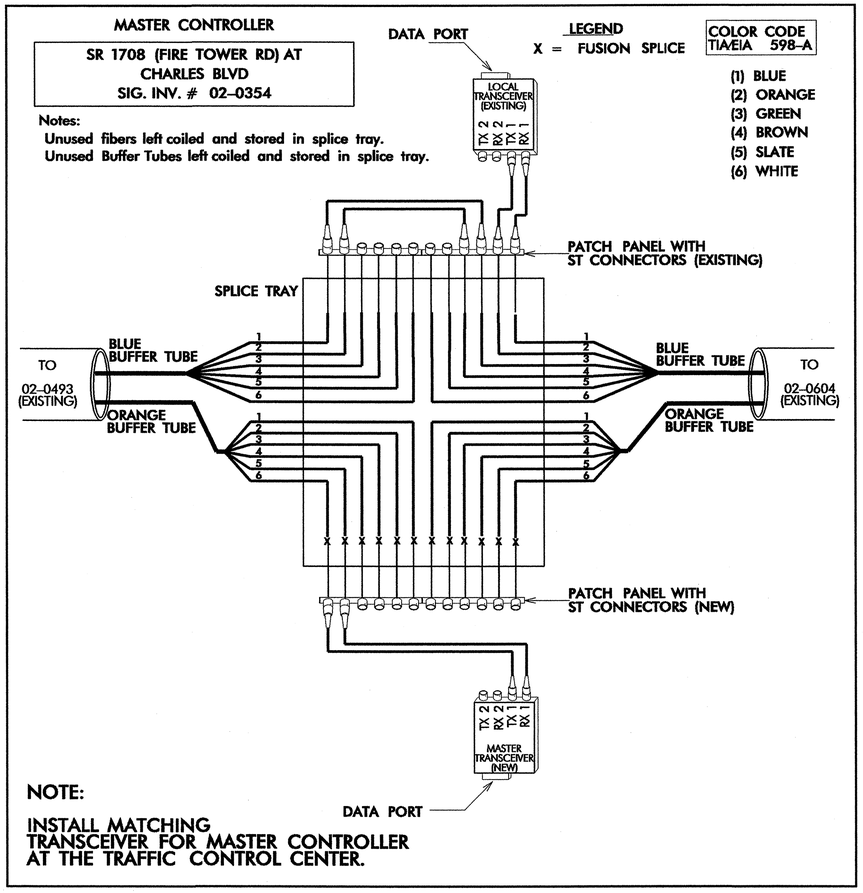
REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GENE C. MURR, JR.
SIGNATURE 3-8-06 DATE

CADD Filename:

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	SIG.50

FIBER OPTIC CABLE



NOTE:

02-0493 SPLICING NOT SHOWN. NO WORK REQUIRED AT THIS CABINET.

NOTE: FURNISH IFS D-9130 MODEL TRANSCEIVERS OR AN APPROVED EQUIVALENT.

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

Prepared in the Offices of:
Traffic Engineering and Safety Systems Branch
NC DEPARTMENT OF TRANSPORTATION
Traffic Management Systems
122 N. McDowell St., Raleigh, NC 27603

SCALE 0

SPLICE PLAN

DIVISION 02 PITT CO. GREENVILLE

PLAN DATE:	MARCH 2006	REVIEWED BY:	I.N. AVERY
PREPARED BY:	S.C. WARDLE	REVIEWED BY:	G.G. MURR

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 14543 ENGINEER GENE G. MURR, JR.
SIGNATURE 3-8-06 DATE

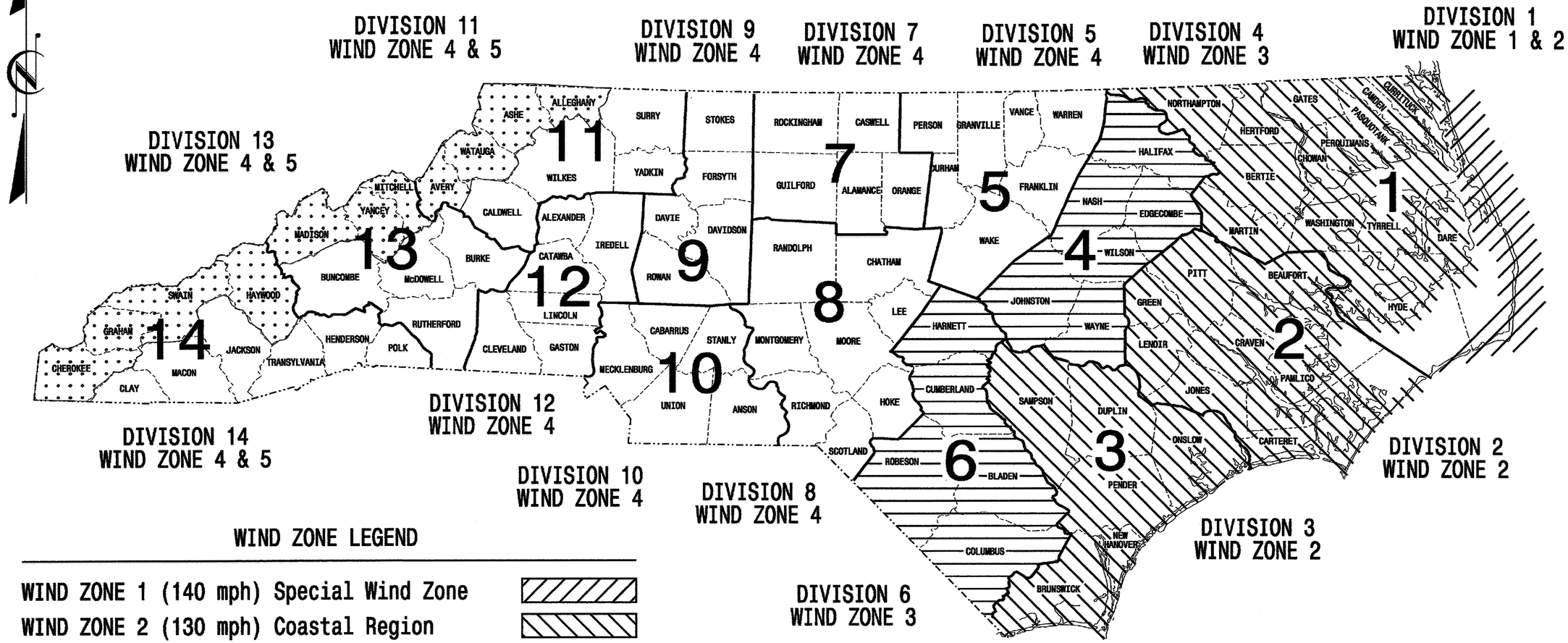
CADD Filenames:

STATE	PROJECT NO.	SHEET NO.
N.C.	U-3613B	Sig. 5I
F. A. PROJ. NO.		M 1
PROJECT ID. NO.		

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STANDARD DRAWINGS FOR METAL POLES

NCDOT METAL POLE STANDARDS



WIND ZONE LEGEND

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

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

Prepared in the Offices of:

Traffic Engineering and Safety Systems Branch
STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION · NCDOT
Signals and Geometrics Section

122 N. McDowell St., Raleigh, NC 27603

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

AASHTO

Standard Specifications for Structural Supports for Highway Signs, Luminares, 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:

TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

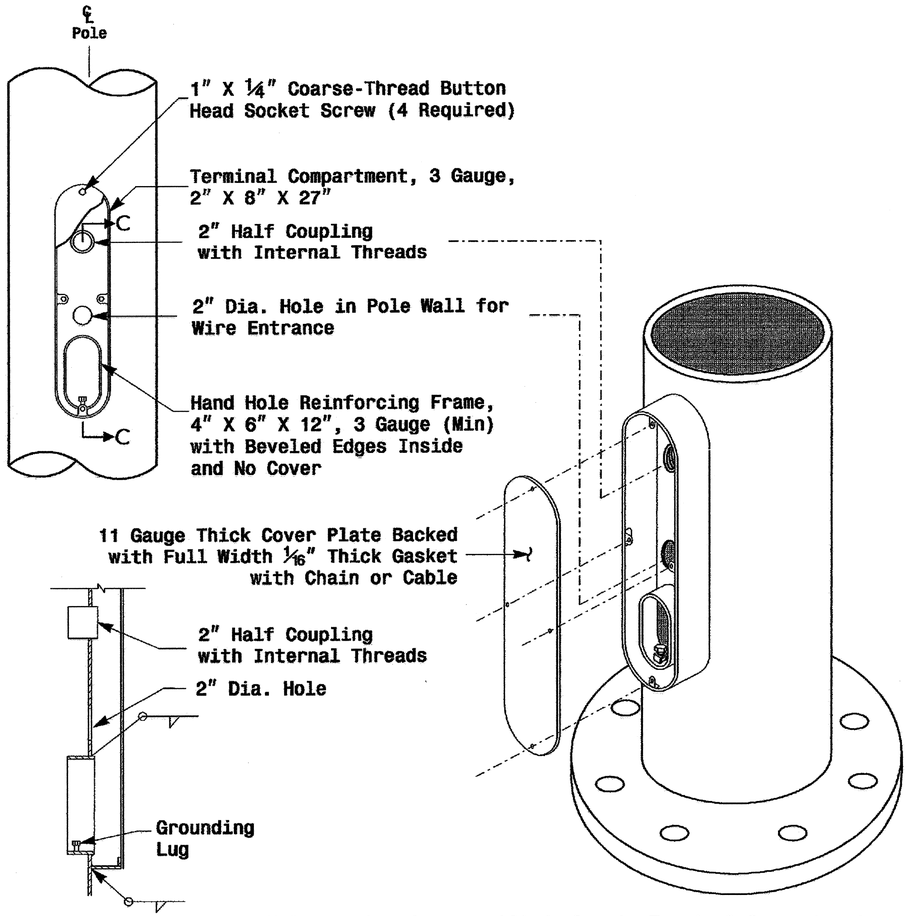
G. A. Fuller, P.E. – State ITS and Signals Engineer
R. E. Mullinax, P.E. – Signals and Geometrics Engineer
P. L. Alexander, P.E. – Signals and Geometrics Special Projects Engineer
D. C. Sarkar, P.E. – Signals and Geometrics Structural Engineer
A. M. Esposito, P.E. – Signals and Geometrics Project Engineer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

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

D. Sarkar — SIGNATURE

9.2.2005 — DATE



Section C-C

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

Terminal Compartment Detail

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

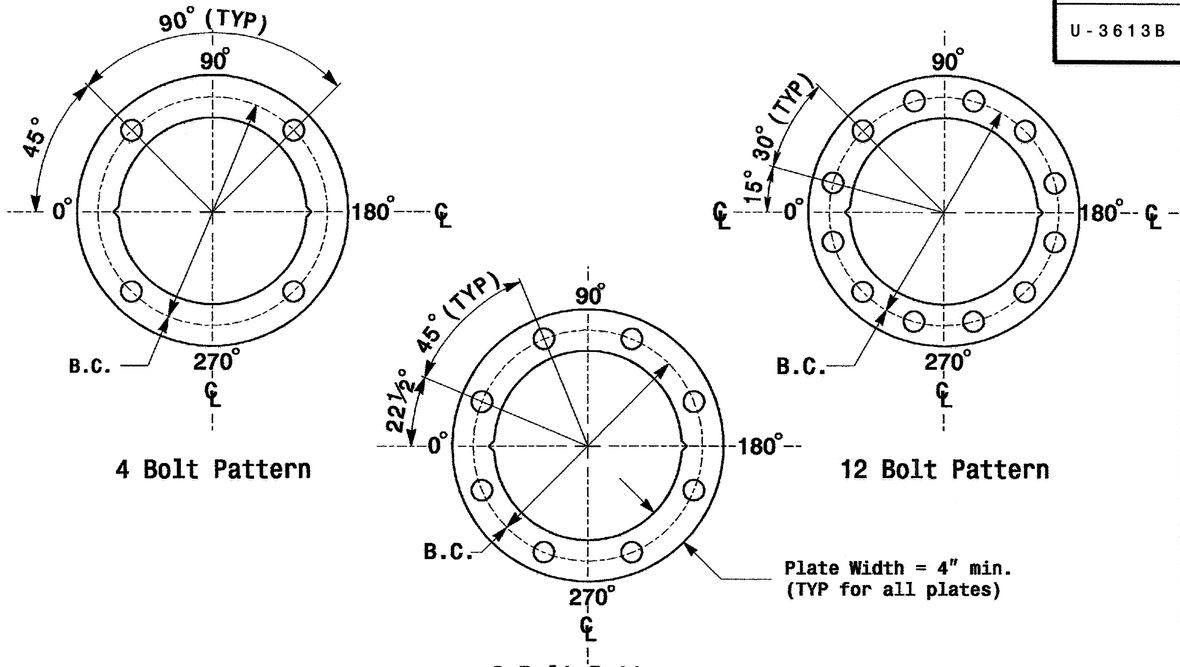
Shaft I.D. Tag
(Provide on Strain Poles and Mast Arm Poles)

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

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

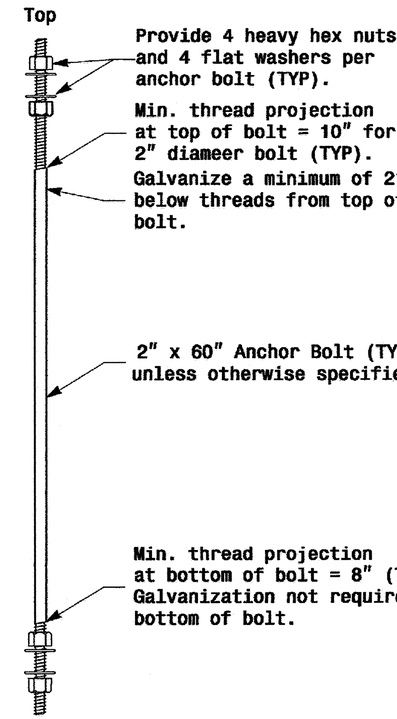
Notes:
1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
2) A.B. = Anchor Bolt
3) B.C. = Bolt Circle of Anchor Bolts
4) If Custom Design, use "NCDOT STANDARD" line for plan pole I.D.
5) See drawing M4 for mounting positions of I.D. tags.

Identification Tag Details



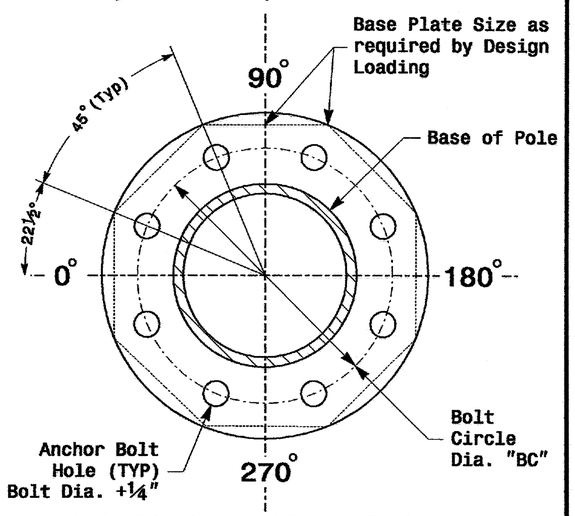
Construct Templates and Plates from ¼" min. thick Steel. Galvanizing is not required.

Base Plate Template and Anchor Bolt Lock Plate Details



Anchor Bolt Detail

Note: See Strain Pole drawing M3 and Mast arm drawing M4 for base plate weld details.



8 Bolt Base Plate Detail

Fabrication Details – All Poles

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	Sig. 52 M 2

Prepared in the Offices of: Traffic Engineering Branch, Division of Highways, North Carolina Department of Transportation, 122 N. McDowell St., Raleigh, NC 27603

Typical Fabrication Details Common To All Metal Poles

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

REVISIONS	INIT.	DATE

SCALE: 0 NA NONE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 028094 ENGINEER DEBESH C. SARKAR

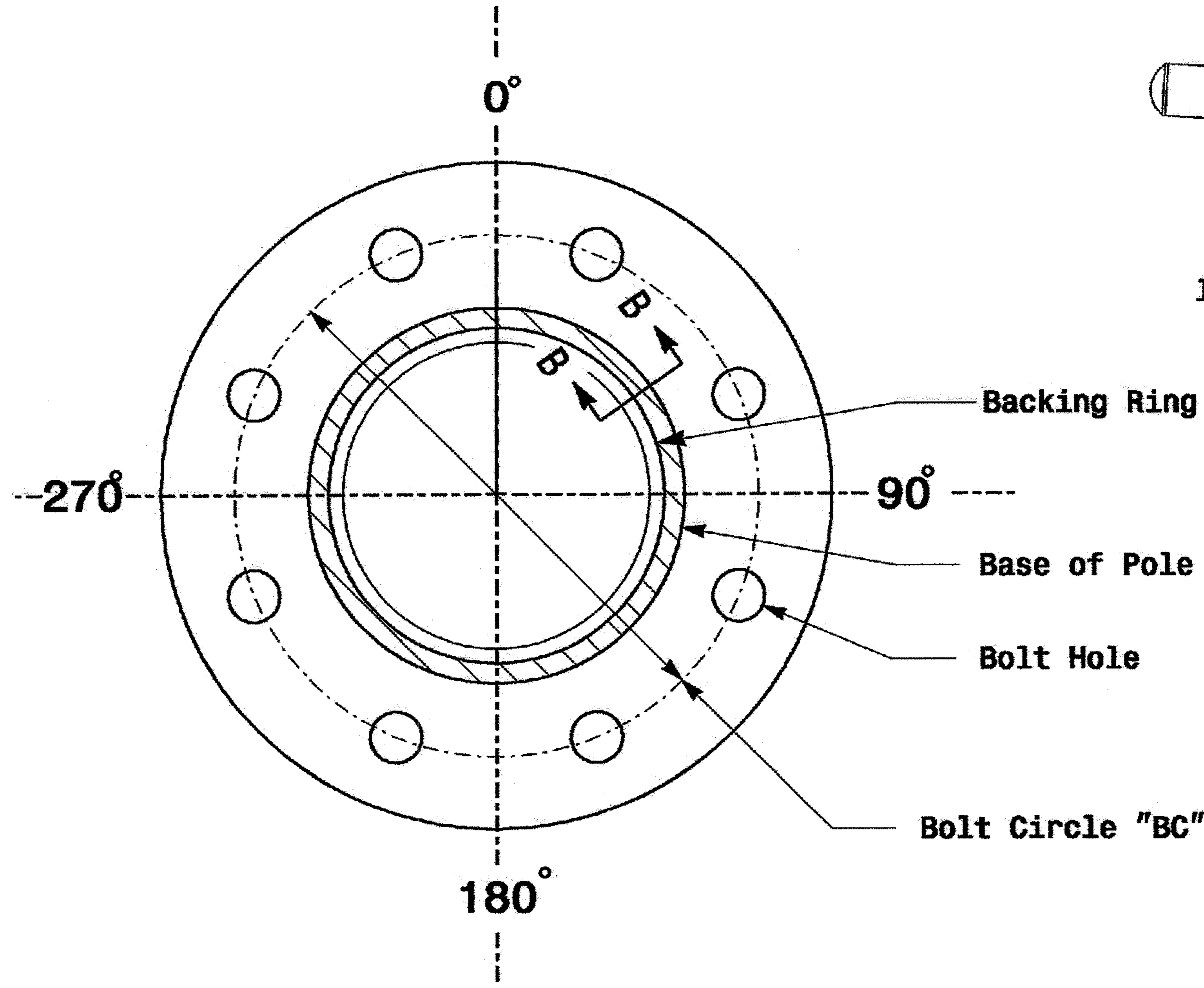
D. Sarkar 9.2.2005
SIGNATURE DATE

SIG. INVENTORY NO.

01-SEP-2005 10:22
D:\M2004 Metal Pole Standards\M2004 m2 thru m5.dgn
candrews

PROJECT REFERENCE NO.	SHEET NO.
U-3613B	Sig.53 M 4

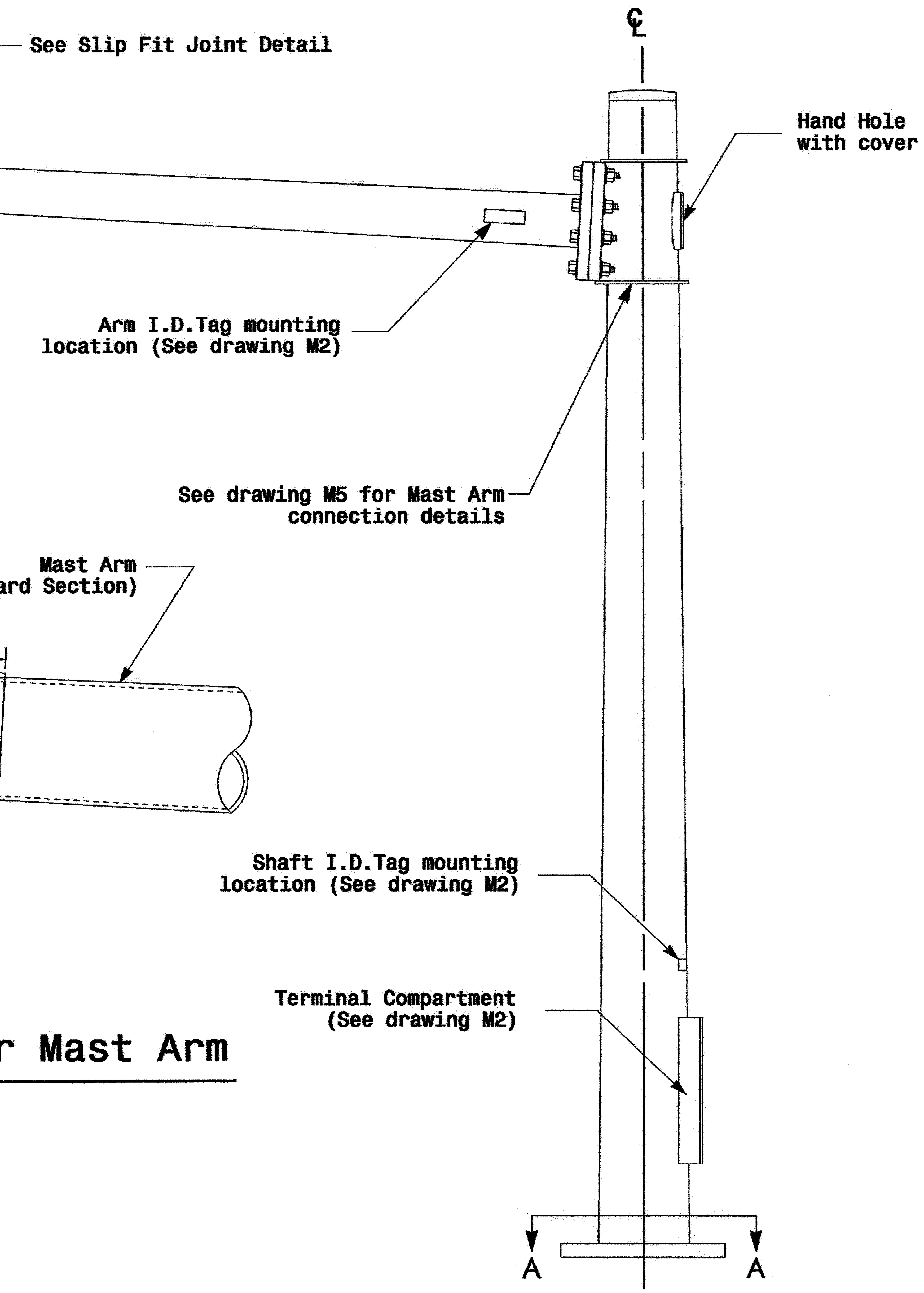
Fabrication Details - Mast Arm Poles



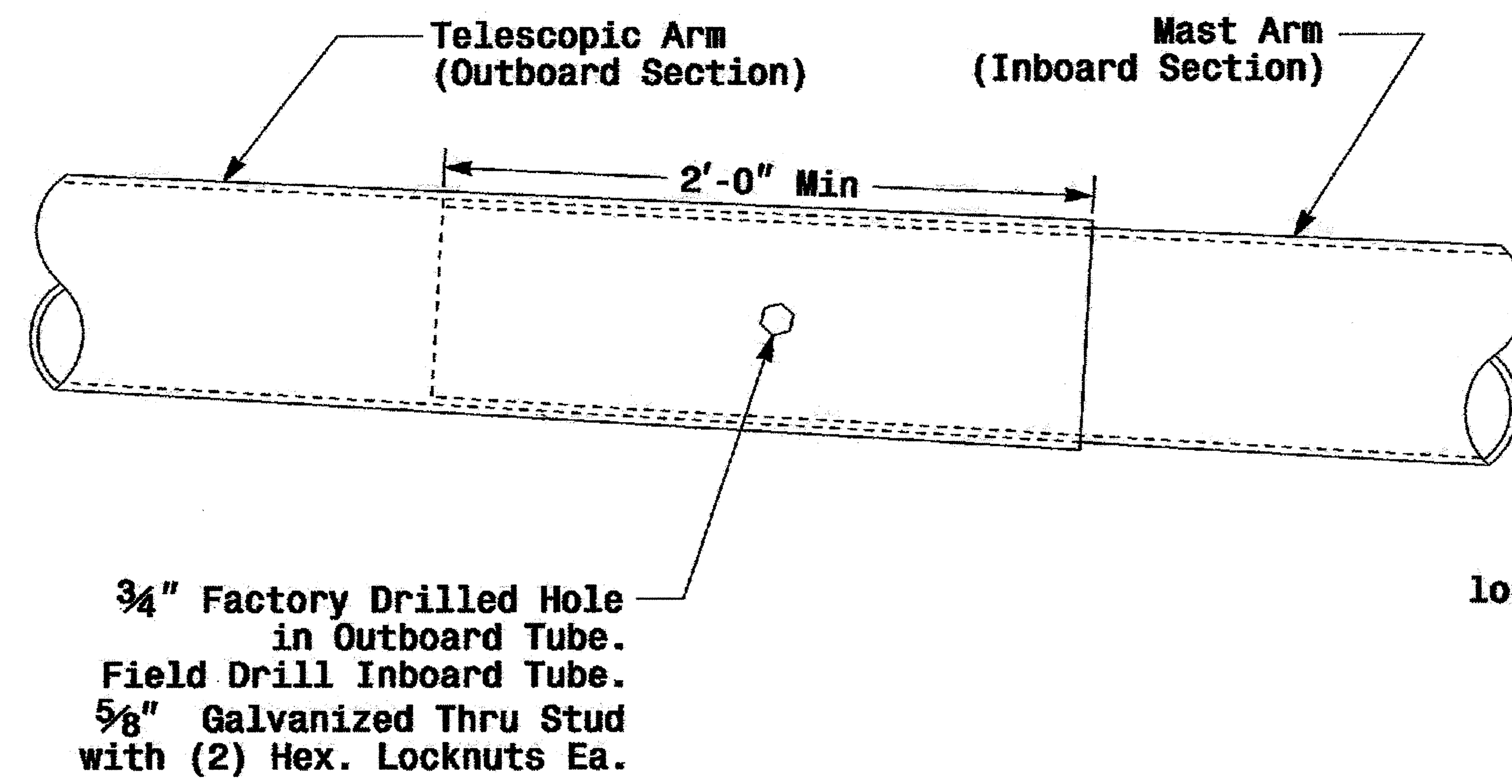
Section A-A

(See drawing M 2)

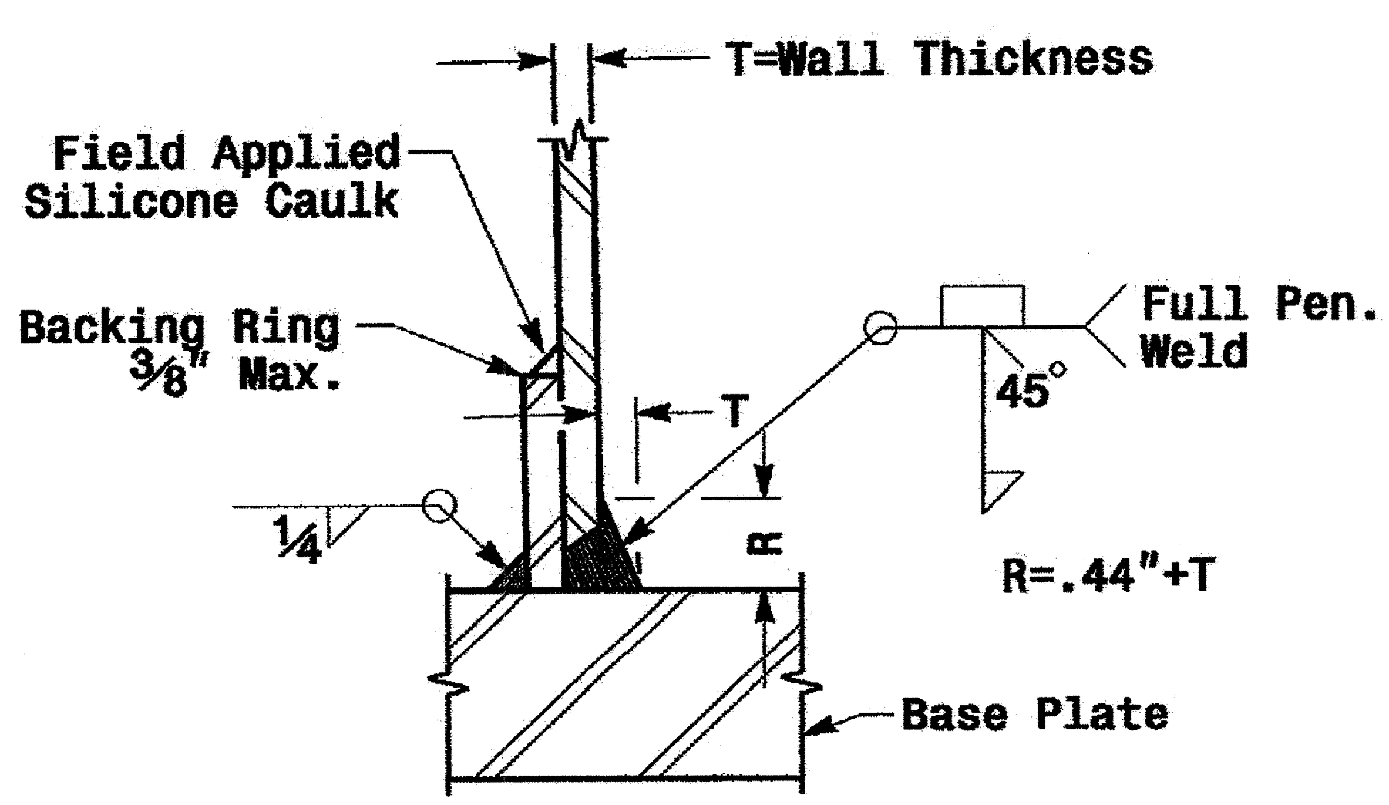
Pole Base Plate



Monotube Mast Arm Pole (.14in./ft. taper)



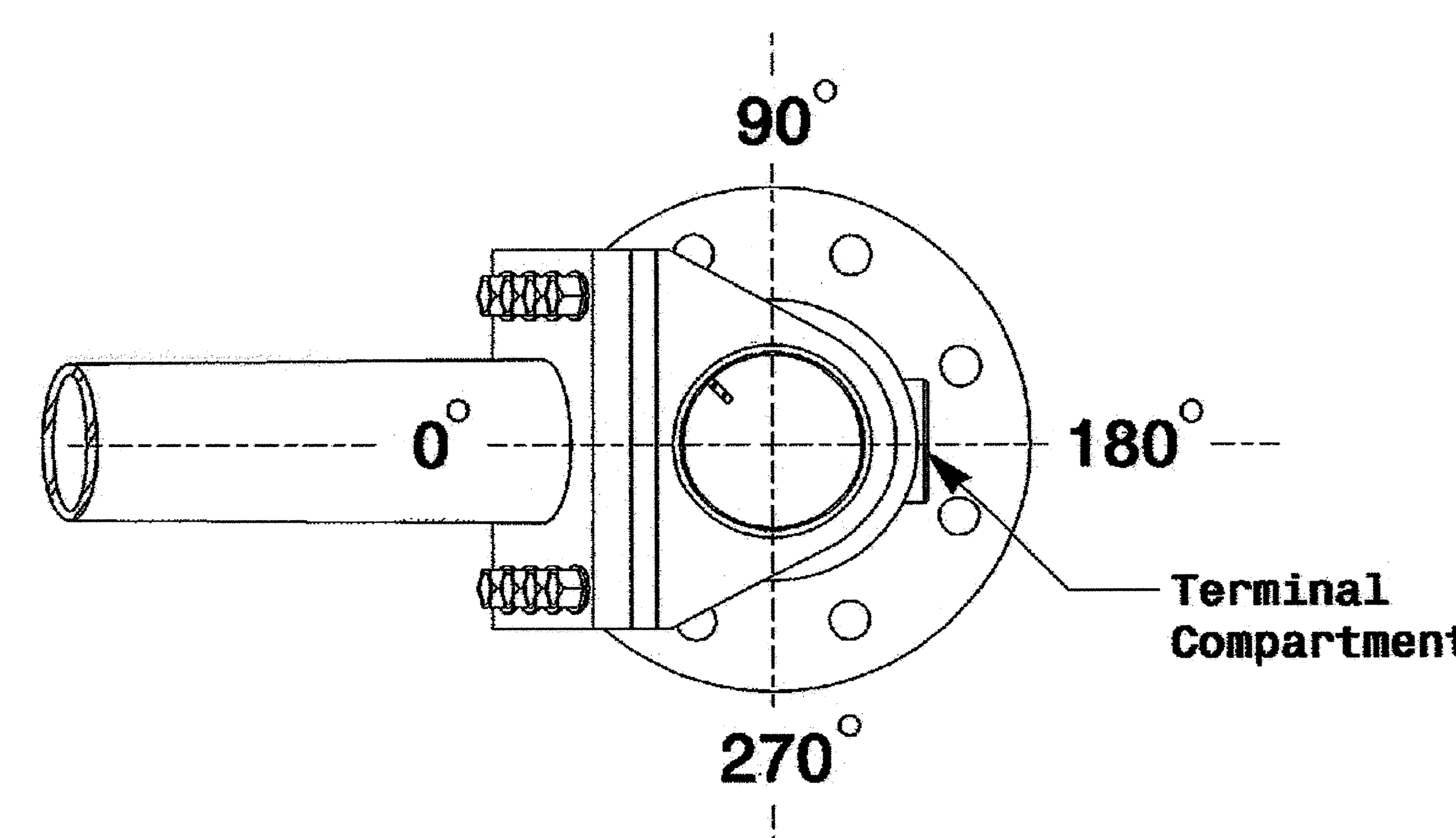
Slip Fit Joint Detail for Mast Arm



Section B-B

(Pole Attachment to Base Plate)

Full-Penetration Groove Weld Detail



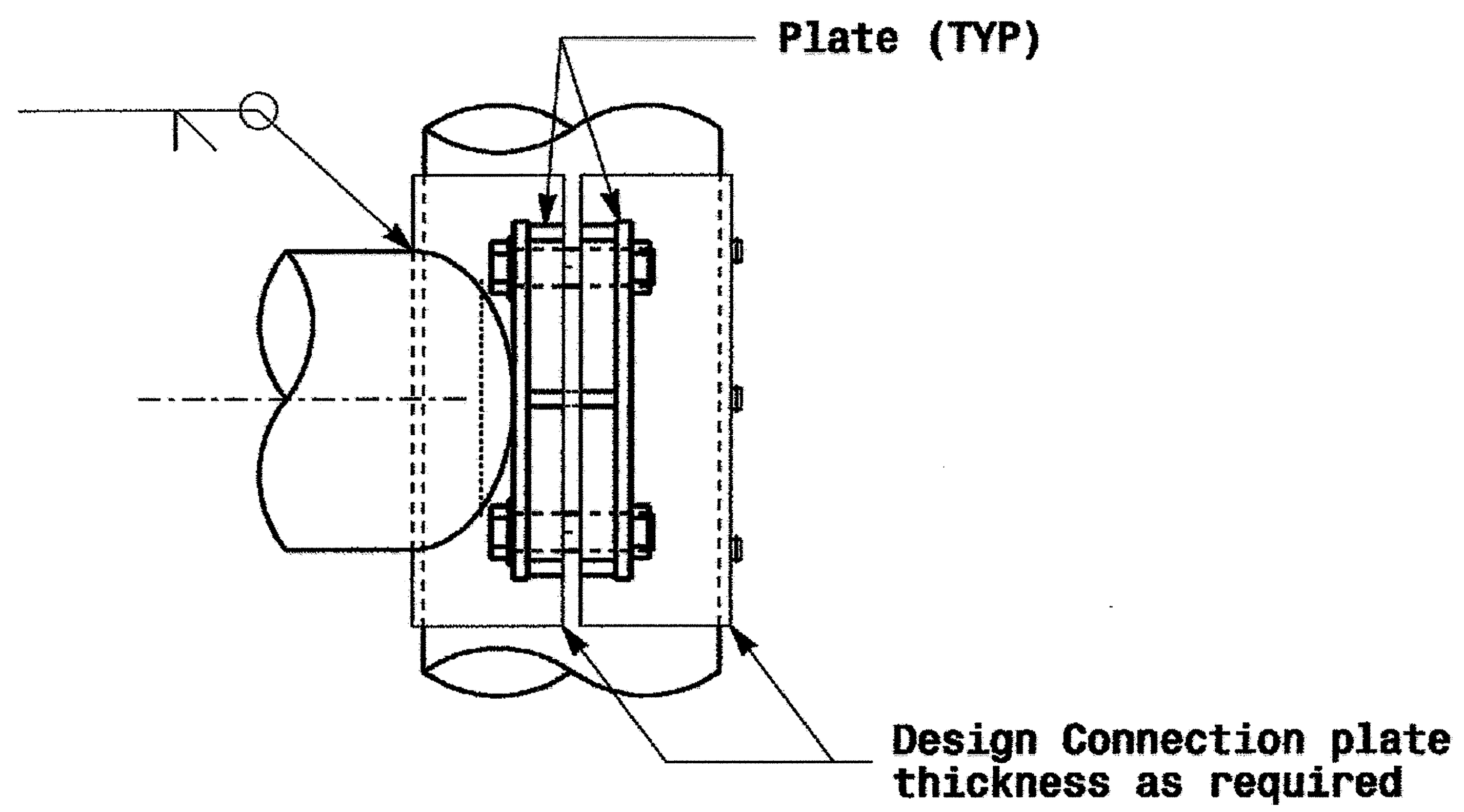
Mast Arm Radial Orientation

Prepared in the Offices of: Signals and Geometrics Section, 122 N. McDowell St., Raleigh, NC 27603	Typical Fabrication Details for Mast Arm Poles	SEAL
SCALE: 0 NA — NONE	PLAN DATE: May 2005 — REVIEWED BY: C.F. Andrews	NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 028094 DEBESH C. SARKAR
	PREPARED BY: P.L. Alexander — REVIEWED BY: A.M. Esposito	SIGNATURE — DATE 9.2.2005
	REVISIONS — INIT. — DATE	SIG. INVENTORY NO.

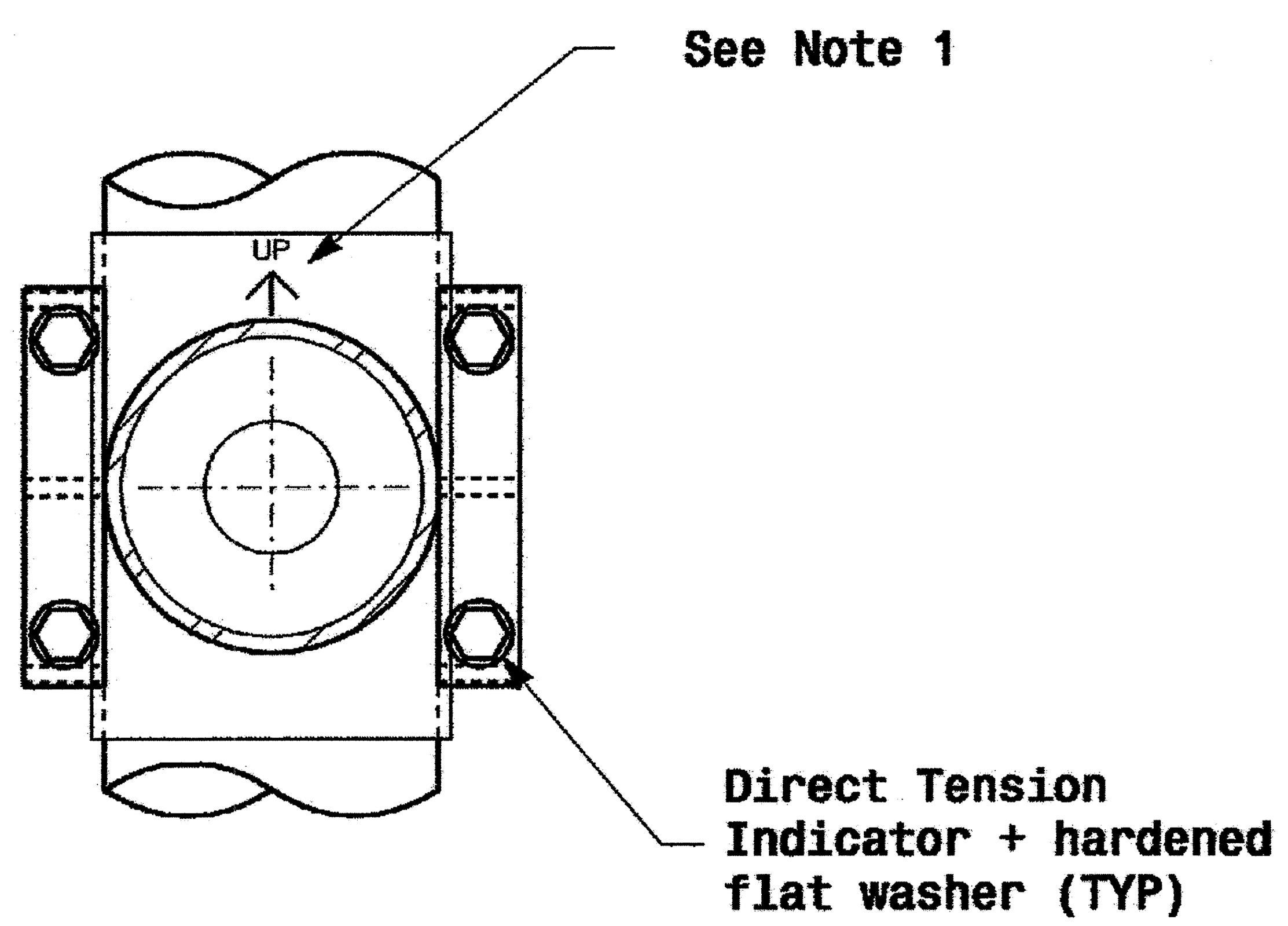
01-SEP-2005 14:08
palexander

Fabrication Details – Mast Arm Poles

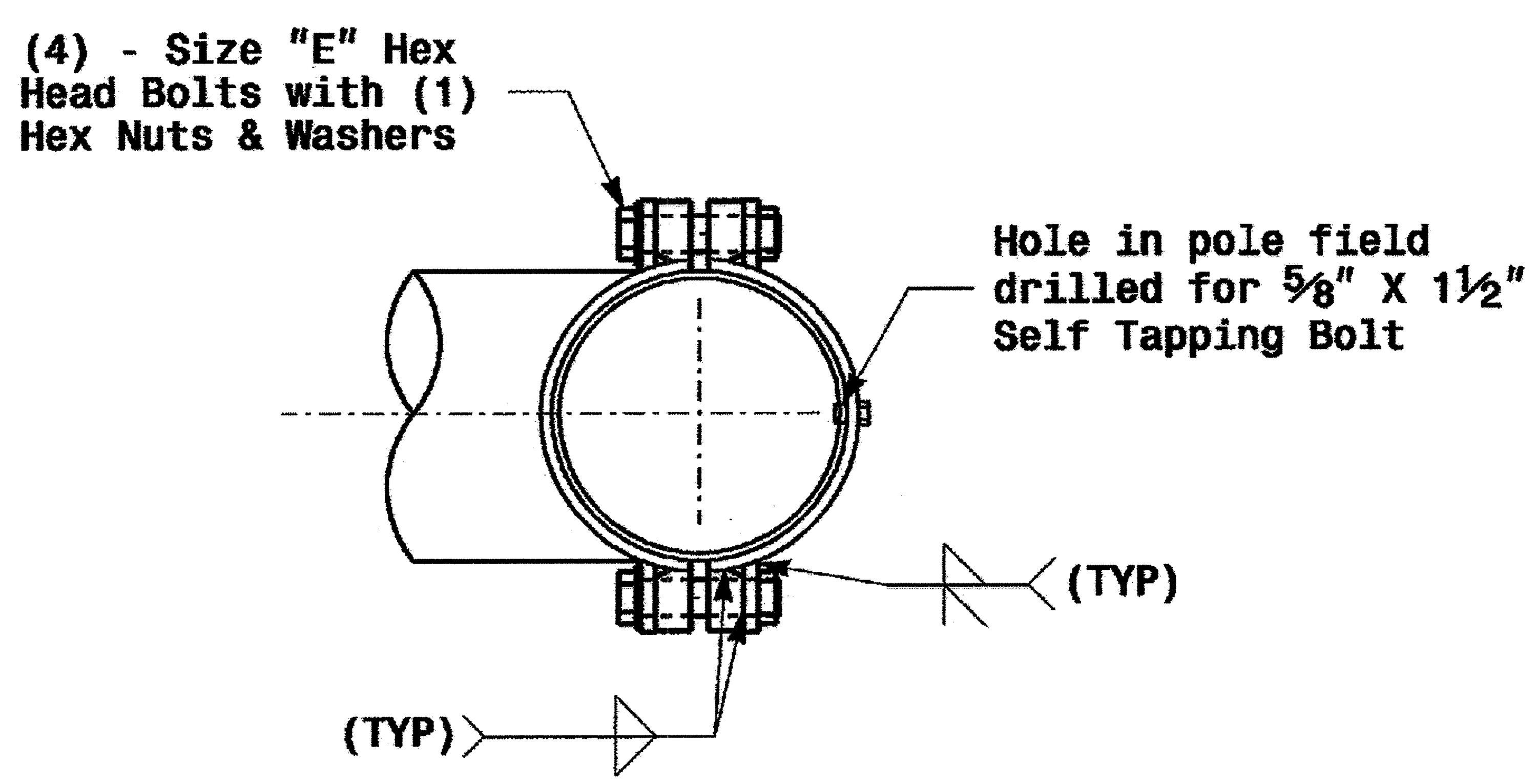
Adjustable Clamp Type Bolted Mast Arm Connection



Side Elevation View

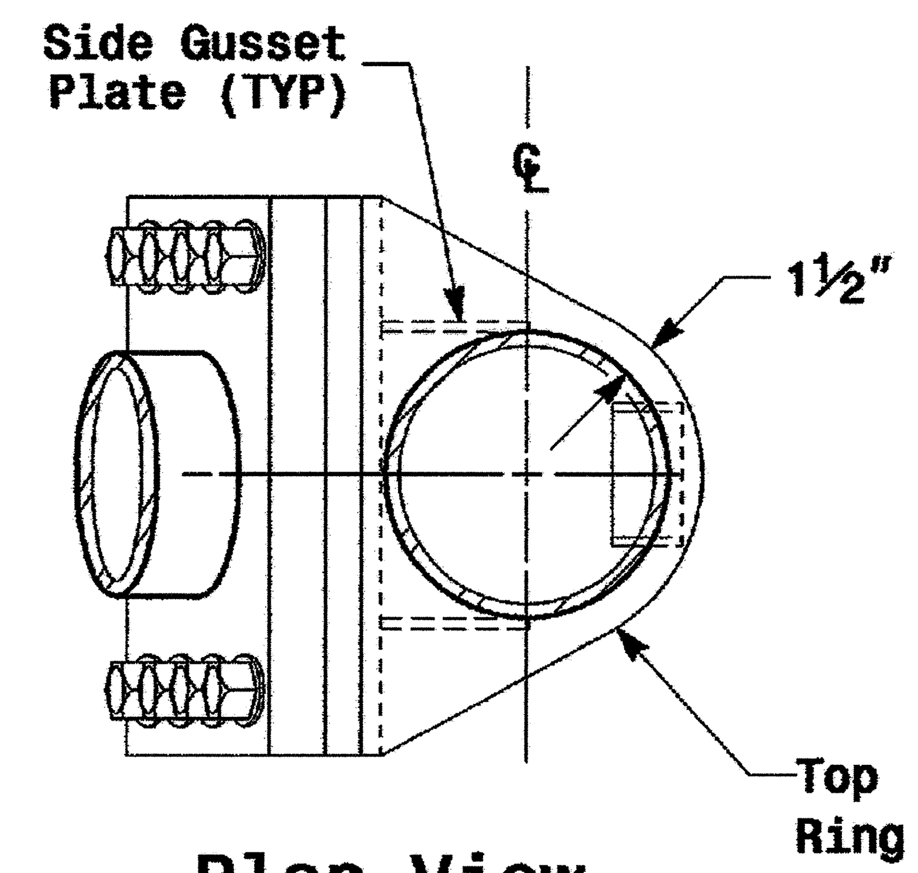


Front Elevation View

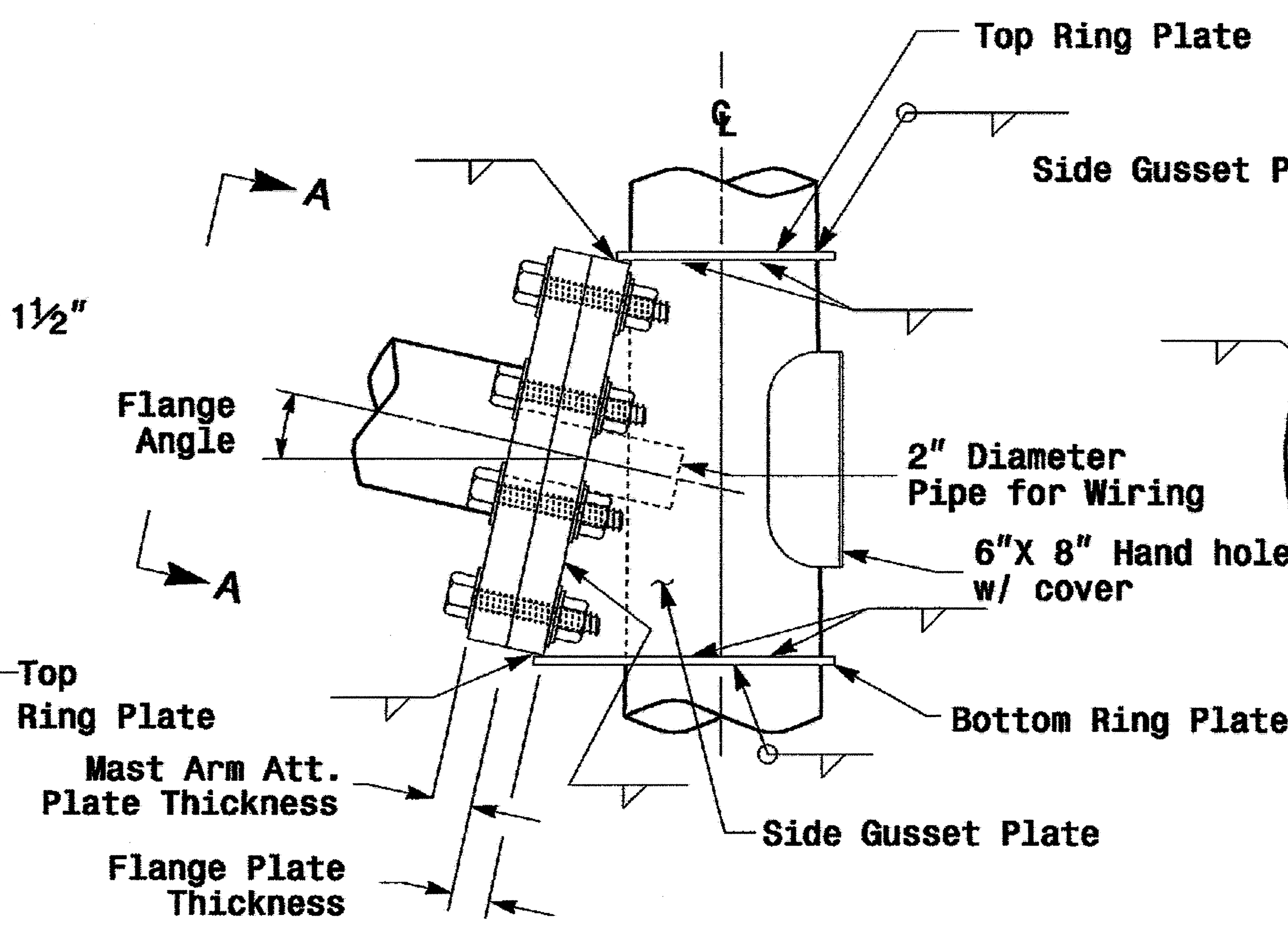


Plan View

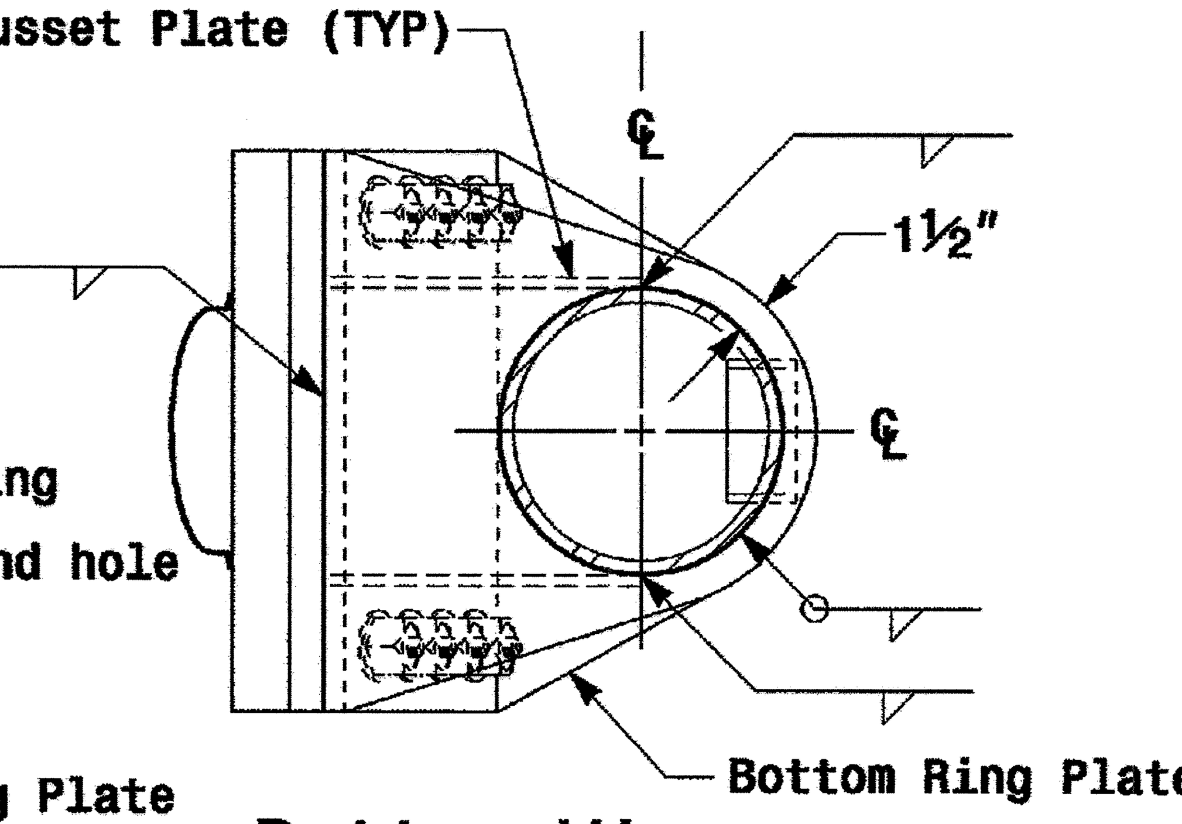
Welded Ring Stiffened Mast Arm Connection



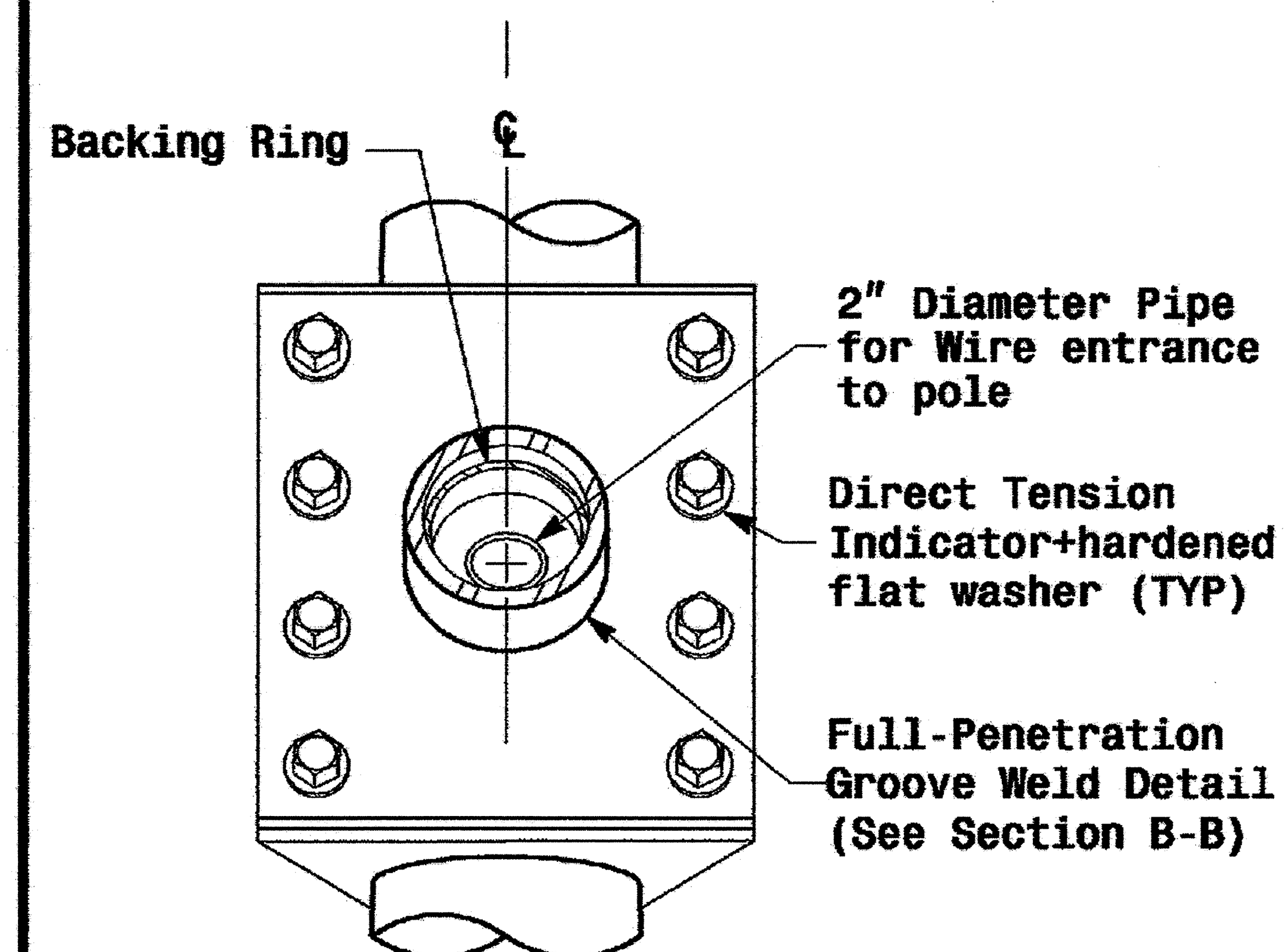
Plan View



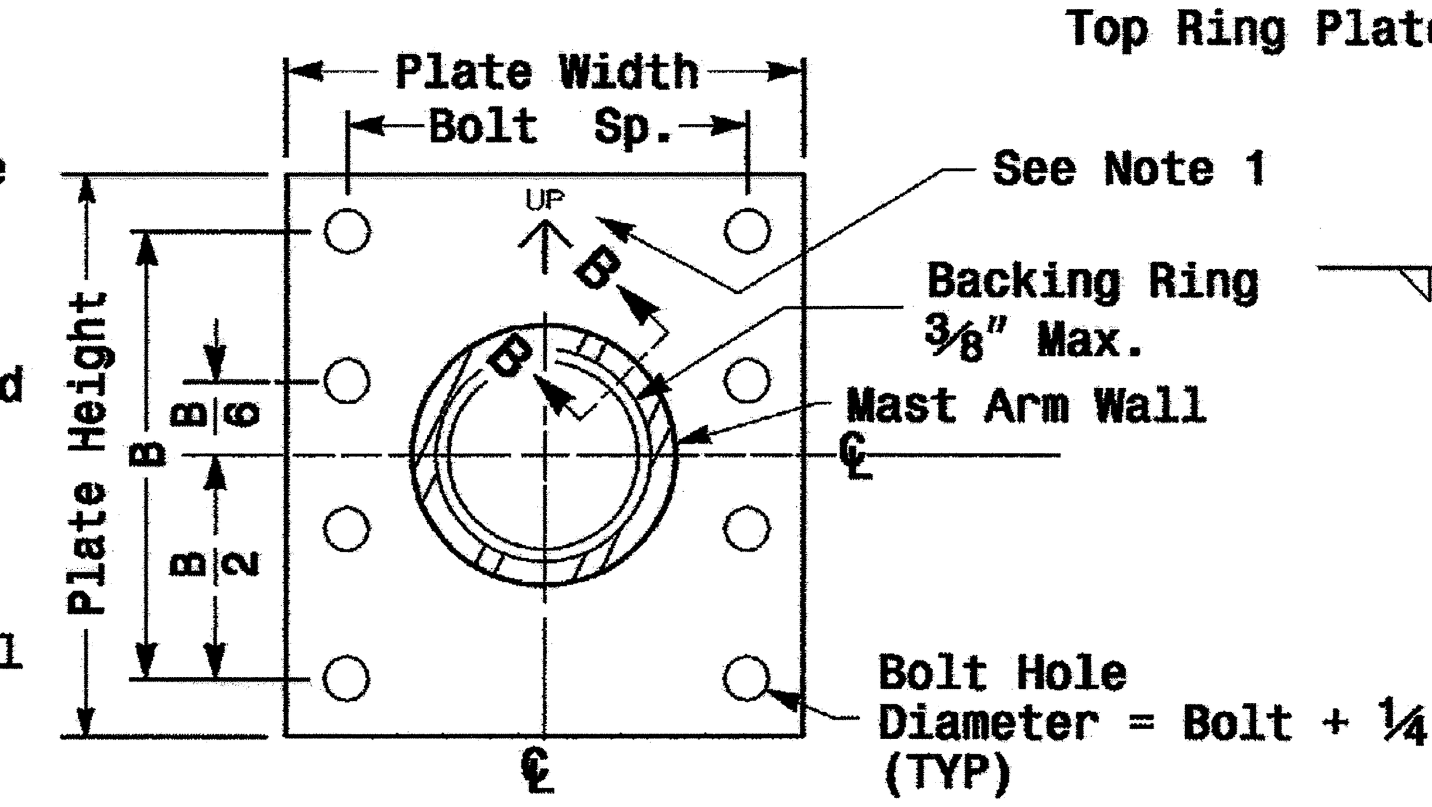
Side Elevation View



Bottom View

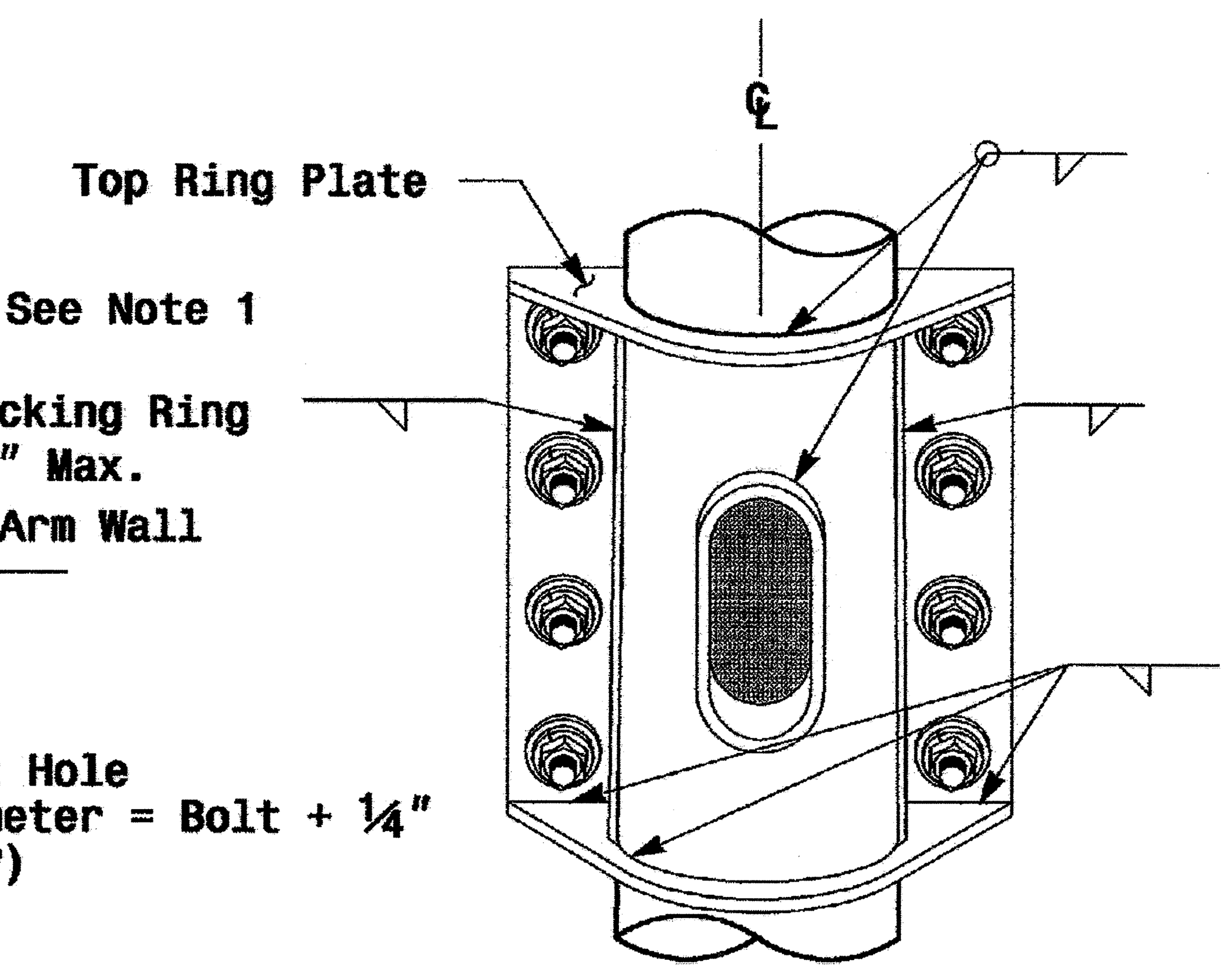


Front Elevation View

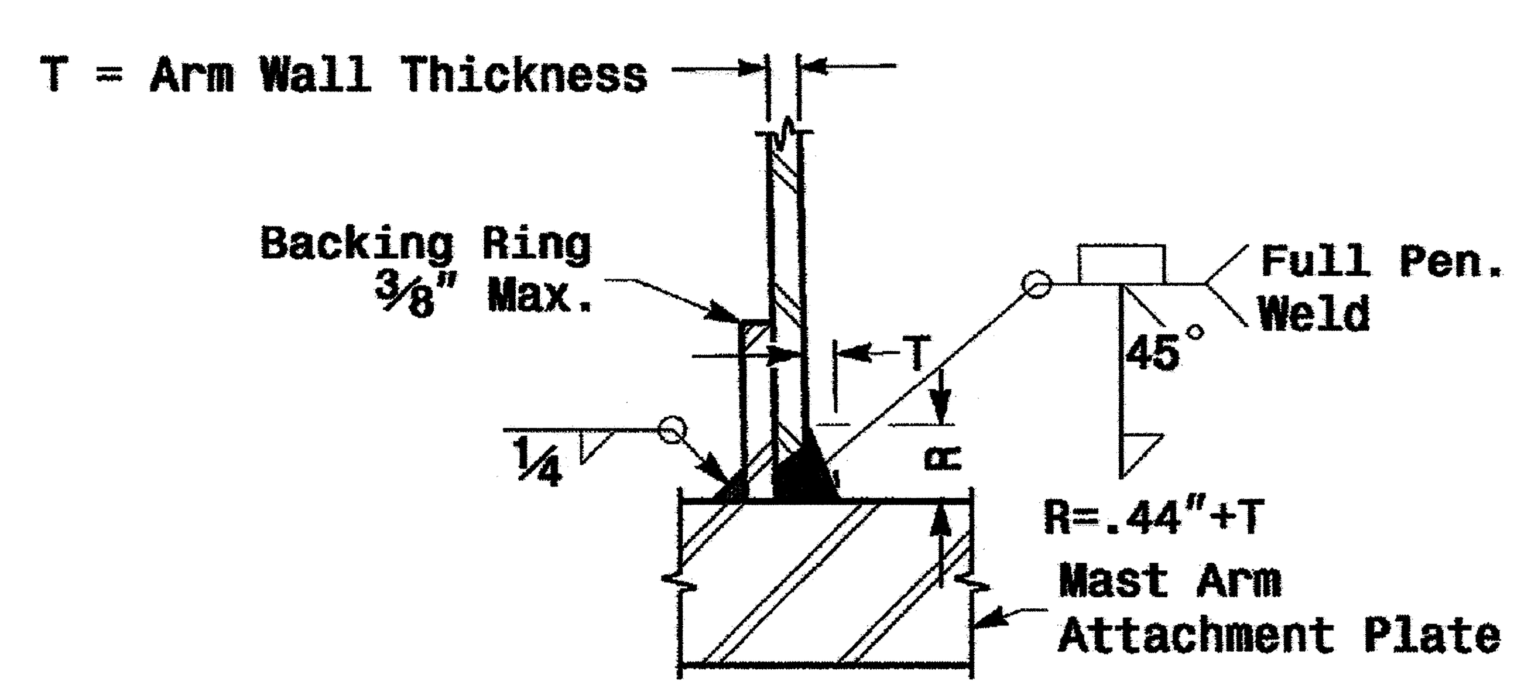


Section View A-A

Mast Arm Attachment Plate



Back Elevation View



Section B-B

Full-Penetration Groove Weld Detail

Notes:

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

Prepared in the Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, State of North Carolina Department of Transportation, 122 N. McDowell St., Raleigh, NC 27603

Fabrication Details For Mast Arm Connection To Pole

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

SCALE: 0 NA — NONE

REVISIONS | INIT. | DATE

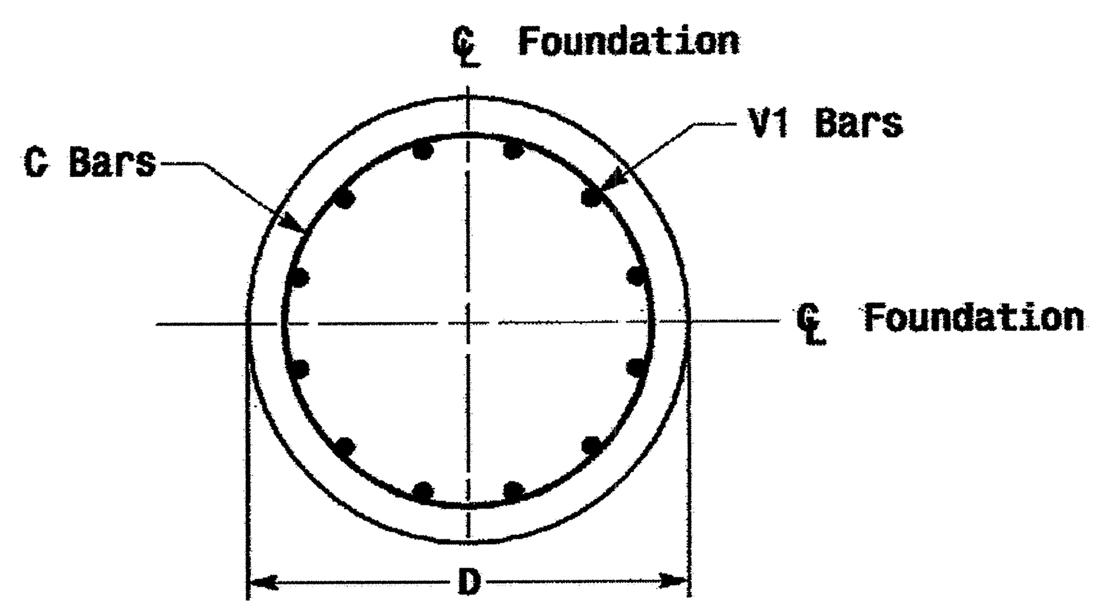
SEAL: North Carolina Professional Engineer, Seal 028094, Debesh C. Sarkar — D. Sarkar 9.2.2005 SIGNATURE DATE

SIG. INVENTORY NO.

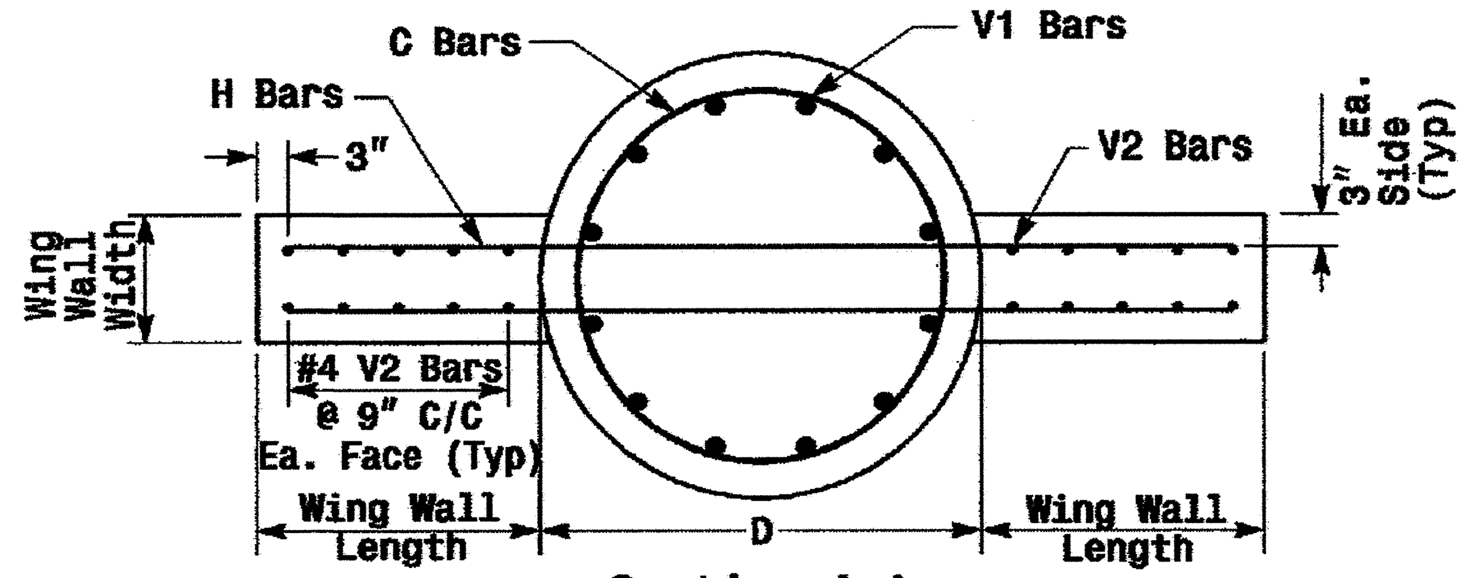
01-SEP-2005 14:11 w:\eoolas-unit\workgroups\2004 metal pole standards\2004 m5.dgn palexander

Construction Details – Foundations

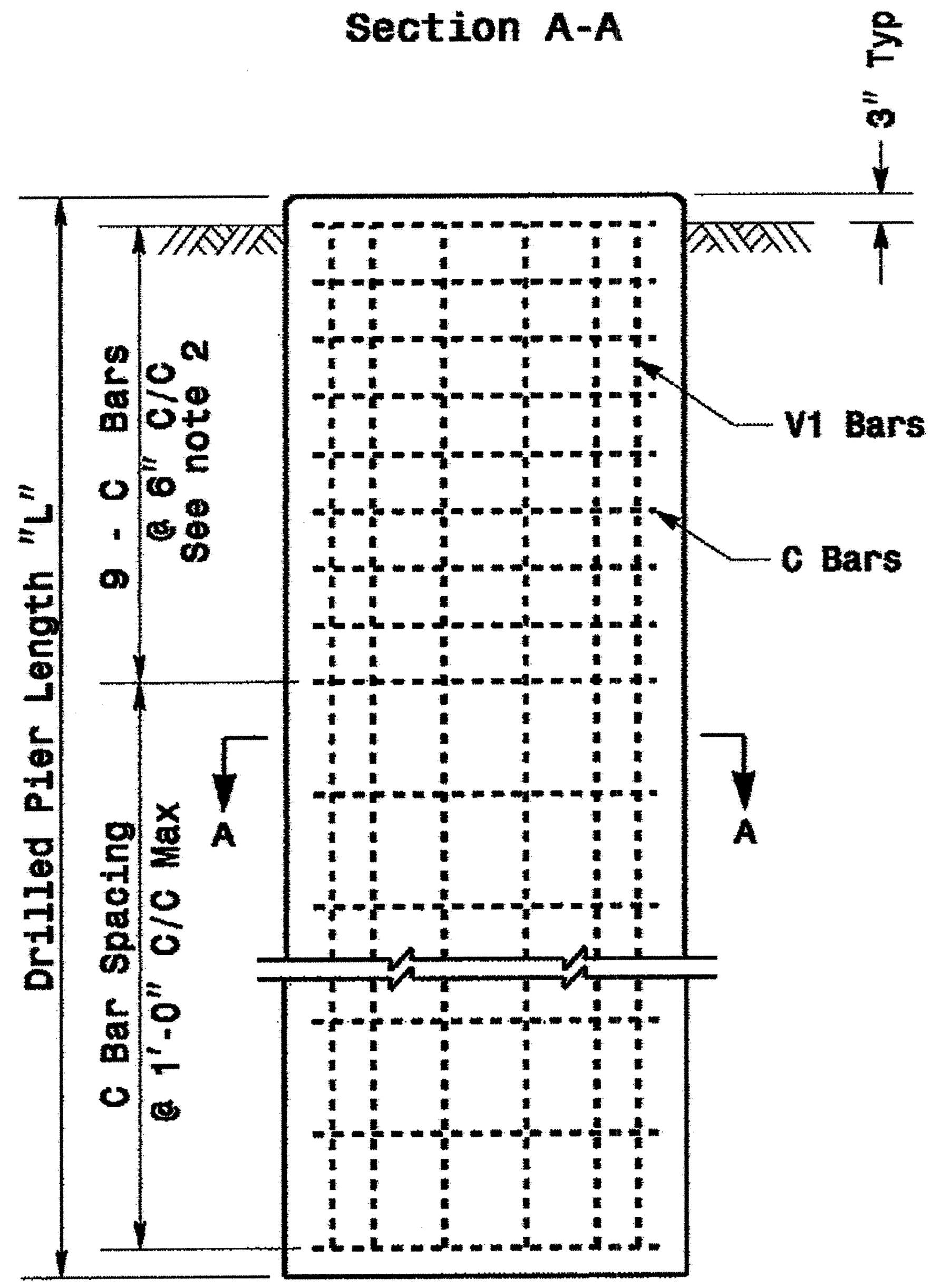
Reinforcing Steel Bars

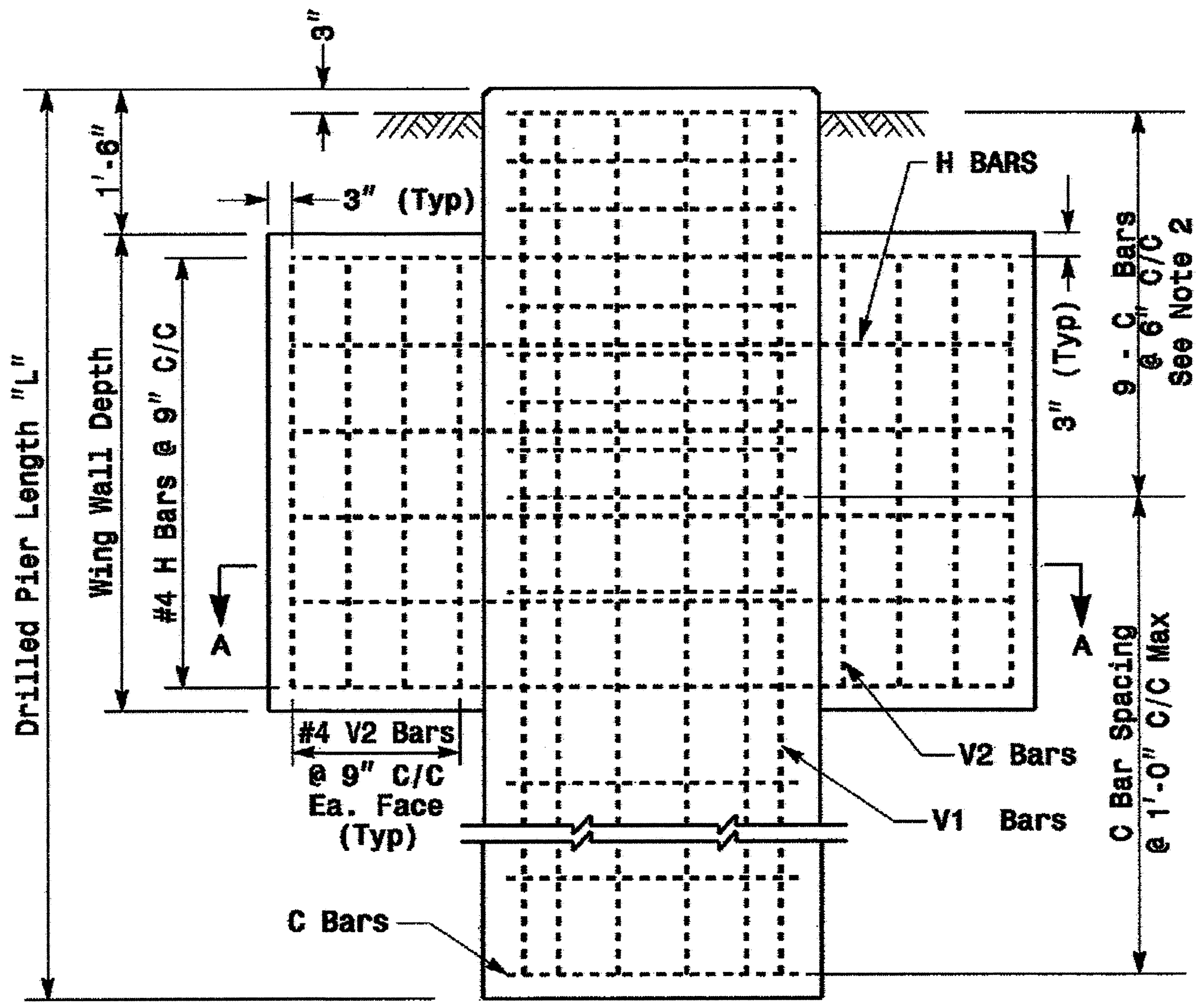


Section A-A



Section A-A





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

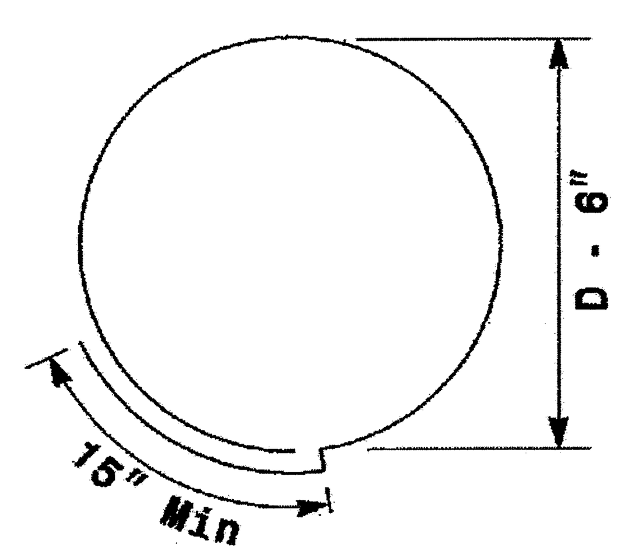
Shaft Dia (in.)	Conc. Volume (cu. yds.)	Bar Name	No.	Size	Type	Length
42"	.356 x L	V1	9	#8	STR.	**
		C	*	#4	CIR.	10'-9"
48"	.465 x L	V1	12	#8	STR.	**
		C	*	#4	CIR.	12'-6"

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

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

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

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



Typical "C" Bars

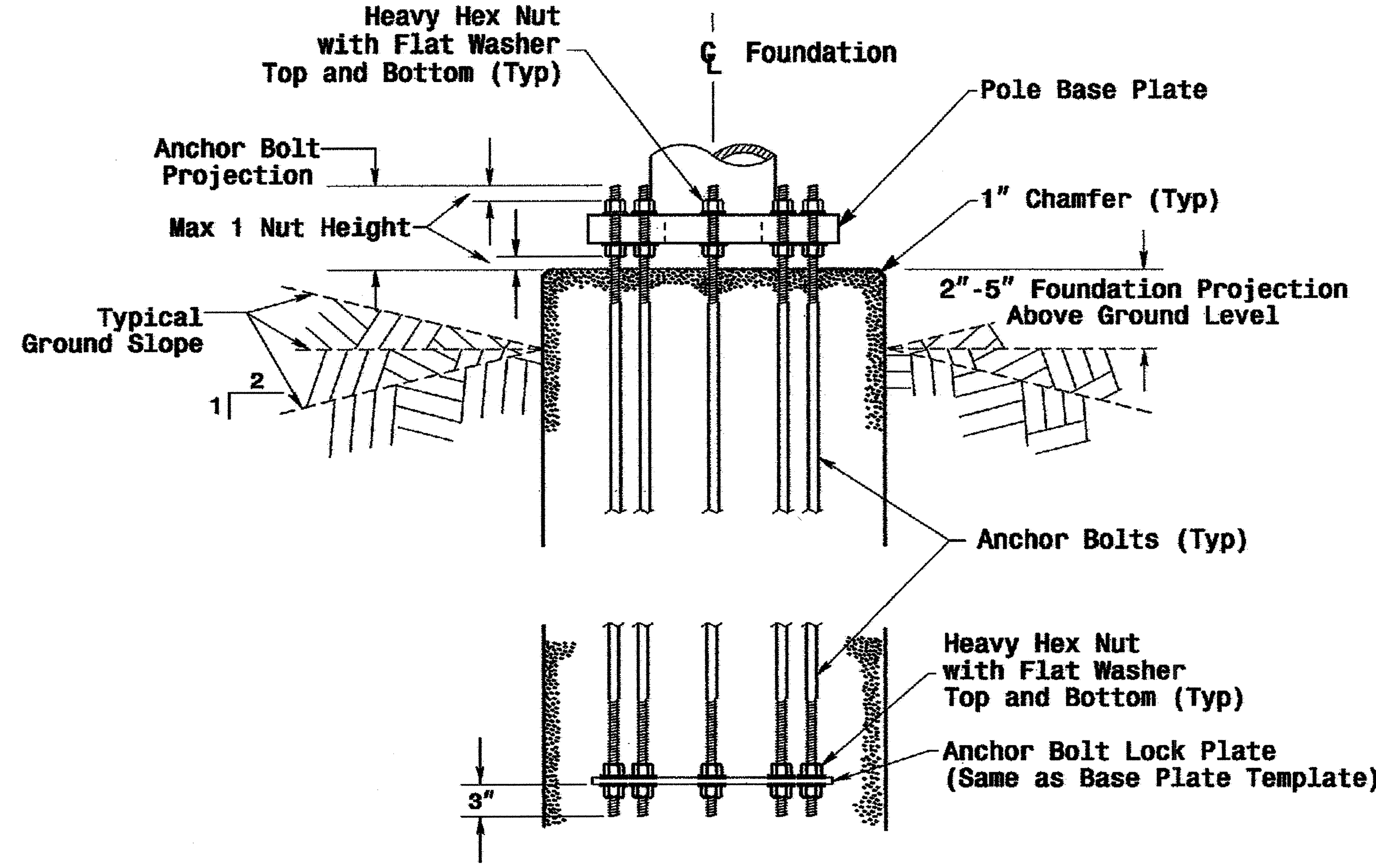
WING WALL DETAILS

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

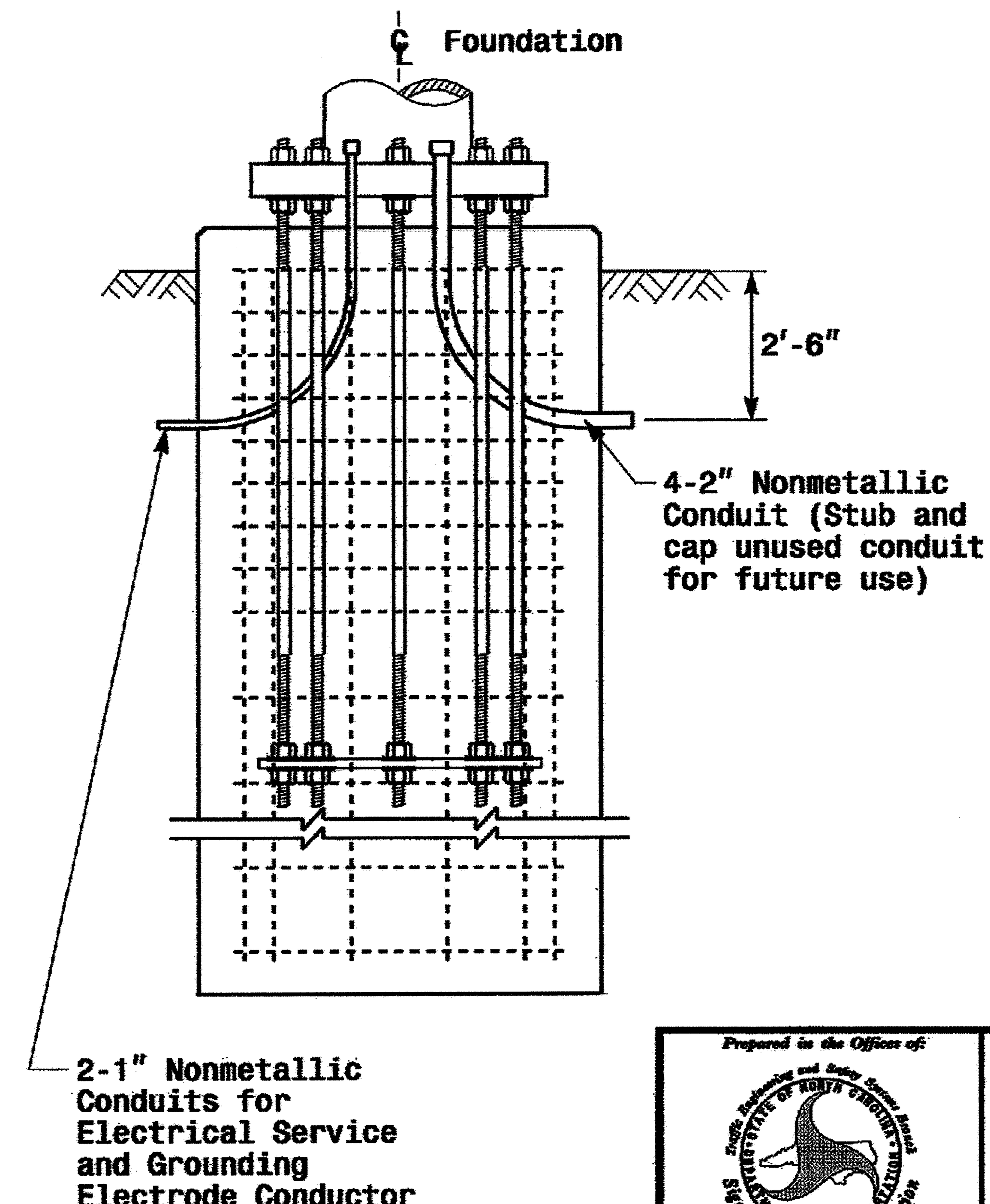
See Note No. 4

Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)



Typical Foundation Conduit Details



Notes

1. The number of C-bars is based on foundation depth. For standard foundations, see sheet M 8.
2. Circular tie reinforcing rings may be vertically adjusted by +/- 3" at a depth between 2'-0" and 3'-0" to facilitate the installation of electrical conduit entering in the cage.
3. The length of V1-bars is based on foundation depth. For standard foundations, see sheet M 8.
4. 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 Offices of: Traffic Engineering and Safety Systems Branch, Signals and Geometrics Section, 122 N. McDowell St., Raleigh, NC 27603

Construction Details Foundations

PLAN DATE:	May 2005	REVIEWED BY:	P.L. ALEXANDER
PREPARED BY:	C.F. ANDREWS	REVIEWED BY:	A.M. ESPOSITO

REVISIONS | INIT. | DATE

SCALE 0 NA NONE

SEAL: North Carolina Professional Engineer SEAL 028094 Debesh C. Sarkar

D. Sarkar 9.2.2005
SIGNATURE DATE

SIG. INVENTORY NO.

01-SEP-2005 17:48
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palexander