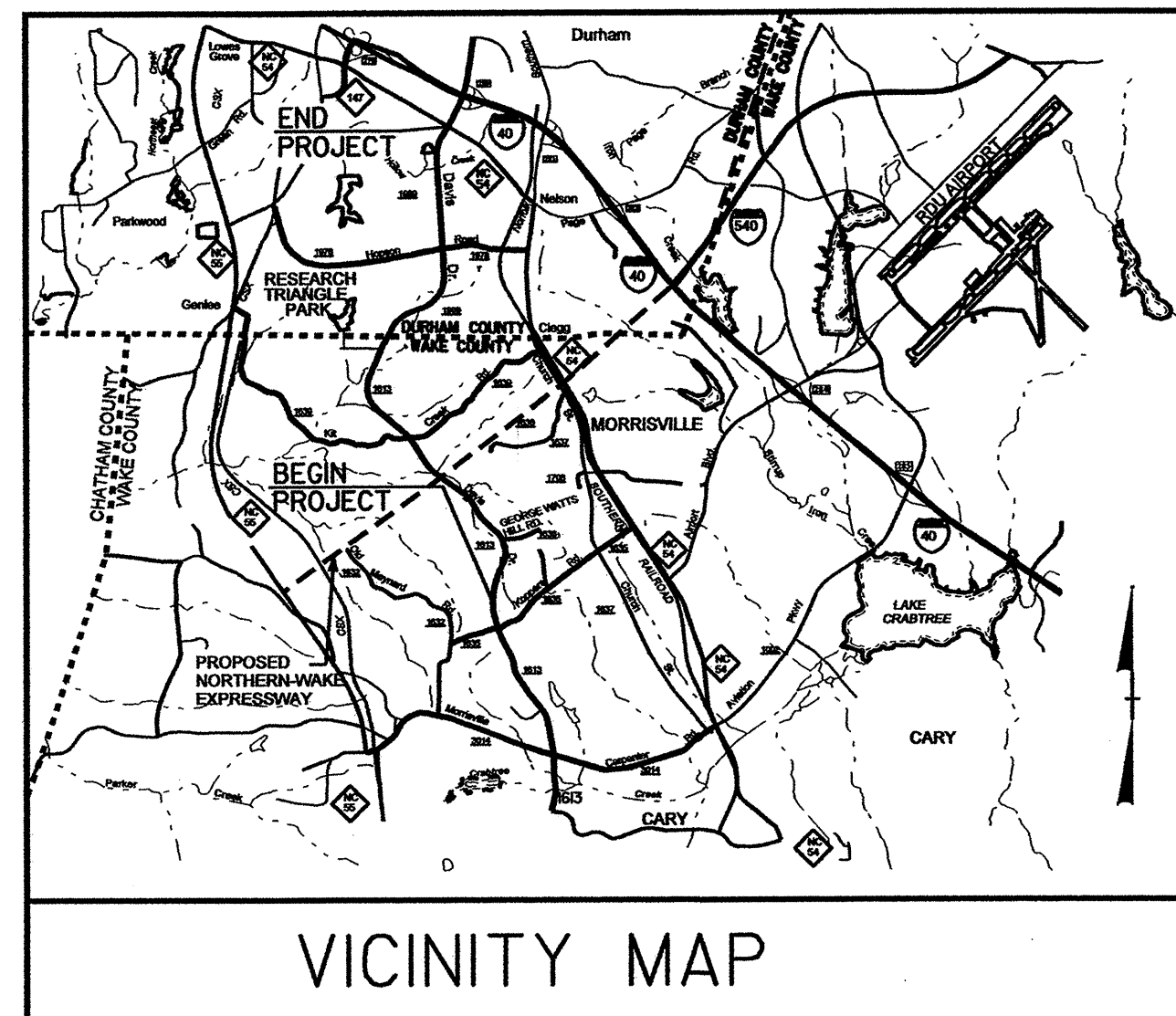
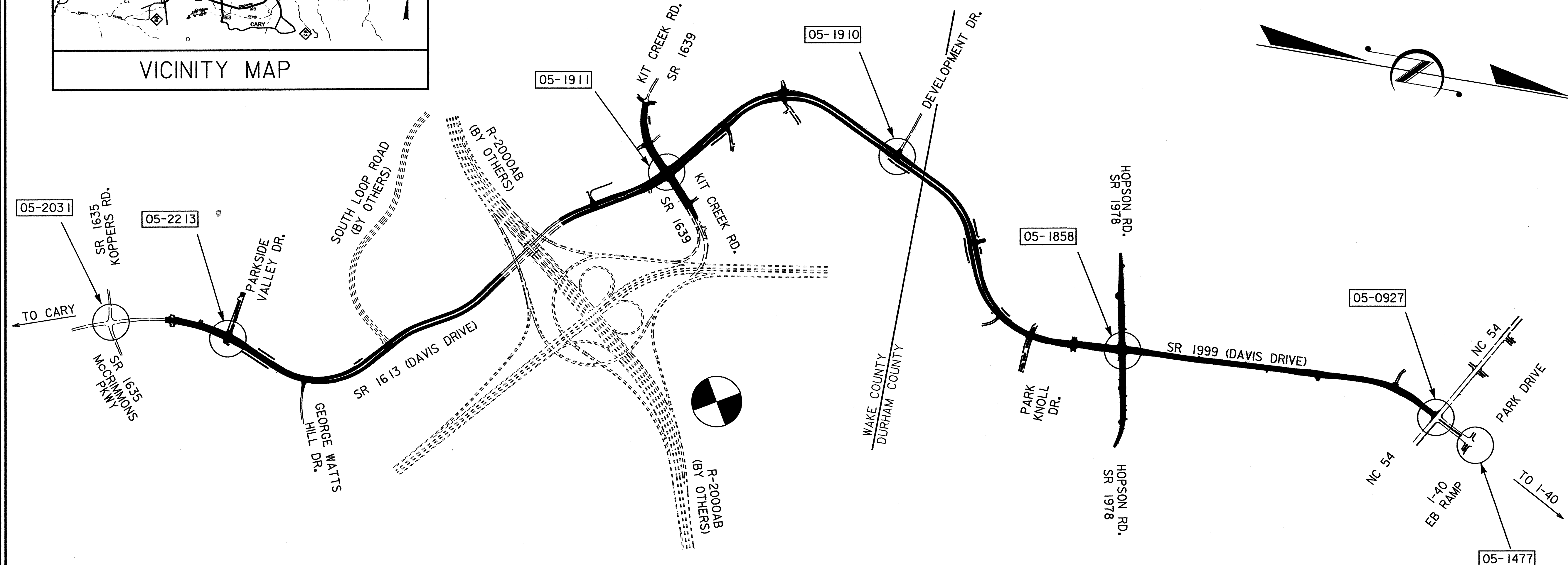




WAKE-DURHAM COUNTY

LOCATION: SR 1613/SR1999 (DAVIS DRIVE) FROM NORTH OF
SR 3014 MORRISVILLE-CARPENTER ROAD) TO
I-40 EASTBOUND RAMPS/PARK DRIVE

TYPE OF WORK: TRAFFIC SIGNALS & COMMUNICATIONS CABLE



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

Sheet #	Reference #
Sig. 1	
Sig. 2-13	05-2031
Sig. 14-21	05-2213
Sig. 22-33	05-1911
Sig. 34-42	05-1910
Sig. 43-51	05-1858
Sig. 52-58	05-0927
Sig. 59-64	05-1477
Sig. 65-72	
Sig. 73	
Sig. 74-76	
Sig. 77-78	

Index of Plans

Title Sheet	Location/Description
SR 1613 (DAVIS DRIVE) AT SR1635 (McCRIMMON PARKWAY	
SR 1613 (DAVIS DRIVE) AT PARKSIDE VALLEY DRIVE AND SUMMER SKY DRIVE	
SR 1613 (DAVIS DRIVE) AT SR 1635 (KIT CREEK ROAD)	
SR 1613/1999 (DAVIS DRIVE) AT DEVELOPMENT DRIVE	
SR 1999 (DAVIS DRIVE) AT SR 1978 (HOPSON ROAD)	
NC 54 AT SR 1999 (DAVIS DRIVE)	
SR 1999 (DAVIS DRIVE) AT I-40 EB RAMPS/PARK DRIVE	
METAL POLE DETAILS	
CONSTRUCTION NOTES	
SPLICE DIAGRAMS	
CABLE ROUTING PLANS	

INTELLIGENT TRANSPORTATION SYSTEMS & SIGNALS UNIT

Contacts:

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

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

Prepared in the Offices of:



122 N. McDowell St., Raleigh, NC 27603

SIGNAL FACE	PHASE		
	0 2 + 6	0 4 + 8	F L A S H
21, 22	G	R	Y
41, 42	R	G	R
61, 62	G	R	Y
81, 82	R	G	R

* SEE NOTE #2

12"

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

INDUCTIVE LOOPS					DETECTOR UNITS							
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING		CALL PLACE DURING GREEN	INHIBIT DELAY DURING GREEN
									FEATURE	TIME		
2A	6X6	EXISTING	420	-	X	2	X	-	-	SEC.	ALL	NO
2B	6X60	EXISTING	0	-	X	2	X	-	DELAY	3 SEC.	ALL	NO
4B	6X40	2-4-2	0	X	-	4	X	-	DELAY	3 SEC.	ALL	YES
4C	6X40	2-4-2	0	X	-	4	X	-	DELAY	10 SEC.	ALL	YES
6A	6X6	6	420	X	-	6	X	-	-	SEC.	ALL	NO
6B	6X60	2-4-2	0	X	-	6	X	-	DELAY	3 SEC.	ALL	NO
8A	6X6	6	420	X	-	8	X	-	DC/EC	100/4.0SEC.	ALL	YES
8B	6X40	2-4-2	0	X	-	8	X	-	DELAY	3 SEC.	ALL	YES
8C	6X40	2-4-2	0	X	-	8	X	-	DELAY	10 SEC.	ALL	YES
VIDEO DETECTION ZONE INSTALLATION CHART												
4A	6X6	-	420	X	-	4	X	-	DC/EC	100/4.0SEC.	ALL	YES

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
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 and detection zones to presence mode.
5. Provide video detection system to accomplish the detection zones shown.

PHASING DIAGRAM DETECTION LEGEND

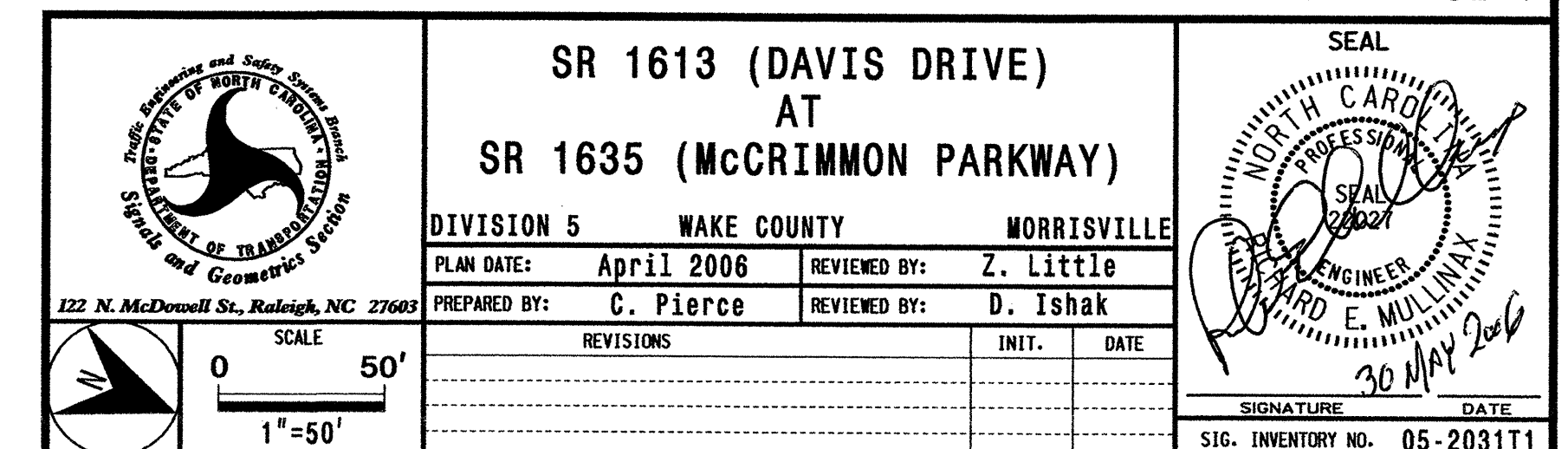
- | | |
|---|-------------------------------|
|  | DETECTED MOVEMENT |
|  | UNDETECTED MOVEMENT (OVERLAP) |
|  | UNSIGNALIZED MOVEMENT |
|  | PEDESTRIAN MOVEMENT |

TIMING CHART				
2070L CONTROLLER AND TS-2 CABINET				
PHASE	Ø2	Ø4	Ø6	Ø8
MINIMUM GREEN	14 SEC.	7 SEC.	14 SEC.	7 SEC.
PASSAGE GAP	6.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	5.2 SEC.	5.2 SEC.	5.2 SEC.	4.8 SEC.
RED CLEARANCE	1.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.
MAX. 1	90 SEC.	40 SEC.	90 SEC.	40 SEC.
RECALL POSITION	MIN. RECALL	NONE	MIN. RECALL	NONE
VEHI. CALL MEMORY	LOCK	NONLOCK	LOCK	NONLOCK
WALK	— SEC.	— SEC.	— SEC.	— SEC.
FLASHING DON'T WALK	— SEC.	— SEC.	— SEC.	— SEC.
VOLUME DENSITY	ON	OFF	ON	OFF
ACTUATION B4 ADD	0 VEHI.	— VEHI.	0 VEHI.	— VEHI.
SEC. PER ACTUATION	2.5 SEC.	— SEC.	2.5 SEC.	— SEC.
MAX. INITIAL	46 SEC.	— SEC.	46 SEC.	— SEC.
TIME B4 REDUCTION	15 SEC.	— SEC.	15 SEC.	— SEC.
TIME TO REDUCE	45 SEC.	— SEC.	45 SEC.	— SEC.
MINIMUM GAP	3.4 SEC.	— SEC.	3.4 SEC.	— SEC.

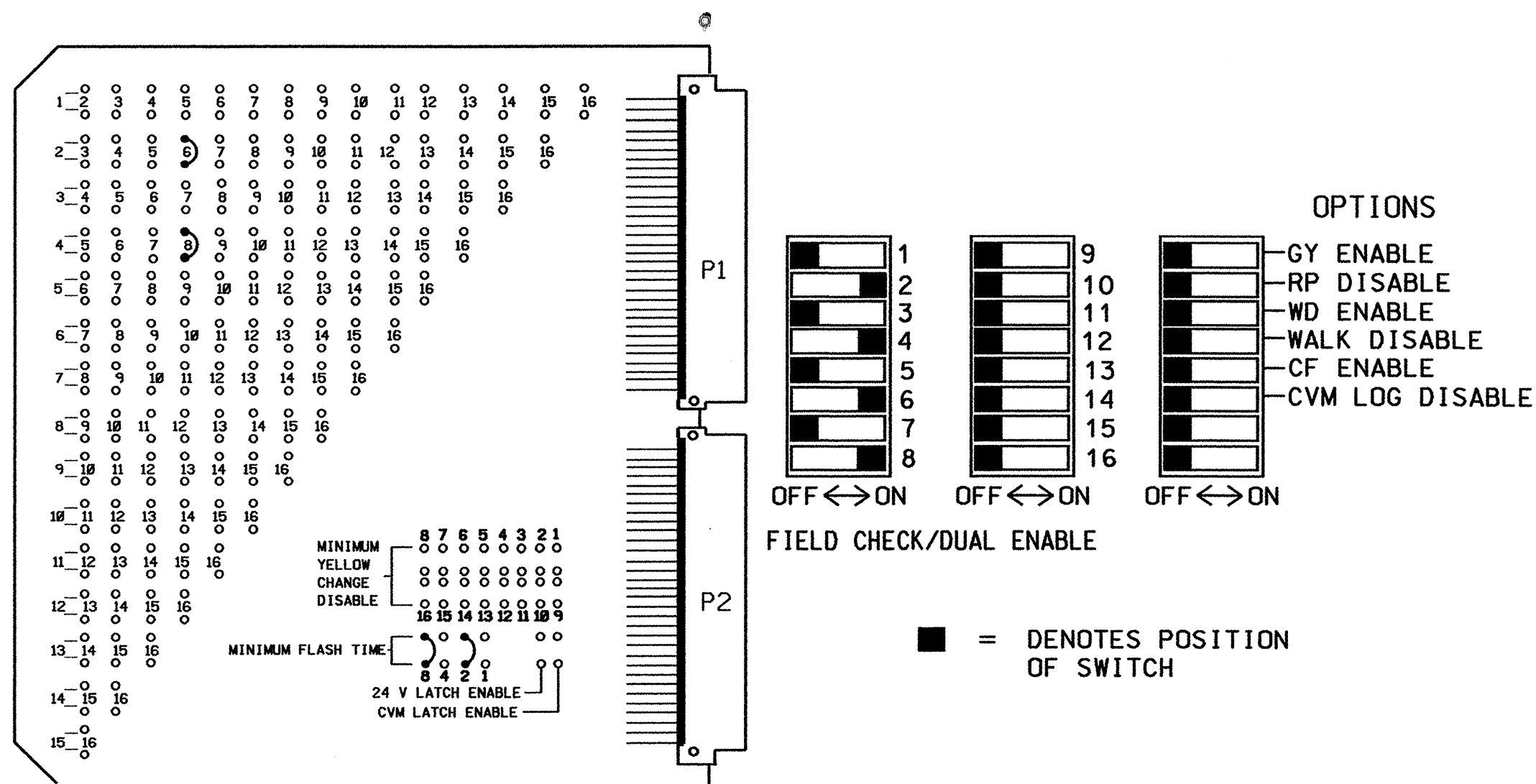
<u>PROPOSED</u>		<u>EXISTING</u>
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head	
	With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Video Detection Zone	
	Controller & Cabinet	
	Junction Box	
	Direct-Bury	N/A
	Right of Way with Marker	
	Directional Arrow	
	Pavement Marking Arrow	
	Construction Zone Drums	N/A
	Construction Zone	N/A

**THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.**

SIGNAL UPGRADE - TEMPORARY DESIGN 1 - CONSTRUCTION PHASE 1



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 1,3,5,7,9,10,11 & 12 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.

PROJECT REFERENCE NO.	SHEET NO.
U-4026	Sig. 3

FIELD CONNECTION HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	41,42	NU	61,62	NU	81,82	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												

NU = NOT USED

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070LN2
CABINETCONTRACTOR SUPPLIED TS-2 NC-3B
SOFTWARE.....ASC/2070
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....12
LOAD SWITCHES USED.....2,4,6,8
PHASES USED.....2,4,6,8
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

SPECIAL DETECTOR NOTES

1. INSTALL A VIDEO DETECTION SYSTEM FOR DET. ZONE 4A. PERFORM INSTALLATION ACCORDING TO MANUFACTURER'S DIRECTION'S AND NCDOT ENGINEER-APPROVED MOUNTING LOCATIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
2. INSURE THAT THE VIDEO DETECTION SYSTEM IS COMPATIBLE WITH TS2 EQUIPMENT AND COMMUNICATES THROUGH 'SDLC' SERIAL PORTS.
3. INSTALL INDUCTIVE LOOPS FOR OTHER DETECTORS IN THE DETECTOR RACK #1 AND DETECTOR RACK #2 SET-UP DETAILS.

DETECTOR RACK #1 SET-UP DETAIL

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

BIU	CH1	SLOT	SLOT	CH1	SLOT	CH1	CH1	CH1
	NOT USED			L5 ø 2 *		L9 ø 4	L15 ø 6 *	NOT USED
	CH2	EMPTY	EMPTY	CH2	EMPTY	CH2	CH2	CH2
	L4 ø 2			NOT USED		L10 ø 4	NOT USED	L14 ø 6

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

LOOP NO.	LOOP PANEL TERMINALS
	L1A,L1B
	L2A,L2B
	L3A,L3B
2A	L4A,L4B
2B	L5A,L5B
	L6A,L6B
	L7A,L7B
	L8A,L8B
4B	L9A,L9B
4C	L10A,L10B
	L11A,L11B
	L12A,L12B
	L13A,L13B
6A	L14A,L14B
6B	L15A,L15B
	L16A,L16B
	L17A,L17B
8A	L18A,L18B
8B	L19A,L19B
8C	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			
3			
4	ø 2		
* 5	ø 2		3
6			
7			
8			
9	ø 4	DELAY	3
10	ø 4	DELAY	10
11			
12			
13			
14	ø 6		
* 15	ø 6		3
16			
17			
18	ø 8	DC/EC	100/4.0
19	ø 8	DELAY	3
20	ø 8	DELAY	10
21			
22			
23			
24			

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

DETECTOR RACK #2

BIU	CH1	CH1	SLOT	SLOT
	L19 ø 8	NOT USED		
	CH2	CH2	EMPTY	EMPTY
	L20 ø 8	L18 ø 8		

LOAD SWITCH ASSIGNMENT DETAIL
(program controller according to schedule in chart below)

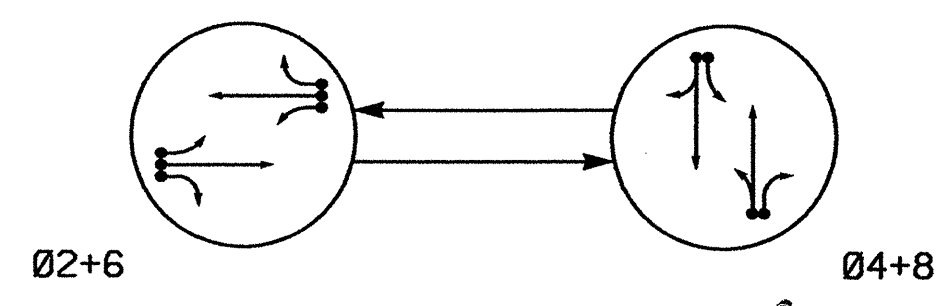
LOAD SWITCH NUMBER	FUNCTION
1	ø 1
2	ø 2
3	ø 3
4	ø 4
5	ø 5
6	ø 6
7	ø 7
8	ø 8
9	2 PED
10	4 PED
11	6 PED
12	8 PED

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2031T1
DESIGNED: April 2006
SEALED: 05-30-06
REVISED: N/A

Signal Upgrade - Temporary 1

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared in the Offices of: 122 N. McDowell St., Raleigh, NC 27603	SR 1613 (Davis Drive) at SR 1635 (McCrimmon Parkway)		SEAL NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE JR. DATE 6-1-06 SIG. INVENTORY NO. 05-2031T1
	Division 5 Wake County Morrisville PLAN DATE: May 2006 PREPARED BY: James Peterson REVIEWED BY:	REVIEWED BY:	

PHASING DIAGRAM



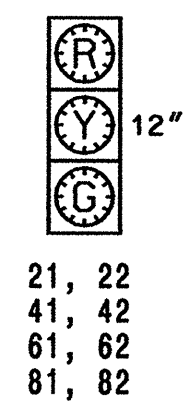
PHASING DIAGRAM DETECTION LEGEND

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

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

* SEE NOTE #2

SIGNAL FACE I.D.



LOOP & DETECTOR UNIT INSTALLATION CHART												
2070L CONTROLLER WITH NEMA TS-2 CABINET												
INDUCTIVE LOOPS						DETECTOR UNITS						
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING		PLACE CALL DURING GREEN	INHIBIT DELAY DURING GREEN
									FEATURE	TIME		
6A	6X6	6	420	X	-	6	-	X	-	- SEC.	ALL	NO
6B	6X60	2-4-2	0	X	-	6	-	X	DELAY	3 SEC.	ALL	NO
8A	6X6	6	420	X	-	8	-	X	DC/EC	100/4.0SEC.	ALL	YES
8B	6X40	2-4-2	0	X	-	8	-	X	DELAY	3 SEC.	ALL	YES
8C	6X40	2-4-2	0	X	-	8	-	X	DELAY	15 SEC.	ALL	YES
VIDEO DETECTION ZONE INSTALLATION CHART												
2A	6X6	-	420	X	-	2	X	-	-	- SEC.	ALL	NO
2B	6X60	-	0	X	-	2	X	-	DELAY	3 SEC.	ALL	NO
4A	6X6	-	420	X	-	4	-	X	DC/EC	100/4.0SEC.	ALL	YES
4B	6X60	-	0	X	-	4	X	-	DELAY	3 SEC.	ALL	YES
4C	6X60	-	0	X	-	4	X	-	DELAY	10 SEC.	ALL	YES

2 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Program phase 4 and phase 8 for dual entry.
- Set all detector units and detection zones to presence mode.
- Provide video detection system to accomplish the detection zones shown.

LEGEND

- PROPOSED
- EXISTING
- Traffic Signal Head
 - Modified Signal Head
 - Sign
 - Pedestrian Signal Head With Push Button & Sign
 - Signal Pole with Guy
 - Signal Pole with Sidewalk Guy
 - Inductive Loop Detector
 - Video Detection Zone
 - Controller & Cabinet
 - Junction Box
 - Direct-Bury
 - Right of Way with Marker
 - Directional Arrow
 - Pavement Marking Arrow
 - Construction Zone Drums
 - Construction Zone

THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

TIMING CHART				
2070L CONTROLLER AND TS-2 CABINET				
PHASE	Ø2	Ø4	Ø6	Ø8
MINIMUM GREEN	14 SEC.	7 SEC.	14 SEC.	7 SEC.
PASSAGE GAP	6.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	5.2 SEC.	5.2 SEC.	5.2 SEC.	4.8 SEC.
RED CLEARANCE	1.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.
MAX. 1	90 SEC.	40 SEC.	90 SEC.	40 SEC.
RECALL POSITION	MIN. RECALL	NONE	MIN. RECALL	NONE
VEHI. CALL MEMORY	LOCK	NONLOCK	LOCK	NONLOCK
WALK	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	ON	OFF	ON	OFF
ACTUATION B4 ADD	0 VEH.	- VEH.	0 VEH.	- VEH.
SEC. PER ACTUATION	2.5 SEC.	- SEC.	2.5 SEC.	- SEC.
MAX. INITIAL	46 SEC.	- SEC.	46 SEC.	- SEC.
TIME B4 REDUCTION	15 SEC.	- SEC.	15 SEC.	- SEC.
TIME TO REDUCE	45 SEC.	- SEC.	45 SEC.	- SEC.
MINIMUM GAP	3.4 SEC.	- SEC.	3.4 SEC.	- SEC.

SIGNAL UPGRADE - TEMPORARY DESIGN 2 - CONSTRUCTION PHASE 2

SR 1613 (DAVIS DRIVE)
AT
SR 1635 (MCCRIMMON PARKWAY)

DIVISION 5 WAKE COUNTY MORRISVILLE

PLAN DATE: APRIL 2006 PREPARED BY: C. Pierce

REVIEWED BY: Z. Little

REVIEWED BY: D. Ishak

REVISIONS

INIT. DATE

SCALE 0 50' 1"=50'

SEAL

NORTH CAROLINA

PROFESSIONAL ENGINEER

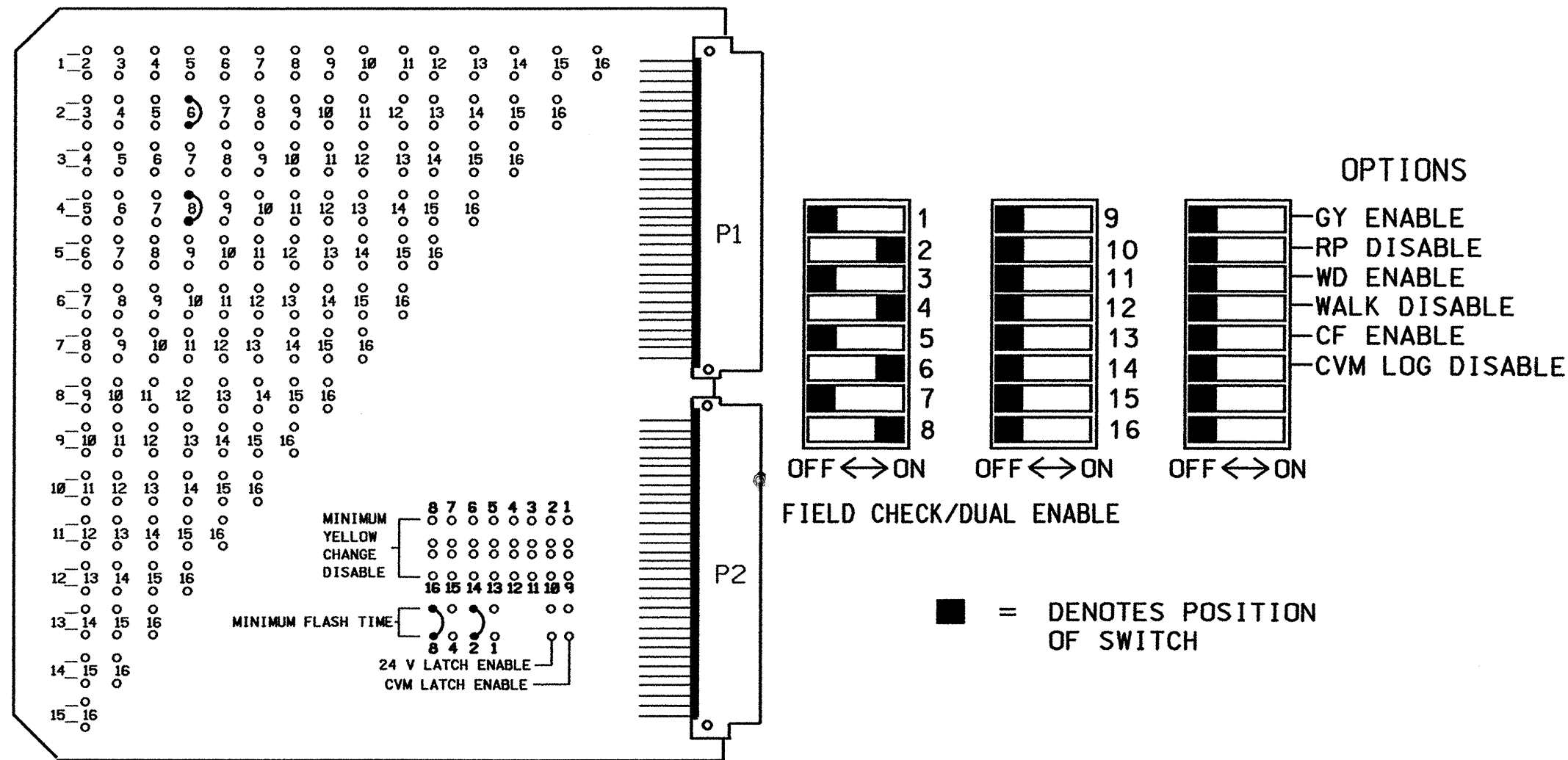
22037

30 MAY 2006

SIGNATURE DATE

SIG. INVENTORY NO. 05-2031T2

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 1,3,5,7,9,10,11 & 12 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.

FIELD CONNECTION HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	41,42	NU	61,62	NU	81,82	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												

NU = NOT USED

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070LN2
CABINETCONTRACTOR SUPPLIED TS-2 NC-3B
SOFTWARE.....ASC/2070
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....12
LOAD SWITCHES USED.....2,4,6,8
PHASES USED.....2,4,6,8
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

SPECIAL DETECTOR NOTES

1. INSTALL A VIDEO DETECTION SYSTEM FOR DET. ZONES 2A, 2B, 4A, 4B AND 4C. PERFORM INSTALLATION ACCORDING TO MANUFACTURER'S DIRECTION'S AND NCDOT ENGINEER-APPROVED MOUNTING LOCATIONS TO ACCOMPLISH DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
2. INSURE THAT THE VIDEO DETECTION SYSTEM IS COMPATIBLE WITH TS2 EQUIPMENT AND COMMUNICATES THROUGH 'SDLC' SERIAL PORTS.
3. INSTALL INDUCTIVE LOOPS FOR OTHER DETECTORS IN THE DETECTOR RACK #1 AND DETECTOR RACK #2 SET-UP DETAILS.

DETECTOR RACK #1 SET-UP DETAIL

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

BIU	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	CH1	CH1
	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	L15	NOT USED
							Ø 6	USED
							*	
							CH2	CH2
							NOT USED	L14
							Ø 6	Ø 6

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
	L5A,L5B
	L6A,L6B
	L7A,L7B
	L8A,L8B
	L9A,L9B
	L10A,L10B
	L11A,L11B
	L12A,L12B
	L13A,L13B
6A	L14A,L14B
6B	L15A,L15B
	L16A,L16B
	L17A,L17B
8A	L18A,L18B
8B	L19A,L19B
8C	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			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14	Ø 6		
* 15	Ø 6	DELAY	3
16			
17			
18	Ø 8	DC/EC	100/4.0
19	Ø 8	DELAY	3
20	Ø 8	DELAY	15
21			
22			
23			
24			

DETECTOR RACK #2

BIU	CH1	CH1	SLOT	SLOT
	L19	NOT USED		
	Ø 8	Ø 8		
	*			
	CH2	CH2	EMPTY	EMPTY
	L20	L18		
	Ø 8	Ø 8		

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	Ø 1
2	Ø 2
3	Ø 3
4	Ø 4
5	Ø 5
6	Ø 6
7	Ø 7
8	Ø 8
9	2 PED
10	4 PED
11	6 PED
12	8 PED

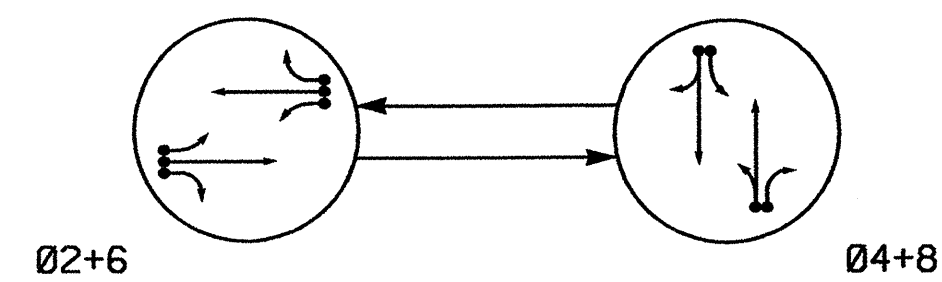
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2031T2
DESIGNED: April 2006
SEALED: 05-30-06
REVISED: N/A

Signal Upgrade - Temporary 2

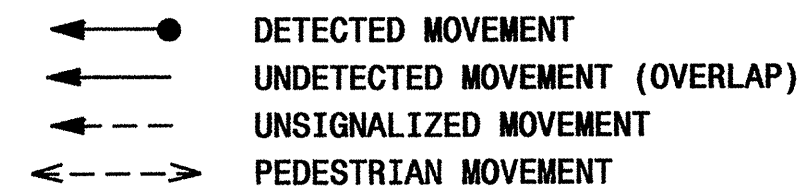
 122 N. McDowell St., Raleigh, NC 27603	ELECTRICAL AND PROGRAMMING DETAILS FOR:		SR 1613 (Davis Drive) at SR 1635 (McCrimmon Parkway)		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER JOHN T. ROWE JR. 008453
	Division 5 Wake County Morrisville		PLAN DATE: May 2006 REVIEWED BY: JWP		PREPARED BY: James Peterson REVIEWED BY:
	REVISIONS		INIT.		DATE

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

PHASING DIAGRAM



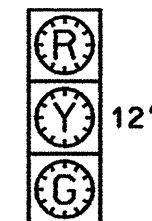
PHASING DIAGRAM DETECTION LEGEND



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

*SEE NOTE #2

SIGNAL FACE I.D.



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

LOOP & DETECTOR UNIT INSTALLATION CHART 2070L CONTROLLER WITH NEMA TS-2 CABINET											
INDUCTIVE LOOPS						DETECTOR UNITS					
LOOP NO.	SIZE (ft)	URNS	DIST. FROM STOPBAR (ft)	NEW EXISTING	NEMA PHASE	NEW EXISTING	TIMING	FEATURE	TIME	PLACE CALL DURING GREEN	INHIBIT DELAY DURING GREEN
8A	6X6	6	420	- X	8	- X	DC/EC	100/4.0SEC.	ALL	YES	YES
8B	6X40	2-4-2	0	- X	8	- X	DELAY	3 SEC.	ALL	YES	YES
8C	6X40	2-4-2	0	- X	8	- X	DELAY	15 SEC.	ALL	YES	YES

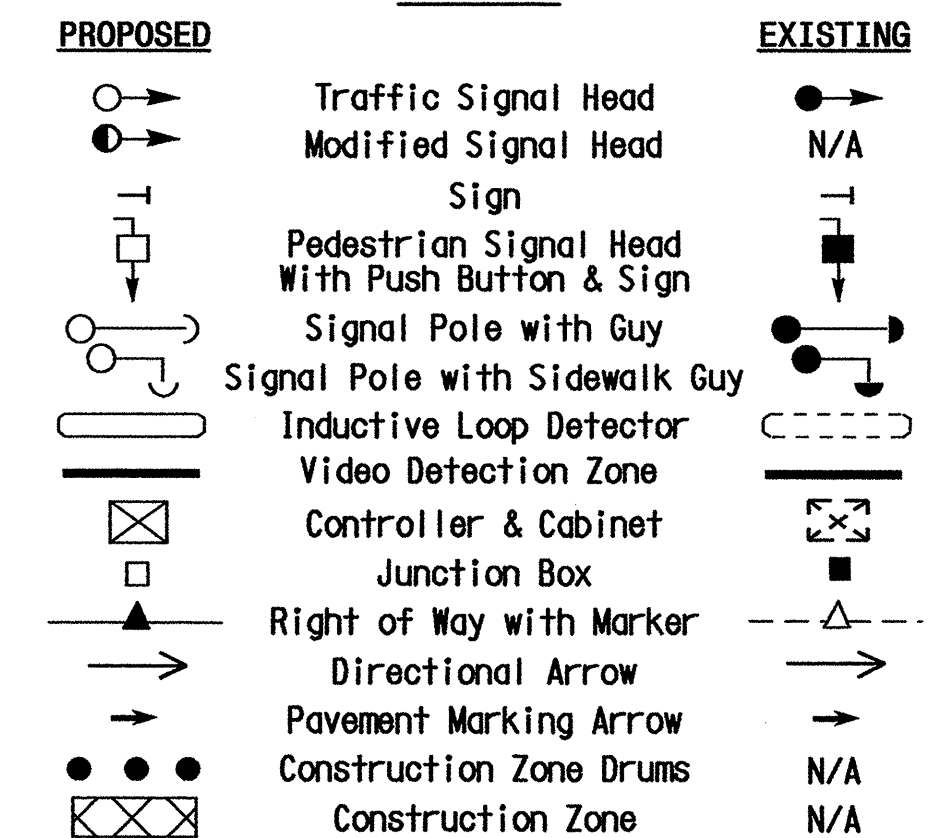
VIDEO DETECTION ZONE INSTALLATION CHART											
LOOP NO.	SIZE (ft)	URNS	DIST. FROM STOPBAR (ft)	NEW EXISTING	NEMA PHASE	NEW EXISTING	TIMING	FEATURE	TIME	PLACE CALL DURING GREEN	INHIBIT DELAY DURING GREEN
2A	6X6	-	420	X -	2	- X	-	-	SEC.	ALL	NO
2B	6X60	-	0	X -	2	- X	DELAY	3 SEC.	ALL	NO	NO
4A	6X6	-	420	- X	4	- X	DC/EC	100/4.0SEC.	ALL	YES	YES
4B	6X60	-	0	- X	4	- X	DELAY	3 SEC.	ALL	YES	YES
4C	6X60	-	0	- X	4	- X	DELAY	10 SEC.	ALL	YES	YES
6A	6X6	-	420	X -	6	X -	-	-	SEC.	ALL	NO
6B	6X60	-	0	X -	6	X -	DELAY	3 SEC.	ALL	NO	NO

2 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Program phase 4 and phase 8 for dual entry.
- Set all detector units and detection zones to presence mode.
- Provide video detection system to accomplish the detection zones shown.

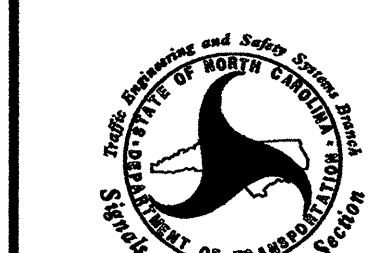
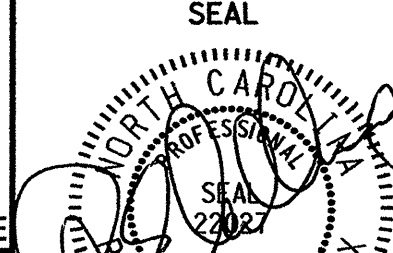
LEGEND



THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

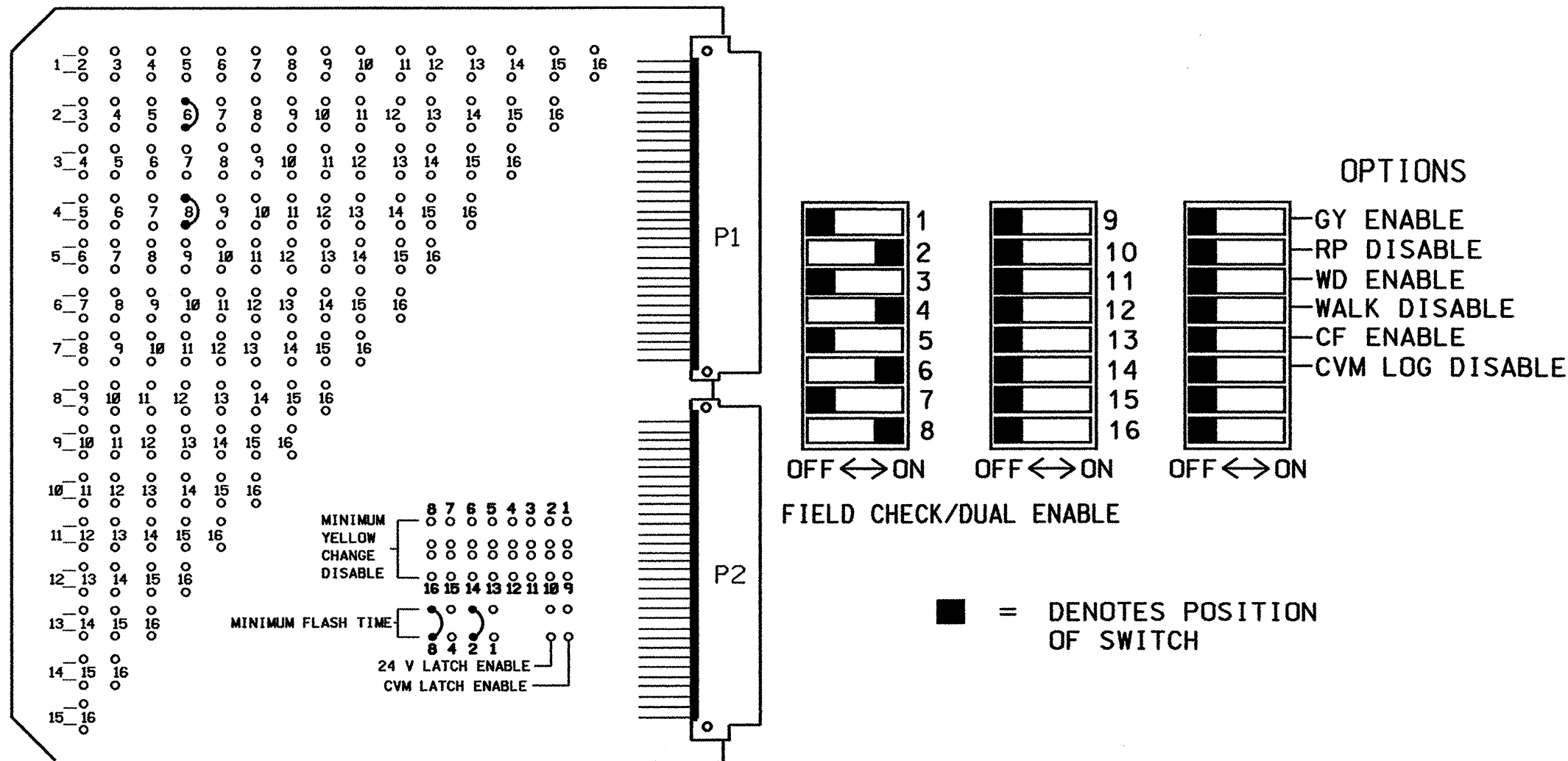
TIMING CHART 2070L CONTROLLER AND TS-2 CABINET				
PHASE	Ø2	Ø4	Ø6	Ø8
MINIMUM GREEN	14 SEC.	7 SEC.	14 SEC.	7 SEC.
PASSAGE GAP	6.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	5.2 SEC.	3.8 SEC.	5.2 SEC.	3.0 SEC.
RED CLEARANCE	1.0 SEC.	1.5 SEC.	1.0 SEC.	2.3 SEC.
MAX. 1	90 SEC.	40 SEC.	90 SEC.	40 SEC.
RECALL POSITION	MIN. RECALL	NONE	MIN. RECALL	NONE
VEH. CALL MEMORY	LOCK	NONLOCK	LOCK	NONLOCK
WALK	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	ON	OFF	ON	OFF
ACTUATION B4 ADD	0 VEH.	- VEH.	0 VEH.	- VEH.
SEC. PER ACTUATION	2.5 SEC.	- SEC.	2.5 SEC.	- SEC.
MAX. INITIAL	46 SEC.	- SEC.	46 SEC.	- SEC.
TIME B4 REDUCTION	15 SEC.	- SEC.	15 SEC.	- SEC.
TIME TO REDUCE	45 SEC.	- SEC.	45 SEC.	- SEC.
MINIMUM GAP	3.4 SEC.	- SEC.	3.4 SEC.	- SEC.

SIGNAL UPGRADE - TEMPORARY DESIGN 3 - CONSTRUCTION PHASE 3

 122 N. McDowell St., Raleigh, NC 27603	SR 1613 (DAVIS DRIVE) AT SR 1635 (MCCRIMMON PARKWAY)		SEAL  20 MAR 2006
	DIVISION 5 WAKE COUNTY MORRISVILLE PLAN DATE: APRIL 2006 REVIEWED BY: Z. Little PREPARED BY: C. Pierce REVIEWED BY: D. Ishak		SIGNATURE DATE
REVISIONS		INIT.	DATE
0 50' 1"=50'		SIG. INVENTORY NO. 05-203113	

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 1,3,5,7,9,10,11 & 12 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.

PROJECT REFERENCE NO.	SHEET NO.
U-4026	Sig. 7

FIELD CONNECTION HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	41,42	NU	61,62	NU	81,82	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												

NU = NOT USED

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070LN2
CABINETCONTRACTOR SUPPLIED TS-2 NC-3B
SOFTWARE.....ASC/2070
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....12
LOAD SWITCHES USED.....2,4,6,8
PHASES USED.....2,4,6,8
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

SPECIAL DETECTOR NOTES

1. INSTALL A VIDEO DETECTION SYSTEM FOR DET. ZONES 2A,2B,4A,4B,4C, 6A AND 6B. PERFORM INSTALLATION ACCORDING TO MANUFACTURER'S DIRECTION'S AND NCDOT ENGINEER-APPROVED MOUNTING LOCATIONS TO ACCOMPLISH DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
2. INSURE THAT THE VIDEO DETECTION SYSTEM IS COMPATIBLE WITH TS2 EQUIPMENT AND COMMUNICATES THROUGH 'SDLC' SERIAL PORTS.
3. INSTALL INDUCTIVE LOOPS FOR OTHER DETECTORS IN THE DETECTOR RACK #2 SET-UP DETAILS.

DETECTOR RACK #1 SET-UP DETAIL

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

BIU	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT	SLOT
	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

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
	L5A,L5B
	L6A,L6B
	L7A,L7B
	L8A,L8B
	L9A,L9B
	L10A,L10B
	L11A,L11B
	L12A,L12B
	L13A,L13B
	L14A,L14B
	L15A,L15B
	L16A,L16B
	L17A,L17B
8A	L18A,L18B
8B	L19A,L19B
8C	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			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18	ø8	DC/EC	100/4.0
19	ø8	DELAY	3
20	ø8	DELAY	15
21			
22			
23			
24			

DETECTOR RACK #2

BIU	CH1 L19 ø8	CH1 NOT USED	SLOT	SLOT
	CH2 L20 ø8	CH2 L18 ø8	EMPTY	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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-2031T3
DESIGNED: April 2006
SEALED: 05-30-06
REVISED: N/A

Signal Upgrade - Temporary 3

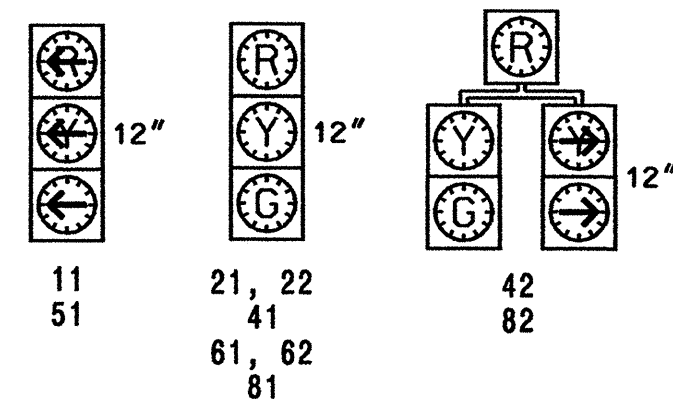
ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared in the Offices of: 122 N. McDowell St., Raleigh, NC 27603	SR 1613 (Davis Drive) at SR 1635 (McCrimmon Parkway) Division 5 Wake County Morrisville	SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 008453 JOHN T. ROWE, JR.
	PLAN DATE: May 2006 PREPARED BY: James Peterson	REVIEWED BY: [Signature] REVIEWED BY: [Signature]
REVISIONS		INIT. DATE
[Signature]		[Signature]
S16. INVENTORY NO. 05-2031T3		

* SEE NOTE #2

 Denotes L.E.D.



Denotes L.E.D.



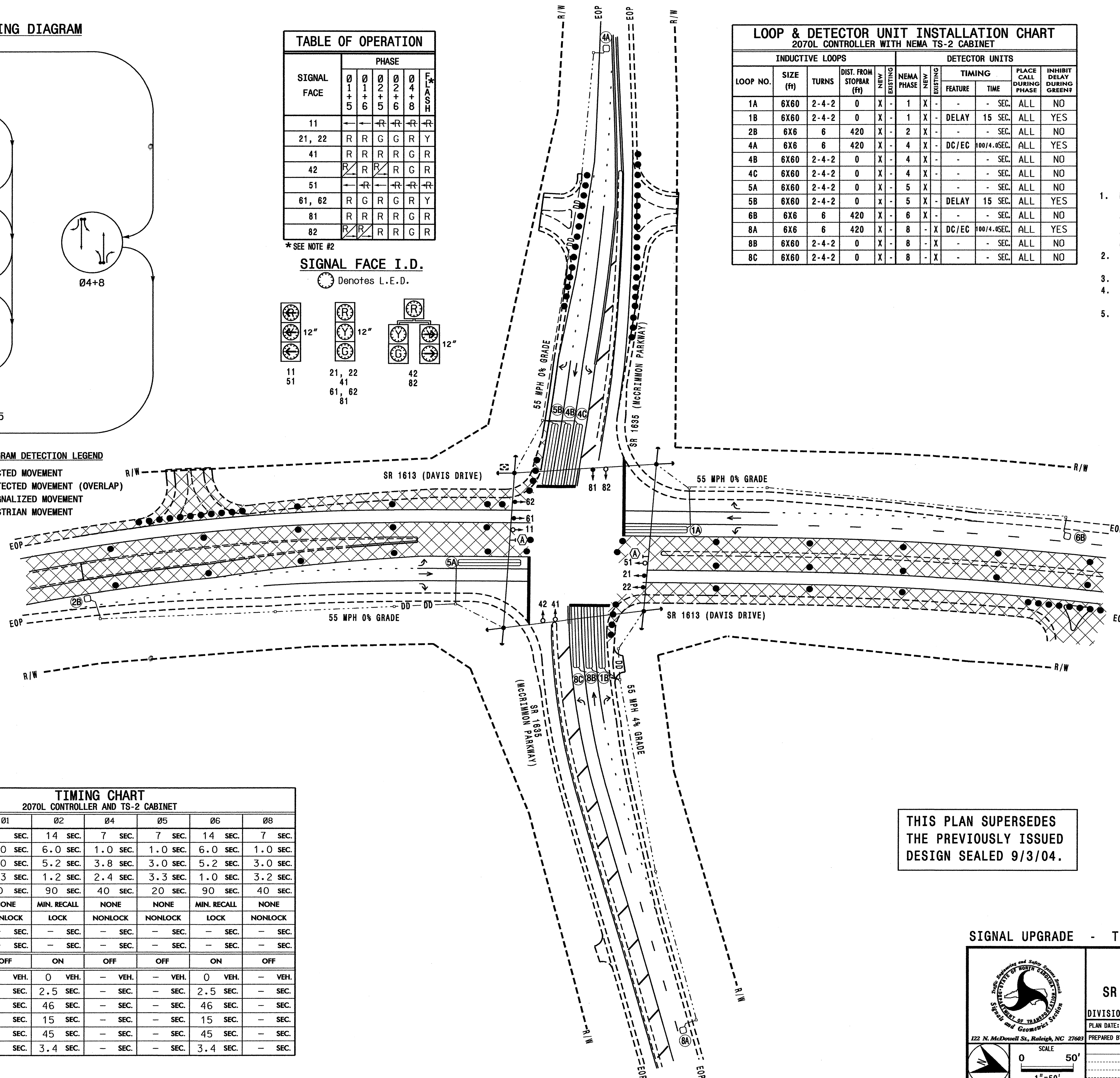
←●	DETECTED MOVEMENT
←	UNDETECTED MOVEMENT (OVERLAP)
← - -	UNSIGNALIZED MOVEMENT
← - - - - - →	PEDESTRIAN MOVEMENT

TIMING CHART						
2070L CONTROLLER AND TS-2 CABINET						
PHASE	Ø1	Ø2	Ø4	Ø5	Ø6	Ø8
MINIMUM GREEN	7 SEC.	14 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.
PASSAGE/GAP	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.2 SEC.	3.8 SEC.	3.0 SEC.	5.2 SEC.	3.0 SEC.
RED CLEARANCE	3.3 SEC.	1.2 SEC.	2.4 SEC.	3.3 SEC.	1.0 SEC.	3.2 SEC.
MAX. 1	20 SEC.	90 SEC.	40 SEC.	20 SEC.	90 SEC.	40 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
VEH. 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.	46 SEC.	— SEC.	— SEC.	46 SEC.	— SEC.
TIME B4 REDUCTION	— SEC.	15 SEC.	— SEC.	— SEC.	15 SEC.	— SEC.
TIME TO REDUCE	— SEC.	45 SEC.	— SEC.	— SEC.	45 SEC.	— SEC.
MINIMUM GAP	— SEC.	3.4 SEC.	— SEC.	— SEC.	3.4 SEC.	— SEC.

LOOP & DETECTOR UNIT INSTALLATION CHART											
2070L CONTROLLER WITH NEMA TS-2 CABINET											
INDUCTIVE LOOPS						DETECTOR UNITS					
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW EXISTING	NEMA PHASE	NEW EXISTING	TIMING		PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN	
							FEATURE	TIME			
1A	6X60	2-4-2	0	X -	1	X -	-	-	SEC.	ALL	NO
1B	6X60	2-4-2	0	X -	1	X -	DELAY	15	SEC.	ALL	YES
2B	6X6	6	420	X -	2	X -	-	-	- SEC.	ALL	NO
4A	6X6	6	420	X -	4	X -	DC/EC	100/4.	0SEC.	ALL	YES
4B	6X60	2-4-2	0	X -	4	X -	-	-	- SEC.	ALL	NO
4C	6X60	2-4-2	0	X -	4	X -	-	-	- SEC.	ALL	NO
5A	6X60	2-4-2	0	X -	5	X -	-	-	- SEC.	ALL	NO
5B	6X60	2-4-2	0	X -	5	X -	DELAY	15	SEC.	ALL	YES
6B	6X6	6	420	X -	6	X -	-	-	- SEC.	ALL	YES
8A	6X6	6	420	X -	8 -	X	DC/EC	100/4.	0SEC.	ALL	YES
8B	6X60	2-4-2	0	X -	8 -	X -	-	-	- SEC.	ALL	NO
8C	6X60	2-4-2	0	X -	8 -	X -	-	-	- SEC.	ALL	NO

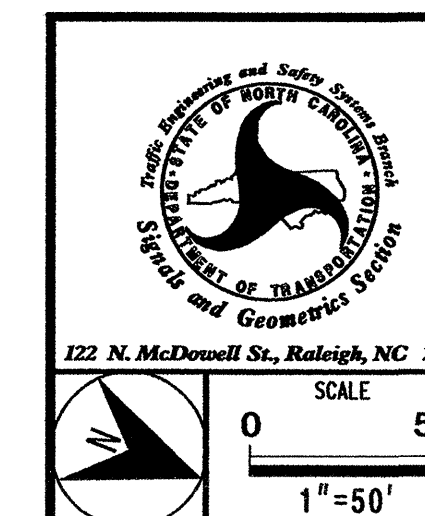
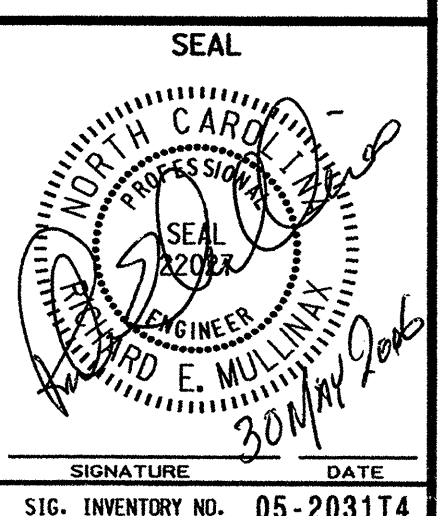
NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
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 and detection zones to presence mode.
5. Loop 6B numbered for final design.



**THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.**

SIGNAL UPGRADE - TEMPORARY DESIGN 4 - CONSTRUCTION PHASE 4

[illegible]

(program card and set switches as shown below)



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 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.

PHASE	1		2	3	4	5		6	7	8	2 PED	4 PED	6 PED	8 PED
SIGNAL HEAD NO.	11	82	21,22	NU	41,42	42	51	61,62	NU	81,82	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	5Y							
GREEN ARROW	1G	1G				5G	5G							

NU = NOT USED

BIU	CH1 L3 Ø 1	CH1 NOT USED	CH1 NOT USED	CH1 L5 Ø 2	CH1 NOT USED	CH1 L9 Ø 4	CH1 L15 Ø 6	CH1 L13 Ø 5
	CH2 NOT USED	CH2 L2 Ø 1	CH2 L8 Ø 4	CH2 NOT USED	CH2 L12 Ø 5	CH2 L10 Ø 4	CH2 NOT USED	CH2 NOT USED

LOOP NO.	LOOP PANEL TERMINALS
	L1A,L1B
1A	L2A,L2B
1B	L3A,L3B
	L4A,L4B
2B	L5A,L5B
	L6A,L6B
	L7A,L7B
4A	L8A,L8B
4B	L9A,L9B
4C	L10A,L10B
	L11A,L11B
5A	L12A,L12B
5B	L13A,L13B
	L14A,L14B
6B	L15A,L15B
	L16A,L16B
	L17A,L17B
8A	L18A,L18B
8B	L19A,L19B
8C	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.

CONTROLLER DETECTOR NO.	FUNCTION	TIMING	
		FEATURE	TIME(SEC)
1			
2	$\phi 1$		
3	$\phi 1$	DELAY	15
4			
5	$\phi 2$		
6			
7			
8	$\phi 4$	DC/EC	100/4.0
9	$\phi 4$		
10	$\phi 4$		
11			
12	$\phi 5$		
13	$\phi 5$	DELAY	15
14			
15	$\phi 6$		
16			
17			
18	$\phi 8$	DC/EC	100/4.0
19	$\phi 8$		
20	$\phi 8$		
21			
22			
23			
24			

BIU	CH1 L19 Ø 8	CH1 NOT USED	S L O T	S L O T
	CH2 L20 Ø 8	CH2 L18 Ø 8		

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

```

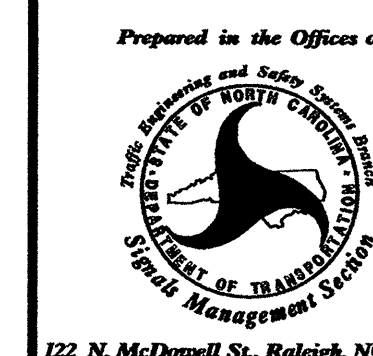
CONTROLLER.....CONTRACTOR SUPPLIED 2070LN2
CABINET .....CONTRACTOR SUPPLIED TS-2 NC-3B
SOFTWARE.....ASC/2070
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....12
LOAD SWITCHES USED.....1,2,4,5,6,8
PHASES USED.....1,2,4,5,6,8
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

```

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2031T4
DESIGNED: April 2006
SEALED: 05-30-06
REVISED: N/A

Signal Upgrade - Temporary 4

**ELECTRICAL AND PROGRAMMING
DETAILS FOR**



SR 1613 (Davis Drive)
at
SR 1635 (McCrimmon Parkway)

Division 5 Wake County Morrisville

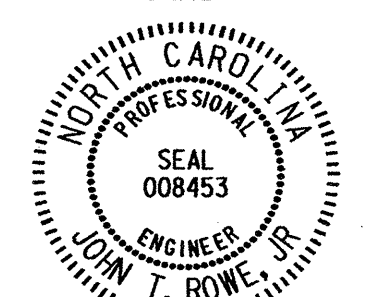
PLAN DATE:	May 2006	REVIEWED BY:	YH/01
------------	----------	--------------	-------

PREPARED BY: James Peterson	REVIEWED BY:
-----------------------------	--------------

REVISIONS		INIT.	DATE
-----------	--	-------	------

[illegible]

SEAL



Pha Tral 6-1-06

SIGNATURE DATE	
SIG. INVENTORY NO. 05-2031T4	

8 PHASE
FULLY ACTUATED
(CARY SIGNAL SYSTEM)

NOTES

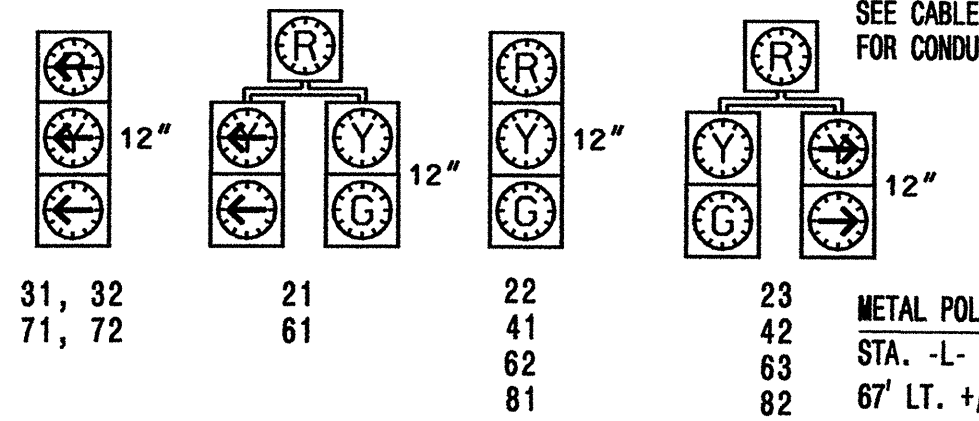
1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Install backplates for signal heads numbered 31, 32, 41, 42, 71, 72, 81, and 82.
4. Omit phase 1 during phase 2 on.
5. Omit phase 5 during phase 6 on.
6. Program controller to clear from phase 2+6 to phases 1 and/or 5 by progressing through phase 4+8 (See Electrical Details).
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
8. During coordination, phase 3 and/or phase 7 may be lagged.
9. Thirty days after implementation of the revised signal operations, sign B and/or orange flags may be removed at the discretion of the Regional Traffic Engineer.
10. Set all detector units to presence mode.

LOOP & DETECTOR UNIT INSTALLATION CHART											
2070L CONTROLLER WITH NEMA TS-2 CABINET											
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW EXISTING	NEMA PHASE	NEW EXISTING	TIMING		PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN	
							FEATURE	TIME			
1A	6X60	2-4-2	0	X	-	6	X	DELAY	3 SEC.	ALL	NO
1B	6X60	2-4-2	0	-	X	1	X	DELAY	15 SEC.	ALL	YES
2A	6X6	6	420	X	-	2	X	-	- SEC.	ALL	NO
2B	6X6	6	420	-	X	2	-	-	- SEC.	ALL	NO
3A	6X60	2-4-2	0	X	-	3	X	DELAY	3 SEC.	ALL	YES
3B	6X60	2-4-2	0	-	X	3	-	-	- SEC.	ALL	NO
4A	6X6	6	420	-	X	4	-	DC/EC	100/4.0 SEC.	ALL	YES
4B	6X60	2-4-2	0	-	X	4	-	-	- SEC.	ALL	NO
5A	6X60	2-4-2	0	X	-	2	X	DELAY	3 SEC.	ALL	NO
5B	6X60	2-4-2	0	-	X	5	-	DELAY	15 SEC.	ALL	YES
6A	6X6	6	420	X	-	6	X	-	- SEC.	ALL	NO
6B	6X6	6	420	-	X	6	-	-	- SEC.	ALL	NO
7A	6X60	2-4-2	0	X	-	7	X	DELAY	3 SEC.	ALL	YES
7B	6X60	2-4-2	0	-	X	7	-	-	- SEC.	ALL	NO
8A	6X6	6	420	-	X	8	-	DC/EC	100/4.0 SEC.	ALL	YES
8B	6X60	2-4-2	0	-	X	8	-	-	- SEC.	ALL	NO

TABLE OF OPERATION											
SIGNAL FACE	PHASE								F	A	S
	Ø 1 + 5	Ø 1 + 6	Ø 2 + 5	Ø 2 + 6	Ø 3 + 7	Ø 3 + 8	Ø 4 + 7	Ø 4 + 8			
21	R	R	G	G	R	R	R	R	Y		
22	R	R	G	G	R	R	R	R	Y		
23	R	R	G	G	R	R	R	R	Y		
31, 32	R	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		
61	R	R	G	G	R	R	R	R	Y		
62	R	R	G	G	R	R	R	R	Y		
63	R	R	G	G	R	R	R	R	Y		
71, 72	R	R	R	R	R	R	R	R			
81	R	R	R	R	R	R	G	G	R		
82	R	R	R	R	R	R	G	G	R		

SIGNAL FACE I.D.

Denotes L.E.D.



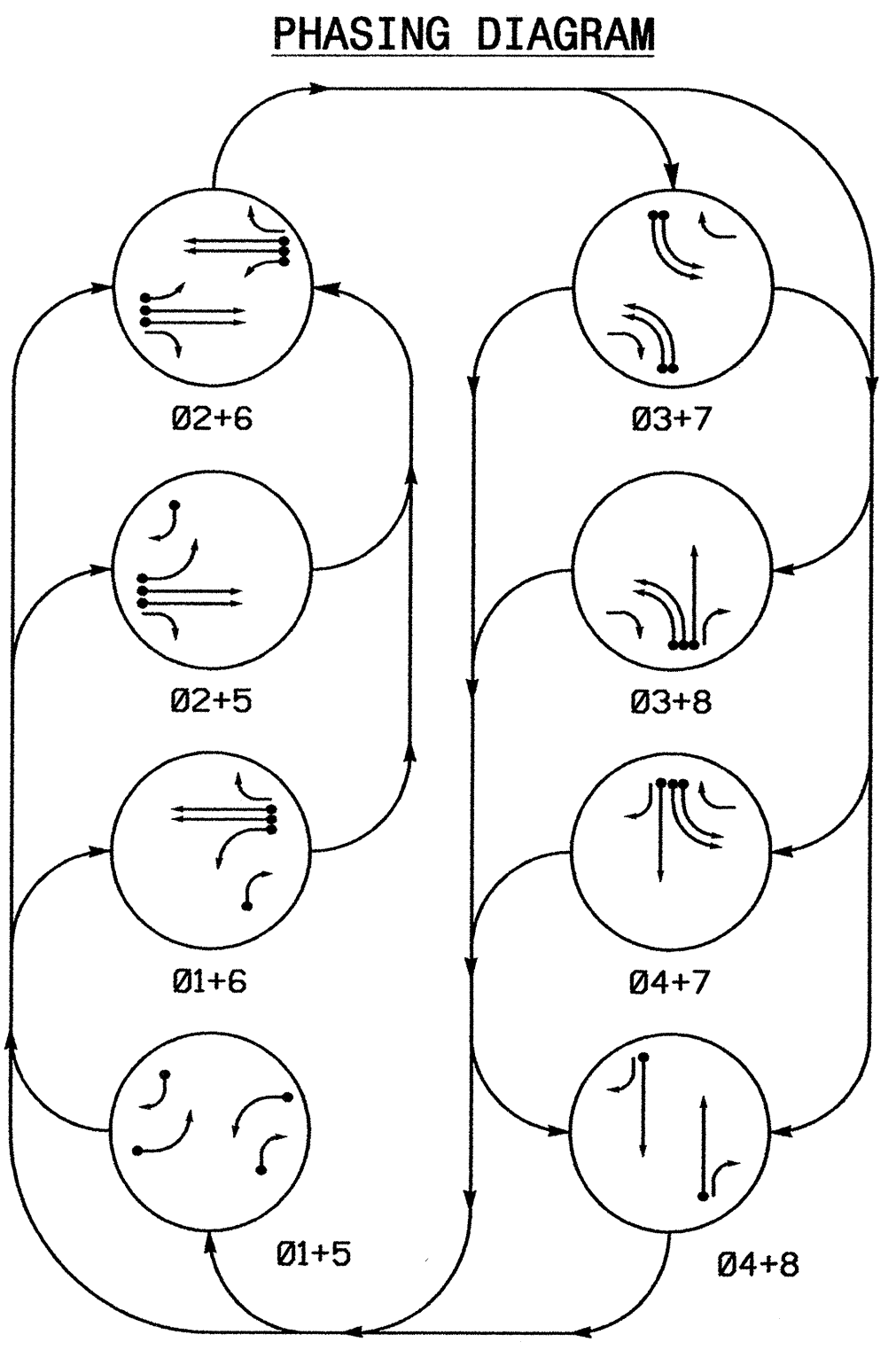
SEE CABLE ROUTING PLAN SHEET FOR CONDUIT ROUTING.

METAL POLE AND MASTARM #1
STA. -L- 67+69 +/-
67' LT. +/-

METAL POLE AND MASTARM #2
STA. -L- 69+10 +/-
87' LT. +/-

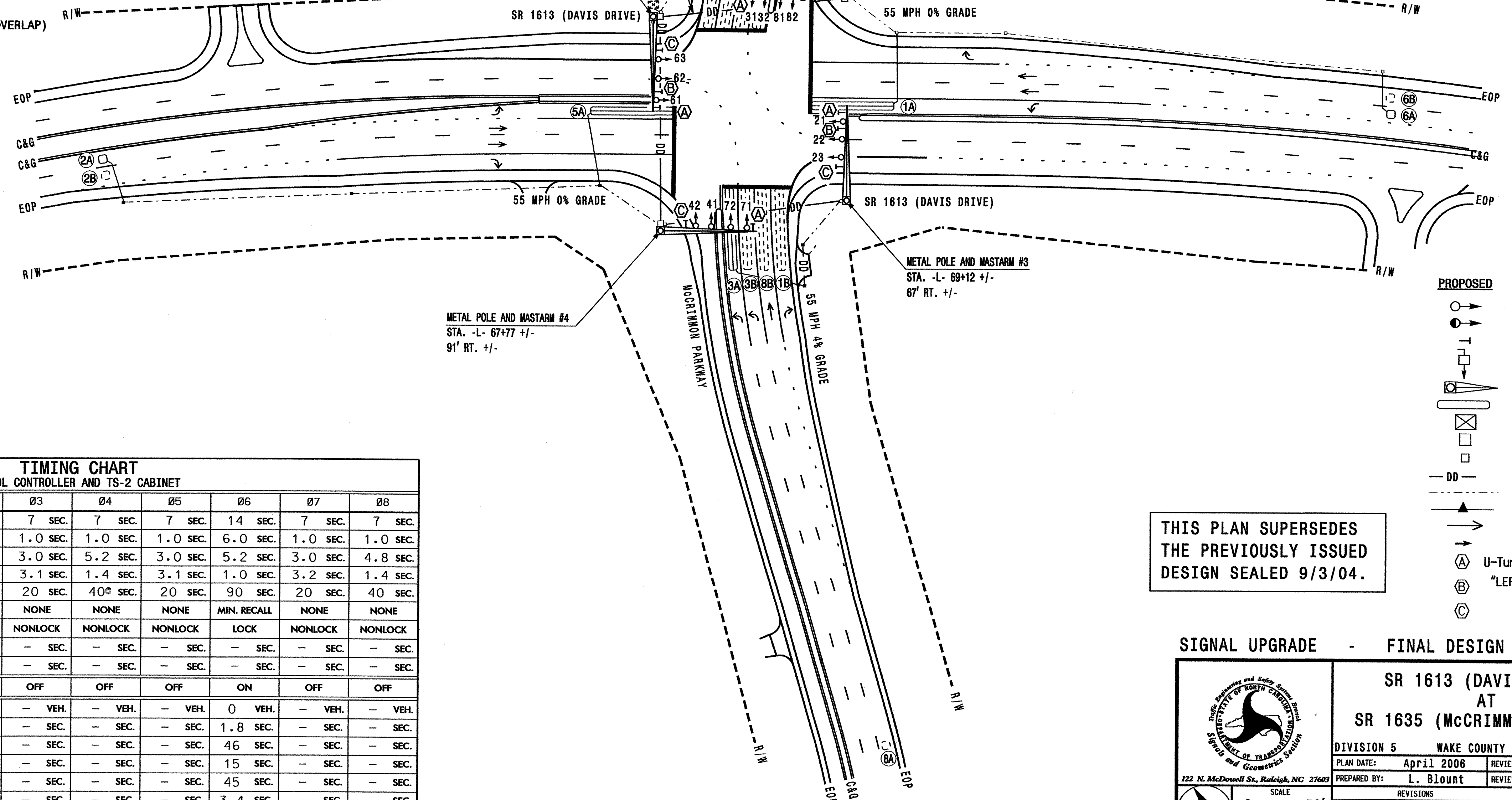
METAL POLE AND MASTARM #3
STA. -L- 69+12 +/-
67' RT. +/-

METAL POLE AND MASTARM #4
STA. -L- 67+77 +/-
91' RT. +/-



PHASING DIAGRAM DETECTION LEGEND

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



LEGEND

- | PROPOSED | EXISTING |
|--|----------------------------------|
| Traffic Signal Head | Modified Signal Head |
| Pedestrian Signal Head With Push Button & Sign | Metal Pole with Mastarm |
| Inductive Loop Detector | Controller & Cabinet |
| Oversized Junction Box | Junction Box |
| Directional Drill | 2-in Underground Conduit |
| Right of Way with Marker | Directional Arrow |
| Pavement Marking Arrow | U-Turn "MUST YIELD" Sign (R3-27) |
| "LEFT TURN YIELD ON GREEN" Sign (R10-12) W/ Orange Flags | Overhead Street Sign |

THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

TIMING CHART								
2070L CONTROLLER AND TS-2 CABINET								
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	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.2 SEC.	3.0 SEC.	5.2 SEC.	3.0 SEC.	5.2 SEC.	3.0 SEC.	4.8 SEC.
RED CLEARANCE	3.1 SEC.	1.2 SEC.	3.1 SEC.	1.4 SEC.	3.1 SEC.	1.0 SEC.	3.2 SEC.	1.4 SEC.
MAX. 1	20 SEC.	90 SEC.	20 SEC.	40 SEC.	20 SEC.	90 SEC.	20 SEC.	40 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	OFF
ACTUATION B4 ADD	- VEHI.	0 VEHI.	- VEHI.	- VEHI.	- VEHI.	0 VEHI.	- VEHI.	- VEHI.
SEC. PER ACTUATION	- SEC.	1.8 SEC.	- SEC.	- SEC.	- SEC.	1.8 SEC.	- SEC.	- SEC.
MAX. INITIAL	- SEC.	46 SEC.	- SEC.	- SEC.	- SEC.	46 SEC.	- SEC.	- SEC.
TIME B4 REDUCTION	- SEC.	15 SEC.	- SEC.	- SEC.	- SEC.	15 SEC.	- SEC.	- SEC.
TIME TO REDUCE	- SEC.	45 SEC.	- SEC.	- SEC.	- SEC.	45 SEC.	- SEC.	- SEC.
MINIMUM GAP	- SEC.	3.4 SEC.	- SEC.	- SEC.	- SEC.	3.4 SEC.	- SEC.	- SEC.

SIGNAL UPGRADE - FINAL DESIGN

SR 1613 (DAVIS DRIVE)
AT
SR 1635 (MCCRIMMON PARKWAY)

DIVISION 5 WAKE COUNTY MORRISVILLE

PLAN DATE: April 2006 REVIEWED BY: Zachary Little

PREPARED BY: L. Blount REVIEWED BY: Doumit Ishak

REVISIONS INIT. DATE

SIGNATURE DATE

SIG. INVENTORY NO. 05-2031

(program card and set switches as shown below)



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

BIU	CH1 L3 Ø 1	CH1 L1 Ø 6 ✱	CH1 L7 Ø 3	CH1 L5 Ø 2	CH1 L11 Ø 2 ✱	CH1 L9 Ø 4	CH1 L15 Ø 6	CH1 L13 Ø 5
	CH2 L4 Ø 2	CH2 L2 Ø 1	CH2 L8 Ø 4	CH2 L6 Ø 3	CH2 L12 Ø 5	CH2 NOT USED	CH2 L16 Ø 7	CH2 L14 Ø 6

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
		2A	L4A, L4B
		2B	L5A, L5B
		3A	L6A, L6B
		3B	L7A, L7B
		4A	L8A, L8B
		4B	L9A, L9B
ADD JUMPERS FROM: L11A TO L12A, AND L11B TO L12B	5A	L11A, L11B	
		L12A, L12B	
		L13A, L13B	
	5B	L14A, L14B	
	6A	L15A, L15B	
	6B	L16A, L16B	
	7A	L17A, L17B	
	7B	L18A, L18B	
	8A	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	Ø6	DELAY	3
2	Ø1	DELAY	15
3	Ø1	DELAY	15
4	Ø2		
5	Ø2		
6	Ø3	DELAY	3
7	Ø3		
8	Ø4	DC/EC	100/4.0
9	Ø4		
10			
* 11	Ø2	DELAY	3
12	Ø5	DELAY	15
13	Ø5	DELAY	15
14	Ø6		
15	Ø6		
16	Ø7	DELAY	3
17	Ø7		
18	Ø8	DC/EC	100/4.0
19	Ø8		
20			
21			
22			
23			
24			

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

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 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 CARY SIGNAL SYSTEM.

BIU	CH1 L19 Ø 8	CH1 L17 Ø 7	S L O T	S L O T
	CH2 NOT USED	CH2 L18 Ø 8	E M P T Y	E M P T Y

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+, 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.

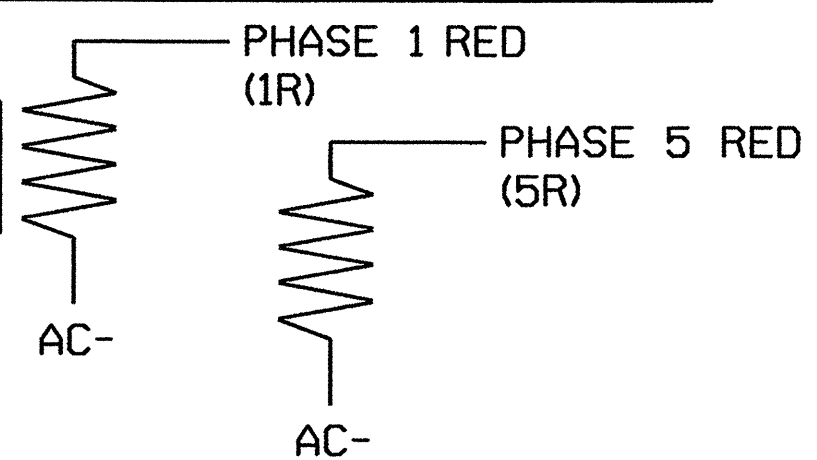
PHASE	1	2	3		4	5	6	7		8	2 PED	4 PED	6 PED	8 PED
SIGNAL HEAD NO.	61,82	21, 22,23	23	31,32	41,42	21,42	61, 62,63	63	71,72	81,82	NU	NU	NU	NU
RED	*	2R			4R	*	6R			8R				
YELLOW		2Y			4Y		6Y			8Y				
GREEN		2G			4G		6G			8G				
RED ARROW				3R					7R					
YELLOW ARROW	1Y		3Y	3Y		5Y		7Y	7Y					
GREEN ARROW	1G		3G	3G		5G		7G	7G					

NU = NOT USED

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

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 SIGNAL SEQUENCE MONITOR TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON PHASES THAT DO NOT USE THE RED DISPLAY IN THE FIELD.

```

CONTROLLER.....CONTRACTOR SUPPLIED 2070LN2
CABINET .....CONTRACTOR SUPPLIED TS-2 NC-3B
SOFTWARE.....ASC/2070
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....12
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

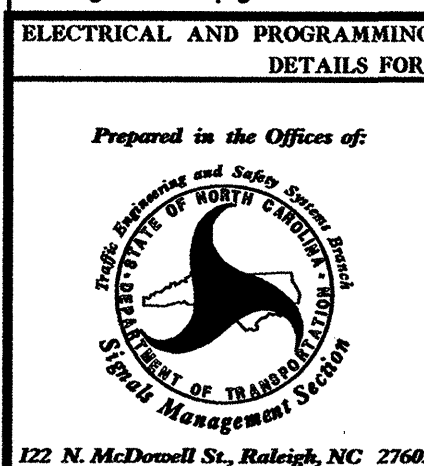
```

(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

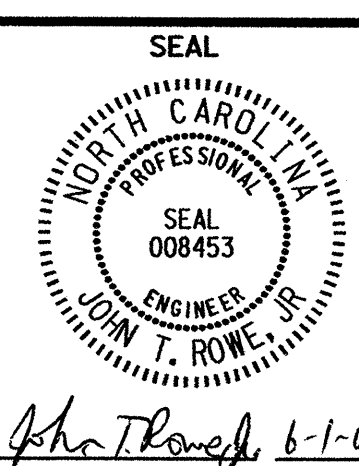
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2031
DESIGNED: April 2006
SEALED: 05-30-06
REVISED: N/A

Signal Upgrade - Final



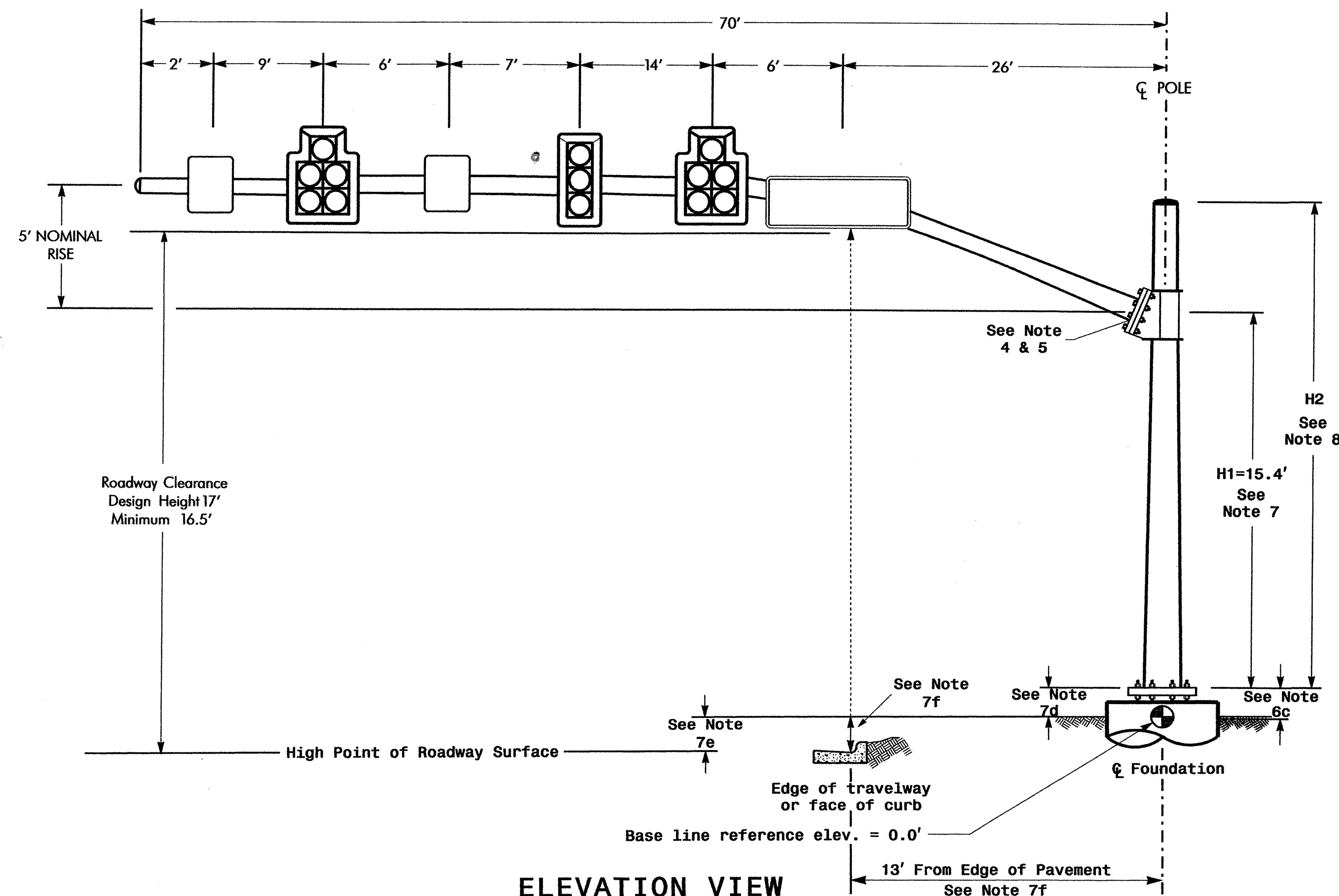
SR 1613 (Davis Drive)
at
SR 1635 (McCrimmon Parkway)

Division 5	Wake County	Morrisville
PLAN DATE: May 2006	REVIEWED BY:	
PREPARED BY: James Peterson	REVIEWED BY:	
REVISITONS	INIT.	DATE

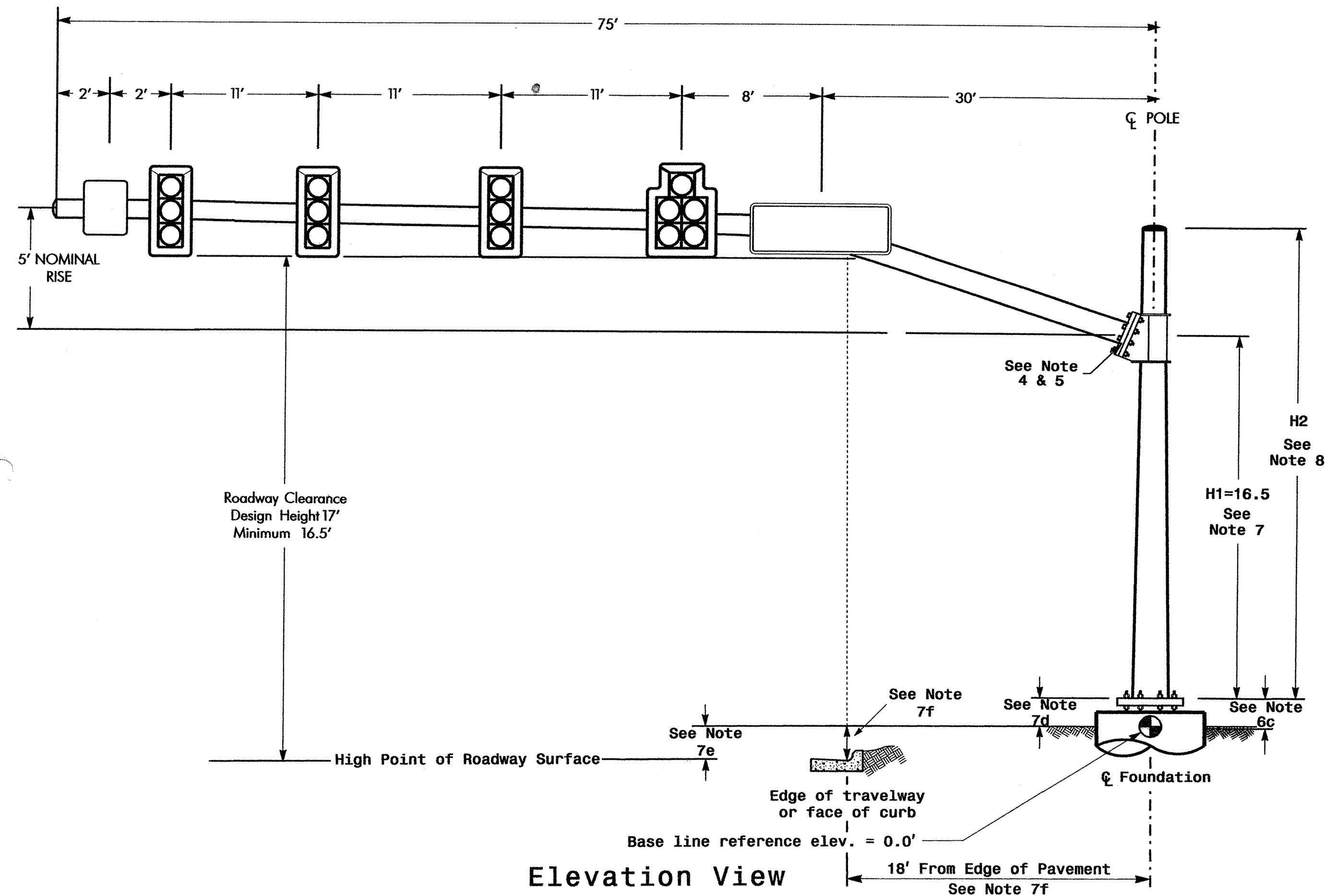


SIGNATURE	DATE
SIG. INVENTORY NO.	05-2031

Design Loading for METAL POLE NO. 1



Design Loading for METAL POLE NO. 2

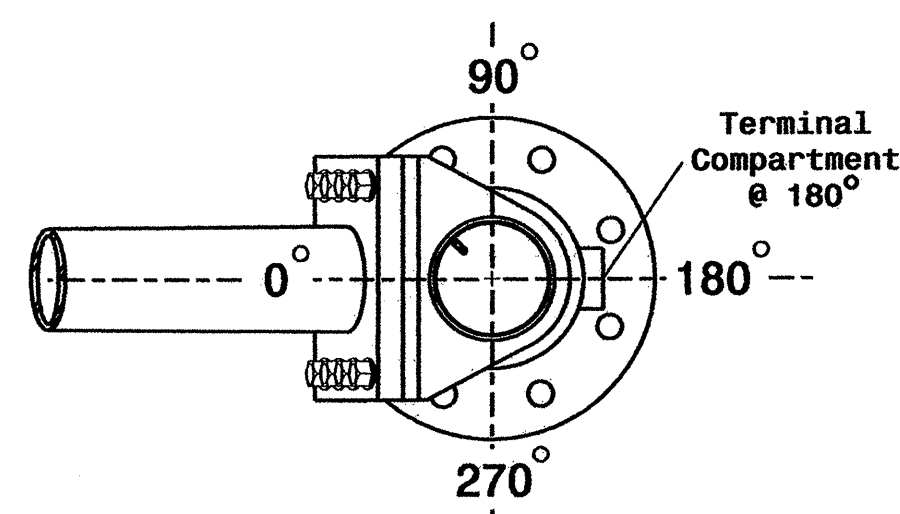


SPECIAL NOTE

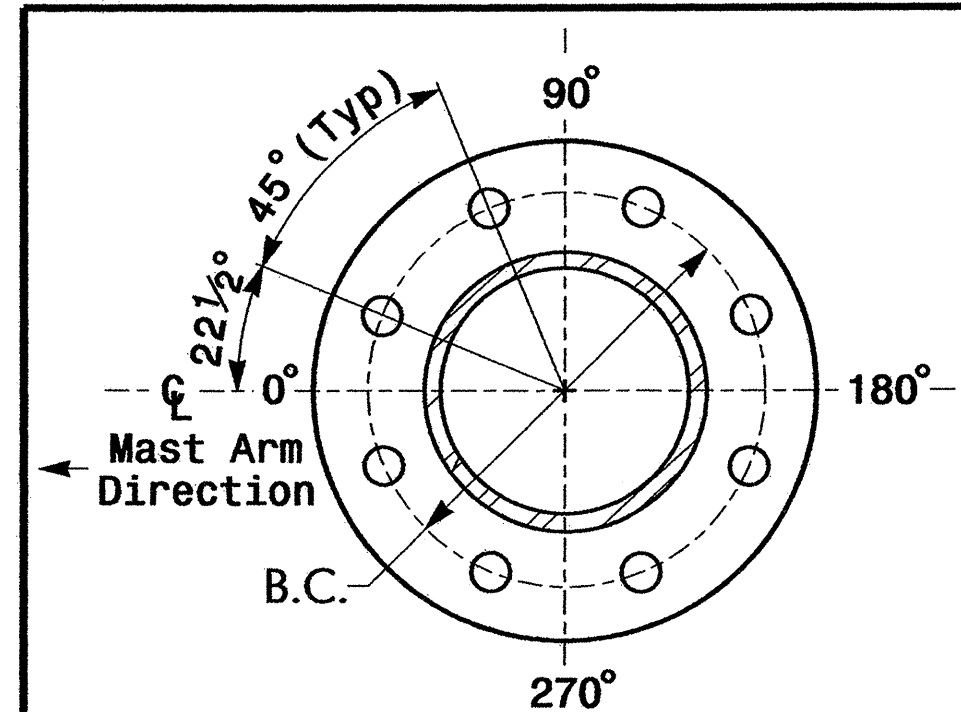
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

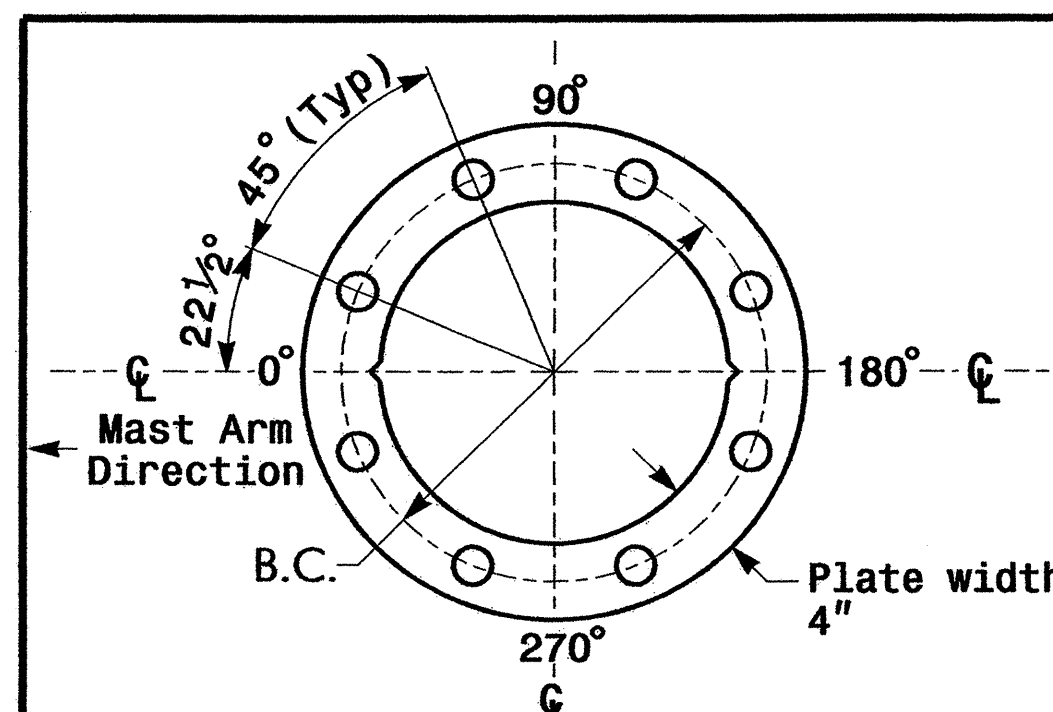
Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at Foundation @ ground level	+/-0.0 ft.	+/-0.0 ft.
Elevation difference at High point of roadway surface	-1.8 ft.	-2.9 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.



POLE RADIAL ORIENTATION



See Note 6



For 8 Bolt Base Plate

METAL POLE No. 1 and 2

PROJECT REFERENCE NO.	SHEET NO.
U-4026	Sig.12

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	7.5 S.F.	30.0" W X 36.0" L	14 LBS
	OVERHEAD STREET NAME SIGN	16.0 S.F.	24" W X 96" L	30 LBS

NOTES

Design Reference Material

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

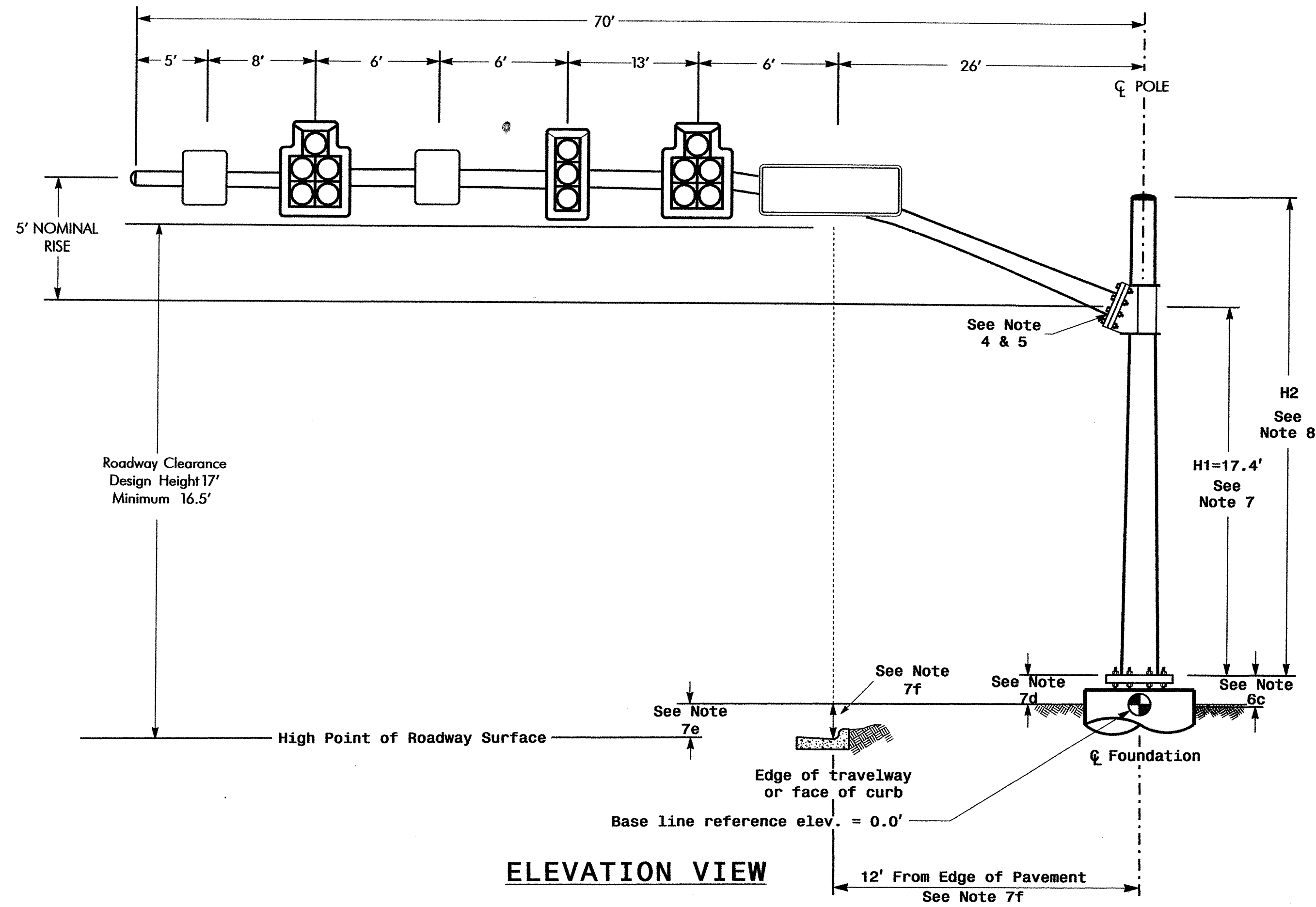
Design Requirements

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- 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.
- The arm-to-pole attachment is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

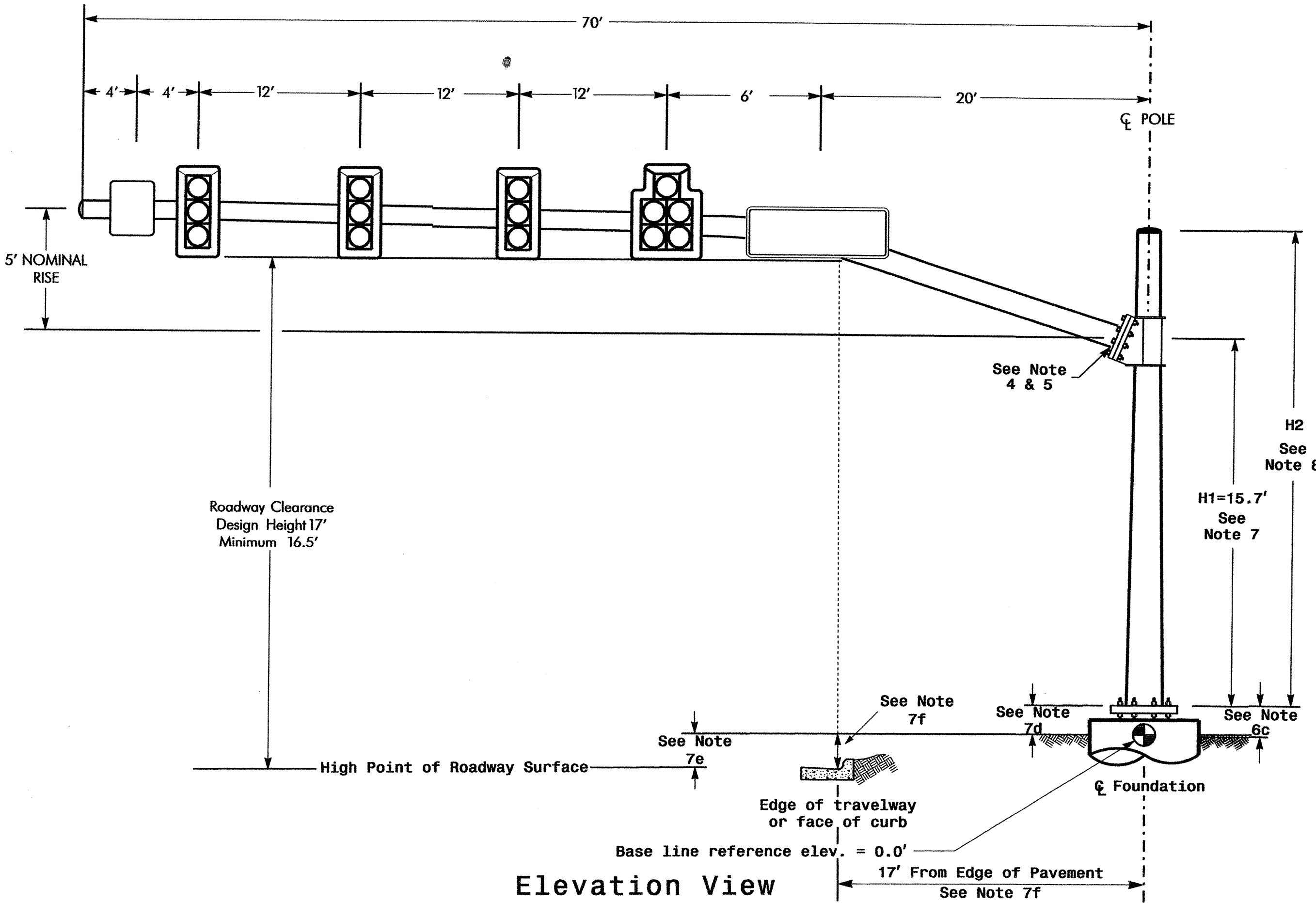
122 N. McDowell St., Raleigh, NC 27603 SCALE: 0 N/A	SR 1613 (DAVIS DRIVE) AT SR 1635 (McCRIMMON PARKWAY) DIVISION 5 WAKE COUNTY MORRISVILLE PLAN DATE: MARCH 2005 REVIEWED BY: Z. LITTLE PREPARED BY: C. PIERCE REVIEWED BY: D. ISHAK		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22027 8 MAY 2006 SIGNATURE DATE SIG. INVENTORY NO. 05-2031
	REVISIONS		
	INIT. DATE		
	DATE		

Design Loading for METAL POLE NO. 3



ELEVATION VIEW

Design Loading for METAL POLE NO. 4



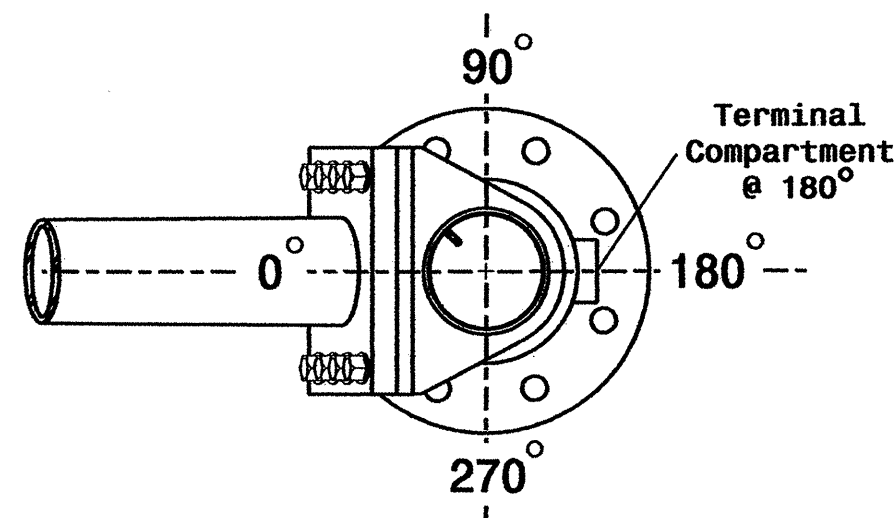
Elevation View

SPECIAL NOTE

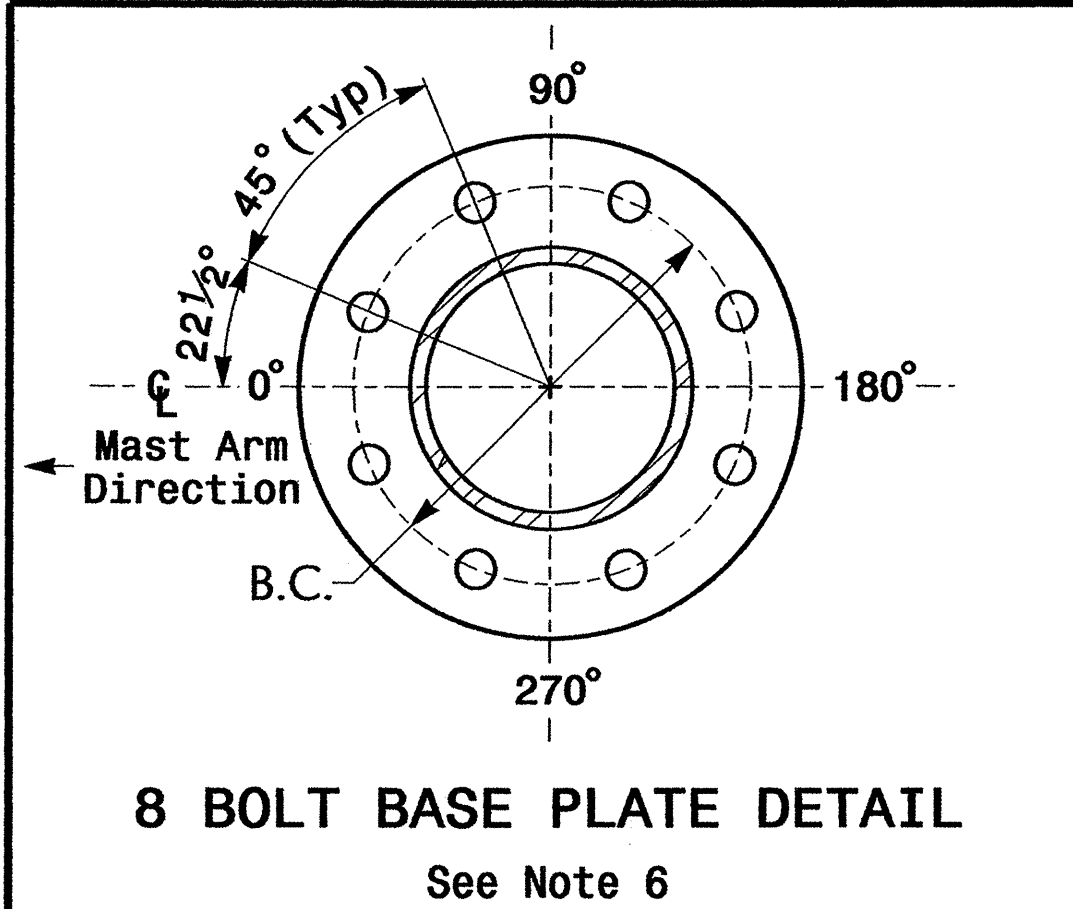
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

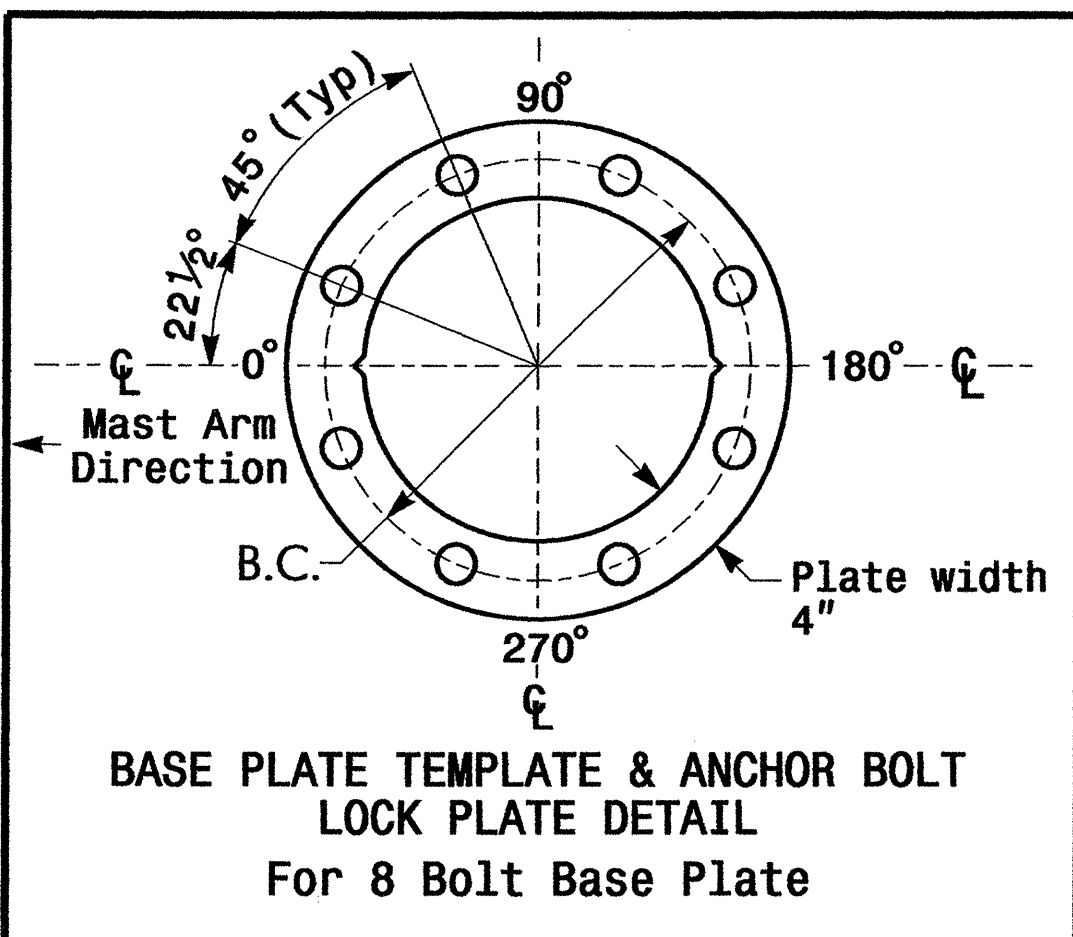
Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at Foundation @ ground level	+/-0.0 ft.	+/-0.0 ft.
Elevation difference at High point of roadway surface	-3.8 ft.	-2.1 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 6



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

METAL POLE No. 3 and 4

PROJECT REFERENCE NO.	SHEET NO.
U-4026	Sig.13

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	7.5 S.F.	30.0" W X 36.0" L	14 LBS
	OVERHEAD STREET NAME SIGN	16.0 S.F.	24" W X 96" L	30 LBS

NOTES

Design Reference Material

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

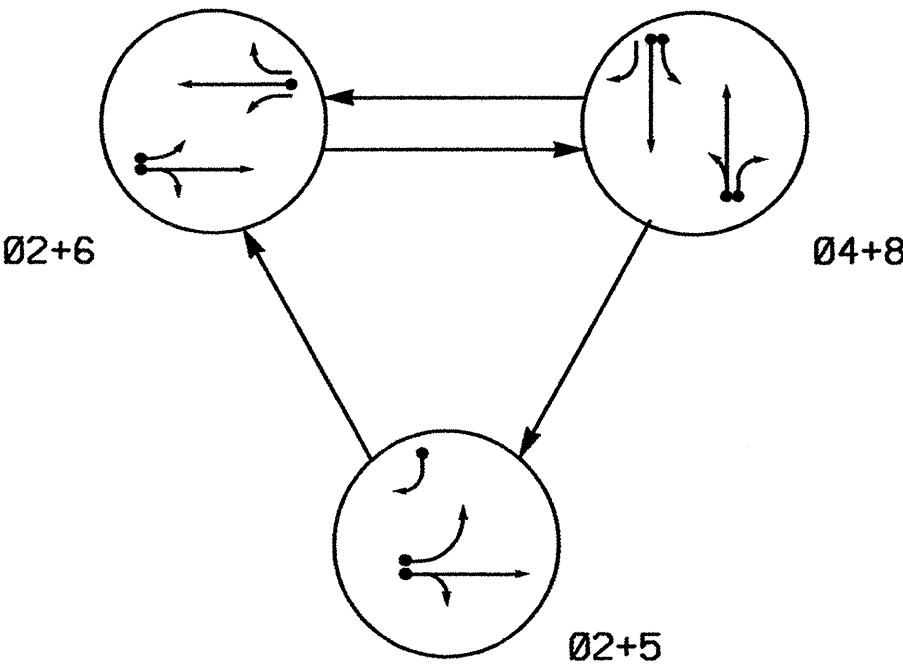
Design Requirements

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- 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.
- The arm-to-pole attachment is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

Prepared in the Office of: 122 N. McDowell St., Raleigh, NC 27603 SCALE: 0 N/A	SR 1613 (DAVIS DRIVE) AT SR 1635 (MCCRIMMON PARKWAY) DIVISION 5 WAKE COUNTY MORRISVILLE PLAN DATE: MARCH 2005 REVIEWED BY: Z. LITTLE PREPARED BY: C. PIERCE REVIEWED BY: D. ISHAK REVISIONS: INIT. DATE		SEAL SIGNATURE: DATE SIG. INVENTORY NO. 05-2031
	0 N/A		

PHASING DIAGRAM



SIGNAL FACE	PHASE			
	02 +5	02 +6	04 +8	FLASH
21		G	R	Y
22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
61, 62	R	G	R	Y
81, 82	R	R	G	R

SIGNAL FACE I.D.
Denotes L.E.D.

LOOP & DETECTOR UNIT INSTALLATION CHART											
INDUCTIVE LOOPS						DETECTOR UNITS					
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING	FEATURE	INHIBIT DELAY DURING GREEN?
2A	6X6	6	420	X	-	2	-	X	-	- SEC.	NO
4A	6X60	2-4-2	0	-	X	4	-	X	-	- SEC.	NO
4B	6X60	2-4-2	0	-	X	4	-	X	-	- SEC.	NO
5A	6X40	2-4-2	0	-	X	2	-	X	DELAY	3 SEC.	NO
5B	6X60	2-4-2	0	-	X	5	-	X	DELAY	15 SEC.	YES
6A	6X6	6	420	-	X	6	-	X	-	- SEC.	NO
8A	6X60	2-4-2	0	-	X	8	-	X	DELAY	3 SEC.	YES
8B	6X60	2-4-2	0	-	X	8	-	X	DELAY	15 SEC.	YES

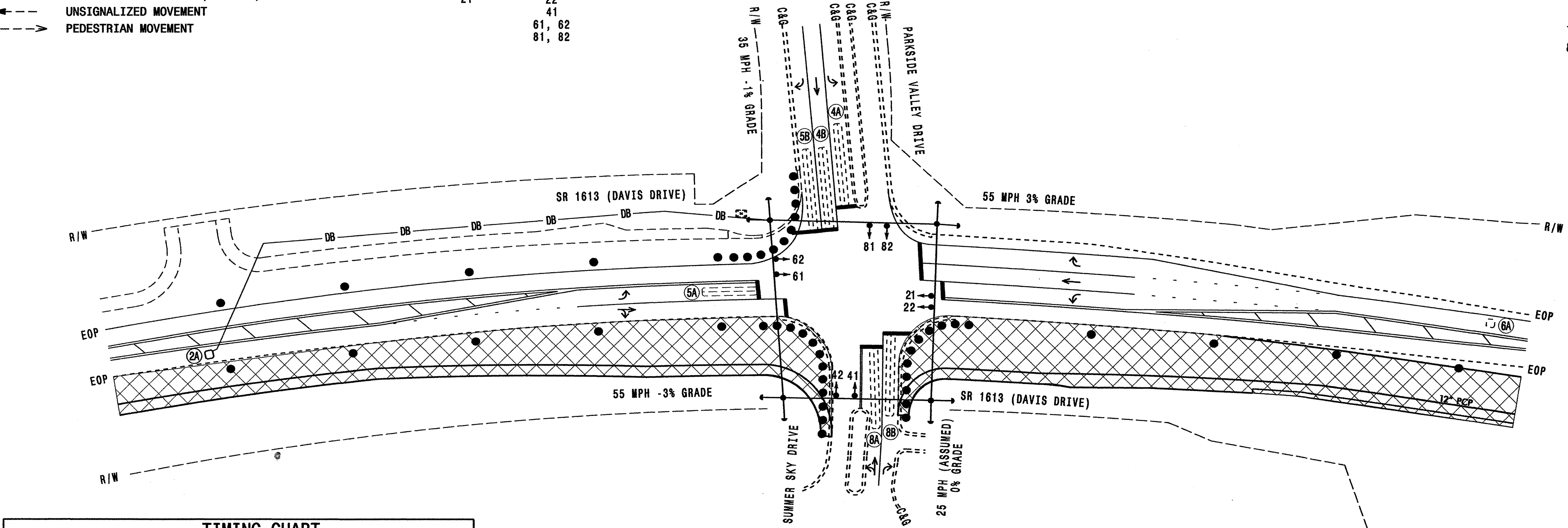
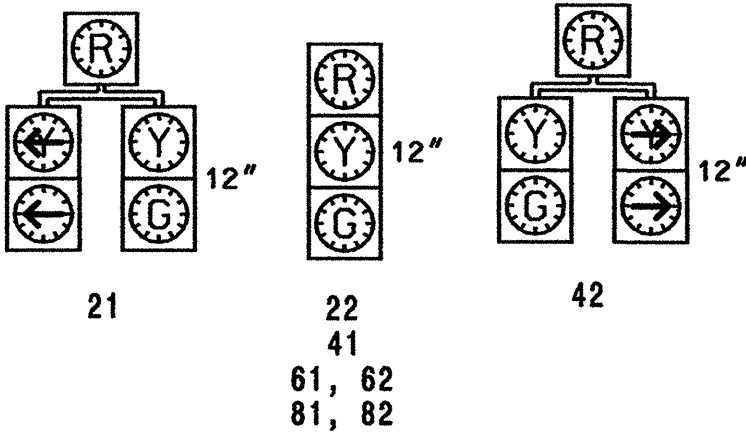
3 PHASE
FULLY ACTUATED
(CARY SIGNAL SYSTEM)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Omit phase 5 during phase 6 on.
- Program controller to clear from phase 2+6 to phase 2+5 by progressing through phase 4+8 (see Electrical Details).
- Program phase 4 and phase 8 for dual entry.
- Set all detector units to presence mode.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

PHASING DIAGRAM DETECTION LEGEND

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



TIMING CHART					
2070L CONTROLLER WITH TS-2 CABINET					
PHASE	02	04	05	06	08
MINIMUM GREEN	14 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.
PASSAGE GAP	6.0 SEC.	1.0 SEC.	2.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	5.5 SEC.	3.9 SEC.	3.0 SEC.	4.9 SEC.	3.2 SEC.
RED CLEARANCE	1.1 SEC.	1.7 SEC.	3.2 SEC.	1.0 SEC.	2.6 SEC.
MAX. 1	90 SEC.	40 SEC.	20 SEC.	90 SEC.	40 SEC.
RECALL POSITION	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
VEH. CALL MEMORY	LOCK	NONLOCK	NONLOCK	LOCK	NONLOCK
WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	ON	OFF	OFF	ON	OFF
ACTUATION B4 ADD	0 VEH.	-	- VEH.	0 VEH.	-
SEC. PER ACTUATION	2.5 SEC.	- SEC.	- SEC.	2.5 SEC.	- SEC.
MAX. INITIAL	46 SEC.	- SEC.	- SEC.	46 SEC.	- SEC.
TIME B4 REDUCTION	15 SEC.	- SEC.	- SEC.	15 SEC.	- SEC.
TIME TO REDUCE	45 SEC.	- SEC.	- SEC.	45 SEC.	- SEC.
MINIMUM GAP	3.4 SEC.	- SEC.	- SEC.	3.4 SEC.	- SEC.

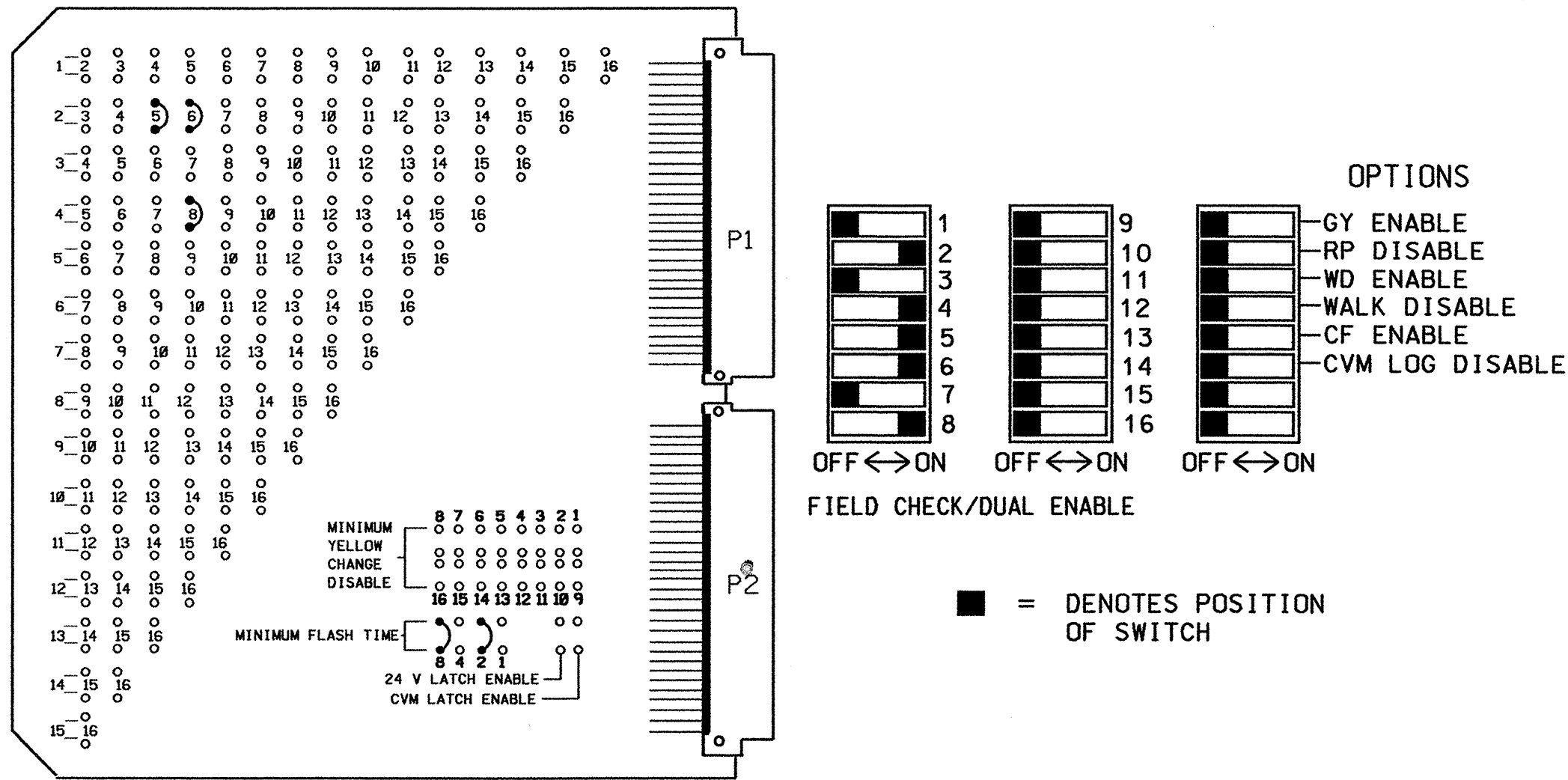
LEGEND	
PROPOSED	EXISTING
Traffic Signal Head	N/A
Modified Signal Head	N/A
Sign	N/A
Pedestrian Signal Head With Push Button & Sign	N/A
Signal Pole with Guy	N/A
Signal Pole with Sidewalk Guy	N/A
Inductive Loop Detector	N/A
Controller & Cabinet	N/A
Junction Box	N/A
2-in Underground Conduit	N/A
Right of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

THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

SIGNAL UPGRADE - TEMPORARY DESIGN 1 - CONSTRUCTION PHASES 1 & 2

		SR 1613 (DAVIS DRIVE) AT PARKSIDE VALLEY DRIVE AND SUMMER SKY DRIVE		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER 30 DAY	
DIVISION 5 WAKE COUNTY MORRISVILLE		PLAN DATE: April 2006 REVIEWED BY: Z. Little		PREPARED BY: L. Blount REVIEWED BY: D. Y. Ishak	
122 N. McDowell St., Raleigh, NC 27603		SCALE 0 50'		SIGNATURE DATE	
1"=50'		REVISIONS		SIG. INVENTORY NO. 05-2213T1	

EDI MODEL MMU-16E
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL
(existing)



MMU PROGRAMMING CARD

DETECTOR RACK SET-UP DETAIL

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

	CH1	CH1	CH1	CH1	S L O T	CH1	S L O T	S L O T	S L O T	S L O T
	L 3 ø 4	L 1 ø 2	L 7 ø 6	L 5 ø 2 *		L 9 ø 8				
BIU	CH2 L 4 ø 5	CH2 L 2 ø 4	CH2 NOT USED	CH2 L 6 ø 5	E M P T Y	CH2 L10 ø 8	E M P T Y	E M P T Y	E M P T Y	E M P T Y

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

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

ADD JUMPERS FROM:
L5A TO L6A, AND
L5B TO L6B

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 2		
2	ø 4		
3	ø 4		
4	ø 5	DELAY	15
* 5	ø 2	DELAY	3
6	ø 5	DELAY	15
7	ø 6		
8			
9	ø 8	DELAY	3
10	ø 8	DELAY	15
11			
12			
13			
14			
15			
16			

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

NOTES

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

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070*
CABINETCONTRACTOR SUPPLIED TS-2 NC-8A*
SOFTWARE.....ASC/2070
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....2,4,5,6,8
PHASES USED.....2,4,5,6,8
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED
*EXISTING EQUIPMENT

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

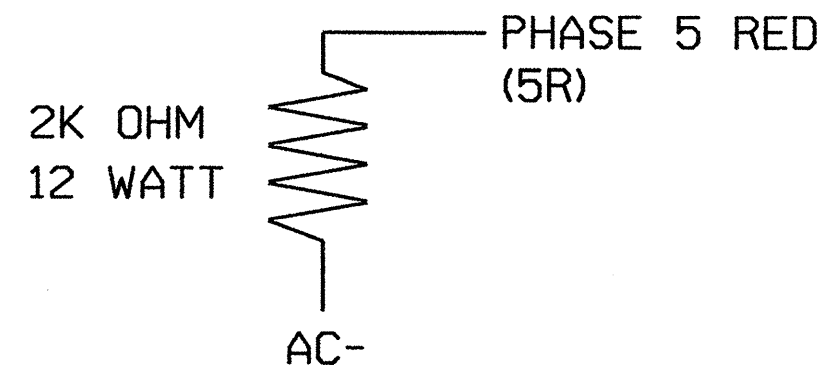
LOAD SWITCH NUMBER	FUNCTION
1	ø 1
2	ø 2
3	ø 3
4	ø 4
5	ø 5
6	ø 6
7	ø 7
8	ø 8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

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	21,42	61,62	NU	81,82	NU	NU	NU	NU	NU	NU	NU	NU
GREEN		2G		4G		6G		8G								
YELLOW		2Y		4Y		6Y		8Y								
RED		2R		4R	*	6R		8R								
RED ARROW																
YELLOW ARROW					5Y											
GREEN ARROW					5G											
PEDESTRIAN																
WALK																

NU = NOT USED
*DENOTES INSTALL LOAD RESISTOR (SEE BELOW)

LOAD RESISTOR INSTALLATION DETAIL



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.

SPECIAL BACK-UP PROTECTION NOTES

- PROGRAM CONTROLLER TO OMIT PHASE 5 DURING PHASE 6 ON.
- TO ACCOMPLISH BACK-UP FEATURE DESCRIBED IN NOTE 1, ENABLE 'BACK-UP PROTECTION GROUP 1' UNDER CONTROLLER SUBMENU 9: 'OPTION DATA'.
- IT IS REQUIRED FOR THE CONTROLLER TO BE PROGRAMMED SUCH THAT IF IT IS IN PHASE 2+6, THEN PHASE 2+5 CANNOT BE SERVED NEXT WITHOUT FIRST PROGRESSING THROUGH PHASE 4+8. 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.

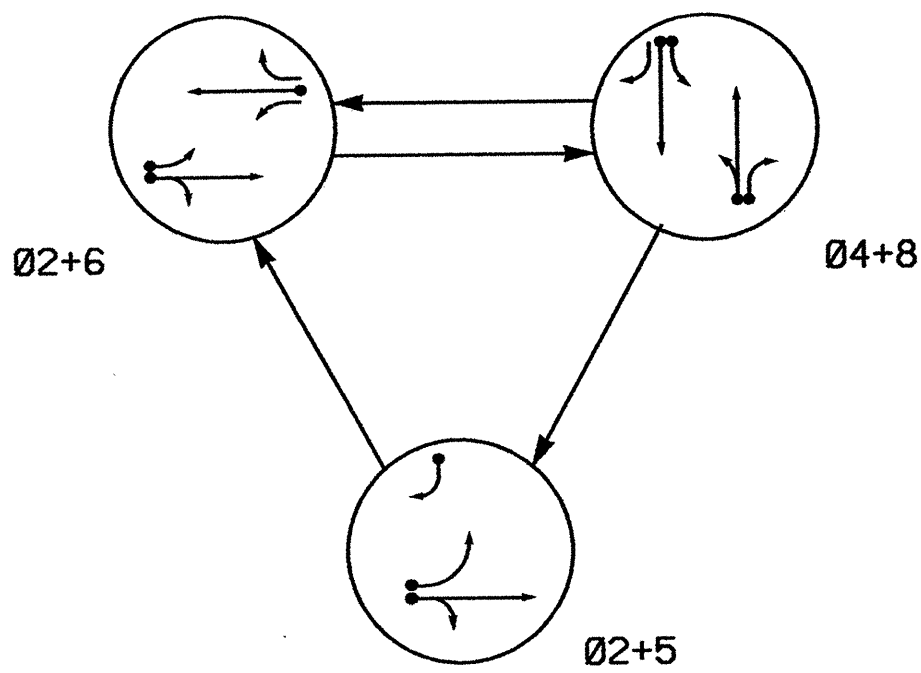
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2213T1
DESIGNED: April 2006
SEALED: 05-30-06
REVISED: NA

THIS ELECTRICAL DETAIL SUPERSEDES
THE DETAIL SEALED ON 09-15-05

Signal Upgrade - Temporary Design 1

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared in the Offices of: 122 N. McDowell St., Raleigh, NC 27603	SR 1613 (Davis Dr.) at Parkside Valley Drive and Summer Sky Drive	
	Division 5 PLAN DATE: May 2006 PREPARED BY: James Peterson	Wake County Morrisville REVIEWED BY: JWP REVIEWED BY:
REVISIONS		INIT. DATE
SIGNATURE		DATE
6-1-06		
SIG. INVENTORY NO. 05-2213T1		

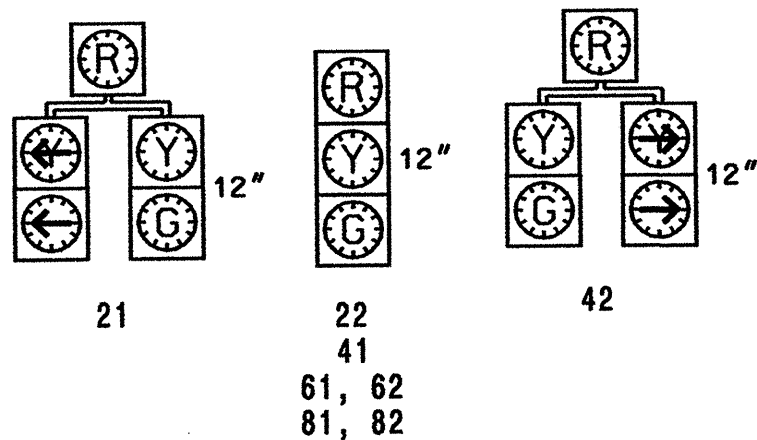
PHASING DIAGRAM



SIGNAL FACE	PHASE			
	Ø 2+5	Ø 2+6	Ø 4+8	FLASH
21	G	R	Y	
22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
61, 62	R	G	R	Y
81, 82	R	R	G	R

SIGNAL FACE I.D.

Denotes L.E.D.



PHASING DIAGRAM DETECTION LEGEND

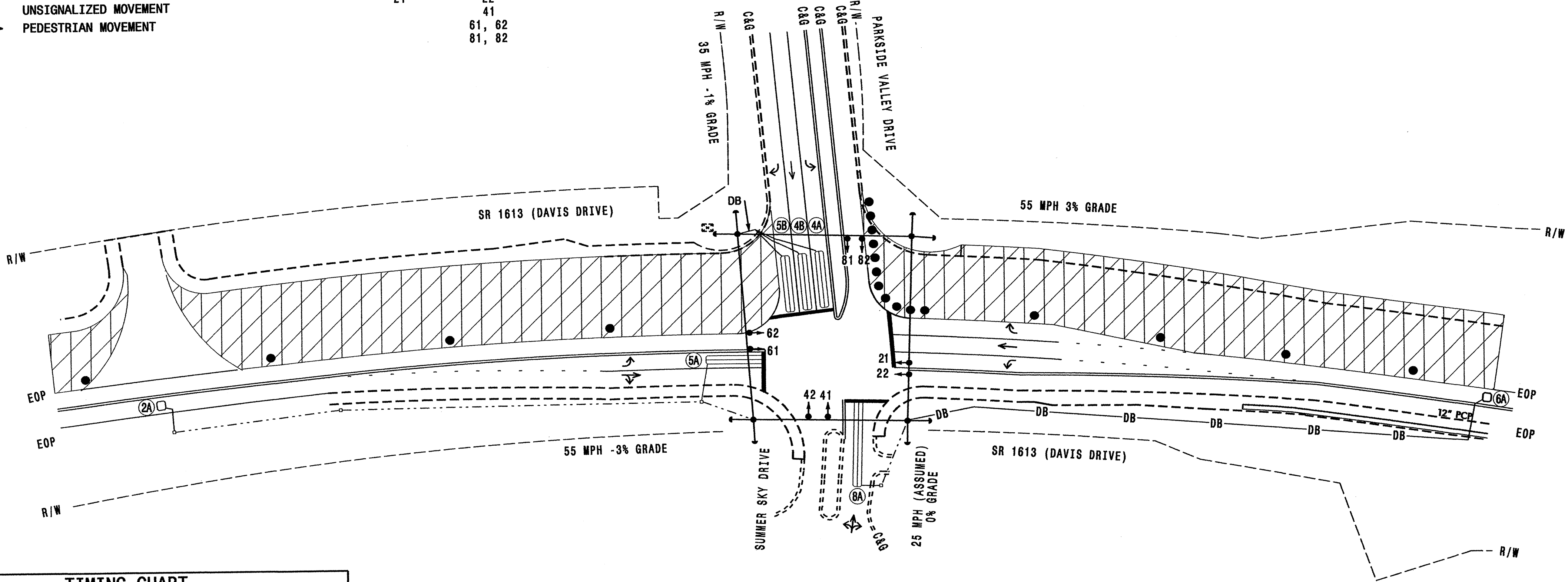
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

LOOP & DETECTOR UNIT INSTALLATION CHART											
2070 CONTROLLER WITH NEMA TS-2 CABINET											
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	INDUCTIVE LOOPS				DETECTOR UNITS			
				NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING	INHIBIT DELAY DURING GREEN	
2A	6X6	6	420	X	-	2	-	X	-	SEC.	NO
4A	6X40	2-4-2	0	X	-	4	-	X	-	SEC.	NO
4B	6X40	2-4-2	0	X	-	4	-	X	-	SEC.	NO
5A	6X40	2-4-2	0	X	-	2	-	X	DELAY	3 SEC.	NO
5B	6X40	2-4-2	0	X	-	5	-	X	DELAY	15 SEC.	YES
6A	6X6	6	420	X	-	6	-	X	-	SEC.	NO
8A	6X60	2-4-2	0	X	-	8	-	X	DELAY	5 SEC.	YES

3 PHASE FULLY ACTUATED (CARY SIGNAL SYSTEM)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition existing signal heads numbered 21, 22, 61 and 62.
- Omit phase 5 during phase 6 on.
- Program controller to clear from phase 2+6 to phase 2+5 by progressing through phase 4+8 (see Electrical Details).
- Program phase 4 and phase 8 for dual entry.
- Set all detector units to presence mode.
- Pavement markings are existing.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



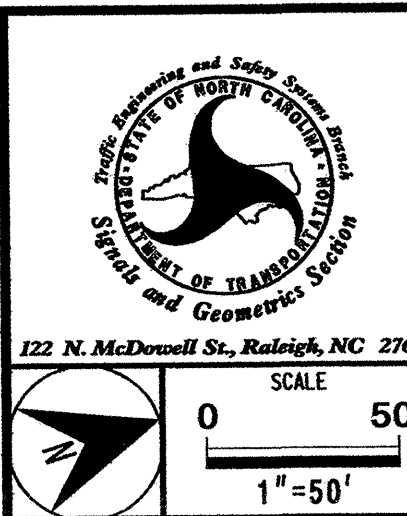
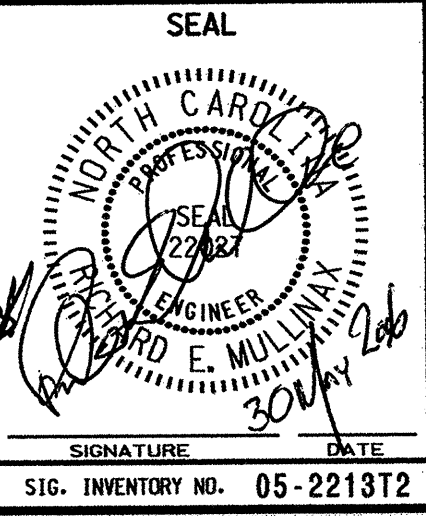
LEGEND

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

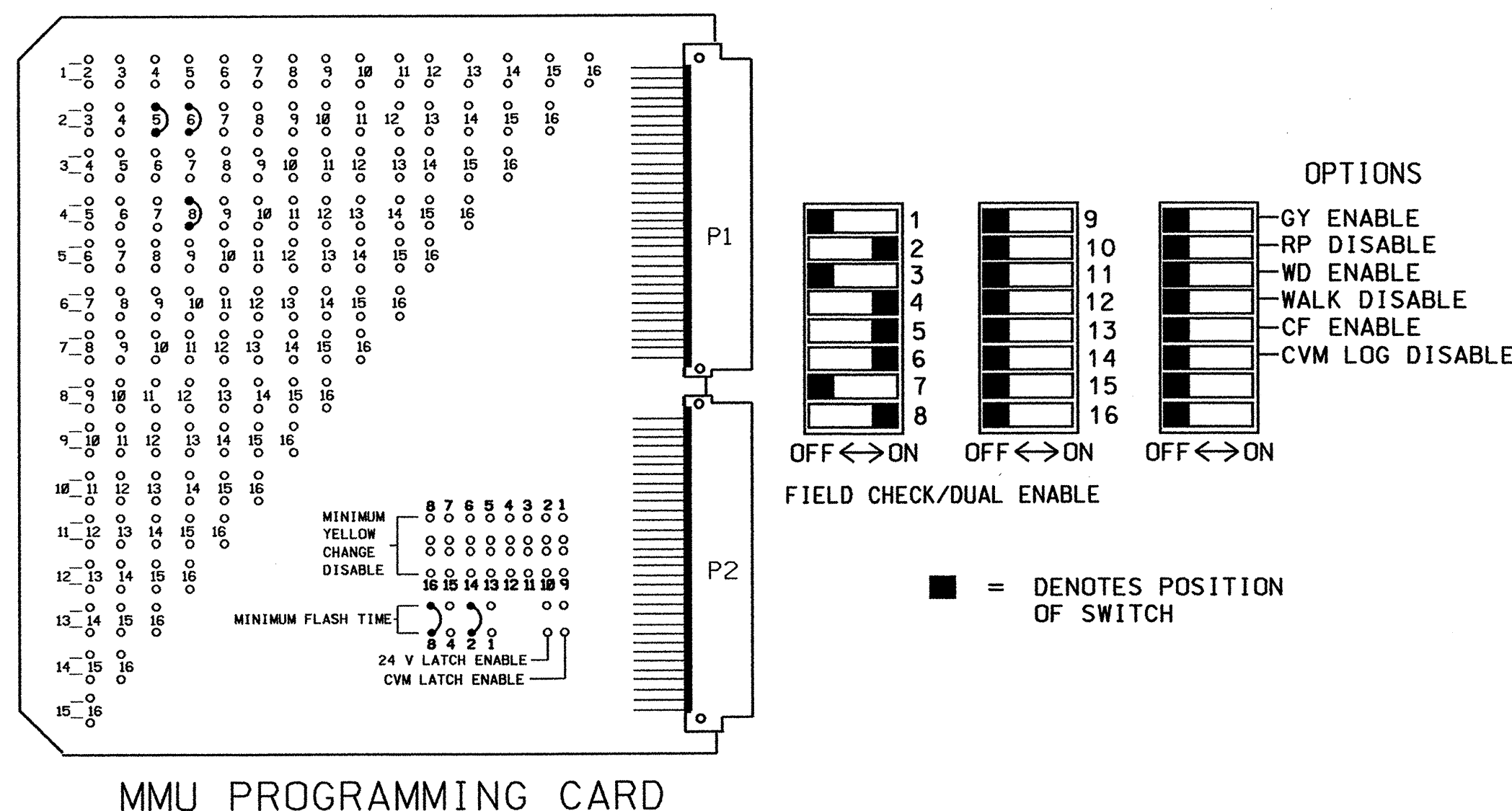
TIMING CHART					
2070L CONTROLLER WITH TS-2 CABINET					
PHASE	Ø2	Ø4	Ø5	Ø6	Ø8
MINIMUM GREEN	14 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.
PASSAGE/GAP	6.0 SEC.	2.0 SEC.	2.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	5.5 SEC.	3.9 SEC.	3.0 SEC.	4.9 SEC.	3.2 SEC.
RED CLEARANCE	1.1 SEC.	1.2 SEC.	2.3 SEC.	1.0 SEC.	2.2 SEC.
MAX. 1	90 SEC.	40 SEC.	20 SEC.	90 SEC.	40 SEC.
RECALL POSITION	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
VEH. CALL MEMORY	LOCK	NONLOCK	NONLOCK	LOCK	NONLOCK
WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
VOLUME DENSITY	ON	OFF	OFF	ON	OFF
ACTUATION B4 ADD	0 VEH.	- VEH.	- VEH.	0 VEH.	- VEH.
SEC. PER ACTUATION	2.5 SEC.	- SEC.	- SEC.	2.5 SEC.	- SEC.
MAX. INITIAL	46 SEC.	- SEC.	- SEC.	46 SEC.	- SEC.
TIME B4 REDUCTION	15 SEC.	- SEC.	- SEC.	15 SEC.	- SEC.
TIME TO REDUCE	45 SEC.	- SEC.	- SEC.	45 SEC.	- SEC.
MINIMUM GAP	3.4 SEC.	- SEC.	- SEC.	3.4 SEC.	- SEC.

THIS PLAN SUPERSEDES THE PREVIOUSLY ISSUED DESIGN SEALED 9/3/04.

SIGNAL UPGRADE - TEMPORARY DESIGN 2 - CONSTRUCTION PHASE 3

	SR 1613 (DAVIS DRIVE) AT PARKSIDE VALLEY DRIVE AND SUMMER SKY DRIVE		SEAL
	DIVISION 5 WAKE COUNTY MORRISVILLE		
	PLAN DATE: June 2005	REVIEWED BY: Z. Little	
	PREPARED BY: C. Pierce	REVIEWED BY: D. Y. Ishak	
REVISIONS		INIT.	DATE
0 50'		1"=50'	
SIGNATURE		DATE	
SIG. INVENTORY NO. 05-2213T2			

EDI MODEL MMU-16E
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL
(existing)



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 L 3 Ø 4	CH1 L 1 Ø 2	CH1 L 7 Ø 6	CH1 L 5 Ø 2 *	S L O T	CH1 L 9 Ø 8	S L O T	S L O T	S L O T	S L O T	S L O T
	CH2 L 4 Ø 5	CH2 L 2 Ø 4	CH2 NOT USED	CH2 L 6 Ø 5		E M P T Y					

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

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

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

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

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

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 1,3,7,9,10,11,12,13,14,15 & 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. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
- 11. THE CABINET AND CONTROLLER ARE PART OF THE CARY SIGNAL SYSTEM.

EQUIPMENT INFORMATION

```

CONTROLLER.....CONTRACTOR SUPPLIED 2070*
CABINET .....CONTRACTOR SUPPLIED TS-2 NC-8A*
SOFTWARE.....ASC/2070
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....2,4,5,6,8
PHASES USED.....2,4,5,6,8
OLA.....NOT USED
OLB.....NOT USED
OLC.....NOT USED
OLD.....NOT USED

```

LOAD SWITCH ASSIGNMENT DETAIL

(*existing*)

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

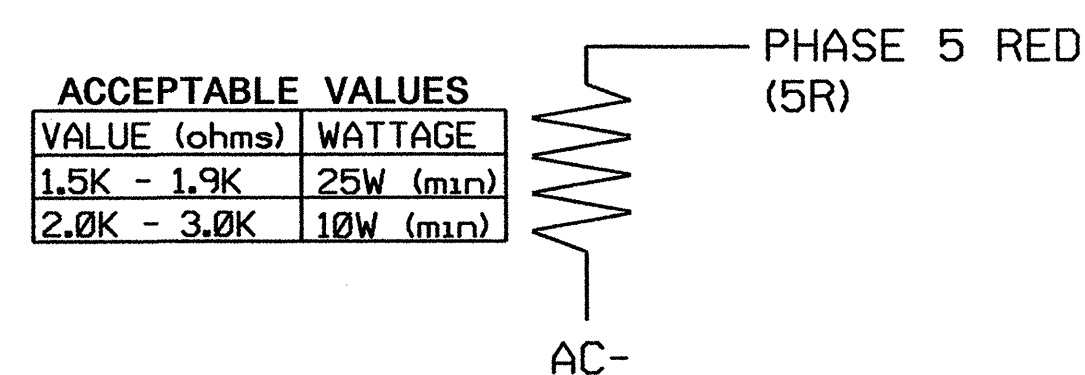
FIELD CONNECTION HOOK-UP CHART

[illegible]

NU = NOT USED
*DENOTES EXISTING LOAD RESISTOR (SEE BELOW)

LOAD RESISTOR INSTALLATION DETAIL

(existing)



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.

SPECIAL BACK-UP PROTECTION NOTES

1. PROGRAM CONTROLLER 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
3. IT IS REQUIRED FOR THE CONTROLLER TO BE PROGRAMMED SUCH THAT IF IT IS IN PHASE 2+6, THEN PHASE 2+5 CANNOT BE SERVED NEXT WITHOUT FIRST PROGRESSING THROUGH PHASE 4+8. 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.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2213T2
DESIGNED: June 2005
SEALED: 05-30-06
REVISED: NA

THIS ELECTRICAL DETAIL SUPERSEDES
THE DETAIL SEALED ON 09-15-05

Signal Upgrade - Temporary Design 2

SR 1613 (Davis Dr.)

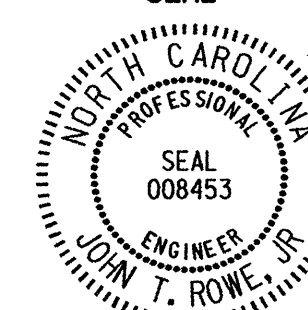
at
Parkside Valley Drive and
Summer Sky Drive

Division 5 Wake County Morrisville

PLAN DATE: May 2006	REVIEWED BY: YLW
---------------------	------------------

REVISIONS	INIT.	DATE
-----------	-------	------

SEAR



SIGNATURE John T. Rowe, Jr. DATE 6-1-06
SIG. INVENTORY NO. 05-2213T2

SIGNAL FACE	PHASE					
	0 1 + 5	0 1 + 6	0 2 + 5	0 2 + 6	0 4 + 8	0 4 + 9
11	←	←	←	←	←	←
21, 22	R	R	G	G	R	Y
41, 42	R	R	R	R	G	R
51	←	←	←	←	←	←
61, 62	R	G	R	G	R	Y
81, 82	R	R	R	G	G	R

* SEE NOTE # 2

 Denotes L.E.D.



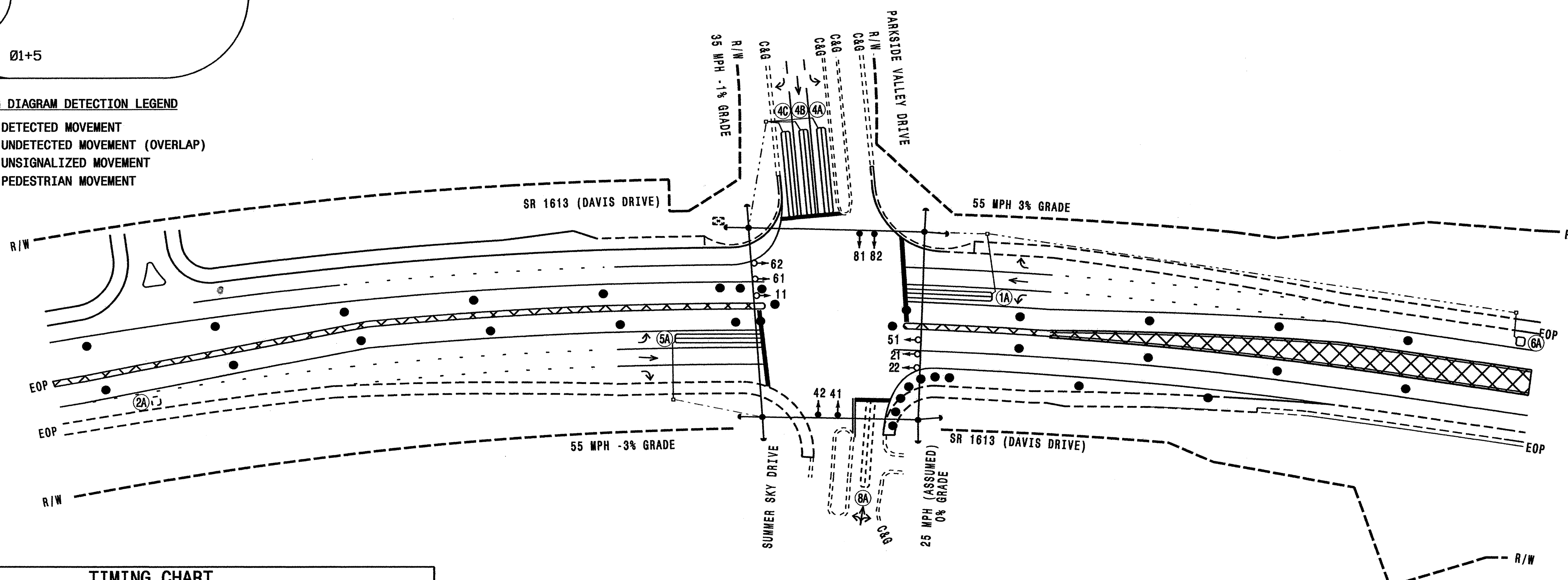
INDUCTIVE LOOPS						DETECTOR UNITS					
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW EXISTING	NEMA PHASE	NEW EXISTING	TIMING		PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREENS	
							FEATURE	TIME			
1A	6X60	2-4-2	0	X -	1 -	X -	-	-	SEC.	ALL	NO
2A	6X6	6	420	X -	2 -	X -	-	-	SEC.	ALL	NO
4A	6X60	2-4-2	0	X -	4 -	X -	-	-	SEC.	ALL	NO
4B	6X60	2-4-2	0	X -	4 -	X -	-	-	SEC.	ALL	NO
4C	6X60	2-4-2	0	X -	4 -	X -	DELAY	15	SEC.	ALL	YES
5A	6X60	2-4-2	0	X -	5 -	X -	-	-	SEC.	ALL	NO
6A	6X6	6	420	X -	6 -	X -	-	-	SEC.	ALL	NO
8A	6X60	2-4-2	0	X -	8 -	X -	DELAY	10	SEC.	ALL	YES

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads 21 , 22, 61 and 62.
4. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
5. Program phase 4 and phase 8 for dual entry.
6. During coordination phase 1 or phase 5 may be lagged.
7. Set all detector units to presence mode.

PHASING DIAGRAM DETECTION LEGEND

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

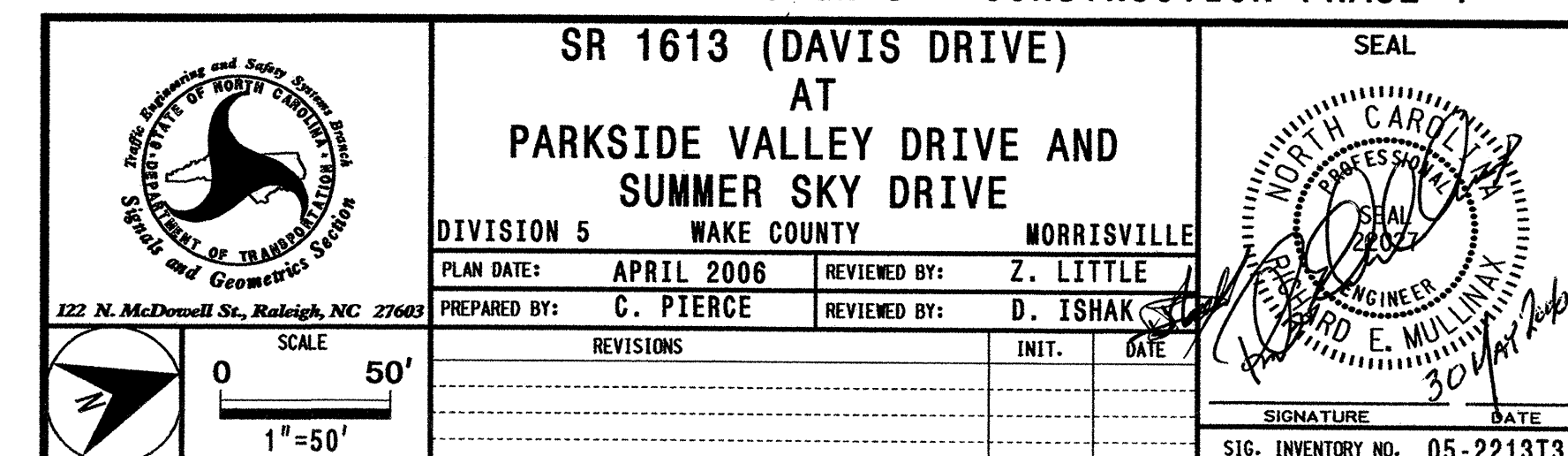


PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Right of Way with Marker	
	Directional Arrow	
	Pavement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

TIMING CHART							
2070L CONTROLLER WITH TS-2 CABINET							
PHASE	Ø1	Ø2	Ø4	Ø5	Ø6	Ø8	
MINIMUM GREEN	7 SEC.	14 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.	
PASSAGE/GAP	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.	
YELLOW CHANGE INT.	3.0 SEC.	5.5 SEC.	3.9 SEC.	3.0 SEC.	4.9 SEC.	3.2 SEC.	
RED CLEARANCE	2.9 SEC.	1.1 SEC.	2.4 SEC.	3.1 SEC.	1.1 SEC.	3.1 SEC.	
MAX. 1	30 SEC.	90 SEC.	40 SEC.	30 SEC.	90 SEC.	40 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	— VEHI.	0 VEHI.	— VEHI.	— VEHI.	0 VEHI.	— VEHI.	
SEC. PER ACTUATION	— SEC.	2.5 SEC.	— SEC.	— SEC.	2.5 SEC.	— SEC.	
MAX. INITIAL	— SEC.	46 SEC.	— SEC.	— SEC.	46 SEC.	— SEC.	
TIME B4 REDUCTION	— SEC.	15 SEC.	— SEC.	— SEC.	15 SEC.	— SEC.	
TIME TO REDUCE	— SEC.	45 SEC.	— SEC.	— SEC.	45 SEC.	— SEC.	
MINIMUM GAP	— SEC.	3.4 SEC.	— SEC.	— SEC.	3.4 SEC.	— SEC.	

**THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.**

SIGNAL UPGRADE - TEMPORARY DESIGN 3 - CONSTRUCTION PHASE 4



(existing)



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

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

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

EQUIPMENT INFORMATION

CONTROLLER.....	CONTRACTOR SUPPLIED	2070*	
CABINET	CONTRACTOR SUPPLIED	TS-2	NC-8A*
SOFTWARE.....	ASC/2070		
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		

*EXISTING EQUIPMENT

(*existing*)

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

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 & 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 PART OF THE CARY SIGNAL SYSTEM.

FIELD CONNECTION HOOK-UP CHART

NU = NOT USED

NOTE : REMOVE EXISTING LOAD RESISTOR ON PHASE 5 RED (5R).

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2213T3
DESIGNED: April 2006
SEALED: 05-30-06
REVISED: NA

Signal Upgrade - Temporary Design 3

ELECTRICAL AND PROGRAMMING
DETAILS FOR:

Prepared in the Offices of:



122 N. McDowell St., Raleigh, NC 27603

SR 1613 (Davis Dr.)
at
Parkside Valley Drive and
Summer Sky Drive

Division 5	Wake County	Morrisville	
PLAN DATE: May 2006	REVIEWED BY:	<i>John T. Rowe, Jr.</i>	
PREPARED BY: James Peterson	REVIEWED BY:		
REVISIONS	INIT.	DATE	

SEAL



John T. Rowe, Jr. 6-1-06
SIGNATURE DATE
SIG. INVENTORY NO. 05-2213T3

LOOP & DETECTOR UNIT INSTALLATION CHART												
2070 CONTROLLER WITH NEMA TS-2 CABINET												
INDUCTIVE LOOPS							DETECTOR UNITS					
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING		PLACE CALL DURING PHASE	INHIBIT DELAY DURING GREEN?
									FEATURE	TIME		
1A	6X60	2-4-2	0	X	-	6	-	X	DELAY	3 SEC.	ALL	NO
2A	6X6	6	420	X	-	1	-	X	DELAY	15 SEC.	ALL	YES
2B	6X6	6	420	-	X	2	X	-	-	- SEC.	ALL	NO
4A	6X60	2-4-2	0	-	X	4	-	X	-	- SEC.	ALL	NO
4B	6X60	2-4-2	0	-	X	4	-	X	-	- SEC.	ALL	NO
5A	6X60	2-4-2	0	X	-	2	-	X	DELAY	3 SEC.	ALL	NO
						5	-	X	DELAY	15 SEC.	ALL	YES
5B	6X60	2-4-2	0	-	X	5	-	X	DELAY	15 SEC.	ALL	YES
6A	6X6	6	420	X	-	6	-	X	-	- SEC.	ALL	NO
6B	6X6	6	420	-	X	6	X	-	-	- SEC.	ALL	NO
8A	6X60	2-4-2	0	-	X	8	-	X	DELAY	10 SEC.	ALL	YES

5 PHASE
FULLY ACTUATED
(CARY SIGNAL SYSTEM)

NOTES

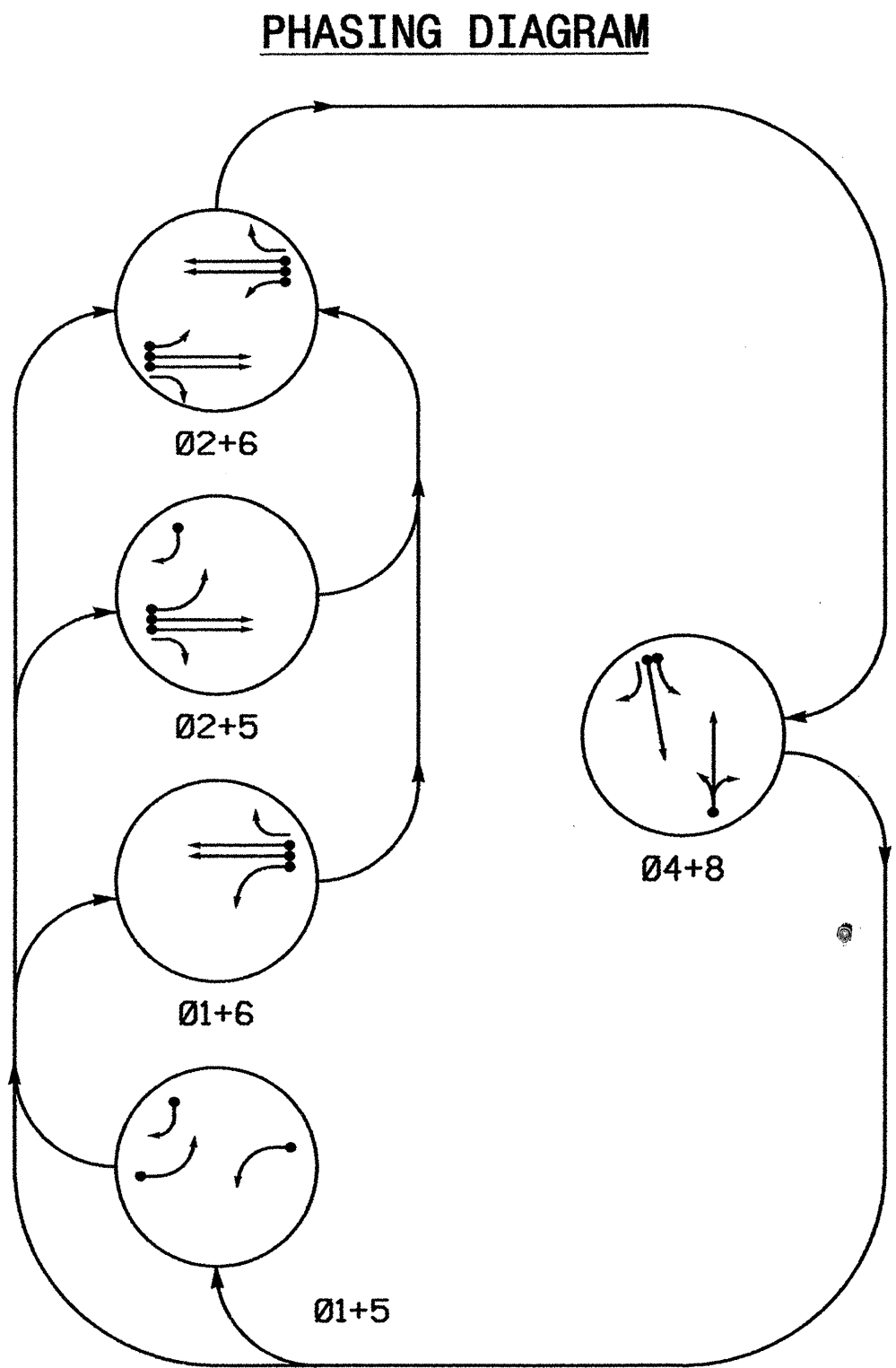
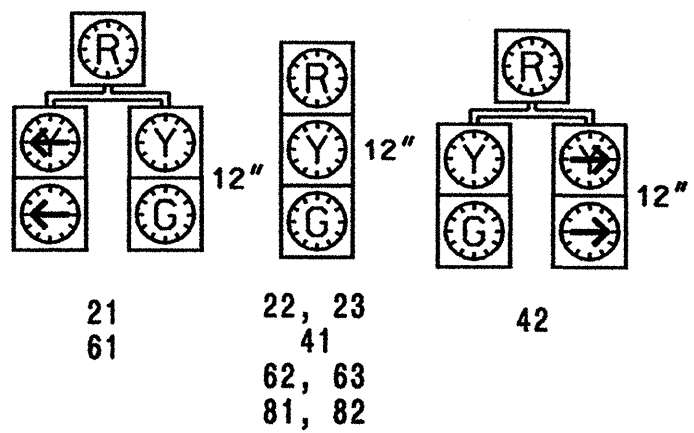
1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Install backplates for signal heads numbered 41, 42, 81, and 82.
4. Omit phase 1 during phase 2 on.
5. Omit phase 5 during phase 5 on.
6. Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4+8 (see Electrical Details).
7. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
8. Program phase 4 and phase 8 for dual entry.
9. Set all detector units to presence mode.

SIGNAL FACE	PHASE					
	Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4+8	F+LASH
21	R	R	G	G	R	Y
22, 23	R	R	G	G	R	Y
41	R	R	R	R	G	R
42	R	R	R	R	G	R
61	R	R	G	G	R	Y
62, 63	R	R	G	G	R	Y
81, 82	R	R	R	R	G	R

* SEE NOTE # 2

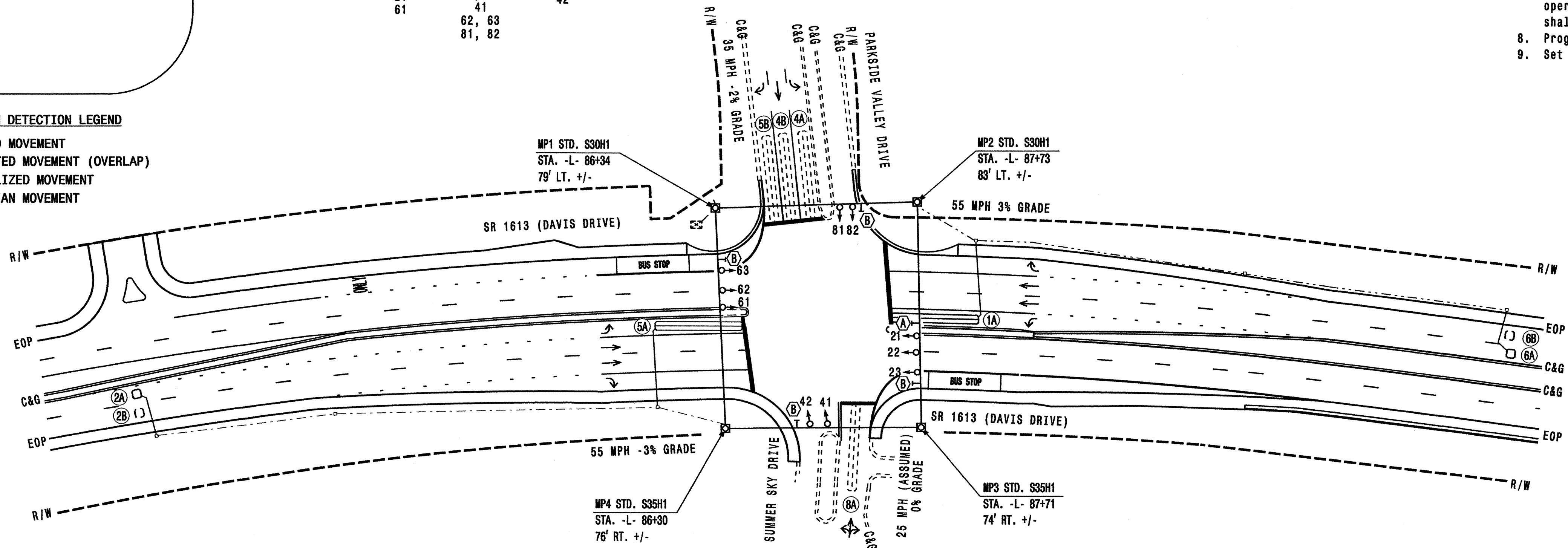
SIGNAL FACE I.D.

Denotes L.E.D.



PHASING DIAGRAM DETECTION LEGEND

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



TIMING CHART						
2070L CONTROLLER WITH TS-2 CABINET						
PHASE	Ø1	Ø2	Ø4	Ø5	Ø6	Ø8
MINIMUM GREEN	7 SEC.	14 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.
PASSAGE GAP	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.5 SEC.	5.4 SEC.	3.0 SEC.	4.9 SEC.	5.2 SEC.
RED CLEARANCE	2.8 SEC.	1.1 SEC.	1.5 SEC.	3.1 SEC.	1.1 SEC.	1.4 SEC.
MAX. 1	30 SEC.	90 SEC.	40 SEC.	30 SEC.	90 SEC.	40 SEC.
RECALL POSITION	NONE	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
VEH. 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.	1.8 SEC.	- SEC.	- SEC.	1.8 SEC.	- SEC.
MAX. INITIAL	- SEC.	46 SEC.	- SEC.	- SEC.	46 SEC.	- SEC.
TIME B4 REDUCTION	- SEC.	15 SEC.	- SEC.	- SEC.	15 SEC.	- SEC.
TIME TO REDUCE	- SEC.	45 SEC.	- SEC.	- SEC.	45 SEC.	- SEC.
MINIMUM GAP	- SEC.	3.4 SEC.	- SEC.	- SEC.	3.4 SEC.	- SEC.

THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

LEGEND		EXISTING
PROPOSED		
○→	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	⊥
⊥	Right of Way with Marker	⊥
→	Directional Arrow	→
→	Pavement Marking Arrow	→
→	Construction Zone Drums	N/A
→	Construction Zone	N/A
→	U-Turn "MUST YIELD" Sign (R3-27)	→
→	Overhead Street Sign	→

SIGNAL UPGRADE - FINAL DESIGN

122 N. McDowell St., Raleigh, NC 27603

SR 1613 (DAVIS DRIVE)
AT
PARKSIDE VALLEY DRIVE AND
SUMMER SKY DRIVE

DIVISION 5 WAKE COUNTY MORRISVILLE

PLAN DATE: April 2006 REVIEWED BY: Zachary Little

PREPARED BY: L. Blount REVIEWED BY: Doumit Ishak

REVISIONS

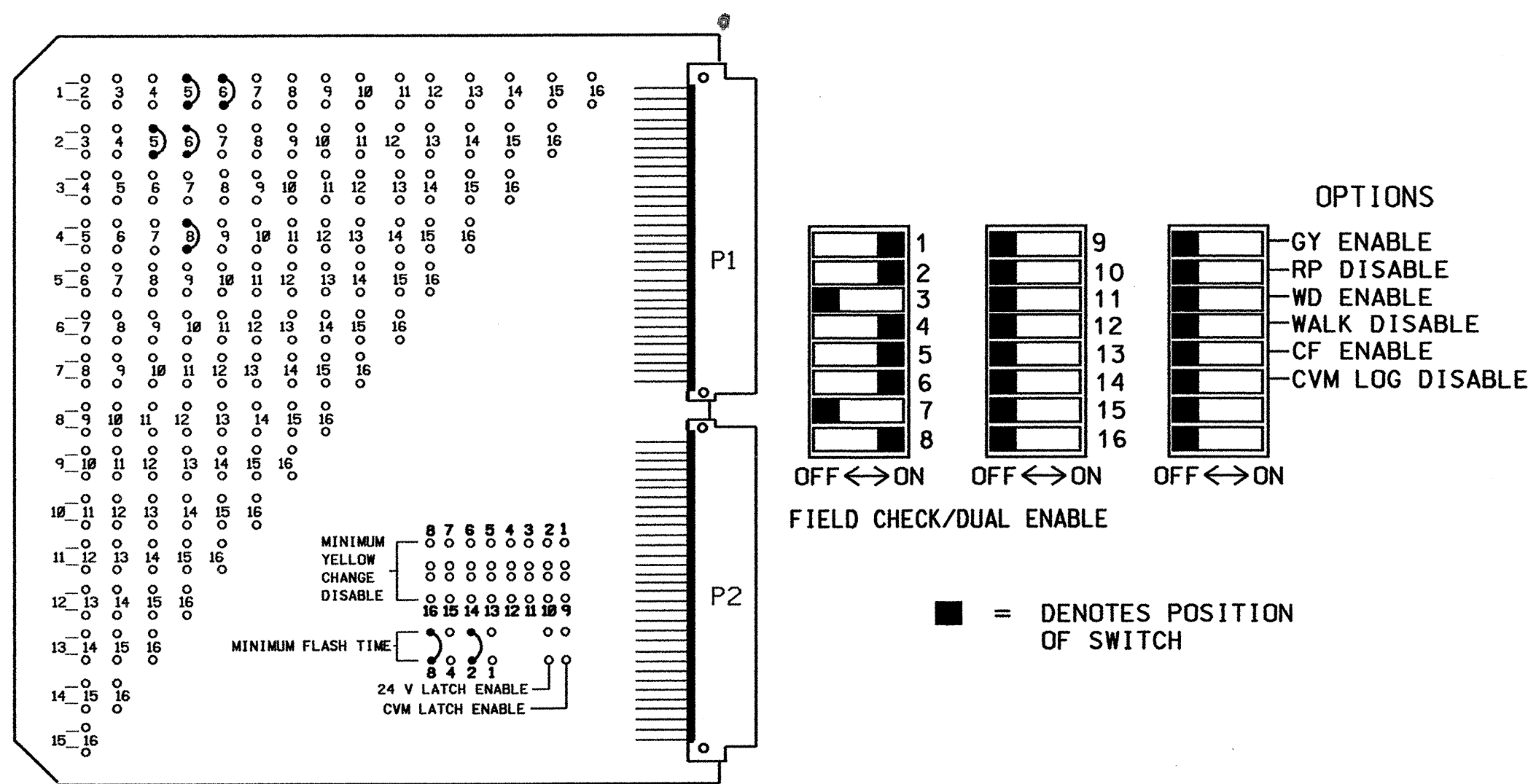
INIT. DATE

SIGNATURE DATE

SIG. INVENTORY NO. 05-2213

30114

EDI MODEL MMU-16E
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL
(existing)



MMU PROGRAMMING CARD

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	CH1	CH1	CH1	CH1	CH1	S L O T	CH1	S L O T	S L O T	S L O T
	L 3	L 1	L 7	L 5	L11	L 9		L13			
	ø 4	ø 2	ø 6	ø 2	ø 6	ø 8		ø 2			
				*	*						
	CH2	CH2	CH2	CH2	CH2	CH2	E M P T Y	CH2	E M P T Y	E M P T Y	E M P T Y
	L 4	L 2	L 8	L 6	L12	NOT		NOT			
	ø 5	ø 4	ø 6	ø 5	ø 1	USED		USED			

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

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

ADD JUMPERS FROM
L5A TO L6A, AND
L5B TO L6B

ADD JUMPERS FROM
L11A TO L12A, AND
L11B TO L12B

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 2		
2	ø 4		
3	ø 4		
4	ø 5	DELAY	15
* 5	ø 2	DELAY	3
6	ø 5	DELAY	15
7	ø 6		
8	ø 6		
9	ø 8	DELAY	10
10			
* 11	ø 6	DELAY	3
12	ø 1	DELAY	15
13	ø 2		
14			
15			
16			

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

NOTES

- TO PREVENT "FLASH-CONFLICT" PROBLEMS, WIRE ALL UNUSED LOAD SWITCHES TO FLASH RED. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
- TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED LOAD SWITCH RED OUTPUTS 3,7,9,10,11,12,13,14,15 & 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.
- PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT ON THE MALFUNCTION MANAGEMENT UNIT. SET CONTROLLER POWER-UP FLASH TIME TO 0 SECONDS.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM DETECTORS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS TO ACCOMPLISH THE DETECTION SCHEMES SHOWN ON THE SIGNAL DESIGN PLANS.
- PROGRAM DETECTOR CALL DELAY AND EXTENSION TIMING ON THE CONTROLLER, UNLESS OTHERWISE SPECIFIED.
- SET ALL DETECTOR CARD UNIT CHANNELS TO "PRESENCE" MODE.
- PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
- PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DUAL ENTRY.
- THE CABINET AND CONTROLLER ARE PART OF THE CARY SIGNAL SYSTEM.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070*
CABINETCONTRACTOR SUPPLIED TS-2 NC-8A*
SOFTWARE.....ASC/2070
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

*EXISTING EQUIPMENT

LOAD SWITCH ASSIGNMENT DETAIL

(existing)

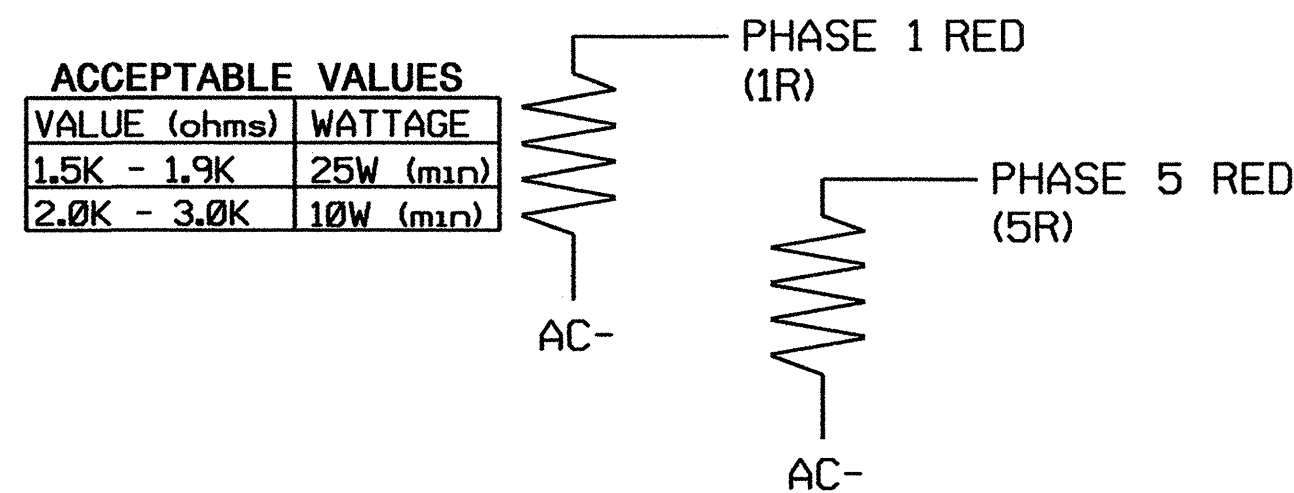
LOAD SWITCH NUMBER	FUNCTION
1	ø1
2	ø2
3	ø3
4	ø4
5	ø5
6	ø6
7	ø7
8	ø8
9	2 PED
10	4 PED
11	6 PED
12	8 PED
13	OLA
14	OLB
15	OLC
16	OLD

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, 23	NU	41, 42	21, 42	61, 62, 63	NU	81, 82	NU	NU	NU	NU	NU	NU	NU	NU
GREEN		2G		4G		6G		8G								
YELLOW		2Y		4Y		6Y		8Y								
RED	*	2R		4R	*	6R		8R								
RED ARROW																
YELLOW ARROW	1Y				5Y											
GREEN ARROW	1G				5G											

NU = NOT USED
* DENOTES EXISTING LOAD RESISTOR (SEE BELOW)

LOAD RESISTOR INSTALLATION DETAIL



NOTE: THE PURPOSE OF THESE RESISTORS ARE 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.

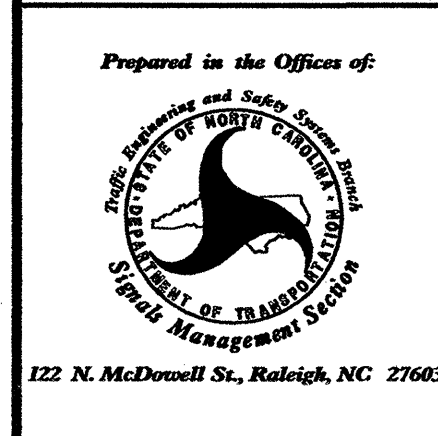
SPECIAL BACK-UP PROTECTION NOTES

- PROGRAM CONTROLLER TO OMIT PHASE 1 DURING PHASE 2 ON, AND TO OMIT PHASE 5 DURING PHASE 6 ON.
- TO ACCOMPLISH BACK-UP FEATURE DESCRIBED IN NOTE 1, ENABLE 'BACK-UP PROTECTION GROUP 1' UNDER CONTROLLER SUBMENU 9: 'OPTION DATA'.
- 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.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-2213
DESIGNED: April 2006
SEALED: 05-30-06
REVISED: NA

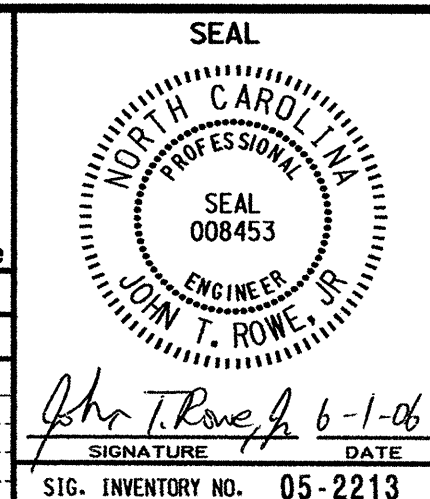
Signal Upgrade - Final

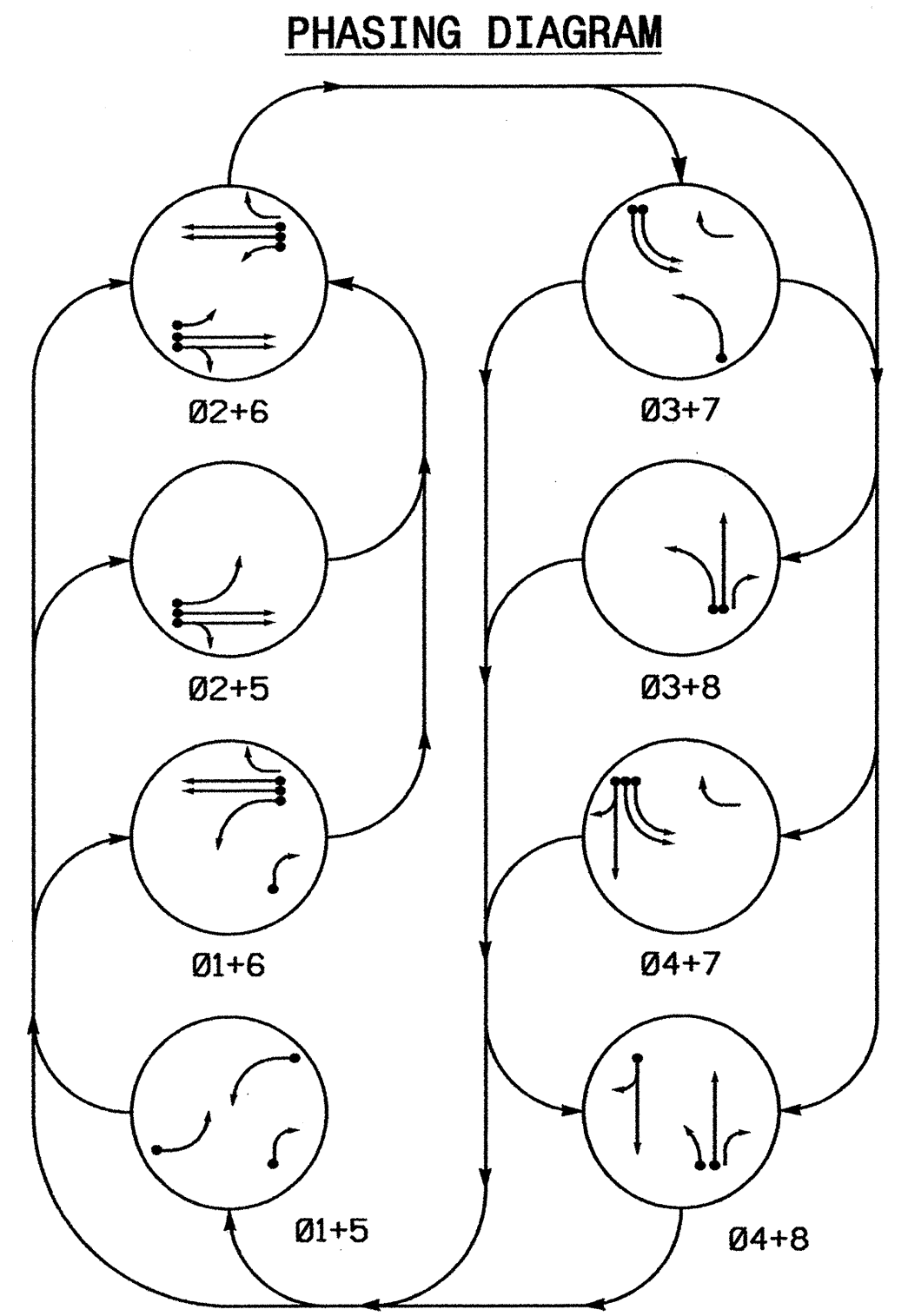
ELECTRICAL AND PROGRAMMING
DETAILS FOR:



SR 1613 (Davis Dr.)
at
Parkside Valley Drive and
Summer Sky Drive

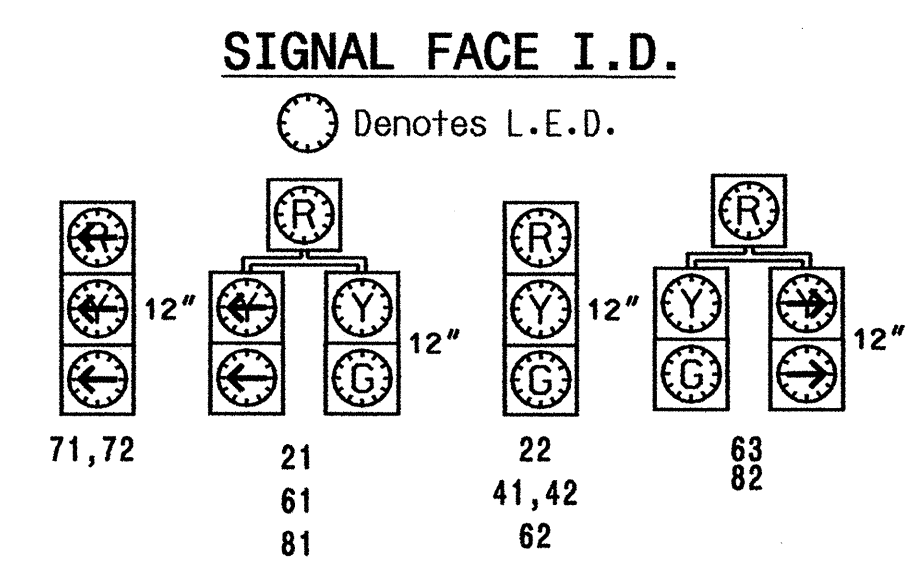
Division 5	Wake County	Morrisville
PLAN DATE: May 2006	REVIEWED BY: J. Rowe	
PREPARED BY: James Peterson	REVIEWED BY:	
REVISIONS	INIT.	DATE





SIGNAL FACE	PHASE							
	Ø1 +5	Ø2 +6	Ø3 +7	Ø4 +8	Ø1 +6	Ø2 +5	Ø3 +8	Ø4 +7
21	R	R	G	R	R	R	R	Y
22	R	R	G	R	R	R	R	Y
41,42	R	R	R	R	R	R	G	R
61	R	R	G	R	R	R	R	Y
62	R	G	R	G	R	R	R	Y
63	R	G	R	G	R	R	R	Y
71,72	R	R	R	R	R	R	R	R
81	R	R	R	R	R	R	R	R
82	R	R	R	R	R	R	R	R

*SEE NOTE #2

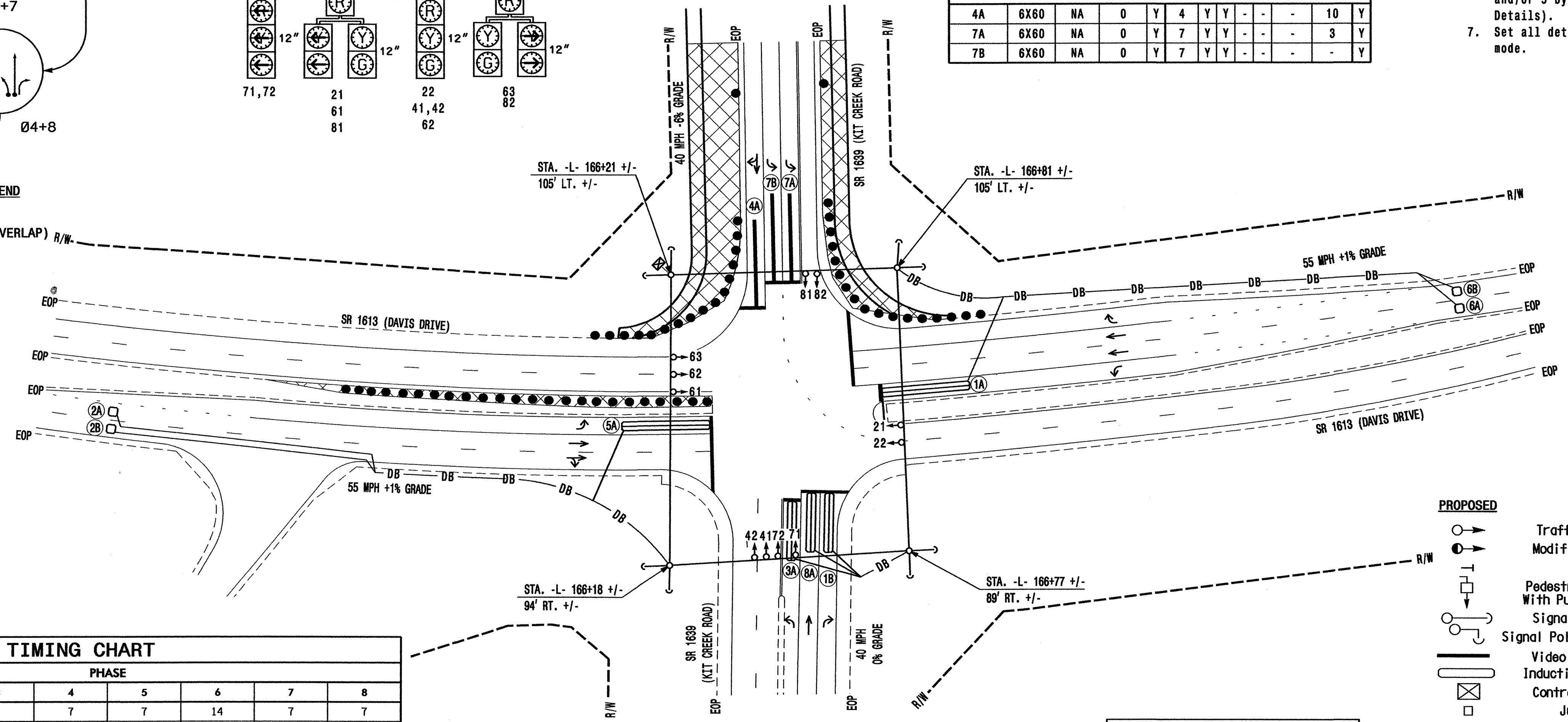
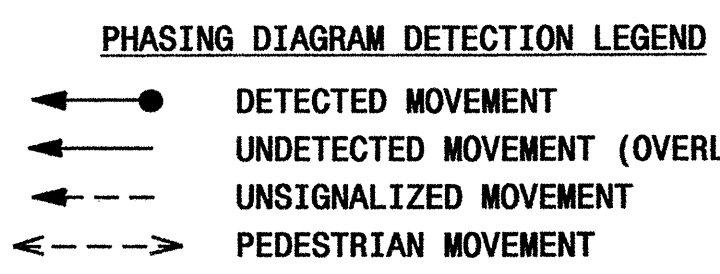


2070L LOOP & DETECTOR INSTALLATION											
INDUCTIVE LOOPS						DETECTOR PROGRAMMING					
LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME
1A	6X60	2-4-2	0	Y	6	Y	Y	Y	-	-	3
1B	6X40	2-4-2	0	Y	1	Y	Y	Y	-	-	15
2A	6X6	6	420	Y	2	Y	Y	Y	-	-	Y
2B	6X6	6	420	Y	2	Y	Y	Y	-	-	Y
3A	6X40	2-4-2	0	Y	3	Y	Y	Y	-	-	15
5A	6X60	2-4-2	0	Y	2	Y	Y	Y	-	-	3
6A	6X6	6	420	Y	6	Y	Y	Y	-	-	Y
6B	6X6	6	420	Y	6	Y	Y	Y	-	-	Y
8A	6X40	2-4-2	0	Y	8	Y	Y	Y	-	-	Y
VIDEO DETECTION ZONES											
4A	6X60	NA	0	Y	4	Y	Y	Y	-	-	10
7A	6X60	NA	0	Y	7	Y	Y	Y	-	-	3
7B	6X60	NA	0	Y	7	Y	Y	Y	-	-	Y

8 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

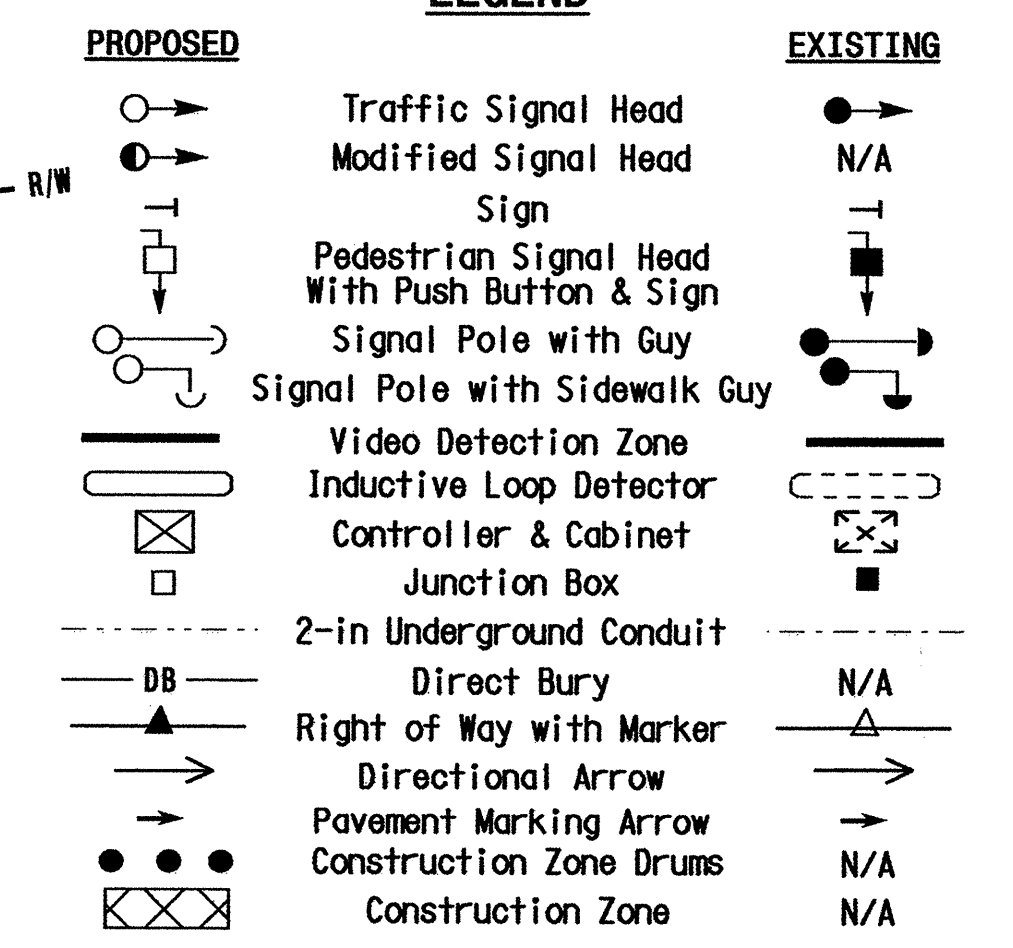
- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Pavement markings are existing.
- Omit phase 1 during phase 2 on.
- Omit phase 5 during phase 6 on.
- Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4+8 (See Electrical Details).
- Set all detector units and detection zones to presence mode.



2070L TIMING CHART								
FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Min Green 1 *	7	14	7	7	7	14	7	7
Extension 1 *	1.0	6.0	1.0	1.0	1.0	6.0	1.0	1.0
Max Green 1 *	20	90	20	30	20	90	20	30
Yellow Clearance	3.0	5.1	3.0	4.7	3.0	5.1	3.1	4.2
Red Clearance	3.1	1.1	2.9	1.9	3.1	1.2	3.7	1.8
Walk 1 *	-	-	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-	-	-
Seconds Per Actuation *	-	1.8	-	-	-	1.8	-	-
Max Variable Initial *	-	46	-	-	-	46	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	45	-	-	-	45	-	-
Minimum Gap	-	3.4	-	-	-	3.4	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW	-	-
Dual Entry	-	-	-	ON	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON	ON	ON

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

LEGEND



THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

SIGNAL UPGRADE - TEMPORARY DESIGN 1 - CONSTRUCTION PHASE 1

222 N. McDowell St., Raleigh, NC 27603

SR 1613 (DAVIS DRIVE)
AT
SR 1639 (KIT CREEK ROAD)

DIVISION 5 WAKE COUNTY RTP

PLAN DATE: April 2006 REVIEWED BY: Zachary Little

PREPARED BY: L. Blount REVIEWED BY: Doumit Ishak

REVISIONS INIT. DATE

SCALE 0 50' 1"=50'

SEAL
NORTH CAROLINA
PROFESSIONAL ENGINEER
2007
E. MULLIN
26 MAY 2006

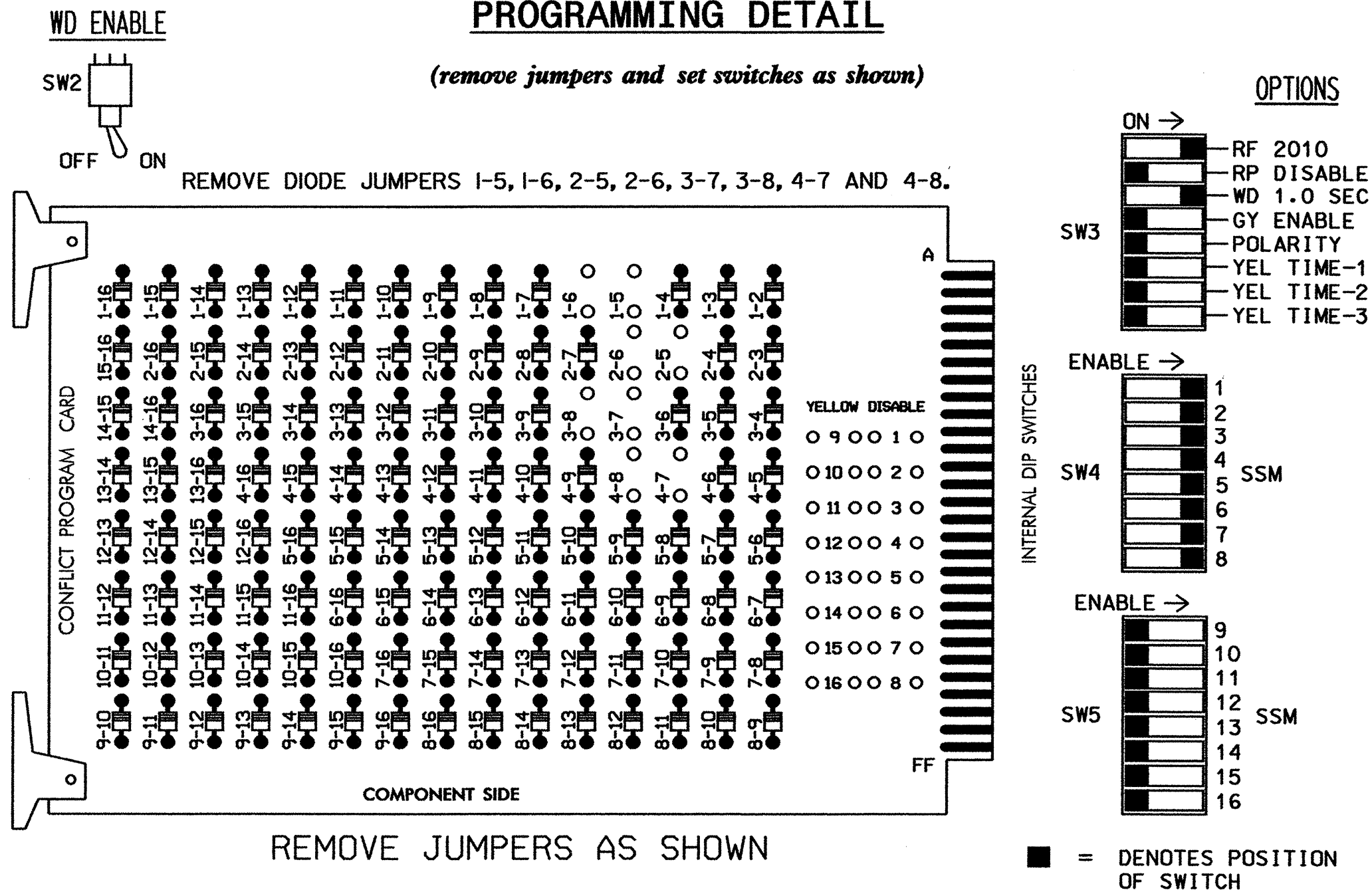
SIGNATURE DATE

SIG. INVENTORY NO. 05-1911T1

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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

INPUT FILE POSITION LAYOUT

(front view)

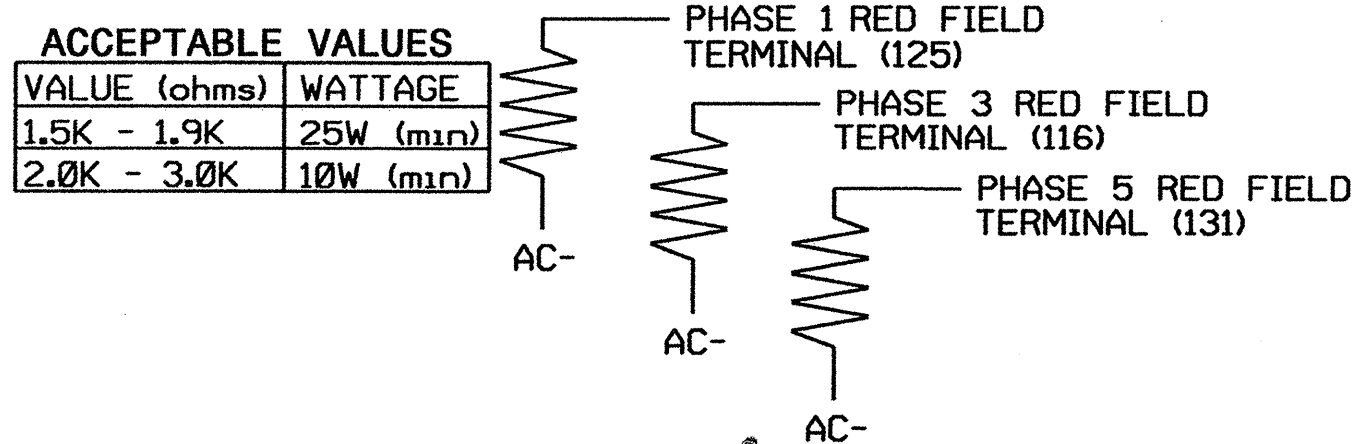
FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	Ø 1	Ø 6	Ø 2	Ø 7	Ø 5	Ø 8	Ø 9	Ø 4	Ø 3	Ø 10	Ø 11	Ø 12	Ø 13	FS
L	1B	1A	2A	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 7	Ø 8	Ø 9	Ø 10	DC ISOLATOR
	NOT USED	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 7	Ø 8	Ø 9	Ø 10	Ø 11	Ø 12	ST
		1A	2B	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 7	Ø 8	Ø 9	Ø 10	DC ISOLATOR

FILE "J"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	Ø 2	Ø 6	Ø 5	Ø 4	Ø 3	Ø 8	Ø 9	Ø 10	Ø 11	Ø 12	Ø 13	Ø 14	Ø 15	Ø 16
L	5A	6A	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 7	Ø 8	Ø 9	Ø 10	Ø 11	Ø 12
	Ø 5	Ø 6	Ø 7	Ø 8	Ø 9	Ø 10	Ø 11	Ø 12	Ø 13	Ø 14	Ø 15	Ø 16	Ø 17	Ø 18
	5A	6B	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 7	Ø 8	Ø 9	Ø 10	Ø 11	Ø 12

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

FS = FLASH SENSE
ST = STOP TIME

LOAD RESISTOR
INSTALLATION DETAIL



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

NOTES

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

EQUIPMENT INFORMATION

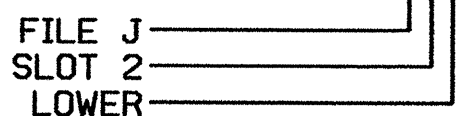
CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET.....CONTRACTOR SUPPLIED 332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAPS.....NONE

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1B	TB2-1,2	I1U	56	18	1	1	Y	Y			15
1A	TB2-5,6	I2U	39	1	2	6	Y	Y	Y		3
	TB2-7,8	I2L	43	5	12	1	Y	Y			15
2A	TB2-9,10	I3U	63	25	32	2	Y	Y			
2B	TB2-11,12	I3L	76	38	42	2	Y	Y			
3A	TB4-9,10	I6U	41	3	4	8	Y	Y			3
	TB4-11,12	I6L	45	7	14	3	Y	Y			15
5A	TB3-5,6	J2U	40	2	6	2	Y	Y	Y		3
	TB3-7,8	J2L	44	6	16	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			
8A	TB7-1,2	J7U	66	28	38	8	Y	Y			

- Add jumpers from TB2-5 to TB2-7, and from TB2-6 to TB2-8.
- Add jumpers from TB4-9 to TB4-11, and from TB4-10 to TB4-12.
- Add jumpers from TB3-5 to TB3-7, and from TB3-6 to TB3-8.

INPUT FILE POSITION LEGEND: J2L



SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	61,82	21,22	NU	81	41,42	NU	21	61,62 63	NU	71,72	63	81,82
RED	*	128		*	101		*	134				107
YELLOW		129			102			135				108
GREEN		130			103			136				109
RED ARROW										122		
YELLOW ARROW	126			117			132			123	123	
GREEN ARROW	127			118			133			124	124	
⬇												
⬇												

NU = Not Used

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

DYNAMIC BACK-UP CONTROL PROGRAMMING

(program controller as shown below)

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

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

PRESS 'NEXT'

DYNAMIC/BACKUP CONTROL FUNCTION #02
OVERLAPS: ABCDEFGHIJKLMNPO
IF OVERLAPS ARE ACTIVE :
OR PHASES: 12345678910111213141516
IF PHASES ARE ON: X
OMIT PHASES :
CALL PHASES : X

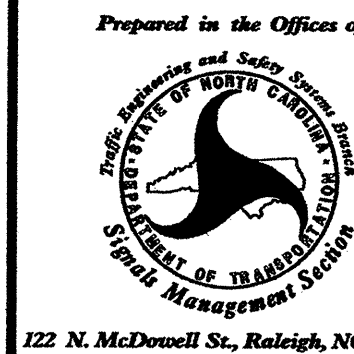
BACKUP PROTECTION PROGRAMMING COMPLETE

This Detail Supersedes The
Previously Issued Detail
Sealed 9-3-04

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1911T1
DESIGNED: April 2006
SEALED: 5-26-06
REVISED: N/A

Signal Upgrade - Temporary Design 1

ELECTRICAL AND PROGRAMMING
DETAILS FOR:



SR 1613 (Davis Drive)
At
SR 1639 (KIT CREEK ROAD)

Division 5 Wake County RTP

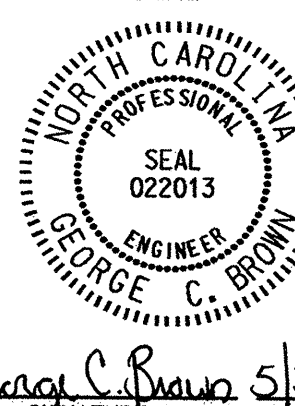
PLAN DATE: 5-16-06 REVIEWED BY: D.T. Joyce

PREPARED BY: D.H. Spaulding REVIEWED BY:

REVISIONS INIT. DATE

SIGNATURE DATE

SEAL



SIG. INVENTORY NO. 05-1911 T1

PHASING DIAGRAM

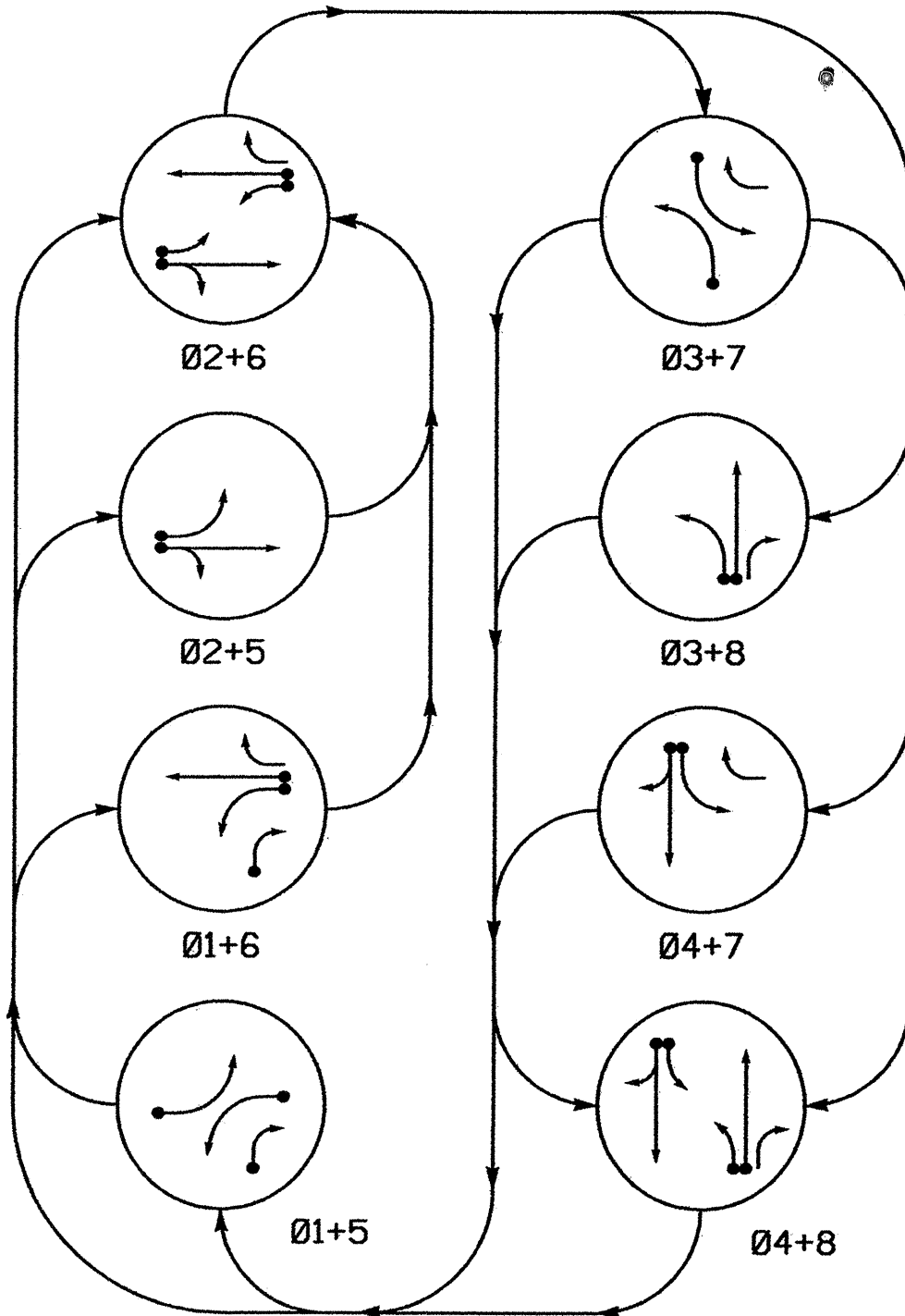


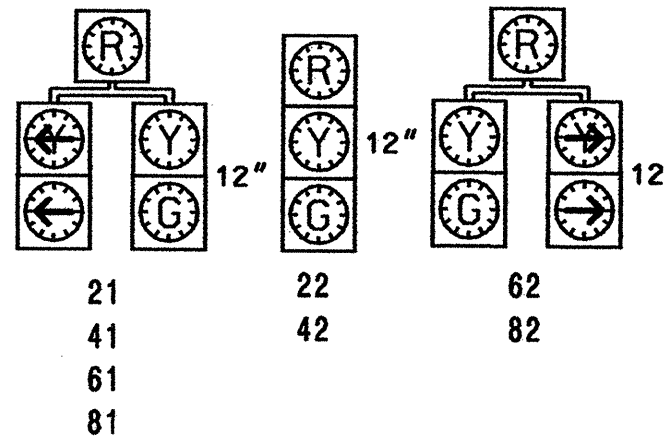
TABLE OF OPERATION

SIGNAL FACE	PHASE								
	0 1 + 5	0 1 + 6	0 2 + 5	0 2 + 6	0 3 + 7	0 3 + 8	0 4 + 7	0 4 + 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	R	G	G	R	R	R	R	Y
62	R	R	G	G	R	R	R	R	Y
81	R	R	R	R	R	R	G	G	R
82	R	R	R	R	R	R	G	G	R

***SEE NOTE #2**

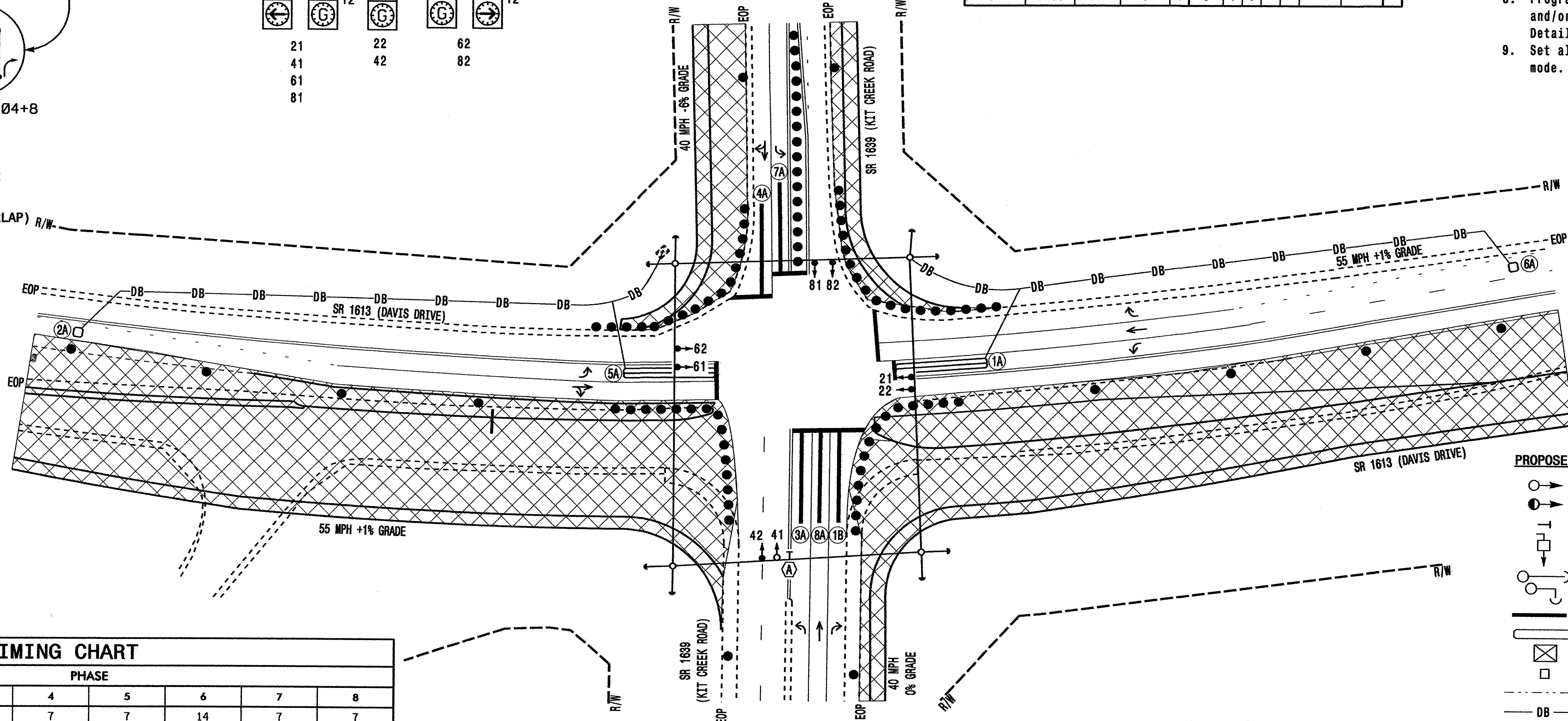
SIGNAL FACE I.D

⦿ Denotes L.E.D.



PHASING DIAGRAM DETECTION LEGEND

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



2070L TIMING CHART

[illegible]

* 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.

2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING					
LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	NEW LOOP	PHASE	CALLING	EXTENSION FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME
1A	6X60	2-4-2	0	Y	6	Y	Y	Y	-	3
					1	Y	Y	-	-	15
2A	6X6	6	420	Y	2	Y	Y	-	-	-
5A	6X60	2-4-2	0	Y	2	Y	Y	Y	-	3
					5	Y	Y	-	-	15
6A	6X6	6	420	Y	6	Y	Y	-	-	-
VIDEO DETECTION ZONES										
1B	6X60	NA	0	Y	1	Y	Y	-	-	15
3A	6X60	NA	0	Y	8	Y	Y	-	-	3
					3	Y	Y	-	-	15
4A	6X60	NA	0	Y	4	Y	Y	-	-	10
7A	6X60	NA	0	Y	4	Y	Y	-	-	3
					7	Y	Y	-	-	15
8A	6X60	NA	0	Y	8	Y	Y	-	-	-

VIDEO DETECTION ZONE

1B	6X60	NA	0	Y	1	Y	Y	-	-	-	15
3A	6X60	NA	0	Y	8	Y	Y	-	-	-	3
					3	Y	Y	-	-	-	15
4A	6X60	NA	0	Y	4	Y	Y	-	-	-	10
7A	6X60	NA	0	Y	4	Y	Y	-	-	-	3
					7	Y	Y	-	-	-	15
8A	6X60	NA	0	Y	8	Y	Y	-	-	-	-

**8 PHASE
FULLY ACTUATED
(ISOLATED)**

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads numbered 21,22,61 and 62.
4. Omit phase 1 during phase 2 on.
5. Omit phase 5 during phase 6 on.
6. Omit phase 3 during phase 4 on.
7. Omit phase 7 during phase 8 on.
8. Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4+8 (See Electrical Details).
9. Set all detector units and detection zones to presence mode.

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 | |
| | Video Detection Zone | |
| | Inductive Loop Detector | |
| | Controller & Cabinet | |
| | Junction Box | |
| | 2-in Underground Conduit | |
| | Direct Bury | N/A |
| | Right of Way with Marker | |
| | Directional Arrow | |
| | Pavement Marking Arrow | |
| | Construction Zone Drums | N/A |
| | Construction Zone | N/A |
| | "LEFT TURN YIELD ON GREEN" Sign
With Orange Flags (R10-12) | |

THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04

SIGNAL UPGRADE - TEMPORARY DESIGN 2 - CONSTRUCTION PHASE 2



122 N. McDowell St., Raleigh, NC 27601

SR 1613 (DAVIS DRIVE)
AT
SR 1639 (KIT CREEK ROAD)

DIVISION 5 WAKE COUNTY R1

PLAN DATE:	April 2006	REVIEWED BY:	Zachary Little
------------	------------	--------------	----------------

503 PREPARED BY: L. Blount REVIEWED BY: Doumit Ishakov

REVISIONS	INIT.	DATE
-----------	-------	------

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	5
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	---

[illegible]

SEAL

NORTH CAROLINA

PROFESSIONAL

SEAL

22027

R. L. WILLIAMS

ENGINEER

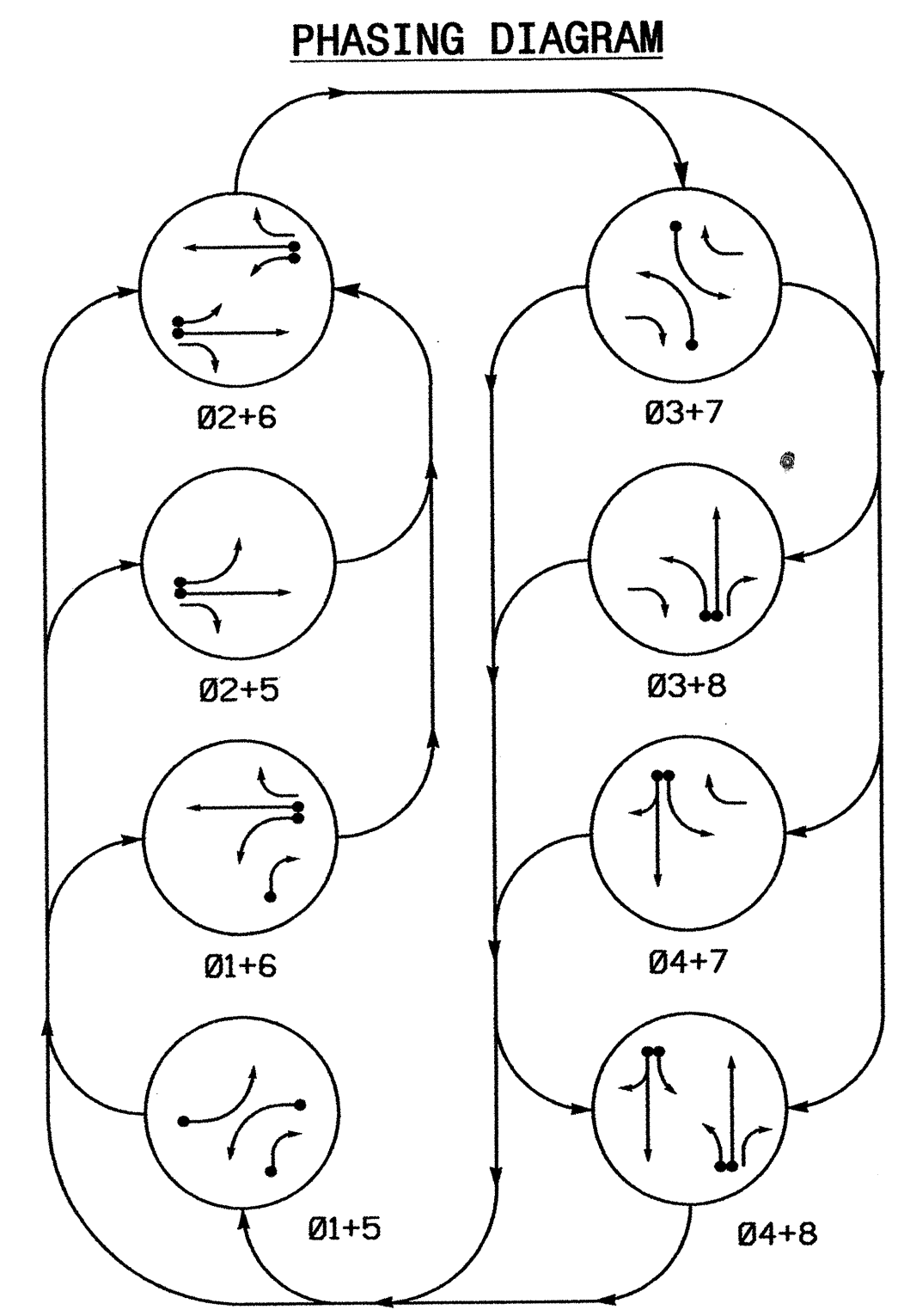
~~CONFIDENTIAL~~ MUL

18/04/2004

26 MZ

SIGNATURE _____ DATE _____

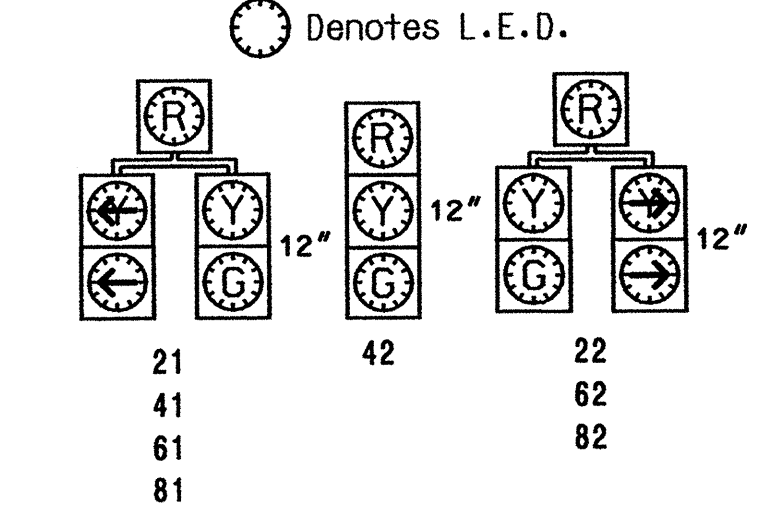
SIG. INVENTORY NO. 05-191112



SIGNAL FACE	PHASE								F* FLASH
	01 +5	02 +6	03 +7	04 +8	05 +9	06 +0	07 +1	08 +2	
21	R	R	G	R	R	R	R	Y	
22	R	R	G	R	R	R	R	Y	
41	R	R	R	R	R	R	G	R	
42	R	R	R	R	R	R	G	R	
61	R	R	G	R	R	R	R	Y	
62	R	R	G	R	R	R	R	Y	
81	R	R	R	R	R	R	G	R	
82	R	R	R	R	R	R	G	R	

*SEE NOTE #2

SIGNAL FACE I.D.

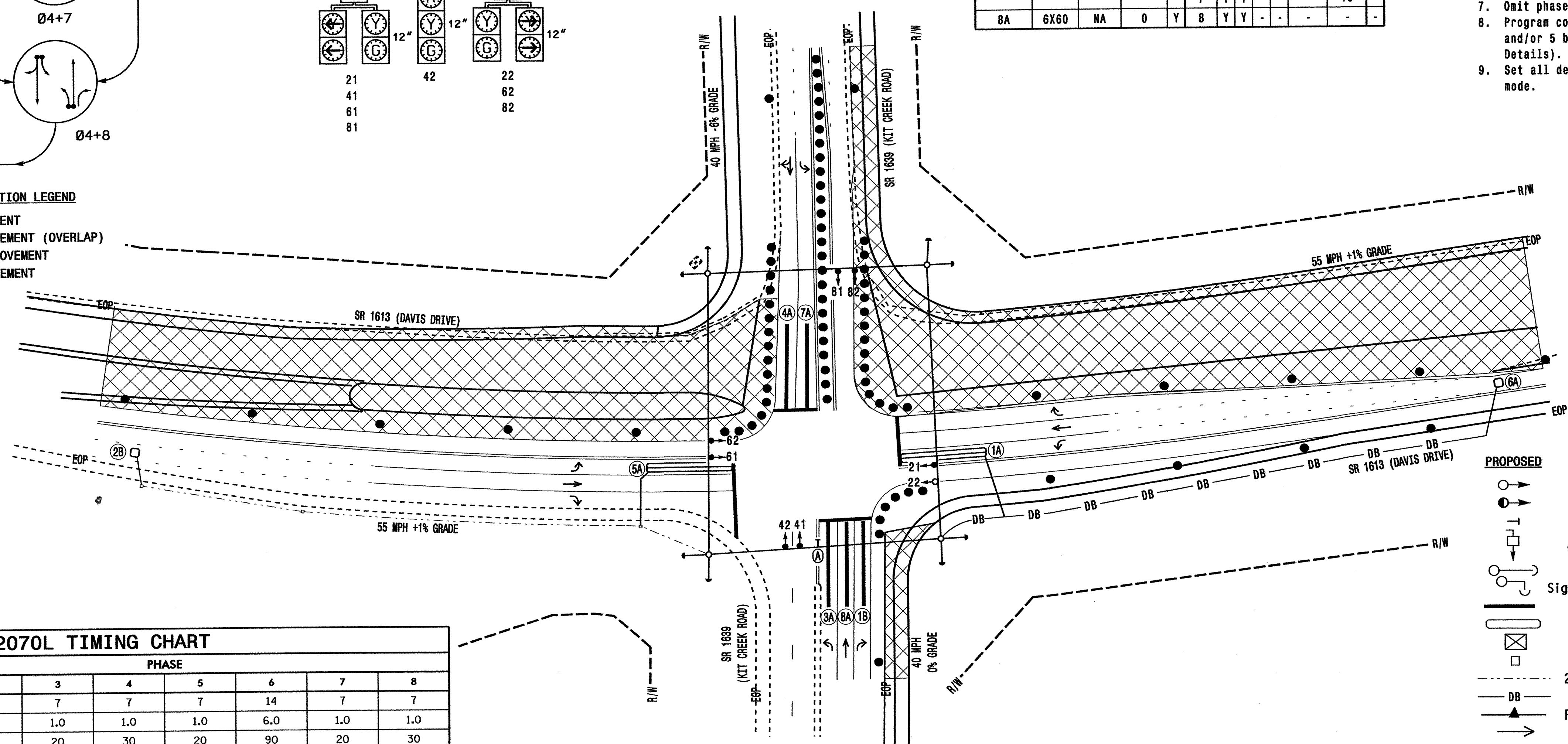
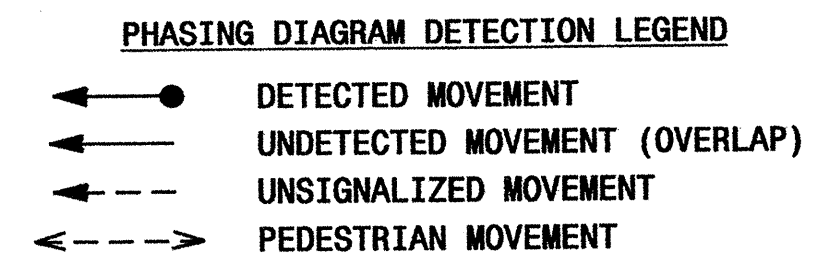


2070L LOOP & DETECTOR INSTALLATION											
INDUCTIVE LOOPS						DETECTOR PROGRAMMING					
LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	NEW CARD
1A	6X60	2-4-2	0	Y	6	Y	Y	Y	-	3	-
2B	6X6	6	420	Y	1	Y	Y	-	-	15	-
5A	6X60	2-4-2	0	Y	2	Y	Y	Y	-	3	-
6A	6X6	6	420	Y	5	Y	Y	-	-	15	-
VIDEO DETECTION ZONES											
1B	6X60	NA	0	Y	1	Y	Y	-	-	15	-
3A	6X60	NA	0	Y	8	Y	Y	-	-	3	-
4A	6X60	NA	0	Y	3	Y	Y	-	-	15	-
7A	6X60	NA	0	Y	4	Y	Y	-	-	10	-
8A	6X60	NA	0	Y	7	Y	Y	-	-	3	-
										15	-
										-	-

8 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition existing signal heads numbered 21, 61 and 62.
- Omit phase 1 during phase 2 on.
- Omit phase 5 during phase 6 on.
- Omit phase 3 during phase 4 on.
- Omit phase 7 during phase 8 on.
- Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4+8 (See Electrical Details).
- Set all detector units and detection zones to presence mode.



2070L TIMING CHART								
FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Min Green 1 *	7	14	7	7	7	14	7	7
Extension 1 *	1.0	6.0	1.0	1.0	1.0	6.0	1.0	1.0
Max Green 1 *	20	90	20	30	20	90	20	30
Yellow Clearance	3.0	5.1	3.0	4.7	3.0	5.1	3.1	4.2
Red Clearance	2.3	1.2	2.3	1.2	2.9	1.2	2.3	1.2
Walk 1 *	-	-	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-	-	-
Seconds Per Actuation *	-	2.5	-	-	-	2.5	-	-
Max Variable Initial *	-	46	-	-	-	46	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	45	-	-	-	45	-	-
Minimum Gap	-	3.4	-	-	-	3.4	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW	-	-
Dual Entry	-	-	-	ON	-	-	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON	ON	ON	ON

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

THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

SIGNAL UPGRADE - TEMPORARY DESIGN 3 - CONSTRUCTION PHASE 3

222 N. McDowell St., Raleigh, NC 27603

SR 1613 (DAVIS DRIVE)
AT
SR 1639 (KIT CREEK ROAD)

DIVISION 5 WAKE COUNTY RTP

PLAN DATE: APRIL 2006 REVIEWED BY: Z. LITTLE

PREPARED BY: C. PIERCE REVIEWED BY: D. ISHAK

REVISIONS

SCALE 0 50' 1"=50'

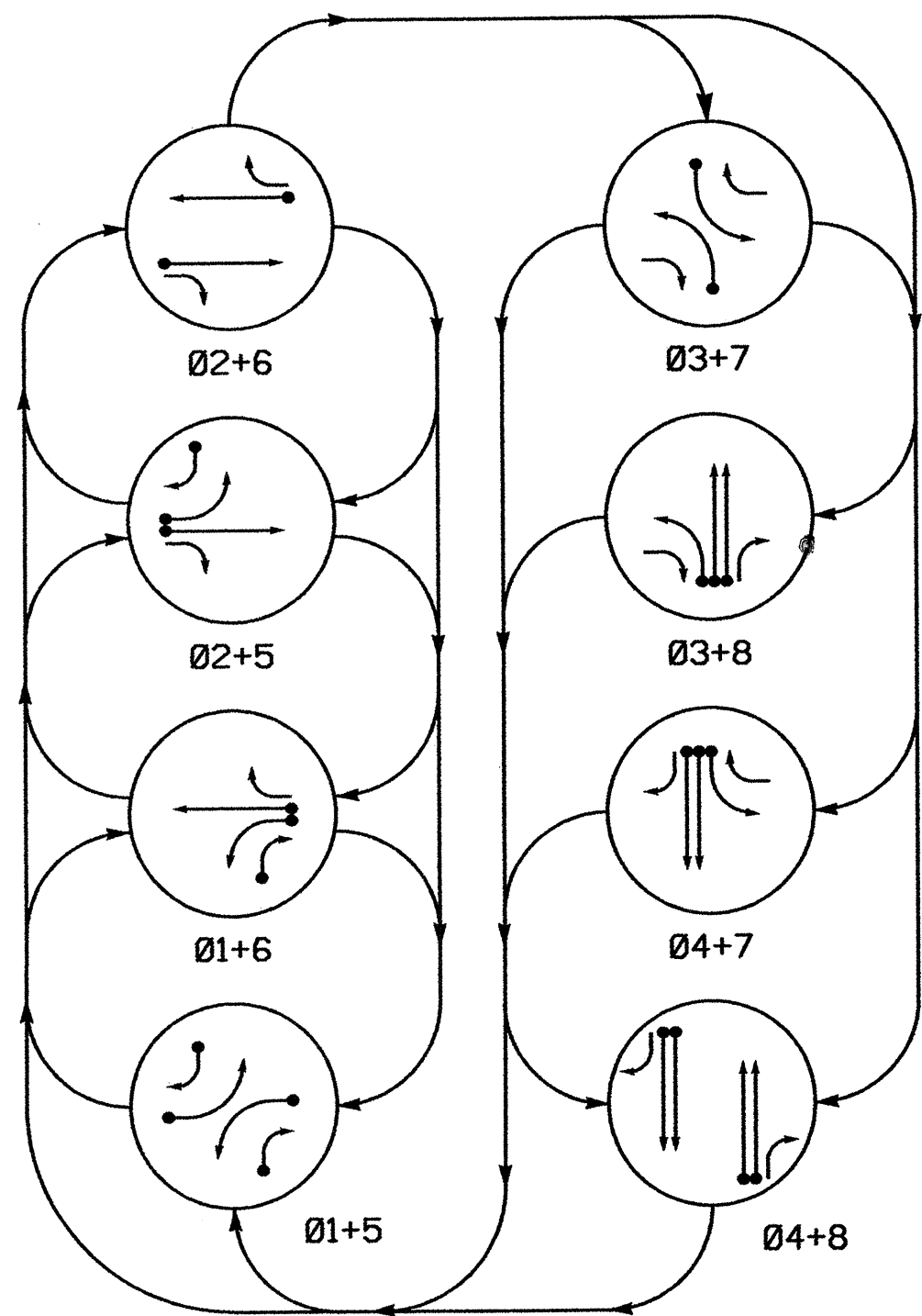
SEAL

SIGNATURE DATE

SIG. INVENTORY NO. 05-191173

SIG. INVENTORY NO. 05-1911T3

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

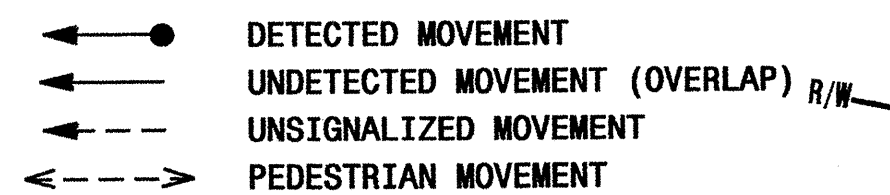


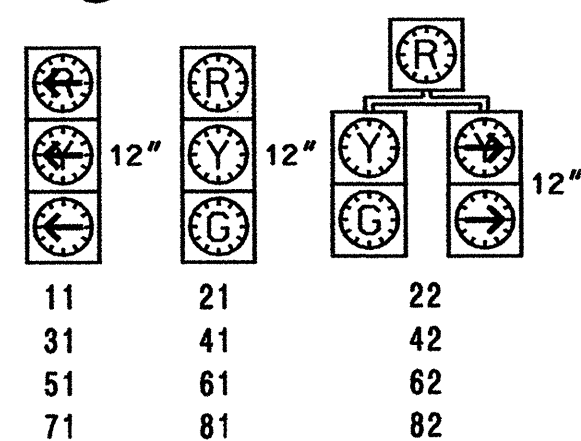
TABLE OF OPERATION

SIGNAL FACE	PHASE							
	Ø 1 + 5	Ø 1 + 6	Ø 2 + 5	Ø 2 + 6	Ø 3 + 7	Ø 3 + 8	Ø 4 + 7	Ø 4 + 8
11	—	—	—	—	—	—	—	—
21	R	R	G	G	R	R	R	Y
22	R	R	G	G	R	R	R	Y
31	—	—	—	—	—	—	—	—
41	R	R	R	R	R	R	G	G
42	R	R	R	R	R	R	G	G
51	—	—	—	—	—	—	—	—
61	R	G	R	G	R	R	R	Y
62	R	G	R	G	R	R	R	Y
71	—	—	—	—	—	—	—	—
81	R	R	R	R	R	R	G	G
82	R	R	R	R	R	R	G	G

*SEE NOTE #2

SIGNAL FACE I.D.

Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY		STRETCH TIME	DELAY TIME	
								SYSTEM	LOOP			
1A	6X60	2-4-2	0	Y	1	Y	Y	-	-	-	-	
1C	6X60	2-4-2	0	Y	1	Y	Y	-	-	-	15	
2B	6X6	6	420	-	2	Y	Y	-	-	-	-	
3B	6X60	2-4-2	0	Y	3	Y	Y	-	-	-	-	
4A	6X60	2-4-2	0	Y	4	Y	Y	-	-	-	-	
4B	6X60	2-4-2	0	Y	4	Y	Y	-	-	-	-	
5A	6X60	2-4-2	0	-	5	Y	Y	-	-	-	-	
5C	6X60	2-4-2	0	Y	5	Y	Y	-	-	-	15	
6B	6X6	6	420	Y	6	Y	Y	-	-	-	-	
7B	6X60	2-4-2	0	Y	7	Y	Y	-	-	-	-	
8A	6X60	2-4-2	0	Y	8	Y	Y	-	-	-	-	
8B	6X60	2-4-2	0	Y	8	Y	Y	-	-	-	-	

8 PHASE FULLY ACTUATED (ISOLATED)

NOTES

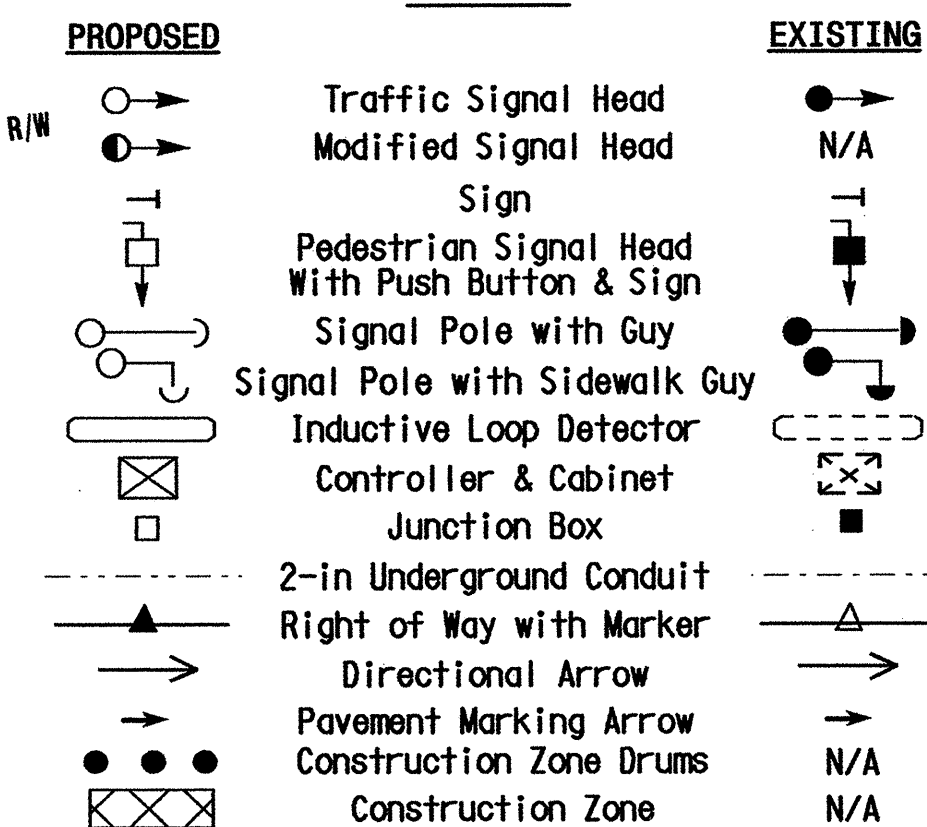
- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition existing signal heads numbered 22, 41, 62 and 82.
- Set all detector units to presence mode.
- Renumber existing signed head 42 as 41.
- Some detection loops numbered to accommodate final design.

2070L TIMING CHART

FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Min Green 1 *	7	14	7	7	7	14	7	7
Extension 1 *	1.0	6.0	1.0	1.0	1.0	6.0	1.0	1.0
Max Green 1 *	20	90	20	30	20	90	20	30
Yellow Clearance	3.0	5.1	3.0	4.7	3.0	5.1	3.1	4.2
Red Clearance	3.9	1.4	3.7	2.3	3.9	1.5	3.8	2.3
Walk 1 *	-	-	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-	-	-
Seconds Per Actuation *	-	2.5	-	-	-	2.5	-	-
Max Variable Initial *	-	46	-	-	-	46	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	45	-	-	-	45	-	-
Minimum Gap	-	3.4	-	-	-	3.4	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW	-	-
Dual Entry	-	-	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON	ON	ON

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

LEGEND

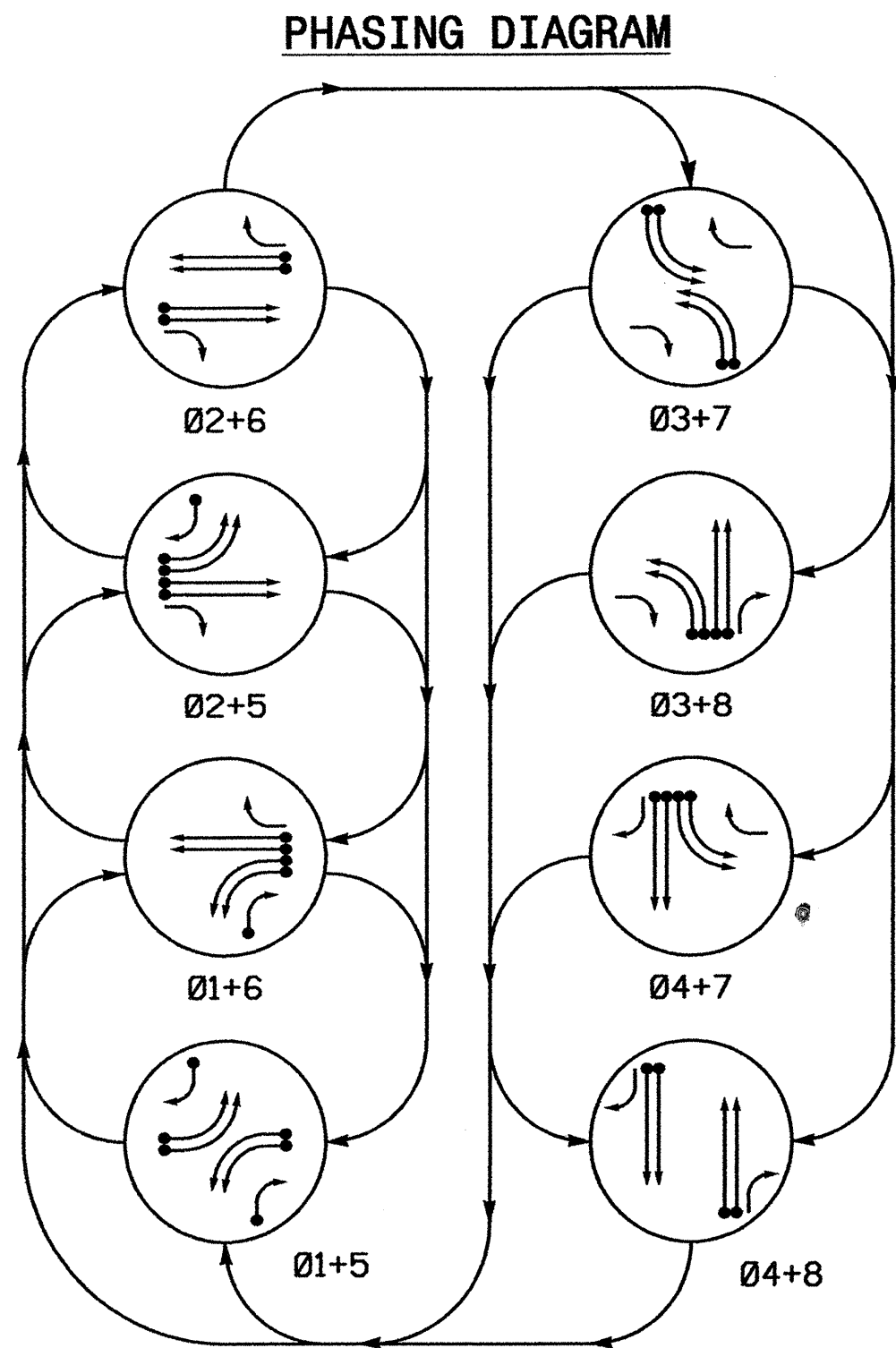


THIS PLAN SUPERSEDES THE PREVIOUSLY ISSUED DESIGN SEALED 9/3/04.

SIGNAL UPGRADE - TEMPORARY DESIGN 4 - CONSTRUCTION PHASE 4

	SR 1613 (DAVIS DRIVE) AT SR 1639 (KIT CREEK ROAD)		SEAL	
	DIVISION 5 WAKE COUNTY RTP		DATE	
122 N. McDowell St., Raleigh, NC 27603	PLAN DATE: APRIL 2006	REVIEWED BY: Z. LITTLE	DATE	
	PREPARED BY: C. PIERCE	REVIEWED BY: D. ISHAK	DATE	
	REVISIONS	INIT.	DATE	
	SIGNATURE		DATE	
SIG. INVENTORY NO. 05-191114				

SIG. INVENTORY NO. 05-1911T4

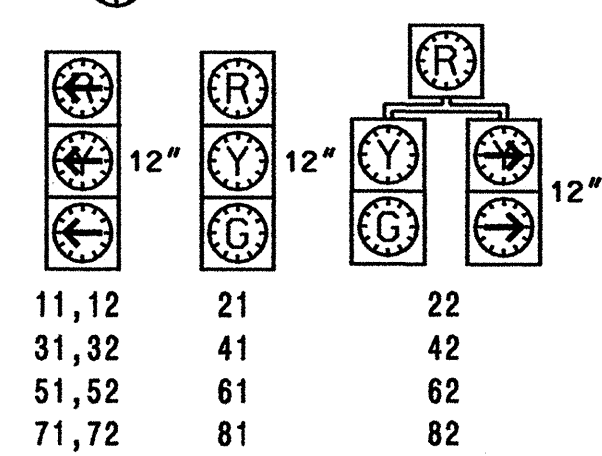


SIGNAL FACE	PHASE							
	Ø 1 + 5	Ø 1 + 6	Ø 2 + 5	Ø 2 + 6	Ø 3 + 7	Ø 3 + 8	Ø 4 + 7	Ø 4 + 8
11,12	←	←	←	←	←	←	←	←
21	R	R	G	G	R	R	R	Y
22	R	R	G	G	R	R	R	Y
31,32	←	←	←	←	←	←	←	←
41	R	R	R	R	R	R	G	G
42	R	R	R	R	R	R	G	G
51,52	←	←	←	←	←	←	←	←
61	R	G	R	G	R	R	R	Y
62	R	G	R	G	R	R	R	Y
71,72	←	←	←	←	←	←	←	←
81	R	R	R	R	R	G	R	G
82	R	R	R	R	R	G	R	G

*SEE NOTE #2

SIGNAL FACE I.D.

Denotes L.E.D.



PHASING DIAGRAM DETECTION LEGEND

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

2070L LOOP & DETECTOR INSTALLATION									
INDUCTIVE LOOPS					DETECTOR PROGRAMMING				
LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME
1A	6X60	2-4-2	0	Y	1	Y	Y	-	-
1B	6X60	2-4-2	0	Y	1	Y	Y	-	-
1C	6X60	2-4-2	0	-	1	Y	Y	-	15
2A	6X6	6	420	Y	2	Y	Y	-	-
2B	6X6	6	420	-	2	Y	Y	-	-
3A	6X60	2-4-2	0	Y	3	Y	Y	-	-
3B	6X60	2-4-2	0	-	3	Y	Y	-	-
4A	6X60	2-4-2	0	-	4	Y	Y	-	-
4B	6X60	2-4-2	0	-	4	Y	Y	-	-
5A	6X60	2-4-2	0	Y	5	Y	Y	-	-
5B	6X60	2-4-2	0	Y	5	Y	Y	-	-
5C	6X60	2-4-2	0	-	5	Y	Y	-	15
6A	6X6	6	420	Y	6	Y	Y	-	-
6B	6X6	6	420	-	6	Y	Y	-	-
7A	6X60	2-4-2	0	Y	7	Y	Y	-	-
7B	6X60	2-4-2	0	-	7	Y	Y	-	-
8A	6X60	2-4-2	0	-	8	Y	Y	-	-
8B	6X60	2-4-2	0	-	8	Y	Y	-	-

8 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.

LEGEND

- | PROPOSED | EXISTING |
|--|----------|
| Traffic Signal Head | N/A |
| Modified Signal Head | N/A |
| Sign | N/A |
| Pedestrian Signal Head With Push Button & Sign | N/A |
| Metal Pole with Mastarm | N/A |
| Inductive Loop Detector | N/A |
| Controller & Cabinet | N/A |
| Junction Box | N/A |
| 2-in Underground Conduit | N/A |
| Directional Drill | N/A |
| Right of Way with Marker | N/A |
| Directional Arrow | N/A |
| Pavement Marking Arrow | N/A |

THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

2070L TIMING CHART								
FEATURE	PHASE							
	1	2	3	4	5	6	7	8
Min Green 1 *	7	14	7	7	7	14	7	7
Extension 1 *	1.0	6.0	1.0	1.0	1.0	6.0	1.0	1.0
Max Green 1 *	20	100	20	30	20	100	20	30
Yellow Clearance	3.0	5.1	3.0	4.7	3.0	5.1	3.1	4.2
Red Clearance	3.9	1.4	3.7	2.4	3.9	1.5	3.8	2.4
Walk 1 *	-	-	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-	-	-
Seconds Per Actuation *	-	1.8	-	-	-	1.8	-	-
Max Variable Initial *	-	46	-	-	-	46	-	-
Time Before Reduction *	-	15	-	-	-	15	-	-
Time To Reduce *	-	45	-	-	-	45	-	-
Minimum Gap	-	3.4	-	-	-	3.4	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW	-	-
Dual Entry	-	-	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON	ON	ON

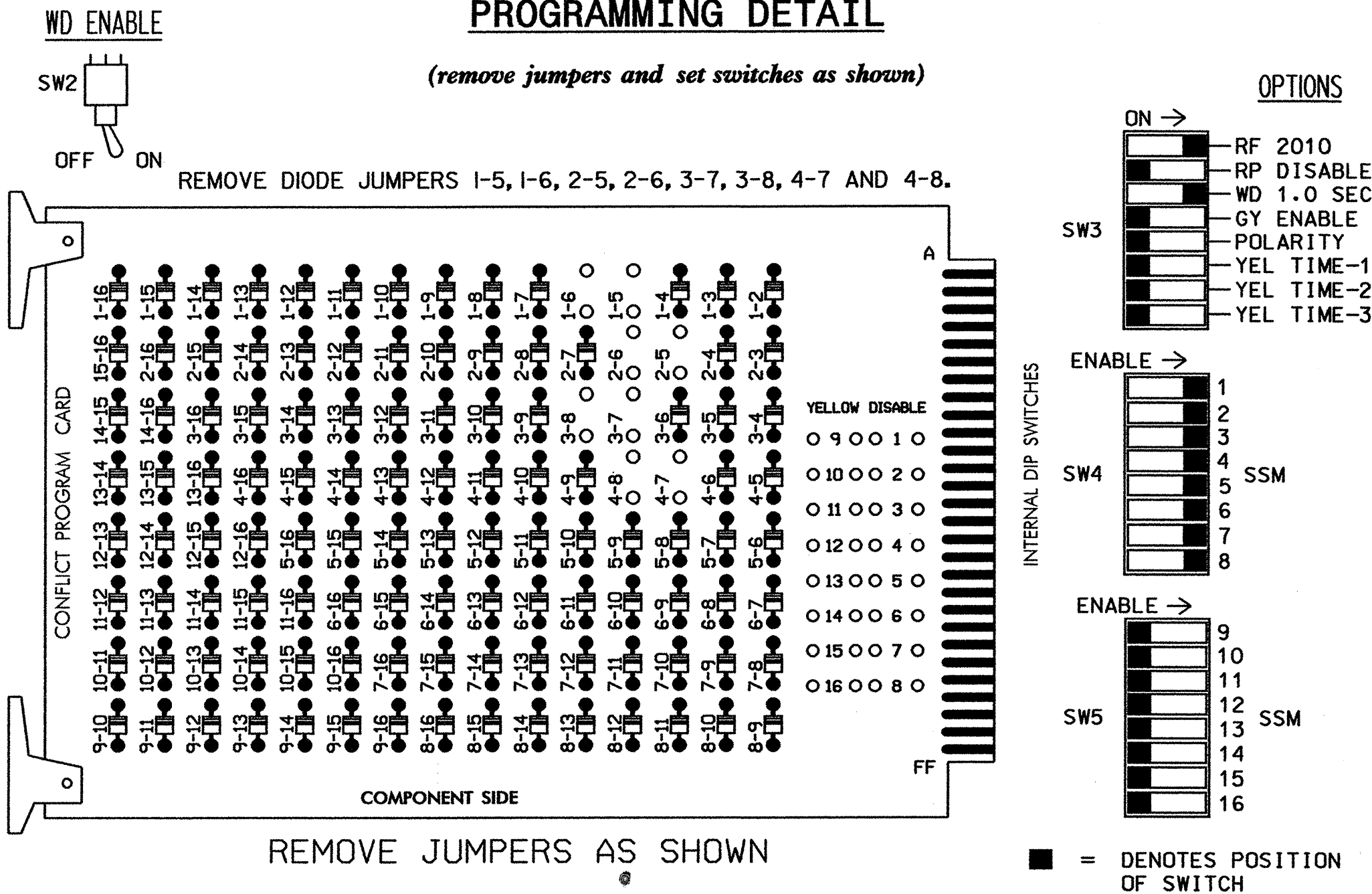
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

SIGNAL UPGRADE - FINAL DESIGN

	SR 1613 (DAVIS DRIVE) AT SR 1639 (KIT CREEK ROAD)	
	DIVISION 5	WAKE COUNTY
	PLAN DATE: April 2006	REVIEWED BY: Zachary Little
	PREPARED BY: L. Blount	REVIEWED BY: Doumit Ishakov
SCALE: 1"=50'	INITIALS	DATE
SIGNATURE		DATE
SIC. INVENTORY NO.		05-1911

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL



NOTES

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

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET.....CONTRACTOR SUPPLIED 332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8
PHASES USED.....1,2,3,4,5,6,7,8
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	11,12	82	21,22	NU	31,32	22	41,42	NU	51,52	42	61,62	NU
RED		128			101			134			107	
YELLOW		129			102			135			108	
GREEN		130			103			136			109	
RED ARROW	125			116			131			122		
YELLOW ARROW	126	126		117	117		132	132		123	123	
GREEN ARROW	127	127		118	118		133	133		124	124	
Hand icon												
Person icon												

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	Ø 1	Ø 1	Ø 2	Ø 1	Ø 1	Ø 3	Ø 4	Ø 1	Ø 1	Ø 1	Ø 1	Ø 1	Ø 1	FS
L	1A	1B	2A	1C	2B	3A	4A	3B	4B	3C	4C	3D	4D	DC ISOLATOR
U	Ø 5	Ø 5	Ø 6	Ø 5	Ø 5	Ø 7	Ø 8	Ø 5	Ø 5	Ø 5	Ø 5	Ø 5	Ø 5	ST
L	5A	5B	6A	5C	6B	7A	8A	7B	8B	7C	8C	7D	8D	DC ISOLATOR

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Y	Y			
1B	TB2-5,6	I2U	39	1	2	1	Y	Y			
1C	TB2-7,8	I2L	43	5	12	1	Y	Y			15
2A	TB2-9,10	I3U	63	25	32	2	Y	Y			
2B	TB2-11,12	I3L	76	38	42	2	Y	Y			
3A	TB4-9,10	I6U	41	3	4	3	Y	Y			
3B	TB4-11,12	I6L	45	7	14	3	Y	Y			
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			
5C	TB3-7,8	J2L	44	6	16	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			
7A	TB5-9,10	J6U	42	4	8	7	Y	Y			
7B	TB5-11,12	J6L	46	8	18	7	Y	Y			
8A	TB7-1,2	J7U	66	28	38	8	Y	Y			
8B	TB7-3,4	J7L	79	41	48	8	Y	Y			

INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1911
DESIGNED: April 2006
SEALED: 5-26-06
REVISED: N/A

This Detail Supersedes The
Previously Issued Detail
Sealed 9-3-04

Signal Upgrade - Final Design

ELECTRICAL AND PROGRAMMING
DETAILS FOR:

Prepared in the Office of:



122 N. McDowell St., Raleigh, NC 27603

SR 1613 (Davis Drive)
At
SR 1639 (KIT CREEK ROAD)

Division 5 Wake County RTP

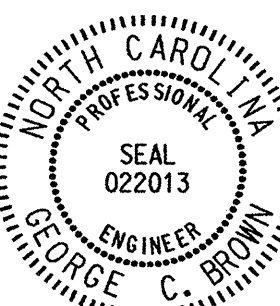
PLAN DATE: 5-18-06 REVIEWED BY: D.T. Joyce

PREPARED BY: D.H. Spaulding REVIEWED BY:

REVISIONS INIT. DATE

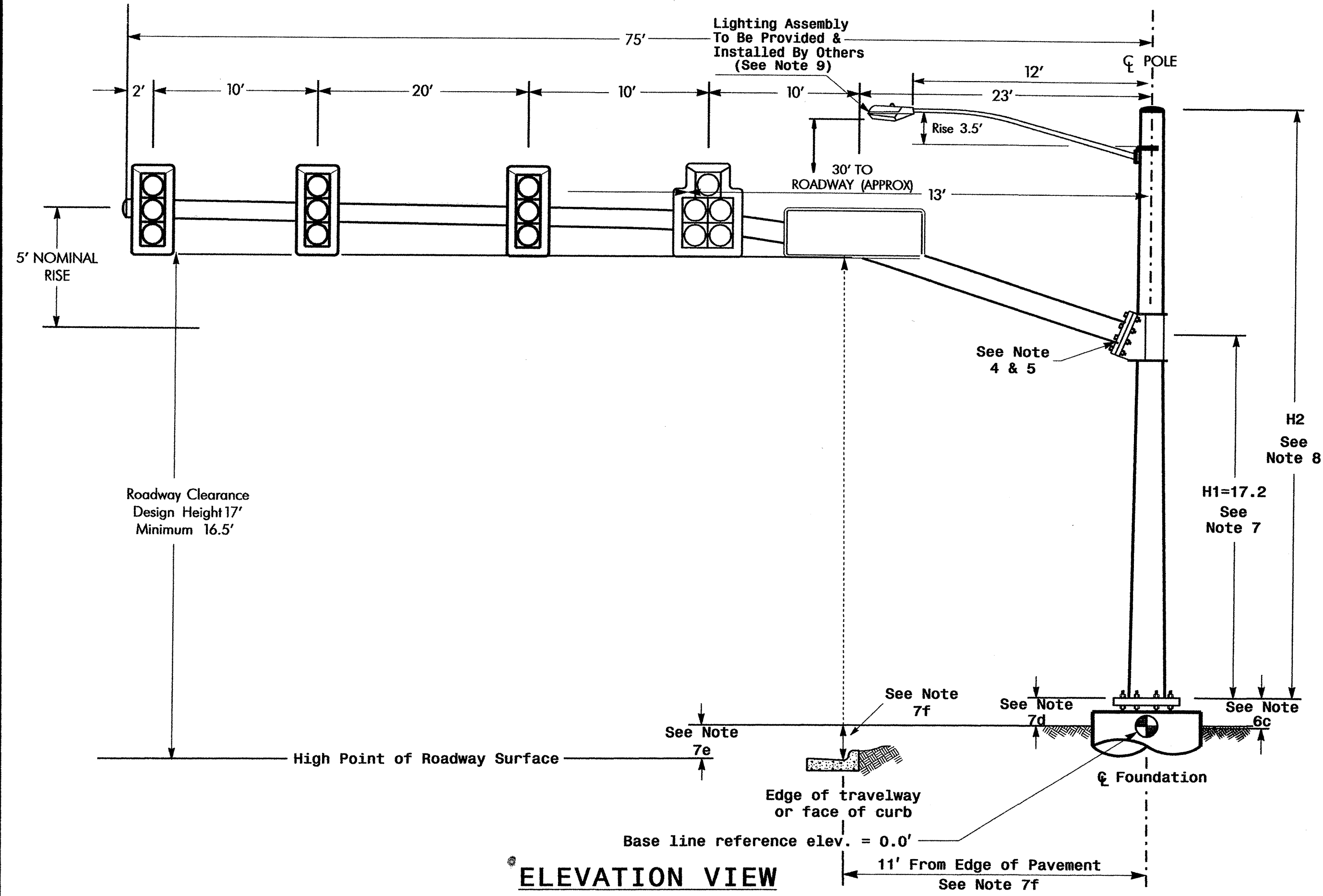
SIGNATURE DATE

SEAL



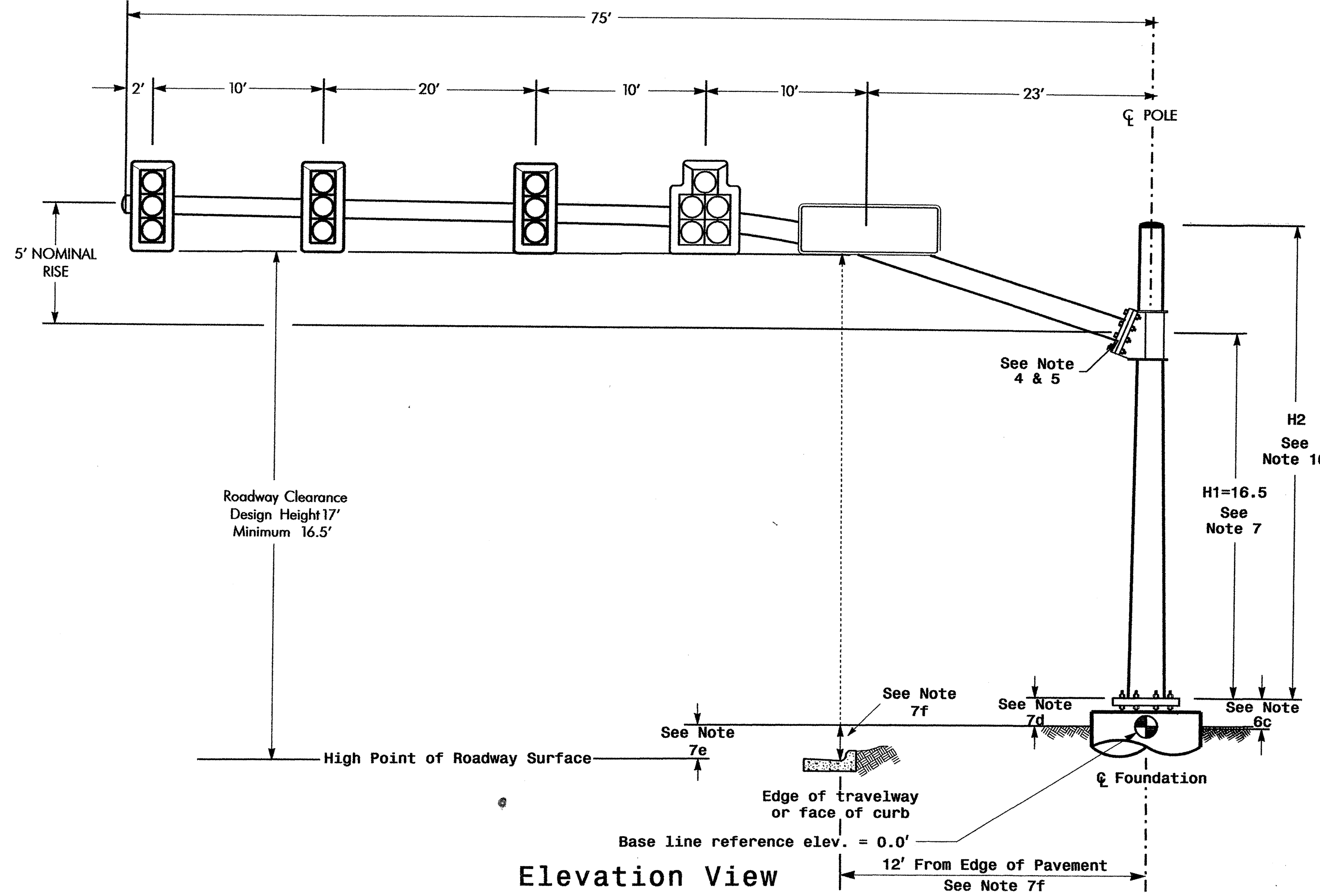
SIG. INVENTORY NO. 05-1911

Design Loading for METAL POLE NO. 1



ELEVATION VIEW

Design Loading for METAL POLE NO. 2



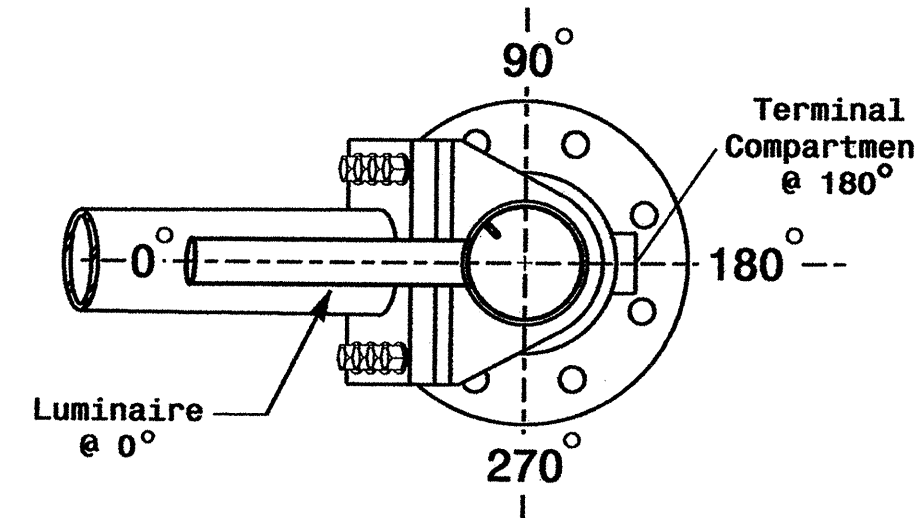
Elevation View

SPECIAL NOTE

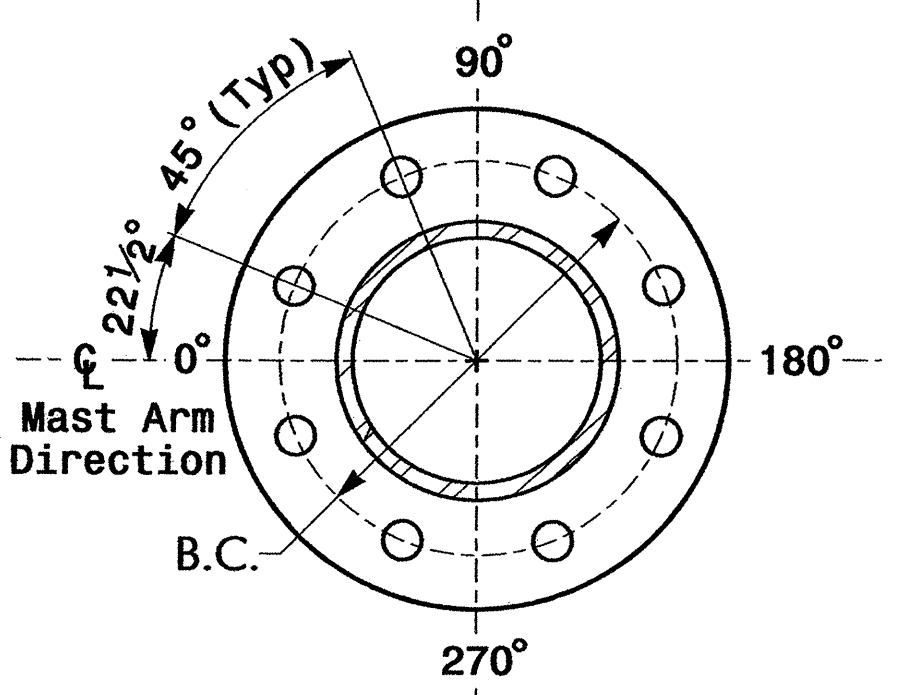
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

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	-3.6 ft.	-2.9 ft.
Elevation difference at Edge of travelway or face of curb	+/- 0.0 ft.	+/- 0.0 ft.

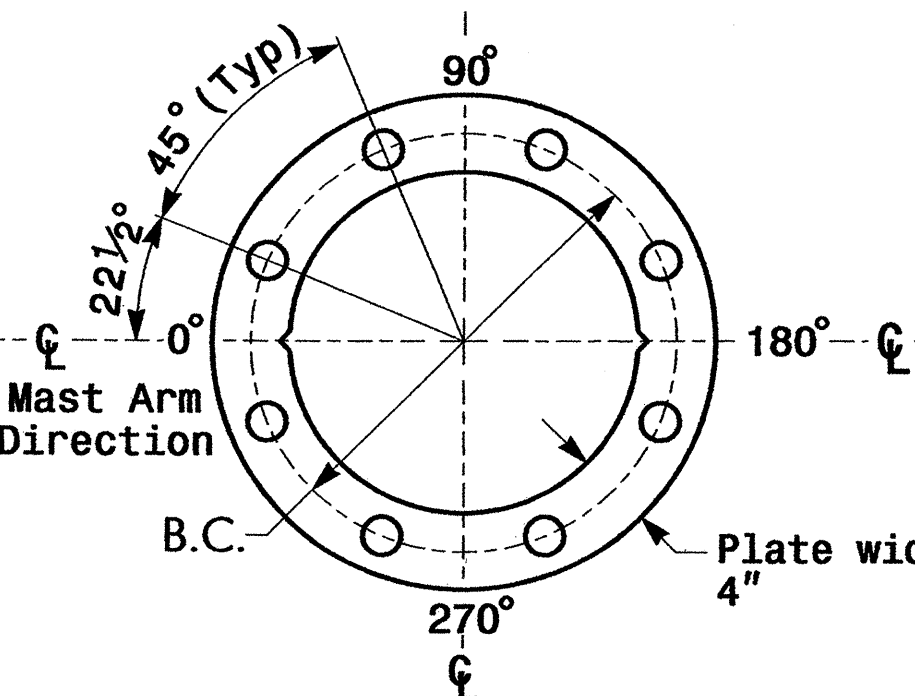


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

METAL POLE No. 1 and 2

PROJECT REFERENCE NO.	SHEET NO.
U-4026	Fig. 32

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
	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS
	OVERHEAD STREET NAME SIGN	16.0 S.F.	24" W X 96" L	30 LBS

NOTES

Design Reference Material

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

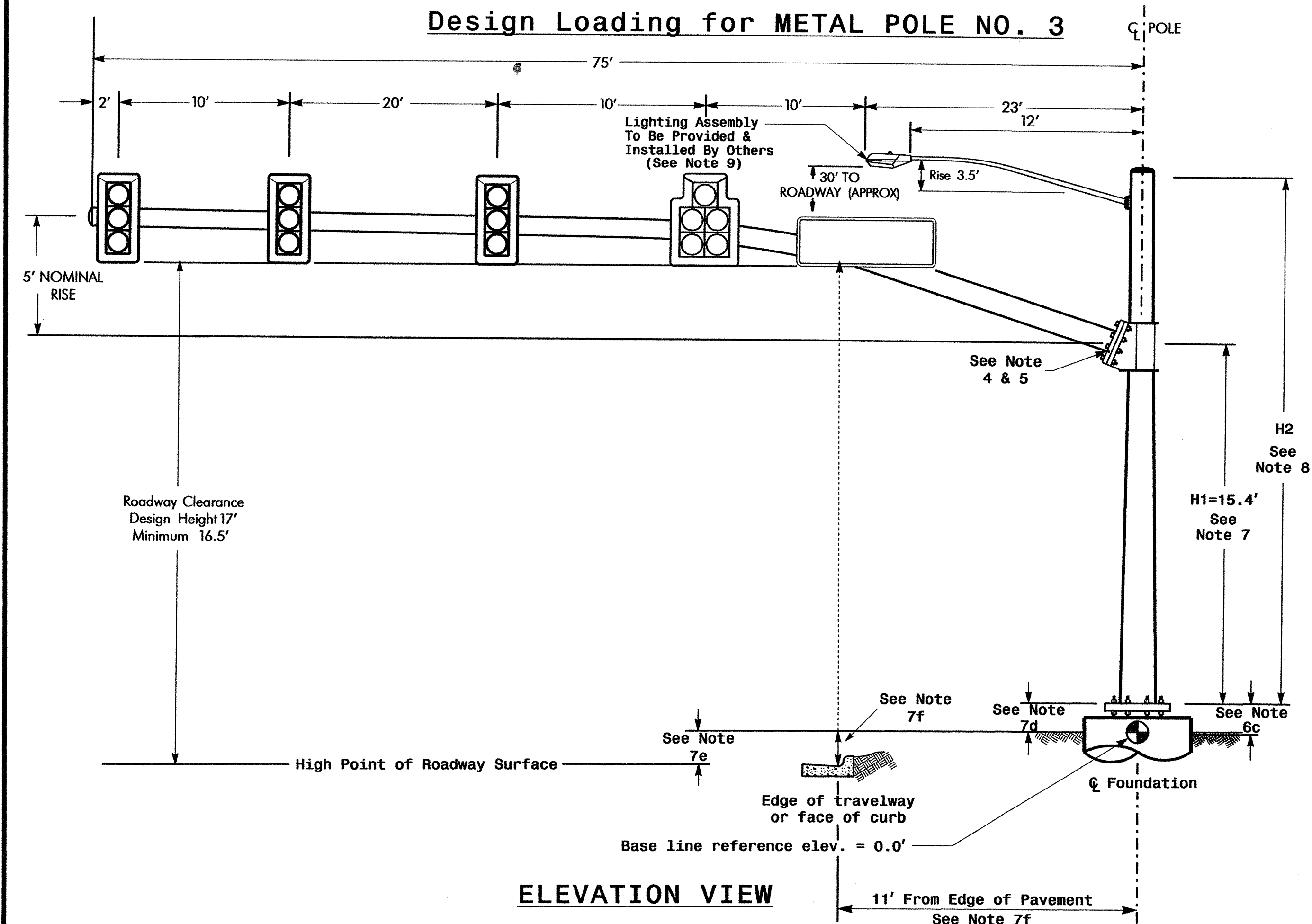
Design Requirements

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- 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.
- The arm-to-pole attachment is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
- The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
- 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.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

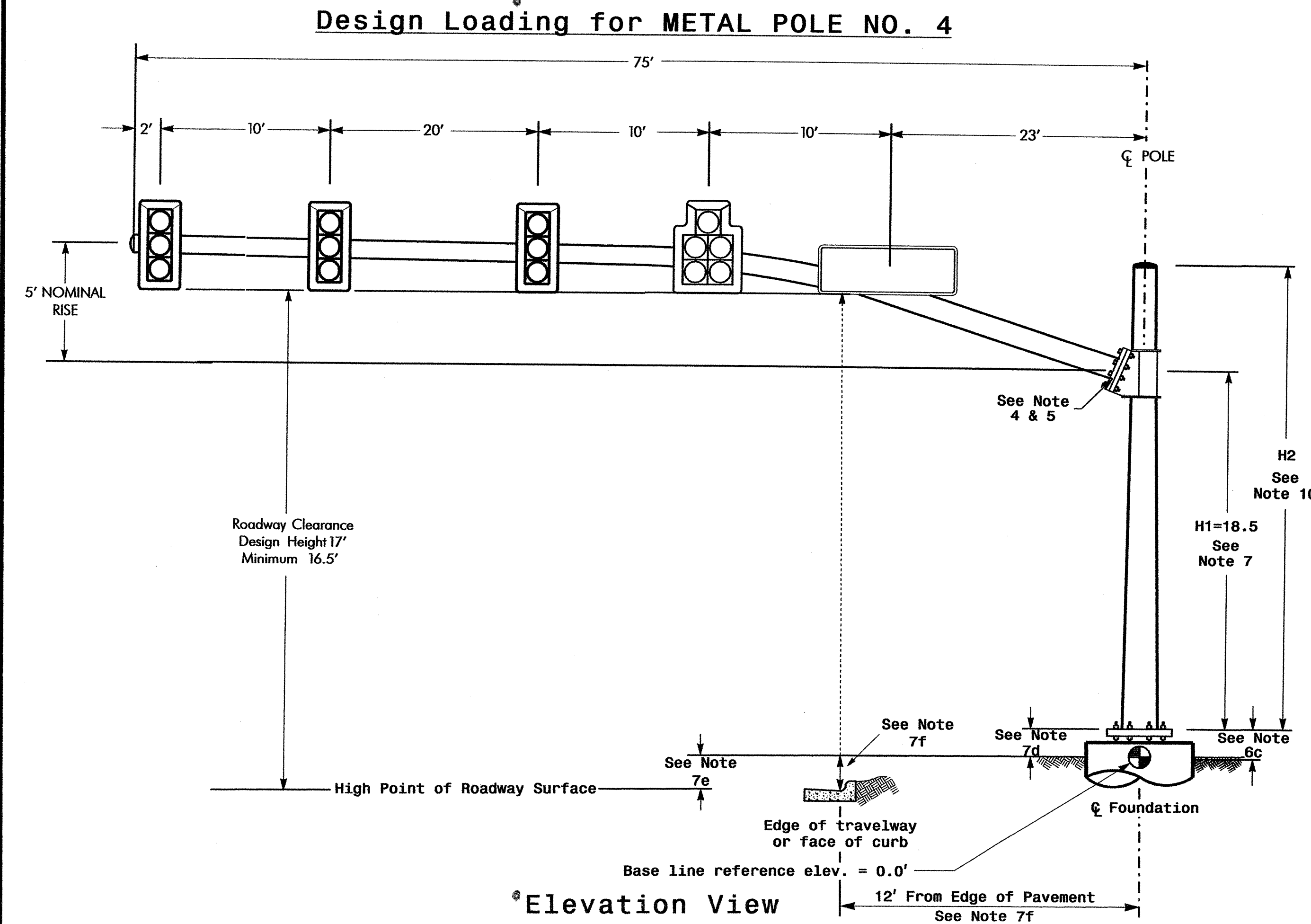
NCDOT Wind Zone 4 (90 mph)

 122 N. McDowell St., Raleigh, NC 27603	SR 1613 (DAVIS DRIVE) AT SR 1635 (KIT CREEK ROAD)			
	DIVISION 5 WAKE COUNTY MORRISVILLE			
	PLAN DATE: MARCH 2005	REVIEWED BY: Z. LITTLE		
	PREPARED BY: C. PIERCE	REVIEWED BY: D. ISHAK		
SCALE: 0 N/A		REVISIONS	INIT.	DATE
N/A				
		SIGNATURE	DATE	
		SIG. INVENTORY NO.	05-1911	

Design Loading for METAL POLE NO. 3



Design Loading for METAL POLE NO. 4

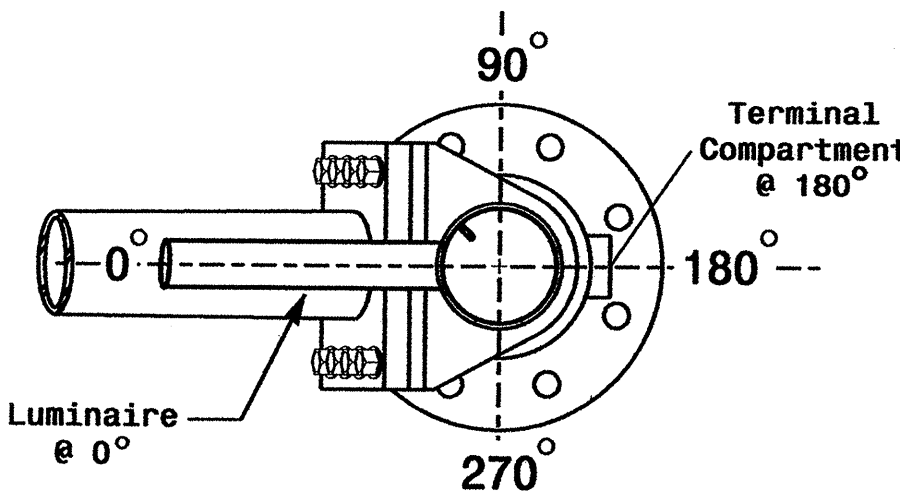


SPECIAL NOTE

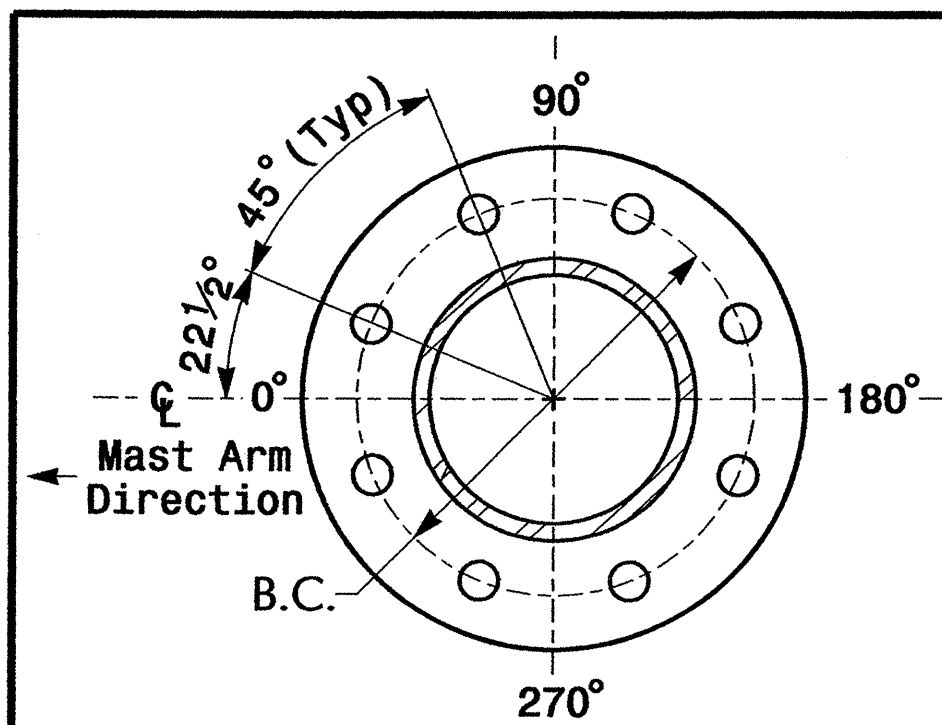
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at C Foundation @ ground level	+/-0.0 ft.	+/-0.0 ft.
Elevation difference at High point of roadway surface	-1.8 ft.	-4.9 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.

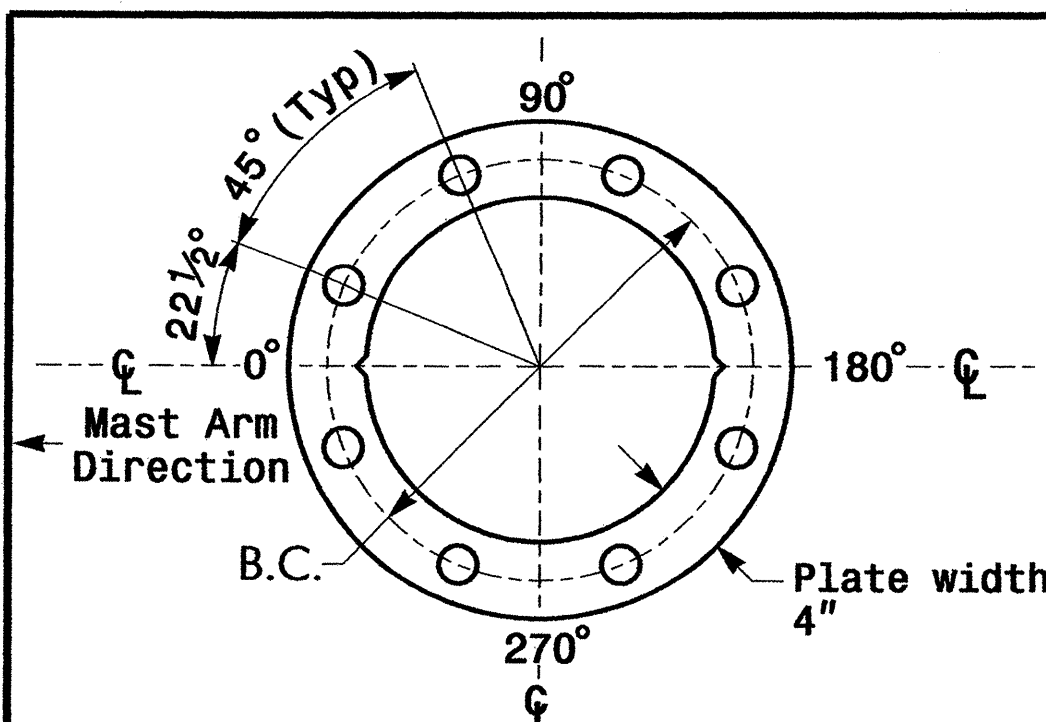


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

METAL POLE No. 3 and 4

PROJECT REFERENCE NO.	SHEET NO.
U-4026	Sig.33

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
	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS
	OVERHEAD STREET NAME SIGN	16.0 S.F.	24" W X 96" L	30 LBS

NOTES

Design Reference Material

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

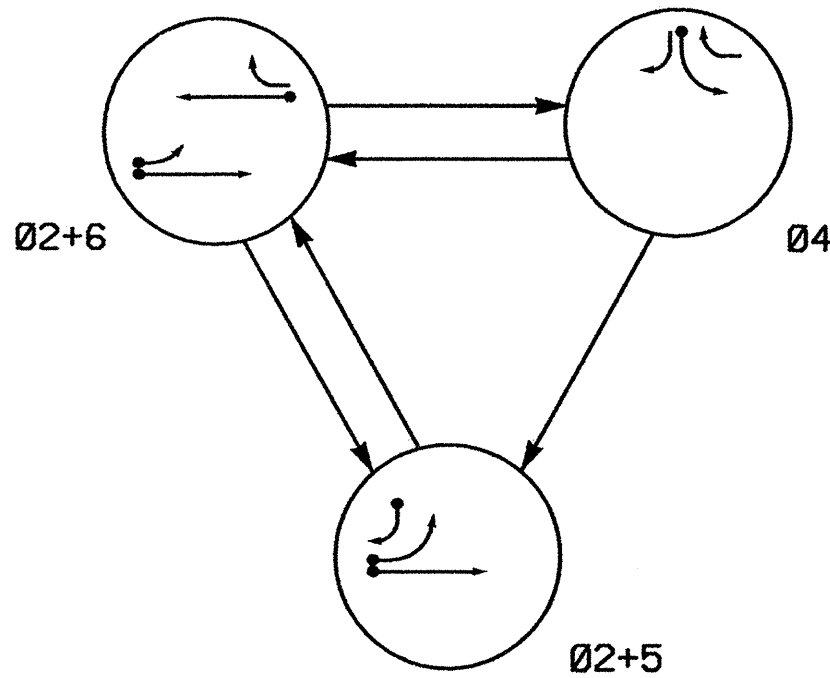
Design Requirements

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- 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.
- The arm-to-pole attachment is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
- The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
- 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.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

 Prepared in the Offices of: Traffic Engineering and Safety Division SIGNALS AND GEOMETRICS SECTION 122 N. McDowell St., Raleigh, NC 27603	SR 1613 (DAVIS DRIVE) AT SR 1635 (KIT CREEK ROAD)		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER E. MULLINAX 8 Mar 2005
	DIVISION 5 WAKE COUNTY MORRISVILLE		
	PLAN DATE: MARCH 2005 PREPARED BY: C. PIERCE	REVIEWED BY: Z. LITTLE REVIEWED BY: D. ISHAK	
	SCALE: 0 N/A N/A	REVISIONS INIT. DATE	
SIGNATURE DATE			SIG. INVENTORY NO. 05-1911

PHASING DIAGRAM

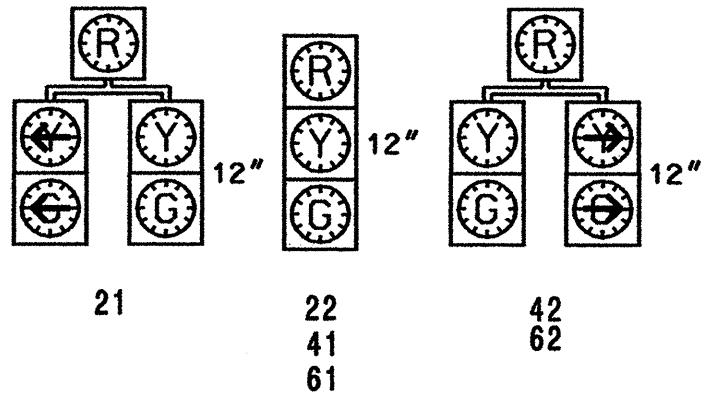


SIGNAL FACE	PHASE			
	02+6	04	02+5	F LASH
21	G	R	Y	
22	G	G	R	Y
41	R	R	G	R
42	R	R	G	R
61	R	G	R	Y
62	R	G	R	Y

*SEE NOTE #2

SIGNAL FACE I.D.

Denotes L.E.D.



2070L LOOP & DETECTOR INSTALLATION

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

3 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

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

LEGEND

PROPOSED	EXISTING

THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

2070L TIMING CHART

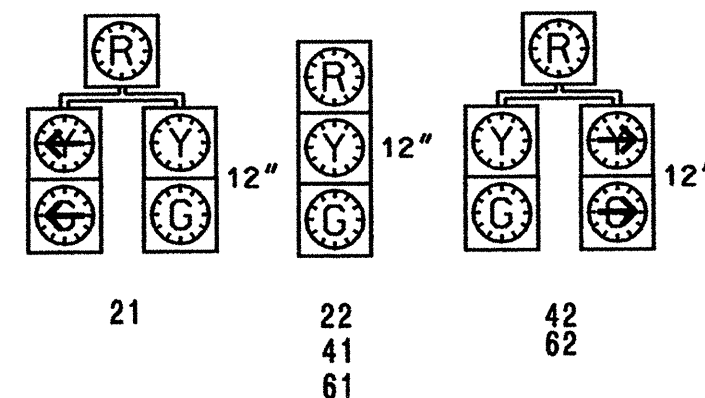
FEATURE	PHASE			
	2	4	5	6
Min Green 1 *	14	7	7	14
Extension 1 *	6.0	1.0	1.0	6.0
Max Green 1 *	90	25	15	90
Yellow Clearance	5.2	3.0	3.0	5.4
Red Clearance	1.0	2.3	1.9	1.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	2.5	-	-	2.5
Max Variable Initial *	46	-	-	46
Time Before Reduction *	15	-	-	15
Time To Reduce *	45	-	-	45
Minimum Gap	3.4	-	-	3.4
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

SIGNAL UPGRADE - TEMPORARY DESIGN 1 - CONSTRUCTION PHASES 1 & 2

	SR 1613 / 1999 (DAVIS DRIVE) AT DEVELOPMENT DRIVE		
	DIVISION 5	WAKE COUNTY	
PLAN DATE: April 2006	REVIEWED BY: Zachary Little	PREPARED BY: L. Blount	REVIEWED BY: Doumit Ishak
REVISIONS	INIT.	DATE	
SIGNATURE		DATE	
SIG. INVENTORY NO. 05-1910T1			

SIGNAL FACE I.D.
 Denotes L.E.D.



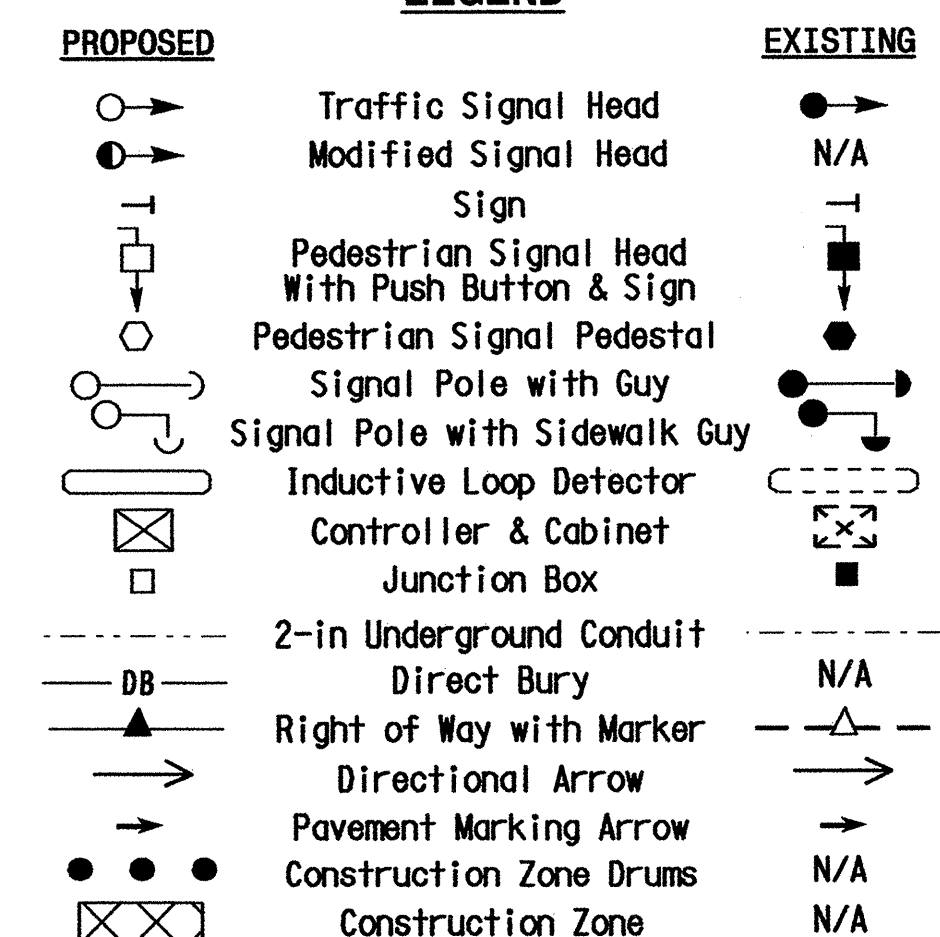
2070L LOOP & DETECTOR INSTALLATION												
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	STOP TIME
2A	6X6	6	420	Y	2	Y	Y	-	-	-	-	
4A	6X40	2-4-2	0	Y	4	Y	Y	-	-	-	3	
5A	6X40	2-4-2	0	Y	2	Y	Y	Y	-	-	3	
					5	Y	Y	-	-	-	15	
5B	6X40	2-4-2	0	Y	5	Y	Y	-	-	-	15	
6A	6X6	6	420	Y	6	Y	Y	-	-	-	-	

3 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads 21, 22, 41, 42, 61 and 62.
4. Set all detector units to presence mode.

LEGEND



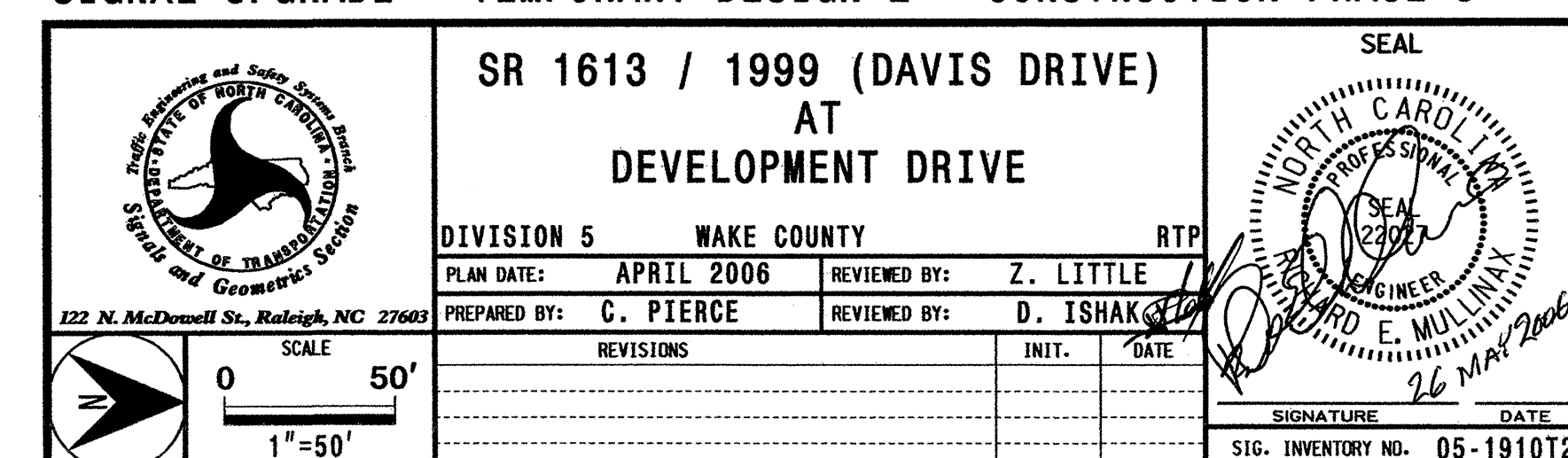
2070L TIMING CHART

FEATURE	PHASE			
	2	4	5	6
Min Green 1 *	14	7	7	14
Extension 1 *	6.0	1.0	1.0	6.0
Max Green 1 *	90	25	15	90
Yellow Clearance	5.2	3.0	3.0	5.4
Red Clearance	1.0	1.9	1.9	1.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	2.5	-	-	2.5
Max Variable Initial *	46	-	-	46
Time Before Reduction *	15	-	-	15
Time To Reduce *	45	-	-	45
Minimum Gap	3.4	-	-	3.4
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

**THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.**

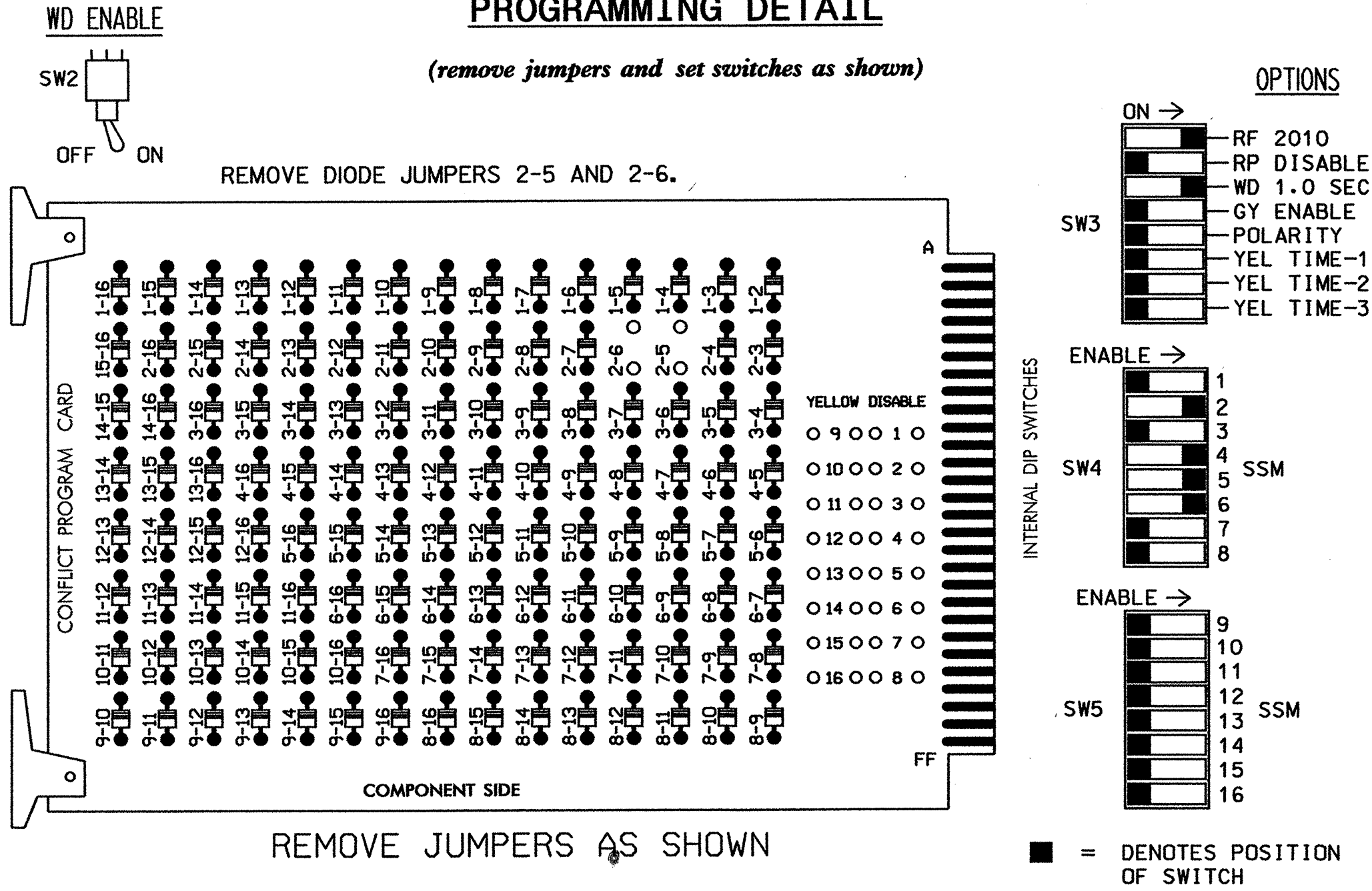
SIGNAL UPGRADE - TEMPORARY DESIGN 2 - CONSTRUCTION PHASE 3



EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



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

INPUT FILE POSITION LAYOUT

(front view)

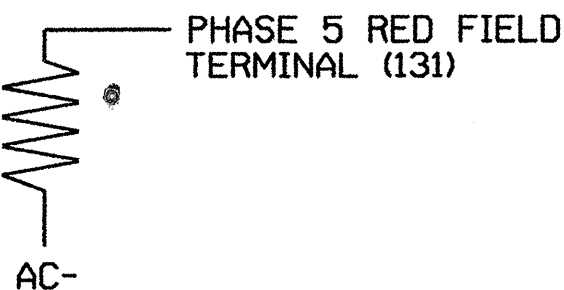
FILE "I"	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	S	S	Ø 2	S	S	Ø 4	S	S	S	S	S	S	S	FS
L	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	DC ISOLATOR
U	Ø 5	Ø 2	Ø 6	S	S	S	S	S	S	S	S	S	S	FS
L	5B	5A	6A	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED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

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

FS = FLASH SENSE
ST = STOP TIME

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 inputs in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

NOTES

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

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET.....CONTRACTOR SUPPLIED 332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S4,S5,S6
PHASES USED.....2,4,5,6
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

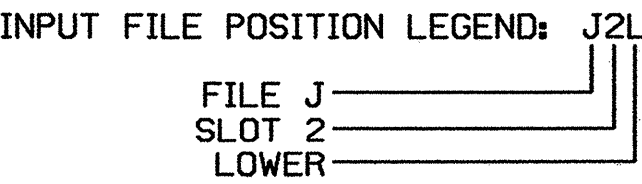
LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	62	NU	21,42	61,62	NU	NU	NU
RED		128			101		*	134				
YELLOW		129			102			135				
GREEN		130			103			136				
RED ARROW												
YELLOW ARROW					102		132					
GREEN ARROW					103		133					
HAND												
PEDESTRIAN												

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-9,10	I3U	63	25	32	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
5B	TB3-1,2	J1U	55	17	5	5	Y	Y			15
5A	TB3-5,6	J2U	40	2	6	2	Y	Y	Y		3
	TB3-7,8	J2L	44	6	16	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			

¹ Add jumpers from TB3-5 to TB3-7, and from TB3-6 to TB3-8.



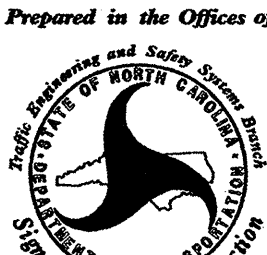
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1910T1&T2
DESIGNED: April 2006
SEALED: 5-26-06
REVISED: N/A

This Detail Supersedes The Previously Issued Detail Sealed 9-3-04

Signal Upgrade - Temporary Design 1 & 2

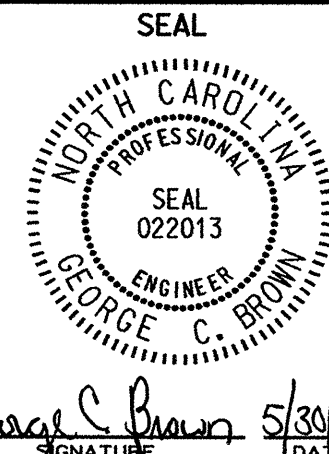
ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1613 / 1999 (Davis Drive)
At
Development Drive



122 N. McDowell St., Raleigh, NC 27603

Division 5		Wake County		RTP
PLAN DATE:	5-5-06	REVIEWED BY:	D.T. Joyce	
PREPARED BY:	D.H. Spaulding	REVIEWED BY:		
REVISIONS		INIT.	DATE	

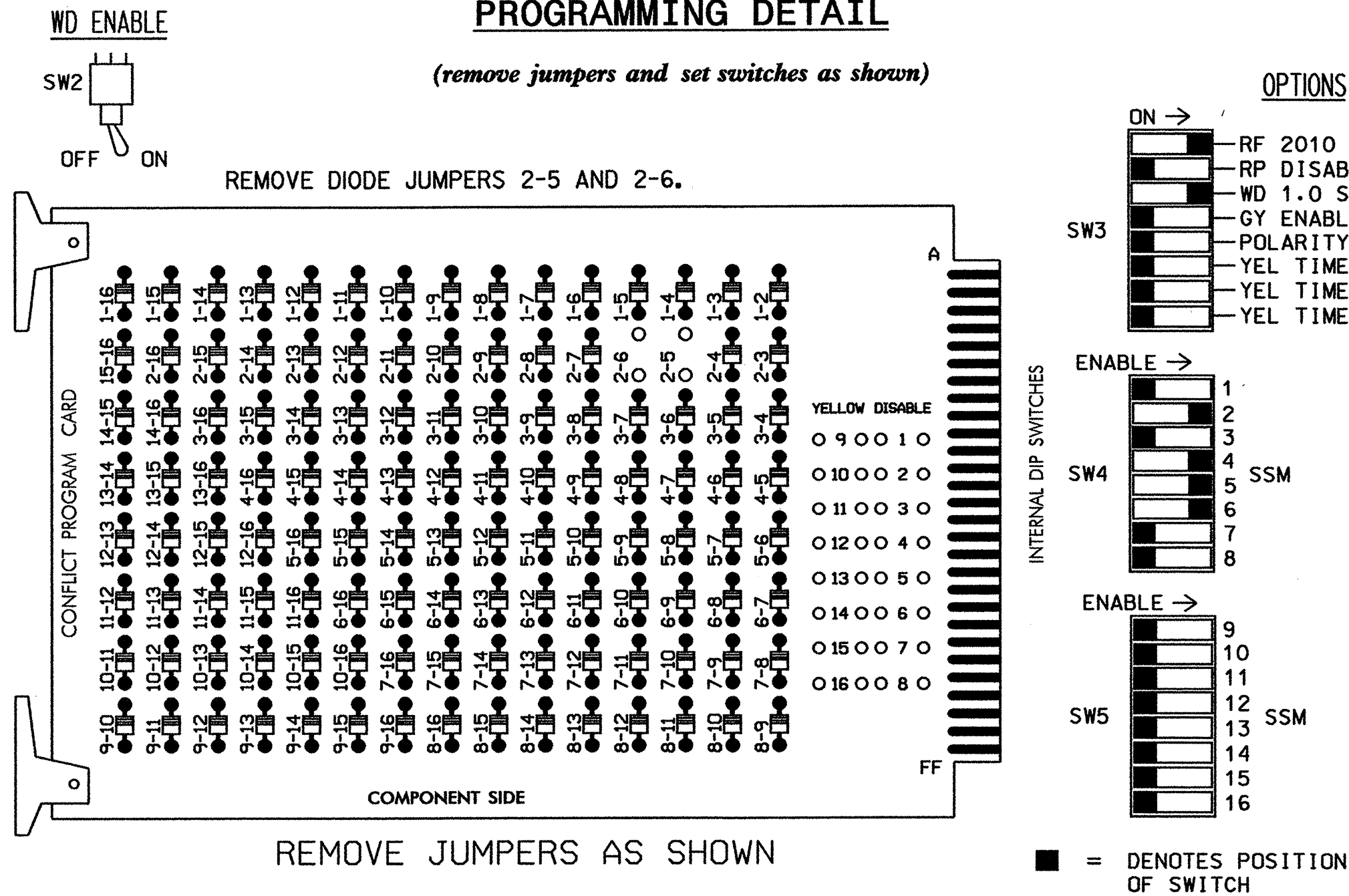


SIG. INVENTORY NO.05-1910 T1&T2

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

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

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET.....CONTRACTOR SUPPLIED 332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S4,S5,S6
PHASES USED.....2,4,5,6
OVERLAPS.....NONE

PROJECT REFERENCE NO.	SHEET NO.
U-4026	Sig. 3e

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	62	NU	51	42	61,62	NU	NU
RED		128			101					134		
YELLOW		129			102					135		
GREEN		130			103					136		
RED ARROW							131					
YELLOW ARROW					102		132	132				
GREEN ARROW					103		133	133				
Hand icon												
Walking person icon												

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

FILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U	FS	FS	NOT USED	FS	FS	NOT USED	FS	FS	FS	FS	FS	FS	FS	FS
L	ISOLATOR	ISOLATOR	2B	ISOLATOR	ISOLATOR	4B	ISOLATOR	ISOLATOR	ISOLATOR	ISOLATOR	ISOLATOR	ISOLATOR	ISOLATOR	ISOLATOR
U	5B	5A	NOT USED	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
L	NOT USED	NOT USED	6B	ISOLATOR	ISOLATOR	ISOLATOR	ISOLATOR	ISOLATOR	ISOLATOR	ISOLATOR	ISOLATOR	ISOLATOR	ISOLATOR	ISOLATOR

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2B	TB2-11,12	I3L	76	38	42	2	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
5B	TB3-1,2	J1U	55	17	5	5	Y	Y			15
5A	TB3-5,6	J2U	40	2	6	5	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			

INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

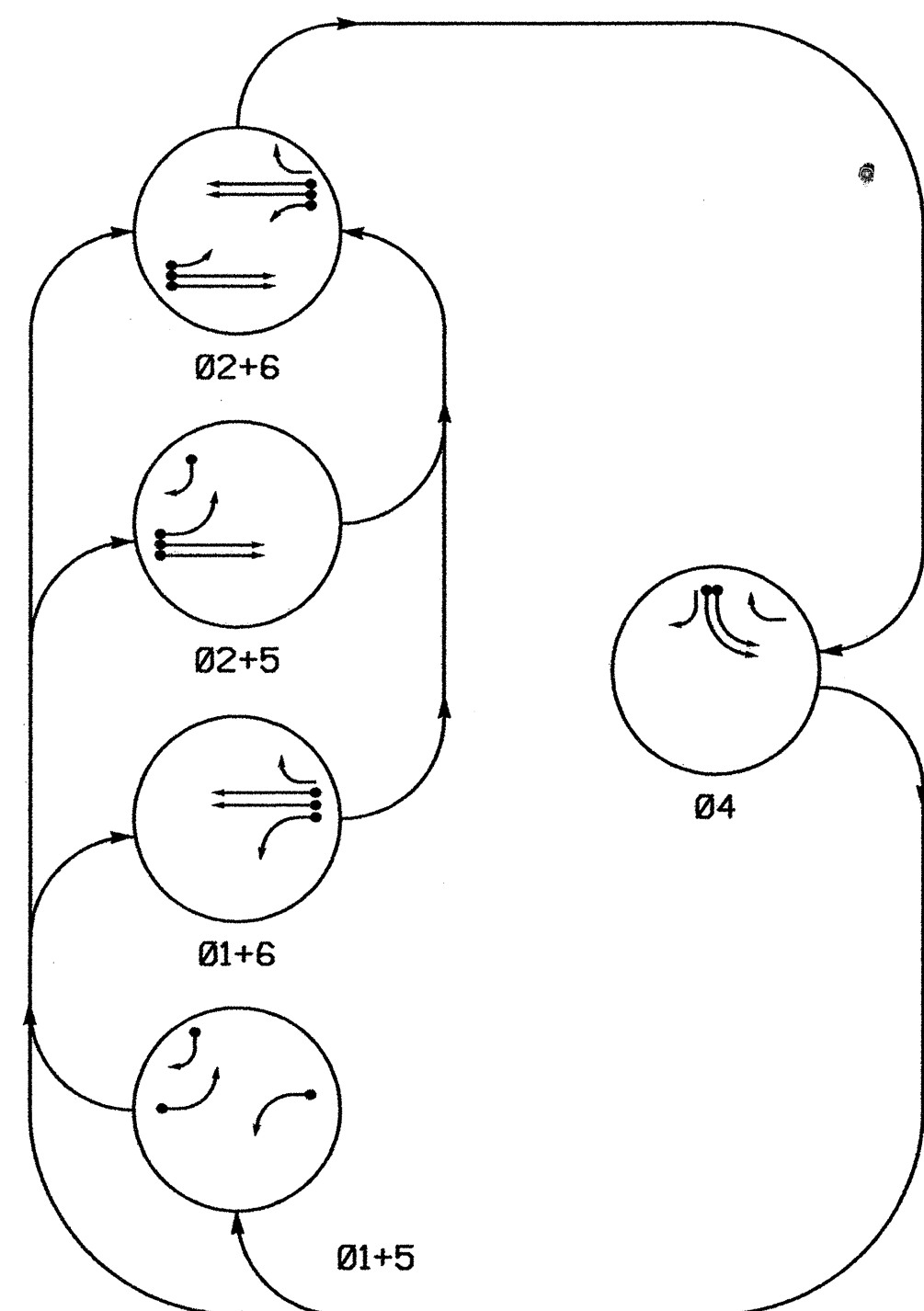
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1910T3
DESIGNED: April 2006
SEALED: 5-26-06
REVISED: N/A

This Detail Supersedes The
Previously Issued Detail
Sealed 9-3-04

Signal Upgrade - Temporary Design 3

Prepared in the Office of: 122 N. McDowell St., Raleigh, NC 27603	ELECTRICAL AND PROGRAMMING DETAILS FOR: SR 1613 / 1999 (Davis Drive) At Development Drive		SEAL George C. Brown 5/30/06
	Division 5 PLAN DATE: 5-5-06 PREPARED BY: D.H. Spaulding	Wake County REVIEWED BY: D.T. Joyce REVIEWED BY:	
	REVISIONS	INIT. DATE	
	SIG. INVENTORY NO. 05-1910 T3		

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

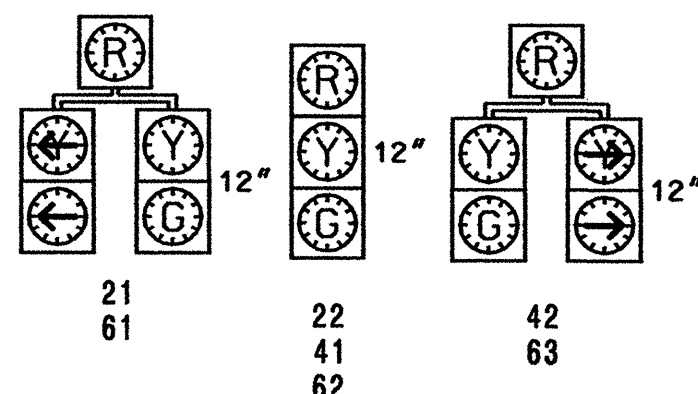
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE					F L G Y
	Ø 1 + 5	Ø 1 + 6	Ø 2 + 5	Ø 2 + 6	Ø 4	
21	R	R	G	G	R	Y
22	R	R	G	G	R	Y
41	R	R	R	R	G	R
42	R	R	R	R	G	R
61	R	G	R	G	R	Y
62	R	G	R	G	R	Y
63	R	G	R	G	R	Y

*SEE NOTE #2

SIGNAL FACE I.D.

Denotes L.E.D.



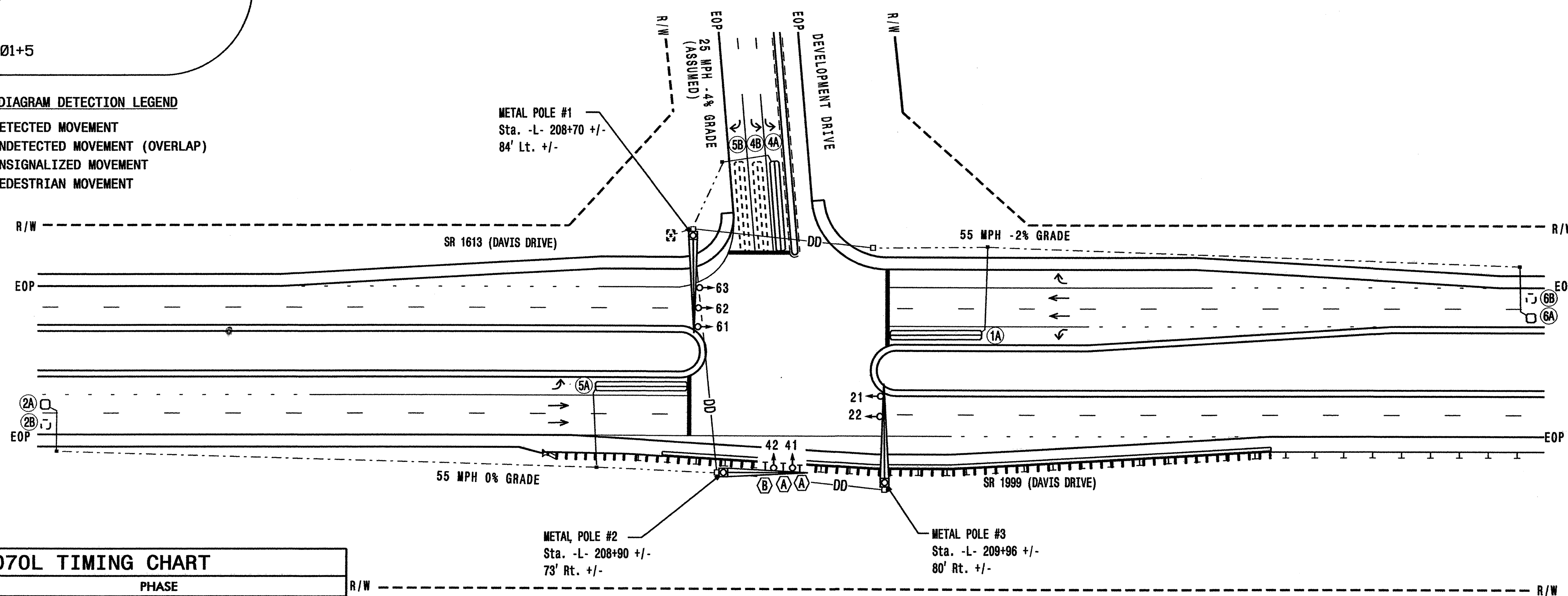
2070L LOOP & DETECTOR INSTALLATION

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	TURNS	DISTANCE FROM STOPBAR (FT)	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	SYSTEM LOOP	STRETCH TIME	DELAY TIME	NEW CARD
1A	6X60	2-4-2	0	Y	6	Y	Y	Y	-	-	3	-
					1	Y	Y	-	-	-	15	Y
2A	6X6	6	420	Y	2	Y	Y	-	-	-	-	Y
2B	6X6	6	420	-	2	Y	Y	-	-	-	-	-
4A	6X60	2-4-2	0	Y	4	Y	Y	-	-	-	-	Y
4B	6X60	2-4-2	0	-	4	Y	Y	-	-	-	-	-
5A	6X60	2-4-2	0	Y	2	Y	Y	Y	-	-	3	-
					5	Y	Y	-	-	-	15	-
5B	6X60	2-4-2	0	-	5	Y	Y	-	-	-	15	-
6A	6X6	6	420	Y	6	Y	Y	-	-	-	-	Y
6B	6X6	6	420	-	6	Y	Y	-	-	-	-	-

5 PHASE FULLY ACTUATED (ISOLATED)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Omit phase 1 during phase 2 on.
- Omit phase 5 during phase 6 on.
- Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4 (See Electrical Details).
- Set all detector units to presence mode.



LEGEND

- | PROPOSED | EXISTING |
|--|---------------------------------|
| Traffic Signal Head | Modified Signal Head |
| Sign | Sign |
| Pedestrian Signal Head With Push Button & Sign | Pedestrian Signal Head |
| Metal Pole with Mastarm | Metal Pole with Mastarm |
| Inductive Loop Detector | Inductive Loop Detector |
| Controller & Cabinet | Controller & Cabinet |
| Junction Box | Junction Box |
| 2-in Underground Conduit | 2-in Underground Conduit |
| Directional Drill | Directional Drill |
| Right of Way with Marker | Right of Way with Marker |
| Directional Arrow | Directional Arrow |
| Pavement Marking Arrow | Pavement Marking Arrow |
| Guardrail | Guardrail |
| Left Arrow "ONLY" Sign (R3-5L) | Left Arrow "ONLY" Sign (R3-5L) |
| Right Arrow "ONLY" Sign (R3-5R) | Right Arrow "ONLY" Sign (R3-5R) |

THIS PLAN SUPERSEDES THE PREVIOUSLY ISSUED DESIGN SEALED 9/3/04.

2070L TIMING CHART

FEATURE	PHASE				
	1	2	4	5	6
Min Green 1 *	7	14	7	7	14
Extension 1 *	1.0	6.0	1.0	1.0	6.0
Max Green 1 *	15	90	25	15	90
Yellow Clearance	3.0	5.2	3.0	3.0	5.4
Red Clearance	2.8	1.3	3.6	3.5	1.3
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	-	1.8	-	-	1.8
Max Variable Initial *	-	46	-	-	46
Time Before Reduction *	-	15	-	-	15
Time To Reduce *	-	45	-	-	45
Minimum Gap	-	3.4	-	-	3.4
Recall Mode	-	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON

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

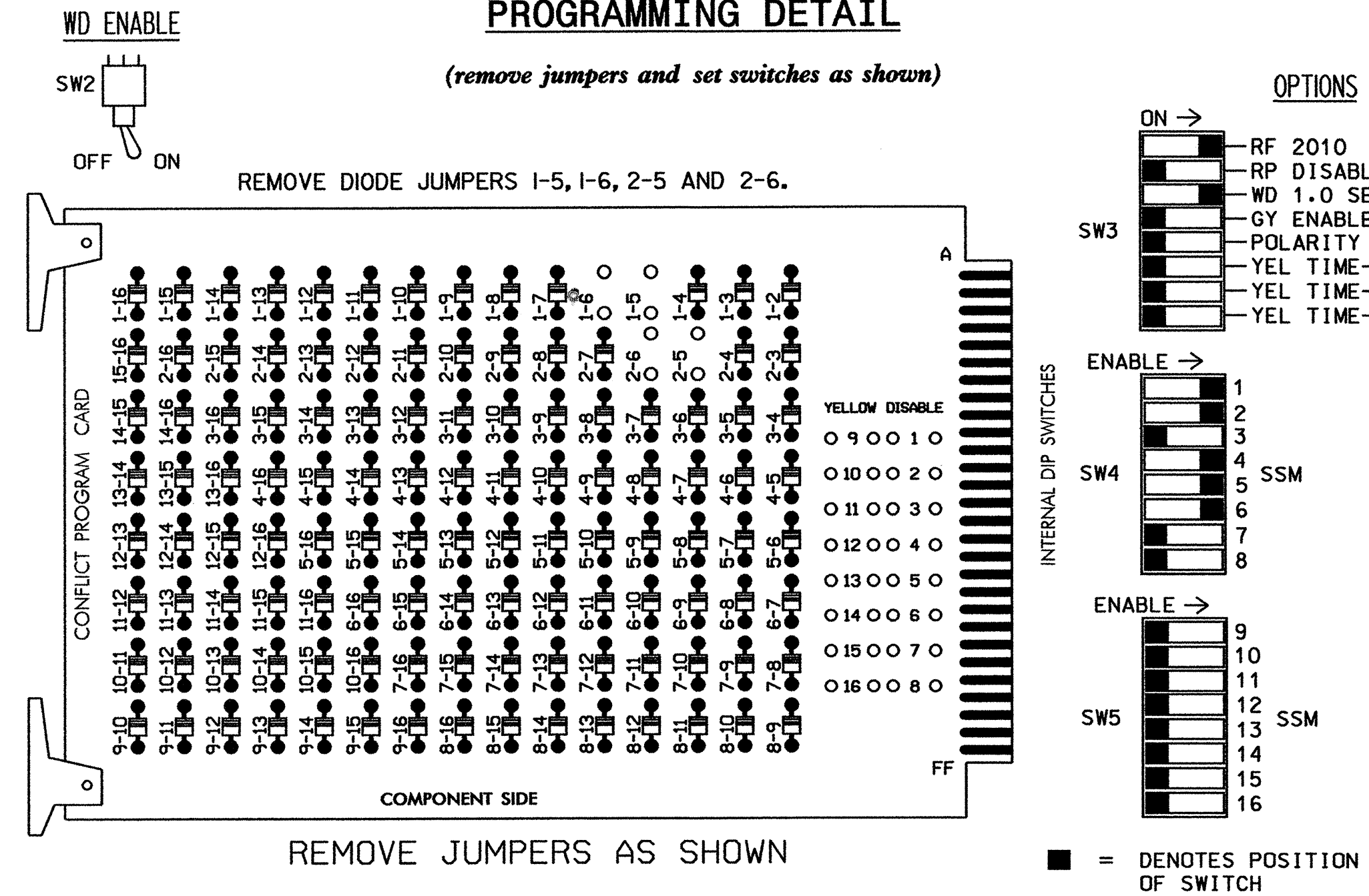
SIGNAL UPGRADE - FINAL DESIGN

	SR 1613 / 1999 (DAVIS DRIVE) AT DEVELOPMENT DRIVE		
	DIVISION 5 WAKE COUNTY RTP		
	PLAN DATE: April 2006	REVIEWED BY: Zachary Little	
	PREPARED BY: L. Blount	REVIEWED BY: Dougmit Ishak	
REVISIONS		INIT.	DATE
SCALE: 0 50' 1"=50'			
SIGNATURE		DATE	
SIG. INVENTORY NO. 05-1910			

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

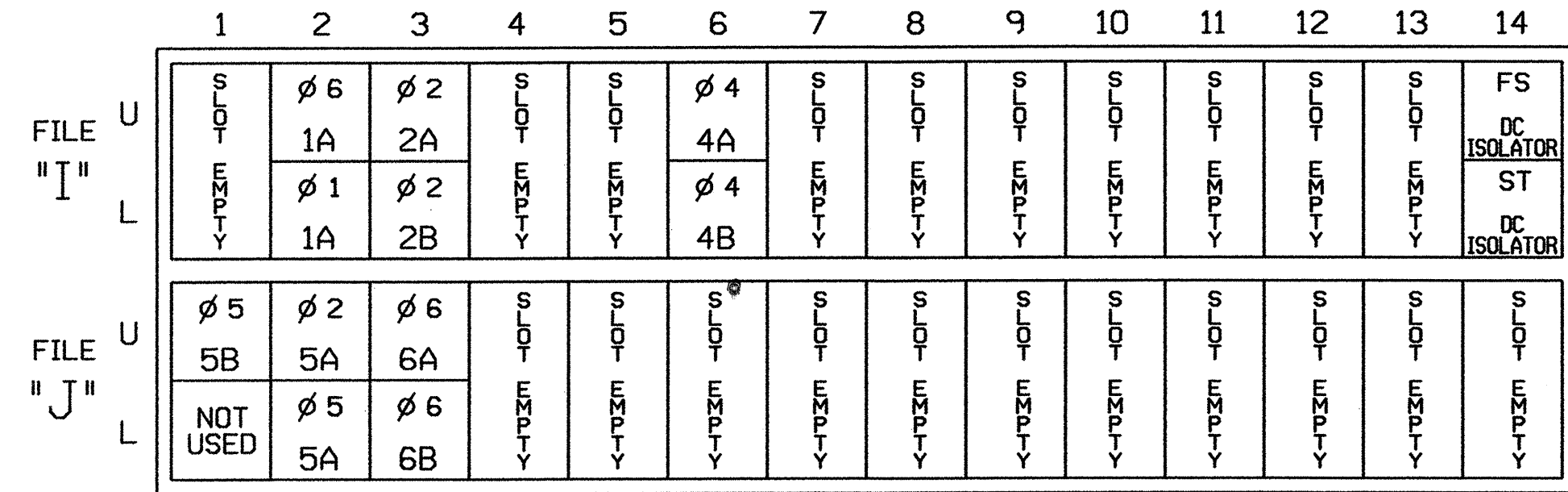


NOTES:

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

INPUT FILE POSITION LAYOUT

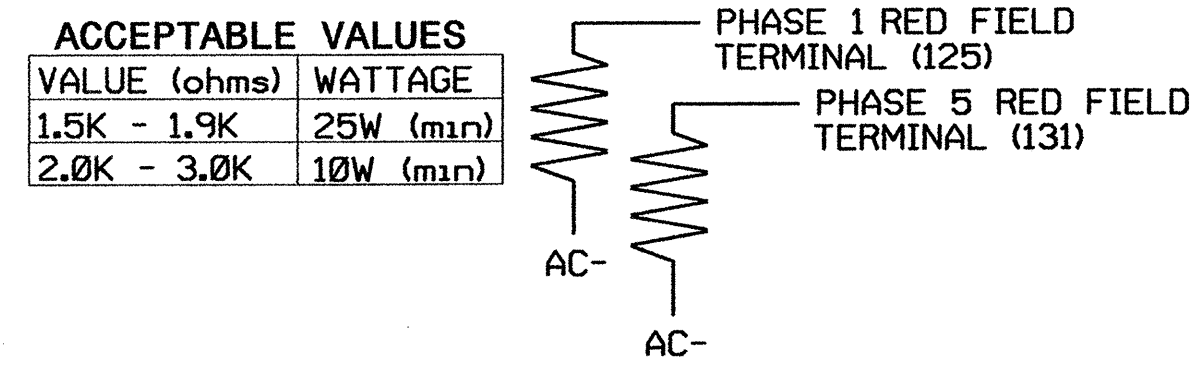
(front view)



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

FS = FLASH SENSE
ST = STOP TIME

LOAD RESISTOR INSTALLATION DETAIL



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

NOTES

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

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 2070L
CABINET.....CONTRACTOR SUPPLIED 332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S4,S5,S6
PHASES USED.....1,2,4,5,6
OVERLAPS.....NONE

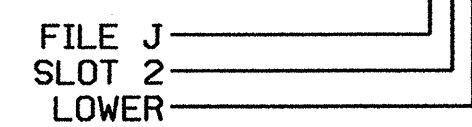
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A ¹	TB2-5,6	I2U	39	1	2	6	Y	Y	Y		3
	TB2-7,8	I2L	43	5	12	1	Y	Y			15
2A	TB2-9,10	I3U	63	25	32	2	Y	Y			
2B	TB2-11,12	I3L	76	38	42	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			
5B	TB3-1,2	J1U	55	17	5	5	Y	Y			15
5A ²	TB3-5,6	J2U	40	2	6	2	Y	Y	Y		3
	TB3-7,8	J2L	44	6	16	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
6B	TB3-11,12	J3L	77	39	46	6	Y	Y			

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

²Add jumpers from TB3-5 to TB3-7, and from TB3-6 to TB3-8.

INPUT FILE POSITION LEGEND: J2L



SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	61	21,22	NU	NU	41,42	63	NU	21,42	61,62 63	NU	NU	NU
RED	*	128			101		*	134				
YELLOW		129			102			135				
GREEN		130			103			136				
RED ARROW												
YELLOW ARROW	126				102		132					
GREEN ARROW	127				103		133					
Hand icon												
Person icon												

NU = Not Used

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

DYNAMIC BACK-UP CONTROL PROGRAMMING

(program controller as shown below)

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

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

PRESS 'NEXT'

DYNAMIC/BACKUP CONTROL FUNCTION #02
OVERLAPS: ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE :
OR PHASES: 12345678910111213141516
IF PHASES ARE ON: X
OMIT PHASES : X
CALL PHASES : X

BACKUP PROTECTION PROGRAMMING COMPLETE

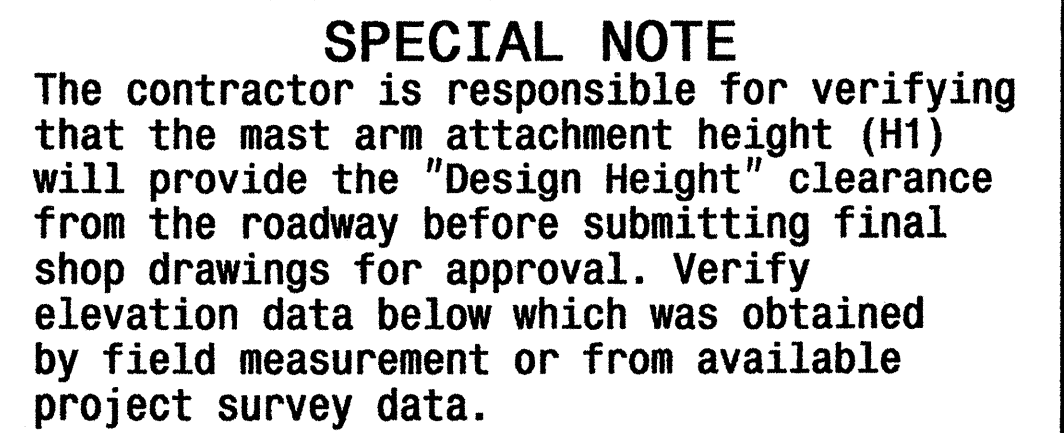
This Detail Supersedes The
Previously Issued Detail
Sealed 9-3-04

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1910
DESIGNED: April 2006
SEALED: 5-26-06
REVISED: N/A

Signal Upgrade - Final Design

Form containing project details, signatures, and stamps. It includes the project name 'SR 1613 / 1999 (Davis Drive)', location 'At Development Drive', and various stamps from the State of North Carolina and the Signal Management Section. It also includes a table for revisions and a signature block for the engineer and designer.

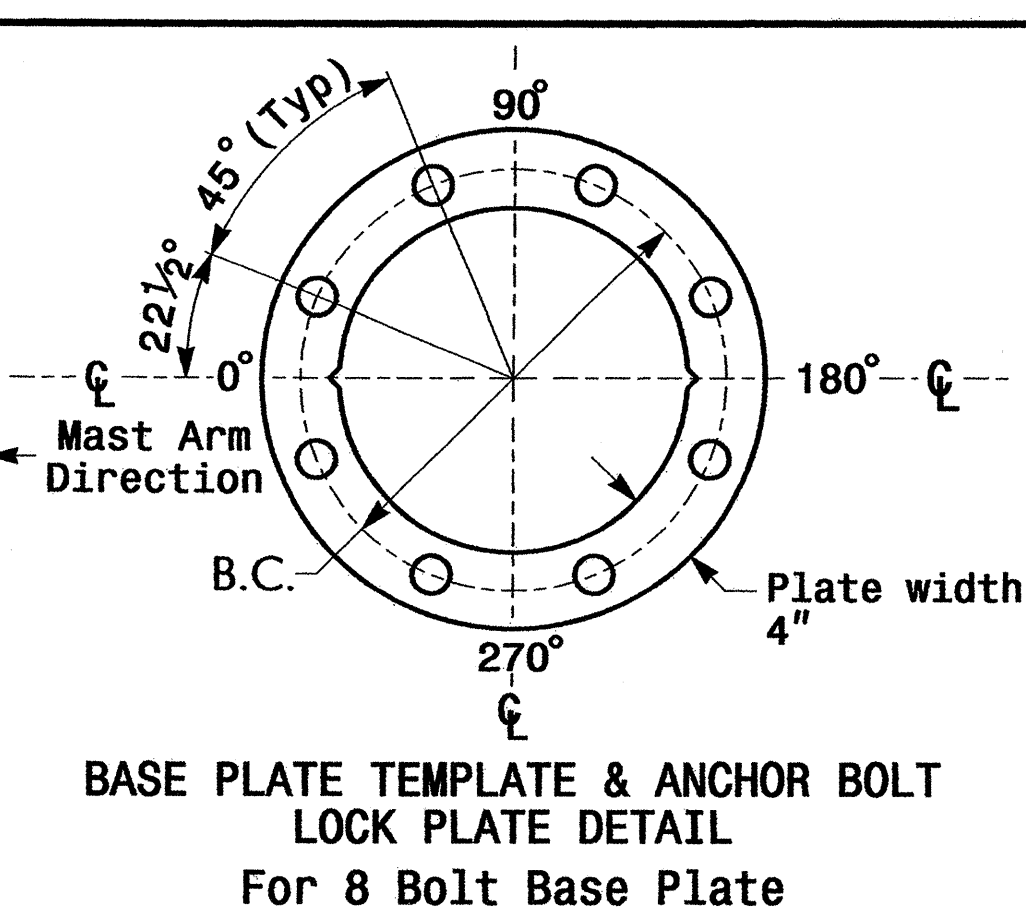
METAL POLE No. 1 and 2



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	- 1.9 ft.	- 0.8 ft.
Elevation difference at Edge of travelway or face of curb	+/- 0.0 ft.	+/- 0.0 ft.



8 BOLT BASE PLATE DETAIL
See Note 6



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
	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS
	SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	7.5 S.F.	30.0" W X 36.0" L	14 LBS

Design Reference Material

1. Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 ASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2006 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website:
<http://www.ncdot.org/doh/preconstruct/traffic/tmssu/ws/mpoles/poles.htm>
- Design Requirements
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. 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.
5. 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 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
 - a. Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - c. The roadway clearance height for design is as shown in the elevation views.
 - d. The top of the pole base plate is .75 feet above the ground elevation.
 - e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - f. Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
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. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus ½ of the total height of the mast arm attachment assembly plus 1 foot.
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 4 (90 mph)

Prepared in the Offices of



Office of Planning and Survey Management
DEPARTMENT OF TRANSPORTATION
& Public Works and Geomatics Section

122 N. McDowell St., Raleigh, NC 27603

SR 1613 / SR 1999 (DAVIS DRIVE)
AT
DEVELOPMENT DRIVE

DIVISION 5	WAKE COUNTY	MORRISVILLE
PLAN DATE: MARCH 2005	REVIEWED BY: Z. LITTLE	
PREPARED BY: C. PIERCE	REVIEWED BY: D. ISHAK	

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA
PROFESSIONAL
SEAL
2027
REGISTERED
E. MULLINAX
B Mar 2006

SCALE

0 _____ N/A

N/A

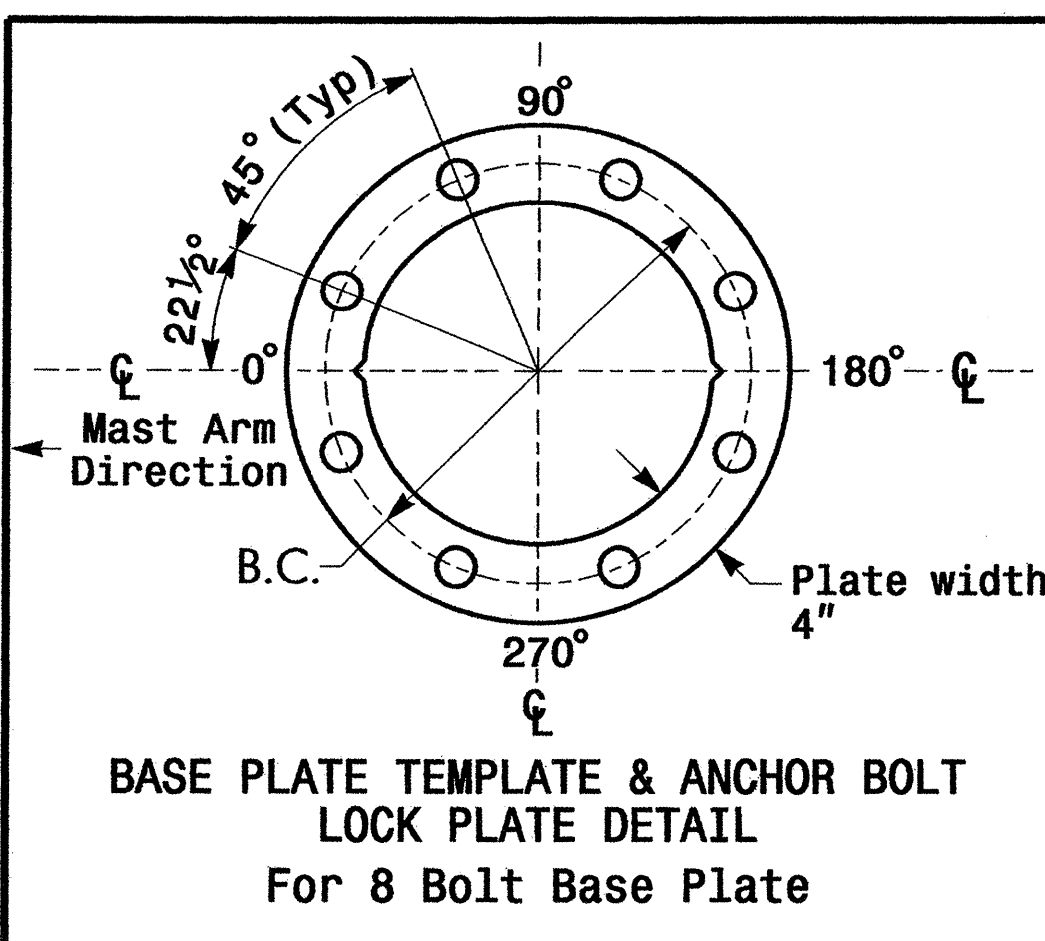
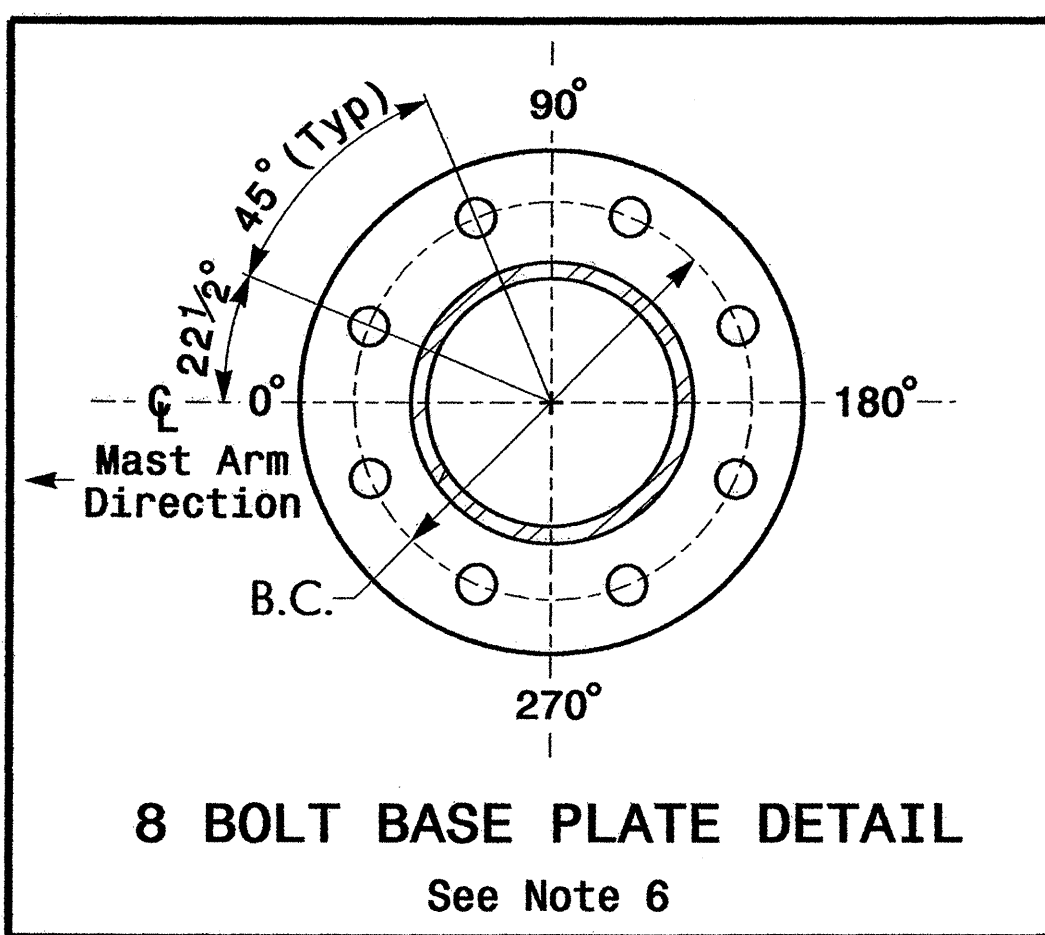
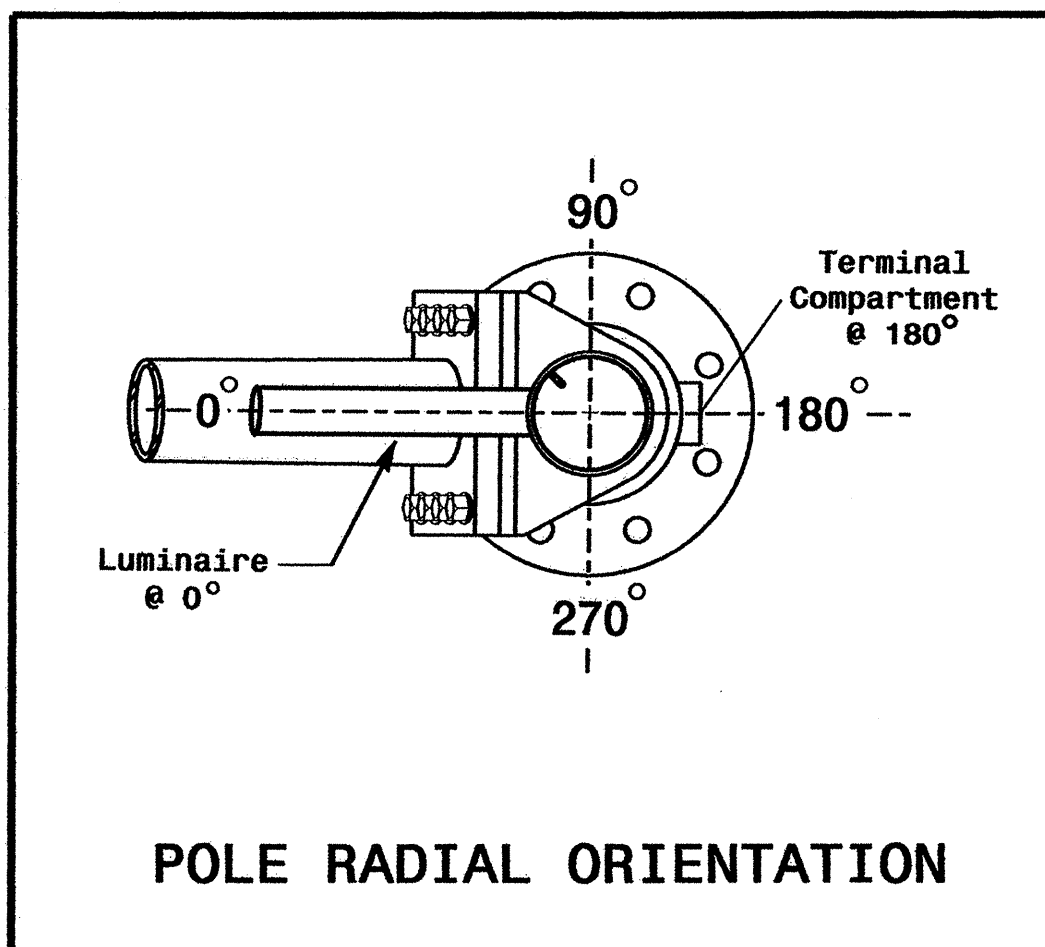
SIGNATURE _____ DATE _____

SIG. INVENTORY NO. 05-1910

The diagram illustrates the elevation view of a lighting pole and its relationship to the roadway. Key features and dimensions include:

- Lighting Assembly:** Located at the top of the pole, with a height of 44' from the pole top. It is noted as being provided and installed by others (See Note 9).
- Pole Height:** The pole itself is 12' high from the foundation to the top.
- Foundation:** The base of the pole is 11' from the edge of the pavement (See Note 7f).
- Clearance:** The roadway clearance design height is 17', with a minimum of 16.5'. The height from the base line reference elevation to the top of the pole is 17.7' (See Note 7).
- Dimensions:** The total height from the base line reference elevation to the top of the pole is 65'. The height from the base line reference elevation to the top of the lighting assembly is 44'. The height from the base line reference elevation to the top of the pole is 12'.
- Notes:**
 - Note 4 & 5: See Note 4 & 5.
 - Note 7a: See Note 7a.
 - Note 7b: See Note 7b.
 - Note 7c: See Note 7c.
 - Note 7d: See Note 7d.
 - Note 7e: See Note 7e.
 - Note 7f: See Note 7f.
 - Note 7g: See Note 7g.
 - Note 7h: See Note 7h.
 - Note 7i: See Note 7i.
 - Note 7j: See Note 7j.
 - Note 7k: See Note 7k.
 - Note 7l: See Note 7l.
 - Note 7m: See Note 7m.
 - Note 7n: See Note 7n.
 - Note 7o: See Note 7o.
 - Note 7p: See Note 7p.
 - Note 7q: See Note 7q.
 - Note 7r: See Note 7r.
 - Note 7s: See Note 7s.
 - Note 7t: See Note 7t.
 - Note 7u: See Note 7u.
 - Note 7v: See Note 7v.
 - Note 7w: See Note 7w.
 - Note 7x: See Note 7x.
 - Note 7y: See Note 7y.
 - Note 7z: See Note 7z.

Elevation Data for Mast Arm Attachment (H1)	
Elevation Differences for:	Pole 3
Baseline reference point at Foundation @ ground level	+/-0.0 ft
Elevation difference at High point of roadway surface	-4.1 ft
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft



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

Design Reference Material

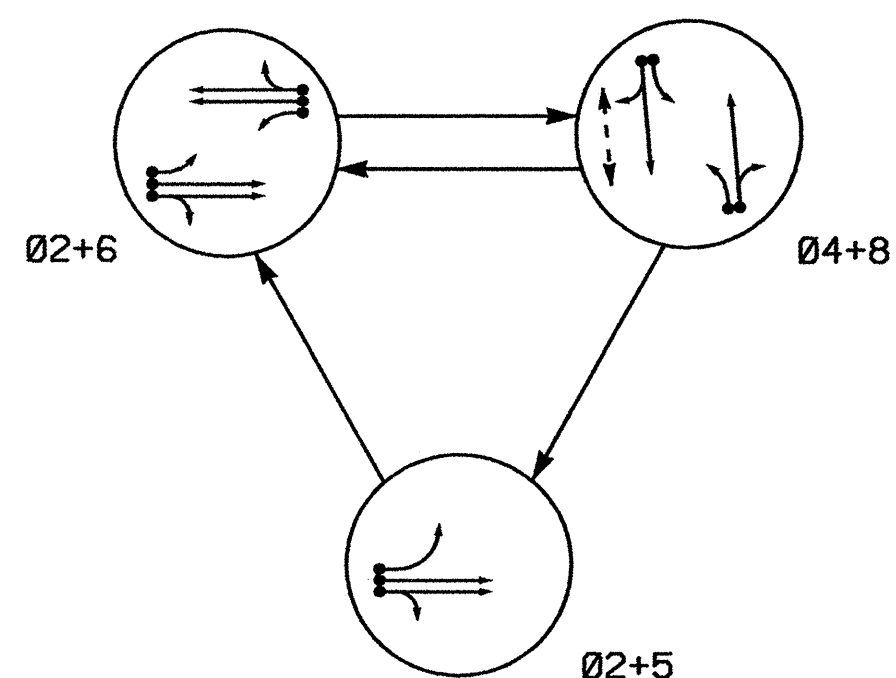
1. Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2002 NCDOT "Standard Specifications for Roads 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. 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.
5. 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 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
 - a. Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - c. The roadway clearance height for design is as shown in the elevation views.
 - d. The top of the pole base plate is .75 feet above the ground elevation.
 - e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - f. Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
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.

[illegible]

PHASING DIAGRAM



SIGNAL FACE	PHASE			
	Ø 2 + 5	Ø 2 + 6	Ø 4 + 8	F ² LASH
21	G	G	R	Y
22	G	G	R	Y
41, 42	R	R	G	R
61, 62	R	G	R	Y
81, 82	R	R	G	R
P41, P42	DW	DW	W	DRK

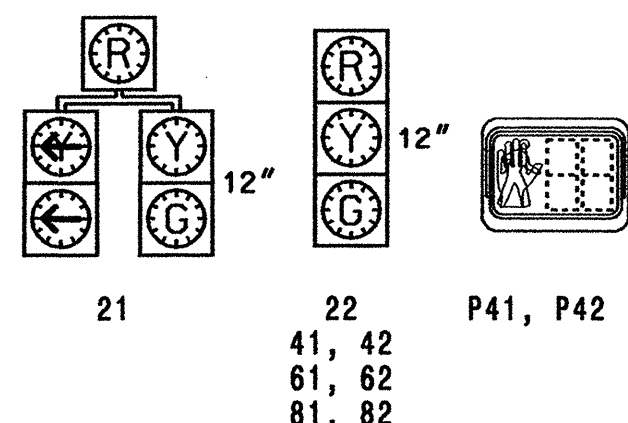
* SEE NOTE # 2

SIGNAL FACE I.D.

Denotes L.E.D.

PHASING DIAGRAM DETECTION LEGEND

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



DETECTION ZONE CHART
170 CONTROLLER AND CABINET

DETECTION ZONES					DETECTOR PROGRAMMING														STATUS	
					NEMA PHASE	TIMING		ATTRIBUTES								SYSTEM	LOOPS			
ZONE NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	NEW	EXISTING				DELAY	CARRY (STRETCH)	FULL TIME DELAY	PEDESTRIAN CALL	RESERVED	COUNT	EXTENSION	TYPE 3			CALLING		
2A	6X6	420	X	-	2	- SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-	
2B	6X6	420	X	-	2	- SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-	
4A	6X60	0	X	-	4	3 SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-	
4B	6X60	0	X	-	4	10 SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-	
4C	6X15	0	X	-	4	15 SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-	
5A	6X60	0	X	-	2	3 SEC.	- SEC.	X	-	-	-	X	X	-	X	-	-	X	-	
					5	15 SEC.	- SEC.	-	-	-	X	X	-	X	-	-	X	-		
					4	15 SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-	
6A	6X15	420	X	-	6	- SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-	
6B	6X60	0	X	-	6	- SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-	
8A	6X60	0	X	-	8	3 SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-	
8B	6X60	0	X	-	8	10 SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-	
8C	6X15	0	X	-	8	15 SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-	
P41, P42	N/A	N/A	X	-	4	- SEC.	- SEC.	-	X	-	-	-	-	-	-	-	-	-	X	

3 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Program phase 5 as protected/permitted.
- Program controller to clear from phase 2+6 to phase 2+5 by progressing through phase 4+8 (See Electrical Details).
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Set all detection zones to presence mode.
- The contractor shall locate cameras and modify the detection zone locations per manufacturer's instructions to accomplish the detection scheme shown.
- Relocate overhead utilities on the north side of Hopson Road to avoid conflict with all signal equipment for the temporary and final installations.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.

LEGEND

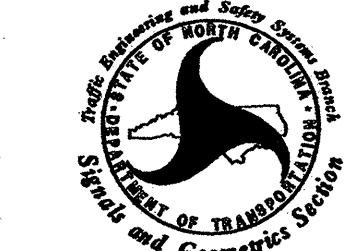
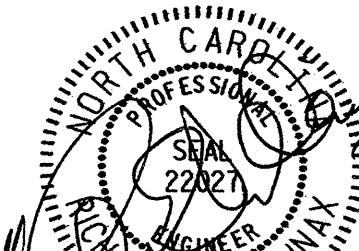
- | PROPOSED | EXISTING |
|-------------------------------|----------|
| Traffic Signal Head | N/A |
| Modified Signal Head | N/A |
| Sign | N/A |
| Pedestrian Signal Head | N/A |
| With Push Button & Sign | N/A |
| Pedestrian Signal Pedestal | N/A |
| Signal Pole with Guy | N/A |
| Signal Pole with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

THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

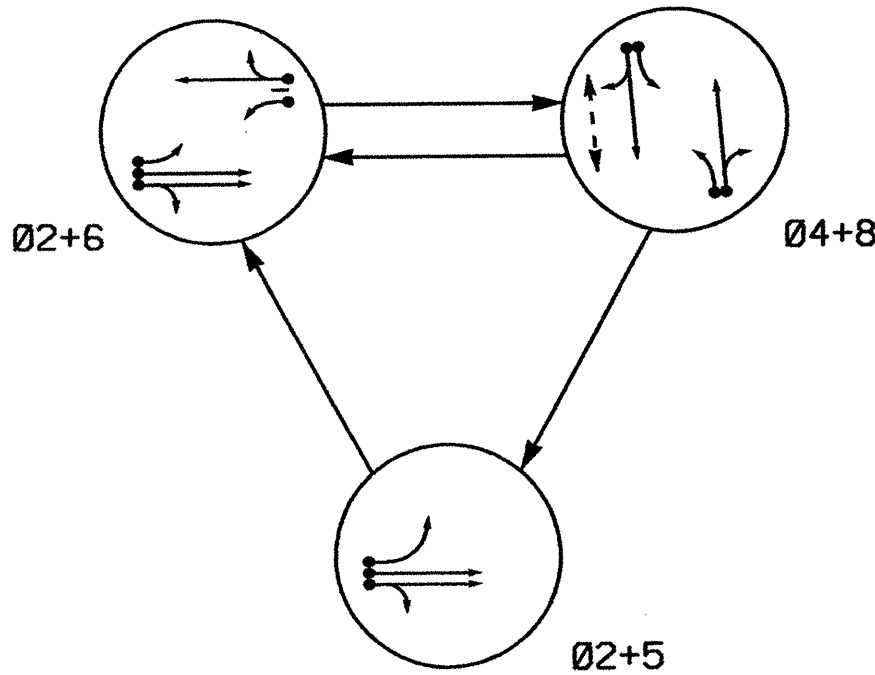
TIMING CHART
170 CONTROLLER

PHASE	Ø2	Ø4	Ø5	Ø6	Ø8
MINIMUM INITIAL	14 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.
VEHICLE EXTENSION	6.0 SEC.	1.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	5.2 SEC.	5.4 SEC.	3.0 SEC.	5.1 SEC.	4.9 SEC.
RED CLEARANCE	1.5 SEC.	1.3 SEC.	3.2 SEC.	1.7 SEC.	1.6 SEC.
MAXIMUM LIMIT	90 SEC.	30 SEC.	20 SEC.	90 SEC.	30 SEC.
RECALL POSITION	VEH. RECALL	NONE	NONE	VEH. RECALL	NONE
VEHICLE CALL MEMORY	YELLOW LOCK	NONLOCK	NONLOCK	YELLOW LOCK	NONLOCK
DOUBLE ENTRY	OFF	ON	OFF	OFF	ON
WALK	- SEC.	7 SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	28 SEC.	- SEC.	- SEC.	- SEC.
TYPE 3 LIMIT	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ALTERNATE EXTENSION	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ADD PER VEHICLE	1.8 SEC.	- SEC.	- SEC.	2.5 SEC.	- SEC.
MAXIMUM INITIAL	46 SEC.	- SEC.	- SEC.	46 SEC.	- SEC.
MAXIMUM GAP	7.0 SEC.	1.0 SEC.	1.0 SEC.	7.0 SEC.	1.0 SEC.
REDUCE 0.1 SEC EVERY	1.5 SEC.	- SEC.	- SEC.	1.5 SEC.	- SEC.
MINIMUM GAP	3.4 SEC.	1.0 SEC.	1.0 SEC.	3.4 SEC.	1.0 SEC.

SIGNAL UPGRADE - TEMPORARY DESIGN 1 - CONSTRUCTION PHASE 1

 122 N. McDowell St., Raleigh, NC 27603	SR 1999 (DAVIS DRIVE) AT SR 1978 (HOPSON ROAD)		 31 May 2006
	DIVISION 5 PLAN DATE: April 2006 PREPARED BY: L. Blount	DURHAM COUNTY REVIEWED BY: Zachary Little REVIEWED BY: Doumit Ishak	
SCALE 0 50' 1"=50'		SIGNATURE DATE	
		SIG. INVENTORY NO. 05-1858T1	

PHASING DIAGRAM



SIGNAL FACE	PHASE			
	Ø2 +5	Ø2 +6	Ø4 +8	Ø4 +8
21	G	R	Y	
22	G	R	Y	
41, 42	R	R	G	R
61, 62	R	G	R	Y
81, 82	R	R	G	R
P41, P42	DW	DW	W	DRK

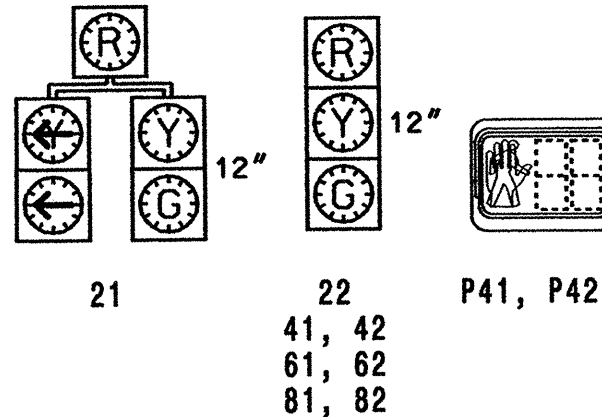
* SEE NOTE #3

SIGNAL FACE I.D.

Denotes L.E.D.

PHASING DIAGRAM DETECTION LEGEND

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



DETECTION ZONE CHART
170 CONTROLLER AND CABINET

DETECTION ZONES				DETECTOR PROGRAMMING											
				TIMING		ATTRIBUTES									
ZONE NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	DELAY	CARRY (STRETCH)	FULL TIME DELAY	PEDESTRIAN CALL	REVERSED	COUNT	EXTENSION	TYPE 3	CALLING	ALTERNATE
2A	6X6	420	-	X	2	- SEC.	- SEC.	-	-	-	X	X	X	-	X
2B	6X6	420	-	X	2	- SEC.	- SEC.	-	-	-	X	X	X	-	X
4A	6X60	0	-	X	4	3 SEC.	- SEC.	-	-	-	X	X	X	-	X
4B	6X60	0	-	X	4	10 SEC.	- SEC.	-	-	-	X	X	X	-	X
4C	6X15	0	-	X	4	15 SEC.	- SEC.	-	-	-	X	X	X	-	X
5A	6X60	0	-	X	2	3 SEC.	- SEC.	X	-	-	X	X	X	-	X
6A	6X6	420	X	-	6	- SEC.	- SEC.	-	-	-	X	X	X	-	X
6B	6X60	0	-	X	6	- SEC.	- SEC.	-	-	-	X	X	X	-	X
8A	6X60	0	-	X	8	3 SEC.	- SEC.	-	-	-	X	X	X	-	X
8B	6X60	0	-	X	8	10 SEC.	- SEC.	-	-	-	X	X	X	-	X
8C	6X15	0	-	X	8	15 SEC.	- SEC.	-	-	-	X	X	X	-	X
P41, P42	N/A	N/A	-	X	4	- SEC.	- SEC.	-	X	-	-	-	-	-	X

3 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
- Pavement markings are existing.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition existing signal heads 61 and 62.
- Program phase 5 as protected/permitted.
- Program controller to clear from phase 2+6 to phase 2+5 by progressing through phase 4+8 (See Electrical Details).
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- Set all detection zones to presence mode.
- The contractor shall locate cameras and modify the detection zone locations per manufacturer's instructions to accomplish the detection scheme shown.

LEGEND

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

TIMING CHART 170 CONTROLLER					
PHASE	Ø2	Ø4	Ø5	Ø6	Ø8
MINIMUM INITIAL	14 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.
VEHICLE EXTENSION	6.0 SEC.	1.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	5.2 SEC.	5.4 SEC.	3.0 SEC.	5.1 SEC.	4.9 SEC.
RED CLEARANCE	1.5 SEC.	1.3 SEC.	3.2 SEC.	1.7 SEC.	1.7 SEC.
MAXIMUM LIMIT	90 SEC.	30 SEC.	20 SEC.	90 SEC.	30 SEC.
RECALL POSITION	VEH. RECALL	NONE	NONE	VEH. RECALL	NONE
VEHICLE CALL MEMORY	YELLOW LOCK	NONLOCK	NONLOCK	YELLOW LOCK	NONLOCK
DOUBLE ENTRY	OFF	ON	OFF	OFF	ON
WALK	- SEC.	7 SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	33 SEC.	- SEC.	- SEC.	- SEC.
TYPE 3 LIMIT	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ALTERNATE EXTENSION	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ADD PER VEHICLE	1.8 SEC.	- SEC.	- SEC.	2.5 SEC.	- SEC.
MAXIMUM INITIAL	46 SEC.	- SEC.	- SEC.	46 SEC.	- SEC.
MAXIMUM GAP	7.0 SEC.	1.0 SEC.	1.0 SEC.	7.0 SEC.	1.0 SEC.
REDUCE 0.1 SEC. EVERY	1.5 SEC.	- SEC.	- SEC.	1.5 SEC.	- SEC.
MINIMUM GAP	3.4 SEC.	1.0 SEC.	1.0 SEC.	3.4 SEC.	1.0 SEC.

THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

SIGNAL UPGRADE - TEMPORARY DESIGN 2 - CONSTRUCTION PHASES 2 AND 3

	SR 1999 (DAVIS DRIVE) AT SR 1978 (HOPSON ROAD)		
	DIVISION 5 DURHAM COUNTY		
	PLAN DATE: APRIL 2006	REVIEWED BY: Z. LITTLE	
	PREPARED BY: C. PIERCE	REVIEWED BY: D. ISHAK	
REVISIONS		INIT.	DATE
0 50'		1"=50'	
SIGNATURE		DATE	
SIG. INVENTORY NO. 05-185872			

5 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads 21, 41, 42, 61, 62, 81 and 82.
4. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
5. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
6. Set all detection zones to presence mode.
7. The contractor shall locate cameras and modify the detection zone locations per manufacturer's instructions to accomplish the detection scheme shown.

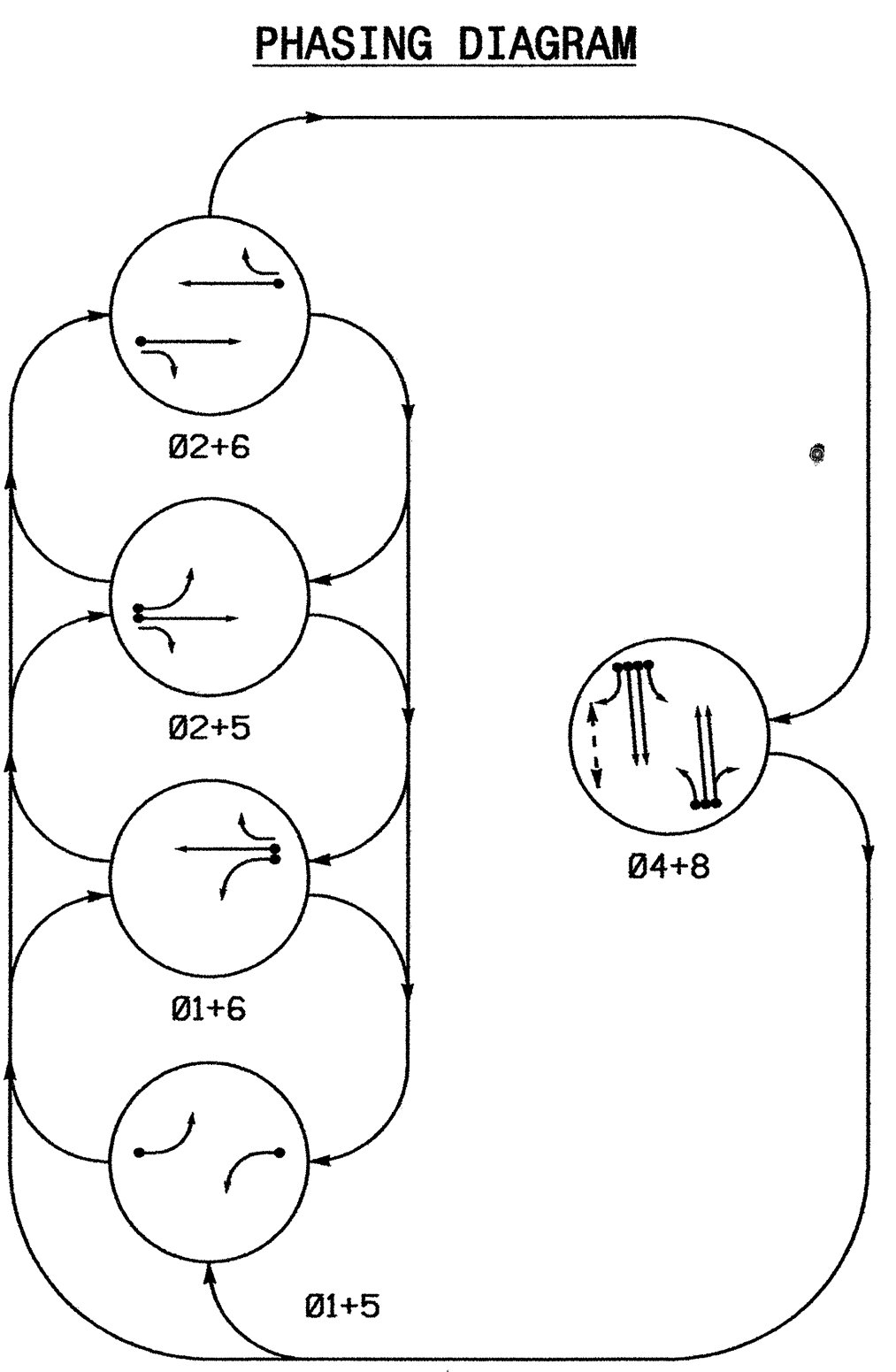
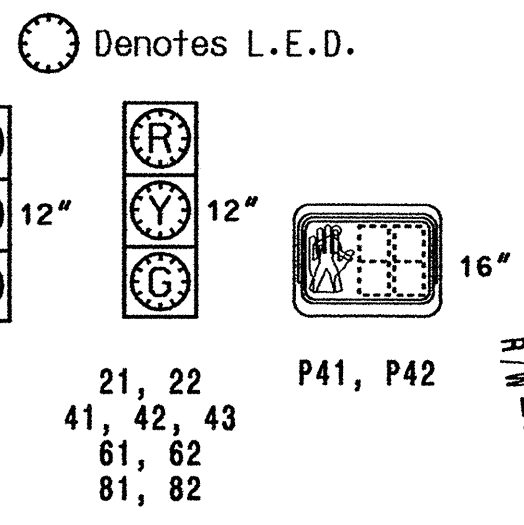
LEGEND

PROPOSED	EXISTING
	N/A
	N/A
	N/A

DETECTION ZONE CHART 170 CONTROLLER AND CABINET																					
DETECTION ZONES					DETECTOR PROGRAMMING																
					NEMA PHASE	TIMING		ATTRIBUTES								STATUS					
ZONE NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	NEW	EXISTING				DELAY	CARRY (STRETCH)	1	2	3	4	5	6	7	8	SYSTEM	LOOPS	NEW	EXISTING
					FULL TIME DELAY	PEDESTRIAN CALL	RESERVED			COUNT	EXTENSION	TYPE 3	CALLING	ALTERNATE							
1A	6X60	0	X	-	1	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-	-	X	-
2A	6X6	355	X	-	2	- SEC.	- SEC.	-	-	-	-	-	X	X	-	X	-	-	-	-	X
4A	6X60	0	X	-	4	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-	-	-	X
4B	6X60	0	X	-	4	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-	-	-	X
4C	6X60	0	X	-	4	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-	-	-	X
4D	6X60	0	X	-	4	15 SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-	-	-	X
5A	6X60	0	X	-	5	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-	-	-	X
6A	6X6	355	X	-	6	- SEC.	- SEC.	-	-	-	-	-	X	X	-	X	-	-	-	-	X
8A	6X60	0	X	-	8	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-	-	-	X
8B	6X60	0	X	-	8	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-	-	-	X
8C	6X60	0	X	-	8	10 SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-	-	-	X
P41, P42	N/A	N/A	-	X	4	- SEC.	- SEC.	-	X	-	-	-	-	-	-	-	-	-	-	-	X

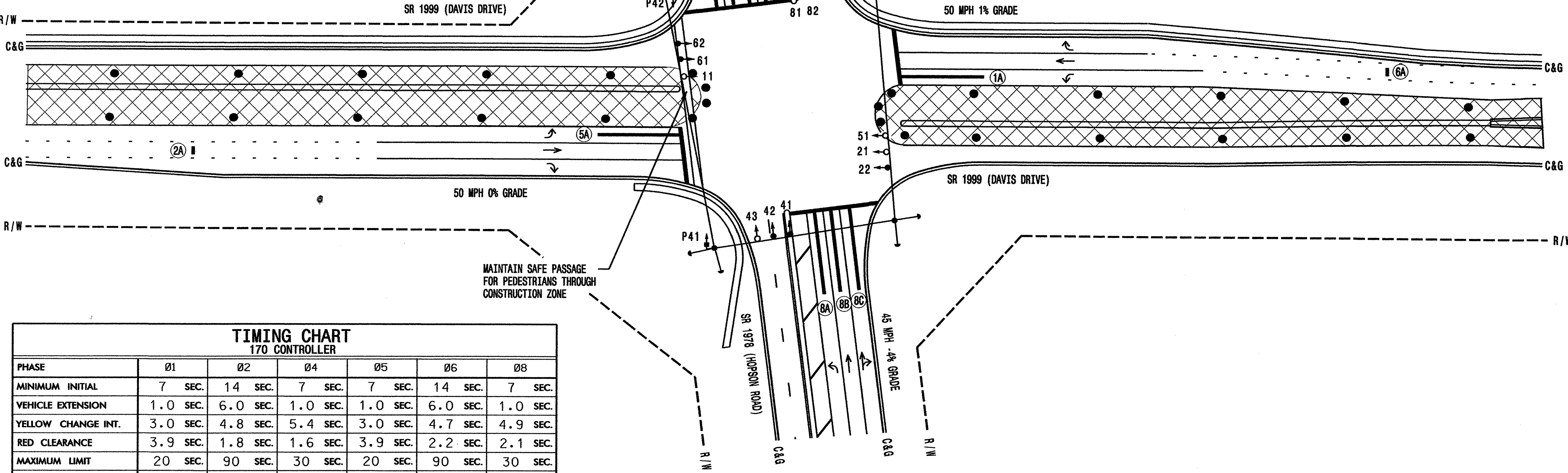
TABLE OF OPERATION						
SIGNAL FACE	PHASE					
	Ø 1 + 5	Ø 2 + 6	Ø 2 + 5	Ø 4 + 8	Ø 4 + 8	F+ LASH
11	←	←	←	←	←	←
21, 22	R	R	G	G	R	Y
41, 42, 43	R	R	R	R	G	R
61, 62	R	G	R	G	R	Y
51	←	←	←	←	←	←
81, 82	R	R	R	R	G	R
P41, P42	DW	DW	DW	DW	W	DRK

SIGNAL FACE I.D.



PHASING DIAGRAM DETECTION LEGEND

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



TIMING CHART 170 CONTROLLER						
PHASE	Ø1	Ø2	Ø4	Ø5	Ø6	Ø8
MINIMUM INITIAL	7 SEC.	14 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.
VEHICLE EXTENSION	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.8 SEC.	5.4 SEC.	3.0 SEC.	4.7 SEC.	4.9 SEC.
RED CLEARANCE	3.9 SEC.	1.8 SEC.	1.6 SEC.	3.9 SEC.	2.2 SEC.	2.1 SEC.
MAXIMUM LIMIT	20 SEC.	90 SEC.	30 SEC.	20 SEC.	90 SEC.	30 SEC.
RECALL POSITION	NONE	VEH. RECALL	NONE	NONE	VEH. RECALL	NONE
VEHICLE CALL MEMORY	NONLOCK	YELLOW LOCK	NONLOCK	NONLOCK	YELLOW LOCK	NONLOCK
DOUBLE ENTRY	OFF	OFF	ON	OFF	OFF	ON
WALK	- SEC.	- SEC.	7 SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	30 SEC.	- SEC.	- SEC.	- SEC.
TYPE 3 LIMIT	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ALTERNATE EXTENSION	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ADD PER VEHICLE	- SEC.	2.5 SEC.	- SEC.	- SEC.	2.5 SEC.	- SEC.
MAXIMUM INITIAL	- SEC.	40 SEC.	- SEC.	- SEC.	40 SEC.	- SEC.
MAXIMUM GAP	1.0 SEC.	7.0 SEC.	1.0 SEC.	1.0 SEC.	7.0 SEC.	1.0 SEC.
REDUCE 0.1 SEC EVERY	- SEC.	1.5 SEC.	- SEC.	- SEC.	1.5 SEC.	- SEC.
MINIMUM GAP	1.0 SEC.	3.1 SEC.	1.0 SEC.	1.0 SEC.	3.1 SEC.	1.0 SEC.

THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

SIGNAL UPGRADE - TEMPORARY DESIGN 3 - CONSTRUCTION PHASE 4

122 N. McDowell St., Raleigh, NC 27603

SR 1999 (DAVIS DRIVE)
AT
SR 1978 (HOPSON ROAD)

DIVISION 5 DURHAM COUNTY

PLAN DATE: APRIL 2006
PREPARED BY: C. PIERCE

REVIEWED BY: Z. LITTLE
REVIEWED BY: D. ISHAK

REVISIONS

SCALE
0 50'
1"=50'

SEAL

SIGNATURE
SIG. INVENTORY NO. 05-185813

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

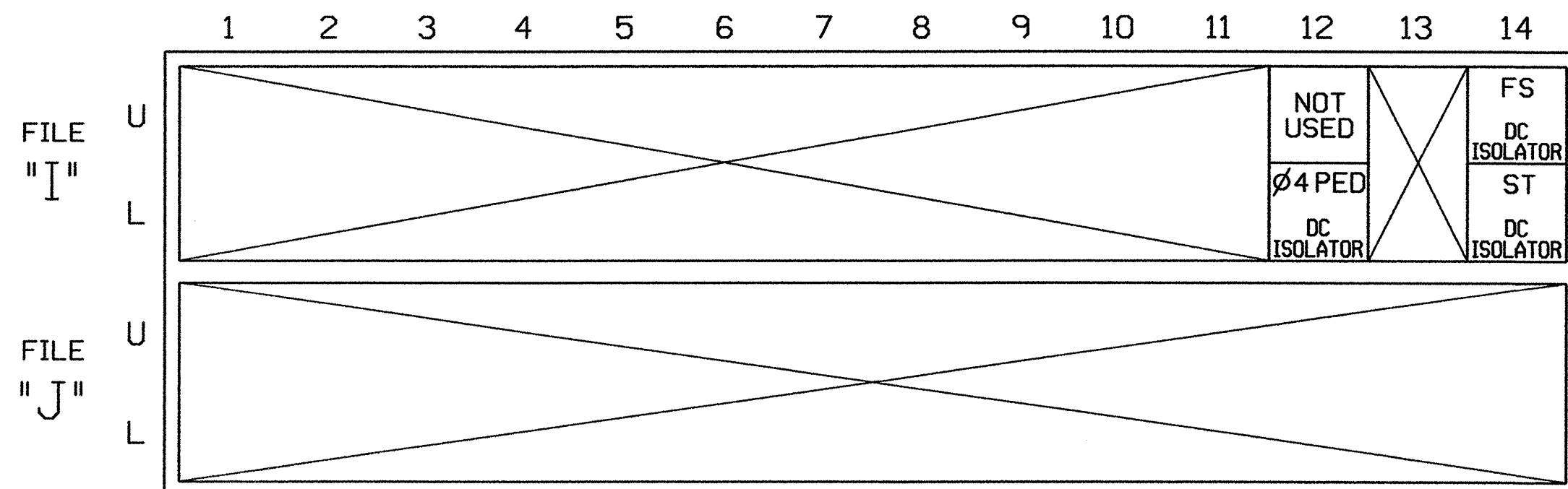


NOTES:

1. CARD IS PROVIDED WITH ALL DIODE JUMPERS IN PLACE. REMOVAL OF ANY JUMPER ALLOWS ITS CHANNELS TO RUN CONCURRENTLY.
2. MAKE SURE JUMPERS SEL1-SEL5 ARE PRESENT ON THE MONITOR BOARD.

INPUT FILE POSITION LAYOUT

(front view)



 = SEE 'SPECIAL DETECTOR NOTES' THIS SHEET

FS = FLASH SENSE
ST = STOP TIME

NOTES

1. TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN THE OUTPUT FILE. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
2. ENSURE THAT RED ENABLE IS ACTIVE AT ALL TIMES DURING NORMAL OPERATION. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED RED MONITOR INPUTS 3,7, 9,10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
3. PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
4. SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT WITHIN THE CONTROLLER PROGRAMMING.
5. ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
6. PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DOUBLE ENTRY.
7. PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
8. SET ALL DETECTION ZONES TO 'PRESENCE' MODE.

EQUIPMENT INFORMATION

```
*CONTROLLER.....CONTRACTOR SUPPLIED 170E
*CABINET .....CONTRACTOR SUPPLIED 332
SOFTWARE .....BI TRANS 233NC2
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S4,S4P,S5,S6,S8
PHASES USED.....1,2,4,4PED,5,6,8
OVERLAPS.....NONE
```

EXISTING FROM TEMPORARY 1 *

SPECIAL DETECTOR NOTES

INSTALL A VIDEO DETECTION SYSTEM FOR VEHICLE DETECTION.
INSTALLATION TO BE DONE IN ACCORDANCE WITH MANUFACTURER'S
DIRECTIONS AND NCDOT ENGINEER-APPROVED MOUNTING LOCATIONS
IN ORDER TO ACCOMPLISH THE DETECTION SCHEMES SHOWN IN
DETECTION ZONE CHART ON THE SIGNAL DESIGN PLAN.

THE VIDEO DETECTION SYSTEM MUST BE COMPATIBLE WITH 170
CONTROLLER EQUIPMENT.

SET ALL DETECTION ZONES TO 'PRESENCE' MODE.

PEDESTRIAN PUSH-BUTTON CONNECTION & PROGRAMMING

PED PUSH BUTTONS	TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHAS
P41, P42	TB8-5,6	I12L	--	69	2	4PED

INPUT FILE POSITION LEGEND: I12L

DETECTOR ATTRIBUTES LEGEND:

FILE I _____
SLOT 12 _____
LOWER _____

1-FULL TIME DELAY
2-PED CALL
3-RESERVED
4-COUNTING
5-EXTENSION
6-TYPE 3
7-CALLING
8-ALTERNATE

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.

-- NOTE --

INSTALL NEW LOAD SWITCH 'S1' UNDER TEMPORARY 3

FIELD CONNECTION HOOK-UP CHART

**	LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
	PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
	SIGNAL HEAD NO.	11	21,22	NU	NU	41,42,43	P41, P42	51	61,62	NU	NU	81,82	NU
	GREEN		130			103			136			109	
	YELLOW		129			102			135			108	
	RED		128			101		*	134			107	
	RED ARROW	125						131					
	YELLOW ARROW	126						132					
	GREEN ARROW	127						133					
							104						
						106							

NU = NOT USED

* REMOVE EXISTING LOAD RESISTOR
INSTALLED UNDER TEMPORARY 1.

SEE 'COUNTDOWN PEDESTRIAN SIGNAL OPERATION' NOTE THIS SHEET.

NOTE!

1. REMOVE PROTECTED/PERMITTED PROGRAMMING FROM
PHASE 5: KEYPAD INPUT E/I25+E+4= NONE
2. PROGRAM ZONE '5A' PER 'DETECTION ZONE CHART'
ON SIGNAL DESIGN PLAN.

PEDESTRIAN PHASE PROGRAMMING

PROGRAM PEDESTRIAN 4P OUTPUT AT KEYPAD INPUT E/I25+F+7=Ø4.

THIS ELECTRICAL DETAIL IS FOR THE
TEMPORARY SIGNAL DESIGN: 05-1858T3
DESIGNED: APRIL 2006
SEALED: 31 MAY 2006
REVISED: N/A

TYPE 170 CONTROLLER & 332 CABINET

THIS DETAIL SUPERSEDES DETAIL DATED
AUGUST 2004 AND SEALED 9/3/04

TEMPORARY DESIGN 3 - CONSTRUCTION PHASE 4

ELECTRICAL AND PROGRAMMING DETAILS FOR:	SR 1999 (DAVIS DRIVE) at SR 1978 (HOPSON ROAD)	SEAL 																																	
Prepared in the Offices of: 	DIVISION 05 DURHAM COUNTY DURHAM																																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">PLAN DATE: MAY 2006</td> <td style="width: 33%;">REVIEWED BY: <i>T. Syph</i></td> <td style="width: 33%;"></td> </tr> <tr> <td>PREPARED BY: F.E. RUSS</td> <td>REVIEWED BY:</td> <td></td> </tr> </table>			PLAN DATE: MAY 2006	REVIEWED BY: <i>T. Syph</i>		PREPARED BY: F.E. RUSS	REVIEWED BY:																												
PLAN DATE: MAY 2006	REVIEWED BY: <i>T. Syph</i>																																		
PREPARED BY: F.E. RUSS	REVIEWED BY:																																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">REVISIONS</th> <th style="width: 20%;">INIT.</th> <th style="width: 20%;">DATE</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>			REVISIONS	INIT.	DATE																														
REVISIONS	INIT.	DATE																																	
122 N. McDowell St., Raleigh, NC 27603																																			
<i>George C. Brown</i> 6/12/06 SIGNATURE DATE SIG. INVENTORY NO. 05-185813																																			

PHASING DIAGRAM

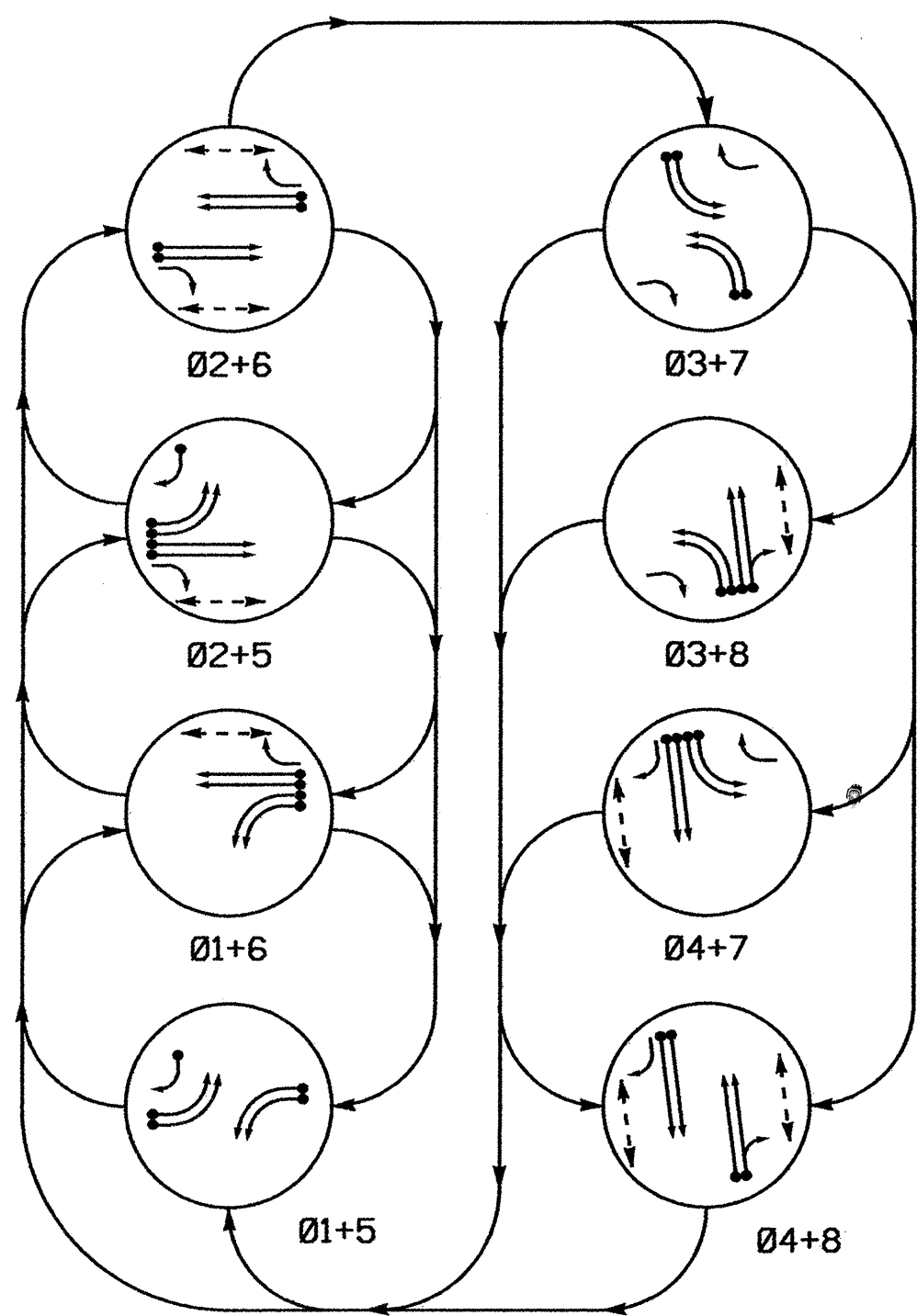


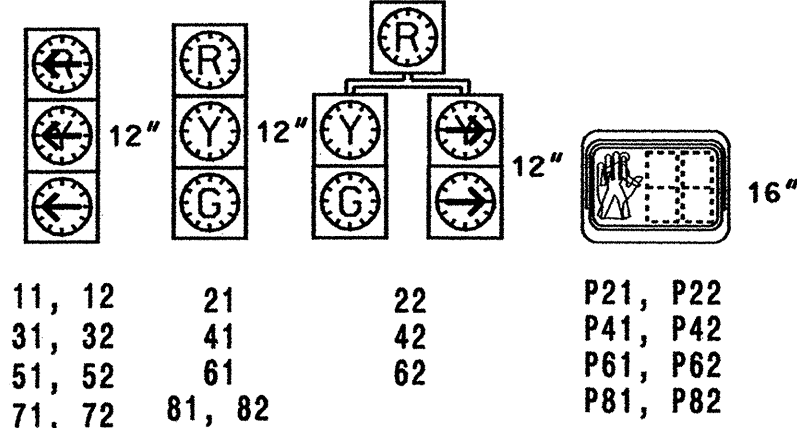
TABLE OF OPERATION

SIGNAL FACE	PHASE							
	Ø1+5	Ø2+5	Ø3+7	Ø3+8	Ø4+7	Ø4+8	F L A S H	
11, 12	---	---	---	---	---	---	---	---
21	R	R	G	G	R	R	Y	---
22	R	R	G	G	R	R	Y	---
31, 32	---	---	---	---	---	---	---	---
41	R	R	R	R	R	G	G	R
42	---	---	---	---	---	---	---	---
51, 52	---	---	---	---	---	---	---	---
61	R	G	R	G	R	R	Y	---
62	R	G	R	G	R	R	Y	---
71, 72	---	---	---	---	---	---	---	---
81, 82	R	R	R	R	R	G	G	R
P21, P22	DW	DW	W	W	DW	DW	DRK	---
P41, P42	DW	DW	DW	DW	DW	W	W	DRK
P61, P62	DW	W	DW	W	DW	DW	DRK	---
P81, P82	DW	DW	DW	DW	W	DW	W	DRK

*SEE NOTE #2

SIGNAL FACE I.D.

Denotes L.E.D.



PHASING DIAGRAM DETECTION LEGEND

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

LOOP & DETECTOR UNIT INSTALLATION CHART

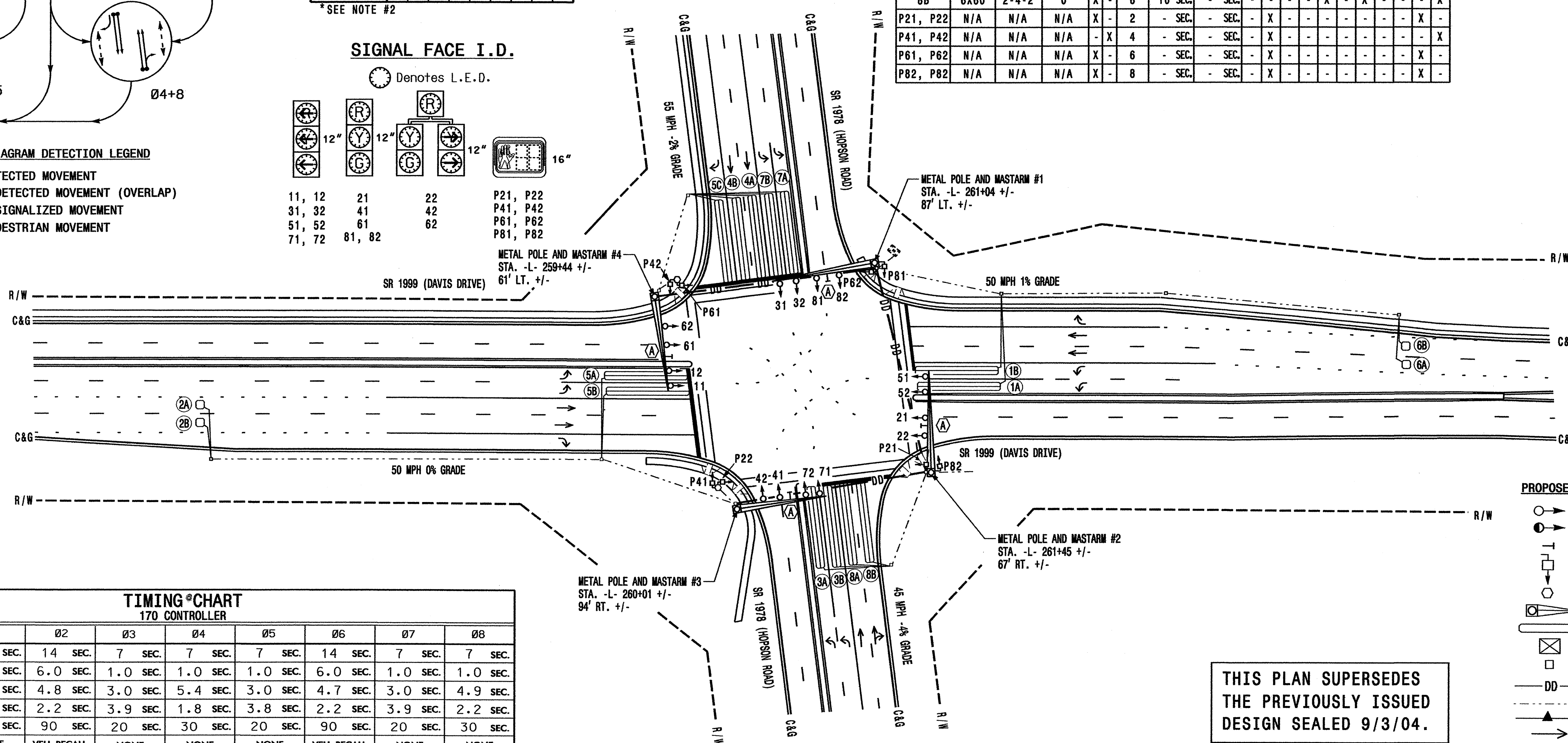
170 CONTROLLER AND CABINET

INDUCTIVE LOOPS				DETECTOR PROGRAMMING									
LOOP NO.	SIZE (Ft)	TURNS	DIST. FROM STOPBAR (Ft)	NEW	EXISTING	NEHA PHASE	TIMING		ATTRIBUTES				
							DELAY	CARRY (STRETCH)	FULL TIME DELAY	PEDESTRIAN CALL	REVERSED	COUNT	EXTENSION
1A	6X60	2-4-2	0	X	-	1	- SEC.	- SEC.	-	-	-	X	X
1B	6X60	2-4-2	0	X	-	1	- SEC.	- SEC.	-	-	-	X	X
2A	6X6	5	355	X	-	2	- SEC.	- SEC.	-	-	-	X	X
2B	6X6	5	355	X	-	2	- SEC.	- SEC.	-	-	-	X	X
3A	6X60	2-4-2	0	X	-	3	- SEC.	- SEC.	-	-	-	X	X
3B	6X60	2-4-2	0	X	-	3	- SEC.	- SEC.	-	-	-	X	X
4A	6X60	2-4-2	0	X	-	4	- SEC.	- SEC.	-	-	-	X	X
4B	6X60	2-4-2	0	X	-	4	- SEC.	- SEC.	-	-	-	X	X
5A	6X60	2-4-2	0	X	-	5	- SEC.	- SEC.	-	-	-	X	X
5B	6X60	2-4-2	0	X	-	5	- SEC.	- SEC.	-	-	-	X	X
5C	6X60	2-4-2	0	X	-	5	15 SEC.	- SEC.	-	-	-	X	X
6A	6X6	5	355	X	-	6	- SEC.	- SEC.	-	-	-	X	X
6B	6X6	5	355	X	-	6	- SEC.	- SEC.	-	-	-	X	X
7A	6X60	2-4-2	0	X	-	7	- SEC.	- SEC.	-	-	-	X	X
7B	6X60	2-4-2	0	X	-	7	- SEC.	- SEC.	-	-	-	X	X
8A	6X60	2-4-2	0	X	-	8	- SEC.	- SEC.	-	-	-	X	X
8B	6X60	2-4-2	0	X	-	8	10 SEC.	- SEC.	-	-	-	X	X
P21, P22	N/A	N/A	N/A	X	-	2	- SEC.	- SEC.	-	X	-	-	-
P41, P42	N/A	N/A	N/A	X	-	4	- SEC.	- SEC.	-	X	-	-	-
P61, P62	N/A	N/A	N/A	X	-	6	- SEC.	- SEC.	-	X	-	-	-
P81, P82	N/A	N/A	N/A	X	-	8	- SEC.	- SEC.	-	X	-	-	-

8 PHASE FULLY ACTUATED (ISOLATED)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Set all detector units to presence mode.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.



TIMING CHART

170 CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM INITIAL	7 SEC.	14 SEC.	7 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.	7 SEC.
VEHICLE EXTENSION	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.8 SEC.	3.0 SEC.	5.4 SEC.	3.0 SEC.	4.7 SEC.	3.0 SEC.	4.9 SEC.
RED CLEARANCE	3.8 SEC.	2.2 SEC.	3.9 SEC.	1.8 SEC.	3.8 SEC.	2.2 SEC.	3.9 SEC.	2.2 SEC.
MAXIMUM LIMIT	20 SEC.	90 SEC.	20 SEC.	30 SEC.	20 SEC.	90 SEC.	20 SEC.	30 SEC.
RECALL POSITION	NONE	VEH. RECALL	NONE	NONE	NONE	VEH. RECALL	NONE	NONE
VEHICLE CALL MEMORY	NONLOCK	YELLOW LOCK	NONLOCK	NONLOCK	NONLOCK	YELLOW LOCK	NONLOCK	NONLOCK
DOUBLE ENTRY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
WALK	- SEC.	7 SEC.	- SEC.	7 SEC.	- SEC.	7 SEC.	- SEC.	7 SEC.
FLASHING DON'T WALK	- SEC.	26 SEC.	- SEC.	26 SEC.	- SEC.	30 SEC.	- SEC.	26 SEC.
TYPE 3 LIMIT	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ALTERNATE EXTENSION	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ADD PER VEHICLE	- SEC.	1.8 SEC.	- SEC.	- SEC.	- SEC.	1.8 SEC.	- SEC.	- SEC.
MAXIMUM INITIAL	- SEC.	40 SEC.	- SEC.	- SEC.	- SEC.	40 SEC.	- SEC.	- SEC.
MAXIMUM GAP	1.0 SEC.	7.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	7.0 SEC.	1.0 SEC.	1.0 SEC.
REDUCE 0.1 SEC EVERY	- SEC.	1.5 SEC.	- SEC.	- SEC.	- SEC.	1.5 SEC.	- SEC.	- SEC.
MINIMUM GAP	1.0 SEC.	3.1 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	3.1 SEC.	1.0 SEC.	1.0 SEC.

LEGEND

- | PROPOSED | EXISTING |
|--|----------|
| Traffic Signal Head | N/A |
| Modified Signal Head | N/A |
| Sign | N/A |
| Pedestrian Signal Head With Push Button & Sign | N/A |
| Pedestrian Signal Pedestal | N/A |
| Metal Pole with Mastarm | N/A |
| Inductive Loop Detector | N/A |
| Controller & Cabinet Junction Box | N/A |
| Directional Drill | N/A |
| 2-in Underground Conduit | N/A |
| Right of Way with Marker | N/A |
| Directional Arrow | N/A |
| Pavement Marking Arrow | N/A |
| Overhead Street Sign | N/A |

THIS PLAN SUPERSEDES THE PREVIOUSLY ISSUED DESIGN SEALED 9/3/04.

SIGNAL UPGRADE - FINAL DESIGN

122 N. McDowell St., Raleigh, NC 27603

SR 1999 (DAVIS DRIVE)
AT
SR 1978 (HOPSON ROAD)

DIVISION 5 DURHAM COUNTY DURHAM

PLAN DATE: April 2006 REVIEWED BY: Zachary Little

PREPARED BY: L. Blount REVIEWED BY: Dounit Ishak

REVISIONS

SCALE 0 50' 1"=50'

SEAL

NORTH CAROLINA

PROFESSIONAL ENGINEER

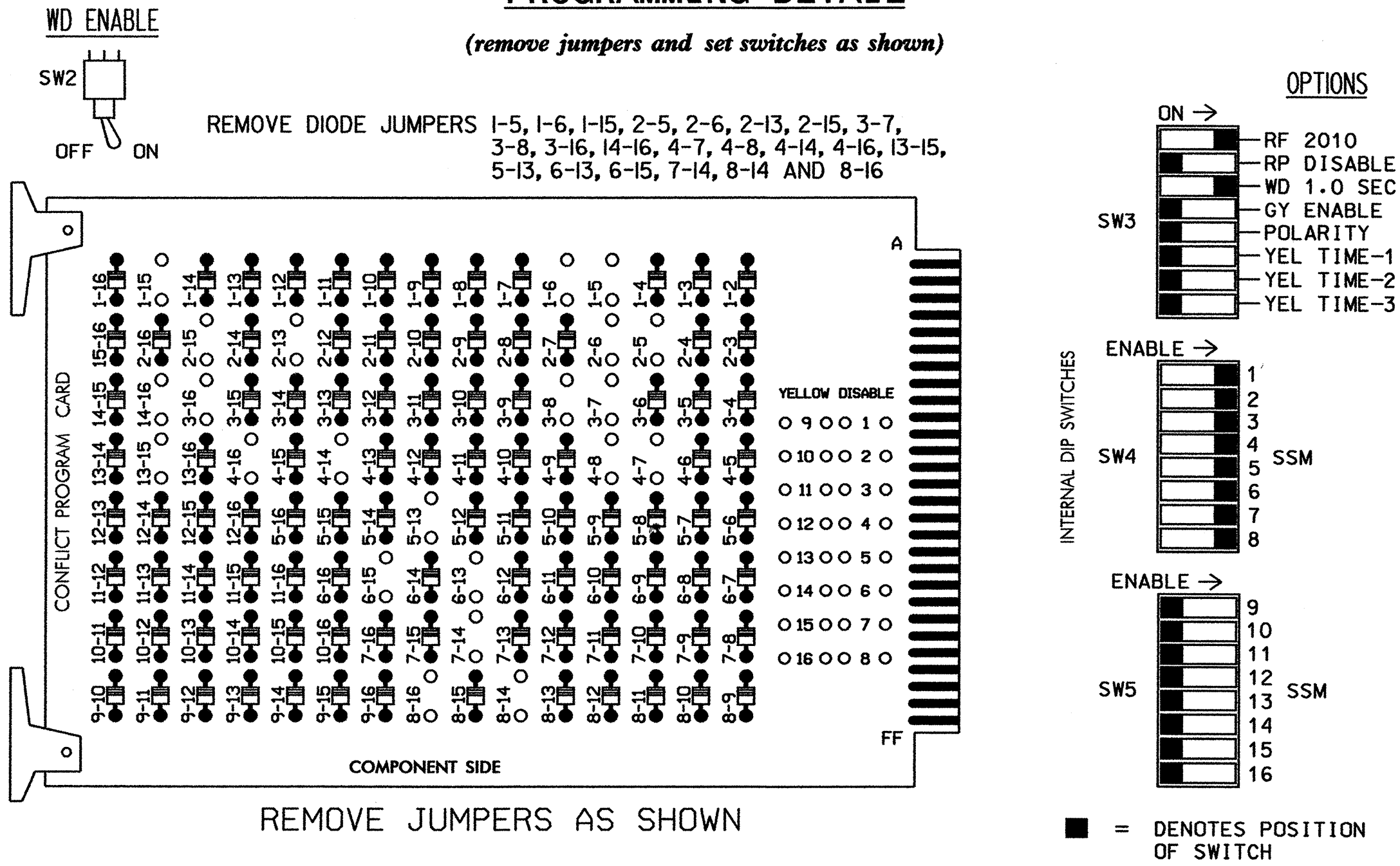
31 May 2006

SIGNATURE DATE

SIG. INVENTORY NO. 05-1858

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL

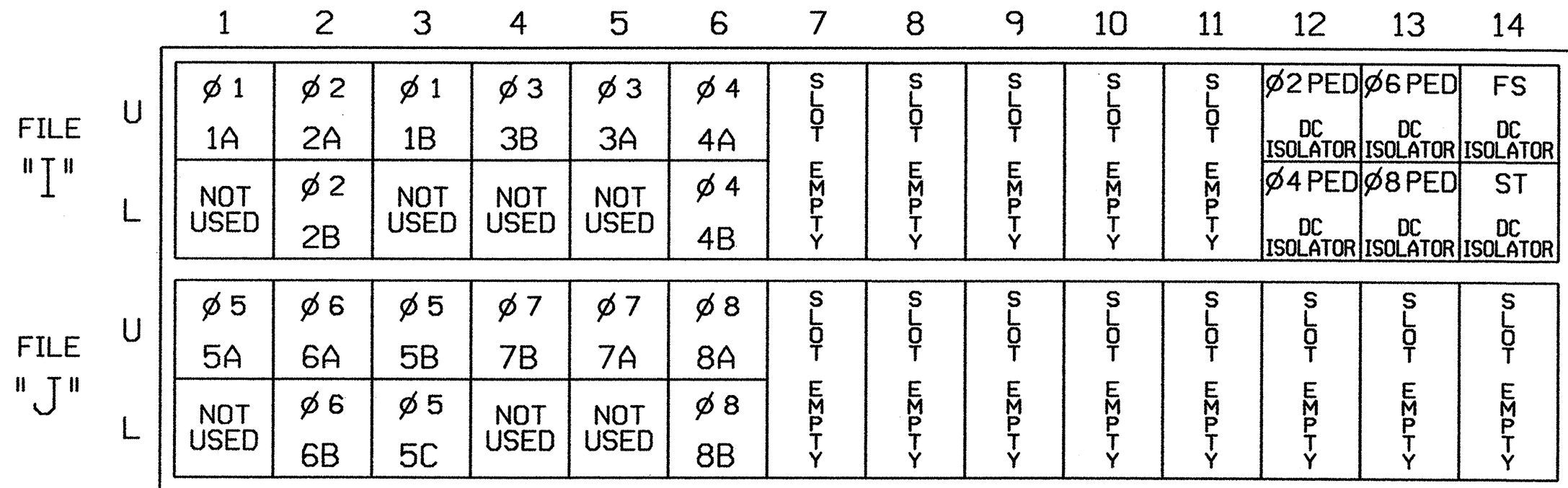


NOTES:

- CARD IS PROVIDED WITH ALL DIODE JUMPERS IN PLACE. REMOVAL OF ANY JUMPER ALLOWS ITS CHANNELS TO RUN CONCURRENTLY.
- MAKE SURE JUMPERS SEL1-SEL5 ARE PRESENT ON THE MONITOR BOARD.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

NOTES

- TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN THE OUTPUT FILE. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
- ENSURE THAT RED ENABLE IS ACTIVE AT ALL TIMES DURING NORMAL OPERATION. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED RED MONITOR INPUTS 9,10, 11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT WITHIN THE CONTROLLER PROGRAMMING.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- DELETE DOUBLE ENTRY PROGRAMMING, ON CONTROLLER UNIT, FOR PHASES 4 AND 8.
- PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
- SET ALL DETECTOR UNITS TO 'PRESENCE' MODE.

EQUIPMENT INFORMATION

*CONTROLLER.....CONTRACTOR SUPPLIED 170E
*CABINETCONTRACTOR SUPPLIED 332
SOFTWAREBI TRANS 233NC2
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S2P,S3,S4,S4P,S5,S6,S6P,S7,S8,S8P
PHASES USED.....1,2,2PED,3,4,4PED,5,6,6PED,7,8,8PED
OVERLAPS.....NONE

EXISTING FROM TEMPORARY 1*

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
1A	TB2-1,2	I1U	1	56	5 7	1
1B	TB2-9,10	I3U	2	63	5 7	1
2A	TB2-5,6	I2U	3	39	4 5 7	2
2B	TB2-7,8	I2L	4	43	4 5 7	2
3A	TB4-5,6	I5U	5	58	5 7	3
3B	TB4-1,2	I4U	6	47	5 7	3
4A	TB4-9,10	I6U	7	41	5 7	4
4B	TB4-11,12	I6L	8	45	5 7	4
5A	TB3-1,2	J1U	9	55	5 7	5
5B	TB3-9,10	J3U	10	64	5 7	5
5C	TB3-11,12	J3L	11	77	5 7	5
6A	TB3-5,6	J2U	12	40	4 5 7	6
6B	TB3-7,8	J2L	13	44	4 5 7	6
7A	TB5-5,6	J5U	14	57	5 7	7
7B	TB5-1,2	J4U	15	48	5 7	7
8A	TB5-9,10	J6U	16	42	5 7	8
8B	TB5-11,12	J6L	17	46	5 7	8
PED PUSH BUTTONS						
P21, P22	TB8-4,6	I12U	18	67	2	2PED
P41, P42	TB8-5,6	I12L	19	69	2	4PED
P61, P62	TB8-7,9	I13U	20	68	2	6PED
P81, P82	TB8-8,9	I13L	21	70	2	8PED

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

DETECTOR ATTRIBUTES LEGEND:

- FULL TIME DELAY
- PED CALL
- RESERVED
- COUNTING
- EXTENSION
- TYPE 3
- CALLING
- ALTERNATE

PROJECT REFERENCE NO.	SHEET NO.
U-4026	SIG.49

-- NOTE --

INSTALL NEW LOAD SWITCHES S2P,S3,S6P,S7 AND S8P FOR FINAL DESIGN

FIELD CONNECTION HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3		S4	S4P	S5		S6	S6P	S7		S8	S8P
PHASE	1	2	2 PED	3		4	4 PED	5		6	6 PED	7		8	8 PED
SIGNAL HEAD NO.	11,12	21,22	P21, P22	22	31,32	41,42	P41, P42	42	51,52	61,62	P61, P62	62	71,72	81,82	P81, P82
GREEN		130				103				136				109	
YELLOW		129				102				135				108	
RED		128				101				134				107	
RED ARROW	125				116				131				122		
YELLOW ARROW	126				117	117		132	132			123	123		
GREEN ARROW	127				118	118		133	133			124	124		
			113				104				119				110
			115				106				121				112

NU = NOT USED

* SEE 'COUNTDOWN PEDESTRIAN SIGNAL OPERATION' NOTE BELOW.

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.

PEDESTRIAN PHASE PROGRAMMING

PROGRAM PEDESTRIAN 2P OUTPUT AT KEYPAD INPUT E/125+F+5=Ø2.
PROGRAM PEDESTRIAN 4P OUTPUT AT KEYPAD INPUT E/125+F+7=Ø4.
PROGRAM PEDESTRIAN 6P OUTPUT AT KEYPAD INPUT E/125+F+6=Ø6.
PROGRAM PEDESTRIAN 8P OUTPUT AT KEYPAD INPUT E/125+F+8=Ø8.

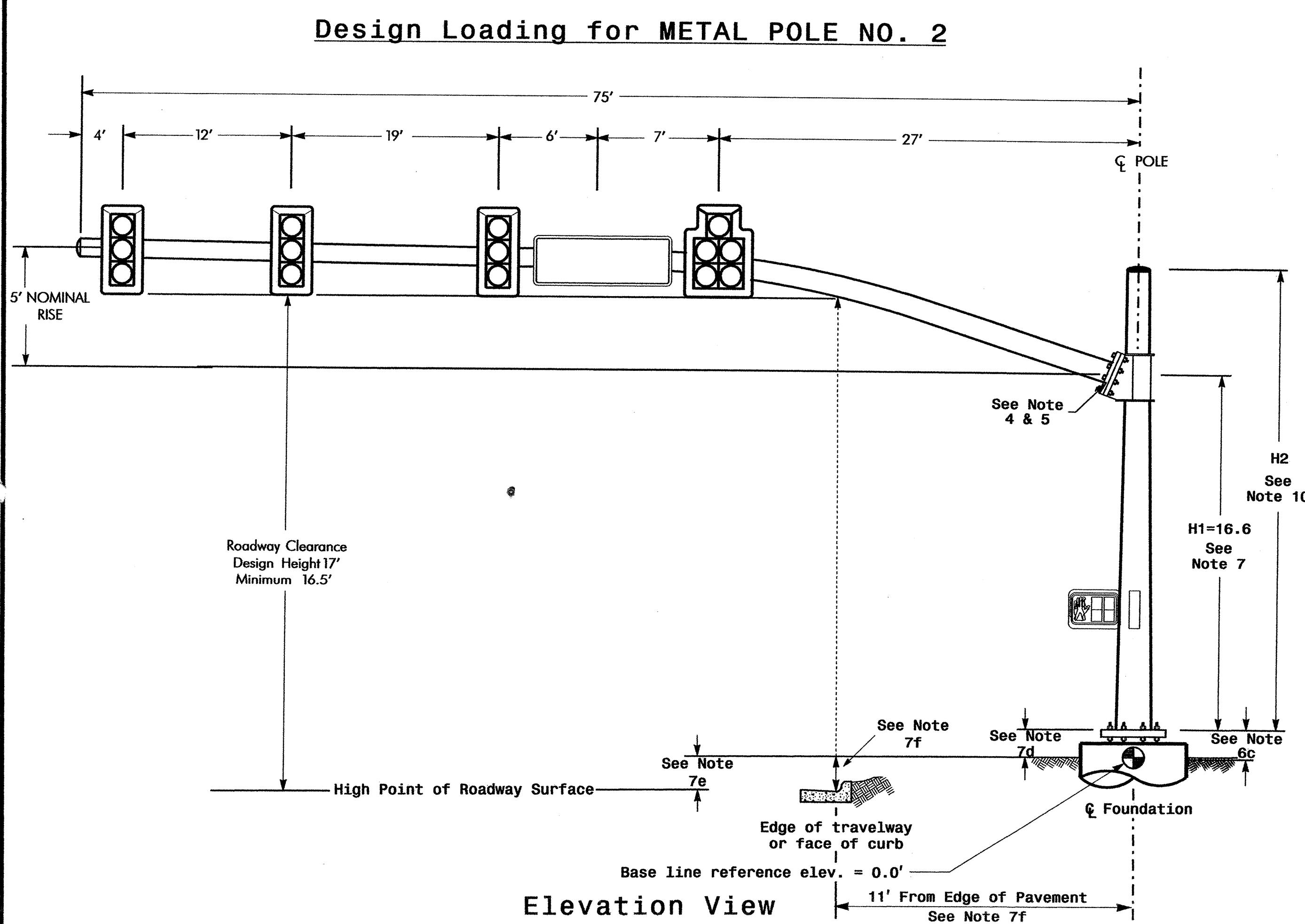
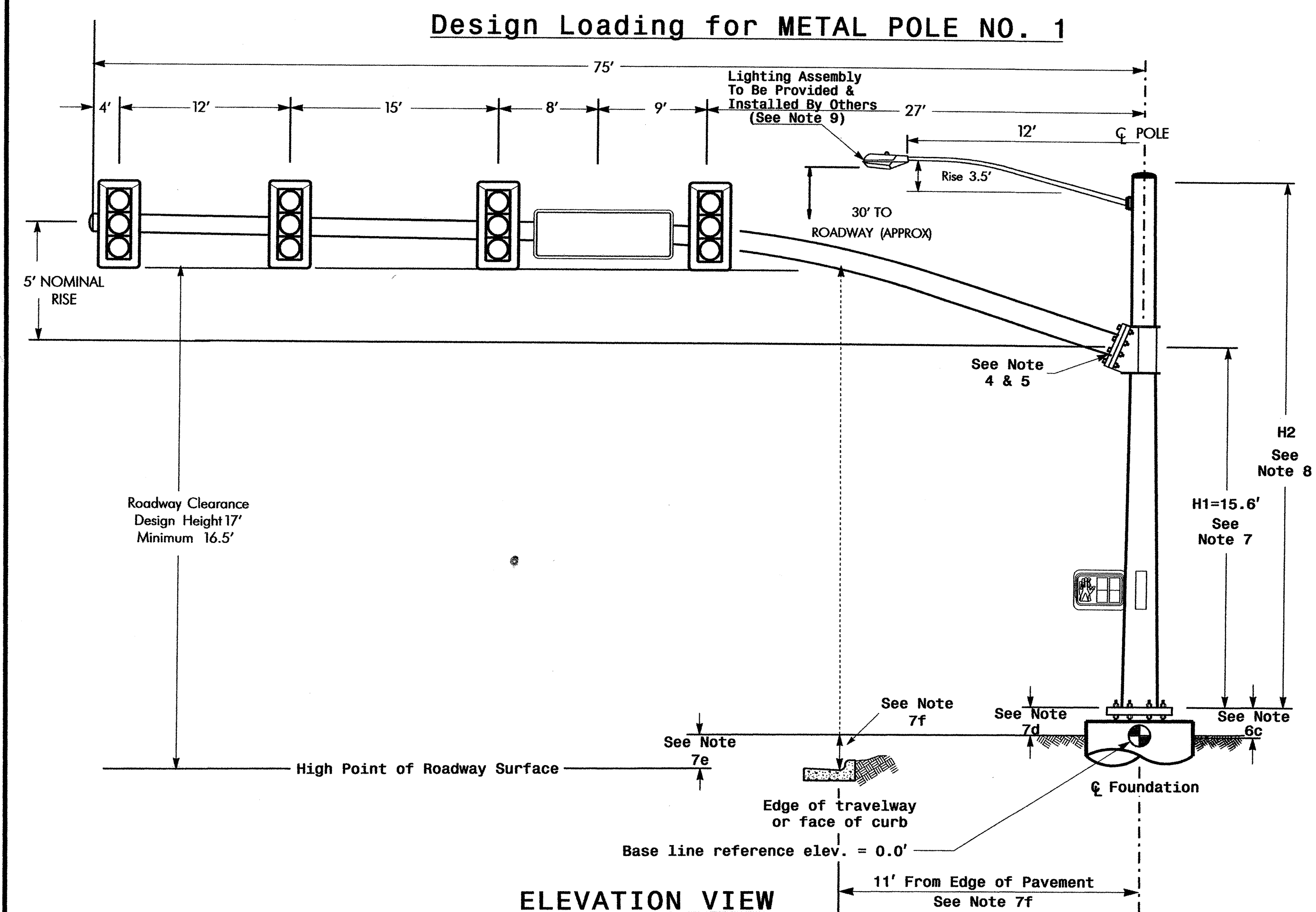
THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1858
DESIGNED: APRIL 2006
SEALED: 31 MAY 2006
REVISED: N/A

TYPE 170 CONTROLLER & 332 CABINET

THIS DETAIL SUPERSEDES DETAIL DATED
AUGUST 2004 AND SEALED 9/3/04

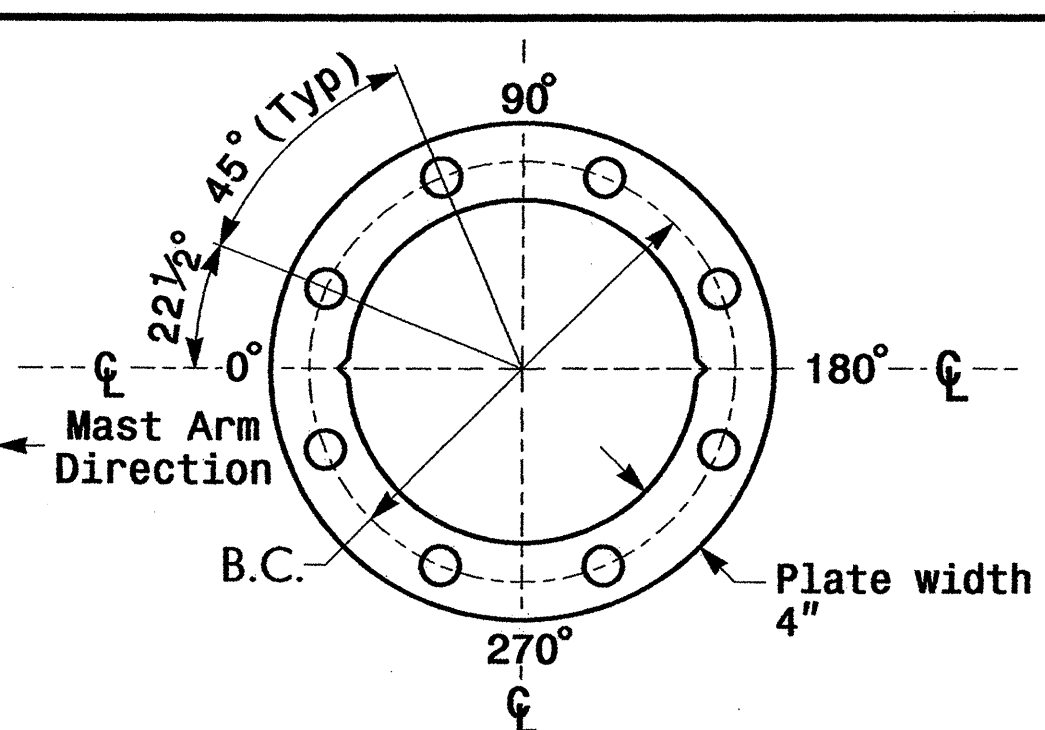
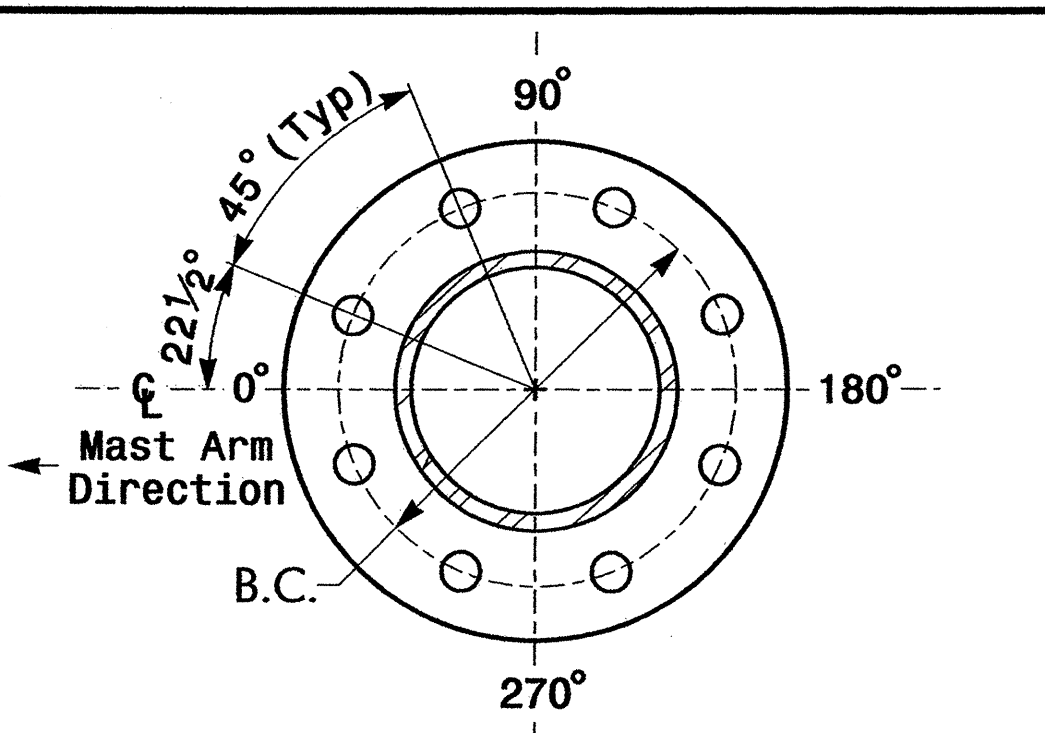
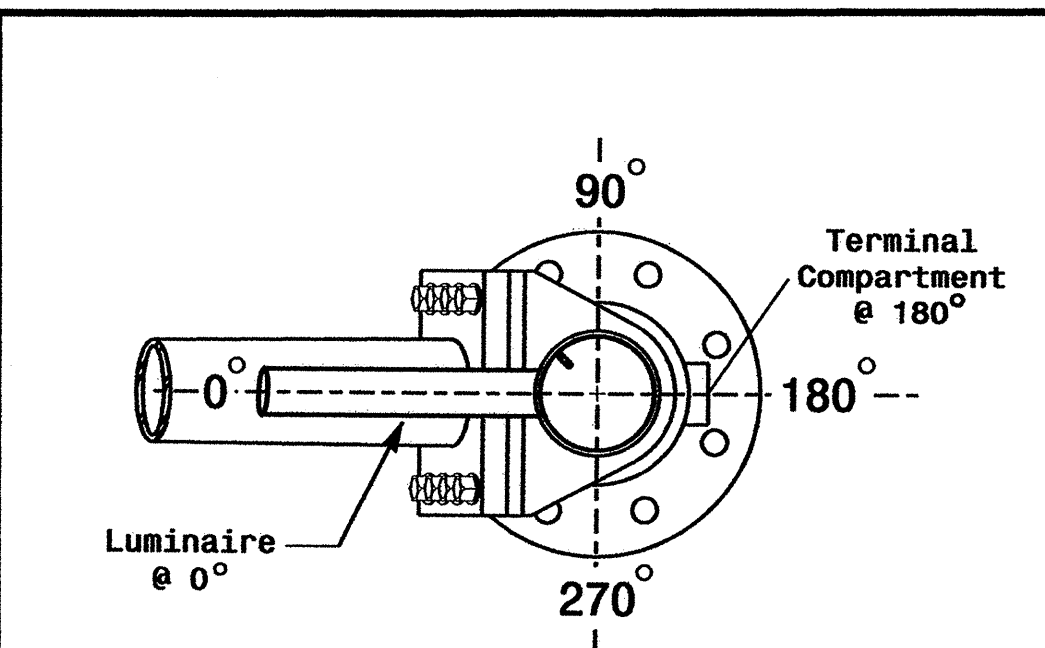
FINAL DESIGN

ELECTRICAL AND PROGRAMMING DETAILS FOR:	SR 1999 (DAVIS DRIVE) at SR 1978 (HOPSON ROAD)	SEAL NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
Prepared in the Offices of: Traffic Engineering and Safety Services Division of Transportation Signal Management Section 122 N. McDowell St., Raleigh, NC 27603	DIVISION 05 PLAN DATE: MAY 2006 PREPARED BY: F.E. RUSS REVISIONS INIT. DATE	DURHAM COUNTY DURHAM REVIEWED BY: T. J. J. J. REVIEWED BY: DATE 6/12/06 DATE 05-1858



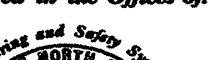
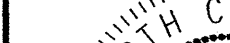
SPECIAL NOTE
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project 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	-2.0 ft.	-3.0 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.

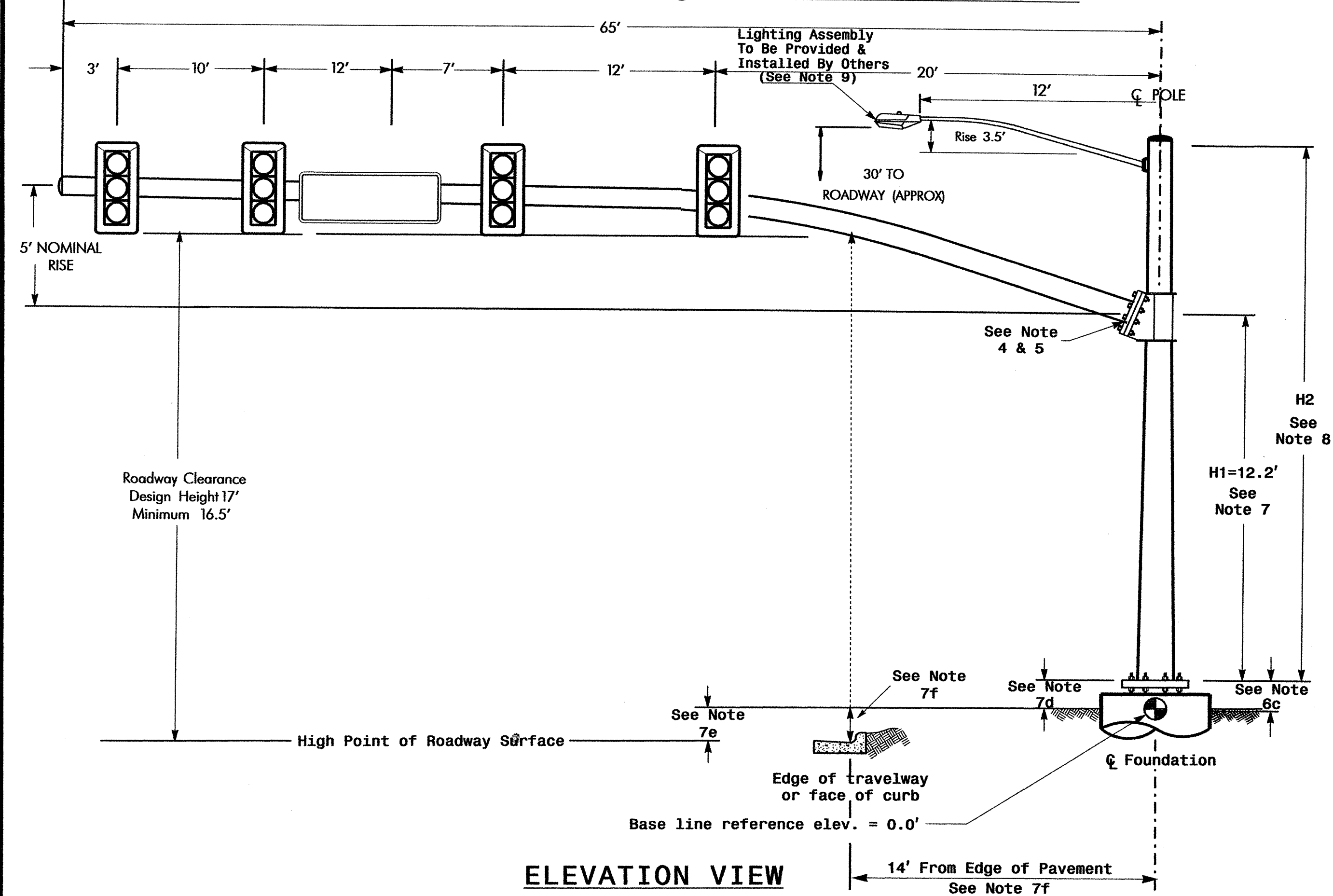


METAL POLE No. 1 and 2	PROJECT REFERENCE NO.	SHEET NO.
	U-4026	Sig. 

- ## NOTES
- Design Reference Material
- Design the traffic signal structure and foundation in accordance with:
 - The 4th Edition 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2006 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website:
<http://www.ncdot.org/doh/preconstruct/traffic/tmssu/ws/mpoles/poles.htm>
- Design Requirements
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
 - Maximum allowable CSR for all signal supports is 0.9.
 - 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.
 - The arm-to-pole attachment is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
 - Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
 - The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
 - The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
 - 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.
 - The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus ½ of the total height of the mast arm attachment assembly plus 1 foot.
 - If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
 - The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
 - The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

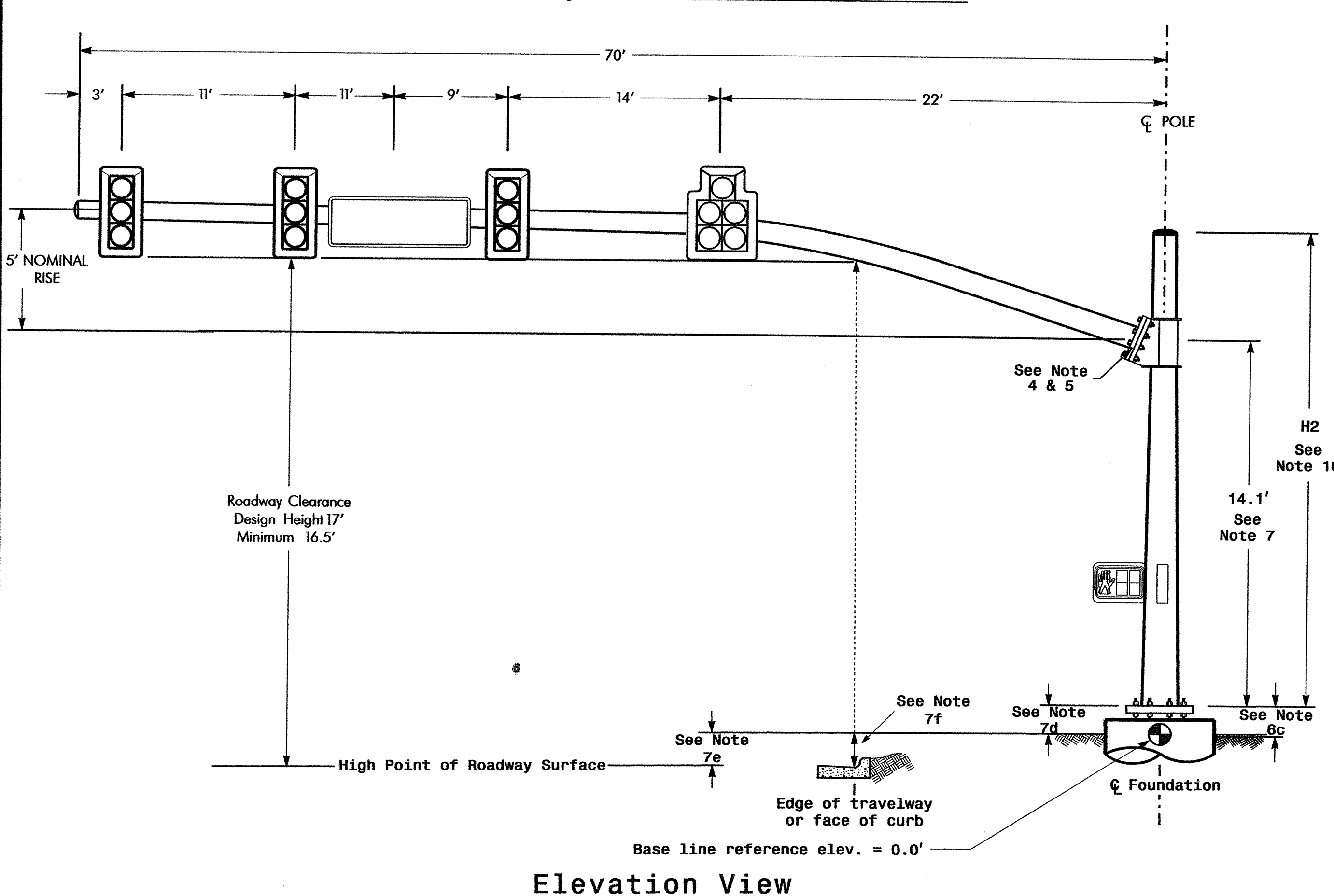
NCDOT Wind Zone 4 (90 mph)		SR 1999 (DAVIS DRIVE) AT SR 1978 (HOPSON ROAD)		SEAL 																													
<i>Prepared in the Offices of:</i> 		DIVISION 5 WAKE COUNTY MORRISVILLE																															
PLAN DATE: MARCH 2005 REVIEWED BY: Z. LITTLE		PREPARED BY: G. PIERCE REVIEWED BY: D. ISHAK																															
SCALE 		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">REVISONS</th> <th style="width: 50%;">INIT.</th> <th style="width: 50%;">DATE</th> </tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>				REVISONS	INIT.	DATE																									
REVISONS	INIT.	DATE																															
N/A		SIGNATURE DATE SIG. INVENTORY NO. 05-1858																															

Design Loading for METAL POLE NO. 3



ELEVATION VIEW

Design Loading for METAL POLE NO. 4



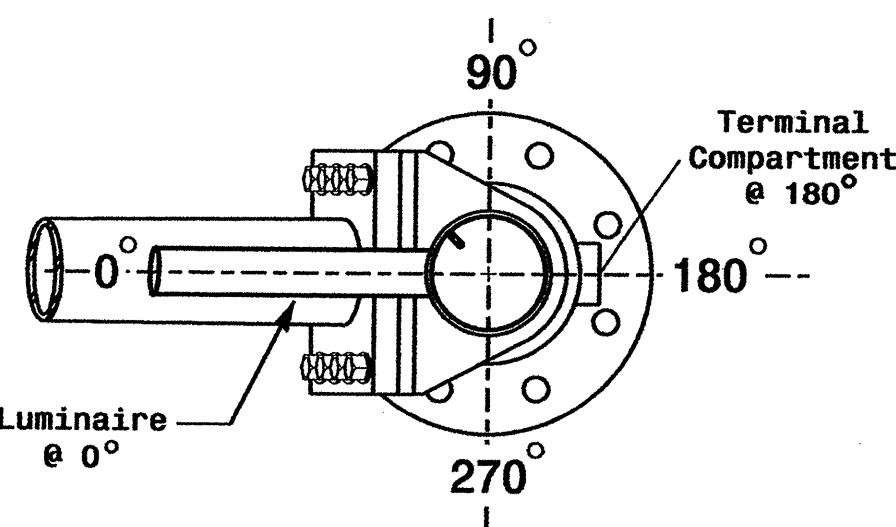
Elevation View

SPECIAL NOTE

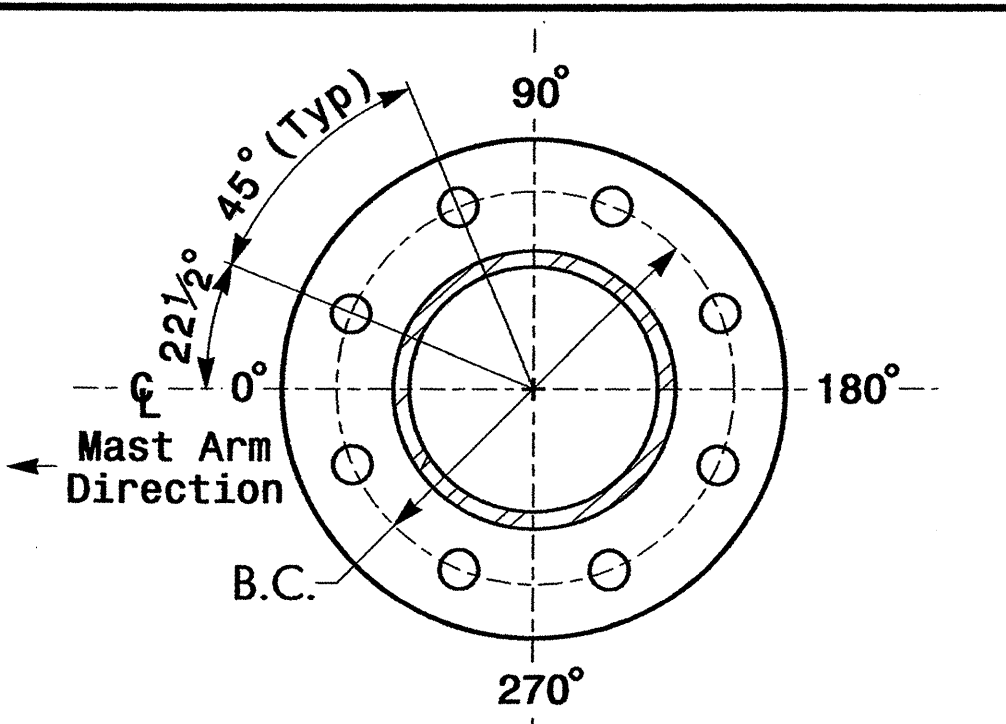
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at Foundation @ ground level	+/-0.0 ft.	+/-0.0 ft.
Elevation difference at High point of roadway surface	1.4 ft.	-0.5 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.

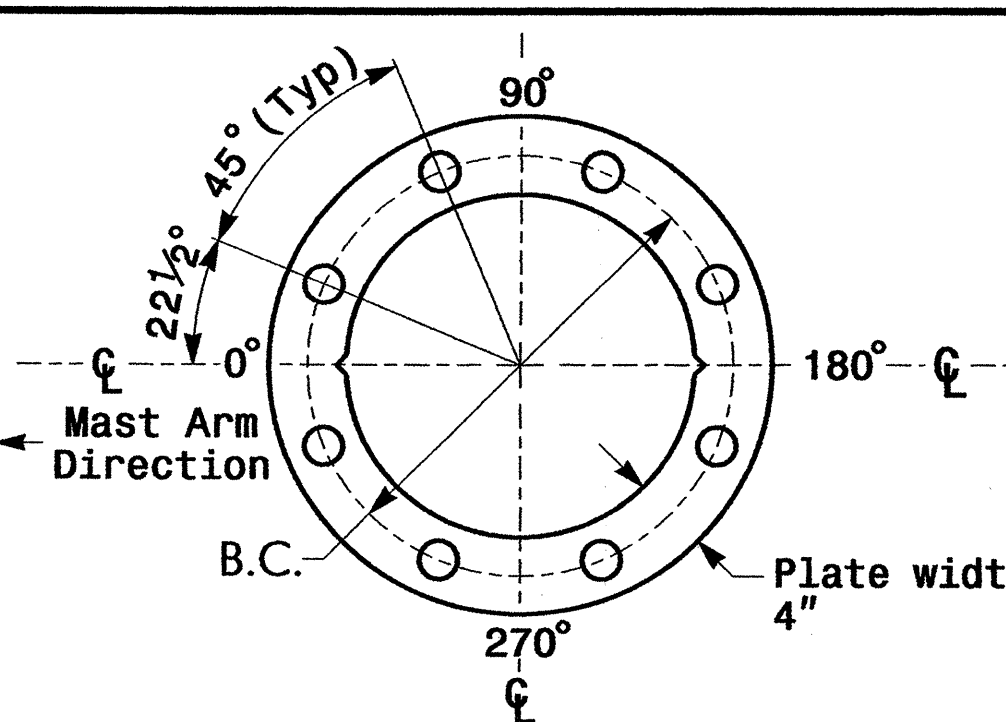


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

METAL POLE No. 3 and 4

PROJECT REFERENCE NO.	SHEET NO.
U-4026	Sig. 51

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
	PEDESTRAIN SIGNAL HEAD 12"-1 SECTION	2.6 S.F.	15.0" W X 28.0" L X 10"D	39 LBS
	OVERHEAD STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	16.0 S.F.	24" W X 96" L	30 LBS
	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

NOTES

Design Reference Material

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

Design Requirements

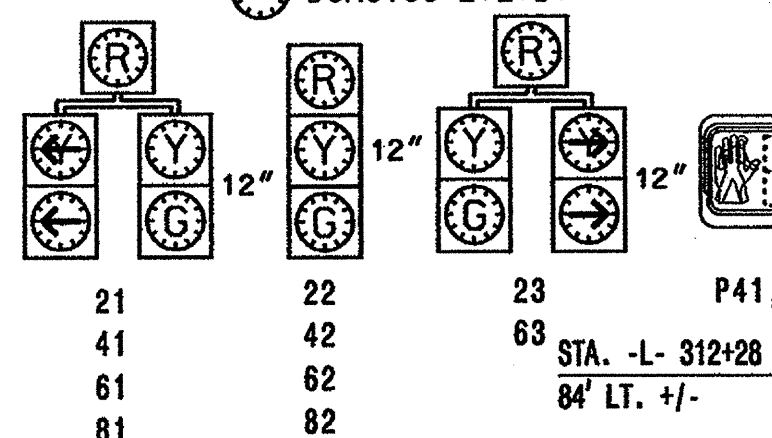
- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- 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.
- The arm-to-pole attachment is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
 - Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
- The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
- 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.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

 122 N. McDowell St., Raleigh, NC 27603	SR 1999 (DAVIS DRIVE) AT SR 1978 (HOPSON ROAD)		
	DIVISION 5 WAKE COUNTY MORRISVILLE		
PLAN DATE: MARCH 2005	REVIEWED BY: Z. LITTLE	INIT.	DATE
PREPARED BY: C. PIERCE	REVIEWED BY: D. ISHAK	INIT.	DATE
REVISIONS		INIT.	DATE
SCALE: 0 N/A		SIGNATURE: DATE	
N/A		SIG. INVENTORY NO. 05-1858	

SIGNAL FACE I.D.

 Denotes L.E.D.

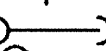


NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
4. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
5. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
6. Program phase 1 as protected/permitted.
7. Program phase 5 as protected/permitted.
8. Program phase 3 as protected/permitted.
9. Program phase 7 as protected/permitted.
10. Program controller to clear from phase 2+6 to phase 1 and/or 5 by progressing through phase 4+8 (See Electrical Details).
11. Set all detection zones to presence mode.
12. Program pedestrian heads to countdown flashing "Don't Walk" time only.

DETECTION ZONES			DETECTOR PROGRAMMING														
			NEMA PHASE	TIMING		ATTRIBUTES										STATUS	
						FULL TIME	1	2	3	4	5	6	7	8	SYSTEM		
ZONE NO.	SIZE (ft.)	DIST. FROM STOPBAR (ft.)	DELAY	CARRY (STRETCH)	1	2	3	4	5	6	7	8	ALTERNATE	NEW	EXISTING		
1A	6X60	0	6	3 SEC.	- SEC.	X	-	-	-	X	-	-	-	-	X	-	
			1	15 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-	
			4	15 SEC.	- SEC.	-	-	-	-	-	-	X	-	-	X	-	
2A	6X6	300	2	- SEC.	- SEC.	-	-	-	X	X	-	X	-	-	X	-	
2B	6X6	300	2	- SEC.	- SEC.	-	-	-	X	X	-	X	-	-	X	-	
3A	6X60	0	8	3 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-	
			3	15 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-	
4A	6X6	420	4	- SEC.	4.0 SEC.	-	-	-	-	X	-	-	-	-	X	-	
4B	6X6	420	4	- SEC.	4.0 SEC.	-	-	-	-	X	-	-	-	-	X	-	
4C	6X60	0	4	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-	
4D	6X60	0	4	10 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-	
5A	6X60	0	2	3 SEC.	- SEC.	X	-	-	-	X	-	-	-	-	X	-	
			5	15 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-	
			4	15 SEC.	- SEC.	-	-	-	-	-	X	-	-	-	X	-	
6A	6X6	300	6	- SEC.	- SEC.	-	-	-	X	X	-	X	-	-	X	-	
6B	6X6	300	6	- SEC.	- SEC.	-	-	-	X	X	-	X	-	-	X	-	
7A	6X60	0	4	3 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-	
			7	15 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-	
8A	6X6	420	8	- SEC.	4.0 SEC.	-	-	-	-	X	-	-	-	-	X	-	
8B	6X6	420	8	- SEC.	4.0 SEC.	-	-	-	-	X	-	-	-	-	X	-	
8C	6X60	0	8	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-	
8D	6X60	0	8	10 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-	
P41, P42	N/A	N/A	4	- SEC.	- SEC.	-	X	-	-	-	-	-	-	-	-	X	

PROPOSED

- | | |
|---|---|
|  | Traffic Signal Head |
|  | Modified Signal Head |
|  | Pedestrian Signal Head
With Push Button & Sign |
|  | Signal Pole with Guy |
|  | Signal Pole with Sidewalk Guy |
|  | Video Detection Zone |
|  | Controller & Cabinet
Pull Box |
|  | 2-in Underground Conduit |
|  | Right of Way with Marker |
|  | Directional Arrow |
|  | Pavement Marking Arrow |
|  | Construction Zone Drums |
|  | Construction Zone |

EXISTING

- 

 N/A
- 

 N/A
- 

 N/A
- 

 N/A
- 

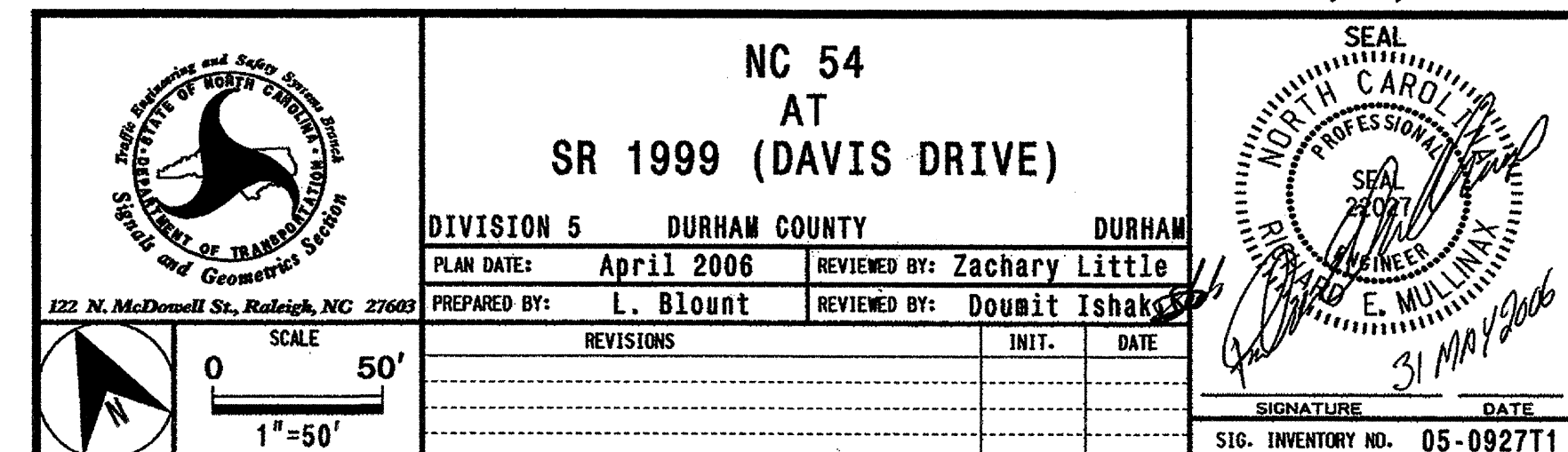
 N/A
- 

 N/A

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
MINIMUM INITIAL	7 SEC.	12 SEC.	7 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.	7 SEC.
VEHICLE EXTENSION	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.3 SEC.	3.0 SEC.	5.3 SEC.	3.0 SEC.	4.3 SEC.	3.0 SEC.	5.1 SEC.
RED CLEARANCE	3.3 SEC.	2.4 SEC.	3.4 SEC.	1.4 SEC.	3.7 SEC.	2.3 SEC.	3.4 SEC.	1.3 SEC.
MAXIMUM LIMIT	20 SEC.	90 SEC.	20 SEC.	40 SEC.	20 SEC.	90 SEC.	20 SEC.	40 SEC.
RECALL POSITION	NONE	VEH. RECALL	NONE	NONE	NONE	VEH. RECALL	NONE	NONE
VEHICLE CALL MEMORY	NONE	YELLOW LOCK	NONE	NONE	NONE	YELLOW LOCK	NONE	NONE
DOUBLE ENTRY	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
WALK	— SEC.	— SEC.	— SEC.	7 SEC.	— SEC.	— SEC.	— SEC.	— SEC.
FLASHING DON'T WALK	— SEC.	— SEC.	— SEC.	24 SEC.	— SEC.	— SEC.	— SEC.	— SEC.
TYPE 3 LIMIT	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.
ALTERNATE EXTENSION	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.
ADD PER VEHICLE	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.
MAXIMUM INITIAL	— SEC.	34 SEC.	— SEC.	— SEC.	— SEC.	34 SEC.	— SEC.	— SEC.
MAXIMUM GAP	1.0 SEC.	7.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	7.0 SEC.	1.0 SEC.	1.0 SEC.
REDUCE 0.1 SEC. EVERY	— SEC.	1.5 SEC.	— SEC.	— SEC.	— SEC.	1.5 SEC.	— SEC.	— SEC.
MINIMUM GAP	1.0 SEC.	3.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	3.0 SEC.	1.0 SEC.	1.0 SEC.

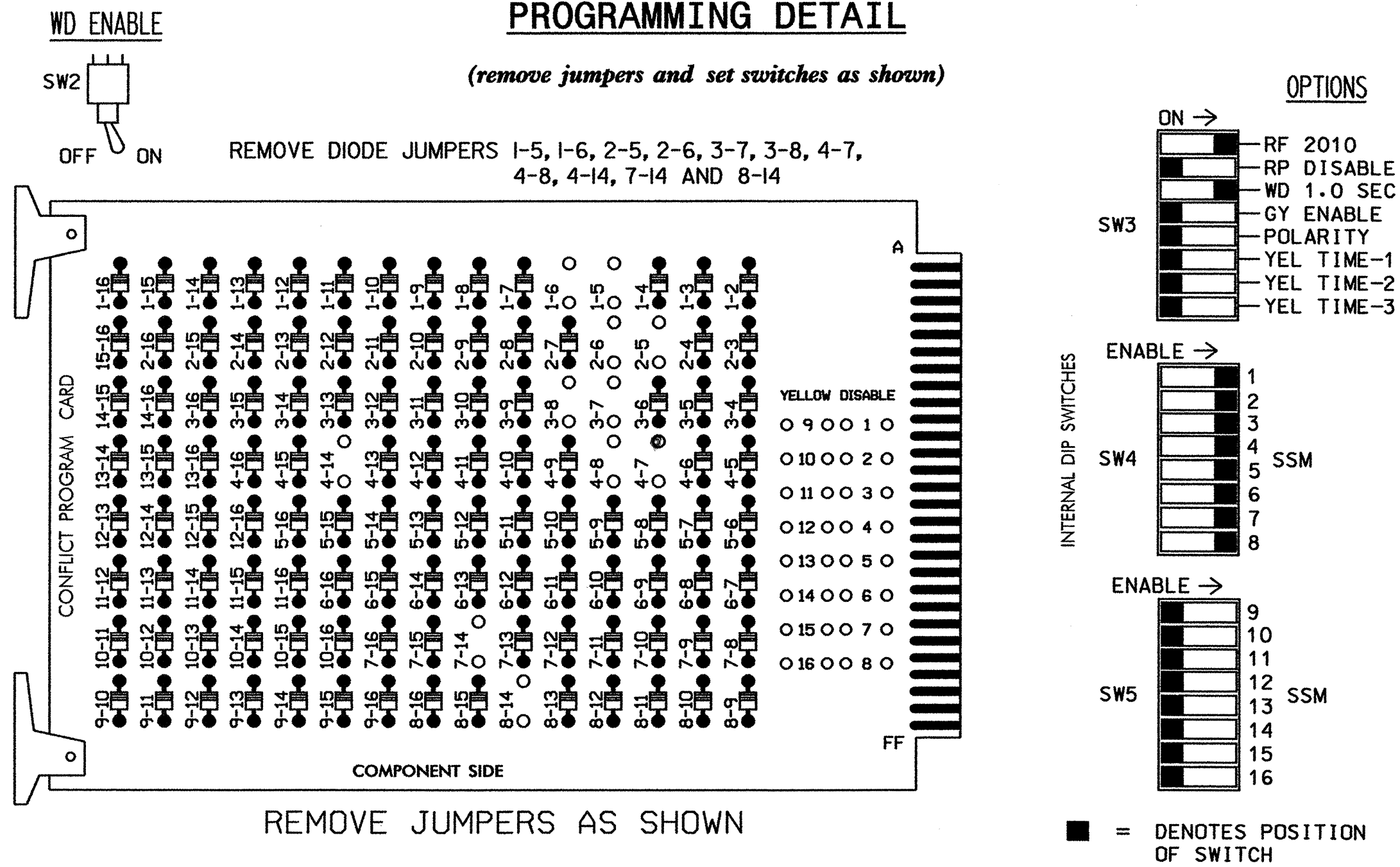
THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

SIGNAL UPGRADE - TEMPORARY DESIGN 1 - CONSTRUCTION PHASES 1, 2, & 3



EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL



NOTES

- TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN THE OUTPUT FILE. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
- ENSURE THAT RED ENABLE IS ACTIVE AT ALL TIMES DURING NORMAL OPERATION. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED RED MONITOR INPUTS 9,10, 11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT WITHIN THE CONTROLLER PROGRAMMING.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DOUBLE ENTRY.
- PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
- SET ALL DETECTION ZONES TO 'PRESENCE' MODE.

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

FIELD CONNECTION HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	61	21,22, 23	NU	23,81	41,42	P41, P42	21	61,62, 63	NU	41,63	81,82	NU	NU	NU	NU	NU	NU	NU
GREEN		130			103			136			109							
YELLOW		129			102			135			108							
RED	*	128		*	101		*	134		*	107							
RED ARROW																		
YELLOW ARROW	126			117			132			123								
GREEN ARROW	127			118			133			124								
							104											
							106											

NU = NOT USED

** SEE 'COUNTDOWN PEDESTRIAN SIGNAL OPERATION' NOTE THIS SHEET.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 170E
CABINETCONTRACTOR SUPPLIED 332
SOFTWAREBI TRANS 233NC2
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S3,S4,S4P,S5,S6,S7,S8
PHASES USED.....1,2,3,4,4PED,5,6,7,8
OVERLAPS.....NONE

BACK-UP PROTECTION NOTES

TO INSURE THAT THE CONTROLLER WILL NOT SEQUENCE FROM PHASE 2 DIRECTLY TO PHASE 1, OR FROM PHASE 6 DIRECTLY TO PHASE 5, OR FROM PHASE 4 DIRECTLY TO PHASE 3, OR FROM PHASE 8 DIRECTLY TO PHASE 7, SPECIAL PROGRAMMING HAS TO BE ENABLED IN THE BI TRANS 233NC2 SOFTWARE. PROGRAM 170E CONTROLLER AS FOLLOWS:

1. PROGRAM PHASES 1, 3, 5 & 7 AS PROTECTED/PERMITTED AT KEYPAD INPUT E/125+E+4=Ø1, 3, 5, 7

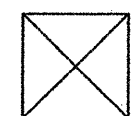
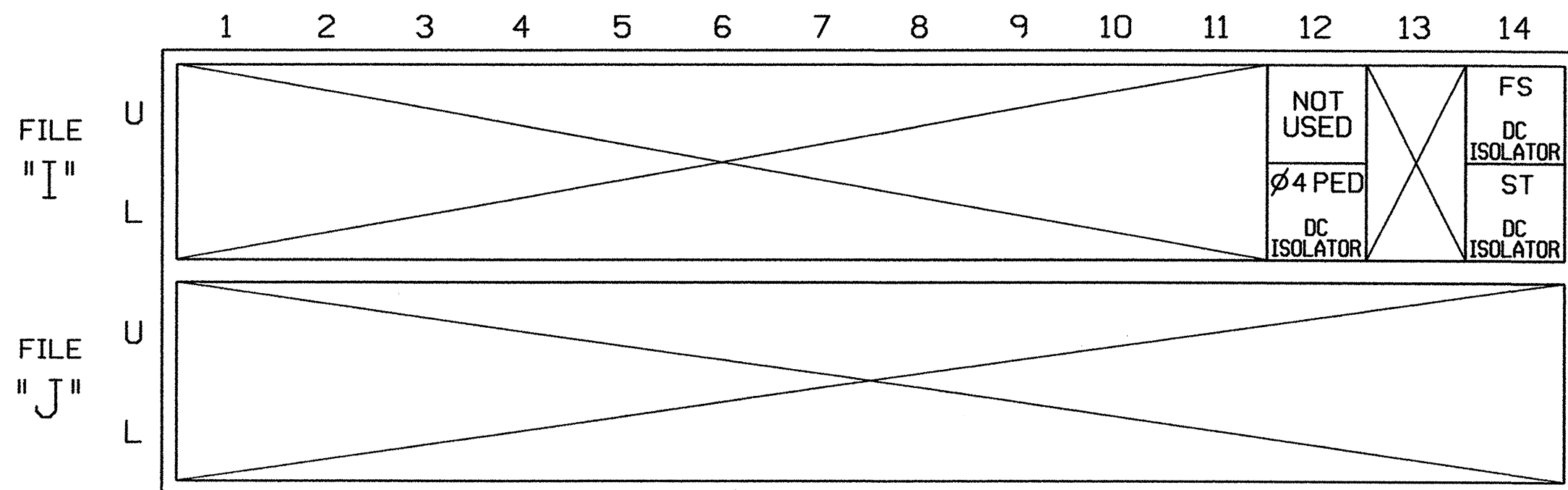
2. ZONES '1A' AND '5A' WILL HAVE TO BE PROGRAMMED TO CALL PHASE 4 (WITH APPROPRIATE DELAY TIME) TO ALLOW CONTROLLER TO SEQUENCE THRU PHASE 4 BEFORE PROCEEDING TO PHASES 1 AND/OR 5. (SEE MACHINE VISION ZONES DETECTION CHART ON SIGNAL DESIGN PLAN).

PEDESTRIAN PHASE PROGRAMMING

PROGRAM PEDESTRIAN 4P OUTPUT AT KEYPAD INPUT E/125+F+7=Ø4.

INPUT FILE POSITION LAYOUT

(front view)



= SEE 'SPECIAL DETECTOR NOTES' THIS SHEET

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTES

INSTALL A MACHINE VISION DETECTION SYSTEM FOR VEHICLE DETECTION. INSTALLATION TO BE DONE IN ACCORDANCE WITH MANUFACTURER'S DIRECTIONS AND NCDOT ENGINEER-APPROVED MOUNTING LOCATIONS IN ORDER TO ACCOMPLISH THE DETECTION SCHEMES SHOWN IN MACHINE VISION ZONES DETECTION CHART ON THE SIGNAL DESIGN PLAN.

THE MACHINE VISION DETECTION SYSTEM MUST BE COMPATIBLE WITH 170 CONTROLLER EQUIPMENT.

SET ALL DETECTION ZONES TO 'PRESENCE' MODE.

PEDESTRIAN PUSH-BUTTON CONNECTION & PROGRAMMING

PED PUSH BUTTONS	TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
P41, P42	TB8-5,6	I12L	--	69	2	4PED

INPUT FILE POSITION LEGEND: I12L

FILE I
SLOT 12
LOWER

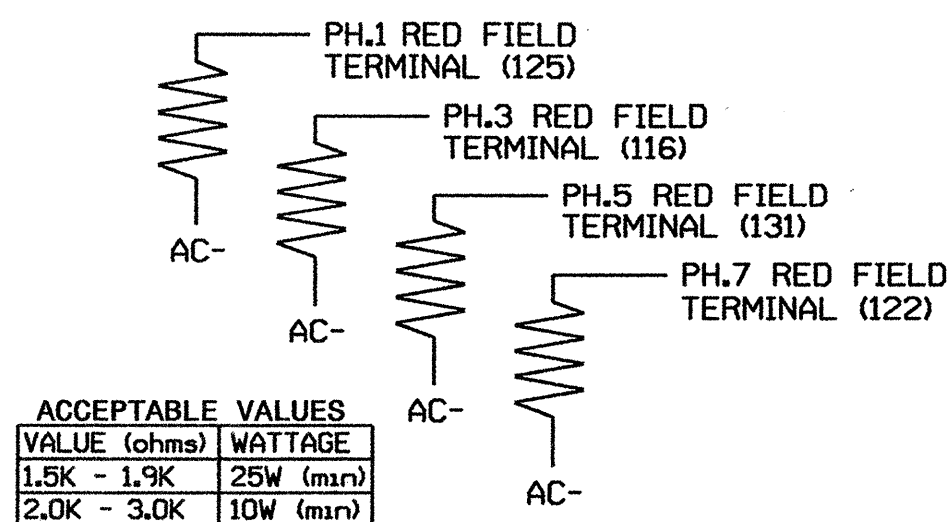
DETECTOR ATTRIBUTES LEGEND:

1-FULL TIME DELAY
2-PED CALL
3-RESERVED
4-COUNTING
5-EXTENSION
6-TYPE 3
7-CALLING
8-ALTERNATE

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

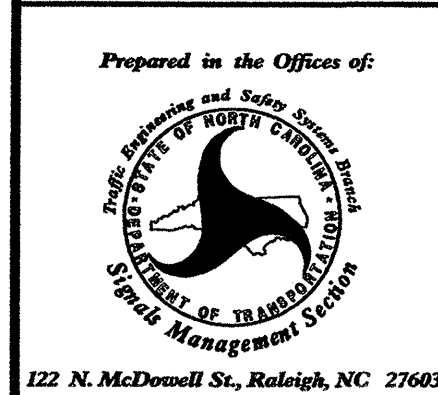
Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

LOAD RESISTOR INSTALLATION DETAIL



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

ELECTRICAL AND PROGRAMMING DETAILS FOR:



NC 54
at
SR 1999 (DAVIS DRIVE)

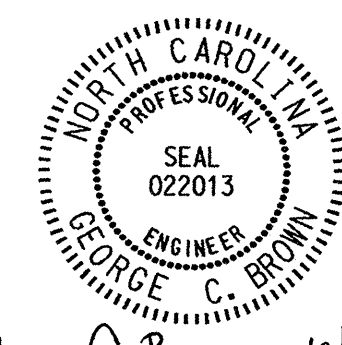
DIVISION 05 DURHAM COUNTY DURHAM

PLAN DATE: MAY 2006 REVIEWED BY: T. J. J.

PREPARED BY: F.E. RUSS REVIEWED BY:

REVISIONS INIT. DATE

SEAL



SIGNATURE DATE
SIG. INVENTORY NO. 05-0927T1

8 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

1. Refer to "Roadway Standard Drawings WCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Reposition existing signal heads 21, 22, 41, 61 and 81.
4. Program all timing information into phase bank 1, 2, and 3 unless otherwise noted.
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. Set all detector zones to presence mode.
8. Renumber existing signal head 22 to 21, 23 to 22, 42 to 41 and 62 to 61.

LEGEND

PROPOSED	EXISTING

MACHINE VISION ZONES DETECTION CHART																
170 CONTROLLER																
DETECTION ZONES			DETECTOR PROGRAMMING													
			NEMA PHASE	TIMING		ATTRIBUTES								STATUS		
						1	2	3	4	5	6	7	8			
ZONE NO.	SIZE (ft.)	DIST. FROM STOPBAR (ft.)		DELAY	CARRY (STRETCH)	PULL TIME DOWN	DO NOT PUSH IN CALL	RESERVED	COUNT	EXTENSION	TYPE 3	CALLING	ATTENUATE	SYSTEM LOOPS	NEW	EXISTING
1A	6X60	0	1	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X
2A	6X6	300	2	- SEC.	- SEC.	-	-	-	X	X	-	X	-	-	-	X
2B	6X6	300	2	- SEC.	- SEC.	-	-	-	X	X	-	X	-	-	-	X
3A	6X60	0	3	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X
3B	6X60	0	3	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X
4A	6X6	420	4	- SEC.	4.0 SEC.	-	-	-	-	X	-	-	-	-	-	X
4B	6X60	0	4	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X
5A	6X60	0	5	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X
5B	6X60	0	5	15 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X
5C	6X60	0	5	15 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X
6A	6X6	300	6	- SEC.	- SEC.	-	-	-	X	X	-	X	-	-	-	X
6B	6X6	300	6	- SEC.	- SEC.	-	-	-	X	X	-	X	-	-	-	X
7A	6X60	0	7	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X
7B	6X60	0	7	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X
8A	6X6	420	8	- SEC.	4.0 SEC.	-	-	-	-	X	-	-	-	-	-	X
8B	6X6	420	8	- SEC.	4.0 SEC.	-	-	-	-	X	-	-	-	-	-	X
8C	6X60	0	8	0 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X
8D	6X60	0	8	10 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X
8E	6X40	0	8	10 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X
P41, P42	N/A	N/A	4	- SEC.	- SEC.	-	X	-	-	-	-	-	-	-	-	X

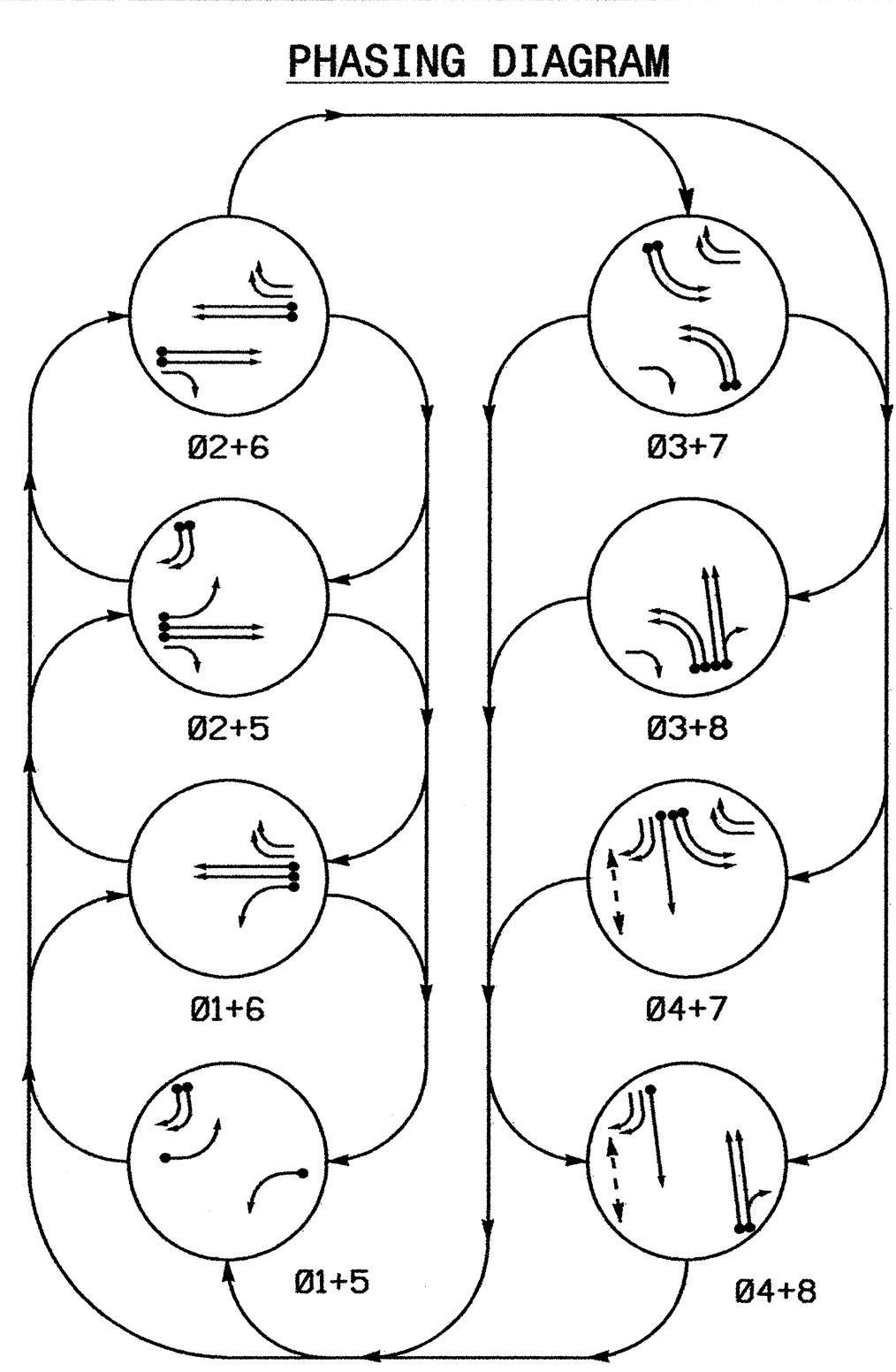
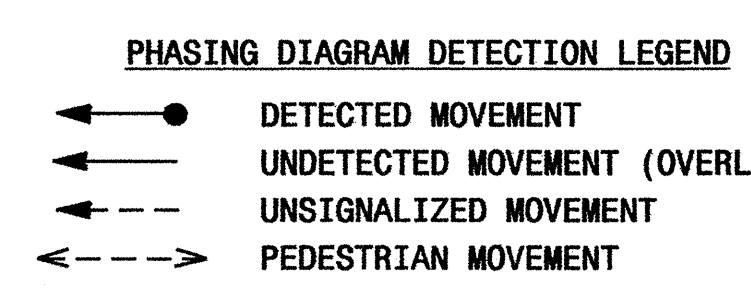
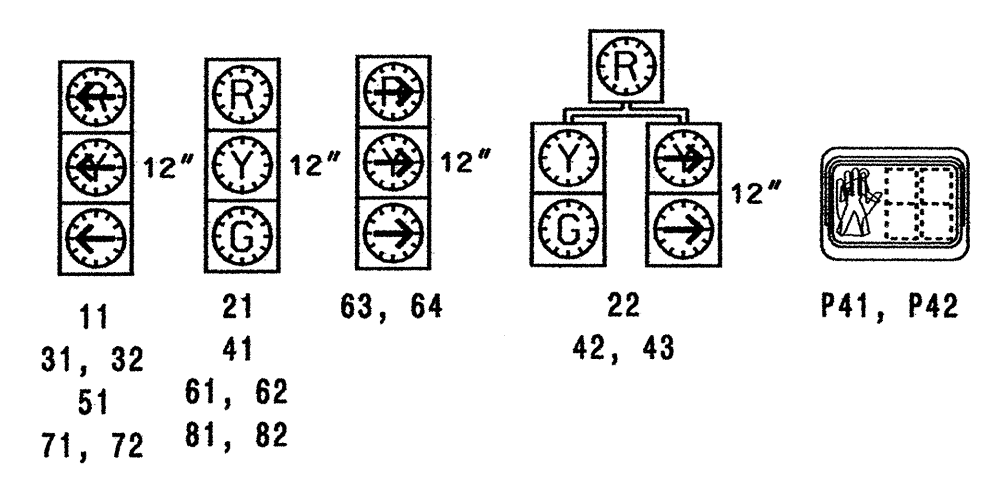


TABLE OF OPERATION									
SIGNAL FACE	PHASE								FLASH
	01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	
11	-	-	-	-	-	-	-	-	-
21	R	R	G	G	R	R	R	R	Y
22	R	R	G	G	R	R	R	R	Y
31, 32	R	R	R	R	-	-	-	-	-
41	R	R	R	R	R	R	G	G	R
42, 43	R	R	R	R	R	R	G	G	R
51	-	-	-	-	-	-	-	-	-
61, 62	R	G	R	G	R	R	R	R	Y
63, 64	R	R	R	R	-	-	-	-	-
71, 72	R	R	R	R	R	R	G	G	R
81, 82	R	R	R	R	R	G	R	G	R
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DRK

* SEE NOTE #2

SIGNAL FACE I.D.

Denotes L.E.D.



TIMING CHART 170 CONTROLLER									
PHASE	01	02	03	04	05	06	07	08	0L1
MINIMUM INITIAL	7 SEC.	12 SEC.	7 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.	7 SEC.	0 SEC.
VEHICLE EXTENSION	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.	N/A SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.3 SEC.	3.0 SEC.	5.3 SEC.	3.0 SEC.	4.3 SEC.	3.0 SEC.	5.1 SEC.	4.3 SEC.
RED CLEARANCE	3.7 SEC.	2.2 SEC.	4.4 SEC.	1.7 SEC.	4.2 SEC.	2.4 SEC.	4.5 SEC.	1.5 SEC.	2.4 SEC.
MAXIMUM LIMIT	20 SEC.	90 SEC.	20 SEC.	40 SEC.	20 SEC.	90 SEC.	20 SEC.	40 SEC.	N/A SEC.
RECALL POSITION	NONE	VEH. RECALL	NONE	NONE	NONE	VEH. RECALL	NONE	NONE	N/A
VEHICLE CALL MEMORY	NONE	YELLOW LOCK	NONE	NONE	NONE	YELLOW LOCK	NONE	NONE	N/A
DOUBLE ENTRY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	N/A
WALK	- SEC.	- SEC.	- SEC.	7 SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	27 SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TYPE 3 LIMIT	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ALTERNATE EXTENSION	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ADD PER VEHICLE	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAXIMUM INITIAL	- SEC.	34 SEC.	- SEC.	- SEC.	- SEC.	34 SEC.	- SEC.	- SEC.	- SEC.
MAXIMUM GAP	1.0 SEC.	7.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	7.0 SEC.	1.0 SEC.	1.0 SEC.	- SEC.
REDUCE 0.1 SEC EVERY	- SEC.	1.5 SEC.	- SEC.	- SEC.	- SEC.	1.5 SEC.	- SEC.	- SEC.	- SEC.
MINIMUM GAP	1.0 SEC.	3.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	3.0 SEC.	1.0 SEC.	1.0 SEC.	- SEC.

THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

SIGNAL UPGRADE - TEMPORARY DESIGN 2 - CONSTRUCTION PHASE 4

122 N. McDowell St., Raleigh, NC 27603

NC 54
AT
SR 1999 (DAVIS DRIVE)

DIVISION 5 DURHAM COUNTY DURHAM

PLAN DATE: APRIL 2006 REVIEWED BY: Z. LITTLE

PREPARED BY: C. PIERCE REVIEWED BY: D. ISHAK

REVISIONS INIT. DATE

SEAL

SIGNATURE DATE

SIG. INVENTORY NO. 05-092712

8 PHASE
FULLY ACTUATED
(DURHAM SIGNAL SYSTEM)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 or phase 5 may be lagged.
- Phase 3 or phase 7 may be lagged.
- Set all detector units to presence mode.
- Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
- Set phase bank 3 maximum limit to 250 seconds for phases used.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Program for SCATS traffic adaptive operation.

VIDEO ZONE DETECTION CHART
170 CONTROLLER AND CABINET

DETECTION ZONES					DETECTOR PROGRAMMING														
					NEMA PHASE	TIMING		ATTRIBUTES										STATUS	
								1	2	3	4	5	6	7	8	SYSTEM	LOOPS	NEW	EXISTING
ZONE NO.	SIZE (ft.)	DIST. FROM STOPBAR (ft.)	NEW	EXISTING	DELAY	CARRY (STRETCH)	FULL TIME DELAY	PEDESTRIAN CALL	RESERVED	COUNT	EXTENSION	TYPE 3	CALLING	ALTERNATE					
1A	6X15	0	X	-	1	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
1B	6X15	0	X	-	1	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
1C	6X15	0	X	-	1	15** SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
1D	6X15	0	X	-	1	15** SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
2A	6X15	0	X	-	2	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
2B	6X15	0	X	-	2	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
3A	6X15	0	X	-	3	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
3B	6X15	0	X	-	3	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
4A	6X15	0	X	-	4	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
4B	6X15	0	X	-	4	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
5A	6X15	0	X	-	5	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
5B	6X15	0	X	-	5	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
5C	6X15	0	X	-	5	15** SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
5D	6X15	0	X	-	5	15** SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-	
6A	6X15	0	X	-	6	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
6B	6X15	0	X	-	6	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
7A	6X15	0	X	-	7	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
7B	6X15	0	X	-	7	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
8A	6X15	0	X	-	8	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
8B	6X15	0	X	-	8	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	
P41, P42	N/A	N/A	-	X	4	- SEC.	- SEC.	-	X	-	-	-	-	-	-	-	-	X	
P61, P62	N/A	N/A	X	-	6	- SEC.	- SEC.	-	X	-	-	-	-	-	-	-	X	-	

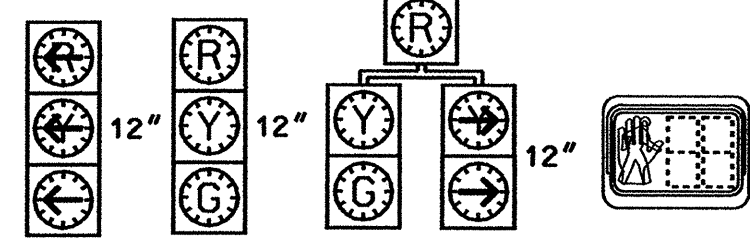
METAL POLE #2
STA. -L- 312+47 +/-
69' RT. +/-

** PROGRAM DELAY IN CONTROLLER, NOT IN DETECTOR

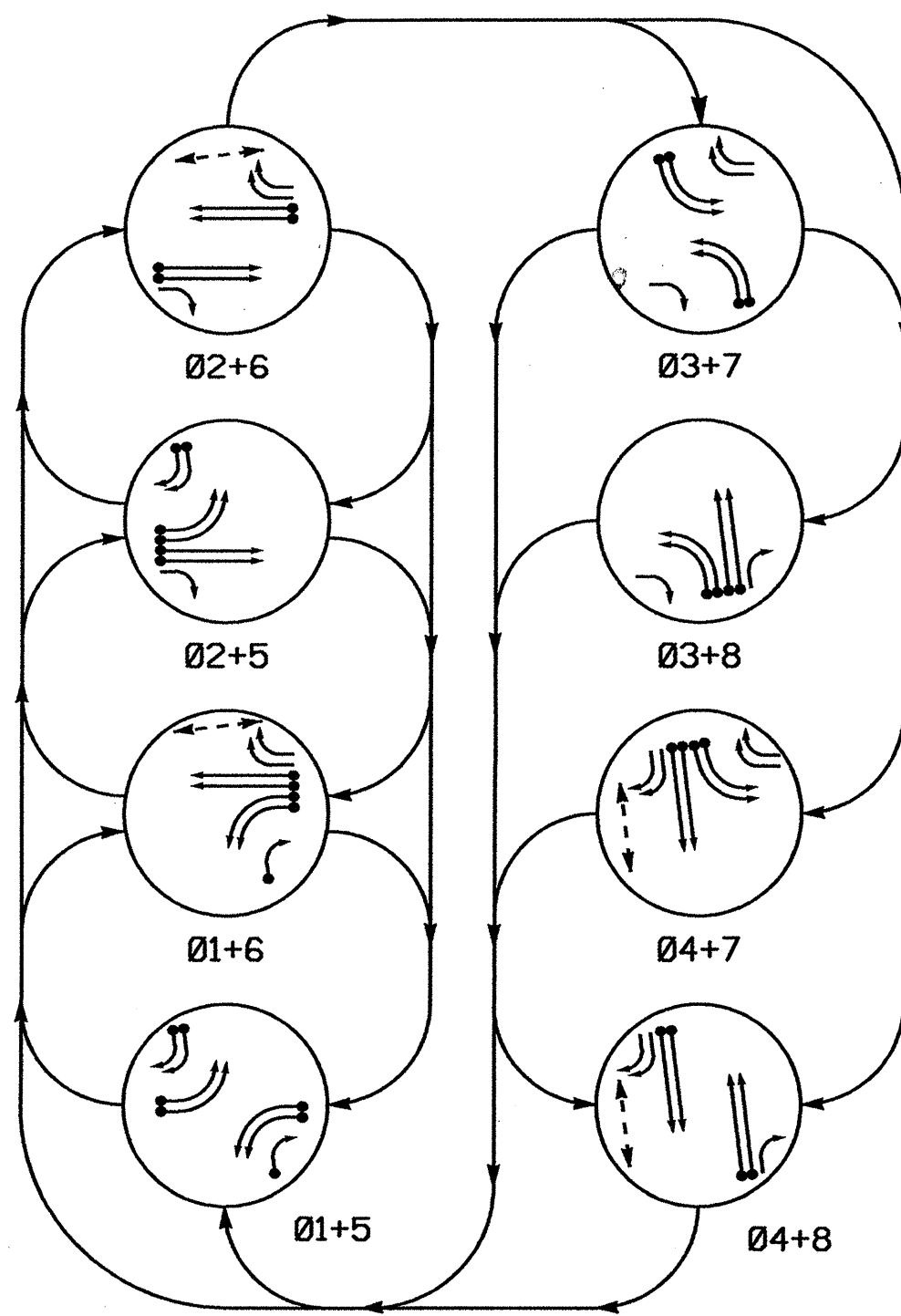
METAL POLE #3
STA. -L- 310+58 +/-
92' RT. +/-METAL POLE #4
STA. -L- 310+39 +/-
62' LT. +/-METAL POLE #1
STA. -L- 311+95 +/-
116' LT. +/-

SIGNAL FACE I.D. *SEE NOTE #2

Denotes L.E.D.

11, 12 21 22
31, 32 41 42, 43
51, 52 61, 62 63, 64
71, 72 81 82
P41, P42
P61, P62

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TIMING CHART
170 CONTROLLER

PHASE	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	ØL1
MINIMUM INITIAL	7 SEC.	12 SEC.	7 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.	7 SEC.	0 SEC.
VEHICLE EXTENSION	1.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	1.0 SEC.	N/A SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.3 SEC.	3.0 SEC.	4.9 SEC.	3.0 SEC.	4.3 SEC.	3.0 SEC.	4.7 SEC.	4.3 SEC.
RED CLEARANCE	3.7 SEC.	2.3 SEC.	4.0 SEC.	2.1 SEC.	4.4 SEC.	2.5 SEC.	4.1 SEC.	2.0 SEC.	2.4 SEC.
MAXIMUM LIMIT	20 SEC.	90 SEC.	20 SEC.	40 SEC.	20 SEC.	90 SEC.	20 SEC.	40 SEC.	N/A SEC.
RECALL POSITION	NONE	VEH. RECALL	NONE	NONE	NONE	VEH. RECALL	NONE	NONE	N/A
VEHICLE CALL MEMORY	NONE	YELLOW LOCK	NONE	NONE	NONE	YELLOW LOCK	NONE	NONE	N/A
DOUBLE ENTRY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	N/A
WALK	- SEC.	- SEC.	- SEC.	7 SEC.	- SEC.	7 SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	22 SEC.	- SEC.	25 SEC.	- SEC.	- SEC.	- SEC.
TYPE 3 LIMIT	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ALTERNATE EXTENSION	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ADD PER VEHICLE	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAXIMUM INITIAL	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MAXIMUM GAP	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
REDUCE 0.1 SEC. EVERY	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
MINIMUM GAP	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.

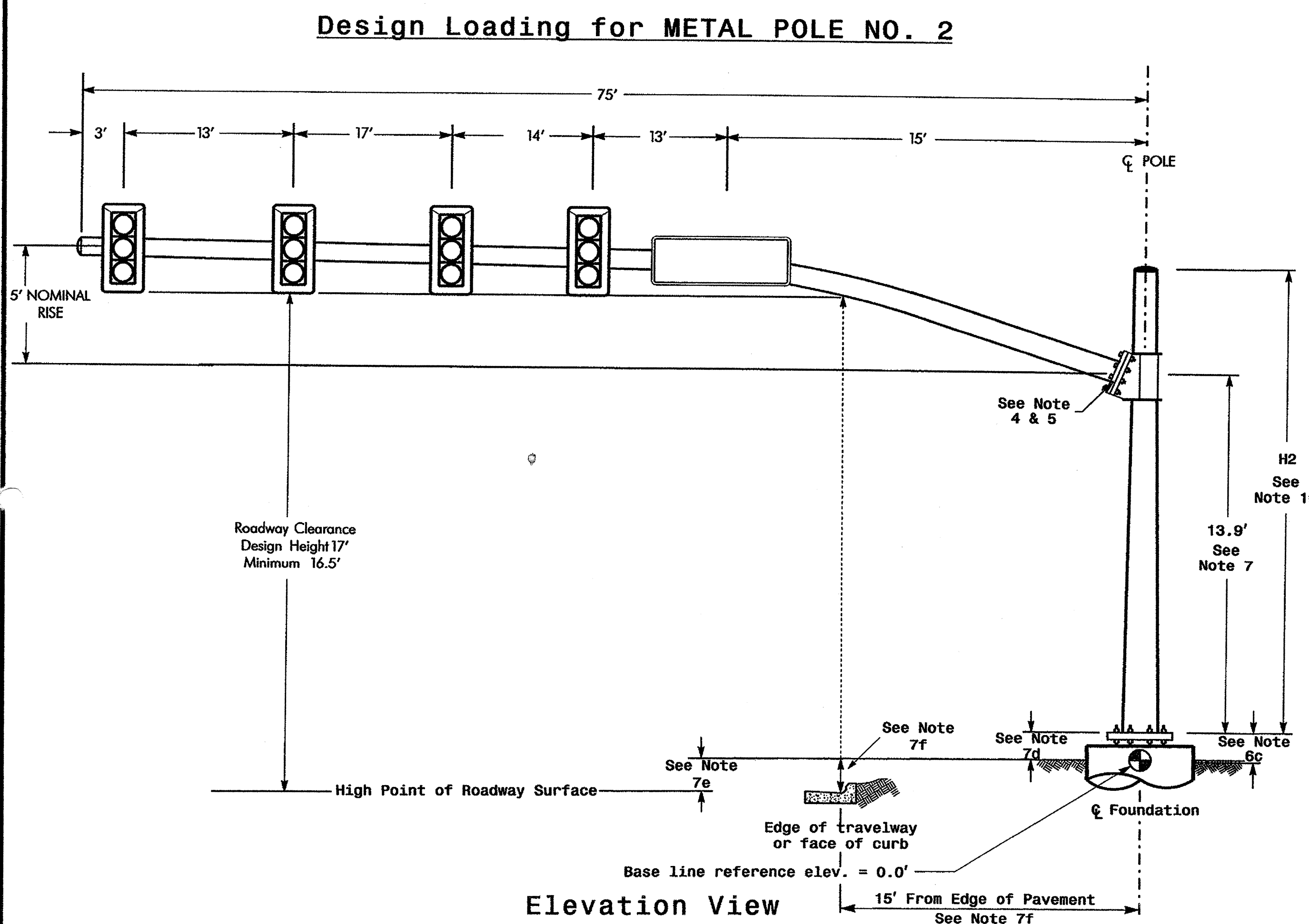
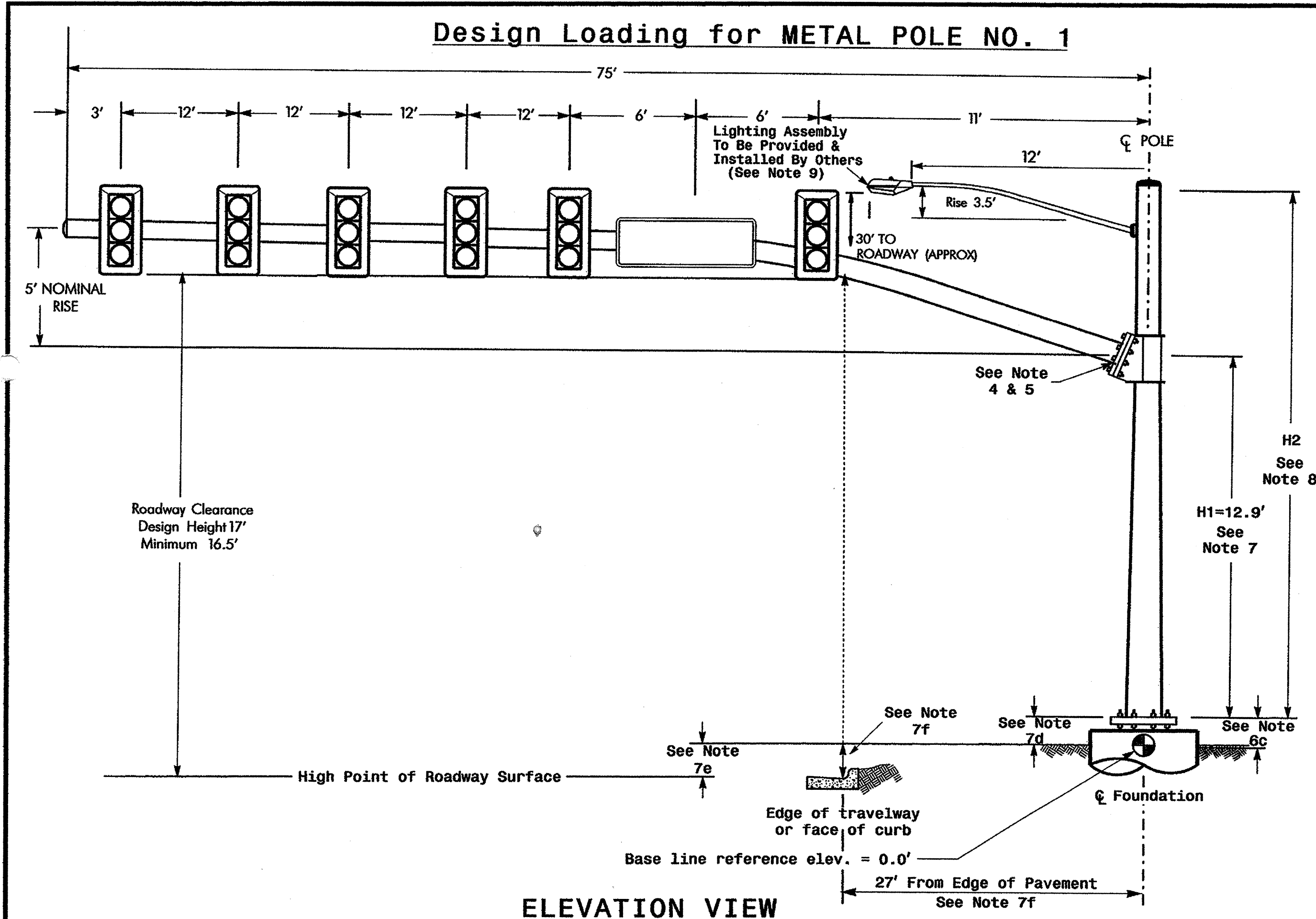
THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

LEGEND

- | PROPOSED | EXISTING |
|--|----------|
| Traffic Signal Head | N/A |
| Modified Signal Head | N/A |
| Sign | N/A |
| Pedestrian Signal Head With Push Button & Sign | N/A |
| Metal Pole with Mastarm | N/A |
| Video Detection Zone | N/A |
| Controller & Cabinet | N/A |
| Pull Box | N/A |
| Directional Drill | N/A |
| Right of Way with Marker | N/A |
| Directional Arrow | N/A |
| Pavement Marking Arrow | N/A |
| Overhead Street Sign | N/A |

SIGNAL UPGRADE - FINAL DESIGN

NC 54 AT SR 1999 (DAVIS DRIVE)		SEAL	
DIVISION 5 DURHAM COUNTY		DURHAM	
PLAN DATE: APRIL 2006	REVIEWED BY: Z. LITTLE	SEAL	
PREPARED BY: C. PIERCE	REVIEWED BY: D. ISHAK	SEAL	
REVISIONS	INIT.	DATE	
SIGNATURE		DATE	
SIG. INVENTORY NO. 05-0927			

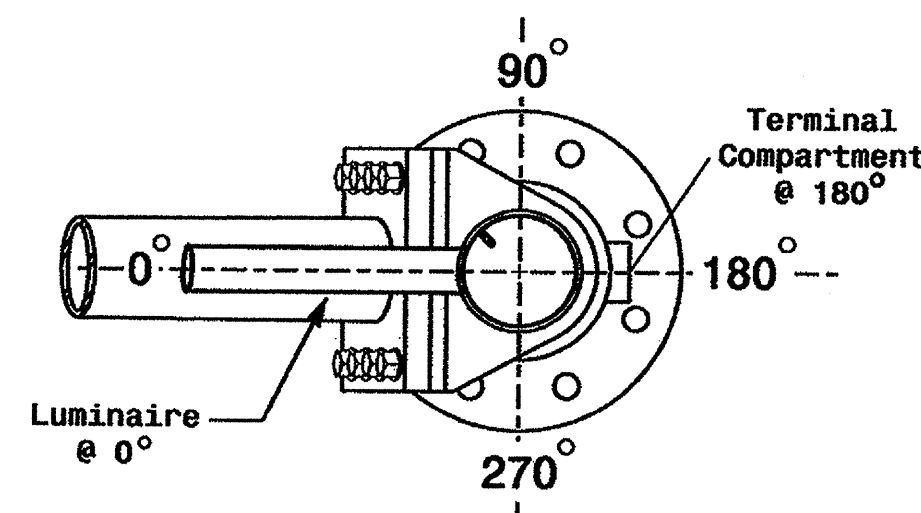


SPECIAL NOTE

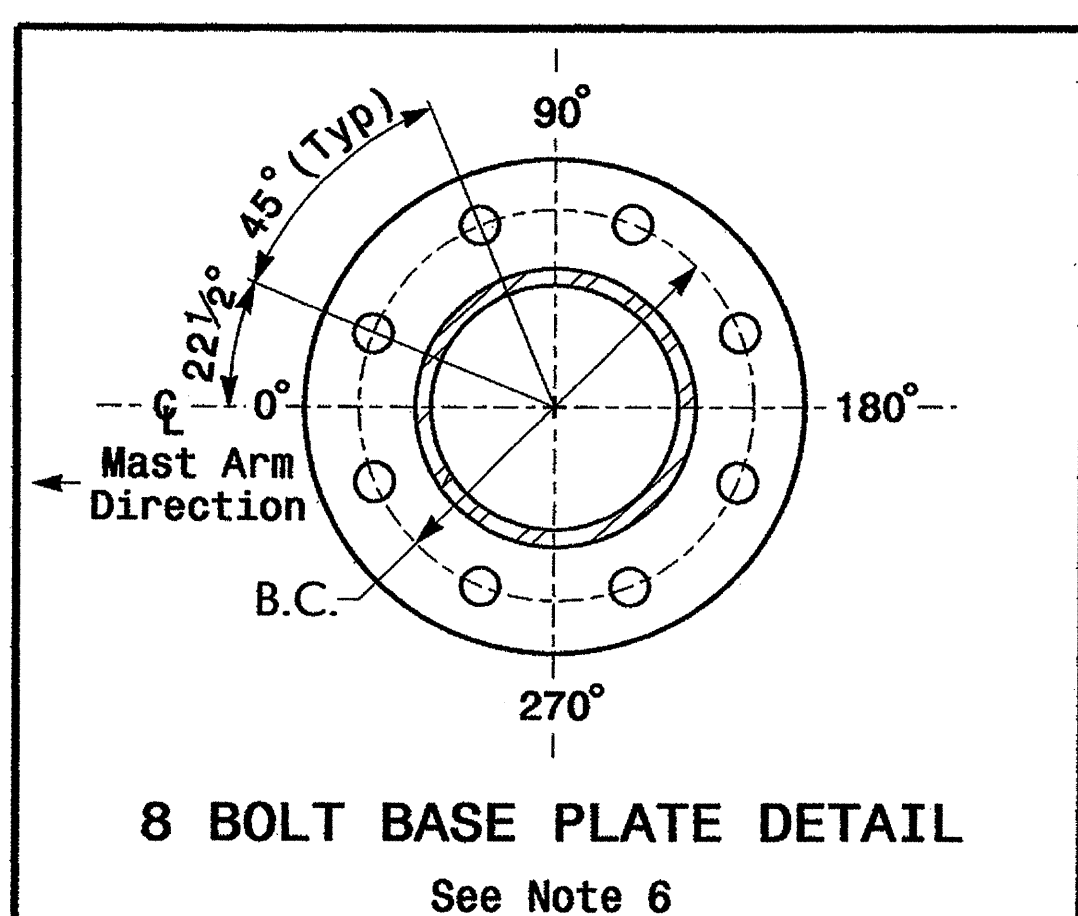
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

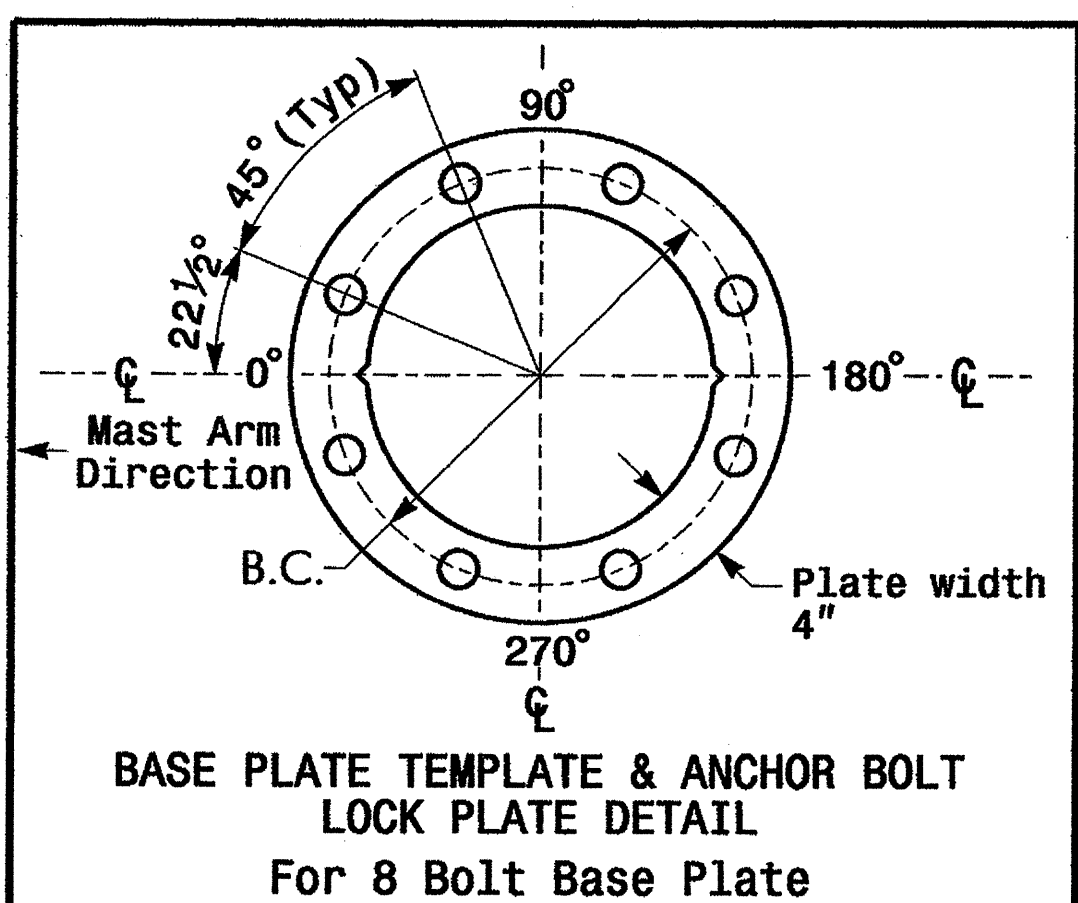
Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at Foundation @ ground level	+/-0.0 ft.	+/-0.0 ft.
Elevation difference at High point of roadway surface	0.6 ft.	-0.3 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.



POLE RADIAL ORIENTATION



See Note 6



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

METAL POLE No. 1 and 2

PROJECT REFERENCE NO.	SHEET NO.
U-4026	Sig.57

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
	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS
	OVERHEAD STREET NAME SIGN	16.0 S.F.	24" W X 96" L	30 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 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2006 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website:
<http://www.ncdot.org/doh/preconstruct/traffic/tmssu/ws/mpoles/poles.htm>

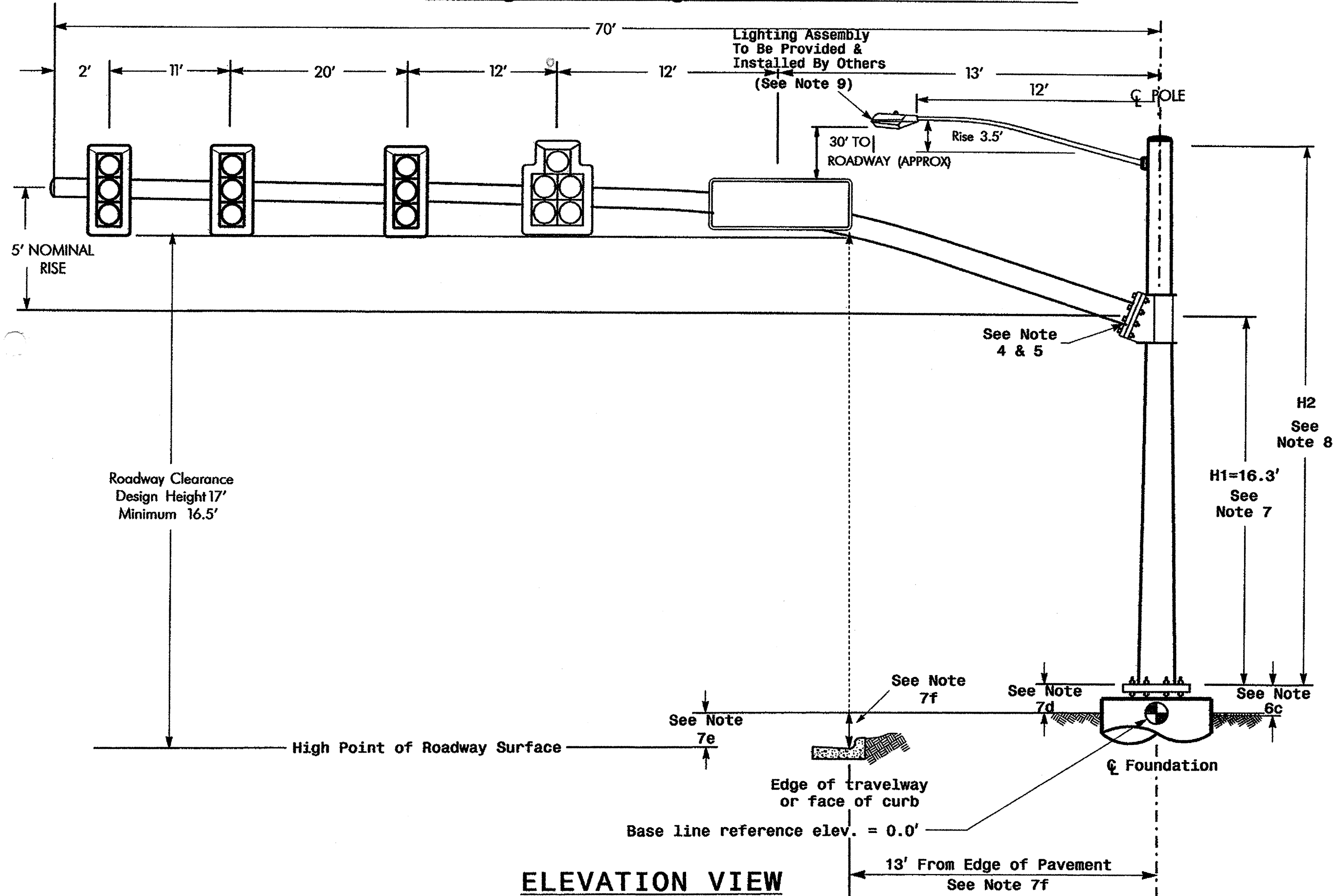
Design Requirements

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. 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.
5. 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 60 inch anchor bolts.
7. The mast arm attachment height (H1) shown is based on the following design assumptions:
 - a. Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - c. The roadway clearance height for design is as shown in the elevation views.
 - d. The top of the pole base plate is .75 feet above the ground elevation.
 - e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - f. Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
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. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
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 4 (90 mph)

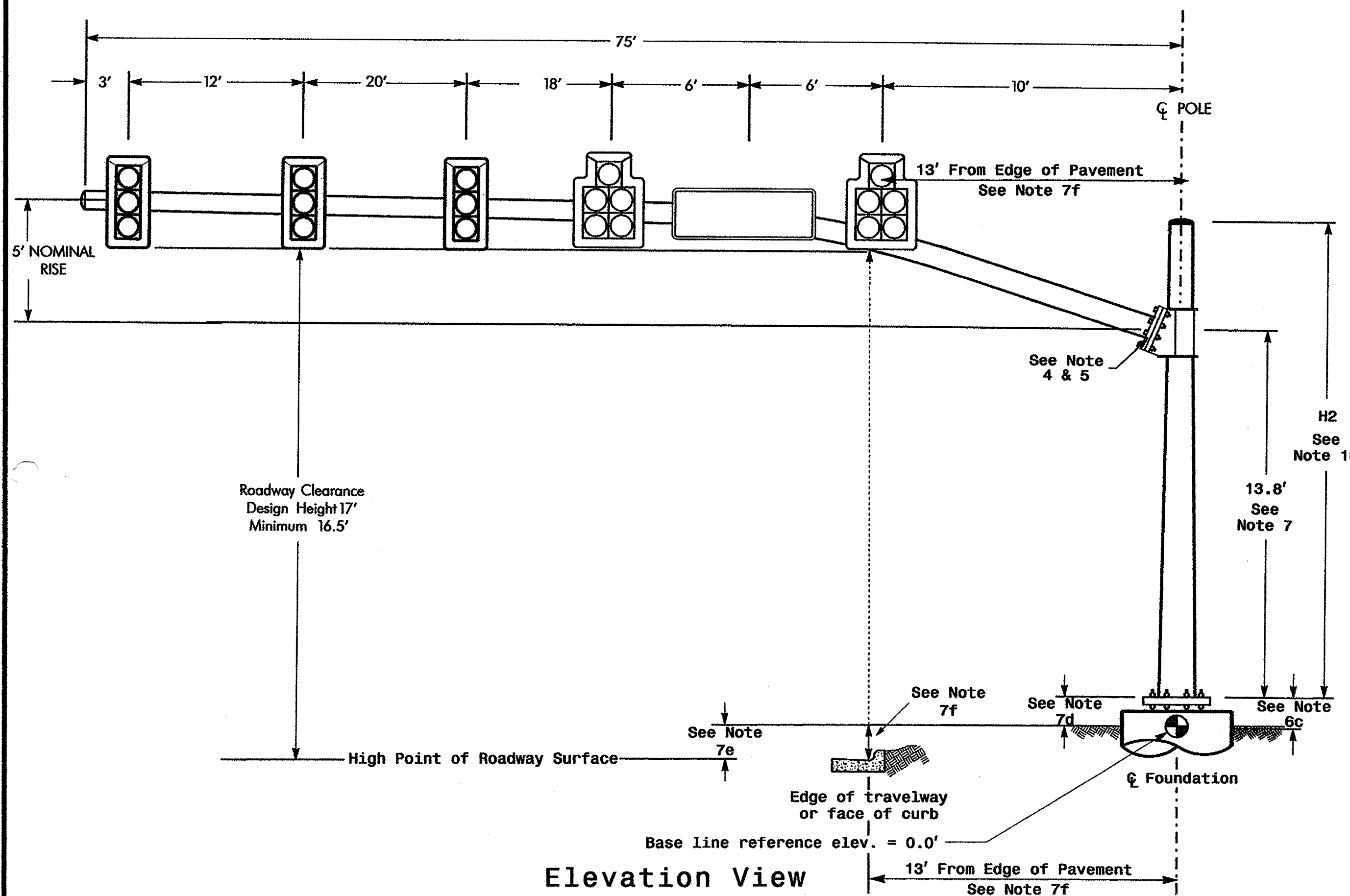
Prepared in the Office of:  122 N. McDowell St., Raleigh, NC 27603	NC 54 AT SR 1999 (DAVIS DRIVE)	 <i>R. E. Mullinax</i>																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">DIVISION 5</td> <td style="width: 33%;">WAKE COUNTY</td> <td style="width: 33%;">MORRISVILLE</td> </tr> <tr> <td>PLAN DATE: MARCH 2005</td> <td>REVIEWED BY: Z. LITTLE</td> <td></td> </tr> <tr> <td>PREPARED BY: C. PIERCE</td> <td>REVIEWED BY: D. ISHAK</td> <td></td> </tr> </table>			DIVISION 5	WAKE COUNTY	MORRISVILLE	PLAN DATE: MARCH 2005	REVIEWED BY: Z. LITTLE		PREPARED BY: C. PIERCE	REVIEWED BY: D. ISHAK																						
DIVISION 5	WAKE COUNTY	MORRISVILLE																														
PLAN DATE: MARCH 2005	REVIEWED BY: Z. LITTLE																															
PREPARED BY: C. PIERCE	REVIEWED BY: D. ISHAK																															
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">REVISIONS</td> <td style="width: 20%;">INIT.</td> <td style="width: 20%;">DATE</td> </tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>			REVISIONS	INIT.	DATE																											
REVISIONS	INIT.	DATE																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;"> SCALE  N/A </td> <td style="width: 40%;"> SIGNATURE _____ DATE _____ SIG. INVENTORY NO. 05-0927 </td> </tr> </table>			SCALE  N/A	SIGNATURE _____ DATE _____ SIG. INVENTORY NO. 05-0927																												
SCALE  N/A	SIGNATURE _____ DATE _____ SIG. INVENTORY NO. 05-0927																															

Design Loading for METAL POLE NO. 3



ELEVATION VIEW

Design Loading for METAL POLE NO. 4



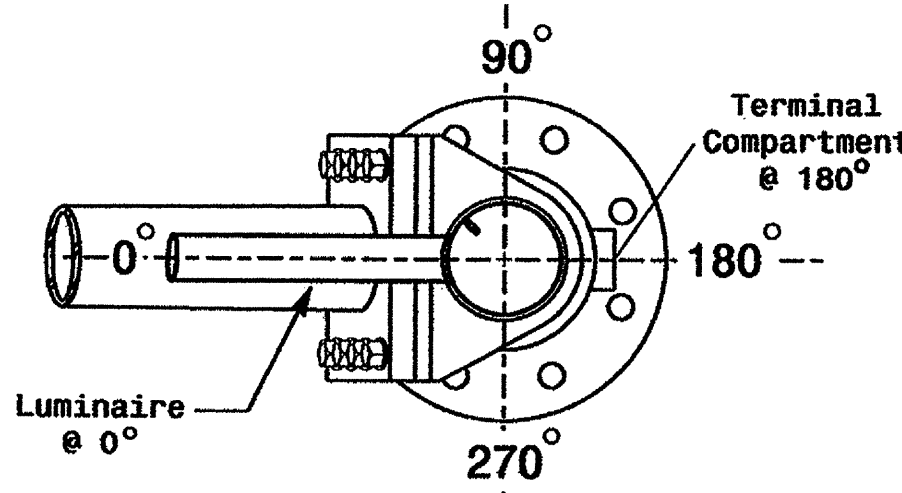
Elevation View

SPECIAL NOTE

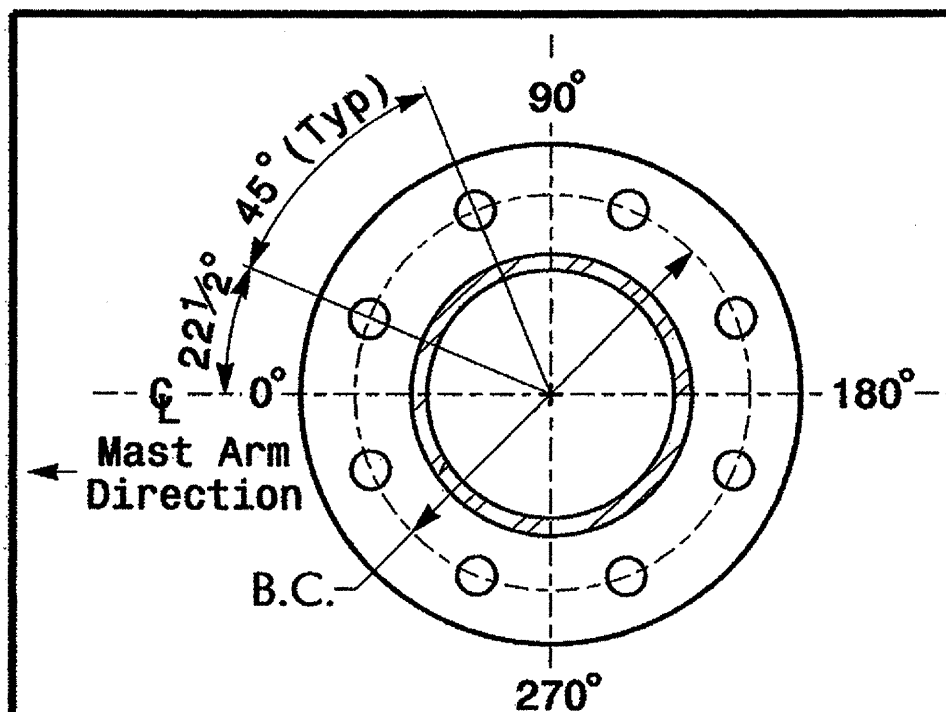
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

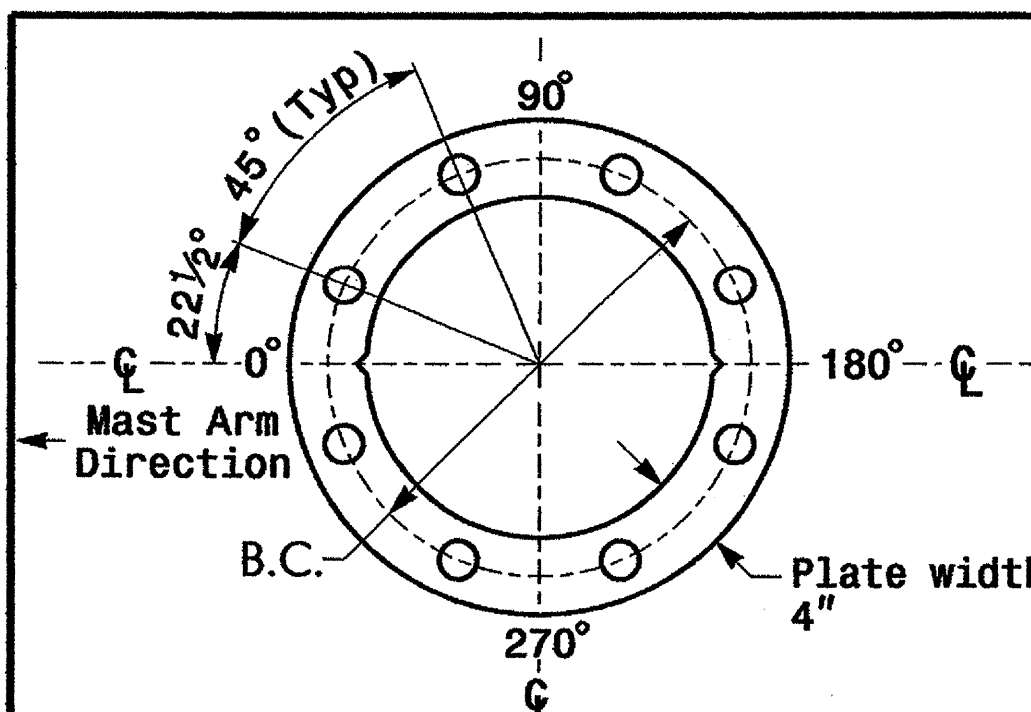
Elevation Differences for:	Pole 3	Pole 4
Baseline reference point at Foundation @ ground level	+/-0.0 ft.	+/-0.0 ft.
Elevation difference at High point of roadway surface	-2.7 ft.	-0.2 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.	+/-0.0 ft.



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 6



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

METAL POLE No. 3 and 4

PROJECT REFERENCE NO.	SHEET NO.
U-4026	58

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
	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS
	OVERHEAD STREET NAME SIGN	16.0 S.F.	24" W X 96" L	30 LBS

NOTES

Design Reference Material

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

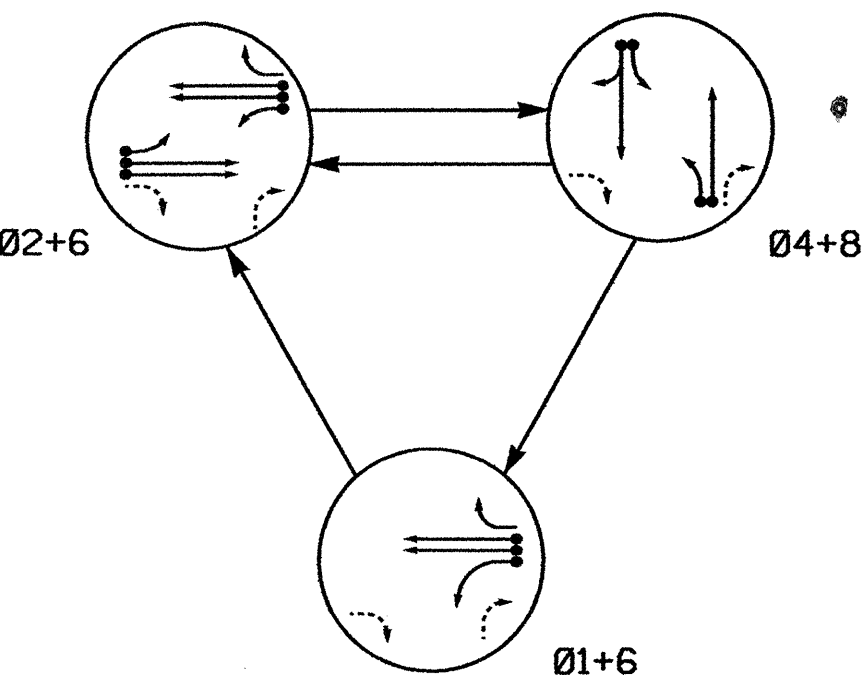
Design Requirements

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "Design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Maximum allowable CSR for all signal supports is 0.9.
- 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.
- The arm-to-pole attachment is a high strength connection. Use Direct Tension Indicators (ASTM F959) for each bolt.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is .75 feet above the ground elevation.
- Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
- Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
- The pole manufacturer will determine the total height (H2) of each pole based on the luminaire height requirement of 30 feet.
- 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.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signals & Geometrics Structural Engineer for assistance at (919) 733-3915.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

NCDOT Wind Zone 4 (90 mph)

Prepared in the Offices of: 122 N. McDowell St., Raleigh, NC 27603	NC 54 AT SR 1999 (DAVIS DRIVE)		SEAL SIG. INVENTORY NO. 05-0927
	DIVISION 5 WAKE COUNTY MORRISVILLE		
	PLAN DATE: MARCH 2005	REVIEWED BY: Z. LITTLE	
	PREPARED BY: C. PIERCE	REVIEWED BY: D. ISHAK	
SCALE: 0 N/A		REVISIONS	
DATE		DATE	

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

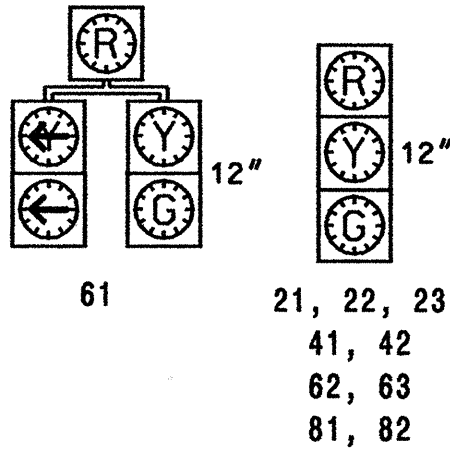
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

SIGNAL FACE	PHASE			
	Ø1 1 + 6	Ø2 2 + 6	Ø4 4 + 8	F* L E O D
21, 22, 23	R	G	R	Y
41, 42	R	R	G	R
61	G	G	R	Y
62, 63	G	G	R	Y
81, 82	R	R	G	R

* SEE NOTE #2

SIGNAL FACE I.D.

Denotes L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART
170 CONTROLLER AND CABINET

INDUCTIVE LOOPS					DETECTOR PROGRAMMING														
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW EXISTING	NEMA PHASE	TIMING		ATTRIBUTES								STATUS			
						DELAY	CARRY (STRETCH)	FULL TIME DELAY	1	2	3	4	5	6	7	8	SYSTEM LOOPS	NEW EXISTING	
1A	6X40	2-4-2	0	- X	6	3 SEC.	- SEC.	X	-	-	-	-	X	-	X	-	-	X	-
					4	15 SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	X	-
					4	15 SEC.	- SEC.	-	-	-	-	-	-	X	-	-	-	X	-
4A	6X60	2-4-2	0	X -	4	3 SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	X	-
4B	6X60	2-4-2	0	X -	4	10 SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	X	-
8A	6X60	2-4-2	0	- X	8	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	X	-
8B	6X60	2-4-2	0	- X	8	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	X	-
MICROWAVE DETECTION																			
2A	6X20	N/A	420	X -	2	- SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-
MICROLOOP DETECTORS																			
6A	N/A	N/A	300	- X	6	- SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-
6B	N/A	N/A	300	- X	6	- SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X	-

3 PHASE
FULLY ACTUATED
(ISOLATED)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Pavement markings are existing.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Program phase 1 as protected / permitted
- Program controller to clear from phase 2+6 to phase 1+6 by progressing through phase 4+8 (See Electrical Details).
- Set all detector units to presence mode.
- Install microwave detection to accomplish the detection scheme shown on the northbound Davis Drive approach.
- Splice lead-in for existing microloops (6A and 6B) in new pull box.
- If necessary, run signal cable and loop lead-in on new spans.
- Remove left arrow "ONLY" signs on northbound and eastbound mastarms.

LEGEND

PROPOSED	EXISTING

THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.

TIMING CHART
170 CONTROLLER

PHASE	Ø1	Ø2	Ø4	Ø6	Ø8
MINIMUM INITIAL	7 SEC.	14 SEC.	7 SEC.	14 SEC.	7 SEC.
VEHICLE EXTENSION	1.0 SEC.	6.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.2 SEC.	3.5 SEC.	5.2 SEC.	3.8 SEC.
RED CLEARANCE	2.3 SEC.	1.0 SEC.	2.1 SEC.	1.0 SEC.	2.0 SEC.
MAXIMUM LIMIT	30 SEC.	90 SEC.	30 SEC.	90 SEC.	30 SEC.
RECALL POSITION	NONE	VEH. RECALL	NONE	VEH. RECALL	NONE
VEHICLE CALL MEMORY	NONLOCK	YELLOW LOCK	NONLOCK	YELLOW LOCK	NONLOCK
DOUBLE ENTRY	OFF	OFF	ON	OFF	ON
WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TYPE 3 LIMIT	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ALTERNATE EXTENSION	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ADD PER VEHICLE	- SEC.	1.8 SEC.	- SEC.	1.8 SEC.	- SEC.
MAXIMUM INITIAL	- SEC.	46 SEC.	- SEC.	34 SEC.	- SEC.
MAXIMUM GAP	1.0 SEC.	7.0 SEC.	1.0 SEC.	7.0 SEC.	1.0 SEC.
REDUCE 0.1 SEC EVERY	- SEC.	1.0 SEC.	- SEC.	1.0 SEC.	- SEC.
MINIMUM GAP	1.0 SEC.	3.4 SEC.	1.0 SEC.	1.7 SEC.	1.0 SEC.

SIGNAL UPGRADE - TEMPORARY DESIGN 1 - CONSTRUCTION PHASES 1, 2, AND 3

SR 1999 (DAVIS DRIVE)
AT
I-40 EB RAMPS/PARK DRIVE

DIVISION 5 DURHAM COUNTY DURHAM

PLAN DATE: April 2006 REVIEWED BY: Zachary Little

PREPARED BY: L. Blount REVIEWED BY: Dounit Ishak

REVISIONS

SCALE 0 50' 1"=50'

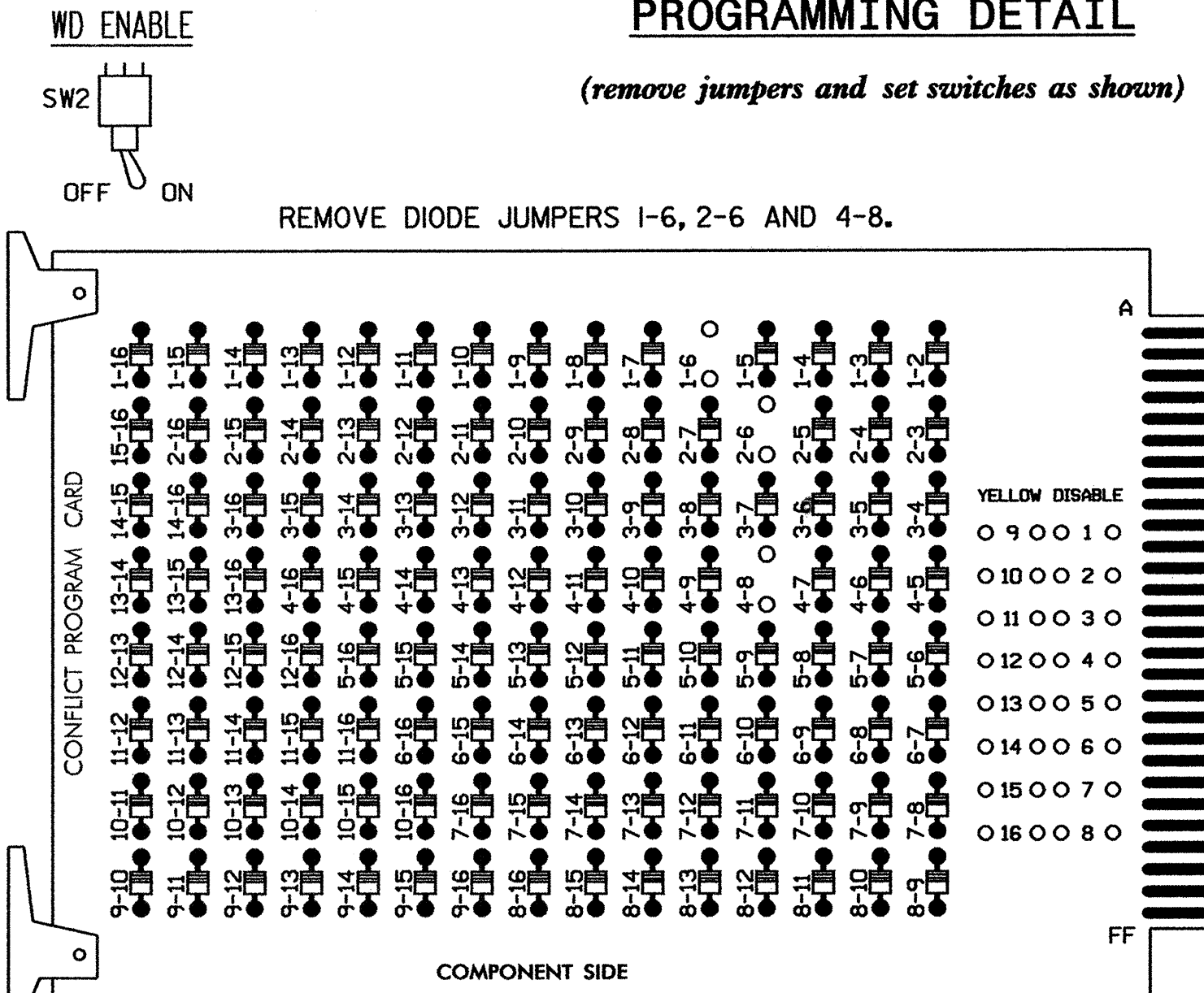
SIGNATURE DATE

SIG. INVENTORY NO. 05-147711

EDJ MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



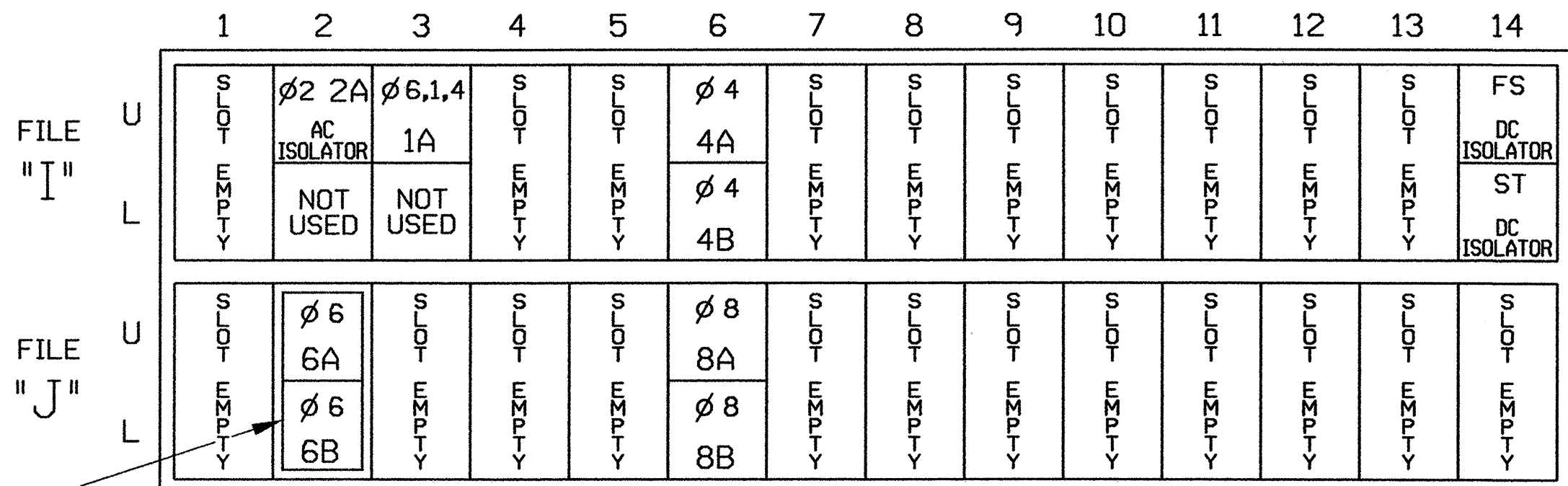
REMOVE JUMPERS AS SHOWN

NOTES:

- CARD IS PROVIDED WITH ALL DIODE JUMPERS IN PLACE. REMOVAL OF ANY JUMPER ALLOWS ITS CHANNELS TO RUN CONCURRENTLY.
- MAKE SURE JUMPERS SEL1-SEL5 ARE PRESENT ON THE MONITOR BOARD.

INPUT FILE POSITION LAYOUT

(front view)



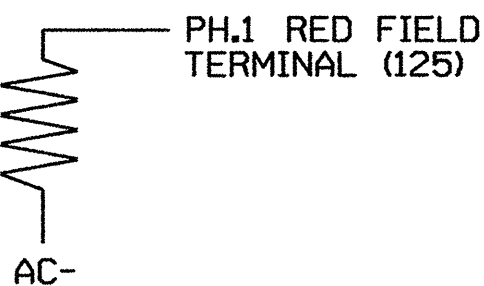
SEE NOTE 9 ABOVE

IMPORTANT!

FOR PROPER OPERATION OF THE MICROWAVE DETECTOR, REMOVE SURGE PROTECTION FROM TB2-5 AND TB2-6. TIE TB2-6 TO AC NEUTRAL. NOTE: IF THIS PROCEDURE IS NOT FOLLOWED, A DIRECT SHORT WILL OCCUR WHEN AC ISOLATOR CARD IS INSERTED INTO SLOT '12'.

LOAD RESISTOR INSTALLATION DETAIL

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

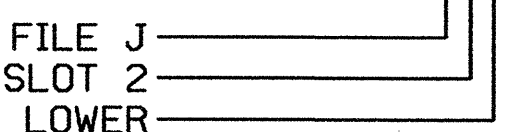


NOTE: THE PURPOSE OF THIS RESISTOR IS TO LOAD THE CHANNEL RED MONITOR INPUT IN ORDER FOR THE SIGNAL SEQUENCE MONITOR TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON THIS CHANNEL, WHICH DOES NOT USE THE RED DISPLAY IN THE FIELD.

DETECTOR ATTRIBUTES LEGEND:

- FULL TIME DELAY
- PED CALL
- RESERVED
- COUNTING
- EXTENSION
- TYPE 3
- CALLING
- ALTERNATE

INPUT FILE POSITION LEGEND: J2L



NOTES

- TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN THE OUTPUT FILE. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
- ENSURE THAT RED ENABLE IS ACTIVE AT ALL TIMES DURING NORMAL OPERATION. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED RED MONITOR INPUTS 3,5,7, 9,10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT WITHIN THE CONROLLER PROGRAMMING.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DOUBLE ENTRY.
- PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
- SET ALL DETECTOR UNITS TO 'PRESENCE' MODE.
- INSTALL A 3M CANOGA C800 SERIES DETECTOR FOR VEHICLE DETECTION ON PHASE 6, FOR TWO EXISTING 2-PROBE MICRO-LOOP STATIONS (LABELED '6A' & '6B') LOCATED AS SHOWN ON SIGNAL DESIGN PLAN. (PROBES ARE WIRED IN SERIES).
- IF AN APPROVED EQUIVALENT TO THE TC-26B PRESENCE MICROWAVE DETECTOR IS USED, DISREGARD THE WIRING DETAIL SHOWN ON THIS SHEET. FOLLOW MANUFACTURER'S INSTRUCTIONS. SENSOR MUST BE WIRED SO THAT INPUT INTERFACE IS ACHIEVED THRU ISOLATION CIRCUITRY.

EQUIPMENT INFORMATION

CONTROLLER.....CONTRACTOR SUPPLIED 170E
CABINETCONTRACTOR SUPPLIED 332
SOFTWAREBI TRANS 233NC2
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S4,S6,S8
PHASES USED.....1,2,4,6,8
OVERLAPS.....NONE

BACK-UP PROTECTION NOTES

TO INSURE THAT THE CONTROLLER WILL NOT SEQUENCE FROM PHASE 2+6 DIRECTLY TO PHASE I+6, SPECIAL PROGRAMMING HAS TO BE ENABLED IN THE BI TRANS 233NC2 SOFTWARE. PROGRAM I70E CONTROLLER AS FOLLOWS:

- PROGRAM PHASE I AS PROTECTED/PERMITTED AT KEYPAD INPUT E/125+E+4=Ø1
- LOOP '1A' WILL HAVE TO BE PROGRAMMED TO CALL PHASE 4 (WITH APPROPRIATE DELAY TIME) TO ALLOW CONTROLLER TO SEQUENCE THRU PHASE 4 BEFORE PROCEEDING TO PHASE I+6. (SEE INPUT FILE PROGRAMMING THIS SHEET).

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
1A	TB2-9,10	I3U	1	63	1 5 7	6
			2	63	5 7	1
			3	63	7	4
2A	**	I2U	4	39	4 5 7	2
4A	TB4-9,10	I6U	5	41	5 7	4
4B	TB4-11,12	I6L	6	45	5 7	4
6A *	TB3-5,6	J2U	7	40	4 5 7	6
6B *	TB3-7,8	J2L	8	44	4 5 7	6
8A	TB5-9,10	J6U	9	42	5 7	8
8B	TB5-11,12	J6L	10	46	5 7	8

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

* SEE NOTE 9 ABOVE

** MICROWAVE DETECTOR. SEE 'MICROWAVE DETECTOR WIRING DETAIL' THIS SHEET.

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

PROJECT REFERENCE NO.	SHEET NO.
U-4026	SIG. 60

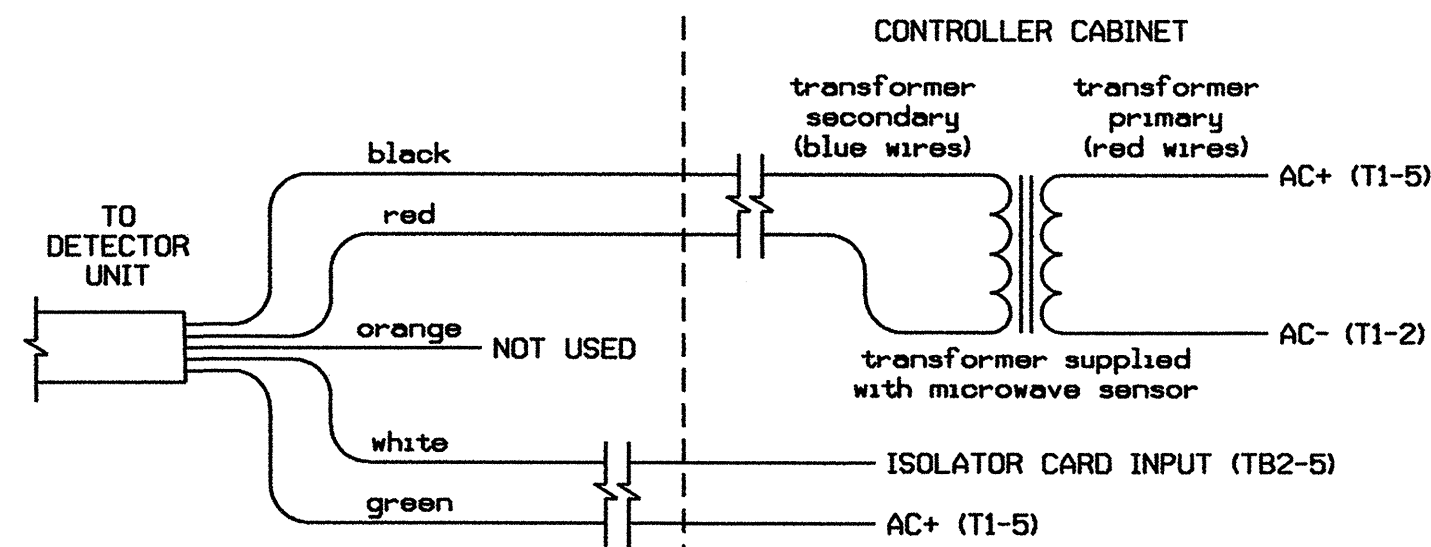
FIELD CONNECTION HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	61	21,22, 23	NU	NU	41,42	NU	NU	61,62, 63	NU	NU	81,82	NU
GREEN		130			103			136			109	
YELLOW		129			102			135			108	
RED	*	128			101			134			107	
RED ARROW												
YELLOW ARROW	126											
GREEN ARROW	127											

NU = NOT USED

MICROWAVE DETECTOR WIRING DETAIL

(wire as shown)



TC26B WIRE LIST

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

NOTES:

- SENSOR IS A MICROWAVE SENSORS, INC. MODEL TC-26B* MICROWAVE MOTION DETECTOR MOUNTED AS DIRECTED BY NCDOT ENGINEER. (AREA OF DETECTION LABELED '2A').
- CONFIGURE AC ISOLATOR CARD TO PLACE CALL UPON REMOVAL OF AC+ FROM THE INPUT. (INVERTED INPUT).
- IMPORTANT: FOR PROPER OPERATION OF THE MICROWAVE DETECTOR, REMOVE SURGE PROTECTION FROM TB2-5 & 6. TIE TB2-6 TO AC NEUTRAL.

*SEE NOTE 10 UNDER 'NOTES' AT TOP, CENTER THIS SHEET

THIS ELECTRICAL DETAIL IS FOR THE
TEMPORARY SIGNAL DESIGN: 05-1477T1
DESIGNED: APRIL 2006
SEALED: 31 MAY 2006
REVISED: N/A

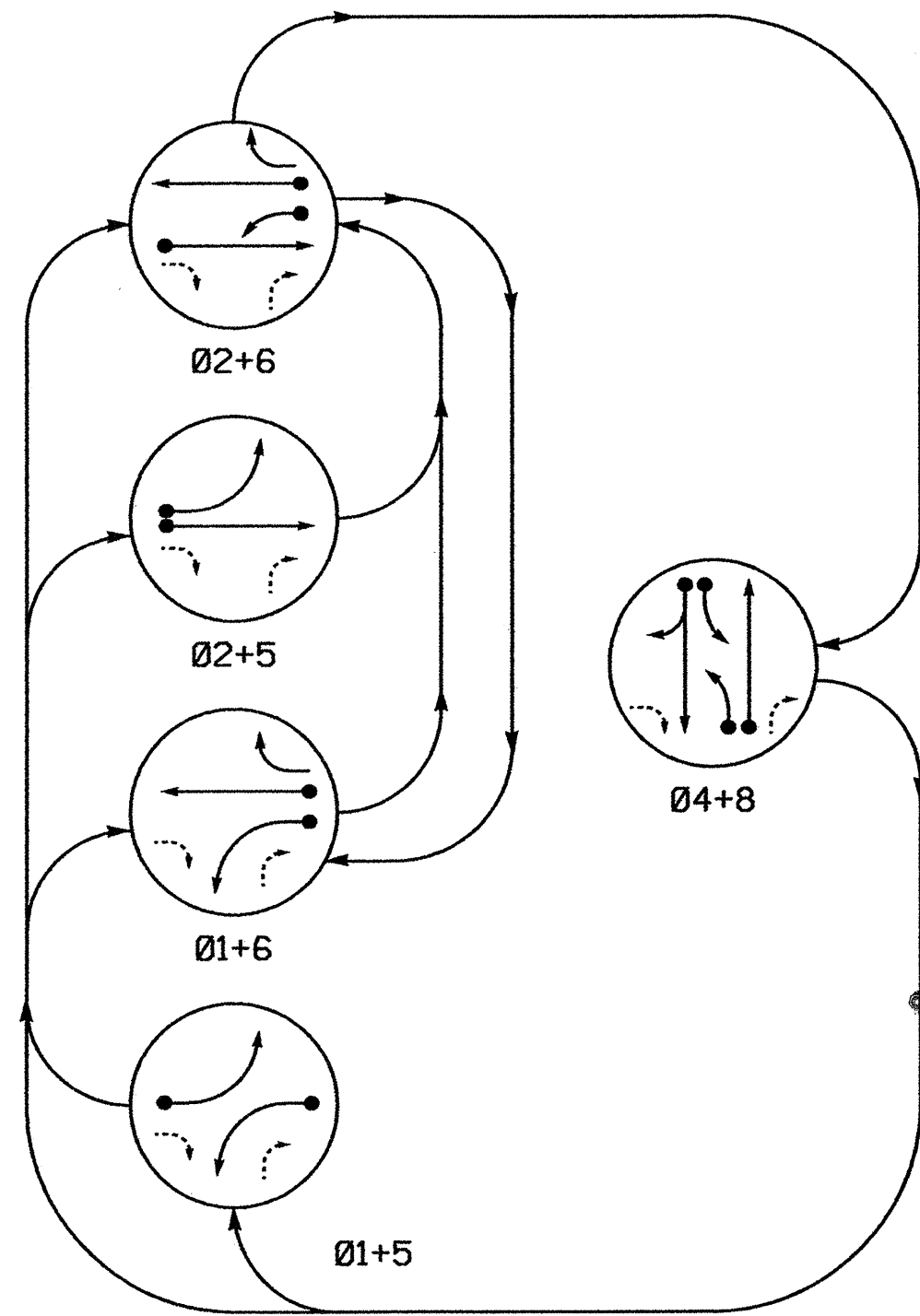
TYPE 170 CONTROLLER & 332 CABINET

THIS DETAIL SUPERSEDES DETAIL DATED
AUGUST 2004 AND SEALED 9/3/04

TEMPORARY DESIGN 1 - CONSTRUCTION PHASES 1, 2, AND 3

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared in the Office of: 122 N. McDowell St., Raleigh, NC 27603	SR 1999 (DAVIS DRIVE) at I-40 EB RAMPS/PARK DRIVE		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER GEORGE C. BROWN
	DIVISION 05 DURHAM COUNTY DURHAM		
	PLAN DATE: MAY 2006	REVIEWED BY: T. J. J.	
	PREPARED BY: F.E. RUSS	REVIEWED BY:	
REVISIONS		INIT.	DATE
SIGNATURE		DATE	
SIG. INVENTORY NO. 05-1477T1			

PHASING DIAGRAM

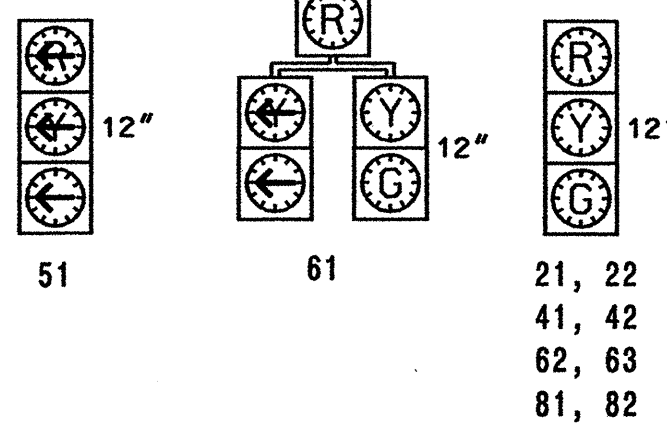


SIGNAL FACE	PHASE					
	Ø 1+5	Ø 1+6	Ø 2+5	Ø 2+6	Ø 4+8	F*ASH
21, 22	R	R	G	G	R	Y
41, 42	R	R	R	R	G	R
51	-	R	-	R	-	R
61	R	G	R	G	R	Y
62, 63	R	G	R	G	R	Y
81, 82	R	R	R	R	G	R

* SEE NOTE #2

SIGNAL FACE I.D.

Denotes L.E.D.



LOOP & DETECTOR UNIT INSTALLATION CHART																					
INDUCTIVE LOOPS							DETECTOR PROGRAMMING														
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	TIMING		ATTRIBUTES								SYSTEM LOOPS	NEW	EXISTING		
									DELAY	CARRY (STRETCH)	FULL TIME DELAY (SEC.)	1	2	3	4	5				6	7
							PLANNING CALL	RESERVED													
1A	6X40	2-4-2	0	-	X	6	3 SEC.	- SEC.	X	-	-	-	X	-	X	-	-	-	X		
2A	6X6	6	420	X	-	2	- SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	X		
4A	6X60	2-4-2	0	-	X	4	3 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X		
4B	6X60	2-4-2	0	-	X	4	10 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X		
5A	6X60	2-4-2	0	X	-	4	- SEC.	SEC.	-	-	-	-	-	-	X	-	-	-	X		
						5	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X	-	
8A	6X60	2-4-2	0	-	X	8	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X		
8B	6X60	2-4-2	0	-	X	8	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	-	X		
MICROLOOP DETECTORS																					
6A	NOT USED IN THIS TEMPORARY DESIGN																				
6B	N/A	N/A	300	-	X	6	- SEC.	- SEC.	-	-	-	-	X	X	-	X	-	-	-	X	

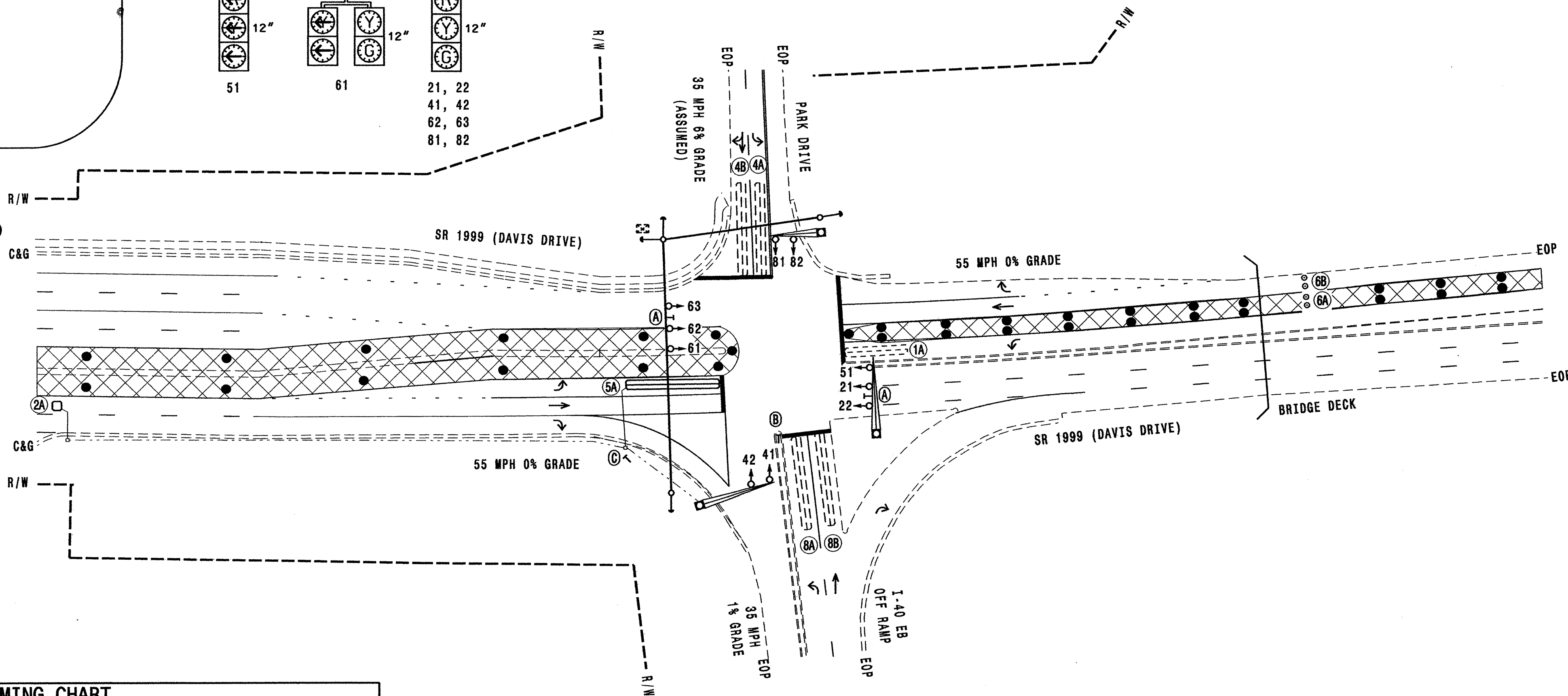
5 PHASE FULLY ACTUATED (ISOLATED)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Program phase 5 as protected / permitted.
- Program controller to clear from phase 2+6 to phase 2+5 by progressing through phase 4+8 (See Electrical Details).
- Set all detector units to presence mode.

PHASING DIAGRAM DETECTION LEGEND

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



LEGEND

PROPOSED	EXISTING
Traffic Signal Head	N/A
Modified Signal Head	N/A
Sign	N/A
Pedestrian Signal Head With Push Button & Sign	N/A
Pedestrian Signal Pedestal	N/A
Signal Pole with Guy	N/A
Signal Pole with Sidewalk Guy	N/A
Metal Pole with Mastarm	N/A
Inductive Loop Detector	N/A
Controller & Cabinet	N/A
Junction Box	N/A
2-in Underground Conduit	N/A
Right of Way with Marker	N/A
Directional Arrow	N/A
Pavement Marking Arrow	N/A
Overhead Street Sign	N/A
Keep Right Sign (R4-7A)	N/A
"YIELD" Sign (R1-2)	N/A
Construction Zone Drums	N/A
Construction Zone	N/A

THIS PLAN SUPERSEDES THE PREVIOUSLY ISSUED DESIGN SEALED 9/3/04.

TIMING CHART						
170 CONTROLLER						
PHASE	Ø1	Ø2	Ø4	Ø5	Ø6	Ø8
MINIMUM INITIAL	7 SEC.	14 SEC.	7 SEC.	7 SEC.	14 SEC.	7 SEC.
VEHICLE EXTENSION	1.0 SEC.	6.0 SEC.	1.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	5.2 SEC.	3.5 SEC.	3.0 SEC.	5.2 SEC.	3.8 SEC.
RED CLEARANCE	2.4 SEC.	1.0 SEC.	2.1 SEC.	3.1 SEC.	1.0 SEC.	2.1 SEC.
MAXIMUM LIMIT	30 SEC.	90 SEC.	30 SEC.	30 SEC.	90 SEC.	30 SEC.
RECALL POSITION	NONE	VEH. RECALL	NONE	NONE	VEH. RECALL	NONE
VEHICLE CALL MEMORY	NONLOCK	YELLOW LOCK	NONLOCK	NONLOCK	YELLOW LOCK	NONLOCK
DOUBLE ENTRY	OFF	OFF	ON	OFF	OFF	ON
WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
FLASHING DON'T WALK	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
TYPE 3 LIMIT	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ALTERNATE EXTENSION	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.	- SEC.
ADD PER VEHICLE	- SEC.	2.5 SEC.	- SEC.	- SEC.	2.5 SEC.	- SEC.
MAXIMUM INITIAL	- SEC.	46 SEC.	- SEC.	- SEC.	34 SEC.	- SEC.
MAXIMUM GAP	1.0 SEC.	15 SEC.	1.0 SEC.	1.0 SEC.	15 SEC.	1.0 SEC.
REDUCE 0.1 SEC EVERY	- SEC.	45 SEC.	- SEC.	- SEC.	45 SEC.	- SEC.
MINIMUM GAP	1.0 SEC.	3.4 SEC.	1.0 SEC.	1.0 SEC.	1.7 SEC.	1.0 SEC.

SIGNAL UPGRADE - TEMPORARY DESIGN 2 - CONSTRUCTION PHASE 4

SR 1999 (DAVIS DRIVE)
AT
I-40 EB RAMP/PARK DRIVE

DIVISION 5 DURHAM COUNTY DURHAM

PLAN DATE: April 2006 REVIEWED BY: Zachary Little

PREPARED BY: L. Blount REVIEWED BY: Dornit Ishak

REVISIONS

SCALE 1"=50'

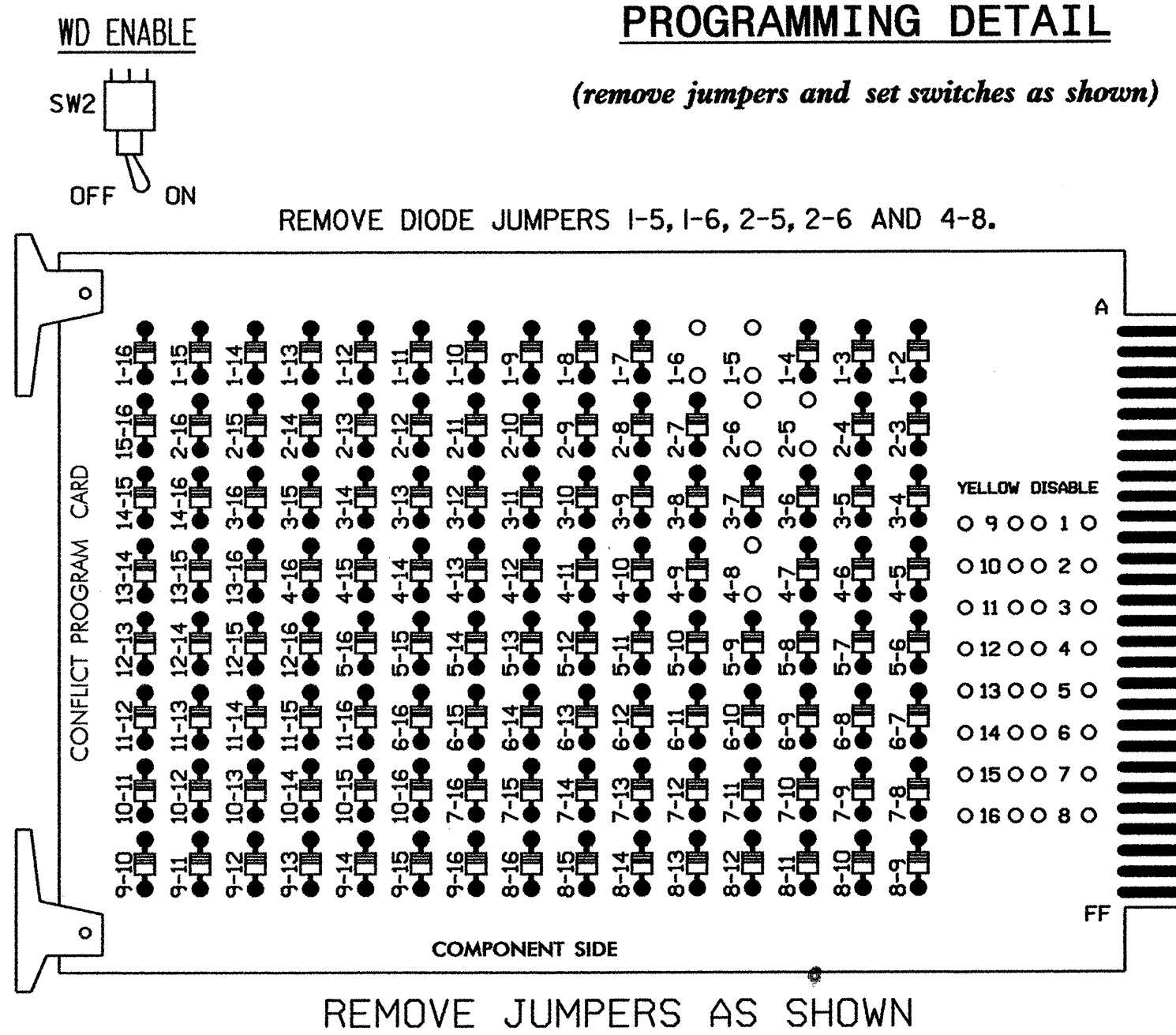
SIGNATURE DATE

SIG. INVENTORY NO. 05-147772

EDI MODEL 2010ECL CONFLICT MONITOR

PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

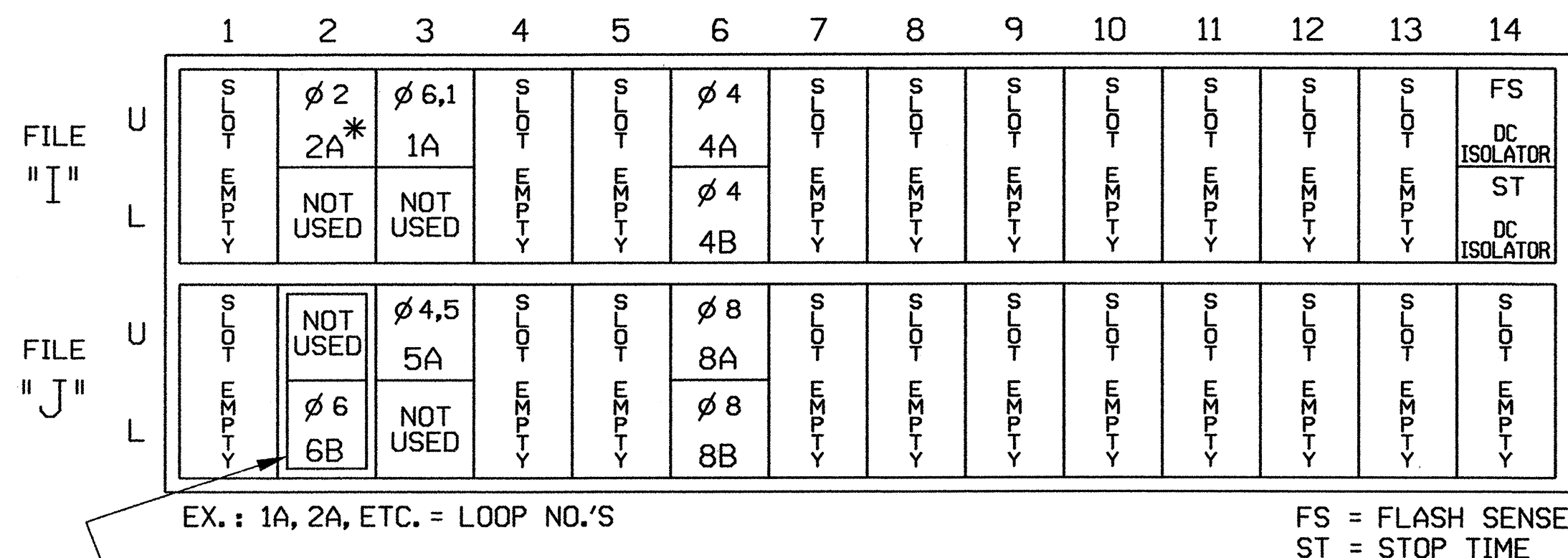


NOTES:

- CARD IS PROVIDED WITH ALL DIODE JUMPERS IN PLACE. REMOVAL OF ANY JUMPER ALLOWS ITS CHANNELS TO RUN CONCURRENTLY.
- MAKE SURE JUMPERS SEL1-SEL5 ARE PRESENT ON THE MONITOR BOARD.

INPUT FILE POSITION LAYOUT

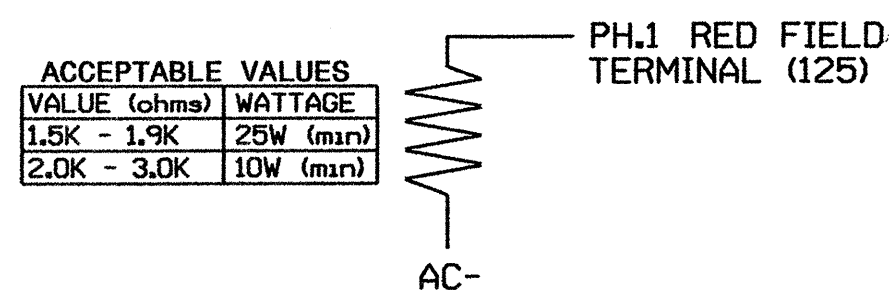
(front view)



* IMPORTANT!

! RE-INSTALL SURGE PROTECTION ON TB2-5 AND TB2-6.

LOAD RESISTOR INSTALLATION DETAIL



NOTE: THE PURPOSE OF THIS RESISTOR IS TO LOAD THE CHANNEL RED MONITOR INPUT IN ORDER FOR THE SIGNAL SEQUENCE MONITOR TO USE THE FULL SIGNAL SEQUENCE MONITORING CAPABILITY ON THIS CHANNEL, WHICH DOES NOT USE THE RED DISPLAY IN THE FIELD.

NOTES

- TO PREVENT "FLASH-CONFLICT" PROBLEMS, INSERT RED FLASH PROGRAM BLOCKS FOR ALL UNUSED VEHICLE LOAD SWITCHES IN THE OUTPUT FILE. VERIFY THAT SIGNAL HEADS FLASH IN ACCORDANCE WITH THE SIGNAL PLANS.
- ENSURE THAT RED ENABLE IS ACTIVE AT ALL TIMES DURING NORMAL OPERATION. TO PREVENT RED FAILURES ON UNUSED MONITOR CHANNELS, TIE UNUSED RED MONITOR INPUTS 3,7, 9,10,11,12,13,14,15 & 16 TO LOAD SWITCH AC+ PER THE CABINET MANUFACTURER'S INSTRUCTIONS.
- PROGRAM CONTROLLER TO START UP IN PHASES 2 AND 6 GREEN.
- SET POWER-UP FLASH TIME TO 10 SECONDS AND IMPLEMENT WITHIN THE CONTROLLER PROGRAMMING.
- ENABLE SIMULTANEOUS GAP-OUT FEATURE, ON CONTROLLER UNIT, FOR ALL PHASES.
- PROGRAM PHASES 4 AND 8, ON CONTROLLER UNIT, FOR DOUBLE ENTRY.
- PROGRAM PHASES 2 AND 6, ON CONTROLLER UNIT, FOR VOLUME DENSITY OPERATION.
- SET ALL DETECTOR UNITS TO 'PRESENCE' MODE.
- A 3M CANOGA C800 SERIES DETECTOR (INSTALLED UNDER TEMPORARY 1) REMAINS FOR VEHICLE DETECTION ON PHASE 6. ONLY ONE EXISTING 2-PROBE MICROLOOP STATION (LABELED '6B') TO BE USED UNDER TEMPORARY 2, LOCATED AS SHOWN ON SIGNAL DESIGN PLAN. (PROBES ARE WIRED IN SERIES).

EQUIPMENT INFORMATION

*CONTROLLER.....CONTRACTOR SUPPLIED 170E

*CABINETCONTRACTOR SUPPLIED 332

SOFTWAREBI TRANS 233NC2

CABINET MOUNT.....BASE

OUTPUT FILE POSITIONS...12

LOAD SWITCHES USED.....S1,S2,S4,S5,S6,S8

PHASES USED.....1,2,4,5,6,8

OVERLAPS.....NONE

EXISTING FROM TEMPORARY 1*

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBUTES	NEMA PHASE
1A	TB2-9,10	I3U	1	63	1 5 7	6
2A**	TB2-5,6	I2U	2	63	5 7	1
4A	TB4-9,10	I6U	4	41	4 5 7	2
4B	TB4-11,12	I6L	5	45	5 7	4
5A	TB3-9,10	J3U	6	64	7	4
6B *	TB3-7,8	J2L	7	64	5 7	5
8A	TB5-9,10	J6U	8	44	4 5 7	6
8B	TB5-11,12	J6L	9	42	5 7	8
			10	46	5 7	8

NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.

*SEE NOTE 9 ABOVE

**RE-INSTALL SURGE PROTECTION ON TB2-5 & TB2-6.

INPUT FILE POSITION LEGEND: J2L

FILE J

SLOT 2

LOWER

DETECTOR ATTRIBUTES LEGEND:

1-FULL TIME DELAY

2-PED CALL

3-RESERVED

4-COUNTING

5-EXTENSION

6-TYPE 3

7-CALLING

8-ALTERNATE

PROJECT REFERENCE NO.	SHEET NO.
U-4026	SIG.62

-- NOTE --

INSTALL NEW LOAD SWITCH 'S5' UNDER TEMPORARY 2

FIELD CONNECTION HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	61	21,22	NU	NU	41,42	NU	51	61,62, 63	NU	NU	81,82	NU
GREEN		130			103			136			109	
YELLOW		129			102			135			108	
RED	*	128			101			134			107	
RED ARROW							131					
YELLOW ARROW	126						132					
GREEN ARROW	127						133					

NU = NOT USED

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

BACK-UP PROTECTION NOTES

TO INSURE THAT THE CONTROLLER WILL NOT SEQUENCE FROM PHASE 2+6 DIRECTLY TO PHASE 2+5, SPECIAL PROGRAMMING HAS TO BE ENABLED IN THE BI TRANS 233NC2 SOFTWARE. PROGRAM 170E CONTROLLER AS FOLLOWS:

- PROGRAM PHASE 5 AS PROTECTED/PERMITTED AT KEYPAD INPUT E/I25+E+4=Ø 5 (Ø 1 IS NO LONGER PROTECTED/PERMITTED).
- LOOP '5A' WILL HAVE TO BE PROGRAMMED TO CALL PHASE 4 TO ALLOW THE CONTROLLER TO SEQUENCE THRU PHASE 4+8 BEFORE PROCEEDING TO PHASE 2+5. (SEE INPUT FILE PROGRAMMING ON THIS SHEET).

THIS ELECTRICAL DETAIL IS FOR THE TEMPORARY SIGNAL DESIGN: 05-1477T2

DESIGNED: APRIL 2006

SEALED: 31 MAY 2006

REVISED: N/A

TYPE 170 CONTROLLER & 332 CABINET

THIS DETAIL SUPERSEDES DETAIL DATED AUGUST 2004 AND SEALED 9/3/04

TEMPORARY DESIGN 2 - CONSTRUCTION PHASE 4

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Office of:



122 N. McDowell St., Raleigh, NC 27603

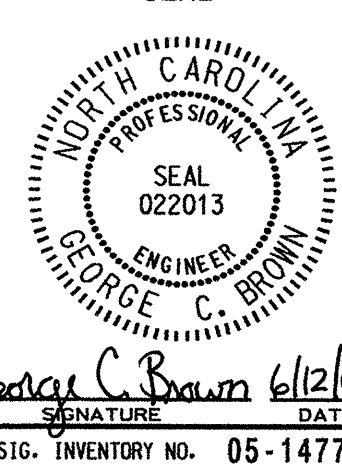
SR 1999 (DAVIS DRIVE)

at

I-40 EB RAMPS/PARK DRIVE

DIVISION 05	DURHAM COUNTY	DURHAM
PLAN DATE: MAY 2006	REVIEWED BY: T. J. J. J.	
PREPARED BY: F.E. RUSS	REVIEWED BY:	
REVISIONS	INIT.	DATE

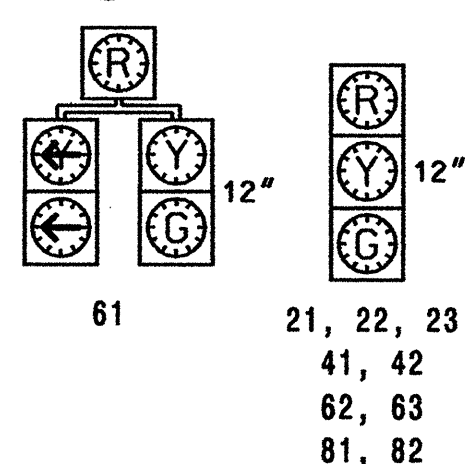
SEAL



SIG. INVENTORY NO. 05-1477T2

* SEE NOTE #2

 Denotes L.E.D.



	DETECTED MOVEMENT
	UNDETECTED MOVEMENT (OVERLAP)
	UNSIGNALIZED MOVEMENT
	PEDESTRIAN MOVEMENT

INDUCTIVE LOOPS							DETECTOR PROGRAMMING												
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	TIMING		ATTRIBUTES								SYSTEM LOOPS	STATUS	
									1	2	3	4	5	6	7	8			
							DELAY	CARRY (STRETCH)											HULL TIME DELAY
1A	6X15	2-4-2	0	X	-	1	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-
2A	6X15	2-4-2	0	X	-	2	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-
2B	6X15	2-4-2	0	X	-	2	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-
2C	6X15	2-4-2	0	X	-	2	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-
4A	6X15	2-4-2	0	X	-	4	3** SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-
4B	6X15	2-4-2	0	X	-	4	10**SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-
4C	6X15	2-4-2	0	X	-	4	10**SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-
6A	6X15	2-4-2	0	X	-	6	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-
6B	6X15	2-4-2	0	X	-	6	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-
6C	6X15	2-4-2	0	X	-	6	15**SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	X
8A	6X15	2-4-2	0	X	-	8	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-
8B	6X15	2-4-2	0	X	-	8	- SEC.	- SEC.	-	-	-	-	-	X	-	X	-	-	-

** PROGRAM DELAY IN CONTROLLER. NOT IN DETECTOR

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated July 2006 and "Standard Specifications for Roads and Structures" dated July 2006, and all applicable sections of the latest version of the Project Special Provisions.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Program phase 1 as protected/permitted.
4. Program controller to clear from phase 2+6 to phase 1+6 by progressing through phase 4+8 (See Electrical Details).
5. Program all timing information into phase banks 1, 2 and 3 unless otherwise noted.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values shall supersede these values.
7. Set all detector units to presence mode.
8. Set Phase Bank 3 Maximum Limit to 250 seconds for phases used.
9. Program for SCATS traffic adaptive operation.
10. Thirty days after implementation of the revised signal operation, sign D and orange flags may be removed at the discretion of the Regional Traffic Engineer.

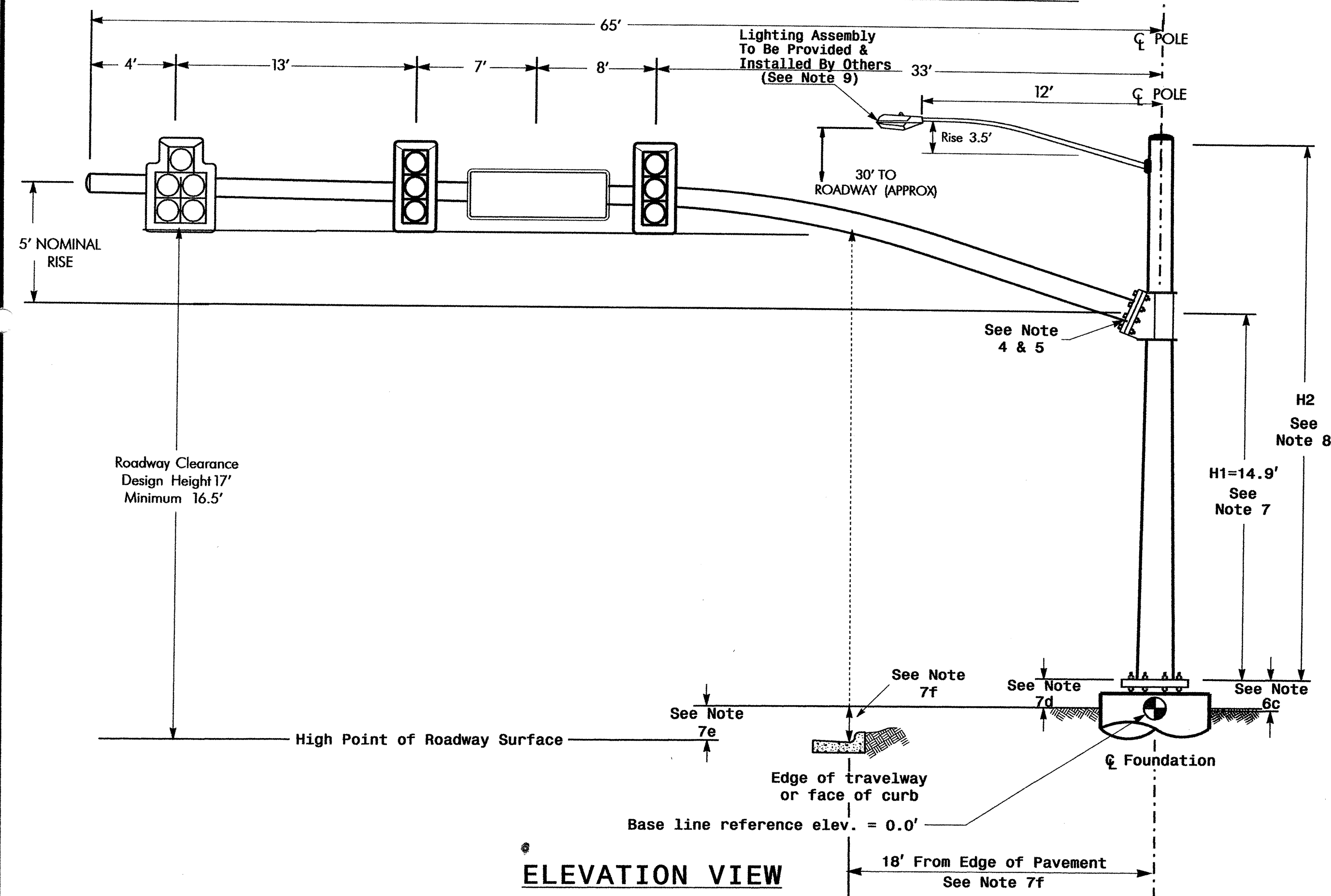
PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Metal Pole with Mastarm	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Right of Way with Marker	
	Directional Drill	N/A
	Directional Arrow	
	Pavement Marking Arrow	
(A)	Overhead Street Sign	(A)
(B)	Keep Right Sign (R4-7A)	(B)
(C)	"YIELD" Sign (R1-2)	(C)
(D)	"LEFT TURN YIELD ON GREEN" Sign (R10-12) with orange flags	(D)

PHASE	Ø1	Ø2	Ø4	Ø6	Ø8
MINIMUM INITIAL	7 SEC.	14 SEC.	7 SEC.	14 SEC.	7 SEC.
VEHICLE EXTENSION	1.0 SEC.	6.0 SEC.	1.0 SEC.	6.0 SEC.	1.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.8 SEC.	3.5 SEC.	5.2 SEC.	3.8 SEC.
RED CLEARANCE	2.4 SEC.	1.0 SEC.	2.1 SEC.	1.0 SEC.	2.0 SEC.
MAXIMUM LIMIT	30 SEC.	90 SEC.	30 SEC.	90 SEC.	30 SEC.
RECALL POSITION	NONE	VEH. RECALL	NONE	VEH. RECALL	NONE
VEHICLE CALL MEMORY	NONLOCK	YELLOW LOCK	NONLOCK	YELLOW LOCK	NONLOCK
DOUBLE ENTRY	OFF	OFF	ON	OFF	ON
WALK	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.
FLASHING DON'T WALK	— SEC.	— SEC.	— SEC.	— SEC.	— SEC.

**THIS PLAN SUPERSEDES
THE PREVIOUSLY ISSUED
DESIGN SEALED 9/3/04.**

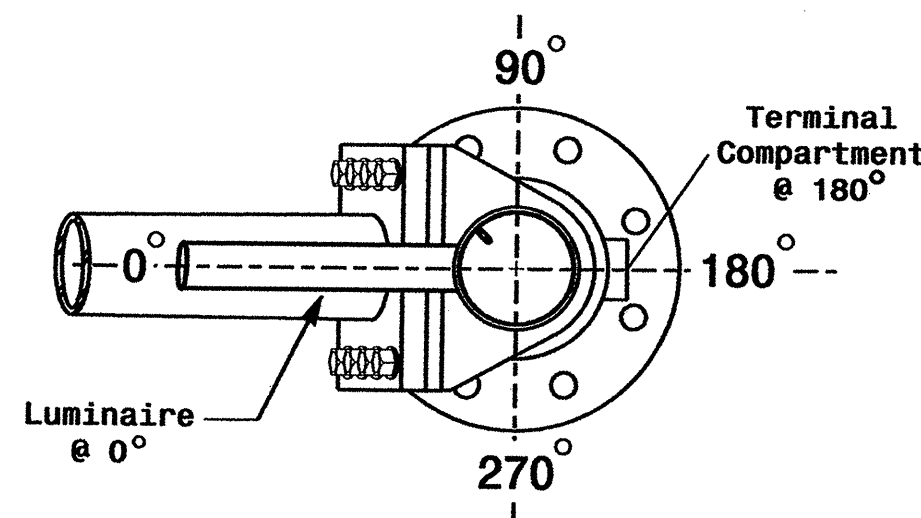
SURVEYING	SR 1999 (DAVIS DRIVE) AT I-40 EB RAMPS/PARK DRIVE																																		
122 N. McDowell St., Raleigh, NC 27603	DIVISION 5 DURHAM COUNTY DURHAM PLAN DATE: April 2006 REVIEWED BY: Zachary Little PREPARED BY: L. Blount REVIEWED BY: Doumit Ishak	SIGNATURE _____ DATE _____ <i>(Signature)</i> 31 May 2006																																	
SCALE 	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">REVISONS</th> <th style="width: 20%;">INIT.</th> <th style="width: 20%;">DATE</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	REVISONS	INIT.	DATE																															
REVISONS	INIT.	DATE																																	

ELEVATION VIEW

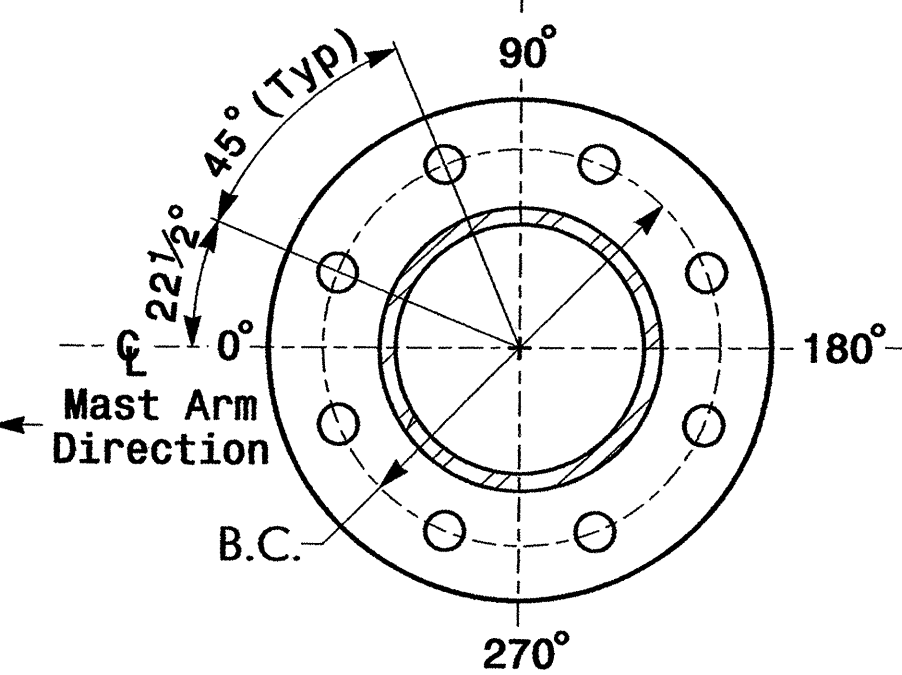


The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Differences for:	Pole 1
Baseline reference point at Foundation @ ground level	+/-0.0 ft.
Elevation difference at High point of roadway surface	-1.2 ft.
Elevation difference at Edge of travelway or face of curb	+/-0.0 ft.

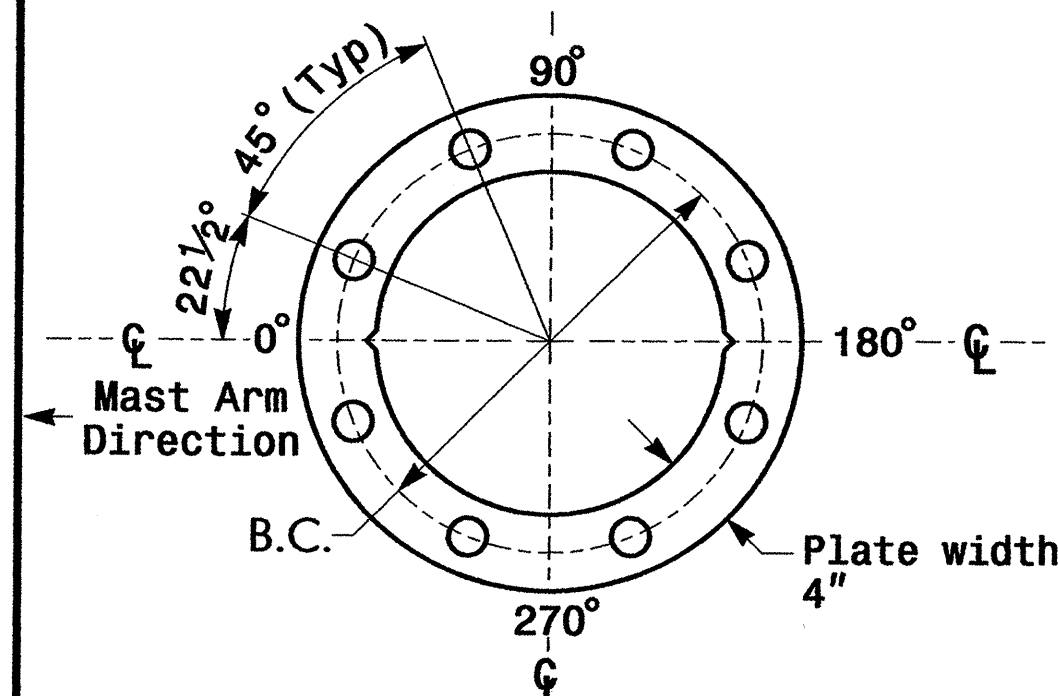


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



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

PROJECT REFERENCE NO.	SHEET NO.
U-4026	Sig. 64

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
	OVERHEAD STREET NAME SIGN RIGID MOUNTED WITH ASTRO-SIGN-BRAC	16.0 S.F.	24" W X 96" L	30 LBS
	LUMINAIRE OVX DROP PRISMATIC REFRACTOR	EPA 0.87 S.F.	13.25" W X 26.25" L	35 LBS

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 2006 NCDOT "Standard Specifications for Roads and Structures". The latest addenda to these specifications can be found in the traffic signal project special provisions.
 - The 2006 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website:
<http://www.ncdot.org/doh/preconstruct/traffic/tmssu/ws/mpoles/poles.htm>
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. 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.
5. 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 60 inch anchor bolts.
 - 7. The mast arm attachment height (H1) shown is based on the following design assumptions:
 - a. Nominal vertical rise in mast arm is 5 feet as measured from the centerline of the arm base to the centerline of the free end of the arm.
 - b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm.
 - c. The roadway clearance height for design is as shown in the elevation views.
 - d. The top of the pole base plate is .75 feet above the ground elevation.
 - e. Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.
 - f. Provide horizontal distance from proposed centerline of foundation to edge of travelway. Refer to the Elevation Data chart above for elevation difference between the proposed foundation ground level and the edge of travelway. This information is necessary when arched arms are specified to ensure that the roadway clearance is maintained at the edge of the travelway and to assist in the camber design of the mast arm.
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.

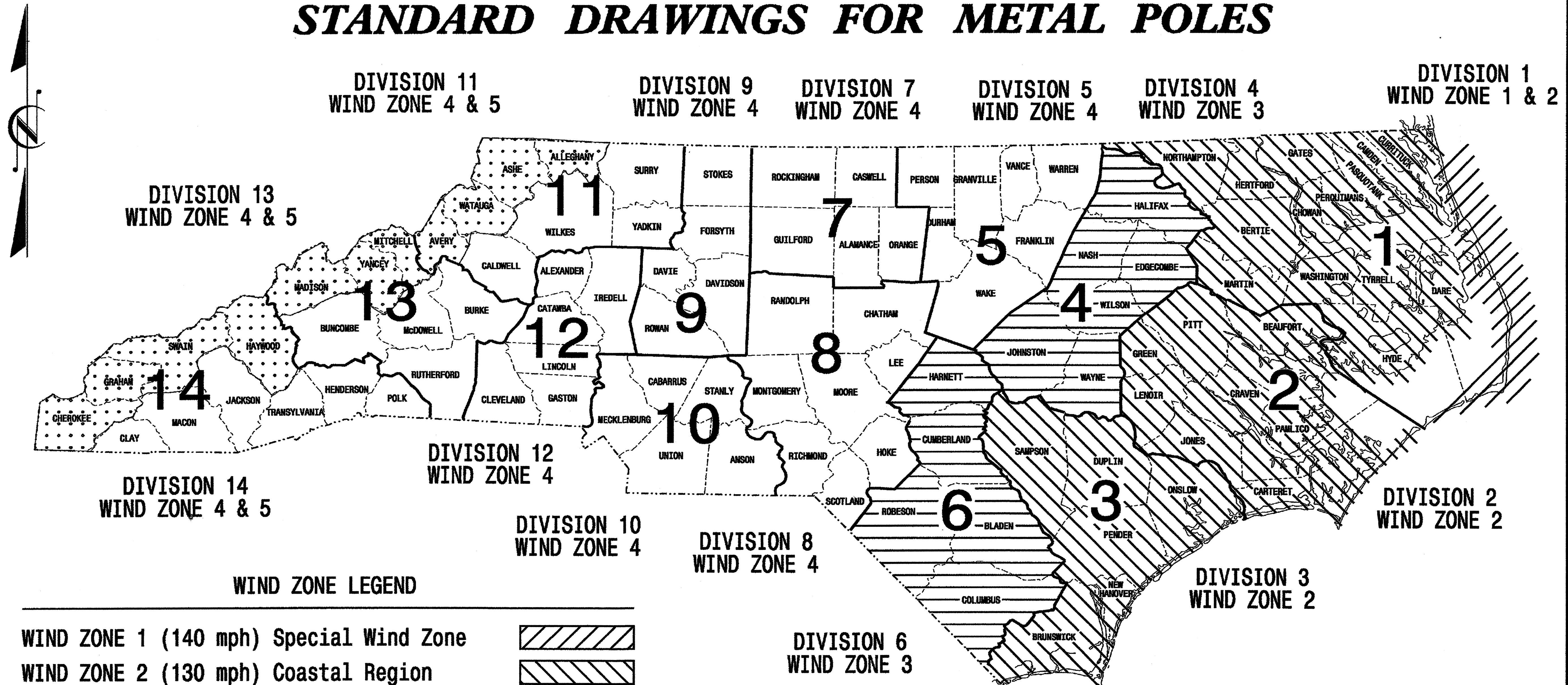
NCDOT Wind Zone 4 (90 mph)

Prepared in the Offices of:  State Department of Transportation Division of Planning and Geomatics Section 122 N. McDowell St., Raleigh, NC 27603	SR 1613 (DAVIS DRIVE) AT I-40 EB RAMPS / PARK DRIVE	 SEAL NORTH CAROLINA PROFESSIONAL ENGINEER E. MULLINS 22027 E. Mullins 8 May 2006																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">DIVISION 5</td> <td style="width: 33%;">WAKE COUNTY</td> <td style="width: 33%;">MORRISVILLE</td> </tr> <tr> <td>PLAN DATE: MARCH 2005</td> <td>REVIEWED BY: Z. LITTLE</td> <td></td> </tr> <tr> <td>PREPARED BY: C. PIERCE</td> <td>REVIEWED BY: D. ISHAK</td> <td></td> </tr> </table>			DIVISION 5	WAKE COUNTY	MORRISVILLE	PLAN DATE: MARCH 2005	REVIEWED BY: Z. LITTLE		PREPARED BY: C. PIERCE	REVIEWED BY: D. ISHAK																						
DIVISION 5	WAKE COUNTY	MORRISVILLE																														
PLAN DATE: MARCH 2005	REVIEWED BY: Z. LITTLE																															
PREPARED BY: C. PIERCE	REVIEWED BY: D. ISHAK																															
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">REVISIONS</td> <td style="width: 20%;">INIT.</td> <td style="width: 20%;">DATE</td> </tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>			REVISIONS	INIT.	DATE																											
REVISIONS	INIT.	DATE																														
SCALE 0 N/A N/A																																
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">SIGNATURE</td> <td style="width: 40%;">DATE</td> </tr> <tr> <td>SIG. INVENTORY NO. 05-1477</td> <td> </td> </tr> </table>			SIGNATURE	DATE	SIG. INVENTORY NO. 05-1477																											
SIGNATURE	DATE																															
SIG. INVENTORY NO. 05-1477																																

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

STATE	PROJECT NO.	SHEET NO.
N.C.	U-4026	Sig. 65
F.A. PROJ. NO.		M 1
PROJECT ID. NO.		

STANDARD DRAWINGS FOR METAL POLES

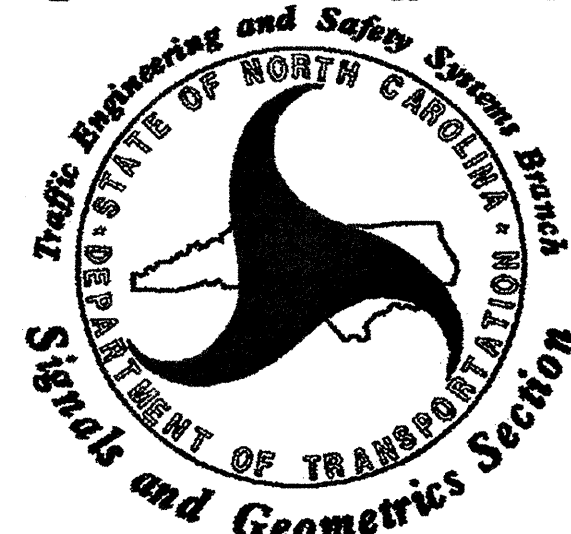


WIND ZONE LEGEND

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

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

Prepared in the Offices of:



122 N. McDowell St., Raleigh, NC 27603

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

AASHTO

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

INDEX OF PLANS

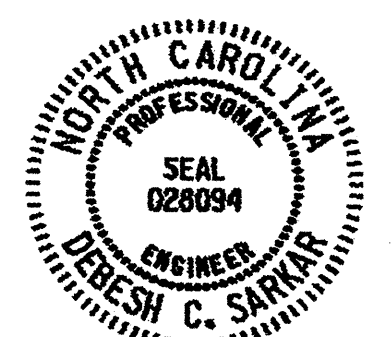
DRAWING NUMBER	DESCRIPTION
M 1	Title Sheet
M 2	Fabrication Details - All Poles
M 3	Fabrication Details - Strain Poles
M 4,5	Fabrication Details - Mast Arm Poles
M 6	Construction Details - Strain Poles
M 7	Construction Details - Foundations
M 8	Standard Strain Poles

NCDOT CONTACTS:

TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

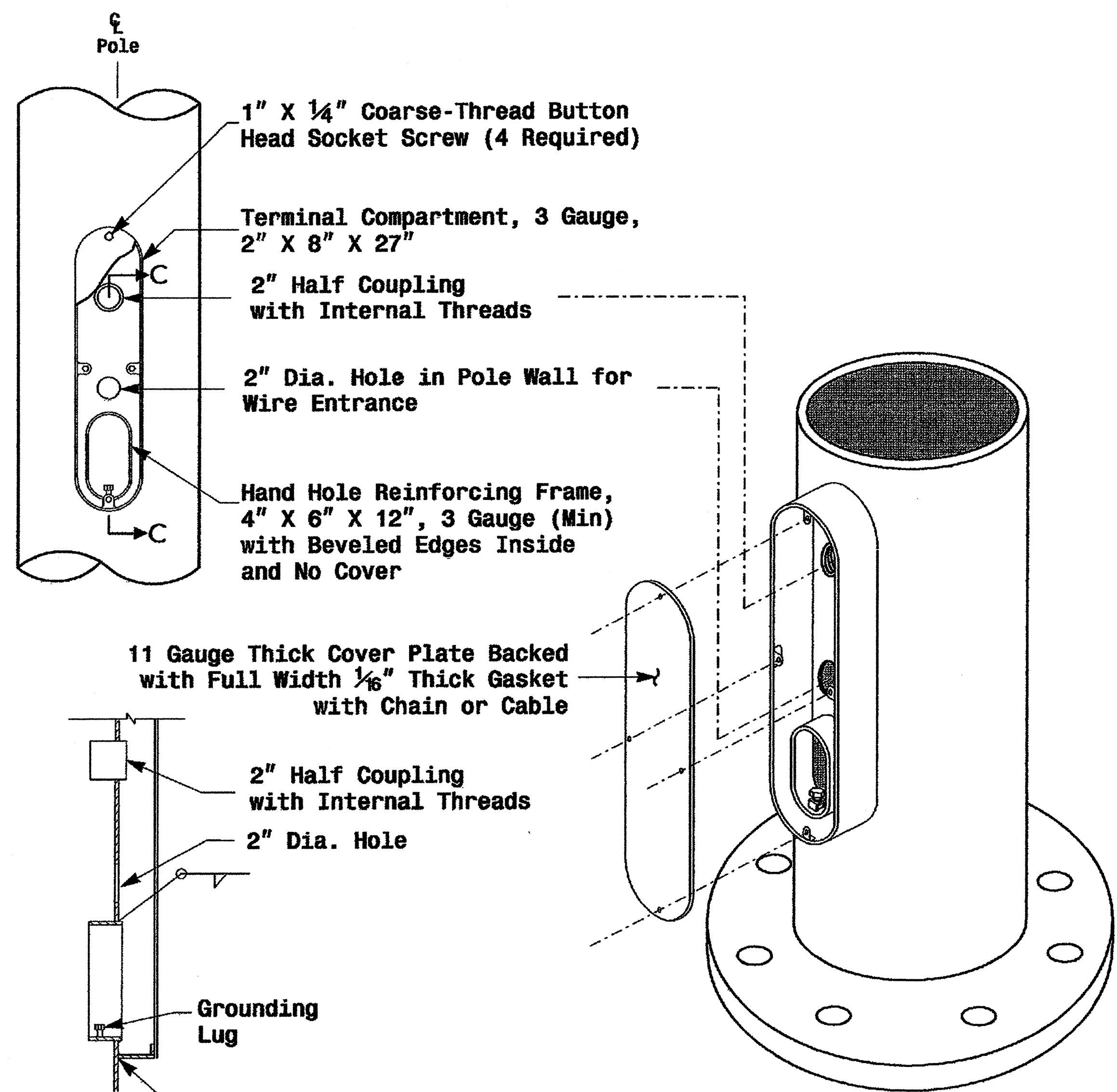
G. A. Fuller, P.E. - State ITS and Signals Engineer
R. E. Mullinax, P.E. - Signals and Geometrics Engineer
P. L. Alexander, P.E. - Signals and Geometrics Special Projects Engineer
D. C. Sarkar, P.E. - Signals and Geometrics Structural Engineer
A. M. Esposito, P.E. - Signals and Geometrics Project Engineer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

SEAL



D. C. Sarkar 9.2.2005
SIGNATURE DATE

Fabrication Details – All Poles



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 _____

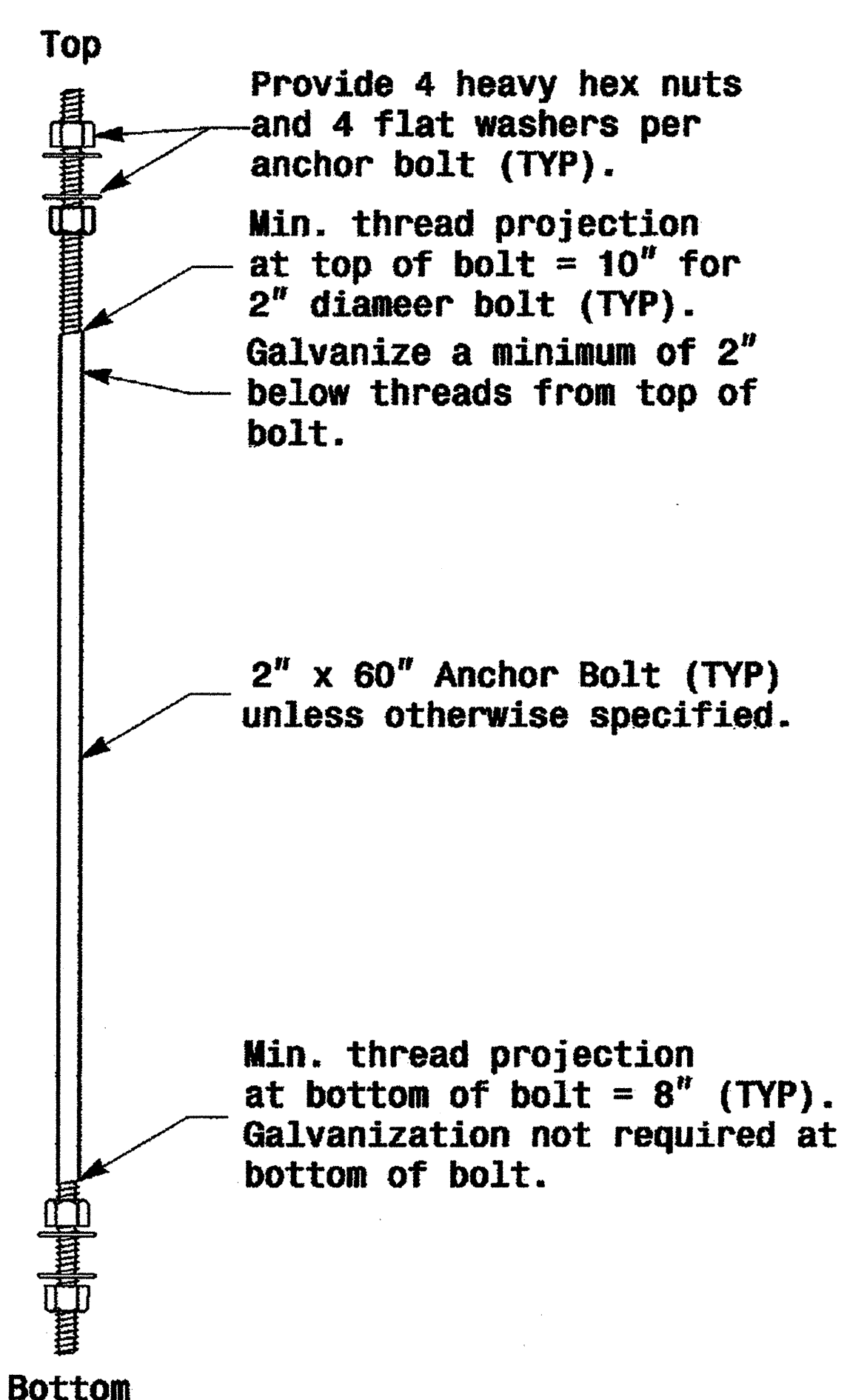
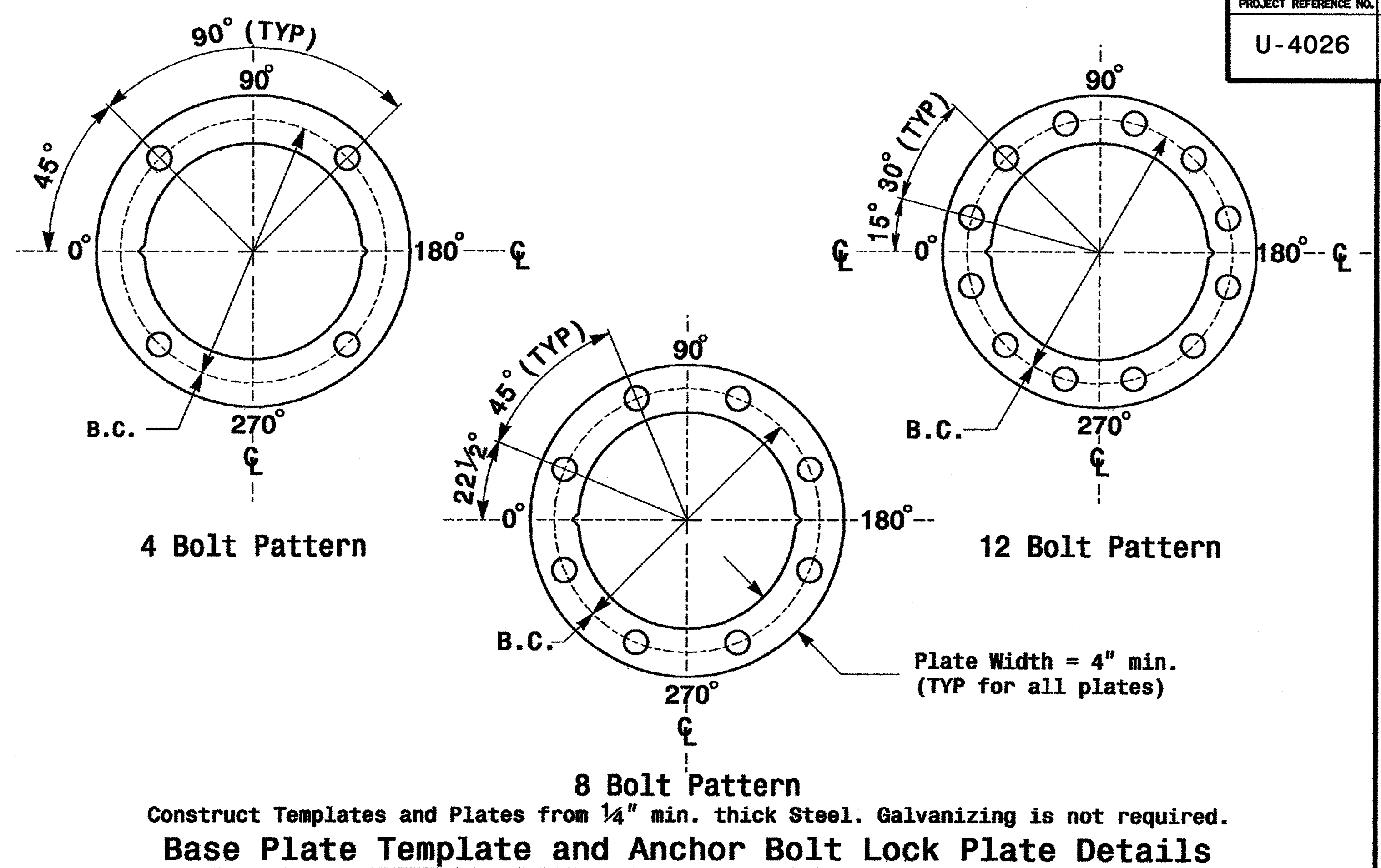
Shaft I.D. Tag (Provide on Strain Poles and Mast Arm Poles)

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

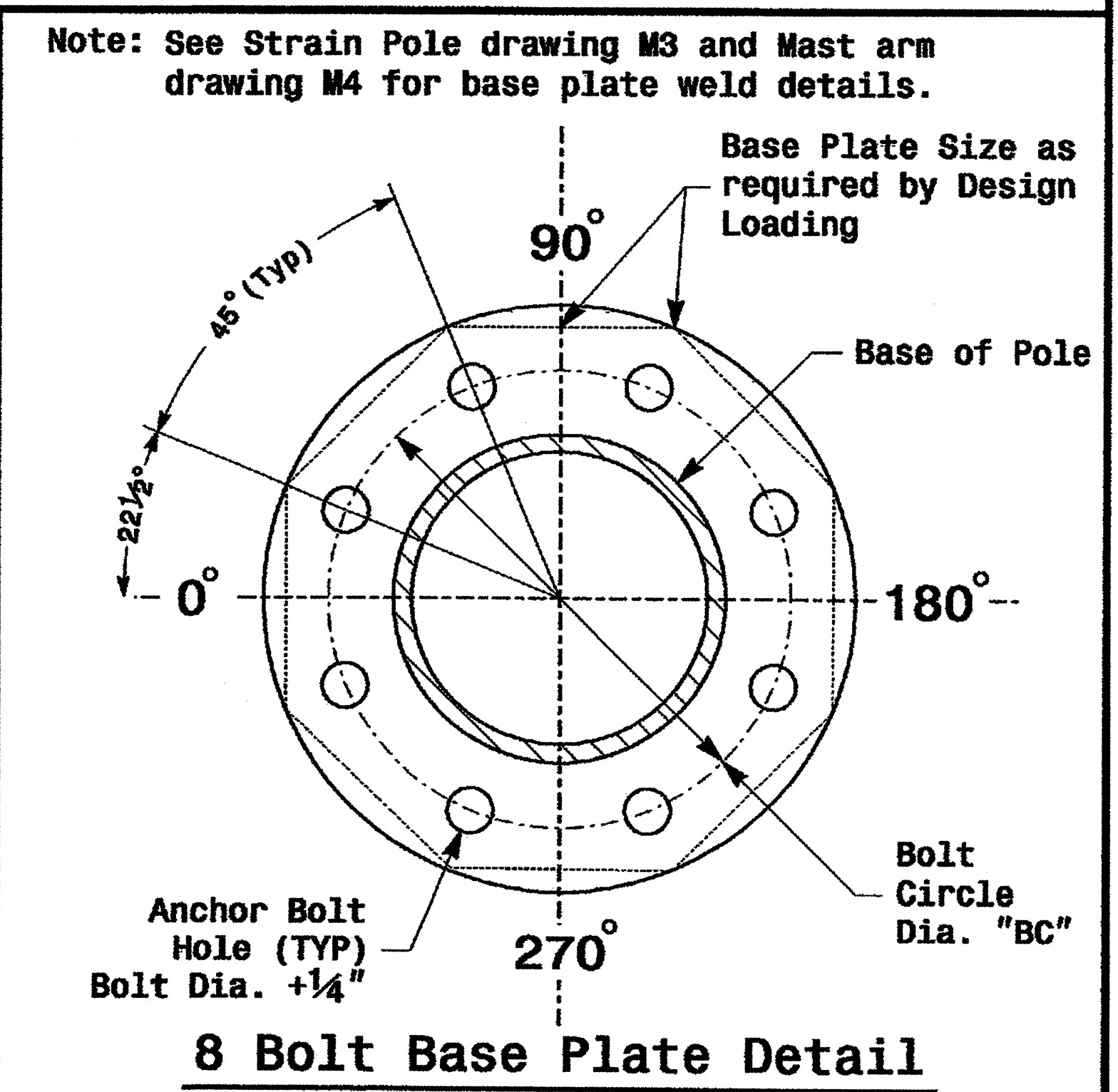
Arm I.D. Tag (Provide on each section of a multi-section mast arm)

- 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



Anchor Bolt Detail

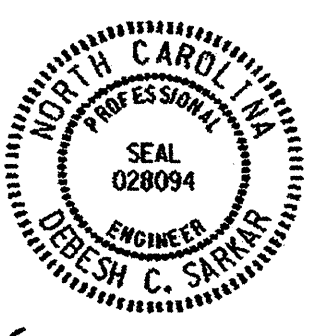


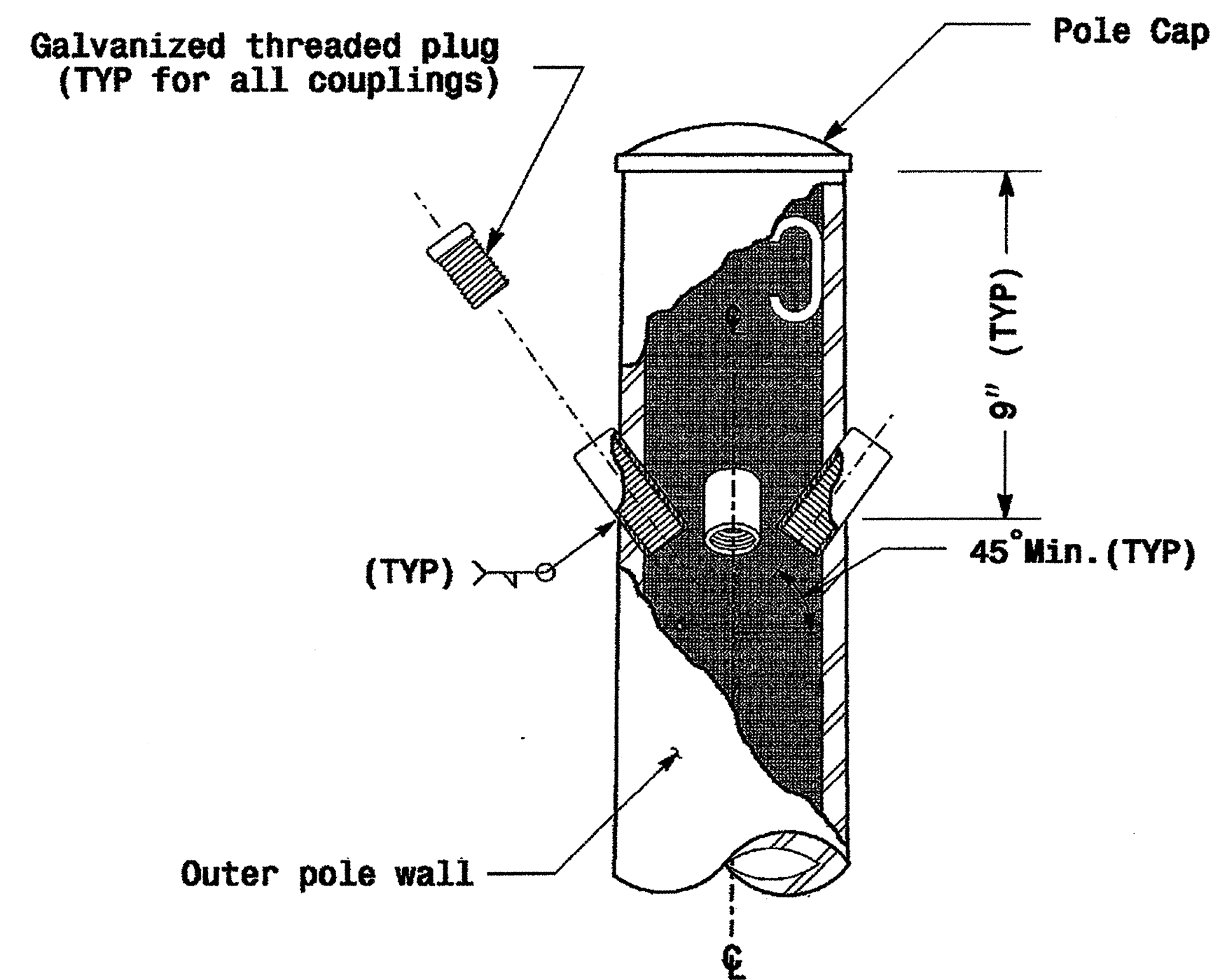
Prepared in the Office of:  222 N. McDowell St., Raleigh, NC 27603

Typical Fabrication Details Common To All Metal Poles

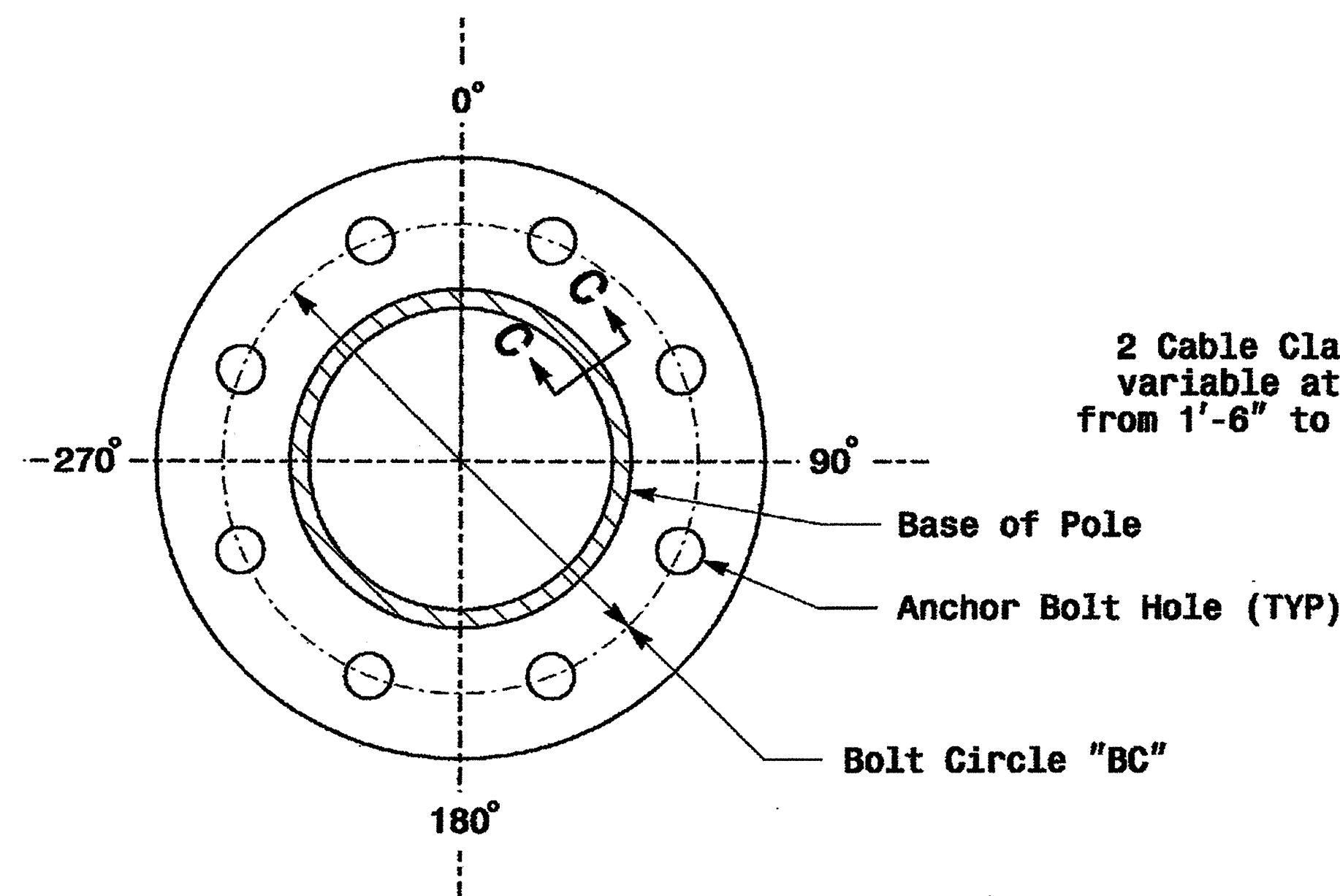
PLAN DATE: May 2005 REVIEWED BY: C.F. Andrews
PREPARED BY: P.L. Alexander REVIEWED BY: A.M. Esposito
REVISIONS: _____ INIT. DATE: _____

SCALE: 0 NA NONE

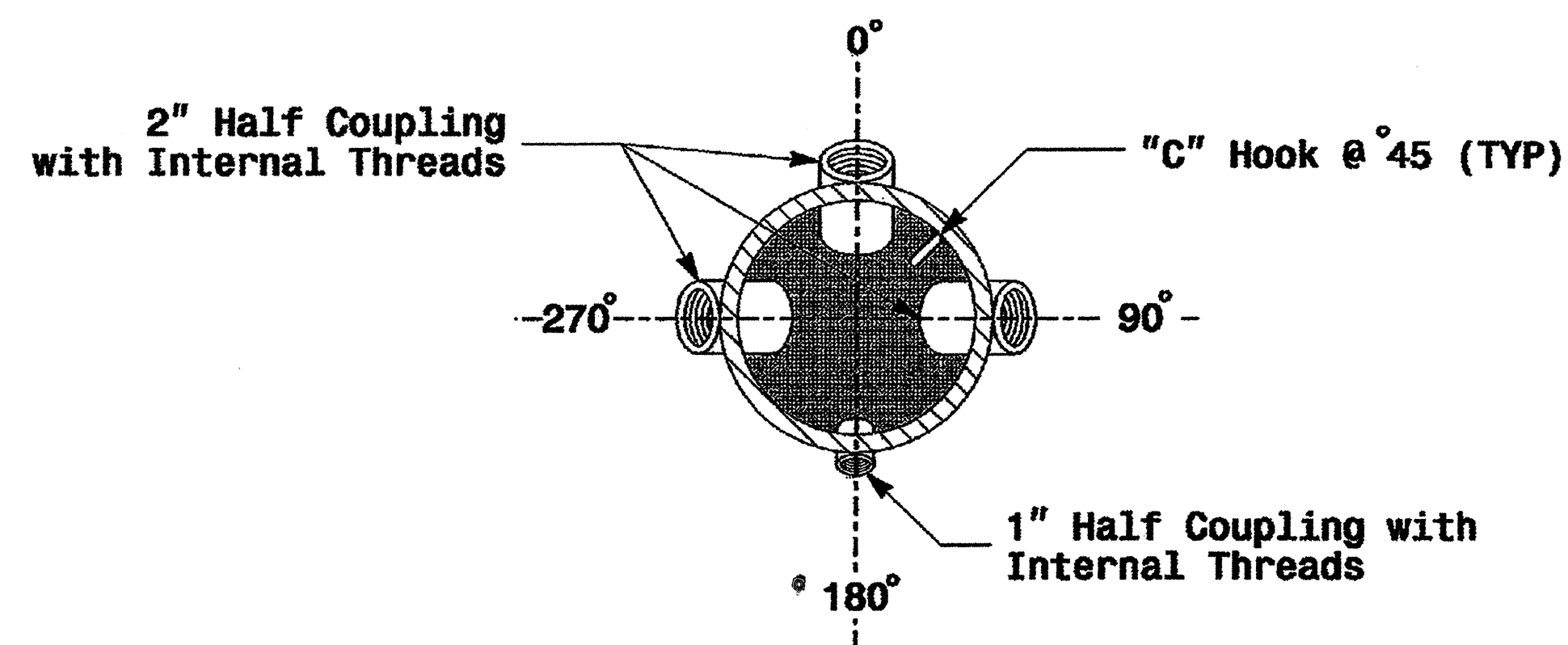
SEAL:  D. Sankar 9.2.2005
SIG. INVENTORY NO. _____



Cable Entrances at Top of Pole

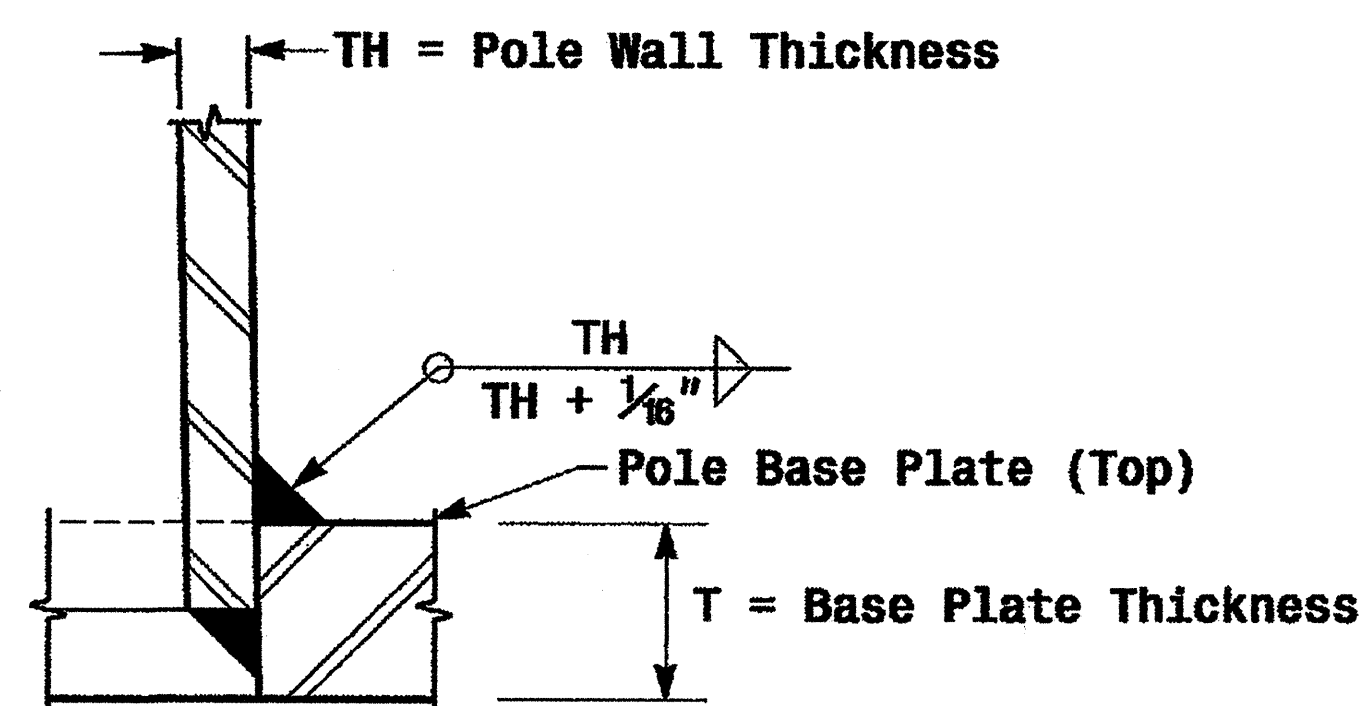


Section B-B
(See drawing M2)
Pole Base Plate



Section A-A

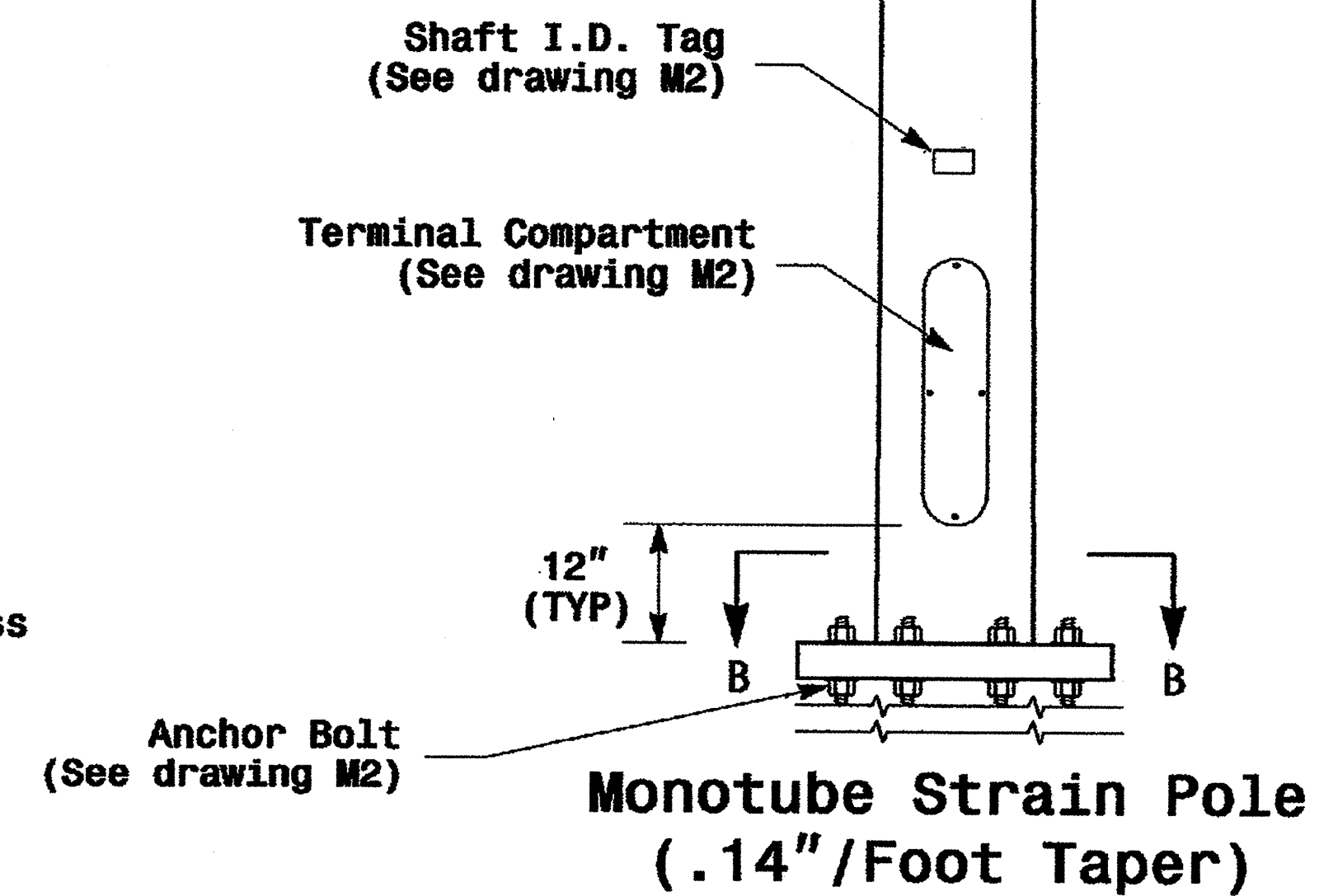
Radial Orientation for Factory Installed Accessories at Top of Pole



Section C-C

Socket Connection Weld Detail

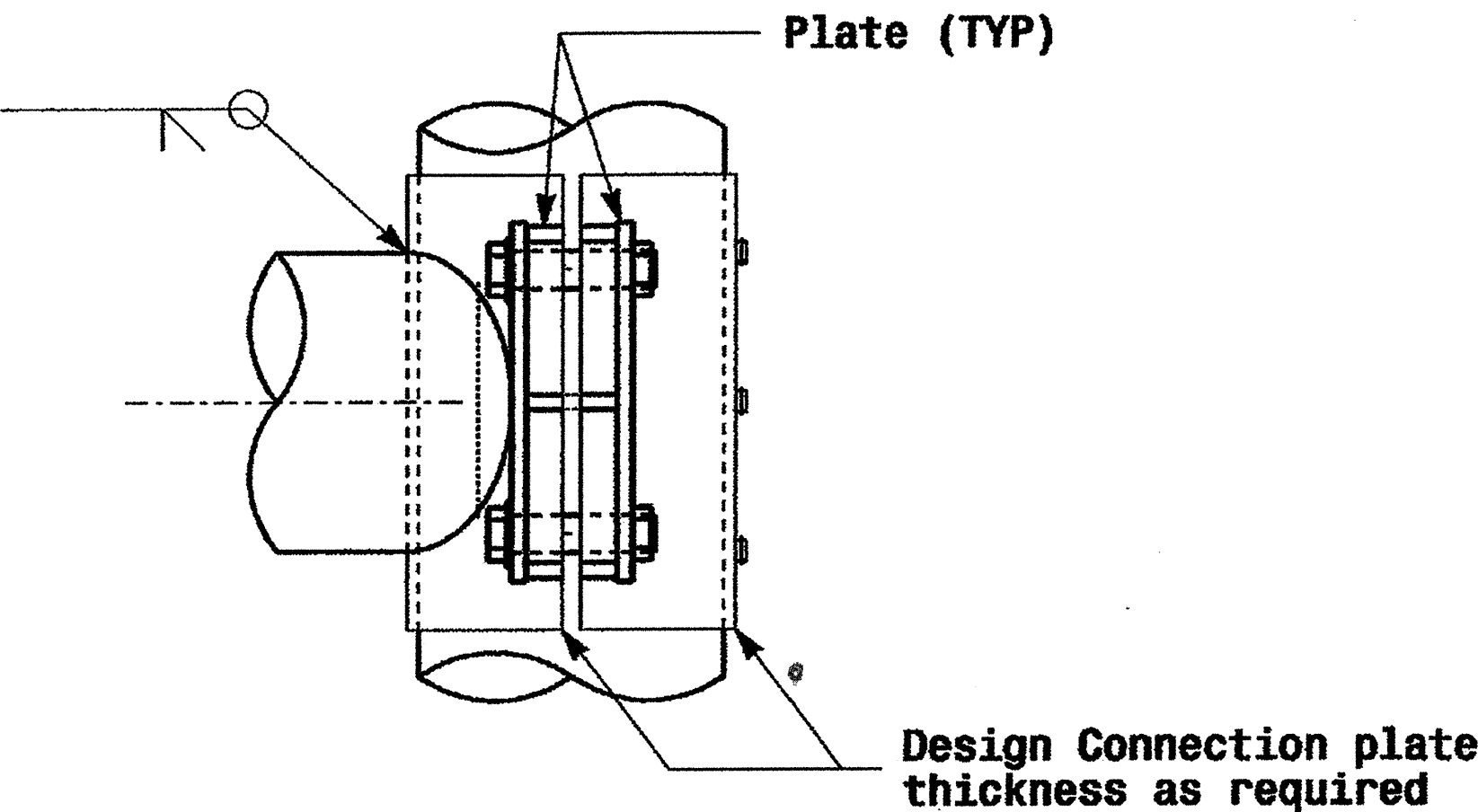
2 Cable Clamps designed for variable attachment heights from 1'-6" to 10' below the top of the pole.



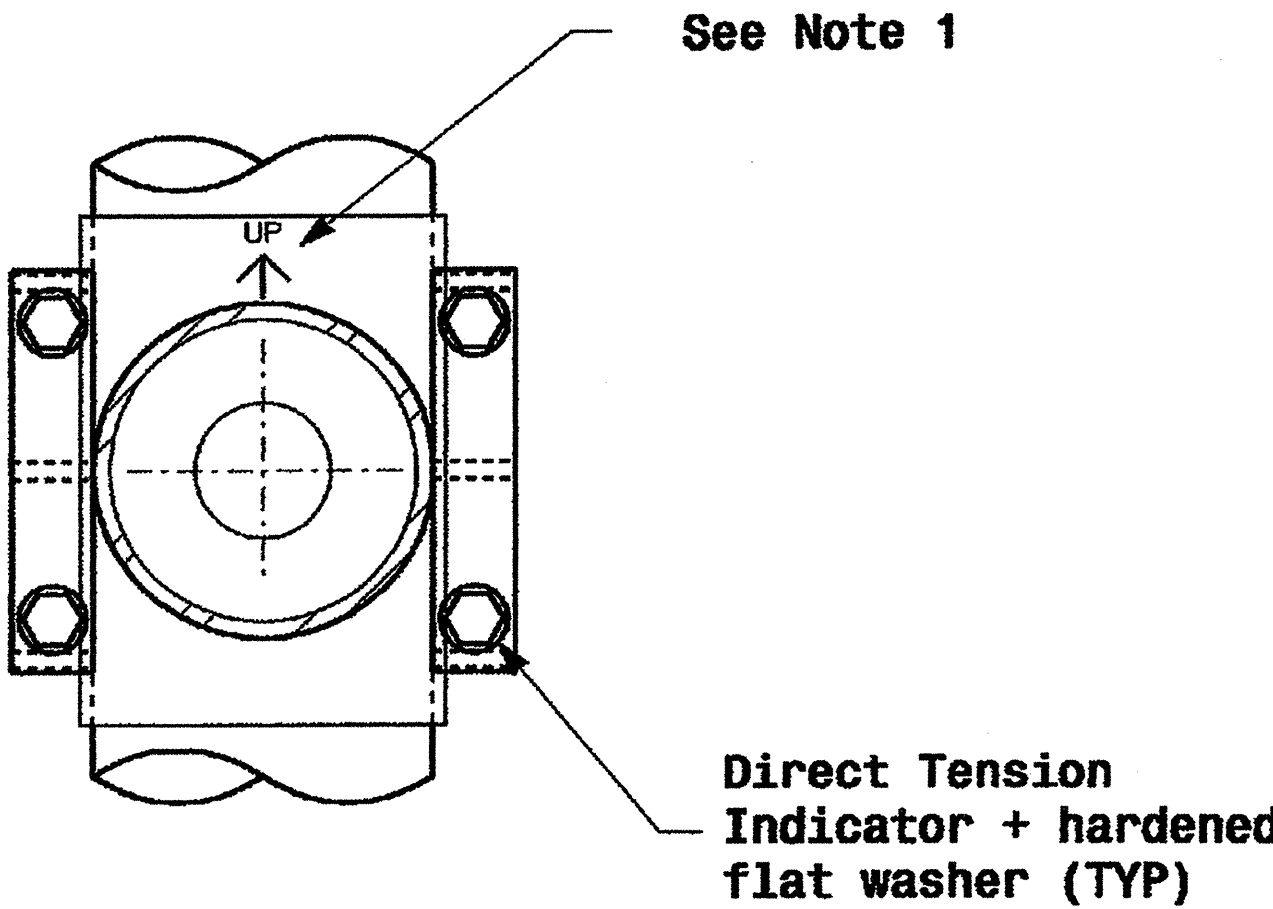
	Typical Fabrication Details For Strain Poles			
	PLAN DATE: May 2005 PREPARED BY: P.L. Alexander	REVIEWED BY: C.F. Andrews REVIEWED BY: A.M. Esposito		SCALE: NA NONE
	REVISIONS:			INIT. DATE
	SIGNATURE: J. Sack 9.2.2005 DATE:			SIG. INVENTORY NO.

Fabrication Details - Strain Poles

Adjustable Clamp Type Bolted
Mast Arm Connection

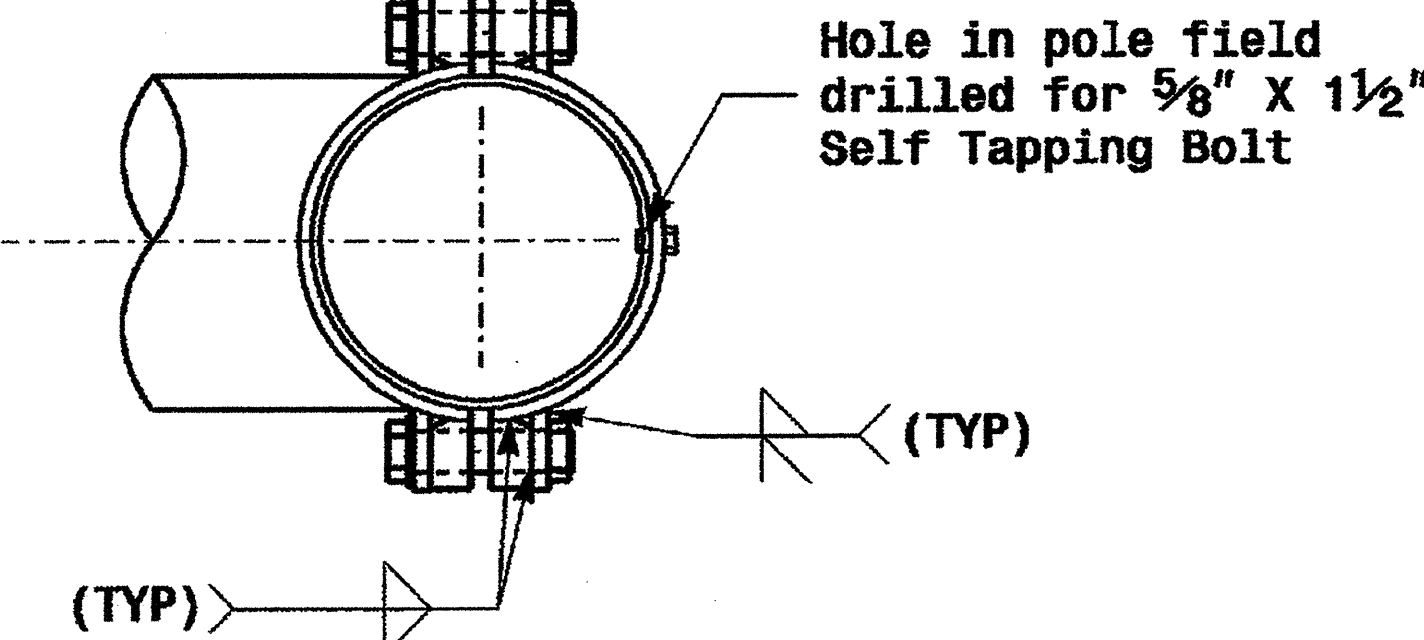


Side Elevation View



Front Elevation View

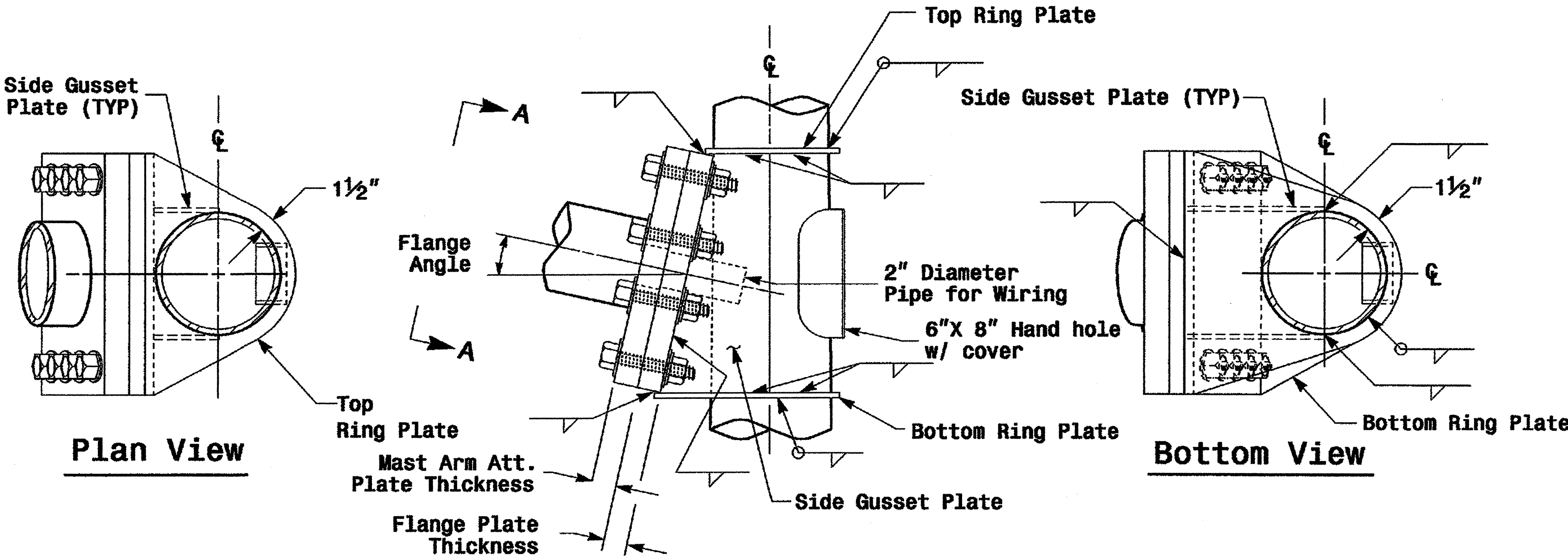
(4) - Size "E" Hex Head Bolts with (1) Hex Nuts & Washers



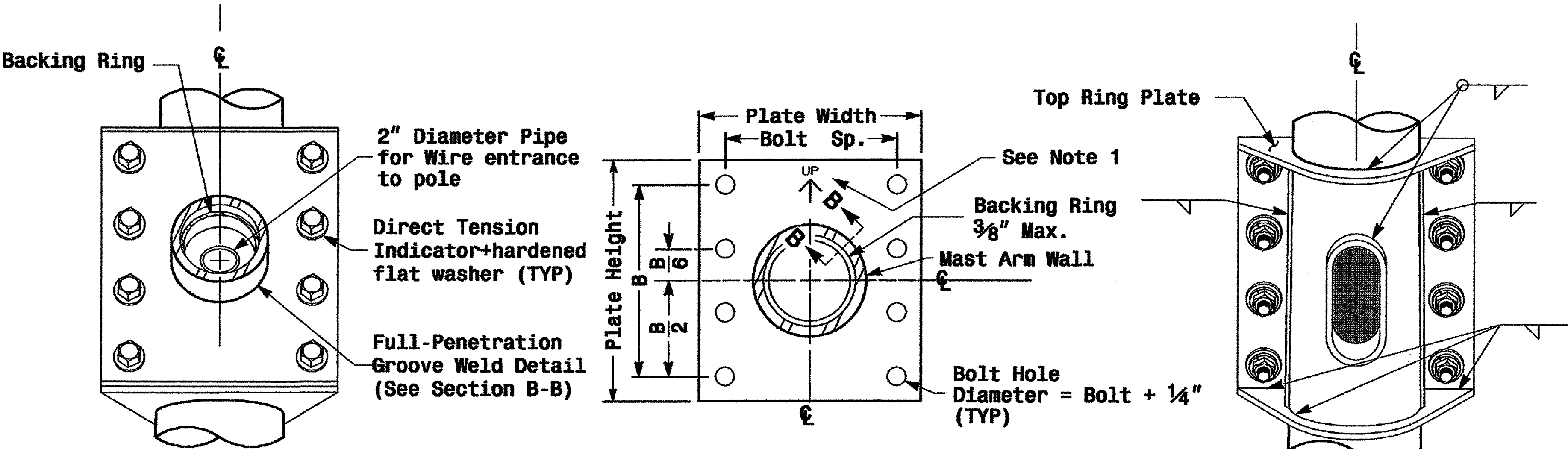
Plan View

Welded Ring Stiffened Mast Arm Connection

PROJECT REFERENCE NO. U-4026
SHEET NO. Sig. 69 M 5



Side Elevation View

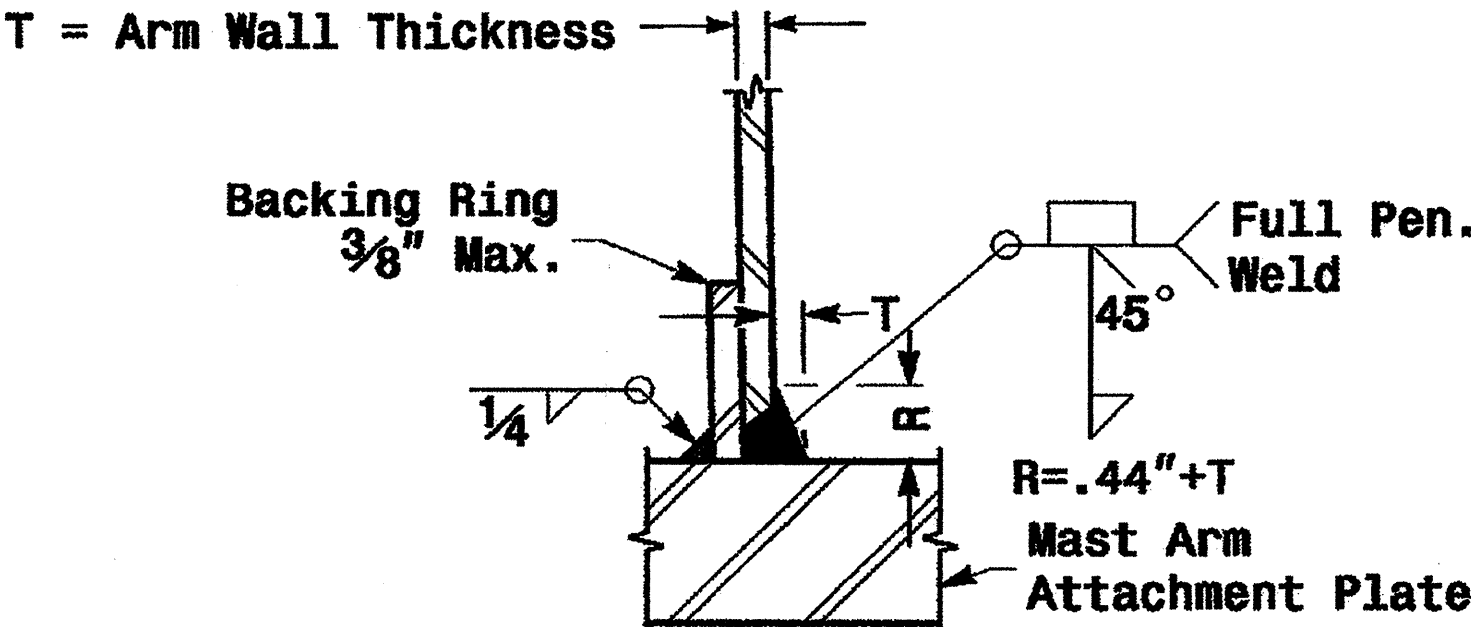


Front Elevation View

Section View A-A

Mast Arm Attachment Plate

Back Elevation View



Section B-B

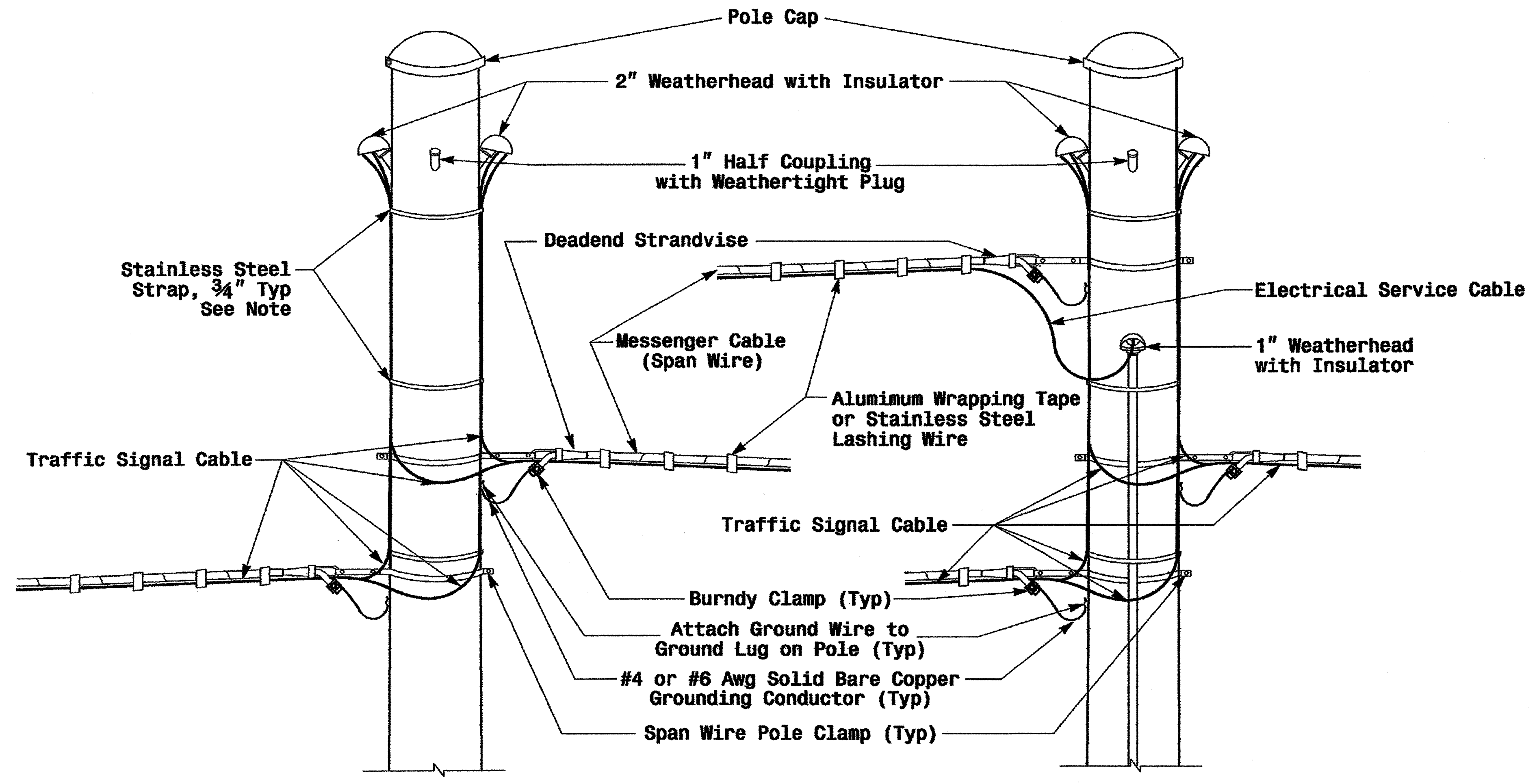
Full-Penetration Groove Weld Detail

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.

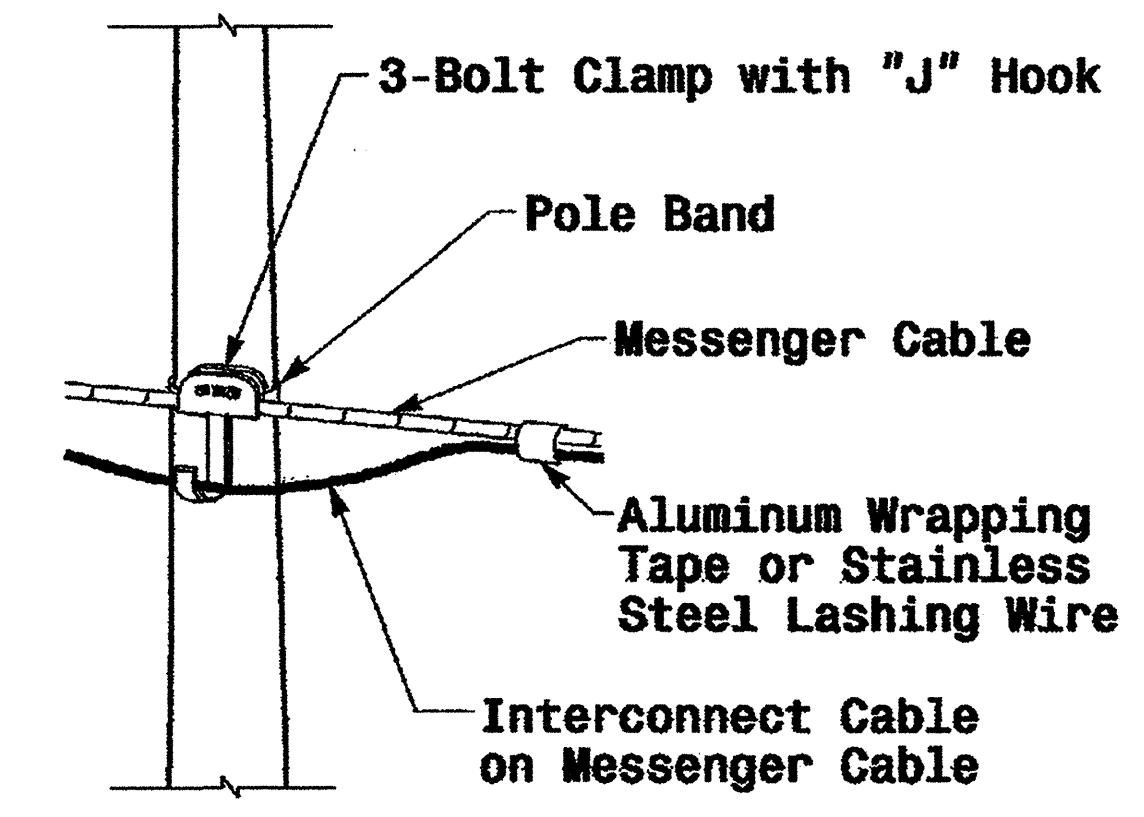
	Fabrication Details For Mast Arm Connection To Pole		
	PLAN DATE: May 2005	REVIEWED BY: C.F. Andrews	
	PREPARED BY: P.L. Alexander	REVIEWED BY: A.W. Esposito	
	REVISIONS	INIT. DATE	
SCALE: 0 NA NONE		SIGNATURE: D. Sarkar 9.2.2005 DATE: 9.2.2005 SIG. INVENTORY NO.	

Fabrication Details - Mast Arm Poles

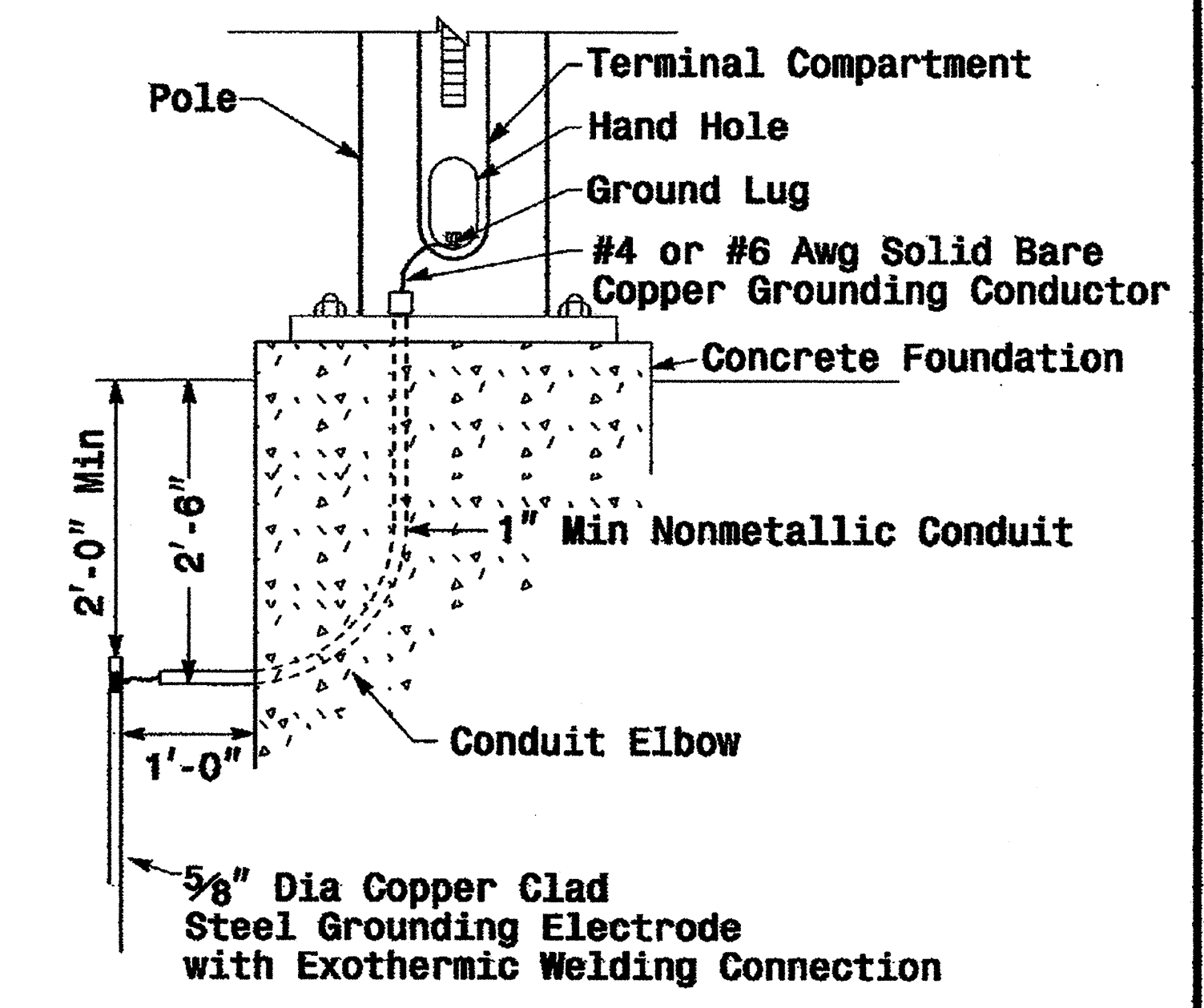


Note: Strap all signal cables to the side of the pole with 3/4" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 36"

Strain Pole Attachments



Attachment of Cable to Intermediate Metal Pole



Metal Pole Grounding Detail

Construction Details - Strain Poles

222 N. McDowell St., Raleigh, NC 27603

Construction Details
Strain Poles

PLAN DATE: May 2005	REVIEWED BY: P.L. ALEXANDER
PREPARED BY: C.F. ANDREWS	REVIEWED BY: D.C. SARKAR
REVISIONS	INIT. DATE

SCALE: 0 NA NONE

SEAL

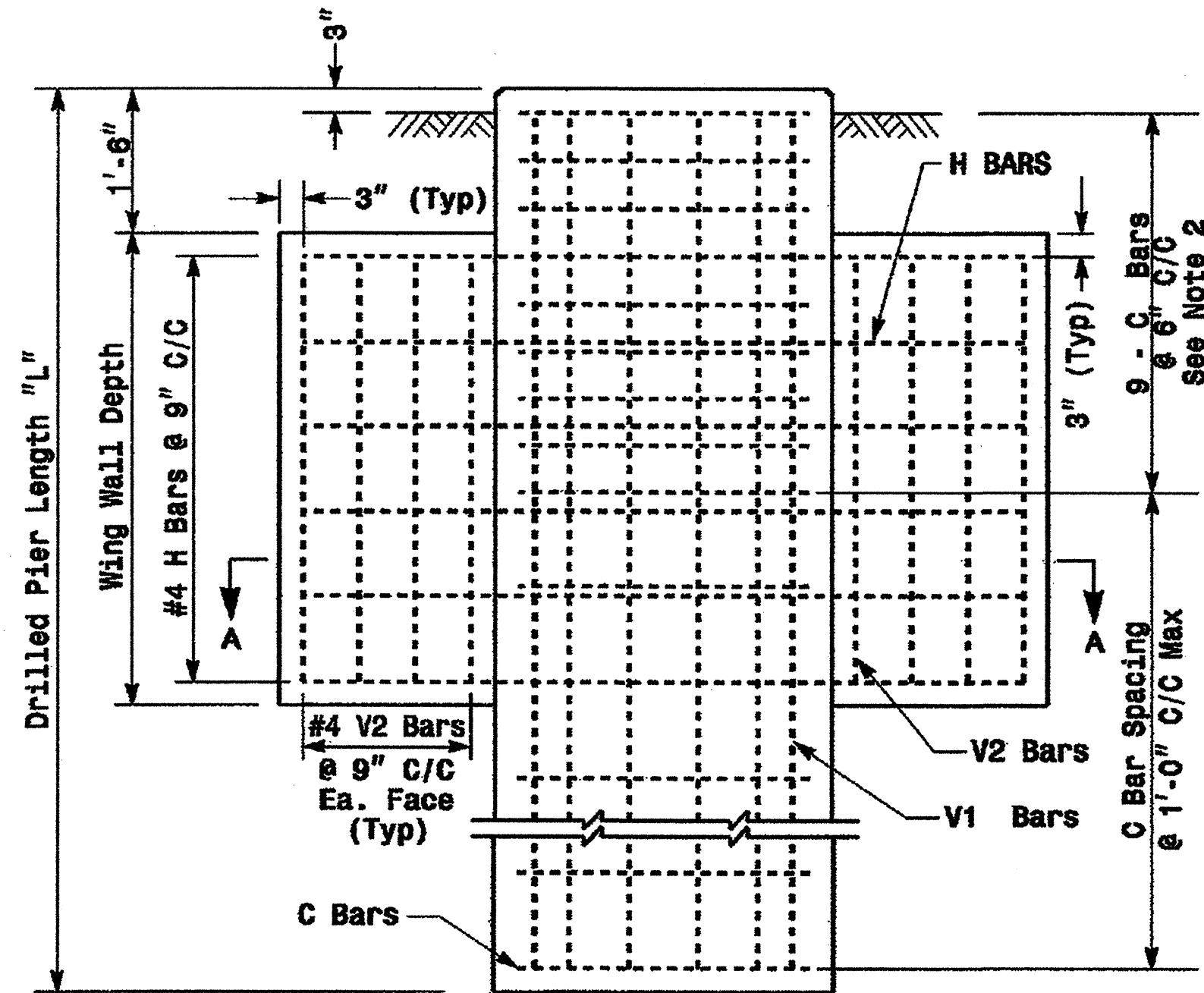
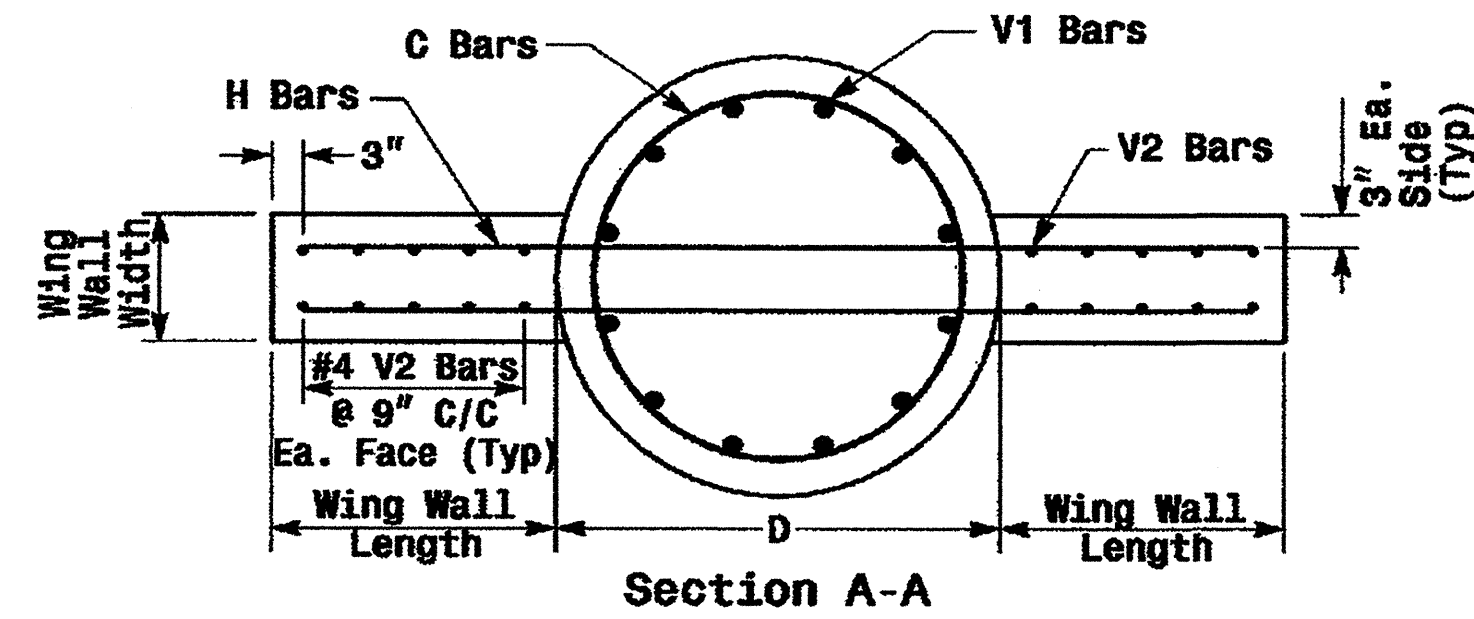
9-1-05

SIGNATURE DATE

SIG. INVENTORY NO.

01-SEP-2005 16:33
w:\projects\un1\workgroup\2004 metol pole strander.dwg
P.L. Alexander

PROJECT REFERENCE NO.	SHEET NO.
U-4026	Sig. 71 M 7

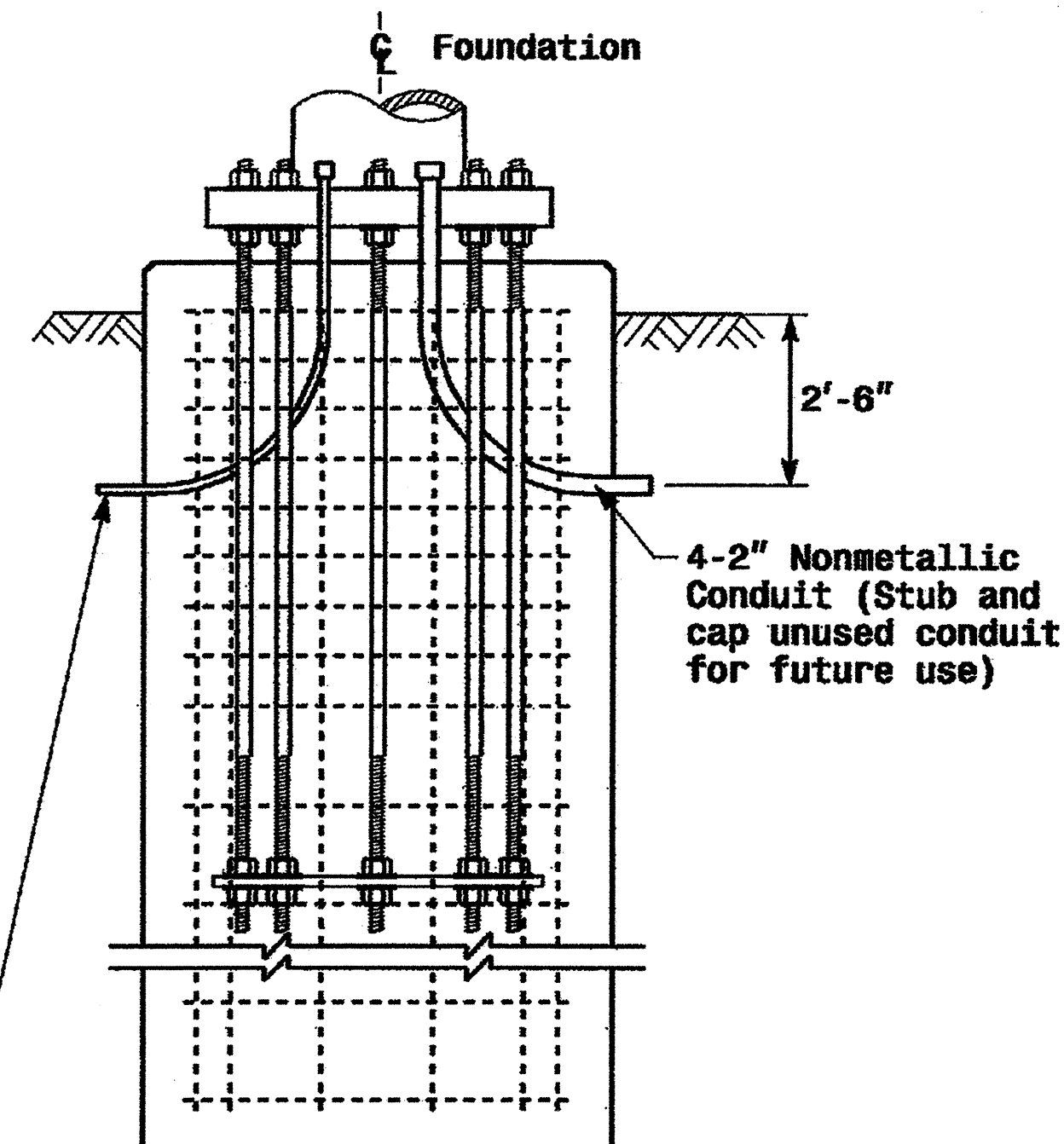
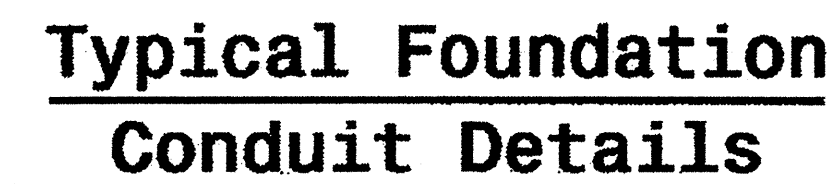


REINFORCING STEEL TABLE FOR STANDARD 42" and 48" DRILL PIER SHAFT WITH TYPE 1 AND TYPE 2 WING WALLS						
Wing Wall Type	Drill Pier Shaft Dia. (in.)	Reinforcing Steel				
		Bar Names	No.	Size	Type	Length
TYPE 1	42"	V1	9	#8	STR.	**
		V2	12	#4	STR.	2'-6"
		H	8	#4	STR.	6'-0"
		C	*	#4	CIR.	10'-9"
TYPE 2	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"

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



(Reinforcing Cage Not Shown for Clarity)



Prepared in the Office of

Department of NORTH CAROLINA STATE TRANSPORTATION SURVEY and Geomatics Section

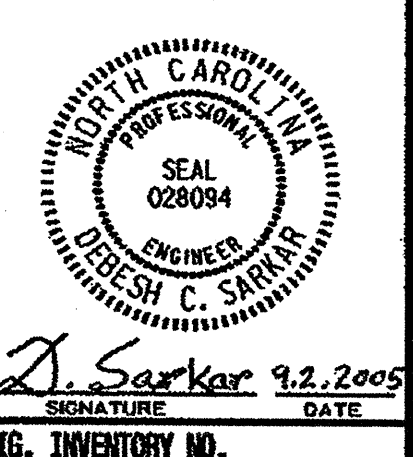
122 N. McDowell St., Raleigh, NC

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.)

Construction Details – Foundations

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

SEAL

**SIG. INVENTORY NO.**

Concrete Volume (cubic yards)=.356 X L

1. Values shown in "Moment at the Pole Base" column represents the minimum acceptable capacity allowable for design using a design CSR of 1.
2. Base plate thickness (T) is 2.0 inches.

1. Perform a standard penetration test at each proposed foundation site to determine "N" value.
2. Select the appropriate wind zone from sheet M 1.
3. Select the soil type (Clay or Sand) that best describes the soil characteristics.
4. Get the appropriate pole case load number from the plans or from the Engineer.
5. Select the appropriate column in the chart based on soil type and "N" value. Select the appropriate row based on the pole load case. The foundation depth is the value where the column and the row intersect.

Prepared in the Office of:  NORTH CAROLINA PROFESSIONAL ENGINEERS AND GEOSCIENTISTS SOCIETY 122 N. McDowell St., Raleigh, NC 27603	Standard Strain Poles and Standard Foundations	SEAL 																						
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;">PLAN DATE: May 2005</td> <td style="width: 50%; padding: 2px;">REVIEWED BY: C.F. Andrews</td> </tr> <tr> <td style="padding: 2px;">PREPARED BY: P.L. Alexander</td> <td style="padding: 2px;">REVIEWED BY: A.M. Esposito</td> </tr> </table>	PLAN DATE: May 2005	REVIEWED BY: C.F. Andrews	PREPARED BY: P.L. Alexander	REVIEWED BY: A.M. Esposito	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;">REVIEWS</td> <td style="width: 10%; padding: 2px;">INIT.</td> <td style="width: 40%; padding: 2px;">DATE</td> </tr> <tr><td style="height: 15px;"> </td><td> </td><td> </td></tr> <tr><td style="height: 15px;"> </td><td> </td><td> </td></tr> <tr><td style="height: 15px;"> </td><td> </td><td> </td></tr> <tr><td style="height: 15px;"> </td><td> </td><td> </td></tr> <tr><td style="height: 15px;"> </td><td> </td><td> </td></tr> </table>		REVIEWS	INIT.	DATE															
PLAN DATE: May 2005	REVIEWED BY: C.F. Andrews																							
PREPARED BY: P.L. Alexander	REVIEWED BY: A.M. Esposito																							
REVIEWS	INIT.	DATE																						
SCALE  0 NA None	 9.2.2005 SIGNATURE DATE																							

- 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 STUBOUTS
- 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 TELEMTRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
- 27 INSTALL NEW TELEMTRY 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

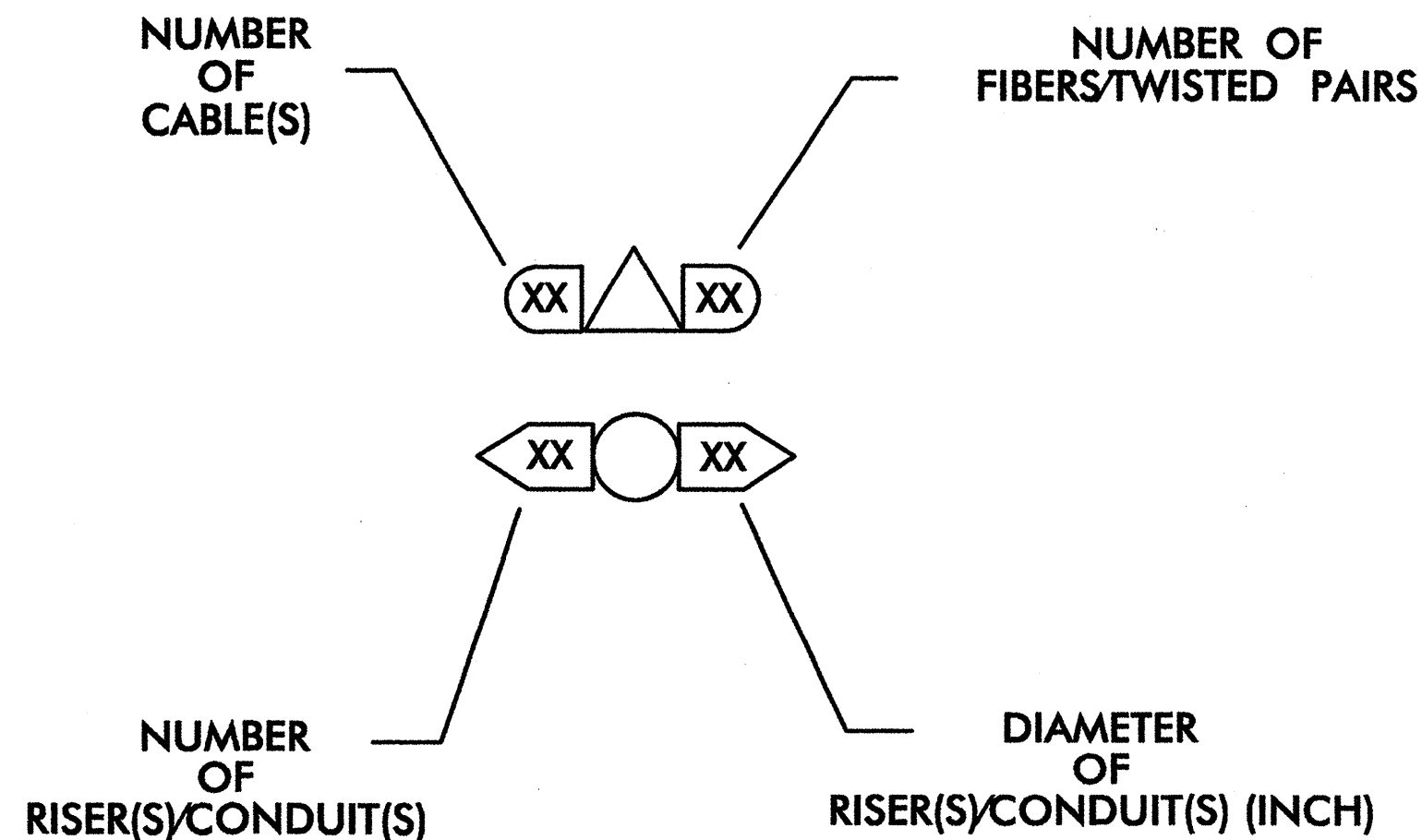
- 35 REMOVE EXISTING CABINET FOUNDATION
- 36 INSTALL CCTV CAMERA ASSEMBLY
- 37 INSTALL CCTV CAMERA WOOD POLE
- 38 INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
- 39 INSTALL JUNCTION BOX
- 40 INSTALL OVERSIZED JUNCTION BOX
- 41 REMOVE EXISTING JUNCTION BOX
- 42 INSTALL WOOD POLE
- 43 REMOVE EXISTING WOOD POLE
- 44 INSTALL AERIAL GUY ASSEMBLY
- 45 INSTALL STANDARD GUY ASSEMBLY
- 46 INSTALL SIDEWALK GUY ASSEMBLY
- 47 INSTALL MESSENGER CABLE
- 48 REMOVE EXISTING COMMUNICATIONS CABLE AND MESSENGER CABLE
- 49 REMOVE EXISTING COMMUNICATIONS CABLE
- 50 INSTALL TELEPHONE SERVICE
- 51 INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
- 52 INSTALL DELINEATOR MARKER
- 53 STORE 30 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
- 59 INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 200 FT OF CABLE
- 60 INSTALL FIBER OPTIC TRANSCEIVER

LEGEND

- F. O. — NEW FIBER OPTIC COMMUNICATIONS CABLE
- TWIST. PR. — NEW TWISTED PAIR COMMUNICATIONS CABLE
- EXIST. — 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
- Ⓢ NEW SPLICE ENCLOSURE
- Ⓢ EXISTING SPLICE ENCLOSURE
- NEW STANDARD GUY ASSEMBLY
- ▷ ◁ NEW CABLE STORAGE RACKS (SNOW SHOES)
- ⊠ EXISTING CONTROLLER AND CABINET
- XX-XXXX SIGNAL INVENTORY NUMBER

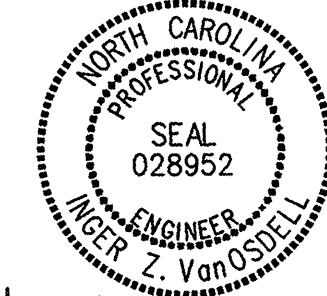
CONSTRUCTION NOTE SYBOLOGY KEY

- 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)



PLAN PREPARED IN THE OFFICE OF:

Kimley-Horn and Associates, Inc.
P.O. Box 33068
Raleigh, N.C. 27636-3068
(919) 677-2000

	CONSTRUCTION NOTES		
	DIVISION 5 WAKE COUNTY		
	PLAN DATE: SEPT. 3, 2004	REVIEWED BY: M.W. DUNZO	
	PREPARED BY: K.D. VANPATTEN	REVIEWED BY: I.Z. VANOSDELL	
REVISIONS		INIT.	DATE
0 N/A			
SIGNATURE		DATE 9-3-04	

SPLICE ENCLOSURE
DAVIS DR. SOUTH OF McCRIMMON PKWY
(CHANNEL 23 ON TOWN OF CARY SIGNAL SYSTEM PROJECT)

PROJECT REFERENCE NO.	SHEET NO.
U-4026	SIG.74

COLOR CODE
TIA/EIA 598-A

(1) BLUE

(2) ORANGE

(3) GREEN

(4) BROWN

(5) SLATE

(6) WHITE

(7) RED

(8) BLACK

(9) YELLOW

(10) VIOLET

(11) ROSE

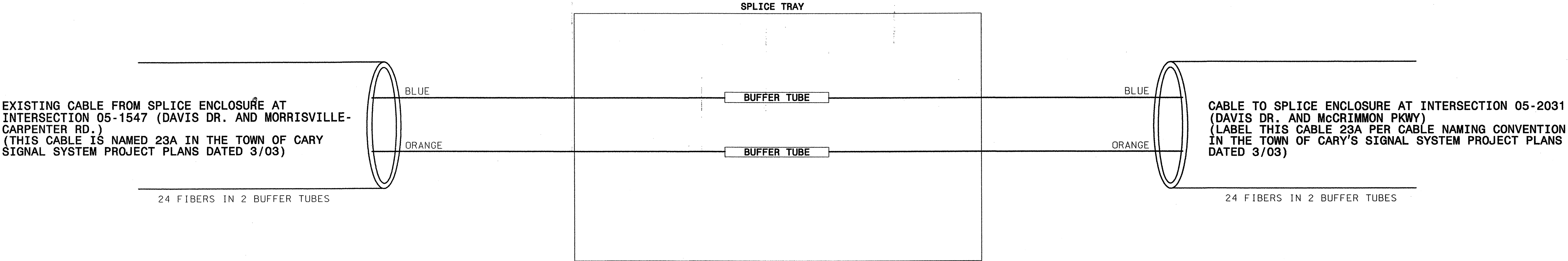
(12) AQUA

X - FUSION SPLICE INDIVIDUAL FIBER

BUFFER TUBE

SPLICE OR EXPRESS ENTIRE BUFFER TUBE AS NOTED

SPLICE ALL FIBERS IN BLUE & ORANGE BUFFER TUBES IN
EXISTING 23A CABLE TO LIKE FIBER COLORS IN BLUE &
ORANGE BUFFER TUBES IN NEW 23A CABLE



PLAN PREPARED IN
THE OFFICE OF:

**Kimley-Horn
and Associates, Inc.**
P.O. Box 33068
Raleigh N.C. 27636-3068
(919) 677-2000

122 N. McDowell St., Raleigh, NC 27603

DIVISION 5

PLAN DATE: SEPT. 3, 2004

PREPARED BY: K.D. VANPATTEN

REVISIONS

WAKE COUNTY

REVIEWED BY: M.W. DUNZO

REVIEWED BY: I.Z. VANOSDELL

INIT. DATE

0

NONE

SEAL

I.Z. Vanosdell
9-03-04
DATE

I:\01036085\systems\U-4026\SH2.dgn

05-2031
DAVIS DR. AND McCRIMMON PKWY
(CHANNEL 23 ON TOWN OF CARY SIGNAL SYSTEM PROJECT)

PROJECT REFERENCE NO.	SHEET NO.
U-4026	\$16.75

LEGEND

COLOR CODE
TIA/EIA 598-A

(1) BLUE

(2) ORANGE

(3) GREEN

(4) BROWN

(5) SLATE

(6) WHITE

(7) RED

(8) BLACK

(9) YELLOW

(10) VIOLET

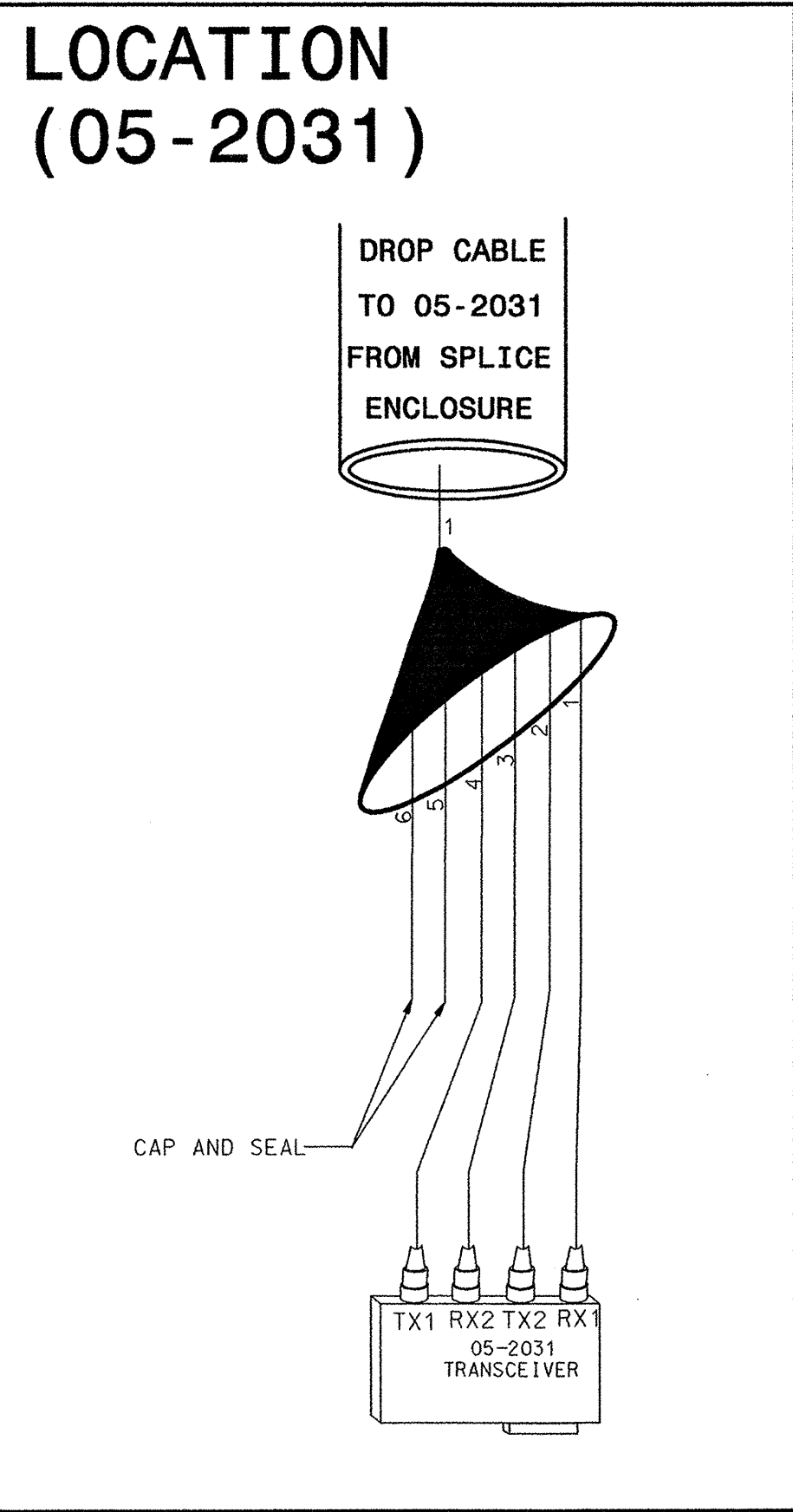
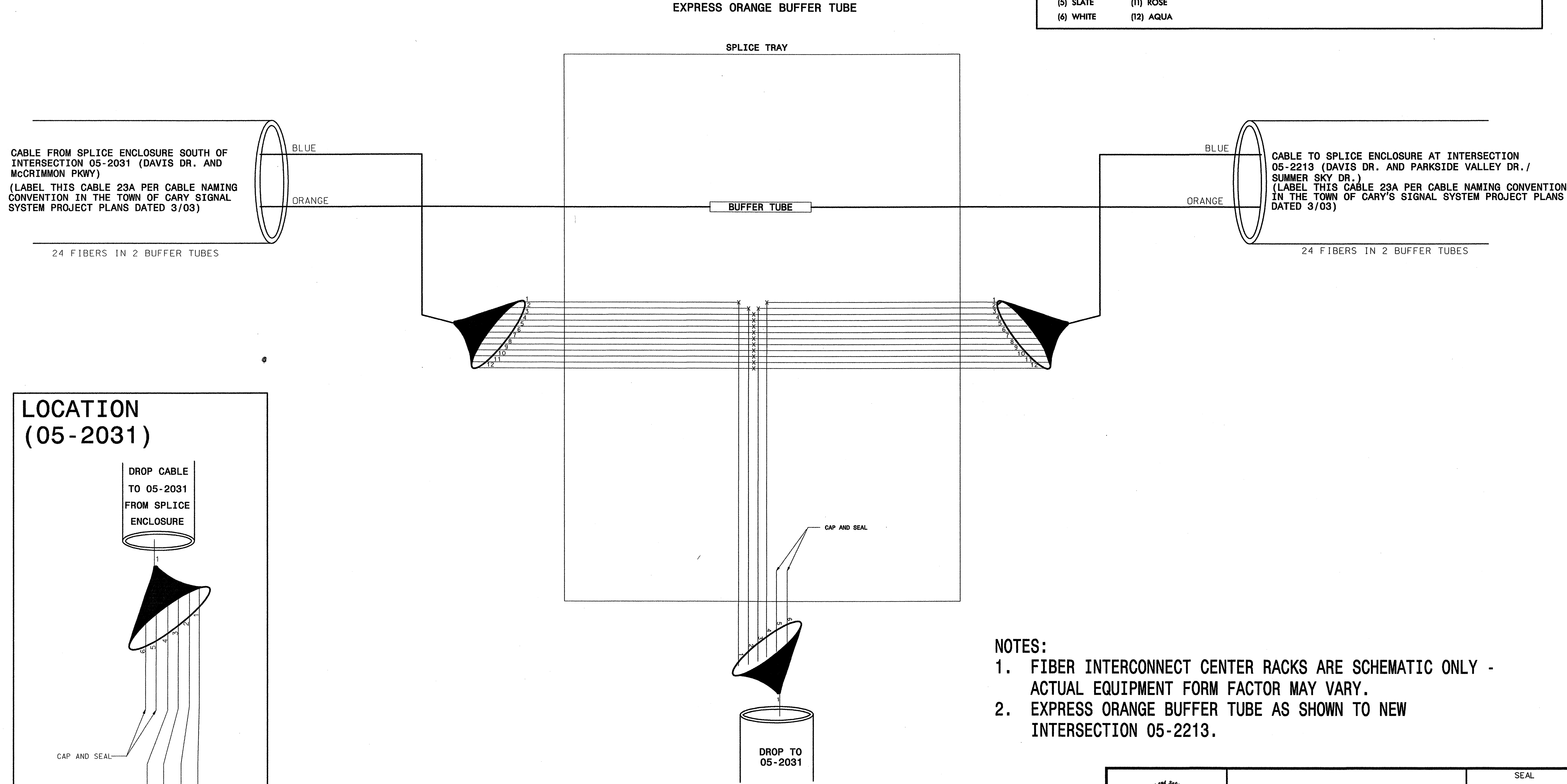
(11) ROSE

(12) AQUA

X - FUSION SPLICE INDIVIDUAL FIBER

BUFFER TUBE

SPLICE OR EXPRESS ENTIRE BUFFER TUBE
AS NOTED



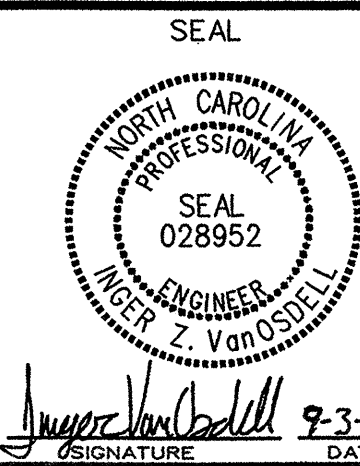
- NOTES:
- FIBER INTERCONNECT CENTER RACKS ARE SCHEMATIC ONLY - ACTUAL EQUIPMENT FORM FACTOR MAY VARY.
 - EXPRESS ORANGE BUFFER TUBE AS SHOWN TO NEW INTERSECTION 05-2213.

PLAN PREPARED IN
THE OFFICE OF:

Kimley-Horn
and Associates, Inc.
P.O. Box 33068
Raleigh N.C. 27636-3068
(919) 677-2000



SPLICE DIAGRAM			
DIVISION 5		WAKE COUNTY	
PLAN DATE: SEPT. 3, 2004	REVIEWED BY: M.W. DUNZO		
PREPARED BY: K.D. VANPATTEN	REVIEWED BY: I.Z. VANOSDELL		
REVISIONS	INIT.	DATE	



P:\01036085\systems\U-4026\sh13.dgn

05-2213
DAVIS DR. AND PARKSIDE VALLEY DR./SUMMER SKY DR.
(CHANNEL 23 ON TOWN OF CARY SIGNAL SYSTEM PROJECT)

PROJECT REFERENCE NO.	SHEET NO.
U-4026	SIG.76

COLOR CODE
TIA/EIA 598-A

(1) BLUE

(2) ORANGE

(3) GREEN

(4) BROWN

(5) SLATE

(6) WHITE

(7) RED

(8) BLACK

(9) YELLOW

(10) VIOLET

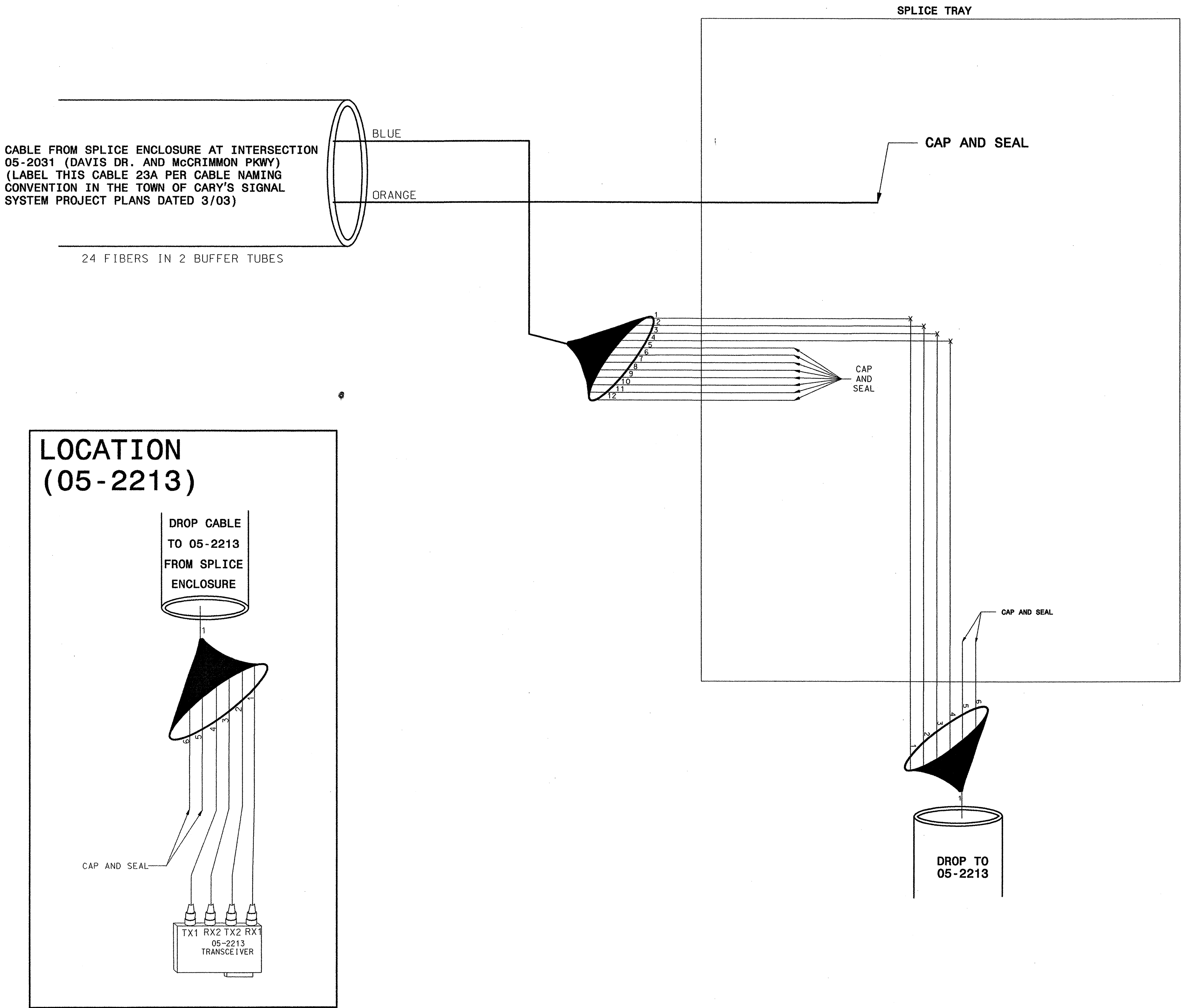
(11) ROSE

(12) AQUA

X - FUSION SPLICE INDIVIDUAL FIBER

BUFFER TUBE

SPLICE OR EXPRESS ENTIRE BUFFER TUBE AS NOTED



NOTES:

1. FIBER INTERCONNECT CENTER RACKS ARE SCHEMATIC ONLY - ACTUAL EQUIPMENT FORM FACTOR MAY VARY.

PLAN PREPARED IN THE OFFICE OF:



Kimley-Horn and Associates, Inc.
P.O. Box 33068
Raleigh N.C. 27636-3068
(919) 677-2000



222 N. McDowell St., Raleigh, NC 27603

DIVISION 5

PLAN DATE: SEPT. 3, 2004

PREPARED BY: K.D. VANPATTEN

WAKE COUNTY

REVIEWED BY: M.W. DUNZO

REVIEWED BY: I.Z. VANOSDELL

REVISIONS

INIT.

DATE

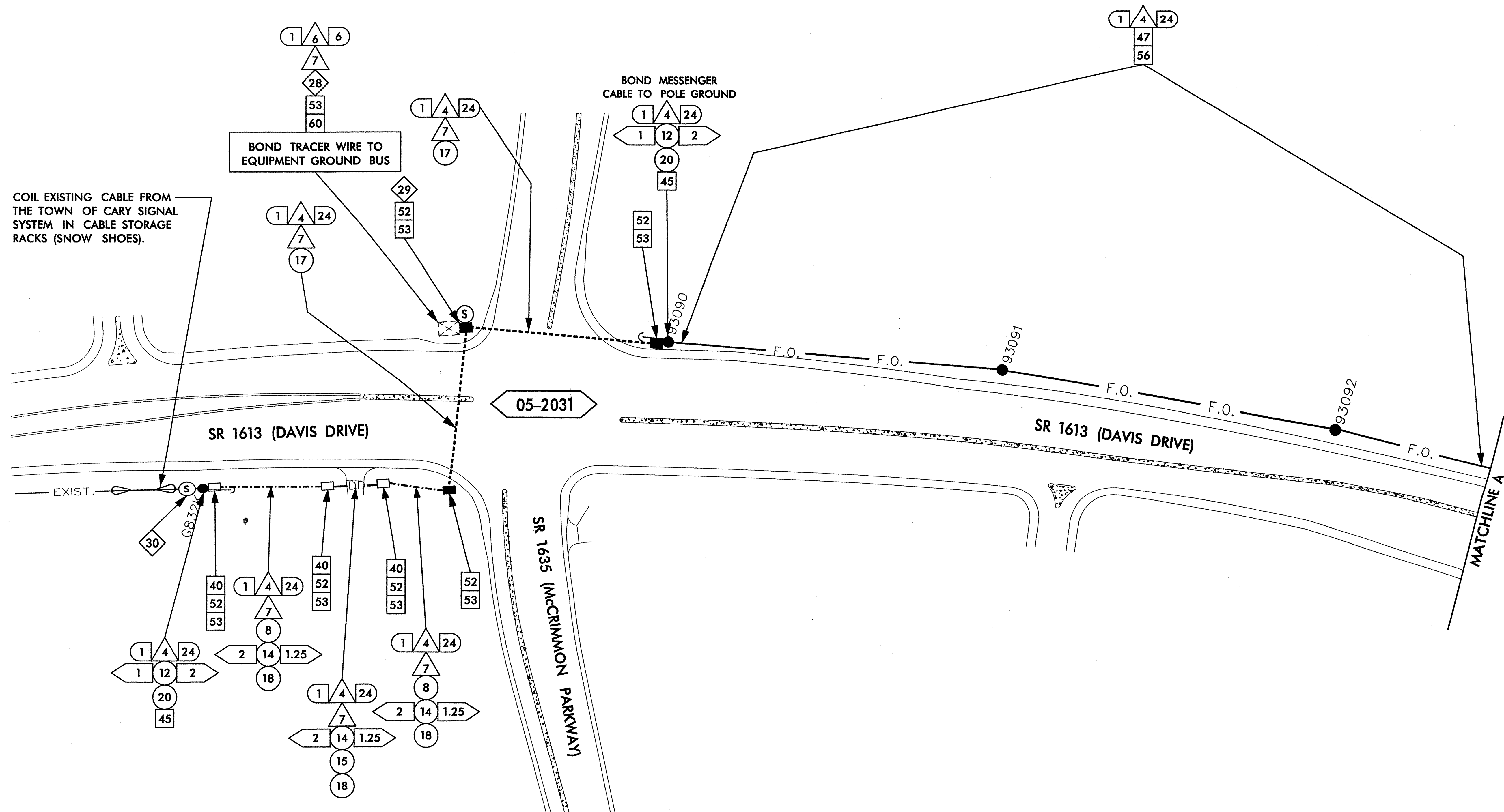
SEAL



028952

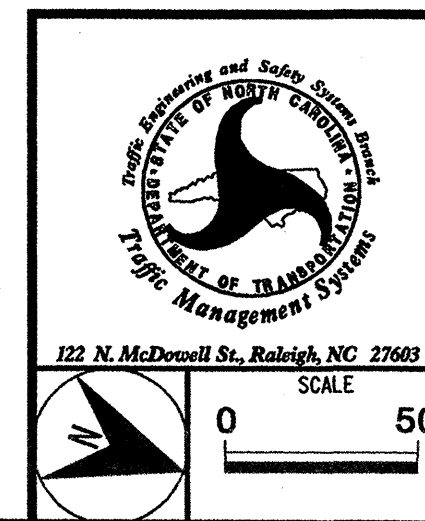
I.Z. Vanosdell

9-3-04



PLAN PREPARED IN THE OFFICE OF:

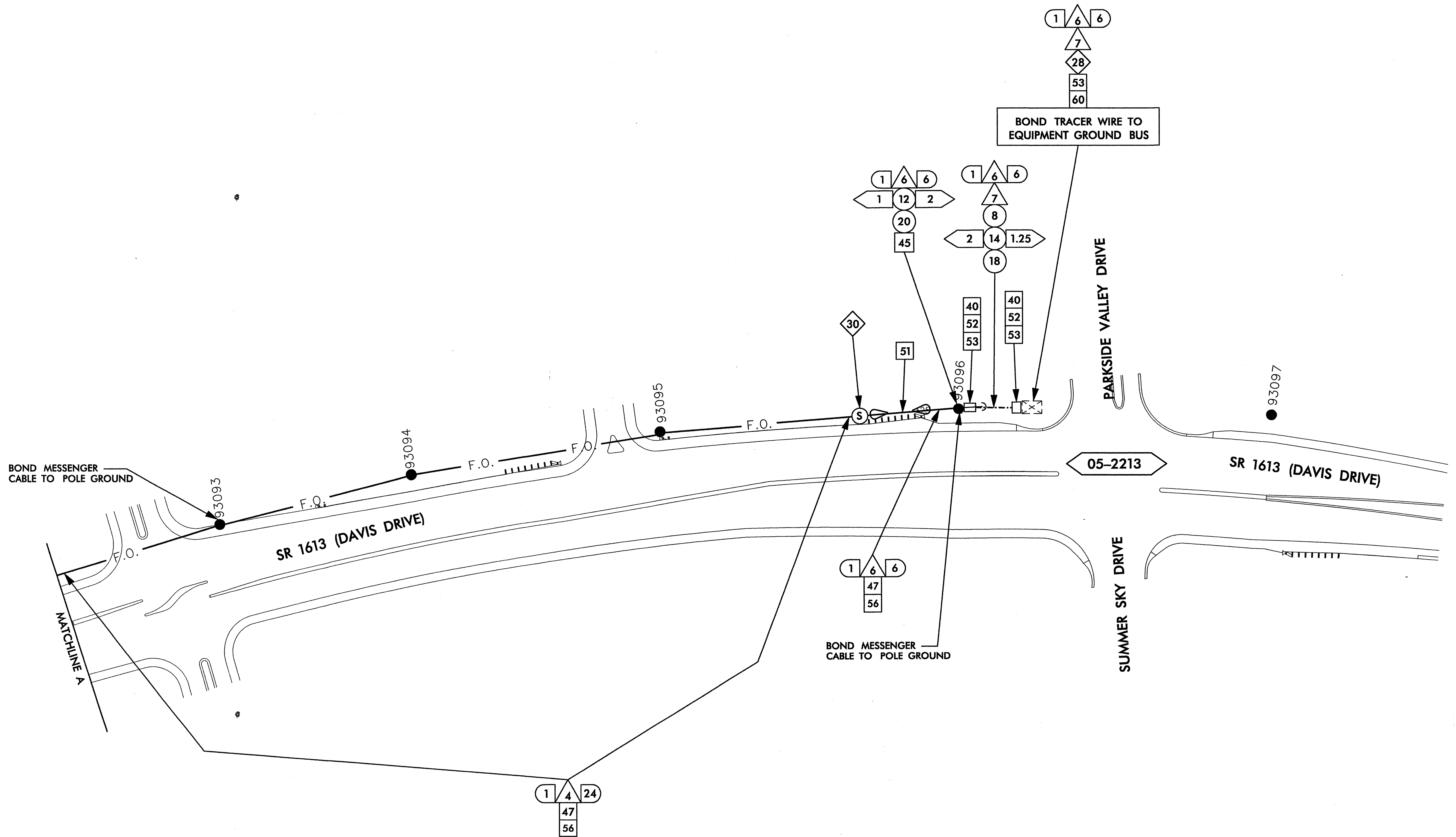
Kimley-Horn and Associates, Inc.
 P.O. Box 33068
 Raleigh, N.C. 27636-3068
 (919) 677-2000



CABLE ROUTING PLANS	
DIVISION 5	
WAKE COUNTY	
PLAN DATE: SEPT. 3, 2004	REVIEWED BY: M.W. DUNZO
PREPARED BY: K.D. VANPATTEN	REVIEWED BY: I.Z. VANOSDELL
REVISIONS	INIT. DATE

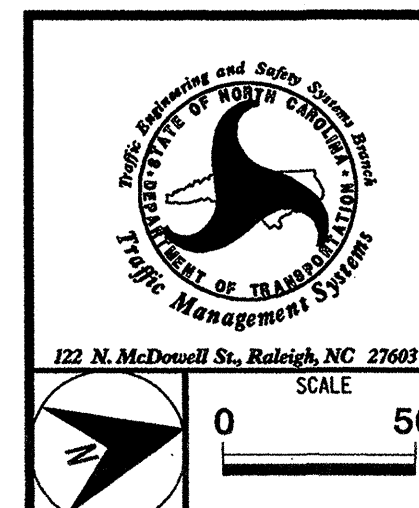
SEAL

 I. Z. VANOSDELL
 7-3-04
 DATE



PLAN PREPARED IN
THE OFFICE OF:

**Kimley-Horn
and Associates, Inc.**
P.O. Box 33068
Raleigh N.C. 27636-3068
(919) 677-2000



CABLE ROUTING PLANS			
DIVISION 5		WAKE COUNTY	
PLAN DATE: SEPT. 3, 2004	REVIEWED BY: M.W. DUNZO		
PREPARED BY: K.D. VANPATTEN	REVIEWED BY: I.Z. VANOSDELL		
REVISIONS		INIT.	DATE

SEAL

I.Z. Vanosdell
9-3-04
DATE