

LOAD SYN

Design Reference Material

- Design Requirements
- installation.
- fully loaded.

- the following:
- (919) 773-2800.

NCDOT Prepareo

750 N.Greenfie 0

	METAL POLE No. 5		PROJEC	T REFERENCE NO	. SHEET NO.
	WETAL FULE NUL 5			U-3308	Sig. 16.3
			·		
	MAST ARM LOADING SCH	IEDUL	.E		
ading Mbol	DESCRIPTION	AREA	SIZE	WEIGHT	
	SIGNAL HEAD 12″–4 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	15.8 S.F.	31.5″ W X 72.0″ L	78 LBS	
000	SIGNAL HEAD 12″–3 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	12.8 S.F.	31.5″ W X 58.5″ L	63 LBS	
	SIGNAL HEAD 12″–5 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	20.7 S.F.	48.0" W X 62.0" L	107 LBS	
NAME SIGN	street name sign rigid mounted	12.0 S.F.	18.0″ W X 96.0″ L	27 LBS	
	pedestrian signal head with mounting hardware	2.2 S.F.	18.5″ W X 17.0″ L	21 LBS	
	sign Rigid Mounted	7.5 S.F.	30.0" W X 36.0" L	14 LBS	

NOTES

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

• The traffic signal project plans and special provisions.

• The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

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

3. Design all signal supports using stress ratios that do not exceed 0.9. 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when

5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.

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.Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.

b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm. c. The roadway clearance height for design is as shown in the elevation views. d. The top of the pole base plate is .75 feet above the ground elevation.

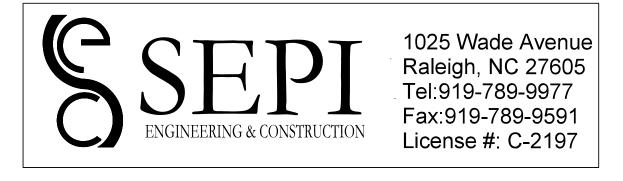
e Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.

8. The pole manufacturer will determine the total height (H2) of the pole using the greater of

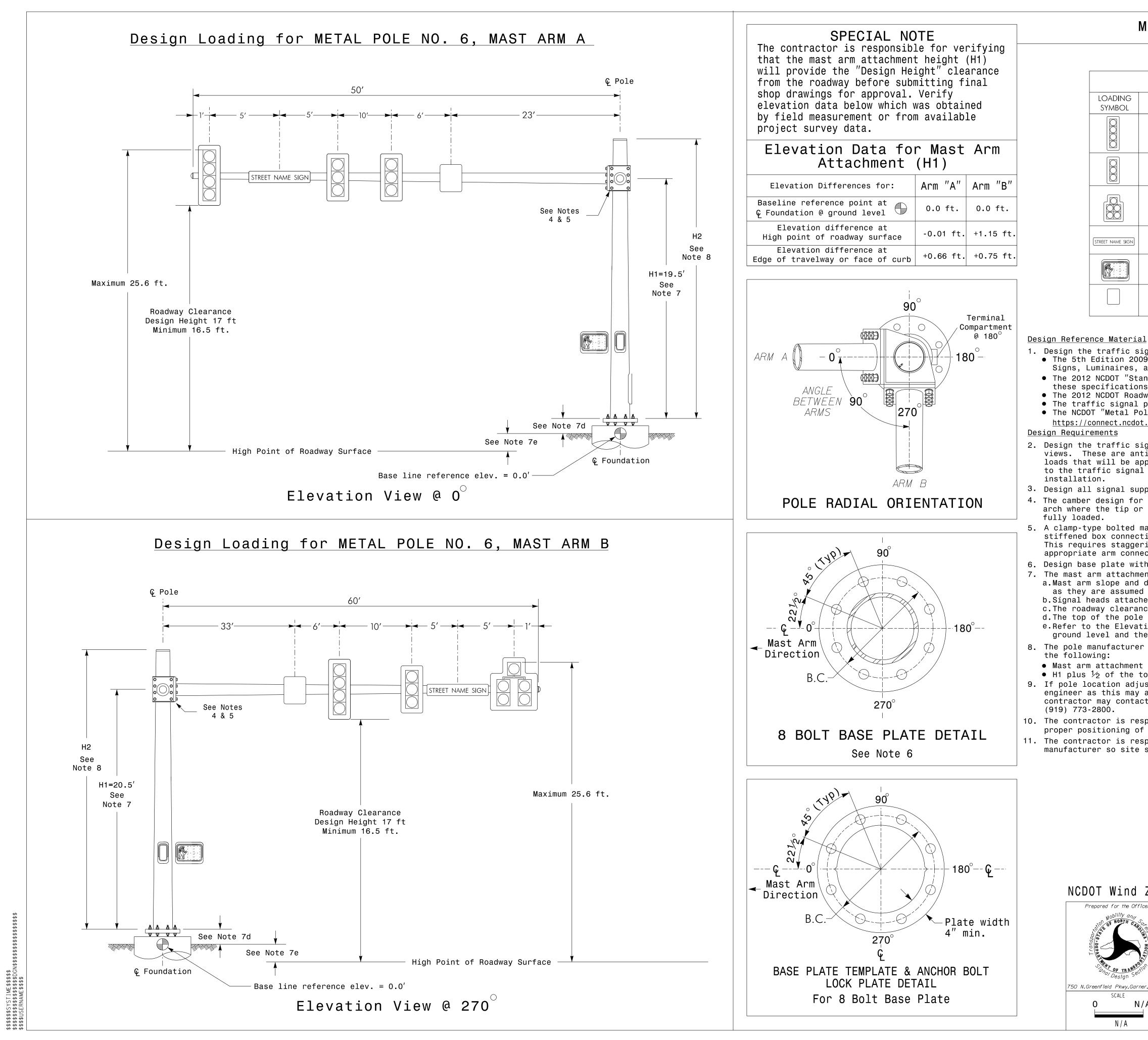
• Mast arm attachment height (H1) plus 2 feet, or • H1 plus $\frac{1}{2}$ of the total height of the mast arm attachment assembly plus 1 foot. 9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The

contractor may contact the Signal Design Structural Engineer for assistance at 10. The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway.

11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.



Wind Zone	4 (90 mph)					
d for the Offices of:					SEAL	
Mobility and Same	NC 55 (South A	lston Av	/enue)	TH CARO	
Division M WOLL	a SR 1926 (Ang		nue)		SEAL	NP.
WA AN ANSPORT	Division 5 Durham Co	unty		Durham	28430	°°°°
OF TRESECT	PLAN DATE: December 2014	REVIEWED BY: J	Hochana	adel	FF TAN WGINEEN	
eld Pkwy,Garner,NC 27529	PREPARED BY: M Copple	REVIEWED BY:			HOCH P. HOCH	
SCALE	REVISIONS		INIT.	DATE	DocuSigned by:	
N/A					MMPAN	4/02/15
					50781D2BF98C498	DATE
N / A					SIG. INVENTORY NO.	05-1026



			PROJEC	T REFERENC	CE NO.	SHEET	NO.
	METAL POLE No. 6			U-3308		Sig. 1	
	MAST ARM LOADING SCH	IEDUL	.E				
loading symbol	DESCRIPTION	AREA	SIZE	WEIGHT			
	SIGNAL HEAD 12″–4 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	15.8 S.F.	31.5″ W X 72.0″ L	78 LBS			
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STREET NAME SIGN	street name sign Rigid mounted	12.0 S.F.	18.0″ W X 96.0″ L	27 LBS			
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5″ W X 17.0″ L	21 LBS			
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS			

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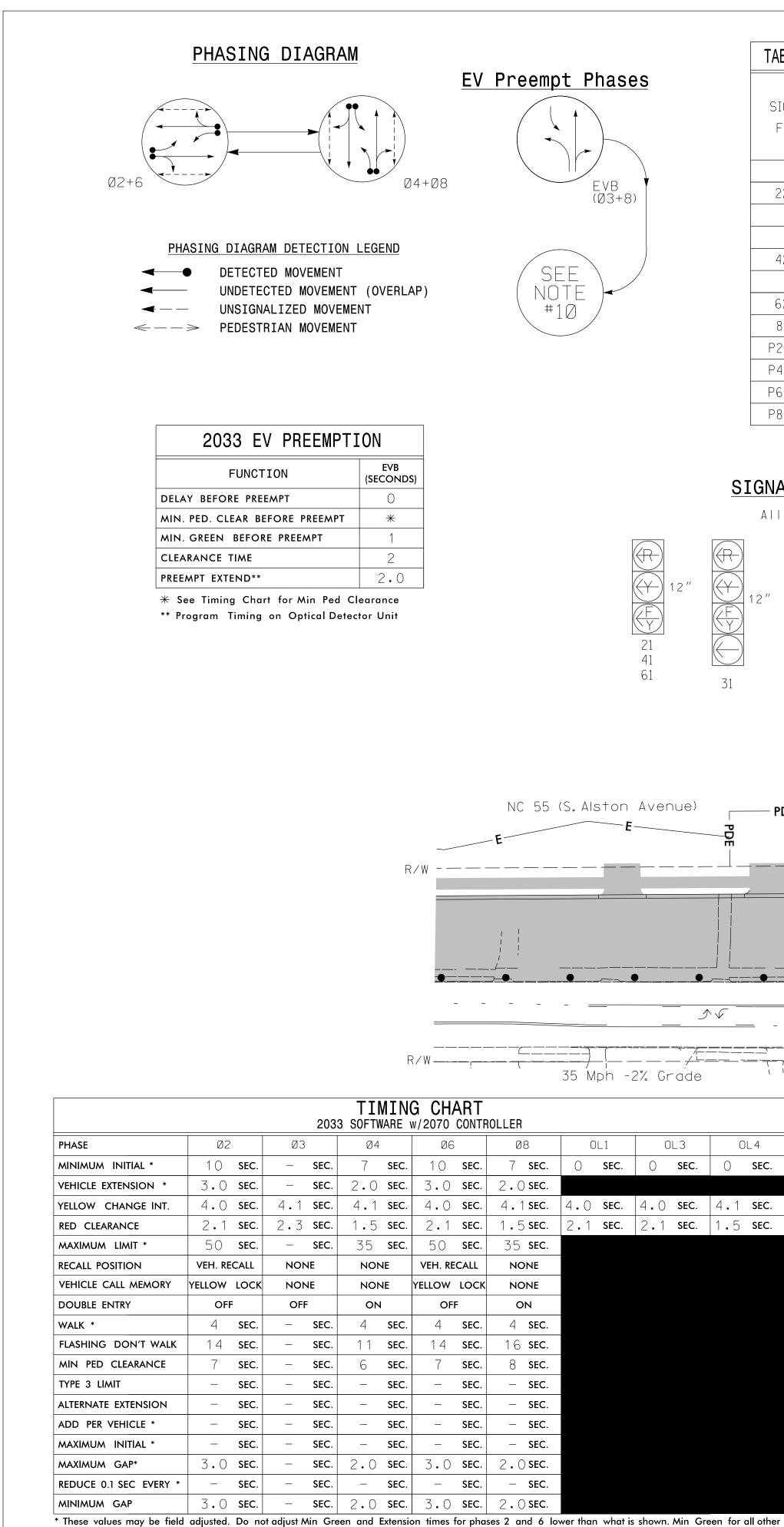
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Mobility and Some NORTH CARDON	NC 5	5 (South A	lston A	venue	e)	WITH CARO	
DIVISION MAX: NOIL	SR	a 1926 (Ang	•	nue)		SEAL	NT
A ANSPOT	Division	5 Durham Co	unty		Durham	28430	EL '''''
Design Sector	PLAN DATE:	December 2014	REVIEWED BY: J	Hochana	adel	FF TO CONFER	N II
eld Pkwy,Garner,NC 27529	PREPARED BY:	M Copple	REVIEWED BY:			P. HOCH	A.,
SCALE		REVISIONS		INIT.	DATE	DocuSigned by:	
N/A						Mmp DL	4/02/15
						50781D2BF98C498	DATE
N / A						SIG. INVENTORY NO.	05-1026

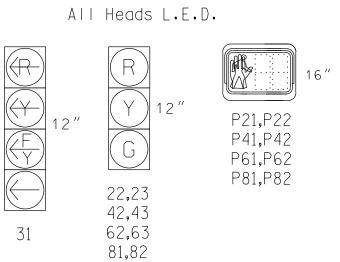


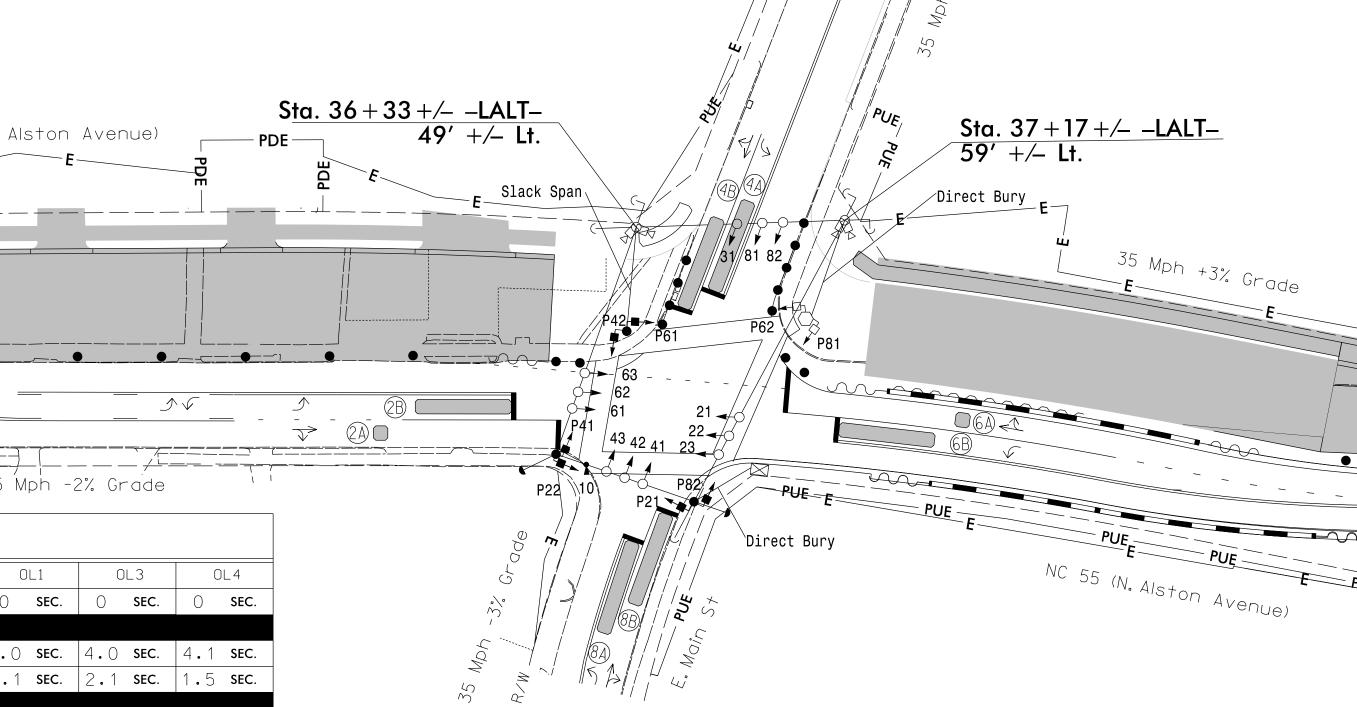
phases should not be lower than 4 seconds.

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42,43	R	G	R	R
61	F	-R	≺R	╶┼
62,63	G	R	R	Y
81,82	R	G	G	R
P21,P22	W	DW	DW	DRK
P41,P42	DW	W	DW	DRK
P61,P62	W	DW	DW	DRK
P81,P82	DW	W	DW	DRK

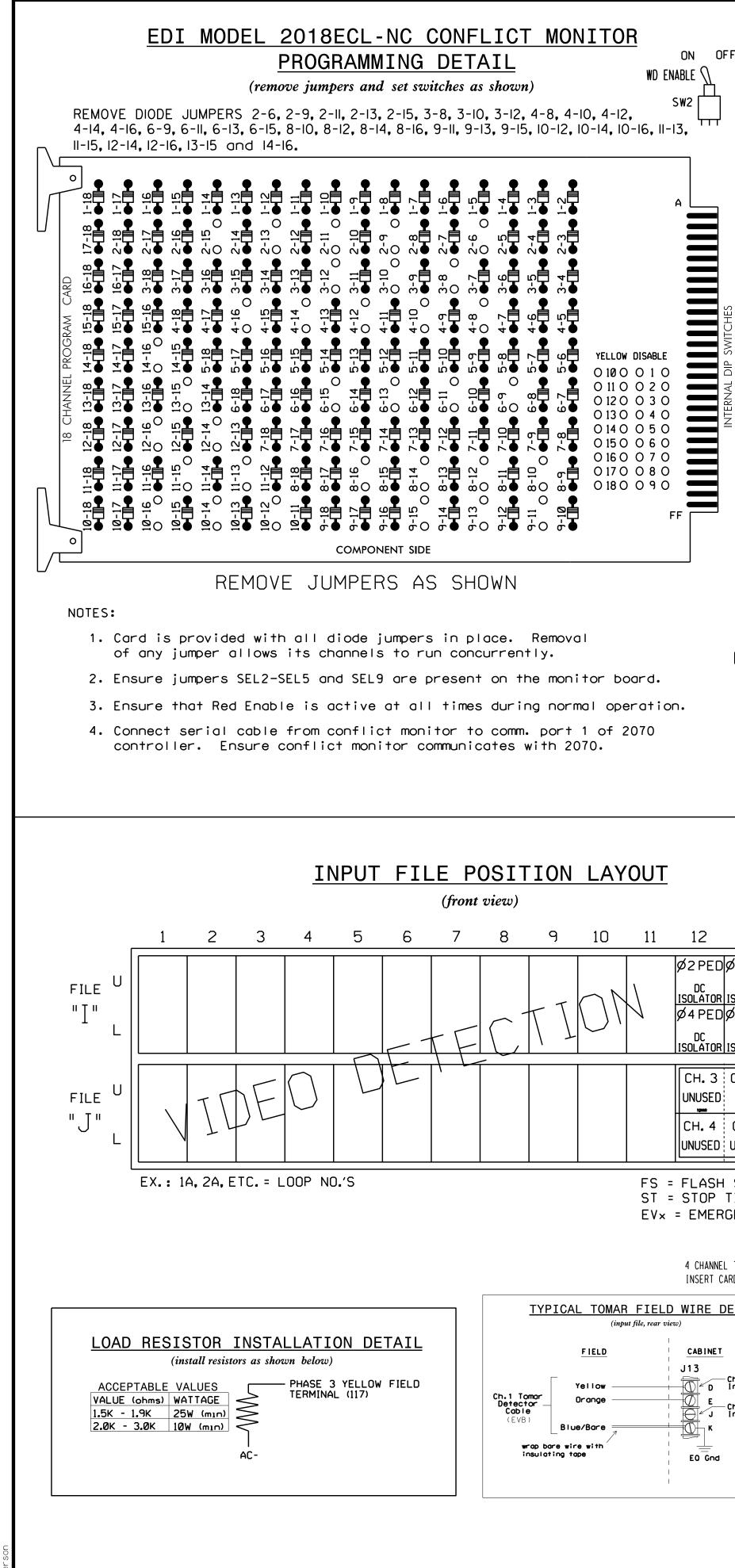
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P62	N/A	N/A	N/A	X -	6	- SEC.		- X					X -	-	7. Omit "WAI	_K" and flashing	g "DON'T WA	LK" with no	
P82	N/A Detect	N/A	N/A	X -	8	– SEC.	- SEC.	- X				- -	Х -	-		oedestrian heads lk″ time	s to counto	down the flash	ing
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											Prepare	ed for Mobilit	the Offic ty and RTH CAR	ces of:	(South/	NC 55 North Alston	Avenue)	SE	AL
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			<u> </u>			~~	1025	Nade	Aver		L L SIG	SMT OF Dal Desi	TRANSPORTIO	5	Division 5 PLAN DATE: Septe	Durham County		urham el	8430 SINEE
		C	S		.T.	DT	1025 Raleig Tel:91	h, NC	276	D5 750	N.Greenfi	Par OF Desi ield Pk	ign Section		PLAN DATE: Septe	Durham County ember 2014 REVIEWED BY Drayton REVIEWED BY	: J Hochanad		8430 GINEER HOCHAULIN

SIGNAL FACE I.D.





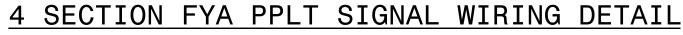


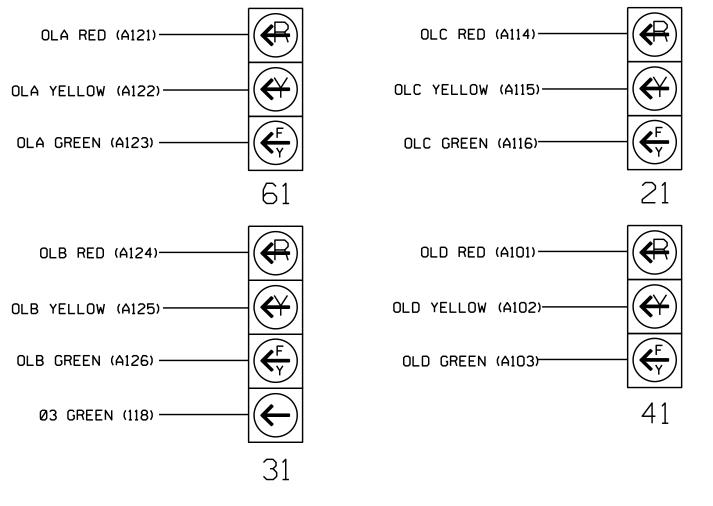


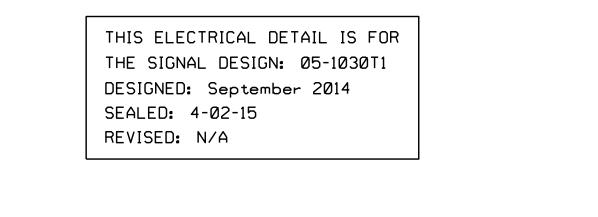
																PROJECT F	EFERENC	E NO.	SHEET NO.
F F	NOTES														t		3308		Sig.17.1
	1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in					SI	GNA	L H	EAD) H	100	K-U	IP (СНА	RT				
	the output file. Verify that signal heads flash in accordance with the signal plans.	LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7 S	58	59	S1Ø	S11	S12	AUX S1	AUX AUX S2 S3	AUX S4	AUX S5	AUX S6
ON → RF 2010	2. Program controller to Start Up in phases 2 and 6 green.	CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10 17	11	12	18
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	3. Set power-up flash time to 0 seconds within the controller programming. The conflict monitor will govern startup	PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2 SPAF	E OL3	OL4	SPARE
		SIGNAL HEAD NO.	NU	22,23			42,43		NU 62						★	31 NU	★	★ 41	NU
RF SSM	 4. Enable Simultaneous Gap-Out feature for all phases. 5. Program all timing information into phase banks 1, 2, 	RED		128			101			34			107						
FYA 1−9 FYA 3−10 FYA 5−11	and 3 unless otherwise noted. 6. Set phase bank 3 maximum limit to 250 seconds for phases	YELLOW		129		*	102		1	35			108						
ш Г Г Г Г Г Г Г Г Г Г Г Г Г Г Г Г Г Г Г	used.	GREEN		130			103		1	36			109						
	 Program phases 4 and 8 for Double Entry. 8. Ensure start up flash phases are coordinated with flash 	RED													A121 (A124	A114	A1Ø1	
	program block assignments.	YELLOW													A122 (4125	A115	A102	
	9. Program Startup Ped Calls for phases 2, 4, 6, and 8. 10. Set the Red Revert interval on the controller to 1 second.	FLASHING													A123 f	4126	A116	A1Ø3	
	11. This cabinet and controller are part of the Durham	ARROW GREEN ARROW				118													
ON →	Signal System.				113			104			119			110					
	EQUIPMENT INFORMATION	 ∕∕			115			106			121			112					
	CONTROLLER	NU = Nc	L 5† U:	sed]
15	CABINET	* Den ins						esist is sh			e l	oad r	resi	stor					
	CABINET MOUNTBASE OUTPUT FILE POSITIONS18 WITH AUX FILE	★ See									ail	belo	w.						
DENOTES POSITION OF SWITCH	LOAD SWITCHES USEDS2,S3,S4,S5,S6,S8,S9,S11,S12, AUX S1,AUX S2,AUX S4,AUX S5																		
	PHASES USED			4 S	EC	TIC	N I	FYA	PPI	LT	S	IGN	AL	WI	RIN	IG DE	ΙΑΤ	L	
	OVERLAP 12 OVERLAP 2	<u>4 SECTION FYA PPLT SIGNAL WIRING DET</u> (wire signal heads as shown)																	
	OVERLAP 3			OLA R	ED (A	A121)—			R			OL	.C RED	D (A11	4)——	[
	* See FYA PPLT Programming Detail on Sheet 2.				_				\leq							-	\smile		
			OLA	YELL	OW (A	4122)-			¥)			OLC Y	C YELLOW (A115)						
	INPUT FILE CONNECTION & PROGRAMMING CHART		OLA YELLOW (A122) OLA GREEN (A123) OLA GREEN (A123) OLC GREEN (A116) OLC GREEN (A116)											.6)——		F			
		61										21							
13 14			OLB RED (A124) OLD RE										.D REC	D (A10)1) ——	[
Ø6PED FS	LOOP NO. LOOP INPUT DETECTOR PIN TERMINAL FILE POS. NO. NO. ATTRIBUTES PHASE															-	$\underbrace{}_{(4)}$		
DC DC ISOLATOR ISOLATOR Ø8PED ST	PED PUSH BUTTONS		OLB	YELL	OW (A	4125)-						OLD Y	ELLU	W (A](\smile		
DC DC ISOLATOR ISOLATOR	P21,P22 TB8-4,6 I12U 25 67 2 2 PED P41,P42 TB8-5,6 I12L 27 69 2 4 PED		OLE	B GREE	En (a:	126) —			F Y			OLD	GREE	N (A10)3)		€ Y		
Сн. 1 5	P61,P62 TB8-7,9 I13U 26 68 2 6 PED			03 GR	EEN (118) —											41		
	P81,P82 TB8-8,9 II3L 28 70 2 8 PED							 ,	31										
CH.2 M UNUSED T	NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES AS SPECIFIED ON SIGNAL DESIGN PLANS.								<u> </u>										
SENSE	INPUT FILE POSITION LEGEND: J2L DETECTOR ATTRIBUTES LEGEND:																		
TIME GENCY VEHICLE PREEMPT	FILE J 1-FULL TIME DELAY							Гт	HIS F	ELEC		CAL DE	ΕΤΑΠ	IS	FOR	7			
1	LOWER 3-RESERVED							Т	HE SI	IGNA	AL DE	ESIGN:	0 5-	-1030					
L TOMAR OSP CARD ARD INTO SLOT J13	4-COUNTING 5-EXTENSION							S	EALE	D: 4	4-02		er 21	014					
DETAIL	6-TYPE 3 7-CALLING 8-ALTERNATE							R	EVISE	ED:	N/A								
-Channel 1 Input (EVB)								et 1 c	f 2										
-Channel 2 Input (UNUSED)	SPECIAL DETECTOR NOTE	ELECTI	AUAL A		OGRAM ETAILS			Sout	h / No			55 Alst	on	Ave	nue			SEAL	1111,
		P	repared	in the Of bility and NORIN	fices of	<i>":</i>	١				a	t		-		,		SFESSION	
	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		1010 0 P		of eny Div.	-	Divisi			D	urham	in S _{County}	,	<u> </u>		rham		SEAL 008453	······
	engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.				NOL NO	-		t <mark>e: Nov</mark> d вү: Jam	es Pet			REVIEWED REVIEWED		JTR	-			VGINEER 7. ROW	Ennin
		750 N (Trais M	OF TRANS anagement 1 Pkwy.Go	Secto rner. MC	27520		RE	VISIONS					INIT.	. D		hn T. R	•	
		, 50 m .c									·						ID60C145EE4	0	_{Dате} 5 - 1030T1

PROJECT REFERENCE NO.	SHEET
U - 3308	Sig.17

	SIGNAL HEAD HOOK-UP CHART																	
٥٧.	S1	S2	S3	S4	S5	S6	S7	S8	59	S1Ø	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
L	1	2	13	3	4	14	5	6	15	7	8	16	g	10	17	11	12	18
	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1		SPARE	0L3		SPARE
).	NU	22,23	P21 . P22	★ 31	42,43	P41. P42	NU	62,63	P61. P62	NU	81,82	P81, P82	★ 61	★ 31	NU	21 ★	★	NU
		128			101			134			107							
1		129		*	102			135			108							
		130			103			136			109							
													A121	A124		A114	A1Ø1	
1													A122	A125		A115	A102	
IG													A123	A126		A116	A103	
				118														
			113			104			119			110						
			115			106			121			112						







OVERLAPS [1-4] PROGRAMMING DETAIL Program overlaps as follows: Main Menu = 4) OVERLAP OVERLAP [1]: LOADSWITCH = 9 VEH SET 1 = 2 YELLOW CLEARANCE = 4.0 RED CLEARANCE = 2.1 PRESS '+' TWICE OVERLAP [3]: LOADSWITCH = 11 VEH SET 1 = 6 YELLOW CLEARANCE = 4.0 RED CLEARANCE = 2.1 PRESS '+' OVERLAP [4]: LOADSWITCH = 12 VEH SET 1 = 8 YELLOW CLEARANCE = 2.1	<pre>FYA PPLT PROGRAMMING 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 3 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 3 = 96 3. Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE Phase 3 RED = 94, Phase 3 YELLOW = 95 </pre>	PPOJECT REFERENCE NO. SHEET NO. U:3308 Sig.17.2 EMERGENCY VEHICLE PREEMPTION PROGRAMMING 1. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 2) EMERGENCY VEHICLE EVB Clear = 2 EVB Clearance Phases = 3.8 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1 3. Ped Clear Before Preempt is a pedestrian timing parameter. and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 2 MIN FDW = 7 PHASE 4 MIN FDW = 7 PHASE 6 MIN FDW = 8 Program extend time on optical detector units for 2.0 sec for EVB.
YELLOW CLEARANCE = 4.1 RED CLEARANCE = 1.5 END OF OVERLAP PROGRAMMING	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.	SPECIAL NOTES EV PREEMPT PROGRAMMING Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y
FLASHER CIRCUIT MODIFICATION DETAIL IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, WAKE THE FOLLOWING FLASHER CIRCUIT CHANGES: 1. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2. 2. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3. 3. REMOVE FLASHER UNIT 2. THE CHANGES LISTED ABOVE TIES ALL PHASES AND OVERLAPS TO FLASHER UNIT 1.	OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 1, 3, 4	MIN WALK DURING PREEMPTION PROGRAMMING To disable MIN WALK pedestrian timing during preemption, program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3 STARTUP CALLS PROGRAMMING Prevents Veh Call to phase 3 during Startup, Phase 3 used only during Preempt. Main Menu - 9) UTILITIES - 1) STARTUP VEHICLE CALLS 2,4,6,8
	THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: Ø5-1030T1 DESIGNED: September 2014 SEALED: 4-02-15 REVISED: N/A	Electrical Detail - Sheet 2 of 2 ELECTRICAL AND PROGRAMMING DETAILS FOR: Propored In the Offices of. Propored In the Offices of. Propored In the Offices of. Division 5 PLAN DATE: November 2014 PREPARED BY: JAMES Peterson REVISIONS TSD N.Greenfield Phys.Garner. NC 27529 Details reviewed BY: REVISIONS Division 5 PLAN DATE: November 2014 REVISIONS REVISIONS NG. 55 Durham PREVISIONS NIT. DATE JATE SIG. INVENTORY NO. 05-1030T1

01-APR-2015 10:54 S:*ITS&SU*ITS Sigr jtpeterson

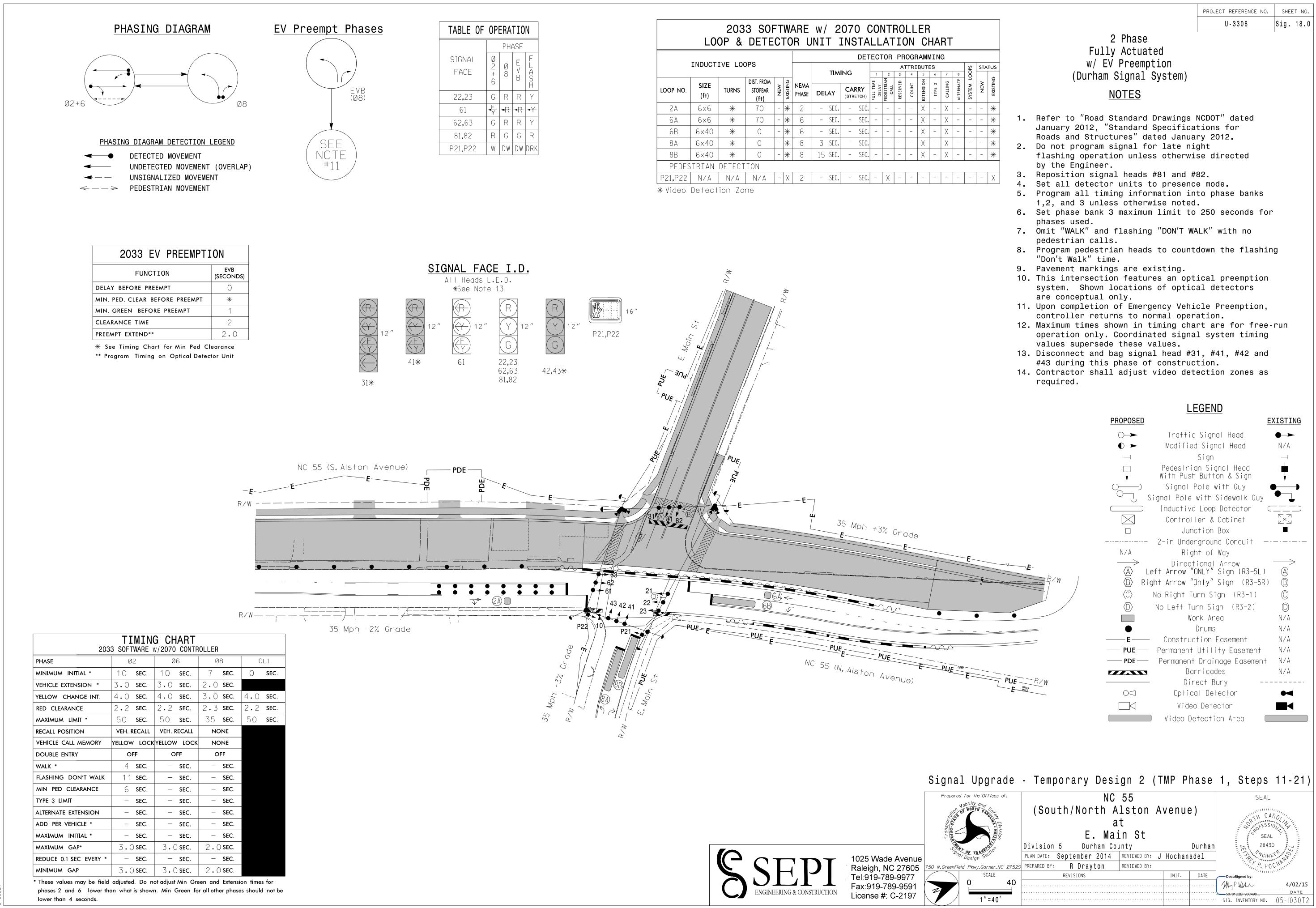
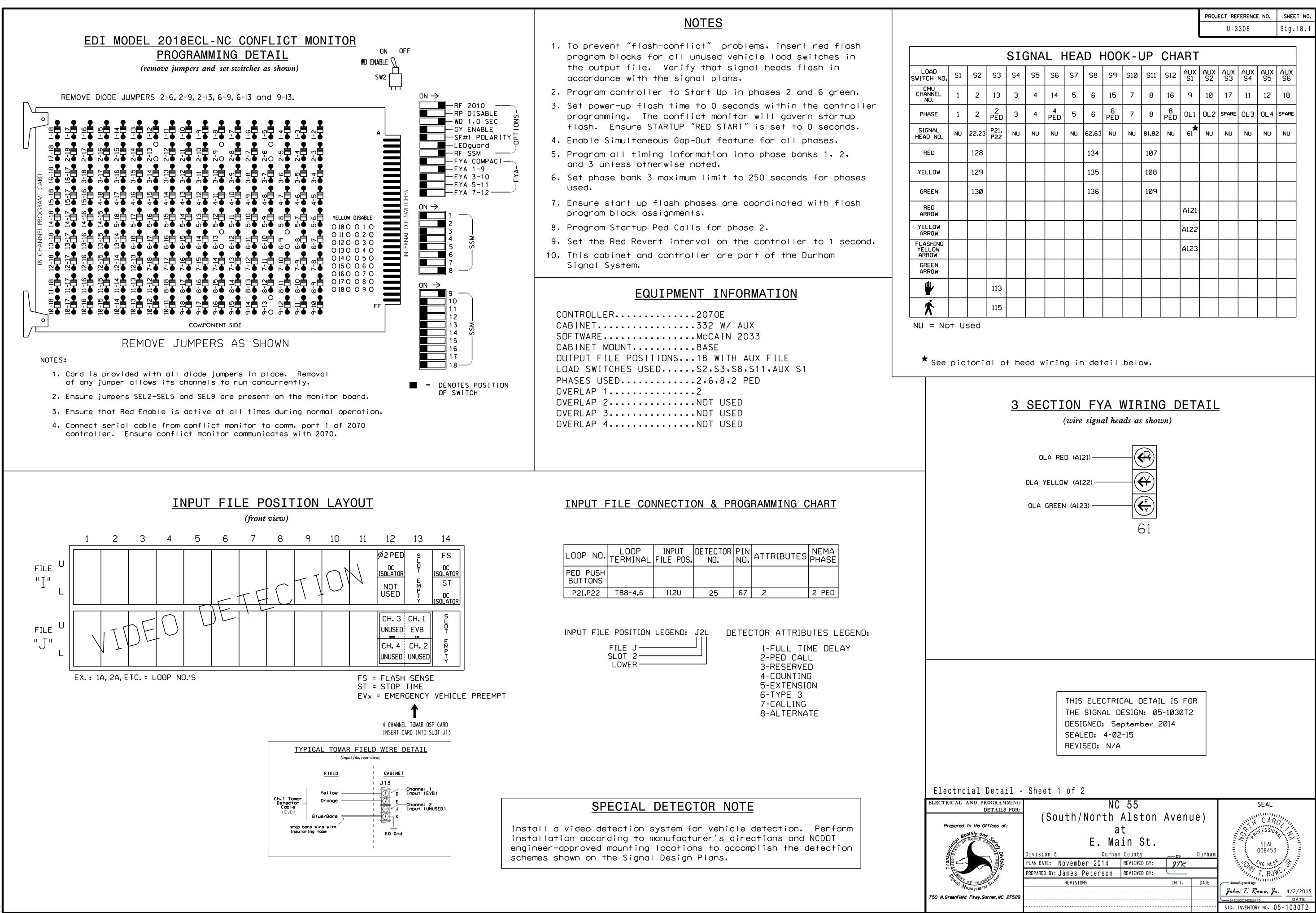
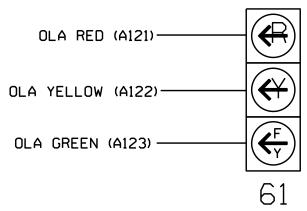


TABLE OF	0PI	ERA	TIO	N
		PH	ASE	
SIGNAL Face	Ø 2+ 6	Ø 8	E V B	TUDL
22,23	G	R	R	Y
61	₹	- R	₹R	- ¥-
62,63	G	R	R	Y
81,82	R	G	G	R
P21,P22	W	DW	DW	DRK

									DET	ECI	ΓOR	PR	OGF	RAM	MIN	(
	INDUCT	IVE LOO	OPS					TIA 4					A٦	TRI	BUT	ES	
								TIM	ING		1	2 Z	3	4	5	6	
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	DEL	AY.	CAF (STRE	RRY ETCH)	PELAY PELAY	PEDESTRIAN CALL	RESERVED	COUNT	EXTENSION	TYPE 3	
2A	6x6	*	70	-	*	2	-	SEC.	-	SEC.	-	-	-	-	Х	-	
6A	6x6	*	70	-	*	6	-	SEC.	-	SEC.	-	-	-	-	Х	-	
6B	6×40	*	0	-	*	6	-	SEC.	-	SEC.	-	-	-	-	Х	-	
8A	6×40	*	0	-	*	8	3	SEC.	-	SEC.	-	-	-	-	Х	-	
8B	6×40	*	0	-	*	8	15	SEC.	-	SEC.	-	-	-	-	Х	-	
PEDES	STRIAN	DETECT	ION														
P21,P22	N/A	N/A	N/A	-	Х	2	-	SEC.	-	SEC.	_	Х	-	-	_	_	ſ



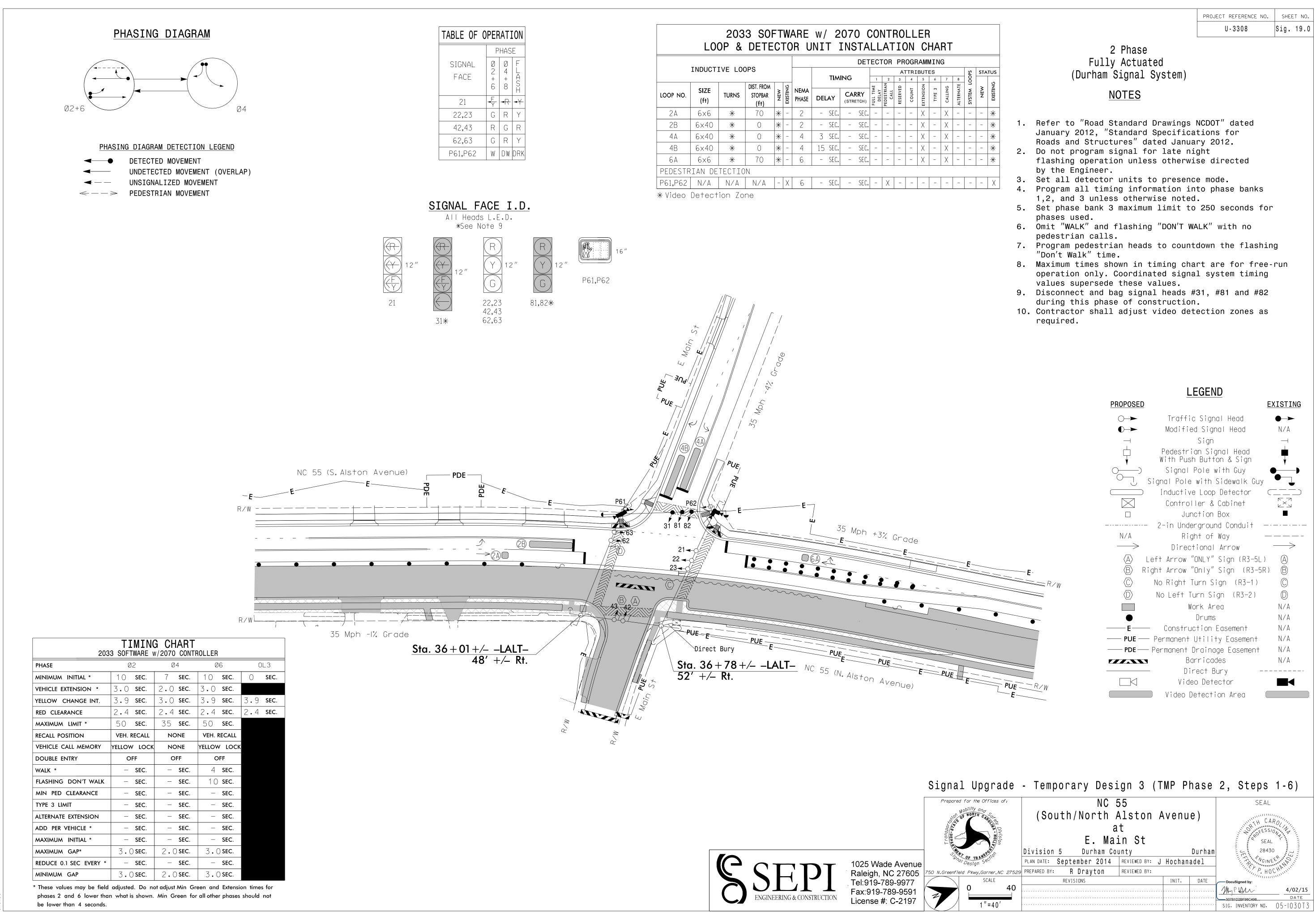
														PROJ	ECT REF	ERENCE	NO.	SHEE	T NO.
															U - 3	308		Sig.	18.1
				SI	GNA	LH	IEA	D	100	K-l	JP	CHA	٩RT						
NO.	S1	S2	S3	S4	S5	S6	S7	S8	59	S1Ø	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
L	1	2	13	3	4	14	5	6	15	7	8	16	Q	10	17	11	12	18	
	1	2	2 PED	З	4	4 PED	5	6	6 PED	7	8	8 PED	OL1		SPARE	OL3	OL4	SPARE	
0 .	NU	22,23	P21 . P22	NU	NU	NU	NU	62,63	NU	NU	81,82	NU	★ 61	NU	NU	NU	NU	NU	
		128						134			107								
٨		129						135			108								
		130						136			109								
,													A121						
N													A122						
NG V													A123						
,																			
			113																
			115																

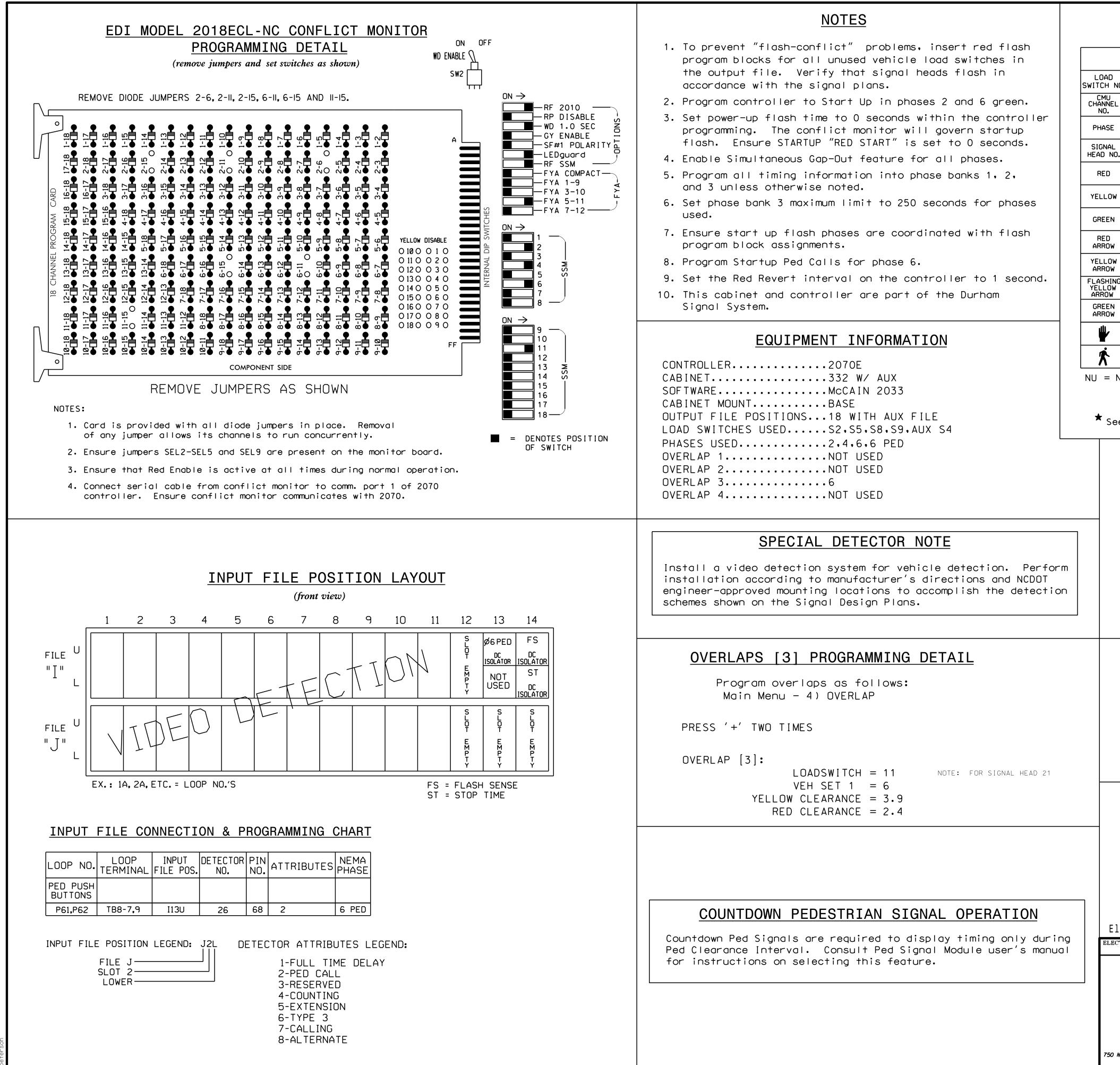


:*ITS&SU*ITS Signals*Workgroups*Sig Man*Peterson*051030_sm_ele_20141230.dgn tpeterson				Γ
	END OF	Main M OVERLAP [1]:		
	OVERLAP PROGRA	lenu – 4) OVERLA	[1] PROGRA	
	AMMING	AP = 9 = 2 = 4.0		
		NOTE: FOR SIGNAL I	<u>ETAIL</u>	
THIS ELECTR THE SIGNAL I DESIGNED: So SEALED: 4-0 REVISED: N/6		HEAD 61		

			PROJECT REFERENCE NO.SHEET NO.U-3308Sig.18.2
		EMERGENCY VEHICLE PREEMPTION PROGR	AMMING
		 Program EVB preempt as follows: Main Menu - 2) PREEMPT - 2) EMERGENCY VEF EVB Clear = 2 EVB Clearance Phases = 8 	ICLE
		2. Program general preemption parameters as Main Menu – 2) PREEMPT – 6) MISC PREEMPTI Min Time Before PE ForceOff =	ON PARAMETERS
	COUNTDOWN PEDESTRIAN SIGNAL OPERATION tdown Ped Signals are required to display timing only during Clearance Interval, Consult Ped Signal Module user's manual	3. Ped Clear Before Preempt is a pedestrian parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMI PHASE 2 MIN FDW = 6	
	instructions on selecting this feature.		
		Program extend time on optical detector units for	2.0 sec for EVB.
	OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA	<u>MIN WALK DURING PREEMPTION</u> <u>PROGRAMMING</u> To disable MIN WALK pedestrian timing during	_
Ma	ain Menu – 1) PHASE – 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 1	program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURAT EXTRA TWO = 3	ION
AL DETAIL IS FOR SIGN: 05-1030T2 otember 2014 -15		PLAN DATE: November 2014 REVIEWED BY: 97R PREPARED BY: James Peterson REVIEWED BY:	$\frac{ham}{IE} = \frac{John T. Rowe, Jr.}{John T. Rowe, Jr.} \frac{4/2/2015}{DATE}$
AL DETAIL IS FOR SIGN: 05-1030T2 otember 2014	FOR 3 SECTION FYA lowing will cause the overlap green outputs to flash, which ed to the flashing yellow arrow. Program as follows: ain Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO	MIN WALK DURING PREEMPTION PROGRAMMING To disable MIN WALK pedestrian timing during program the controller as follows: Main Menu - 9) UTLLITIES - 5) CONFIGURAT EXTRA TWO = 3 Electricial Detail - Sheet 2 of 2 KECTERCAL AND PROMAMINON DETAILS POINT DETAILS POINT DETAILS POINT FROM THE MOVEMBER 2014 RESIDENCE TO THE PROMAMINION DETAILS POINT THE MOVEMBER 2014 RESIDENCE TO THE PROMAMINION RESIDENCE TO THE PROMAMINION RESIDENCE TO THE PROMAMINION RESIDENCE TO THE PROMAMINION RESIDENCE TO THE PROMAMININ	N preemptic ION N TE John T. Row

S ELECTRIC SIGNAL D SIGNED: Sep ALED: 4-02-/ISED: N/A





														PROJ	ECT RE	FERENCE	5 NO.	SHEE	T NO.
															U - 3	308		Sig.1	19.1
													I			, 	<u> </u>		
				SIC	GNA	Lŀ	HEA	D F	100	K-l	JP	CH/	٩RT	,					
NO.	S1	S2	53	S4	S5	S6	S7	S8	59	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
L	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE	
D .	NU	22,23	NU	NU	42,43	NU	NU	62,63	P61, P62	NU	NU	NU	NU	NU	NU	21	NU	NU	
		128			101			134											
v		129			102			135											
		130			103			136											
																A114			
V																A115			
NG V																A116			
									119										
									121										

NU = Not Used

★ See pictorial of head wiring in detail below.

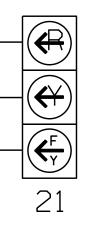
<u>3 SECTION FYA WIRING DETAIL</u>

(wire signal heads as shown)

OLC RED (A114)-

OLC YELLOW (A115)-

OLC GREEN (A116)-



OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA

The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows:

Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 3

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1030T3 DESIGNED: September 2014 SEALED: 4-02-15 REVISED: N/A

TRICAL AND PROGRAMMING DETAILS FOR:		; 55			SEAL
	(South/North	Alston	Avenı	le)	CARD
Prepared in the Offices of: Nob ^{ility} and	a	lt			CFESSION
CIOP NORTH CARD	E. Ma	in St.			SEAL
	Division 5 Durham	m County		Durham	008453
	PLAN DATE: November 2014	REVIEWED BY:			FIG . CNGINEER.
	PREPARED BY: James Peterson	REVIEWED BY:	DS		T. ROWE INT
FILLS ME TRANSCOUNT	REVISIONS		1917R	DATE	
Management o					John T. Rowe, Jr. 4/2/2015
Greenfield Pkwy,Garner,NC 27529					641D60C145EE4F5 DATE
					SIG. INVENTORY NO. 05-1030T3

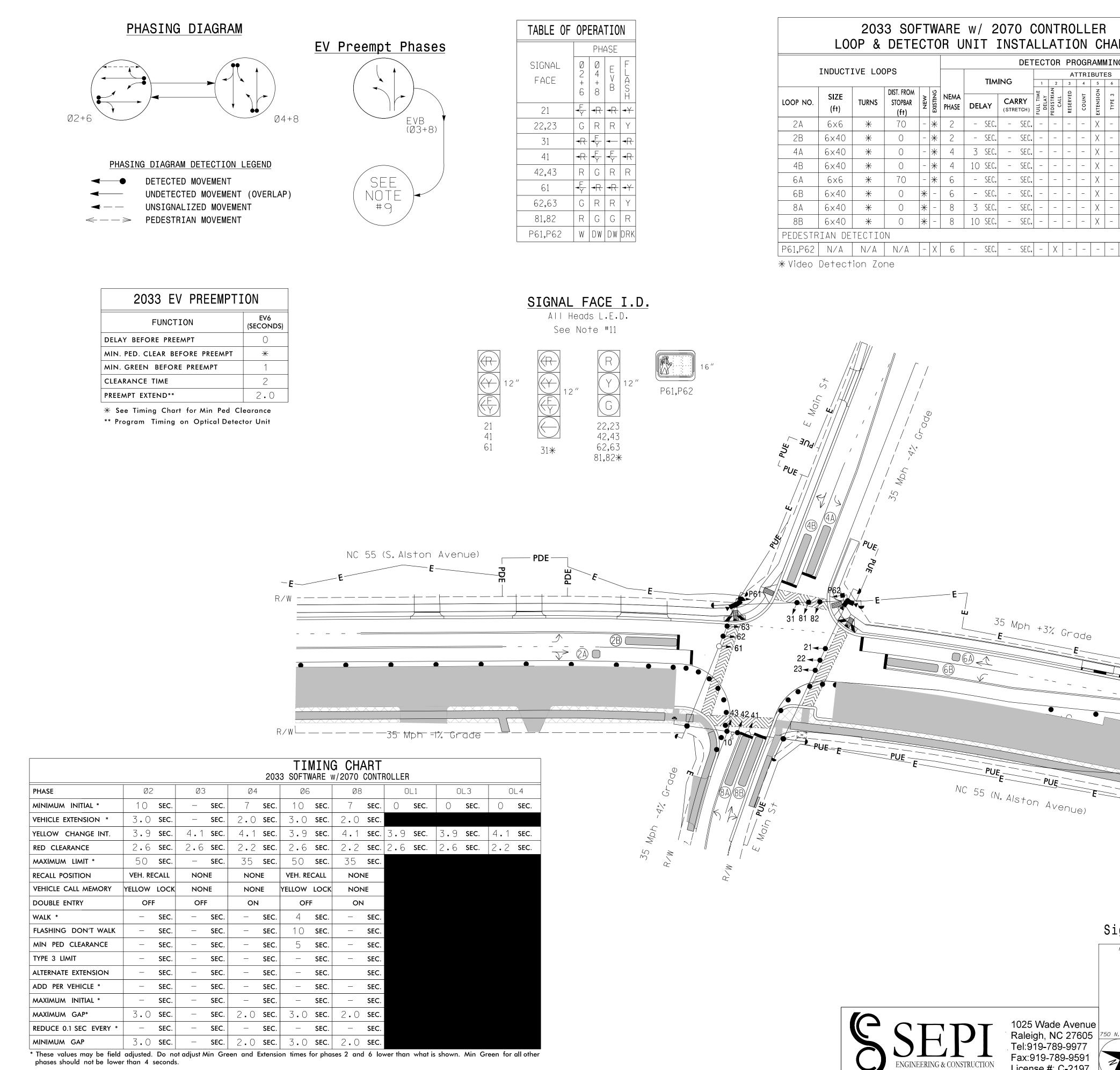
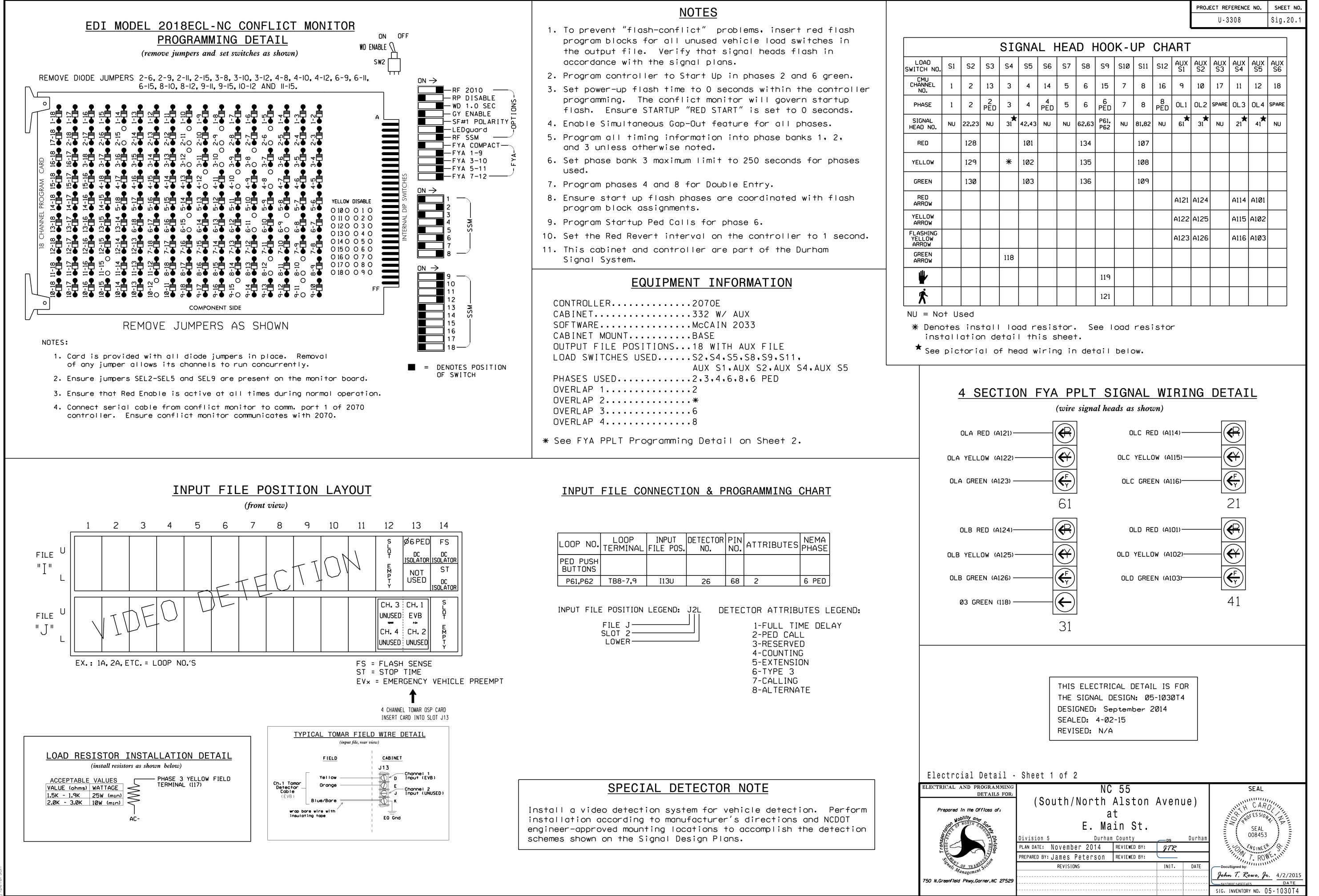


TABLE OF	OP	ERA	TIO	N					
		PHASE							
SIGNAL Face	Ø 2 + 6	Ø 4 + 8	E V B	F L A S H					
21	⊸ F Y	- R−	- R	- ¥-					
22,23	G	R	R	Y					
31	≺R	F	-	≺R					
41	- R	F	- F Y	≺R					
42,43	R	G	R	R					
61	- F Y	- R	- R	- ¥					
62,63	G	R	R	Y					
81,82	R	G	G	R					
P61,P62	W	DW	DW	DRK					

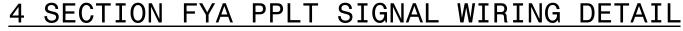
	ARE w/ 2070 CONTROLLE OR UNIT INSTALLATION		2 Phase	PROJECT REFERENCE NO. SHEET N U-3308 Sig. 20
INDUCTIVE LOOPS	DETECTOR PROGRA		Fully Actuated W/ EV Preemption	
DOP NO. SIZE (ft) TURNS DIST. FROM STOPBAR (ft) (ft)			(Durham Signal System)	
(ft) (ft) (ft) z z 2A 6×6 * 70 - *		N N N	NOTES 1. Refer to "Road Standard Drawings	NCDOT" dated
2B 6×40 * 0 - * 4A 6×40 * 0 - *		X - X * X - X *	January 2012, "Standard Specifica Roads and Structures" dated Januar	ations for
4B 6×40 * 0 - *	4 10 SEC SEC	X - X *	2. Do not program signal for late ni flashing operation unless otherwi	ght
6A 6×6 * 70 - * 6B 6×40 * 0 * -	6 - SEC. - - - - 6 - SEC. - SEC. - - -	X - X * X - X *	by the Engineer. 3. Set all detector units to presend	
8A 6×40 * 0 * - 8B 6×40 * 0 * -	8 3 SEC. - SEC. - - - 8 10 SEC. - SEC. - - -	X - X *	 Program all timing information in 1,2, and 3 unless otherwise noted 	1.
EDESTRIAN DETECTION 61,P62 N/A N/A N/A - X	6 - SEC SEC X		5 Set phase bank 3 maximum limit to phases used	
Video Detection Zone			 Omit "WALK" and flashing "DON'T W pedestrian calls. Program pedestrian heads to count 	
Ne - 30 de - 40 Main St Main S			 8. This intersection features an option system. Shown locations of option are conceptual only. 9. Upon completion of Emergency Vehic controller returns to normal operation. Maximum times shown in timing char operation only. Coordinated signal values supersede these values. 11. Reconnect and unbag signal heads during this phase of construction 12. Contractor shall adjucst video de required. 	cal detectors cle Preemption, ration art are for free-run al system timing #31, #81 and #82
			<u>L</u>	EGEND
(4B) (4A)			<u>PROPOSED</u> ○→ Traffic	EXISTING c Signal Head ●→
PUE				d Signal Head N/A
				Sign → an Signal Head ∎ n Button & Sign ↓
E E	—E		⊖) Signal	Pole with Guy
	B			with Sidewalk Guy
	$\begin{array}{c} \hline \hline$			ler & Cabinet ∠׬ ction Box ■
23				rground Conduit — ht of Way
			$\longrightarrow R/W \longrightarrow Direct$	ional Arrow \longrightarrow
				rk Area N/A Drums N/A
PUE				tion Easement N/A Utility Easement N/A
PUE E			PDE Permanent	Drainage Easement N/A
	PUE E PUE			ricades N/A ect Bury
	NC 55 (N. Alston Avenue)	E PUE E PUE		al Detector 🖂
		,		etection Area



Ø6PED FS	LOOP NO. TERMINAL FILE POS. NO. NO. ATTRIBUTES PHASE
DC DC ISOLATOR ISOLATOR NOT ST	PED PUSH BUTTONS
	P61,P62 TB8-7,9 I13U 26 68 2 6 PED
SH SENSE TIME RGENCY VEHICLE PREEMPT	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
DETAIL ET Channel 1 Input (EVB) Channel 2 Input (UNUSED) Md	<u>SPECIAL DETECTOR NOTE</u> Install a video detection system for vehicle detection. Perfo installation according to manufacturer's directions and NCDOT
	engineer-approved mounting locations to accomplish the detections shown on the Signal Design Plans.

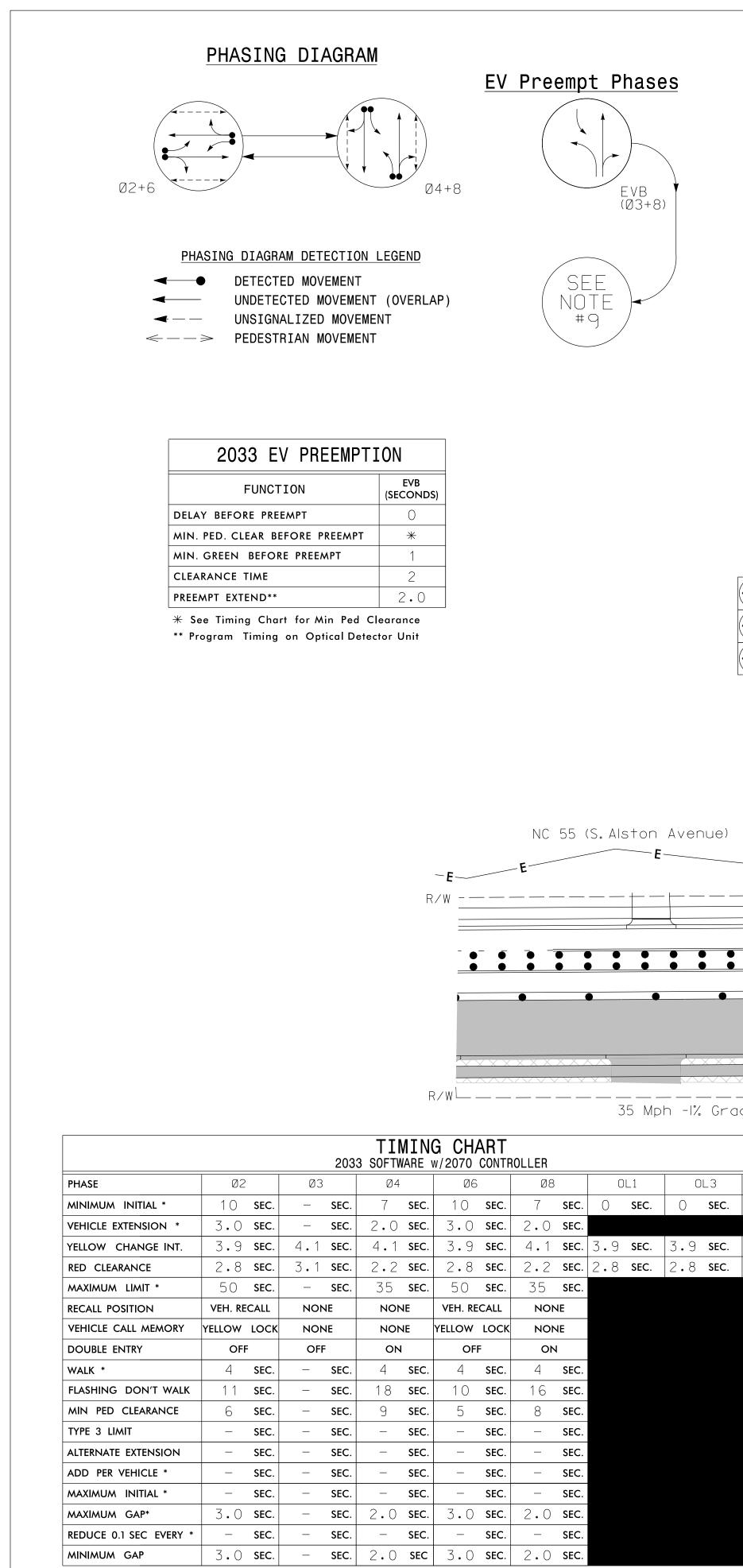
PROJECT REFERENCE NO.	SHEET
U - 3308	Sig 2

	SIGNAL HEAD HOOK-UP CHART																	
NO.	S1	S2	S3	S4	S5	S6	S7	S8	59	S1Ø	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
L	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1		SPARE		 .	SPARE
0.	NU	22,23	NU	★ 31	42,43	NU	NU	62,63	P61, P62	NU	81,82	NU	★ 61	★ 31	NU	21 ★	★ 41	NU
		128			101			134			107							
N		129		*	102			135			108							
		130			103			136			109							
,													A121	A124		A114	A1Ø1	
N													A122	A125		A115	A102	
NG V													A123	A126		A116	A1Ø3	
				118														
									119									
									121									



OVERLAPS [1-4] PROGRAMMING DETAIL		PROJECT REFERENCE NO.SHEET NO.U-3308Sig.20.2
Program overlaps as follows:		EMERGENCY VEHICLE PREEMPTION PROGRAMMING
Program overlaps as follows: Main Menu - 4) OVERLAP OVERLAP [1]: LOADSWITCH = 9 VEH SET 1 = 2 YELLOW CLEARANCE = 3.9 RED CLEARANCE = 2.6 PRESS '+' TWICE OVERLAP [3]: LOADSWITCH = 11 VEH SET 1 = 6 YELLOW CLEARANCE = 3.9 RED CLEARANCE = 3.9 RED CLEARANCE = 2.6 PRESS '+'	<pre>FYA PPLT PROGRAMMING 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 3 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 3 = 96 3. Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE Phase 3 RED = 94, Phase 3 YELLOW = 95 </pre>	 1. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 2) EMERGENCY VEHICLE EVB Clear = 2 EVB Clearance Phases = 3,8 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 6 MIN FDW = 5
OVERLAP [4]: LOADSWITCH = 12 VEH SET 1 = 8 YELLOW CLEARANCE = 4.1 RED CLEARANCE = 2.2 END OF OVERLAP PROGRAMMING	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.	SPECIAL NOTES EV PREEMPT PROGRAMMING Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y
FLASHER CIRCUIT MODIFICATION DETAIL IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES: 1. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2. 2. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3. 3. REMOVE FLASHER UNIT 2. THE CHANGES LISTED ABOVE TIES ALL PHASES AND OVERLAPS TO FLASHER UNIT 1.	OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 1, 3, 4	MIN WALK DURING PREEMPTION PROGRAMMING To disable MIN WALK pedestrian timing during preemption, program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3 STARTUP CALLS PROGRAMMING Prevents Veh Call to phase 3 during Startup, Phase 3 used only during Preempt, Main Menu - 9) UTILITIES - 1) STARTUP
THE CHARGES LISTED ABOVE TIES ALL PHASES AND OVERLAPS TO FLASHER UNIT T. THIS ELECTRICAL DE THE SIGNAL DESIGN: DESIGNED: Septembe SEALED: 4-02-15 REVISED: N/A	Ø5-1Ø3ØT4	Electrcial Detail - Sheet 2 of 2 ELECTRICAL AND PROGRAMMING DETAILS FOR. Propored In the Offices of: Propored In the Offices of:

R-2015 11:00 01-A S:*I

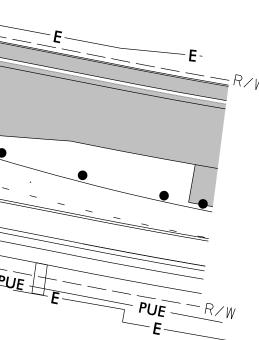


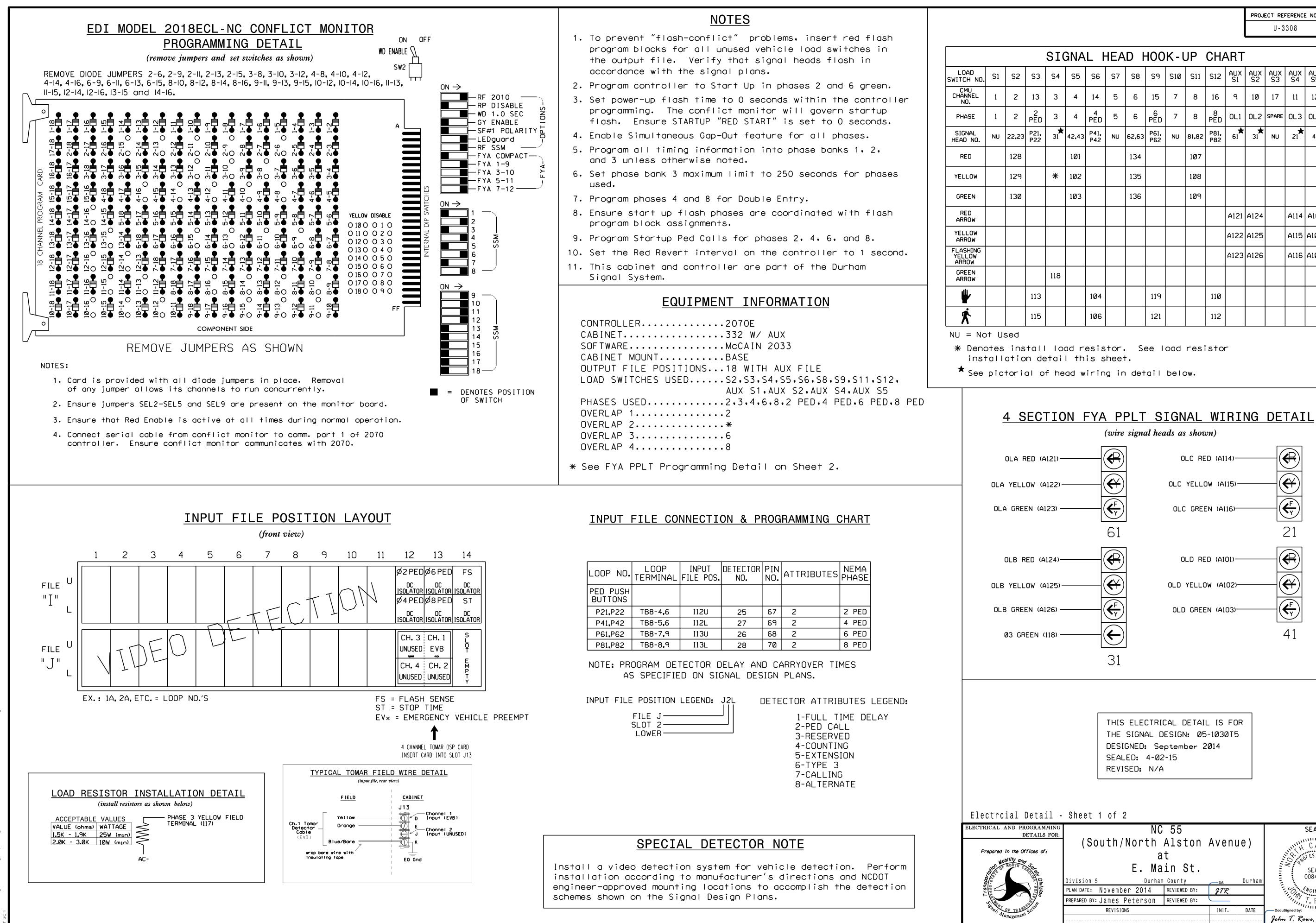
* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Gr phases should not be lower than 4 seconds.

** Timing to be determined by the City of Durham.

TABLE OF OPERATION		w/ 2070 CONTROLLER	2 Phase	U-3308 Sig. 21.0
PHASE SIGNAL ØØEF	INDUCTIVE LOOPS	NIT INSTALLATION CHART DETECTOR PROGRAMMING	Fully Actuated W/ EV Preemption	
FACE	SIZE DIST. FROM ≥ 2 NEMA	ATTRIBUTES 20 STATUS TIMING 1 2 3 4 5 6 7 8 00 9<	(Durham Signal System)	
21 - F - R - R - Y 22,23 G R R Y		$\begin{array}{c c c c c c c c c c c c c c c c c c c $	NOTES	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2B 6×40 * 0 - * 2 4A 6×40 * 0 - * 4	- SEC SEC X - X *	 Refer to "Road Standard Drawings January 2012, "Standard Specifica Roads and Structures" dated Janua 	ations for
42,43 R G R R	4B 6×40 * 0 - * 4 6A 6×6 * 70 * - 6	10 SEC SEC X - X + *	2. Do not program signal for late n flashing operation unless otherw:	ight
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	6B 6×40 * 0 * - 6 8A 6×40 * 0 * - 8	- SEC SEC X - X - + *	by the Engineer. 3. Set all detector units to present 4. Program all timing information in	
81,82 R G G R P21,P22 W DW DW DRK	8B6×40*0*-8PEDESTRIAN DETECTION	10 SEC SEC X - X *	4. Program all timing information in 1,2, and 3 unless otherwise noted 5. Set phase bank 3 maximum limit to	
P41,P42 DW W DW DRK P61,P62 W DW DW DRK	P21,P22 N/A N/A N/A - X 2 P41,P42 N/A N/A N/A - X 4	- SEC SEC X X - SEC SEC X X	phases used. 6. Omit "WALK" and flashing "DON'T W pedestrian calls.	ALK" with no
P81,P82 DW W DW DRK	P61,P62 N/A N/A N/A - X 6 P81,P82 N/A N/A N/A - X 8	- SEC SEC X X - SEC SEC X X	7. Program pedestrian heads to count "Don't Walk" time.	down the flashing
	* Video Detection Zone		8. This intersection features an option system. Shown locations of option	
SIGNAL FACE I.D.			are conceptual only. 9. Upon completion of Emergency Veh: controller returns to normal oper	-
All Heads L.E.D.			10. Maximum times shown in timing cha operation only. Coordinated signa	
	Main St		values supersede these values. 11. Pedestrian pedestals are concepture reference only. See sheets P1-P3	
$\begin{array}{c c} (\uparrow) & 12'' \\ \hline F \\ \hline F \\ \hline \end{array} \\ \begin{array}{c} F \\ \hline F \\ \hline \end{array} \\ \begin{array}{c} F \\ \hline F \\ \hline \end{array} \\ \begin{array}{c} F \\ \hline \end{array} \\ \end{array} \\ \begin{array}{c} F \\ \end{array} \end{array} \\ \begin{array}{c} F \\ \end{array} \\ \end{array} \\ \begin{array}{c} F \\ \end{array} \\ \end{array} \\ \begin{array}{c} F \\ \end{array} \end{array} \\ \begin{array}{c} F \\ \end{array} \\ \end{array} \\ \begin{array}{c} F \\ \end{array} \end{array} \\ \begin{array}{c} F \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} F \\ \end{array} \end{array} \\ \begin{array}{c} F \\ \end{array} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} F \\ \end{array} \end{array} \\ \end{array} \\ \end{array} $ \\ \begin{array}{c} F \\ \end{array} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} F \\ \end{array} \end{array} \\ \end{array} \\ \end{array} \\ \\ \end{array} \\ \end{array} \\ \end{array} \\ \\ \end{array} \\ \end{array} \\ \\ \\ \end{array} \\ \\ \end{array} \\ \\ \\ \end{array} \\ \\ \\ \end{array} \\ \\ \end{array} \\ \\ \\ \\			location details. 12. Contractor shall adjust video det	cection zones as
Y Y P61,P62 21 22,23 P81,P82	PUE		required.	
41 42,43 61 31 62,63 81,82	35 Mor		LE	EGEND
	$\mathbf{u}_{\mathbf{u}}$		<u>PROPOSED</u> ○→ Traffic	Signal Head
	2 ⁴ B) PUI			d Signal Head N/A Sign —
PDE PDE	PUE		v With Push	an Signal Head
	P61 F62 Direct Bury	E	Signal Pole	Pole with Guy with Sidewalk Guy
P42 P	31 81 82 P81		Control	ler & Cabinet
				rground Conduit —
		DGA C		ional Arrow
P41	42 41			Drums N/A tion Easement N/A
rade Direct Bury_P22 10			PDE Permanent	
	Direct Bury		Oct Optico	ect Bury
$\begin{array}{c c} \hline \\ \hline $	8B / / 4	NC 55 (N. Alston Avenue)	Video	Jshbutton Post Detector
C. $4 \cdot 1$ SEC.		L AVENUE)	PUE R/W E	tection Area
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				
			Upgrade - Temporary Design 5 (TMP Ph	
		Prepared to	(South/North Alston Avenue	SEAL
			E. Main St	SEAL
		1025 Wade Avenue	PLAN DATE: September 2014 REVIEWED BY: J Hochanac	urham lel Puocht
n Green for all other		Tel:919-789-9977 Fax:919-789-9591	Pkwy,Garner,NC 27529 PREPARED BY: C Lawson REVIEWED BY: SCALE REVISIONS INIT.	DATE DocuSigned by:
	ENGINEER	ING & CONSTRUCTION License #: C-2197	1 " = 4 0 '	SIG. INVENTORY NO. 05-103015

PROJECT REFERENCE NO.	SHEET NO.
U-3308	Sig. 21.0

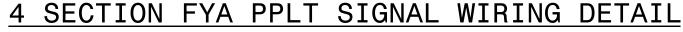




750 N.

PROJECT REFERENCE NO.	SHEET NO.
U-3308	Sig.21.1

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۰٥.	S1	S2	S3	S4	S5	S6	S7	S8	59	S1Ø	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
L	1	2	13	3	4	14	5	6	15	7	8	16	g	10	17	11	12	18
	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	0L2	SPARE		OL4	SPARE
j.	NU	22,23	P21 . P22	★ 31	42,43	P41. P42	NU	62,63	P61, P62	NU	81,82	P81, P82	★ 61	★ 31	NU	★ 21	★ 41	NU
		128			101			134			107							
1		129		*	102			135			108							
		130			103			136			109							
													A121	A124		A114	A1Ø1	
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ig '													A123	A126		A116	A1Ø3	
				118														
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ectrcial Detail -	Sheet 1 of	2					
TRICAL AND PROGRAMMING DETAILS FOR:		NC	55			SEAL	
Prepared in the Offices of:	(South,	North/ a	Alston It	Avenu	le)	FESSION	
SOLUTION THE CARGE AND DEV	Division 5		n in St. m County	DS	Durham	SEAL 008453	A
ISION NOT	PLAN DATE: Novem	per 2014	REVIEWED BY:	JTR.		WGINEER.	51
	PREPARED BY: James	Peterson	REVIEWED BY:			T. ROWE	ut.
Anagement Social	REVISI	ONS		INIT.	DATE	Docusigned by:	
Greenfield Pkwy,Garner,NC 27529						John T. Rowe, Jr.	DATE
						641D60C145EE4F5 SIG. INVENTORY NO. 05-	

OVERLAPS [1-4] PROGRAMMING DETAIL		PROJECT REFERENCE NO.SHEET NO.U-3308Sig.21.2
Program overlaps as follows:		EMERGENCY VEHICLE PREEMPTION PROGRAMMING
Program overlaps as follows: Main Menu - 4) OVERLAP OVERLAP [1]: LOADSWITCH = 9 VEH SET 1 = 2 YELLOW CLEARANCE = 3.9 RED CLEARANCE = 3.9 RED CLEARANCE = 2.8 PRESS '+' TWICE OVERLAP [3]: LOADSWITCH = 11 VEH SET 1 = 6 YELLOW CLEARANCE = 3.9 RED CLEARANCE = 2.8 PRESS '+' OVERLAP [4]: LOADSWITCH = 12 VEH SET 1 = 8 YELLOW CLEARANCE = 4.1 RED CLEARANCE = 2.2 END OF OVERLAP PROGRAMMING	FYA PPLT PROGRAMMING 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 3 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) DUTPUTS - F) FYA PPLT Phase 3 = 96 3. Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu - 6) DUTPUTS - 8) REDIRECT PHASE Phase 3 RED = 94. Phase 3 YELLOW = 95 COUNTDOWN PEDESTRIAN SIGNAL OPERATION Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual	I. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 2) EMERGENCY VEHICLE EVB Clear = 2 EVB Clearance Phases = 3.8 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 2 MIN FDW = 6 PHASE 4 MIN FDW = 9 PHASE 6 MIN FDW = 8 Program extend time on optical detector units for 2.0 sec for EVB. Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTLITIES - 9) MISC
FLASHER CIRCUIT MODIFICATION DETAIL IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:	for instructions on selecting this feature. OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows:	FYA DURING PREEMPT (Y/N) = Y MIN WALK DURING PREEMPTION PROGRAMMING To disable MIN WALK pedestrian timing during preemption, program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3
1. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2. 2. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3. 3. REMOVE FLASHER UNIT 2. THE CHANGES LISTED ABOVE TIES ALL PHASES AND OVERLAPS TO FLASHER UNIT 1.	Main Menu – 1) PHASE – 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 1, 3, 4	STARTUP CALLS PROGRAMMING Prevents Veh Call to phase 3 during Startup. Phase 3 used only during Preempt. Main Menu - 9) UTILITIES - 1) STARTUP VEHICLE CALLS 2,4,6,8
		Electrcial Detail - Sheet 2 of 2 ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of. Prepared In the Offices of.

01-APR-2015 11:04 S:*ITS&SU*ITS Sign jtpeterson

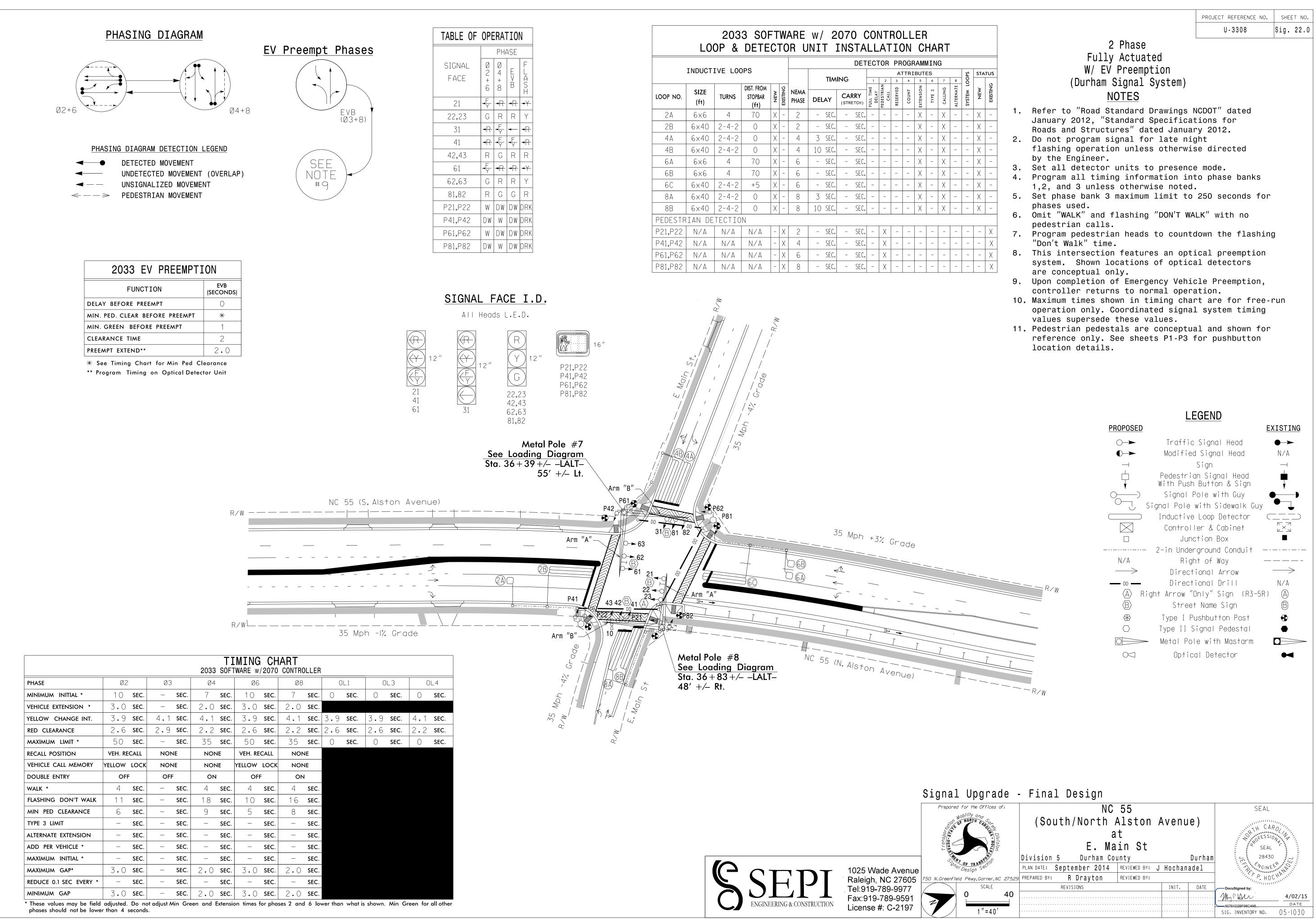
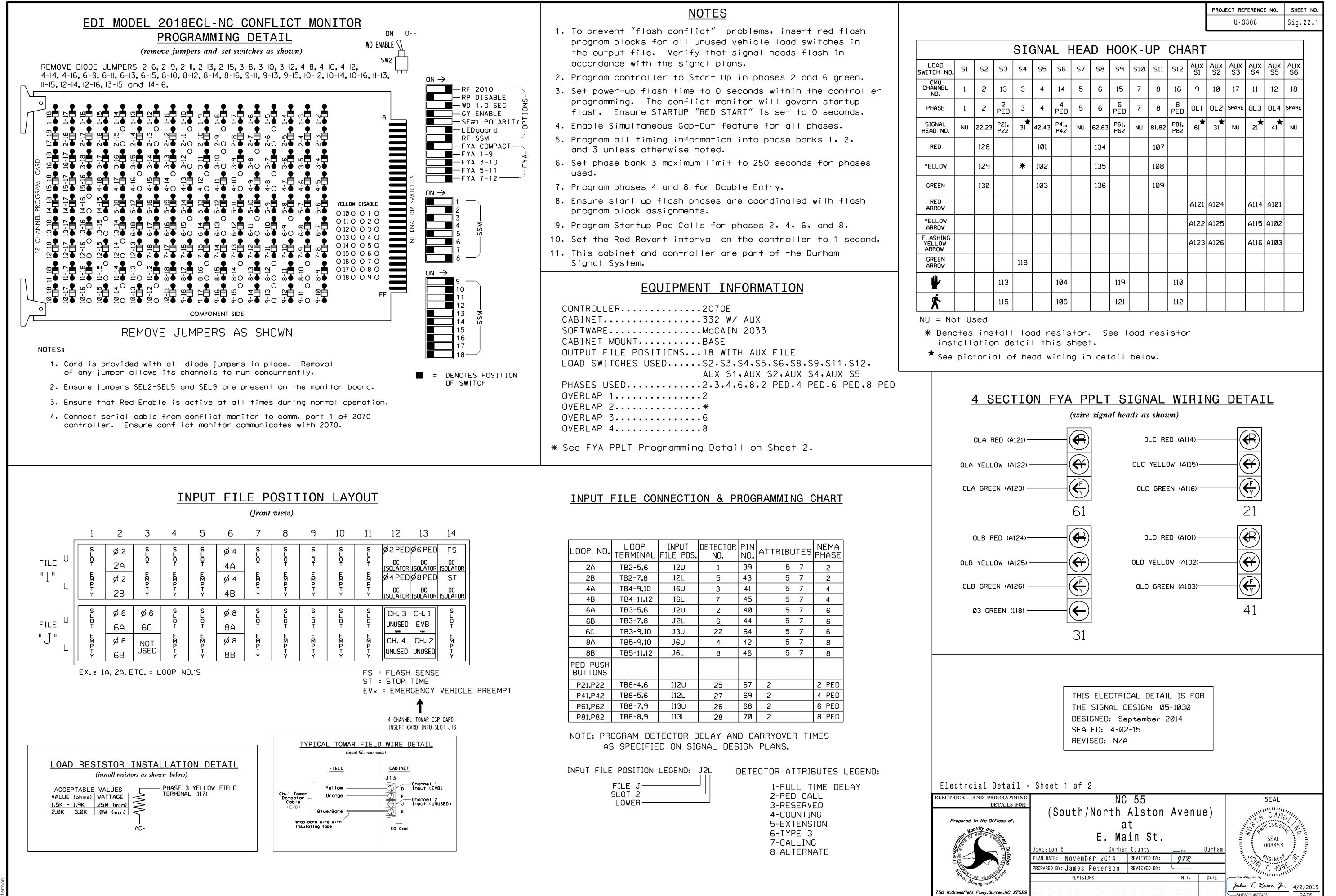


TABLE OF	OPE	RA	FI0	N
		PH	ASE	
SIGNAL Face	Ø 2 + 6	Ø 4 + 8	E V B	F L A S H
21	F	- R	- R	- ¥-
22,23	G	R	R	Y
31	R	₹	•	- R−
41	R	F	- F Y	- R−
42,43	R	G	R	R
61	FY	₹R	- R	◄₩
62,63	G	R	R	Y
81,82	R	G	G	R
P21,P22	W	DW	DW	DRK
P41,P42	DW	W	DW	DRK
P61,P62	W	DW	DW	DRK
P81,P82	DW	W	DW	DRK

										DET	ECI	OR	PR	OGF	RAM	MIN	(
	INDUCT	IVE LOC	DPS					TIAA						TRI			T
			DIST. FROM		(1)			TIM	ING		1	2 Z	3	4	5 Z	6	ŀ
LOOP NO.	SIZE (ft)	TURNS	STOPBAR (ft)	NEV	EXISTING	NEMA PHASE	DEL	AY	CA (STR	RRY etch)	FULL TIME DELAY	PEDESTRIAN CALL	RESERVED	COUNT	EXTENSION	TYPE 3	
2A	6×6	4	70	X	-	2	-	SEC.	-	SEC.	-	-	-	-	X	-	
2B	6×40	2-4-2	0	Х	-	2	_	SEC.	_	SEC.	-	-	I	_	Х	-	
4 A	6×40	2-4-2	0	Х	-	4	3	SEC.	_	SEC.	_	-	-	-	Х	-	
4B	6×40	2-4-2	0	Х	-	4	10	SEC.	-	SEC.	-	-	-	-	Х	-	
6 A	6×6	4	70	Х	-	6	-	SEC.	-	SEC.	-	-	-	-	Х	-	
6B	6x6	4	70	Х	-	6	-	SEC.	-	SEC.	-	-	-	-	Х	-	
60	6×40	2-4-2	+5	Х	-	6	-	SEC.	_	SEC.	_	-	-	-	Х	-	
8 A	6×40	2-4-2	0	Х	-	8	3	SEC.	_	SEC.	-	-	-	_	Х	-	
8B	6×40	2-4-2	0	X	-	8	10	SEC.	-	SEC.	-	-	-	-	Х	-	
PEDESTR	IAN DE	TECTIO	N														
P21,P22	N/A	N/A	N/A	-	Х	2	-	SEC.	-	SEC.	-	Х	-	-	-	-	
P41,P42	N/A	N/A	N/A	-	Х	4	-	SEC.	-	SEC.	-	Х	-	-	-	-	
P61,P62	N/A	N/A	N/A	-	Х	6	-	SEC.	-	SEC.	-	Х	_	-	-	-	ſ
P81,P82	N/A	N/A	N/A	-	Х	8	_	SEC.	_	SEC.	-	Х	_	-	_	-	

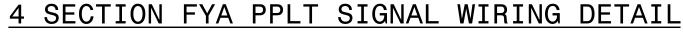


		·		1	1				
EDØ6PED FS		LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	DETECTOR NO.	PIN NO.	ATTRIBU	TES	NEMA PHASE
DC DC DC		2A	TB2-5,6	I2U	1	39	5	7	2
EDØ8PED ST		2B	TB2-7,8	I2L	5	43	5	7	2
DC DC		4A	TB4-9,10	I6U	3	41	5	7	4
OR ISOLATOR ISOLA		4B	TB4-11,12	I6L	7	45	5	7	4
3 СН.1 5		6A	TB3-5,6	J2U	2	40	5	7	6
		6B	TB3-7,8	J2L	6	44	5	7	6
4-01		6C	TB3-9,10	J3U	22	64	5	7	6
4 CH.2		8A	TB5-9,10	J6U	4	42	5	7	8
		8B	TB5-11,12	J6L	8	46	ъ	7	8
SH SENSE		PED PUSH BUTTONS							
P TIME		P21,P22	TB8-4,6	I12U	25	67	2		2 PED
RGENCY VEH	ICLE PREEMPT	P41,P42	TB8-5,6	I12L	27	69	2		4 PED
1		P61,P62	TB8-7,9	I13U	26	68	2		6 PED
NEL TOMAR OSP CARD		P81,P82	TB8-8,9	I13L	28	70	2		8 PED
T CARD INTO SLOT J13			OGRAM DE ⁻ S SPECIFIE					1IT	MES
IET		INPUT FILE	POSITION	LEGEND:	JŻĻ (DETE	CTOR AT	TRIE	BUTES L
Channel 1 Input (EVB) Channel 2 Input (UNUSED)			FILE J SLOT 2 LOWER				1-FUL 2-PED 3-RES 4-COU 5-EXT 6-TYP 7-CAL 8-ALT	CAL ERVE NTIN ENSI E 3 LINC	ED IG ION

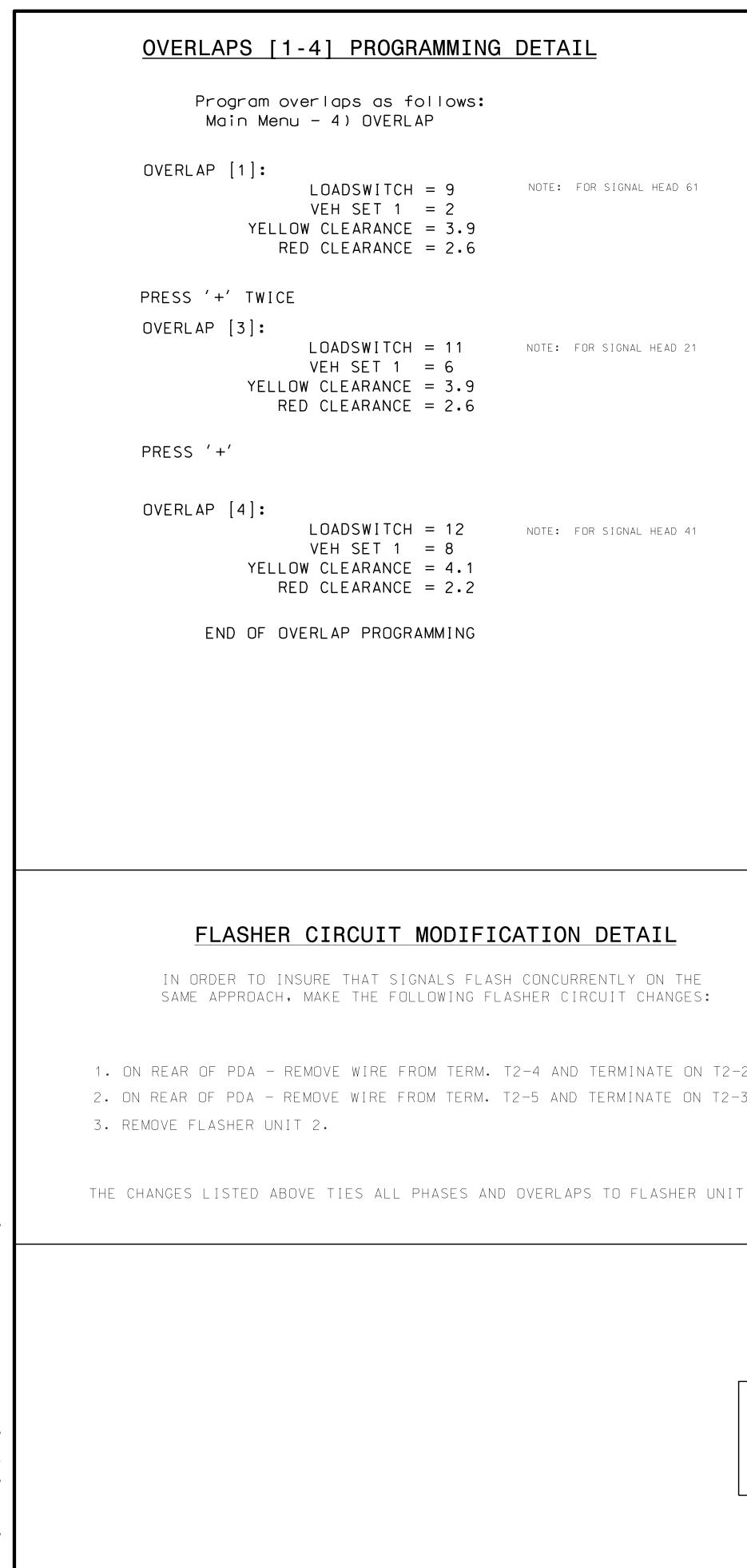
PROJECT REFERENCE NO.	SHEET
U-3308	Sig 2

SIG. INVENTORY NO. 05-1030

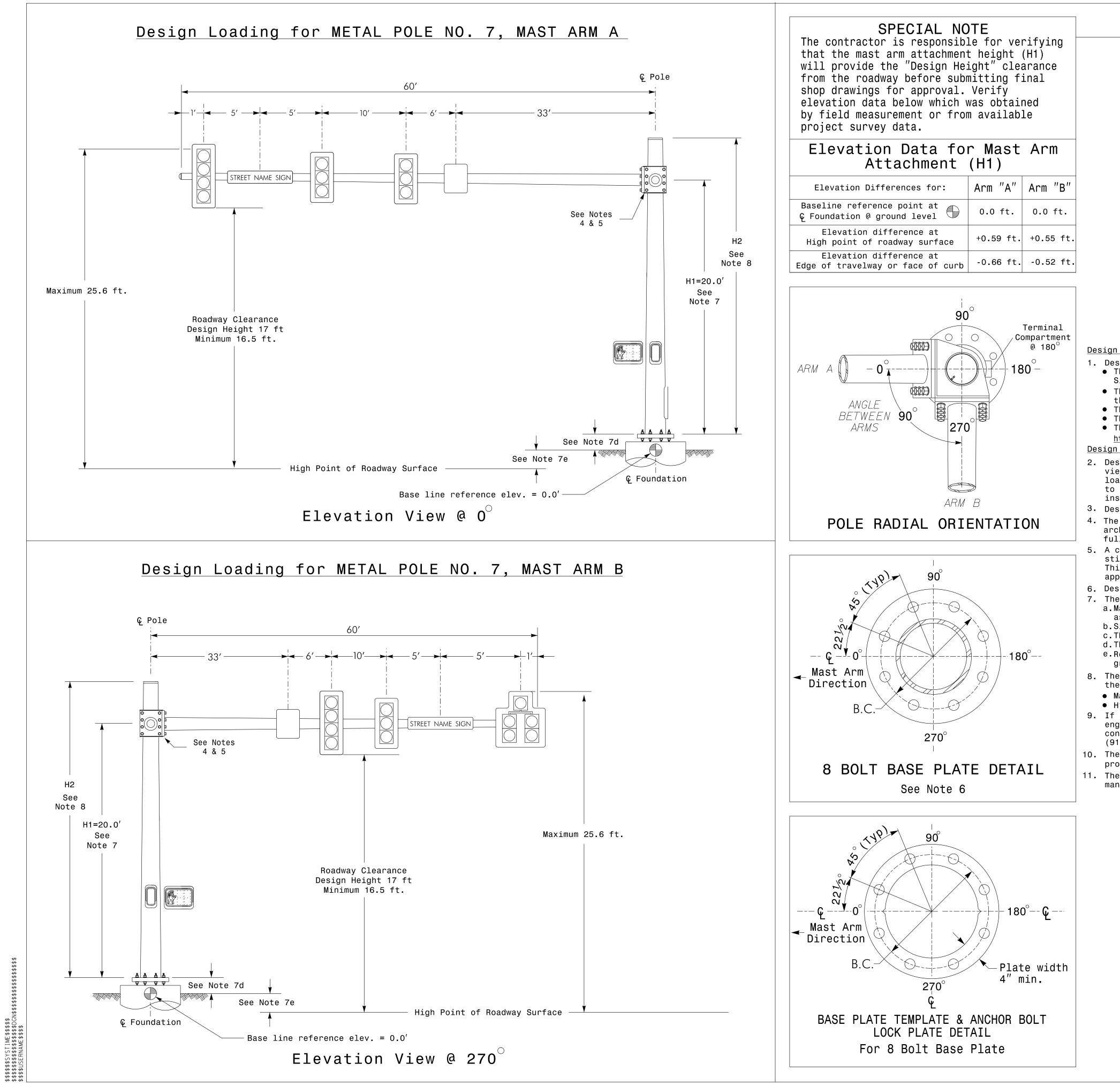
				SI	GNA	Lŀ	HEA	D	100	K-l	JP	CH	٩RT	1				
۰٥.	S1	S2	S3	S4	S5	S6	S7	S8	59	S1Ø	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
-	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	0L2	SPARE	OL3	OL4	SPARE
).	NU	22,23	P21. P22	★ 31	42,43	P41 . P42	NU	62,63	P61, P62	NU	81,82	P81, P82	★ 61	★ 31	NU	21	★ 41	NU
		128			101			134			107							
'		129		*	102			135			108							
		130			103			136			109							
													A121	A124		A114	A1Ø1	
'													A122	A125		A115	A102	
IG													A123	A126		A116	A103	
				118														
			113			104			119			110						
			115			106			121			112						



750 N.Greenfield Pkwy,Garner,NC 27529



	PROJECT REFERENCE NO.SHEET NO.U-3308Sig.22.2
<pre>FYA PPLT PROGRAMMING Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 3 Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 3 = 96 Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE Phase 3 RED = 94, Phase 3 YELLOW = 95 </pre>	<pre>EMERGENCY VEHICLE PREEMPTION PROGRAMMING 1. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 2) EMERGENCY VEHICLE EVB Clear = 2 EVB Clear ance Phases = 3.8 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1 3. Ped Clear Before Preempt is a pedestrian timing parameter. and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 2 MIN FDW = 6 PHASE 4 MIN FDW = 6 PHASE 6 MIN FDW = 5 PHASE 8 MIN FDW = 8 Program extend time on optical detector units for 2.0 sec for EVB.</pre>
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.	SPECIAL NOTES EV PREEMPT PROGRAMMING Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y
<u>OVERLAP GREEN FLASH PROGRAMMING</u> <u>FOR 3 SECTION FYA</u> The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows: -2. -3. Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO DLAP G FL = 1, 3, 4	MIN WALK DURING PREEMPTION PROGRAMMING To disable MIN WALK pedestrian timing during preemption, program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3 STARTUP CALLS PROGRAMMING Prevents Veh Call to phase 3 during Startup. Phase 3 used only during Preempt. Main Menu - 9) UTILITIES - 1) STARTUP VEHICLE CALLS 2,4,6,8
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1030 DESIGNED: September 2014 SEALED: 4-02-15 REVISED: N/A	Electrcial Detail - Sheet 2 of 2 ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of. Interviewed at E. Main St. Division 5 Plan Date: November 2014 Reviewed By: Prepared By: James Peterson Reviewed By: Reviewed By



LOAD SYN

Design Reference Material

- Design Requirements
- installation.
- fully loaded.

- the following:
- (919) 773-2800.

NCDOT Prepared

750 N.Greenfie 0

	METAL POLE No. 7		PROJEC	T REFERENCE NO). SHEET NO.
	WILTAL FULL NU. 7			U-3308	Sig. 22.3
	MAST ARM LOADING SCH	IEDUL	E		
ading Mbol	DESCRIPTION	AREA	SIZE	WEIGHT	
0000	SIGNAL HEAD 12"–4 SECTION WITH 8" BACKPLATE RIGID MOUNTED	15.8 S.F.	31.5″ W X 72.0″ L	78 LBS	
000	SIGNAL HEAD 12"–3 SECTION WITH 8" BACKPLATE RIGID MOUNTED	12.8 S.F.	31.5″ W X 58.5″ L	63 LBS	
	SIGNAL HEAD 12″–5 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	20.7 S.F.	48.0" W X 62.0" L	107 LBS	
NAME SIGN	street name sign rigid mounted	12.0 S.F.	18.0" W X 96.0" L	27 LBS	
	pedestrian signal head with mounting hardware	2.2 S.F.	18.5″ W X 17.0″ L	21 LBS	
	sign Rigid mounted	7.5 S.F.	30.0" W X 36.0" L	14 LBS	

NOTES

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

• The traffic signal project plans and special provisions.

• The NCDOT "Metal Pole Standards" located at the following NCDOT website: <u>https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx</u>

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

3. Design all signal supports using stress ratios that do not exceed 0.9. 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when

5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.

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.Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.

b.Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm. c. The roadway clearance height for design is as shown in the elevation views. d. The top of the pole base plate is .75 feet above the ground elevation.

e Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.

8. The pole manufacturer will determine the total height (H2) of the pole using the greater of

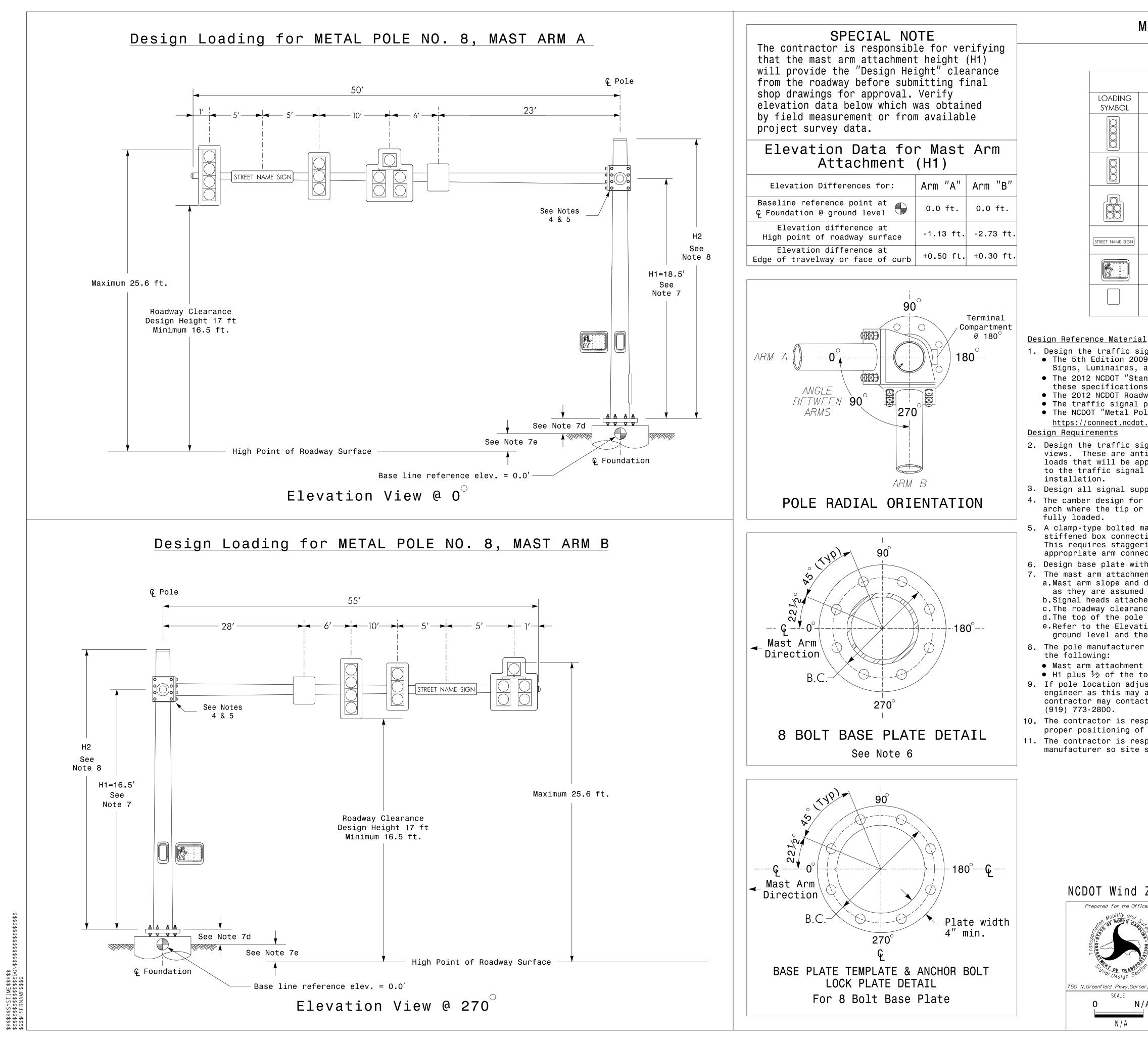
• Mast arm attachment height (H1) plus 2 feet, or

• H1 plus $\frac{1}{2}$ of the total height of the mast arm attachment assembly plus 1 foot. 9. 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 Signal Design Structural Engineer for assistance at

10. The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway. 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.



Wind Zone	4 (90 m	nph)					
d for the Offices of:						SEAL	
Nobility and Same	NC 55	(South A	lston t	Avenue	e)	, WITH CARC	
Noision		E. Ma	in ST			SEAL	· · · · · · · · · · · · · · · · · · ·
A OD - WISPOR	Division 5	Durham Co	unty		Durham	28430	EL ''''
Design Section	PLAN DATE: D	ecember 2014	REVIEWED BY:	J Hochan	adel		
eld Pkwy,Garner,NC 27529	PREPARED BY:	M Copple	REVIEWED BY:			P. HOCY	A',,,''
SCALE	F	REVISIONS		INIT.	DATE	DocuSigned by:	
N/A						MyPAN	4/02/15
						50781D2BF98C498	DATE
N / A				• • • • • • • • • • • • • • • • • • • •		SIG. INVENTORY NO.	05-1030



	METAL POLE No. 8		PROJEC	T REFERENC	E NO.	SHEE	ET NO.
	U-3308		Sig.	22.4			
	MAST ARM LOADING SCH	IEDUL	E				
loading symbol	DESCRIPTION	AREA	SIZE	WEIGHT			
	SIGNAL HEAD 12″–4 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	15.8 S.F.	31.5″ W X 72.0″ L	78 LBS			
	SIGNAL HEAD 12″–3 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	12.8 S.F.	31.5″ W X 58.5″ L	63 LBS			
	SIGNAL HEAD 12″–5 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	20.7 S.F.	48.0″ W X 62.0″ L	107 LBS			
street name sign)	street name sign Rigid Mounted	12.0 S.F.	18.0″ W X 96.0″ L	27 LBS			
	pedestrian signal head with mounting hardware	2.2 S.F.	18.5″ W X 17.0″ L	21 LBS			
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS			

NOTES

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

• The traffic signal project plans and special provisions.

• The NCDOT "Metal Pole Standards" located at the following NCDOT website: <u>https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx</u>

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

3. Design all signal supports using stress ratios that do not exceed 0.9. 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when

5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.

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.Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.

b. Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm. c. The roadway clearance height for design is as shown in the elevation views. d. The top of the pole base plate is .75 feet above the ground elevation.

e Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.

8. The pole manufacturer will determine the total height (H2) of the pole using the greater of

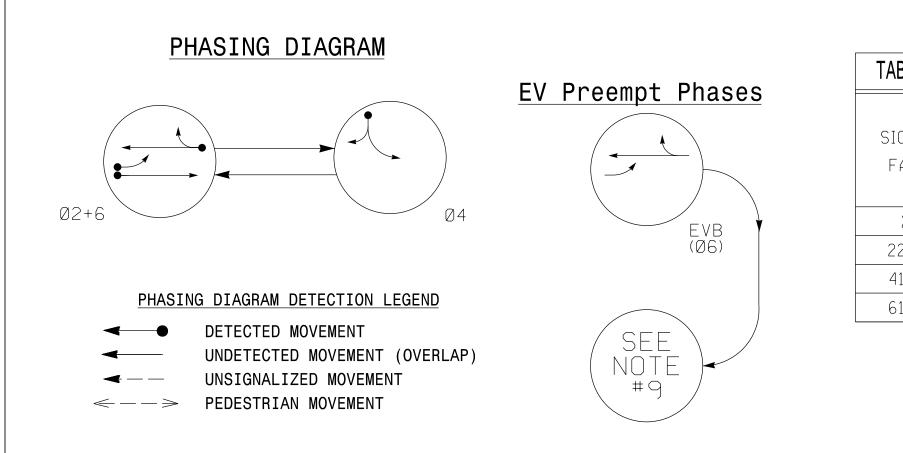
• Mast arm attachment height (H1) plus 2 feet, or

 \bullet H1 plus 1_{2} of the total height of the mast arm attachment assembly plus 1 foot. 9. 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 Signal Design Structural Engineer for assistance at

10. The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway. 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.



Wind Zone	4 (90 mph)				
d for the Offices of:				SEAL	
Nobility ond Ve NORTH CARE	NC 55 (South A a		nue)	WITH CARO	1
Noision	E. Ma	in St		SEAL	, , , , , , , , , , , , , , , , , , ,
	Division 5 Durham Cou	unty	Durham	28430	EL '''''
Design Section	PLAN DATE: December 2014	REVIEWED BY: J HOC	hanadel		
eld Pkwy,Garner,NC 27529	PREPARED BY: M Copple	REVIEWED BY:		P. HOCHP	
SCALE	REVISIONS	INI	T. DATE	DocuSigned by:	
N/A				MmPAN	4/02/15
				50781D2BF98C498	DATE
N / A				SIG. INVENTORY NO.	05-1030



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2033 EV PREEMPTI	ON
FUNCTION	EVB (SECONDS)
DELAY BEFORE PREEMPT	0
MIN. PED. CLEAR BEFORE PREEMPT	0
MIN. GREEN BEFORE PREEMPT	1
CLEARANCE TIME	2
PREEMPT EXTEND**	2.0

** Program Timing on Optical Detector Unit

TIMING CHART												
2033 SOFTWARE w/2070 CONTROLLER												
PHASE	Ø2	Ø4	Ø6	OL3								
MINIMUM INITIAL *	10 SEC .	7 SEC .	10 SEC.	O SEC.								
VEHICLE EXTENSION *	3.0 SEC.	2.0 SEC.	3.0 SEC.									
YELLOW CHANGE INT.	3.7 SEC.	3.0 SEC.	3.7 SEC.	3.7 SEC.								
RED CLEARANCE	1.3 SEC.	1.9 SEC.	1.3 SEC.	1.3 SEC.								
MAXIMUM LIMIT *	50 SEC .	35 sec .	50 SEC .									
RECALL POSITION	VEH. RECALL	NONE	VEH. RECALL	-								
VEHICLE CALL MEMORY	YELLOW LOCK	NONE	YELLOW LOCK	-								
DOUBLE ENTRY	OFF	OFF	OFF	-								
WALK *	— SEC.	– SEC.	— SEC.	-								
FLASHING DON'T WALK	– SEC.	– SEC.	– SEC.									
MIN PED CLEARANCE	– SEC.	– SEC.	— SEC.	-								
TYPE 3 LIMIT	– SEC.	– SEC.	— SEC.	~								
ALTERNATE EXTENSION	– SEC.	– SEC.	— SEC.	-								
ADD PER VEHICLE *	– SEC.	– SEC.	— SEC.	-								
MAXIMUM INITIAL *	– SEC.	– SEC.	— SEC.									
MAXIMUM GAP*	3 . () SEC .	2 . () SEC .	3 . () SEC .									
REDUCE 0.1 SEC EVERY *	– SEC.	– SEC.	– SEC.									
MINIMUM GAP	3 . () SEC .	2 . () SEC .	3 . () SEC .									

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

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)/2015	ation*IR13.017.00 NCDDT 2012 Traff
/20/2015	n*TR13.017.00 NCDDT 2012 Traff

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1,42	R	G	R	R		
1,62	G	R	G	Y		

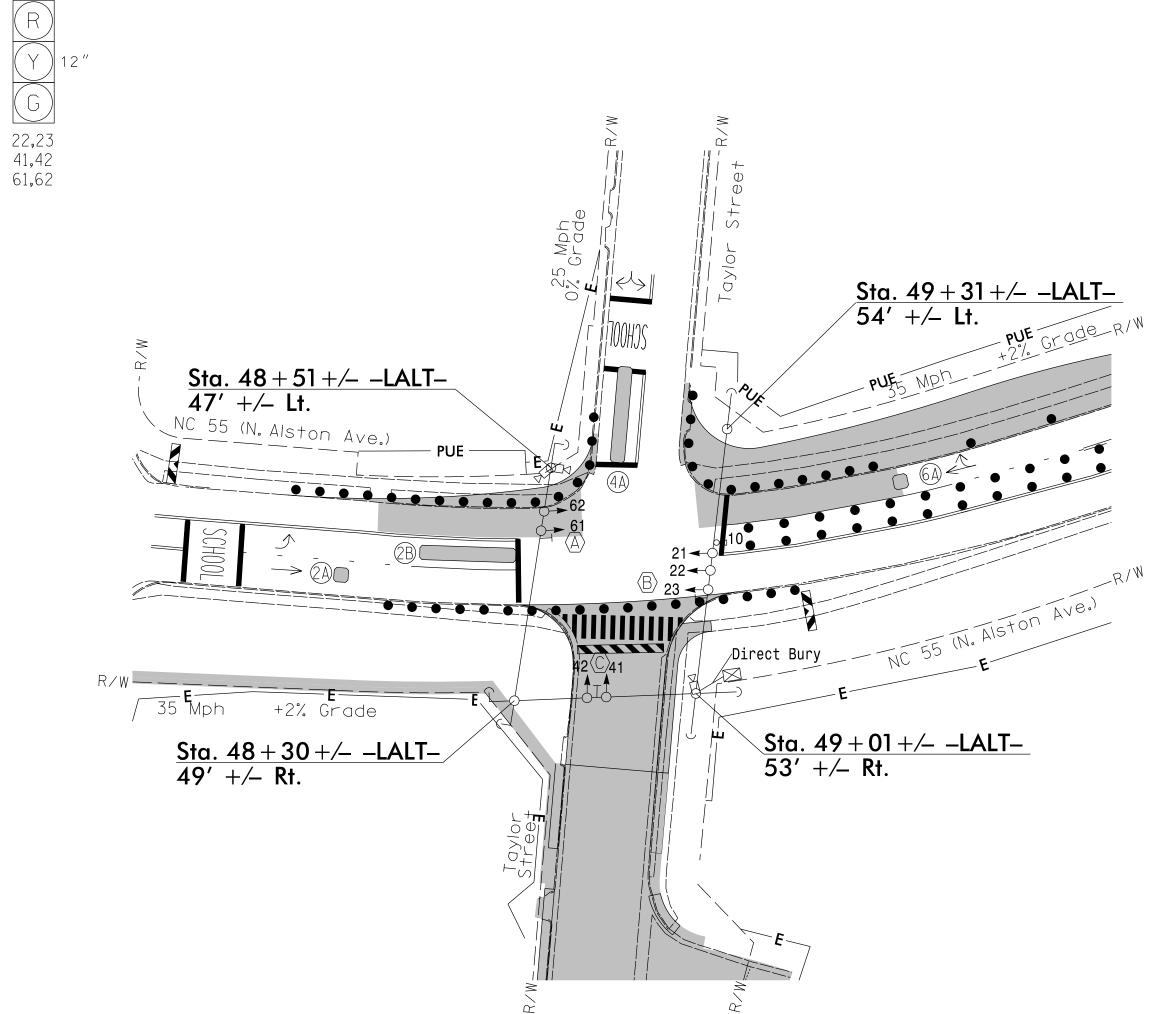
2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

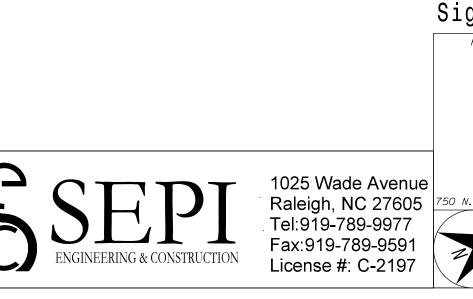
		DETECTOR PROGRAMMING																					
INDUCTIVE LOOPS											ATTRIBUTES ទួ						LOOPS	STA	TUS				
							TIMING			1	1 2		4	5	6	7	8	8					
	0.77		DIST. FROM		U						Ч	A N	0	_	z		ს	Ë		>	ž		
LOOP NO.	SIZE	TURNS	STOPBAR	NEW	EXISTING	NEMA			CAF	RRY	. TIMI LAY	STRI ALL	SERVED	COUNT	NSIG	түре з	CALLING	RNA	SYSTEM	NEW	EXISTING		
	(ft)		(ft)	z	EXIS	PHASE	DEL	DELAY (STRETCH		TCH)	FULL	DELAY PEDESTRIAN CALL		PEDE C		CC	EXTENSION	Т	СА	ALTERNATE	SYS	_	â
2A	6×6	*	70	*	-	2	-	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	*	-		
2B	6×40	*	0	*	-	2	-	SEC.	-	SEC.	Ι	-	-	-	Х	-	Х	-	-	*	-		
4 A	6×40	*	0	*	-	4	10	SEC.	-	SEC.	Ι	_	-	-	Х	-	Х	-	-	*	_		
6 A	6x6	*	70	*	-	6	-	SEC.	-	SEC.	_	-	-	-	Х	-	Х	-	-	*	_		

* Video Detection Zone

NAL FACE I.D.

All Heads L.E.D.



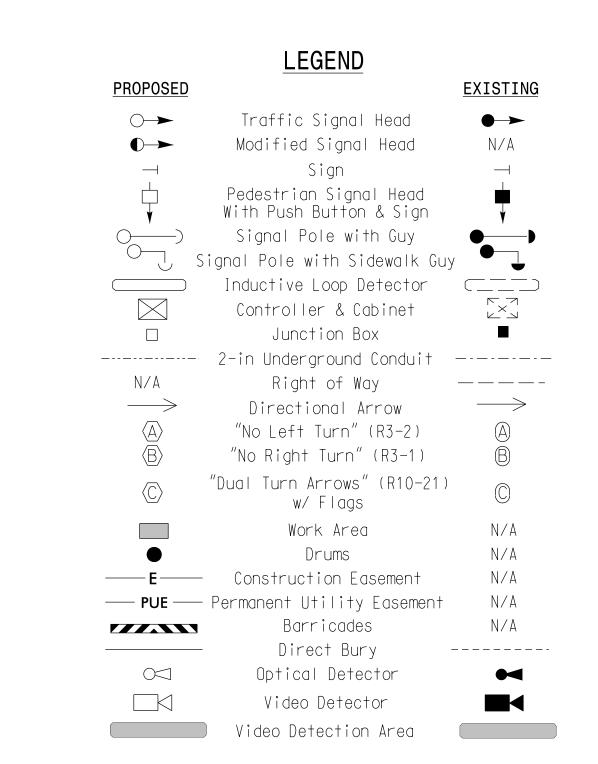


	Sig. 23.0
PROJECT REFERENCE NO.	SHEET NO.

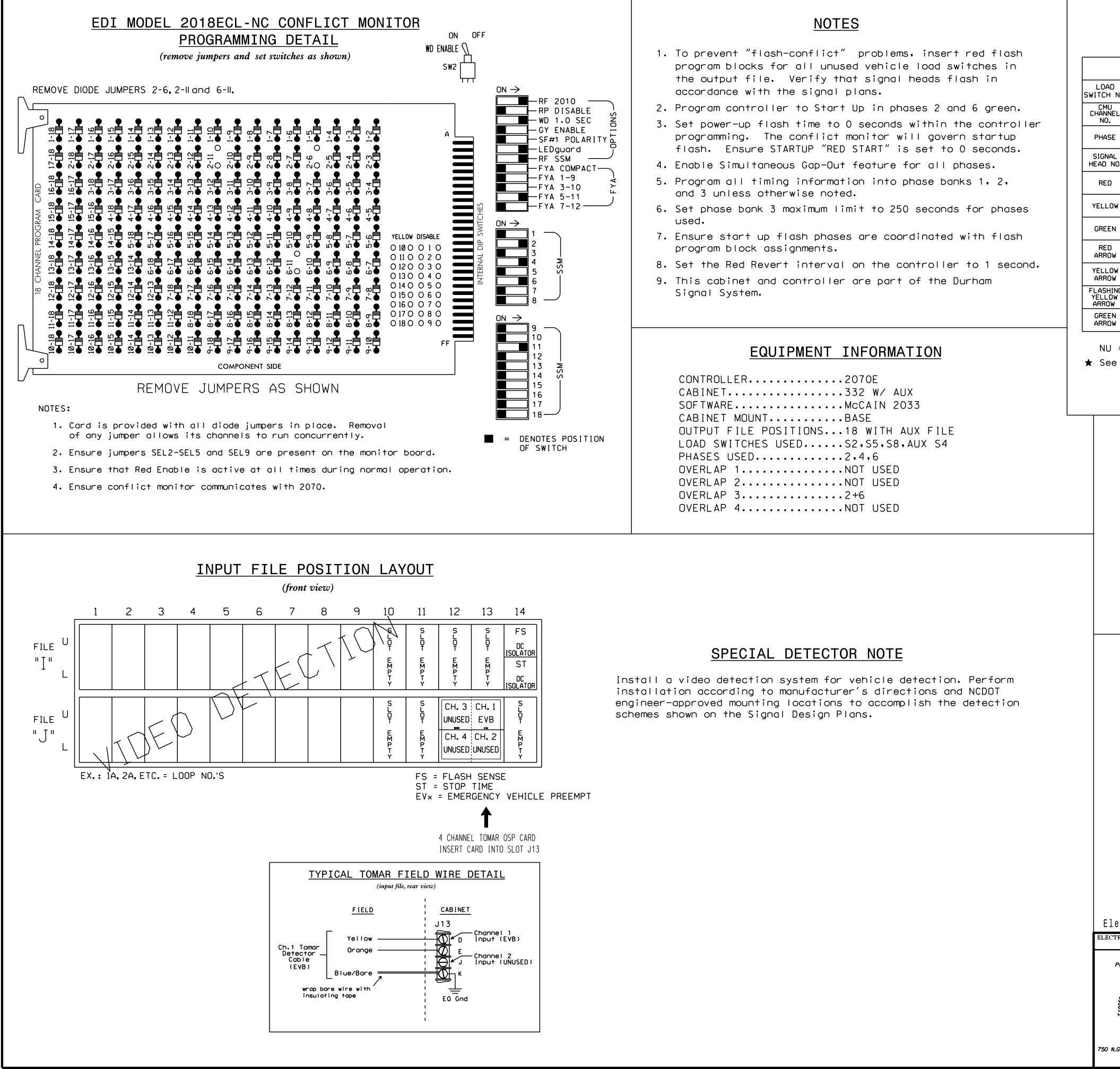
2 Phase Fully Actuated W/ EV Preemption (Durham Signal System)

NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer
- 3. Set all detector units to presence mode.
- 4. Locate new cabinet as to not obstruct sight
- distance of vehicles turning right on red. 5. Program all timing information into phase
- banks 1,2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 7. Pavement markings are existing. 8. This intersection features an optical preemption system. Shown locations of
- optical detectors are conceptual only. 9. Upon completion of Emergency Vehicle Preemption,
- controller returns to normal operation. 10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal
- system timing values supersede these values. 11. Contractor to maintain pedestrian movements through Taylor Street construction areas.



gna]	L Upgrade -	Temp	orary	Desig	n 1	(TMF	P P	nase	1, Steps	1-10)
Prepared	d for the Offices of:								SEAL	
12005	Mobility and Sand	NC 5	55 (Noi	rth Al at	stor:	n Ave	enu	e)	WITH CA	ROJ
	Sion		Тач	/lor S	Stree	et			SEA	
S.		Division		, rham Coui				Durham	2843	
19mg	Design Section	PLAN DATE:	September	2014	REVIEWED B	Y: J H	ochan	ladel		EER
N.Greenfie	eld Pkwy,Garner,NC 27529	PREPARED BY:	C Law	son	REVIEWED B	Υ:			P. HC	CHAMM
	SCALE		REVISIONS				INIT.	DATE	DocuSigned by:	
	0 40								MmPAN	4/02/15
	1 " = 4 0 '								50781D2BF98C498 SIG. INVENTORY NO.	DATE 05-0228TI



														PROJEC	t refei	RENCE I	NO.	SHEET	NO.
															U-33() 8		Sig. 2	3.1
				SI	GNA	LH	HEA	D	100	K-l	JP	CHA	\RT						
4D H NO.	S1	S2	S3	S4	S5	S6	S7	S8	59	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
U NEL	1	2	13	3	4	14	5	6	15	7	8	16	ð	10	17	11	12	18	
SE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	0L2	SPARE		OL4	SPARE	
IAL NO.	NU	22,23	NU	NU	41,42	NU	NU	61,62	NU	NU	NU	NU	NU	NU	NU	≥1 21	NU	NU	
D		128			101			134											
.0W		129			102			135											
EN		130			103			136											
D OW																A114			
.0W 0W																A115			
HING .OW DW																A116			

NU = Not Used

★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

OL3 RED (A114)-OL3 YELLOW (A115)-F OL3 GREEN (A116)-21

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0228T1 DESIGNED: September 2014 SEALED: 04/02/2015 REVISED: N/A

ectrical Detail -	Temporary 1 - Sheet 1 of 2	
TRICAL AND PROGRAMMING DETAILS FOR:	NC 55 (North Alston Avenue)	SEAL
Prepared in the Offices of:	at Taylor Street	SEAL 022013
Divisio Divisio	Division 5 Durham County Durham PLAN DATE: November 2014 REVIEWED BY: T. Joyce	TO MEINEER
	PREPARED BY: C. Strickland REVIEWED BY:	THAT GE C. BRINN
HAT Management Section	REVISIONS INIT. DATE	Docusigned by: Jeorge C. Brown 4/2/2015
I.Greenfield Pkwy,Garner,NC 27529		F12601ED0BEB434 DATE
		SIG. INVENTORY NO. 05-0228T1

OVERLAP [3] PROGRAMMING DETAIL EMERGENCY VEHICL 1. Program EVB preem Program overlaps as follows: Main Menu – 2) PR Main Menu – 4) OVERLAP EVB EVB PRESS '+' TWICE 2. Program general Main Menu – 2) PR OVERLAP [3]: Min LOADSWITCH = 11 NOTE: FOR SIGNAL HEAD 21 VEH SET 1 = 2,6YELLOW CLEARANCE = 3.7RED CLEARANCE = 1.3Program extend time on opt END OF OVERLAP PROGRAMMING OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA The following will cause the overlap green outputs to flash, which are wired to the flashing yellow arrow. Program as follows: Main Menu – 1) PHASE – 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 3Elec ELECTRI 750 N.Gre

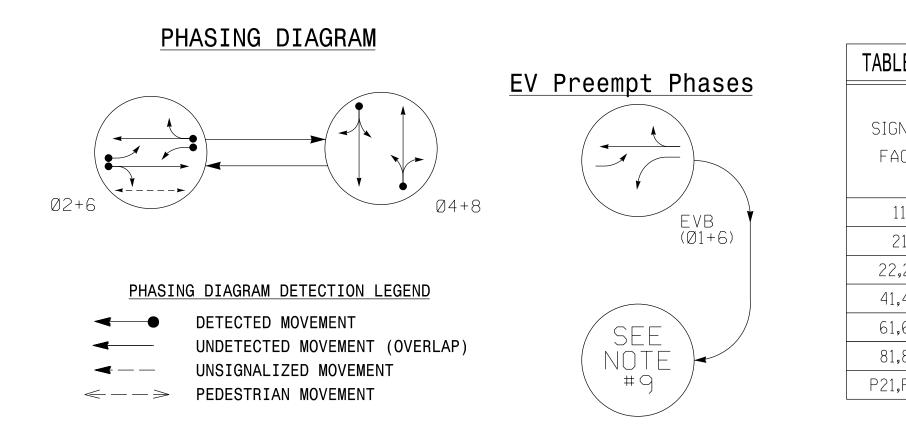
<u>LE PREEMPT</u>	ION PROGRAMM	<u>ENG</u>			
empt as follows PREEMPT - 4) EN Clear = 2 Clearance Phas	MERGENCY VEHICLE				
PREEMPT - 6) M	rameters as follo ISC PREEMPTION PA E ForceOff = 1		S		
otical detecto	or units for 2.0	sec for	EVB.		
				1	
	THIS ELECTRICAL THE SIGNAL DESIC DESIGNED: Septer SEALED: 04/02/2 REVISED: N/A	GN: 05-0228 nber 2014			
				1	
ectrical Detail - TRICAL AND PROGRAMMING DETAILS FOR:	Temporary 1 - Sheet NC 55 (North		Avenu	e)	SEAL
Prepared in the Offices of:		t Street			SEAL
NOIL NOIL	Division 5 Durhan PLAN DATE: November 2014 PREPARED BY: C. Strickland	m County REVIEWED BY: REVIEWED BY:	T. Joy	Durham Ce	DocuSigned by
Greenfield Pkwy.Garner.NC 27529	REVISIONS		INIT.	DATE	-DocuSigned by: <u>Seorge C. Brown</u> <u>F12601ED0BEB434</u> SIG. INVENTORY NO. 05-0228T1

SHEET NO.

Sig. 23.2

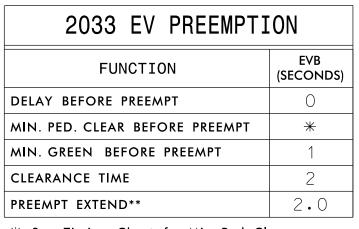
PROJECT REFERENCE NO.

U-3308



11

AII Heads L.E.D.



* See Timing Chart for Min Ped Clearance ** Program Timing on Optical Detector Unit

	203	TIMIN(3 SOFTWARE V	G CHART	ROLLER		
PHASE	Ø1	Ø2	Ø4	Ø6	Ø8	OL3
MINIMUM INITIAL *	– SEC.	10 SEC .	7 SEC .	10 SEC .	7 SEC .	0 SEC.
VEHICLE EXTENSION *	– SEC.	3.0 SEC.	2.0 SEC.	3.0 SEC.	2.0 SEC.	
YELLOW CHANGE INT.	3.7 SEC.	3.7 SEC.	3.2 SEC.	3.7 SEC.	3.0 SEC.	3 . 7 SEC .
RED CLEARANCE	2.1 SEC.	1.4 SEC.	1.8 SEC.	1.4 SEC.	1.9 SEC.	1.4 SEC.
MAXIMUM LIMIT *	– SEC.	50 SEC .	35 SEC .	50 SEC .	35 SEC .	
RECALL POSITION	NONE	VEH. RECALL	NONE	VEH. RECALL	NONE	
VEHICLE CALL MEMORY	NONE	YELLOW LOCK	NONE	YELLOW LOCK	NONE	
DOUBLE ENTRY	OFF	OFF	ON	OFF	ON	
WALK *	– SEC.	4 SEC.	– SEC.	– SEC.	– SEC.	
FLASHING DON'T WALK	– SEC.	11 SEC.	– SEC.	– SEC.	– SEC.	
MIN PED CLEARANCE	– SEC.	6 SEC .	– SEC.	– SEC.	– SEC.	
TYPE 3 LIMIT	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	
ALTERNATE EXTENSION	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	
ADD PER VEHICLE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	
MAXIMUM INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	
MAXIMUM GAP*	– SEC.	3 . () SEC .	2 . () SEC .	3 . () SEC .	2 . 0 SEC .	
REDUCE 0.1 SEC EVERY *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	
MINIMUM GAP	– SEC.	3 . () SEC .	2 . () SEC .	3 . () SEC .	2 . () SEC .	

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

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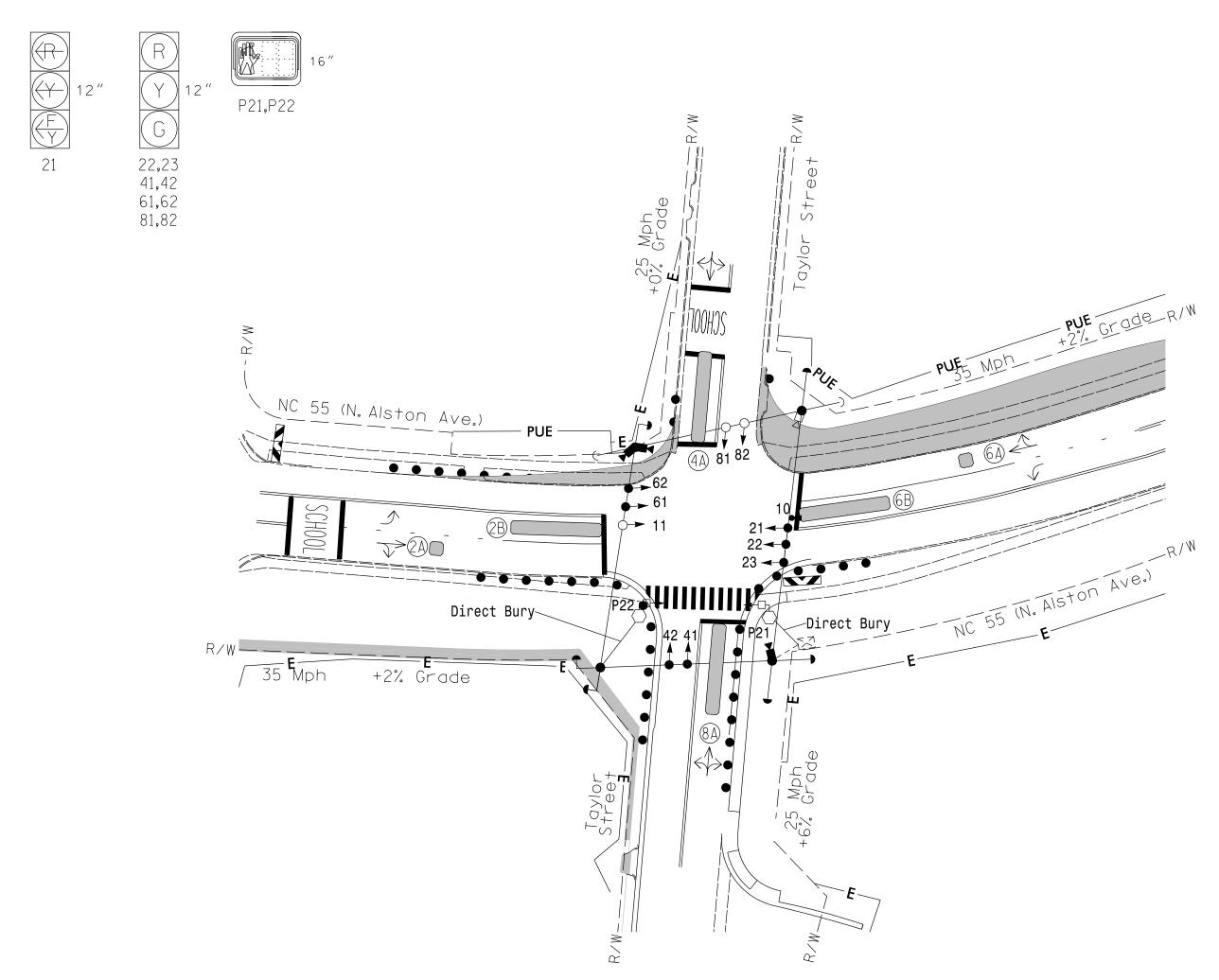
BLE OF	OPE	RAT	ION	١
	P	HAS	E	
GNAL ACE	Ø 2 + 6	Ø 4 + 8	E V B	FLASH
11	- F Y	≺R	◄—	╃
21	F	≺R	F↓≻	◄₩
2,23	G	R	R	Y
1,42	R	G	R	R
1,62	G	R	G	Y
1,82	R	G	R	R
1,P22	W	DW	DW	DRK

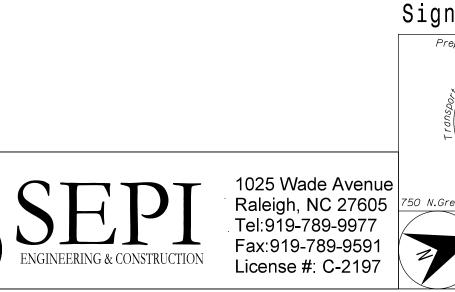
2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

										DET	ECT	OR	PR	OGF	RAM	MIN	G				
	INDUCT	IVE LOO	OPS								ATTRIBUTES							PS	STA	TUS	
				-				IIM	ING		1	2	3	4	5	6	7	8	LOOPS		U
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEV	EXISTING	NEMA PHASE	DEL	AY	CAI (STRE	RRY ETCH)	FULL TIME DELAY	PEDESTRIAN CALL	RESERVED	COUNT	EXTENSION	ТҮРЕ З	CALLING	ALTERNATE	SYSTEM	NEW	EXISTING
2A	6×6	*	70	-	*	2	-	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
2B	6×40	*	0	-	*	2	-	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
4 A	6×40	*	0	-	*	4	10	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
6A	6x6	*	70	-	*	6	-	SEC.	_	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
6B	6×40	*	0	*	-	6	-	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	*	-
8 A	6×40	*	0	*	-	8	10	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	*	-
PEDES	STRIAN	DETECT	ION																		
P21,P22	N/A	N/A	N/A	Х	-	2	-	SEC.	-	SEC.	-	Х	-	-	-	-	-	-	-	Х	-

* Video Detection Zone

SIGNAL FACE I.D.





U-3308	Sig. 24.0
PROJECT REFERENCE NO.	SHEET NO.

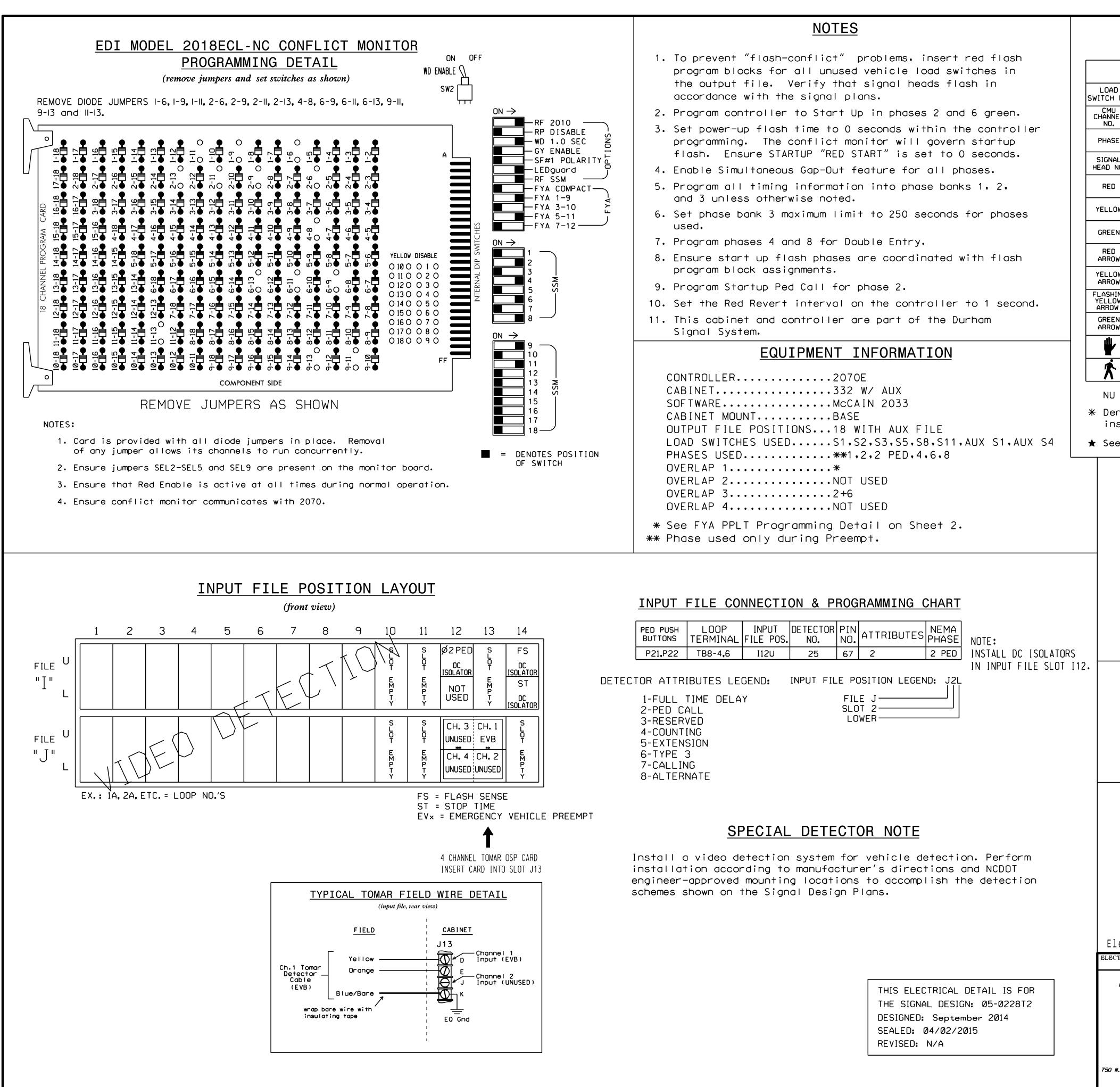
2 Phase Fully Actuated W/ EV Preemption (Durham Signal System)

NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer
- 3. Set all detector units to presence mode.
- 4. Program all timing information into phase
- banks 1,2, and 3 unless otherwise noted. 5. Set phase bank 3 maximum limit to 250 seconds
- for phases used.
- 6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- 7. Program pedestrian heads to countdown the flashing "Don't Walk" time.
- 8. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
- 9. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
- 10. Maximum times shown in timing chart are for free -run operation only. Coordinated signal system timing values supersede these values.
- 11. Pedestrian pedestals are conceptual and shown for reference only. See sheets P1-P3 for pushbutton location details.
- 12. Contractor shall adjust video detection zones as required.

LEGEND <u>PROPOSED</u> <u>EXISTING</u> Traffic Signal Head ●→ $\bigcirc \rightarrow$ Modified Signal Head N/A ●→ Sign -Pedestrian Signal Head With Push Button & Sign Signal Pole with Guy Signal Pole with Sidewalk Guy \bigcirc Inductive Loop Detector \sum Controller & Cabinet Junction Box 2-in Underground Conduit -----_..._ N/A Right of Way _____ \longrightarrow \longrightarrow Directional Arrow Work Area N/A Drums N/A N/A ----- Construction Easement — Permanent Utility Easement N/A ____ PUE -Barricades N/A Direct Bury _____ \bigcirc Optical Detector \bigcirc Type II Signal Pedestal $\square \triangleleft$ Video Detector Video Detection Area

gnal Upgrade -	- Temporary Desi	gn 2 (TMF	Phase	1, Steps	1 - 10)
Prepared for the Offices of:	NC 55 (North A a Taylor	SEAL SEAL			
Concertained Section	Division 5 Durham Com PLAN DATE: September 2014		Durham ochanadel		1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.
N.Greenfield Pkwy,Garner,NC 27529 SCALE	PREPARED BY: C Lawson REVISIONS	REVIEWED BY:	INIT. DATE	DocuSigned by:	CHANNIN
0 40				Mrg P DAA 50781D2BF98C498 SIG, INVENTORY NO.	4/02/15 DATE 05-0228T2



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				SI	GNA		IEA	D	100	K-l	JP	CHA	ART						
4 NO.	S1	S2	S3	S4	S5	S6	S7	S8	59	S1Ø	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
U NEL	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
SE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE	
IAL NO.	★	22,23	P21 . P22	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU	11 ★	NU	NU	21	NU	NU	
D		128			1Ø1			134			107								
.0W	*	129			102			135			108								
EN		130			103			136			109								
D Ow													A121			A114			
.OW OW													A122			A115			
HING OW DW													A123			A116			
EN OW	127																		
			113																

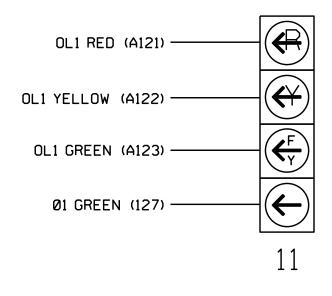
NU = Not Used

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

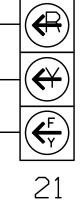
★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



OL3 RED (A114)-OL3 YELLOW (A115)-OL3 GREEN (A116)-



STARTUP CALLS PROGRAMMING

Prevents Veh Call to phase 1 during Startup. Phase 1 used only during Preempt. Main Menu – 9) UTILITIES – 1) STARTUP VEHICLE CALLS 2,4,6,8

LOAD RESISTOR INSTALLATION DETAIL

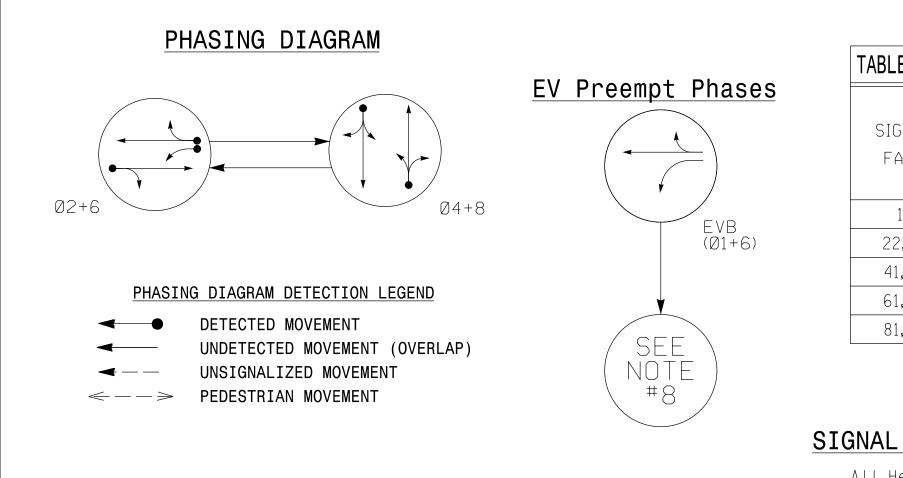
(install	resistor	as	shown	below)	
(msiun	10313101	us	Shown	σεισω	

AC-

ACCEPTABLE VALUES	PHASE 1 YELLOW FIELD
VALUE (ohms) WATTAGE	TERMINAL (126)
1.5K - 1.9K 25W (min)	\leq
2.0K - 3.0K 10W (min)	\geq

lectrical Detail -	Temporary 2 - Sheet	1 of 2					
CTRICAL AND PROGRAMMING DETAILS FOR:	NC 55 (North A	Alston Avenue)	SEAL				
Prepared in the Offices of:	at Taylor	-	CARO				
NORY W CARGON DIV		Division 5 Durham County Durham					
	PLAN DATE: November 2014	REVIEWED BY: T. Joyce	MGINE Et.				
	PREPARED BY: C. Strickland	REVIEWED BY:	CE C. Duin				
SERVICE OF TRANSFORME	REVISIONS	INIT. DATE	-DocuSigned by: Seorae C. Brown 4/2/2015				
N.Greenfield Pkwy.Garner.NC 27529							
			SIG. INVENTORY NO. 05-0228T2				

OVERLAP [3] PROGRAMMING DETAIL Program overlap as follows: Main Menu - 4) OVERLAP PRESS '+' TWICE OVERLAP [3]: LOADSWITCH = 11 VEH SET 1 = 2.6 YELLOW CLEARANCE = 3.7 RED CLEARANCE = 1.4 END OF OVERLAP PROGRAMMING OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA	<pre>FYA PPLT PROGRAMMING (SIGNAL HEAD 11) 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 1 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 1 = 99 3. Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE Phase 1 RED = 97. Phase 1 YELLOW = 98 </pre>	<pre>Program EVB preempt as follows:</pre>
The following will cause the overlap green output to flash, which is wired to the flashing yellow arrow. Program as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 3	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.	SN: 05-0228T2 Inber 2014 Division 5 Durham County Durham



2033 EV PREEMPTI	ON
FUNCTION	EVB (SECONDS)
DELAY BEFORE PREEMPT	0
PED. CLEAR BEFORE PREEMPT	0
MIN. GREEN BEFORE PREEMPT	1
CLEARANCE TIME	2
PREEMPT EXTEND**	2.0

** Program Timing on Optical Detector Unit

TIMING CHART 2033 SOFTWARE W/2070 CONTROLLER										
PHASE	Ø1	Ø2	Ø4	Ø6	Ø8					
MINIMUM INITIAL *	– SEC.	10 SEC .	7 SEC .	10 SEC .	7 SEC .					
VEHICLE EXTENSION *	– SEC.	3.0 SEC.	2.0 SEC.	3.0 SEC.	2.0 SEC.					
YELLOW CHANGE INT.	3.8 SEC.	3.8 SEC.	3.2 SEC.	3.8 SEC.	3.0 SEC.					
RED CLEARANCE	2.3 SEC.	1.6 SEC.	1.2 SEC.	1.6 SEC.	1.9 SEC.					
MAXIMUM LIMIT *	– SEC.	50 SEC .	35 sec .	50 SEC .	35 SEC .					
RECALL POSITION	NONE	VEH. RECALL	NONE	VEH. RECALL	NONE					
VEHICLE CALL MEMORY	NONE	YELLOW LOCK	NONE	YELLOW LOCK	NONE					
DOUBLE ENTRY	OFF	OFF	ON	OFF	ON					
WALK *	– SEC.	— SEC.	– SEC.	– SEC.	– SEC.					
FLASHING DON'T WALK	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.					
MIN PED CLEARANCE	– SEC.	– SEC.	— SEC.	– SEC.	– SEC.					
TYPE 3 LIMIT	— SEC.	— SEC.	– SEC.	– SEC.	— SEC.					
ALTERNATE EXTENSION	— SEC.	— SEC.	– SEC.	– SEC.	— SEC.					
ADD PER VEHICLE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.					
MAXIMUM INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.					
MAXIMUM GAP*	– SEC.	3 . () SEC .	2 . () SEC .	3 . () SEC .	2 . () SEC .					
REDUCE 0.1 SEC EVERY *	– SEC.	— SEC.	– SEC.	– SEC.	– SEC.					
MINIMUM GAP	– SEC.	3 . () SEC .	2 . () SEC .	3 . () SEC .	2 . () SEC .					

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

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_E OF 0	E OF OPERATION										
	PHASE										
GNAL ACE	Ø 2 + 6	Ø 4 + 8	E V B	FLANT							
11	- F Y	≺R	+	╃							
2,23	G	R	R	Y							
1,42	R	G	R	R							
61,62	G	R	G	Y							
81,82	R	G	R	R							

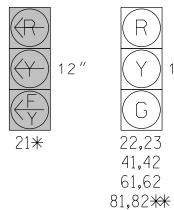
2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

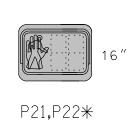
DETE								FECTOR PROGRAMMING													
INDUCTIVE LOOPS														OPS	STA	TUS					
							TIM	ING		1	2 Z	3	4	5	6	7	8 Ш	L00		U	
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	DEL	DELAY CARRY (STRETCH			FULL TIME DELAY	PEDESTRIAN CALL	RESERVED	COUNT	EXTENSION	ТҮРЕ З	CALLING	ALTERNATE	SYSTEM	NEW	EXISTING
2A	6x6	*	70	*	-	2	-	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
4 A	6×40	*	0	-	*	4	10	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
6A	6x6	*	70	*	-	6	-	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
6B	6×40	*	0	*	-	6	-	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
8 A	6×40	*	0	*	-	8	10	SEC.	_	SEC.	_	_	_	-	Х	_	Х	_	-	_	*

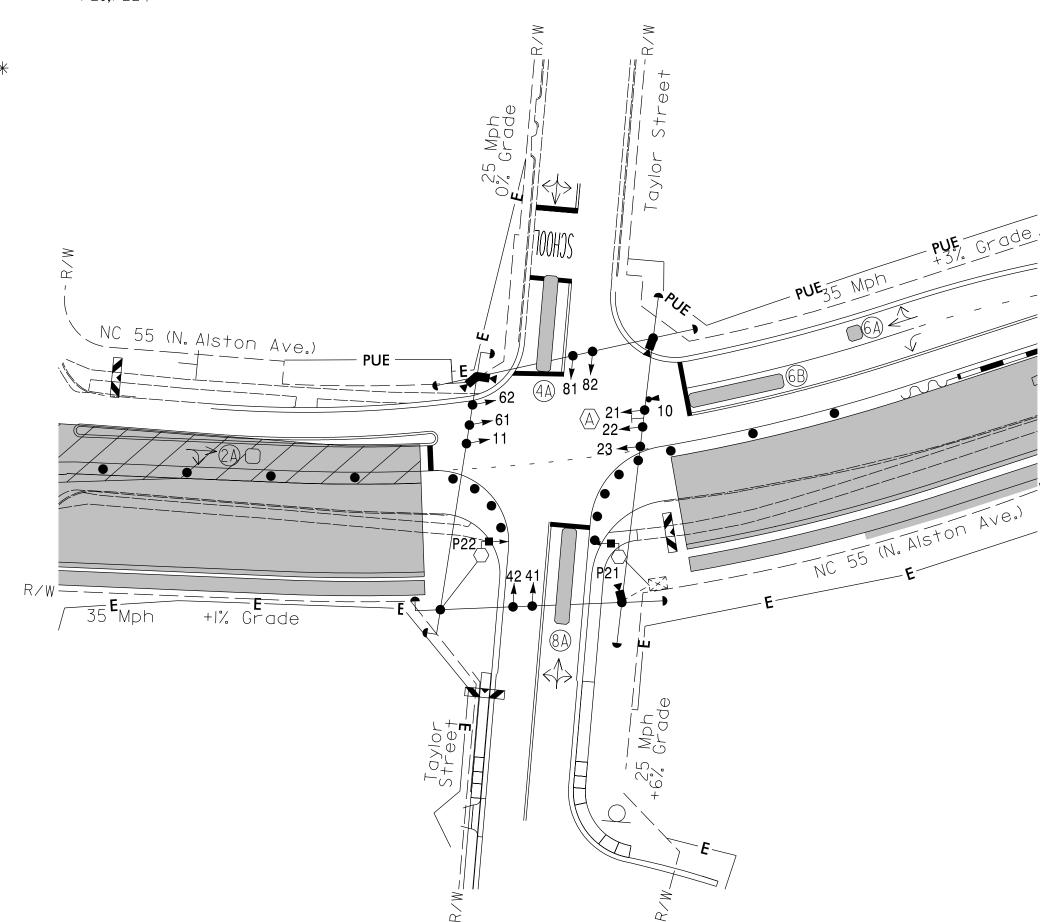
* Video Detection Zone

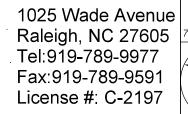
SIGNAL FACE I.D.

All Heads L.E.D. * See Note 10 ** See Note 11









ENGINEERING & CONSTRUCTION

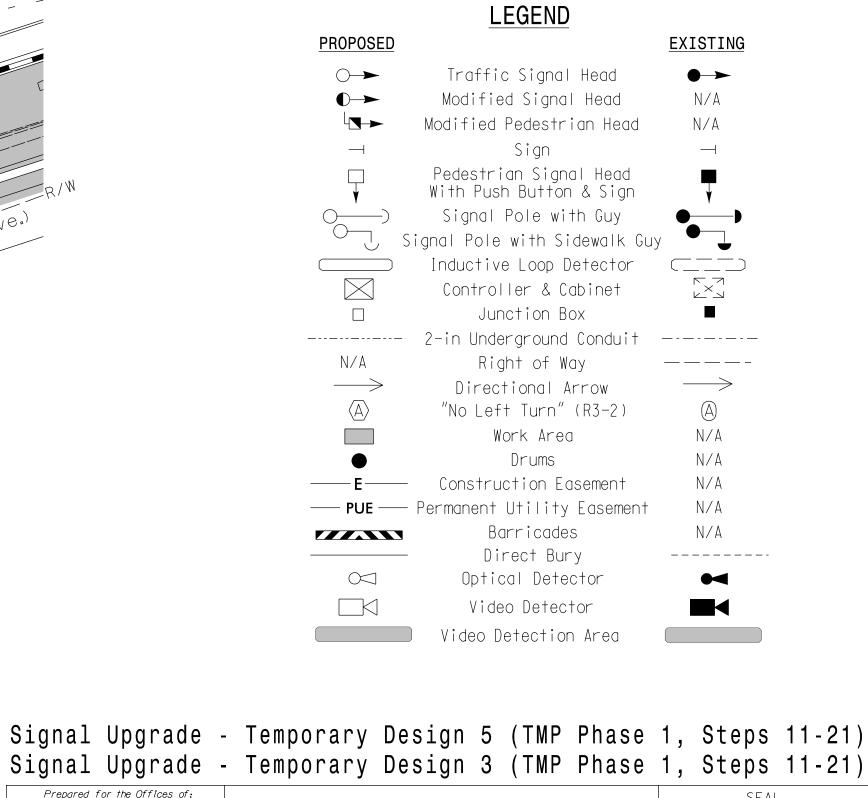


PROJECT REFERENCE NO.	SHEE	T NO.
U-3308	Sig.	25.0

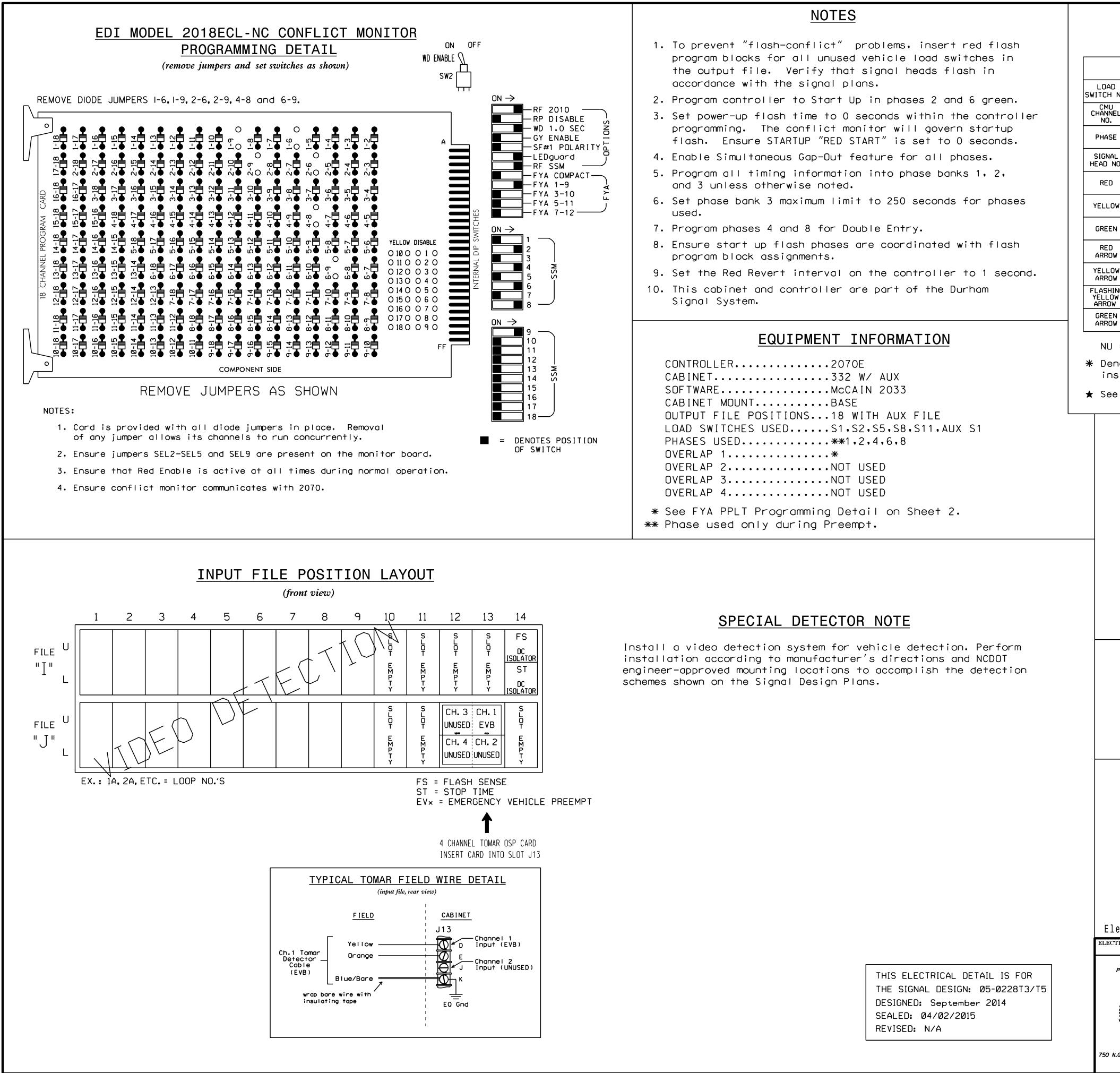
2 Phase Fully Actuated W/ EV Preemption (Durham Signal System)

NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 3. Reposition signal heads #11, #21, #22, #23, #61, #62, and optical detector #10 during this phase of construction.
- 4. Set all detector units to presence mode.
- 5. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.
- 6. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 7. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
- 8. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
- 9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- 10. Disconnect and bag signal head #21 and pedestrian signals #P21 and #P22 for Temporary Design 3. Signal head #21 shall remain disconnected and bagged for Temporary Design 5.
- 11. Reconnect and unbag signal heads #11, #81 and #82 for Temporary Design 5 that were disconnected and bagged for Temporary Design 4.
- 12. Contractor shall adjust video detection zones as required.



Prepared for the Offices of:	SEAL		
NC 55 (North Alston Avenue) at Taylor Street	SEAL		
Division 5 Durham County Durham			
PLAN DATE: September 2014 REVIEWED BY: J Hochanadel	FF TO MOINEE		
N.Greenfield Pkwy,Garner,NC 27529 PREPARED BY: C Lawson REVIEWED BY:	P. HOCHAMIN		
SCALE REVISIONS INIT. DATE	— DocuSigned by:		
0 40	Mm PAN 4/02/15		
1"=40' si	IG. INVENTORY NO. 05-0228T3/T5		



PROJECT REFERENCE NO.	SHEET NO.
U-3308	Sig. 25.1

	SIGNAL HEAD HOOK-UP CHART																	
D NO.	S1	S2	S3	S4	S5	S6	S7	S8	59	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
J IEL	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
Έ	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	0L2	SPARE	0L3	OL4	SPARE
ΆL NO.	★	22,23	NU	NU	41,42	NU	NU	61,62	NU	NU	81,82	NU	11	NU	NU	NU	NU	NU
		128			101			134			107							
WC	*	129			102			135			108							
.N		130			103			136			109							
) IW													A121					
DW IW													A122					
ING DW W													A123					
IN DW	127																	

NU = Not Used

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

★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

OL1 RED (A121) -**H** OL1 YELLOW (A122) -(F Y OL1 GREEN (A123) -Ø1 GREEN (127) -11

STARTUP CALLS PROGRAMMING

Prevents Veh Call to phase 1 during Startup, Phase 1 used only during Preempt. Main Menu – 9) UTILITIES – 1) STARTUP

VEHICLE CALLS 2,4,6,8

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

AC-

_ACCEPTABLE	VALUES		PHASE 1 YELLOW	FIELD
VALUE (ohms)	WATTAGE	\geq	TERMINAL (126)	
1.5K - 1.9K	25W (min)	\leq		
2.0K - 3.0K	10W (m1n)	\geq		

ectrical Detail -	Temporary 3	and 5 -	Sheet 1	of 2					
TRICAL AND PROGRAMMING DETAILS FOR:	NC 55 (1	North	Alston	Avenu	le)	SEAL			
Prepared in the Offices of:	-	a Taylor	t Street			SEAL			
voisinid	Division 5 PLAN DATE: Novembe		County REVIEWED BY:	T. Jov	Durham VCe	m = 022013 =			
	PREPARED BY: C Stri		REVIEWED BY:		y 0 0	PGE C			
Final OF TRANS Section	REVISION	s 		INIT.	DATE	DocuSigned by: George C. Brown	4/2/2015		
Greenfield Pkwy,Garner,NC 27529							DATE		
						SIG. INVENTORY NO. 05-0	228T3/T5		

<u>FYA PPLT PROGRAMMING</u> <u>(SIGNAL HEAD 11)</u>

- 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 1
- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu – 6) OUTPUTS – F) FYA PPLT Phase 1 = 99
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu – 6) OUTPUTS – 8) REDIRECT PHASE Phase 1 RED = 97, Phase 1 YELLOW = 98

SPECIAL NOTES EV PREEMPT PROGRAMMING

Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu – 9) UTILITIES – 9) MISC FYA DURING PREEMPT (Y/N) = Y

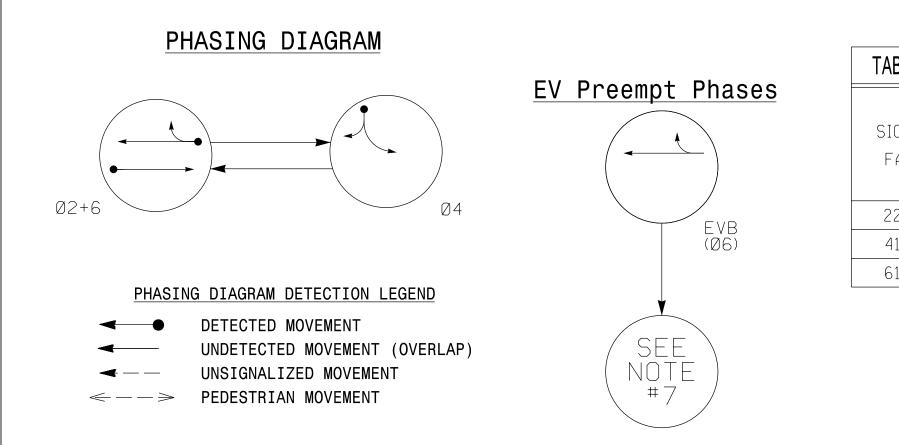
EMERGENCY VEHICL

- 1. Program EVB preer Main Menu - 2) Pf EVB EVB
- 2. Program general Main Menu – 2) Pf Min

Program extend time on op

El ELEC

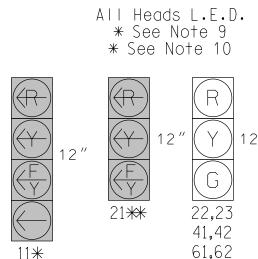
			PROJE	CT REFERENCE NO.	SHEET NO.
				U-3308	Sig. 25.2
<u>LE PREEMPT</u>	ON PROGRAMMING				
empt as follows	SE MERGENCY VEHICLE				
Clear = 2					
Clearance Phas	ses = 1,6				
	ameters as follows:				
	SC PREEMPTION PARAMETERS				
Time Before PE					
otical detector	r units for 2.0 sec for EVI	в.			
	THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0228T				
	DESIGNED: September 2014	3/10			
	SEALED: 04/02/2015				
	REVISED: N/A				
ectrical Detail -	Temporary 3 and 5 - Sheet 2 of	2			
TRICAL AND PROGRAMMING)	SEAL	
DETAILS FOR:	at		/	WW CAR	
Prepared in the Offices of:	Taylor Street			P POFESSIO	N. 1
STOL OF WORTH CAROLE	-			SE AL	
Prepared in the Offices of:	Division 5 Durham County		ırham	SEAL 022013	
	PLAN DATE: November 2014 REVIEWED BY: T PREPARED BY: C. Strickland REVIEWED BY:	. Joyce			BRUIN
Hanagement Section		NIT. D	ATE	DocuSigned by:	
.Greenfield Pkwy.Garner.NC 27529				<u>Seorge C. Bron</u> 	01 4/2/2015 DATE
			S	IG. INVENTORY NO. 05	



2033 EV PREEMPTI	ON
FUNCTION	EVB (SECONDS)
DELAY BEFORE PREEMPT	0
PED. CLEAR BEFORE PREEMPT	0
MIN. GREEN BEFORE PREEMPT	1
CLEARANCE TIME	2
PREEMPT EXTEND**	2.0

** Program Timing on Optical Detector Unit

<u>S</u>	Ι	Gľ	١A	۱L	=,



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T 2033 SOF	EMIN TWARE				}	
PHASE	Øá	2	Ø	4	Ø	0
MINIMUM INITIAL *	10	SEC.	7	SEC.	10	SEC.
VEHICLE EXTENSION *	3.0	SEC.	2.0	SEC.	3.0	SEC.
YELLOW CHANGE INT.	3.8	SEC.	3.0	SEC.	3.7	SEC.
RED CLEARANCE	1.4	SEC.	1.4	SEC.	1.4	SEC.
MAXIMUM LIMIT *	50	SEC.	35	SEC.	50	SEC.
RECALL POSITION	VEH. R	ECALL	NC	NE	VEH. R	ECALL
VEHICLE CALL MEMORY	YELLOW	LOCK	NC	NE	YELLOW	LOCK
DOUBLE ENTRY	OF	F	O	FF	O	=F
WALK *	_	SEC.	_	SEC.	_	SEC.
FLASHING DON'T WALK	_	SEC.	_	SEC.	-	SEC.
MIN PED CLEARANCE	_	SEC.	_	SEC.	-	SEC.
TYPE 3 LIMIT	_	SEC.	_	SEC.	_	SEC.
ALTERNATE EXTENSION	_	SEC.	_	SEC.	_	SEC.
ADD PER VEHICLE *	_	SEC.	_	SEC.	_	SEC.
MAXIMUM INITIAL *	—	SEC.	_	SEC.	_	SEC.
MAXIMUM GAP*	3.0	SEC.	2.0) SEC.	3.0	SEC.
REDUCE 0.1 SEC EVERY *	_	SEC.	_	SEC.	_	SEC.
MINIMUM GAP	3.0	SEC.	2.0) SEC.	3.0	SEC.
* These values may be field	adjusted	l. Do no	ot adjust	Min Gr	een and	

^c 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.

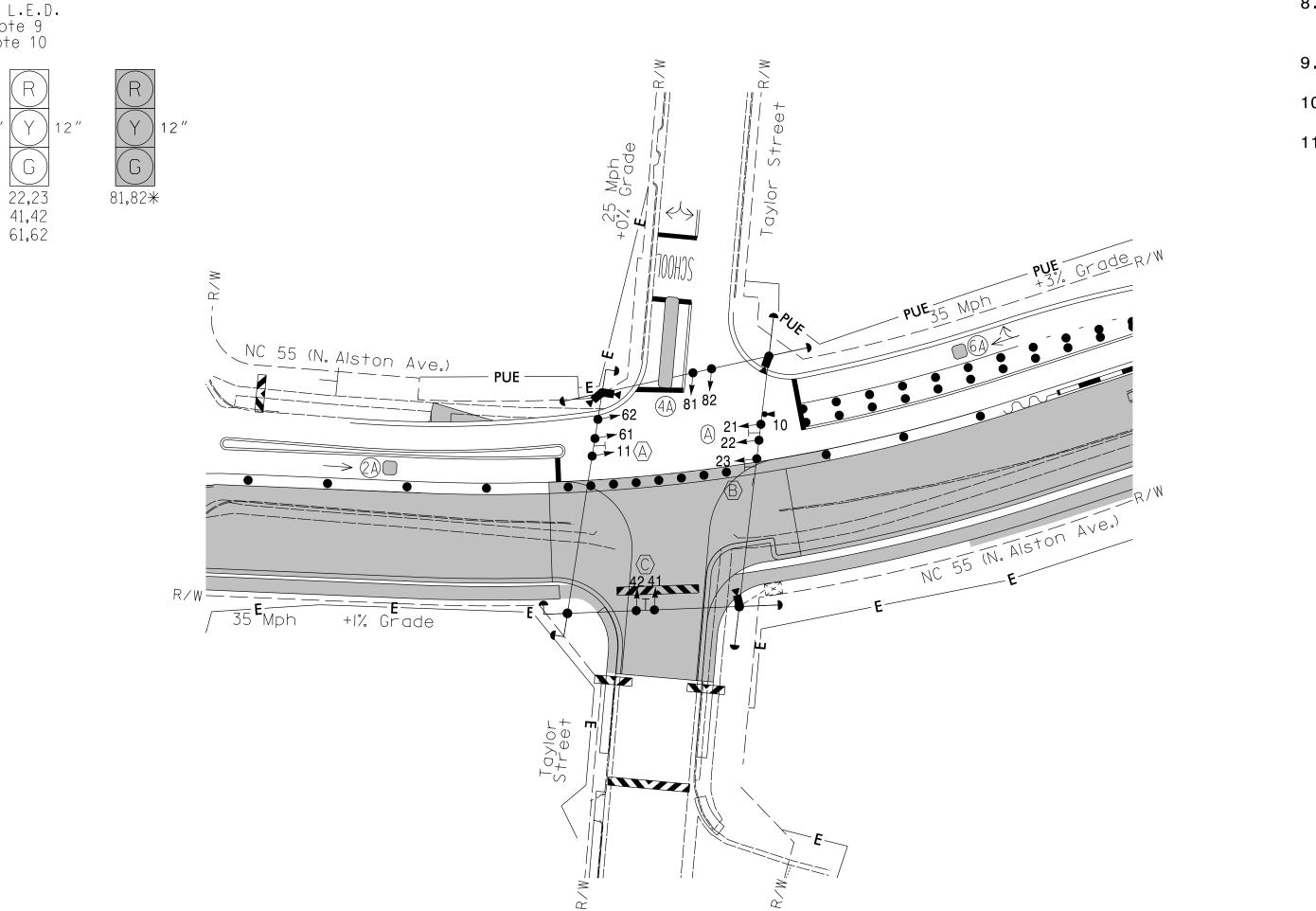
BLE OF	ΩPI	FRA	TTO	N
		HAS		
GNAL ACE	Ø 2 + 6	Ø 4	E V B	F L A S H
2,23	G	R	R	Y
1,42	R	G	R	R
1,62	G	R	G	Y

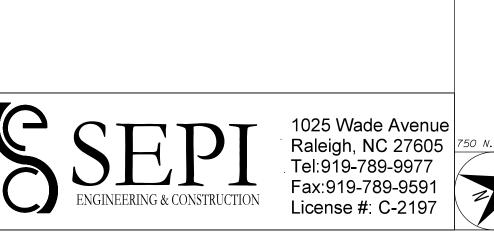
2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

								DE	TEC	FOR	PR	OGF	AMN	/IN	G				
	INDUCT	EVE LOC)PS								A٦	TRI	BUTI	ΞS			PS	STA	TUS
							TIMING			2	3	4	5	6	7	8	8		<i>(</i> D
	0175		DIST. FROM		Q						Ö		z	e	U	ΔTE		2	<u>z</u>
LOOP NO.	SIZE (ft)	TURNS	STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	DELAY	DELAY CARRY (STRETCH)		PEDESTRI CALL	RESERVED	COUNT	EXTENSION	ТҮРЕ	CALLING	ALTERNATE	SYSTEM	NEW	EXISTING
									-	•			ш				•,		
2A	6x6	*	70	¥	-	2	– SEC.	– SEC	• -	-	-	-	Х	-	Х	-	-	-	*
4 A	6×40	*	0	-	*	4	10 SEC.	- SEC	. –	-	-	-	Х	-	Х	-	-	-	*
6A	6×6	*	70	-	*	6	– SEC.	– sec	. –	-	-	-	Х	-	Х	-	-	-	*

* Video Detection Zone

FACE I.D.





PROJECT REFERENCE NO.	SHEET NO.
U-3308	Sig. 26.0

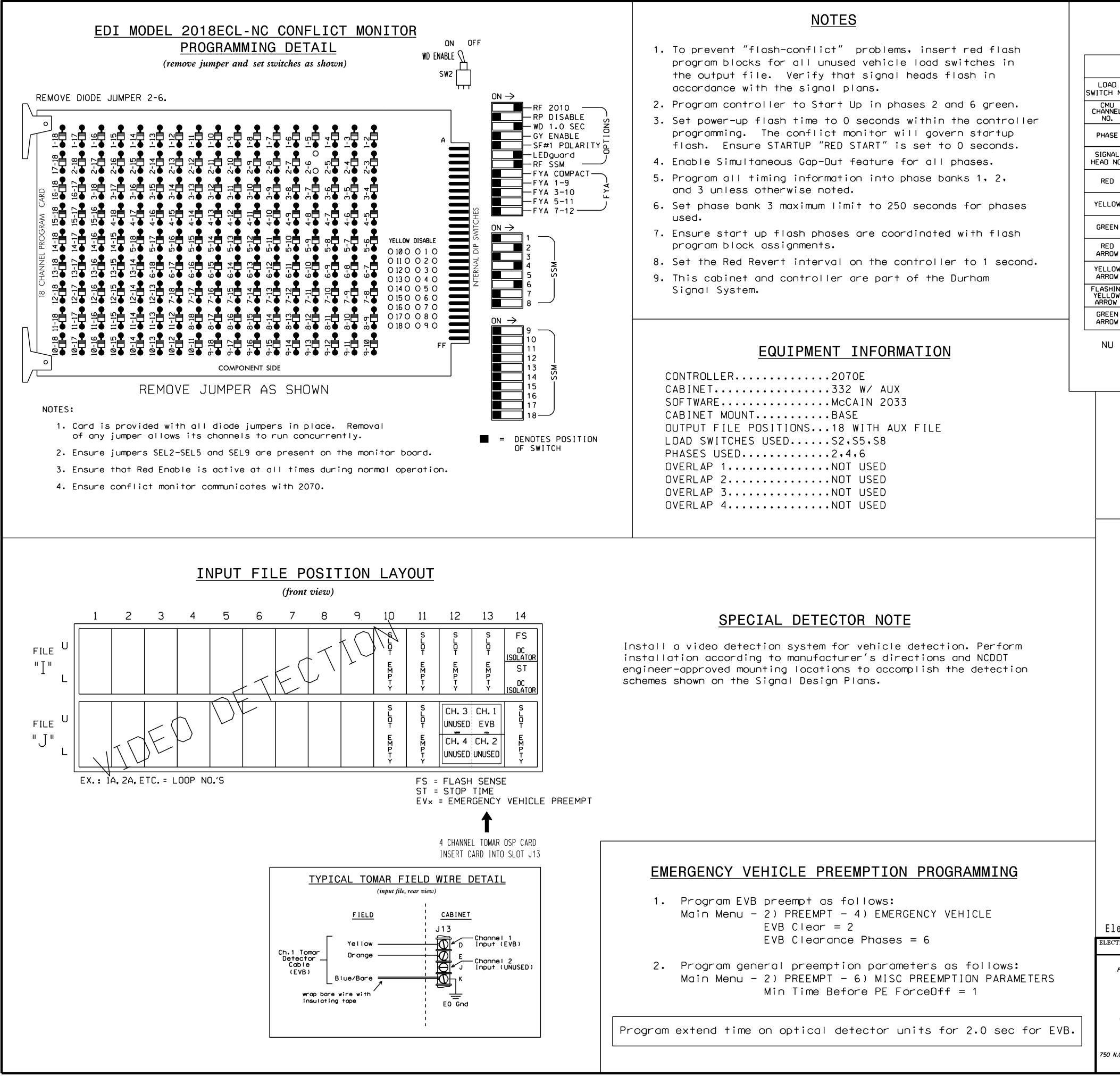
2 Phase Fully Actuated W/ EV Preemption (Durham Signal System)

NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 2. Do not program signal for late night flashing operation unless otherwise directed
- by the Engineer
- 3. Set all detector units to presence mode. 4. Program all timing information into phase banks
- 1,2, and 3 unless otherwise noted.
- 5. Set phase bank 3 maximum limit to 250 seconds for phases used. 6. This intersection features an optical preemption
- system. Shown locations of optical detectors are conceptual only.
- 7. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
- 8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- 9. Disconnect and bag signal heads #11, #81 and #82 during this phase of construction.
- 10. Signal head #21 to remain bagged during this phase of construction.
- 11. Contractor shall adjust video detection zones as required.

LEGEND <u>EXISTING</u> <u>PROPOSED</u> Traffic Signal Head ●→ $\bigcirc \rightarrow$ Modified Signal Head N/A ●→ Sign --Pedestrian Signal Head With Push Button & Sign Signal Pole with Guy \bigcirc Signal Pole with Sidewalk Guy \bigcirc Inductive Loop Detector \sum Controller & Cabinet Junction Box 2-in Underground Conduit -----_----N/A Right of Way _____ \longrightarrow \longrightarrow Directional Arrow $\langle \underline{A} \rangle$ (A)"No Left Turn" (R3-2) $\langle B \rangle$ B "No Right Turn" (R3-1) "Dual Turn Arrows" (R10-21) \bigcirc w/ Flags N/A Work Area N/A Drums ----- Construction Easement N/A N/A ---- PUE ---- Permanent Utility Easement Barricades N/A Direct Bury _____ _____ \bigcirc Optical Detector $\Box \triangleleft$ Video Detector Video Detection Area

Signal Upgrade -	Temporary Design 4 (TMP Phas	e 1, Steps 11-21)
Prepared for the Offices of: Nobility and NoRTH CAC	NC 55 (North Alston Avenue) at	SEAL SEAL CARO/////
Charlesign Section	Taylor StreetDivision 5Durham CountyDurPLAN DATE:September 2014REVIEWED BY:J Hochanadel	
750 N.Greenfield Pkwy,Garner,NC 27529 SCALE	PREPARED BY: C Lawson REVIEWED BY: REVISIONS INIT. DATE	- Doodolgiled by:
0 40		Mg P LAN 4/02/15 50781D2BF98C498 DATE SIG. INVENTORY NO. 05-0228Т4



														PROJEC	T REFE	RENCE I	NO.	SHEET	NO.	
														U-3308				Sig. 26		
																	ł			
				SI	GNA	LF	IEA	DF	100	K-l	JP	CHA	٩RT							
4D H NO.	S1	S2	S3	S4	S5	S6	S7	S8	59	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6		
U NEL	1	2	13	3	4	14	5	6	15	7	8	16	g	10	17	11	12	18		
SE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	0L3	OL4	SPARE		
IAL NO.	NU	22,23	NU	NU	41,42	NU	NU	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU		
D		128			101			134												
.0w		129			102			135												
EN		130			103			136												
D Ow																				
.0W 0W																				
HING .OW DW																				

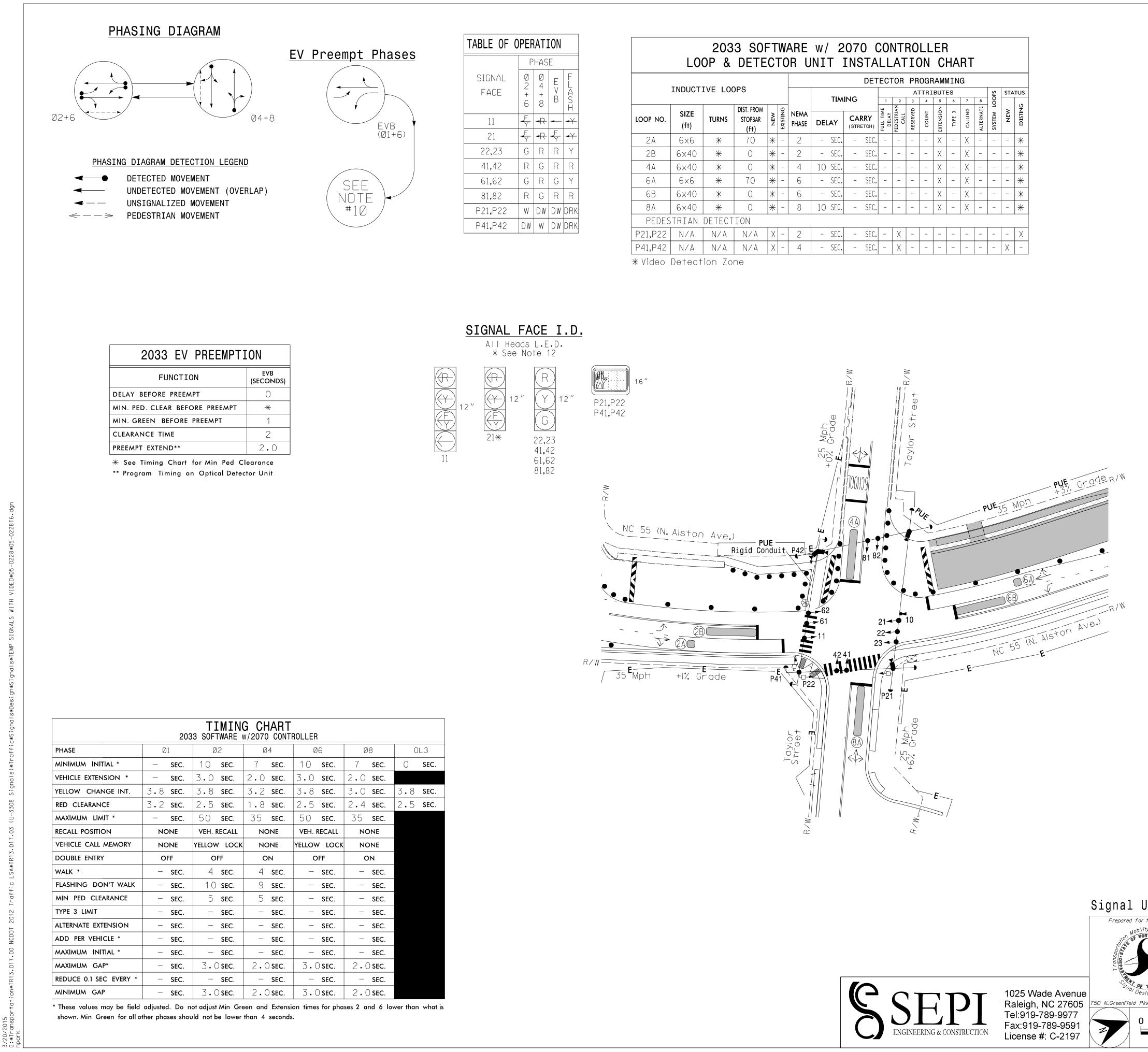
NU = Not Used

STARTUP CALLS PROGRAMMING

Main Menu – 9) UTILITIES – 1) STARTUP VEHICLE CALLS 2,4,6

> THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0228T4 DESIGNED: September 2014 SEALED: 04/02/2015 REVISED: N/A

lectrical Detail -	Temporary 4		
CTRICAL AND PROGRAMMING DETAILS FOR:	NC 55 (North Als	ton Avenue)	SEAL
Prepared in the Offices of:	at Taylor St	SEAL 022013	
Division of the second s	Division 5 Durham Coun		
		ved by: T. Joyce	FIC A STANGINE ER
	PREPARED BY: C. Strickland REVIE	VED BY:	MICE C. Min
Management Secti	REVISIONS	INIT. DATE	— DocuSigned by:
N.Greenfield Pkwy.Garner.NC 27529			George C. Brown 4/2/2015
			<u>— F12601ED0BEB434</u> DATE SIG. INVENTORY NO. 05-0228T4



.E OF 0	PER	AT]	ON	
	P	HAS	E	
GNAL ACE	Ø2+6	Ø 4 + 8	E V B	F L A S H
11	− F Y	≺R	┥	- ¥-
21	- F Y	≺R	F↓≻	- ¥
2,23	G	R	R	Y
1,42	R	G	R	R
1,62	G	R	G	Y
1,82	R	G	R	R
1,P22	W	DW	DW	DRK
1,P42	DW	W	DW	DRK

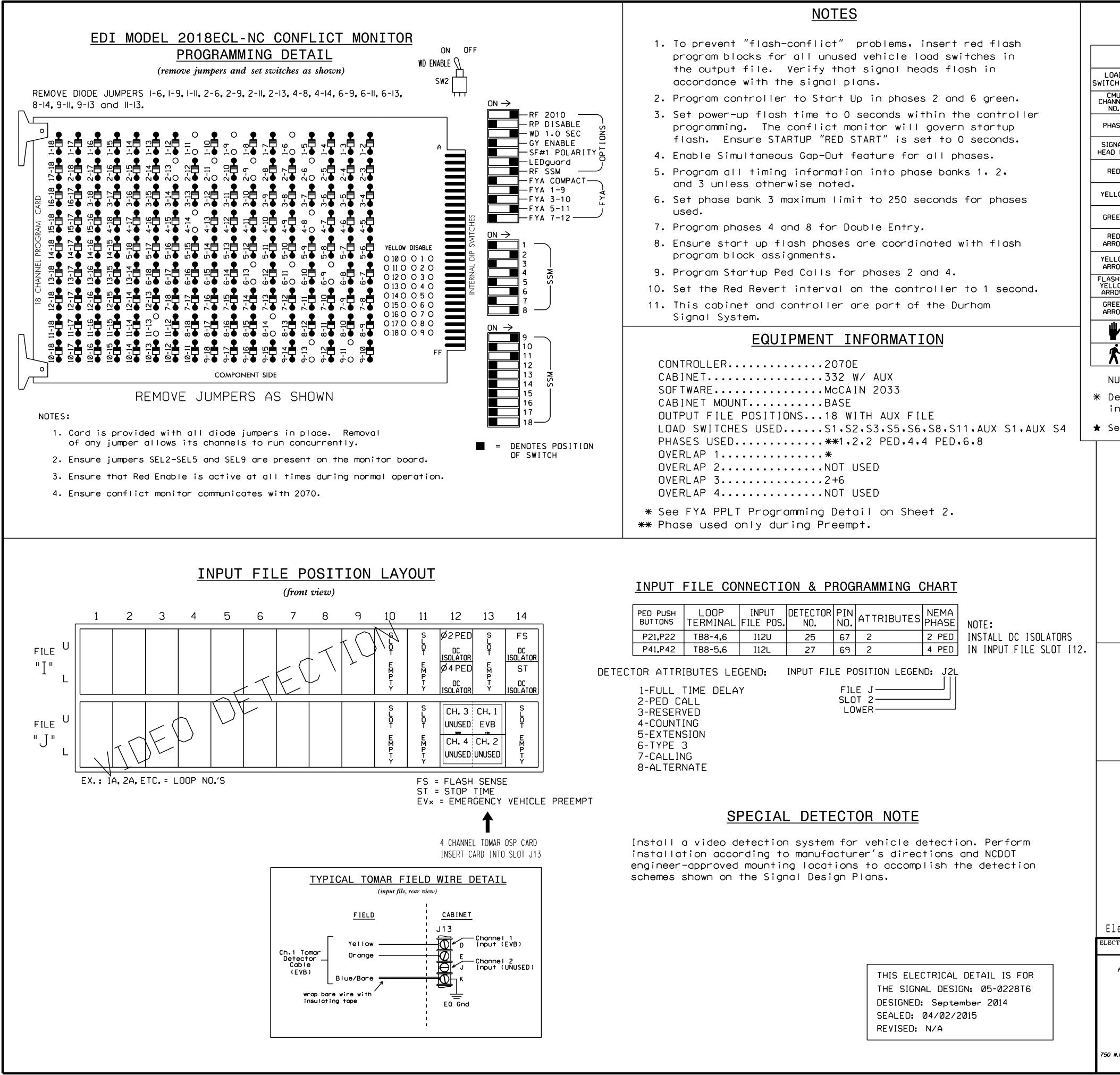
										DET	ECT	OR	PR	OGF		MIN	G				
	INDUCT	IVE LOG	DPS										A٦	TRI	BUT	ES			PS	STA	TUS
		1			1		TIMING			1	2	3	4	5	6	7	8	LOOPS		0	
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEV	EXISTING	NEMA PHASE	DEL	DELAY CARRY (STRETCH)			FULL TIME DELAY	PEDESTRIAN CALL	RESERVED	COUNT	EXTENSION	ТҮРЕ З	CALLING	ALTERNATE	SYSTEM	NEW	EXISTING
2A	6×6	*	70	*	-	2	-	SEC.	-	SEC.	-	-	-	-	Х	-	X	-	-	-	*
2B	6×40	*	0	*	-	2	-	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
4 A	6×40	*	0	*	-	4	10	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
6 A	6x6	*	70	*	-	6	-	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
6B	6×40	*	0	*	-	6	-	SEC.	_	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
8 A	6×40	*	0	*	-	8	10	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
PEDES	STRIAN	DETECT	ION		•		•														
P21,P22	N/A	N/A	N/A	Х	-	2	-	SEC.	_	SEC.	-	Х	-	-	-	-	-	-	-	-	Х
P41,P42	N/A	N/A	N/A	Х	-	4	-	SEC.	-	SEC.	-	Х	-	-	-	-	-	-	-	Х	-
		• – –	•																		

		PROJECT REFERENCE NO.	SHEET NO.
		U-3308 Si	ig. 27.0
	2 Phase		-
	Fully Actuated		
	W/ EV Preemption		
	(Durham Signal System)		
	NOTES		
1. F	Refer to "Road Standard Drawings NCDOT	″ dated	
	January 2012, "Standard Specifications		
	Roads and Structures" dated January 20	12.	
	Do not program signal for late night flashing operation unless otherwise di	rected	
	by the Engineer.		
	Reposition signal heads #11, #21, #22,		
	and optical detector #10 during this construction.	phase of	
	Set all detector units to presence mod	е.	
	Program all timing information into ph		
	1,2, and 3 unless otherwise noted.		
	Set phase bank 3 maximum limit to 250 phases used.	seconds for	
	Omit "WALK" and flashing "DON'T WALK" v	with no	
	pedestrian calls.		
	Program pedestrian heads to countdown	the flashing	
	"Don't Walk" time. This intersection features an optical	nreemntion	
	system. Shown locations of optical det		
á	are conceptual only.		
	Upon completion of Emergency Vehicle P		
	controller returns to normal operation Maximum times shown in timing chart ar		
	operation only. Coordinated signal sys		
١	values supersede these values.	-	
	Reconnect and unbag signal head #21 du	ring	
	this phase of construction. Pedestrian pedestals are conceptual an	d shown for	
	reference only. See sheets P1-P3 for		
	Contractor shall adjust video detectio	n zones as	
1	required.		
	LEGEND		
	PROPOSED	<u>EXISTING</u>	
	PROPOSED		
	PROPOSED ○→ Traffic Signal Head		
	PROPOSED → Traffic Signal Head → Modified Signal Head → Sign ← Pedestrian Signal Head	d N∕A →	
	PROPOSED → Traffic Signal Head → Modified Signal Head → Sign ↓ Pedestrian Signal Head With Push Button & Si	d N/A I gn	
	PROPOSED → Traffic Signal Head → Modified Signal Head → Sign → Pedestrian Signal Head With Push Button & Si → Signal Pole with Guy	d N/A 	
	PROPOSED → Traffic Signal Head → Modified Signal Head → Sign → Pedestrian Signal Head With Push Button & Si → Signal Pole with Sidewal	d N/A ad d gn v k Guy	
	PROPOSED Traffic Signal Head Modified Signal Head Sign Pedestrian Signal Head With Push Button & Si Signal Pole with Sidewal Inductive Loop Detect	d N/A d I gn I k Guy I or I N/A	
	PROPOSED Traffic Signal Head Modified Signal Head Sign Pedestrian Signal Head With Push Button & Si Signal Pole with Guy Signal Pole with Sidewal Inductive Loop Detect Controller & Cabinet	d N/A d I gn I k Guy I or I S I	
	PROPOSED Image: Control ler & Cabinet Image: Control ler<	d N/A d I gn I k Guy I or I k X I I	
	PROPOSED Traffic Signal Head Modified Signal Head Sign Pedestrian Signal Head With Push Button & Si Signal Pole with Guy Signal Pole with Sidewal Inductive Loop Detect Controller & Cabinet	d N/A d I gn I k Guy I or I k X I I	
	PROPOSED Traffic Signal Head Modified Signal Head Sign Pedestrian Signal Head With Push Button & Si Signal Pole with Guy Signal Pole with Sidewal Inductive Loop Detect Controller & Cabinet Junction Box 	d N/A d I gn I k Guy I or I k X I I	
	PROPOSED Image: Constraint of the state of t	d N/A d I gn I k Guy I or I k X I I	
	PROPOSED Image: Constraint of the state of t	d N/A d N/A d gn / k Guy or L X Jit N/A N/A	
	PROPOSED → Traffic Signal Head → Modified Signal Head → Sign → Pedestrian Signal Head → Pedestrian Signal Head → Sign → Signal Poles with Guy > Signal Pole with Sidewal → Inductive Loop Detect △ Controller & Cabinet □ Junction Box → 2-in Underground Condu N/A Right of Way → Directional Arrow ● Dums Construction Easemen	$ \begin{array}{c} $	
	PROPOSED → →	d N/A ad η k Guy or N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A	
	PROPOSED → Traffic Signal Head → Modified Signal Head → Sign → Pedestrian Signal Head → Signal Pole with Guy Signal Pole with Sidewal Inductive Loop Detect △ Signal Pole with Sidewal □ Junction Box □ Junction Box □ Junction Box □ Junction Arrow N/A Right of Way → Directional Arrow Work Area Dums ● Construction Easemen ● Permanent Utility Easer ■ Barricades	$ \begin{array}{c} $	
	PROPOSED Image: Construction Easemenn Image: Construction	$ \begin{array}{c} $	
	PROPOSED → Traffic Signal Head ↓ Modified Signal Head ↓ Sign ↓ Pedestrian Signal Head ↓ Signal Pole with Guy ↓ Signal Pole with Sidewal ↓ Inductive Loop Detect ↓ Inductive Loop Detect ↓ Unction Box ↓ Junction Box ↓ Junction Box ↓ Junction Arrow ↓ Work Area ↓ Dums ↓ E ↓ Dums ↓ Barricades ↓ Detector	$ \begin{array}{c} $	
	PROPOSED → Traffic Signal Head → Modified Signal Head → Sign → Pedestrian Signal Head → Pedestrian Signal Head → Pedestrian Signal Head → Signal Pole with Guy Signal Pole with Sidewal Inductive Loop Detect ○ Signal Pole with Sidewal □ Junction Box □ Directional Arrow Work Area Dums □ Pute Permanent Utility Easem Barricades ○ Optical Detector ※ Type I Signal Pedestor Rigid Conduit Rigid Conduit	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	
	PROPOSED → Traffic Signal Head ↓ Sign ↓ Pedestrian Signal Head ↓ Signal Pole with Guy ↓ Signal Pole with Sidewal ↓ Inductive Loop Detect ↓ Controller & Cabinet ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Directional Arrow ↓ Work Area ↓ Dums ↓ Construction Easemen ▶ Detector ♦ <t< td=""><td>$\begin{array}{c}$</td><td></td></t<>	$ \begin{array}{c} $	
	PROPOSED → Traffic Signal Head → Modified Signal Head → Sign → Pedestrian Signal Head → Pedestrian Signal Head → Pedestrian Signal Head → Signal Pole with Guy Signal Pole with Sidewal Inductive Loop Detect ○ Signal Pole with Sidewal □ Junction Box □ Directional Arrow Work Area Dums □ Pute Permanent Utility Easem Barricades ○ Optical Detector ※ Type I Signal Pedestor Rigid Conduit Rigid Conduit	$ \begin{array}{c} $	
	PROPOSED → Traffic Signal Head ↓ Sign ↓ Pedestrian Signal Head ↓ Signal Pole with Guy ↓ Signal Pole with Sidewal ↓ Inductive Loop Detect ↓ Controller & Cabinet ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Directional Arrow ↓ Work Area ↓ Dums ↓ Construction Easemen ▶ Detector ♦ <t< th=""><th>$\begin{array}{c}$</th><th></th></t<>	$ \begin{array}{c} $	
	PROPOSED → Traffic Signal Head ↓ Sign ↓ Pedestrian Signal Head ↓ Signal Pole with Guy ↓ Signal Pole with Sidewal ↓ Inductive Loop Detect ↓ Controller & Cabinet ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Directional Arrow ↓ Work Area ↓ Dums ↓ Construction Easemen ▶ Detector ♦ <t< th=""><th>$\begin{array}{c}$</th><th></th></t<>	$ \begin{array}{c} $	
	PROPOSED → Traffic Signal Head ↓ Sign ↓ Pedestrian Signal Head ↓ Signal Pole with Guy ↓ Signal Pole with Sidewal ↓ Inductive Loop Detect ↓ Controller & Cabinet ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Directional Arrow ↓ Work Area ↓ Dums ↓ Construction Easemen ▶ Detector ♦ <t< th=""><th>$\begin{array}{c}$</th><th></th></t<>	$ \begin{array}{c} $	
	PROPOSED → Traffic Signal Head ↓ Sign ↓ Pedestrian Signal Head ↓ Signal Pole with Guy ↓ Signal Pole with Sidewal ↓ Inductive Loop Detect ↓ Controller & Cabinet ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Directional Arrow ↓ Work Area ↓ Dums ↓ Construction Easemen ▶ Detector ♦ <t< th=""><th>$\begin{array}{c}$</th><th></th></t<>	$ \begin{array}{c} $	
	PROPOSED → Traffic Signal Head ↓ Sign ↓ Pedestrian Signal Head ↓ Signal Pole with Guy ↓ Signal Pole with Sidewal ↓ Inductive Loop Detect ↓ Controller & Cabinet ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Directional Arrow ↓ Work Area ↓ Dums ↓ Construction Easemen ▶ Detector ♦ <t< th=""><th>$\begin{array}{c}$</th><th></th></t<>	$ \begin{array}{c} $	
Jpgrade	PROPOSED → Traffic Signal Head ↓ Sign ↓ Pedestrian Signal Head ↓ Signal Pole with Guy ↓ Signal Pole with Sidewal ↓ Inductive Loop Detect ↓ Controller & Cabinet ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Directional Arrow ↓ Work Area ↓ Dums ↓ Construction Easemen ▶ Detector ♦ <t< th=""><th>M/A M/A M/A</th><th>- 6)</th></t<>	M/A M/A	- 6)
	PROPOSED → Traffic Signal Head → Sign → Pedestrian Signal Head → Signal Pole with Sudewal → Signal Pole with Sidewal → Junction Box → Junction Box → Directional Arrow → Work Area → Dums - Construction Easemen PUE Permanent Utility Easer Barricades Optical Detector ⊗ Optical Detector ⊗ Type I Signal Pedestor Wideo Detector Video Detector	M/A M/A	- 6)
	PROPOSED → Traffic Signal Head Modified Signal Head Modified Signal Head Modified Signal Head Sign Pedestrian Signal Head With Push Button & Si Signal Pole with Sidewal Inductive Loop Detect Controller & Cabinet Junction Box 2-in Underground Condu N/A Right of Way Directional Arrow Work Area Dums Construction Easemen PUE PUE Permonent Utility Easer Barricades Optical Detector Wideo Detector Video Detector Video Detection Area	A N/A A A A A A A A A A A A A A A A A A A A	
	PROPOSED Traffic Signal Head Modified Signal Head Modified Signal Head Sign Pedestrian Signal Head With Push Button & Si Signal Pole with Guy Signal Pole with Sidewal Inductive Loop Detect Controller & Cabinet Junction Box 2-in Underground Condu N/A Right of Way Directional Arrow Work Area Dums E Construction Easemen PUE Permanent Utility Easer Barricades Dptical Detector Rigid Conduit Video Detector Video Detector Video Detector Video Detector N/A Signal Pedesta	A N/A A A A A A A A A A A A A A A A A A A A	
The Offices of:	PROPOSED → Traffic Signal Head → Sign Pedestrian Signal Head → Sign Pedestrian Signal Head ↓ Signal Pole with Sidewal Inductive Loop Detect Controller & Cabinet □ Junction Box → Directional Arrow ↓ Work Area ↓ Work Area ↓ Work Area ↓ Work Area ↓ Directional Arrow ↓ Work Area ↓ Directional Pole with Sidewal ↓ Directional Arrow ↓ Work Area ↓ Directional Arrow ↓ Directional Arrow	se 2, Steps 1 se 2, Steps 1 SEAL	
	PROPOSED Traffic Signal Head Modified Signal Head Modified Signal Head Signal Pole with Signal Head With Push Button & Si Signal Pole with Guy Signal Pole with Sidewal Inductive Loop Detect Controller & Cabinet Junction Box Junction Box Junction Box Junction Box Junction Box Directional Arrow Work Area Dums E Construction Easemen PUE Permanent Utility Easer Barricades Optical Detector % Type I Signal Pedestor Rigid Conduit Video Detector Vid	se 2, Steps 1 se 2, Steps 1 SEAL	
THE OFFICES OF:	PROPOSED Traffic Signal Head Modified Signal Head Modified Signal Head Sign Pedestrian Signal Head With Push Button & Si Signal Pole with Guy Signal Pole with Sidewal Inductive Loop Detect Controller & Cabinet Junction Box Junction Box Junction Box Junction Box Junction Box Directional Arrow Work Area Dums E Construction Easemen PUE Permanent Utility Easer Barricades Optical Detector % Type I Signal Pedestor Rigid Conduit Video Detector	se 2, Steps 1 se 2,	
TRANSPORT	PROPOSED → Traffic Signal Head → Modified Signal Head → Sign Pedestrian Signal Head → Signal Pole with Sidewal ↓ Signal Pole with Sidewal ↓ Inductive Loop Detect ↓ Controller & Cabinet ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Junction Box ↓ Directional Arrow ↓ Work Area ↓ Dums ↓ Construction Easemen ↓ PUE Permanent Utility Easer Barricades ↓ Direction Lasemen ↓ PUE ↓ Permanent Utility Easer ↓ Barricades ↓ Direction Easemen ↓ PUE ↓ Permanent Utility Easer ↓ Barricades ↓ Video Detector ↓ Junte: September 2014 Evy(EWED EY: J Hochanad	se 2, Steps 1 se 2,	
	PROPOSED → Traffic Signal Head → Modified Signal Head → Sign Pedestrian Signal Head ↓ Signal Pole with Sidewal ↓ Inductive Loop Detect ↓ Controller & Cabinet ↓ Junction Box ↓ Directional Arrow ↓ Work Area ↓ Junction Easemen ↓ PUE ↓ Permanent Utility Easer ↓ Barricades ↓ Dype I Signal Pedestor ↓ Signal Pedestor ↓ Video Detector ↓ Video Detector	se 2, Steps 1 se 2,	

SIG. INVENTORY NO. 05-0228T6

C. A. F. O.

1″=40′



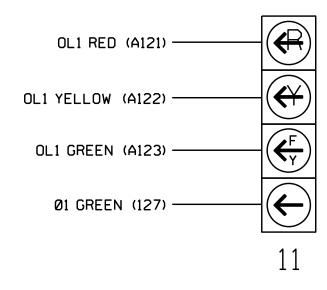
														PROJECT	REFERE	NCE NO.	SI	HEET NO.	•
														l	-3308		Si	g. 27.	1
	SIGNAL HEAD HOOK-UP CHART																		
AD H NO.	S1	S2	S3	S4	S5	S6	S7	S8	59	S1Ø	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
1U INEL D.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
SE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLI	OL2	SPARE			SPARE	
NAL NO.	★	22,23	P21 . P22	NU	41,42	P41 . P42	NU	61,62	NU	NU	81,82	NU	11	NU	NU	21	NU	NU	
D		128			101			134			107								
LOW	*	129			102			135			108								
EN		130			103			136			109								
ID Row													A12	1		A114			
LOW ROW													A12	2		A115			
HING LOW OW													A12	3		A116			
EN ROW	127																		
ł			113			104													
1			115			106													
U =	= Not Used																		

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

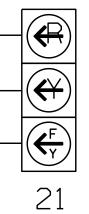
★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



OL3 RED (A114)-OL3 YELLOW (A115)-OL3 GREEN (A116)-



STARTUP CALLS PROGRAMMING

Prevents Veh Call to phase 1 during Startup, Phase 1 used only during Preempt. Main Menu – 9) UTILITIES – 1) STARTUP

VEHICLE CALLS 2,4,6,8

LOAD RESISTOR INSTALLATION DETAIL

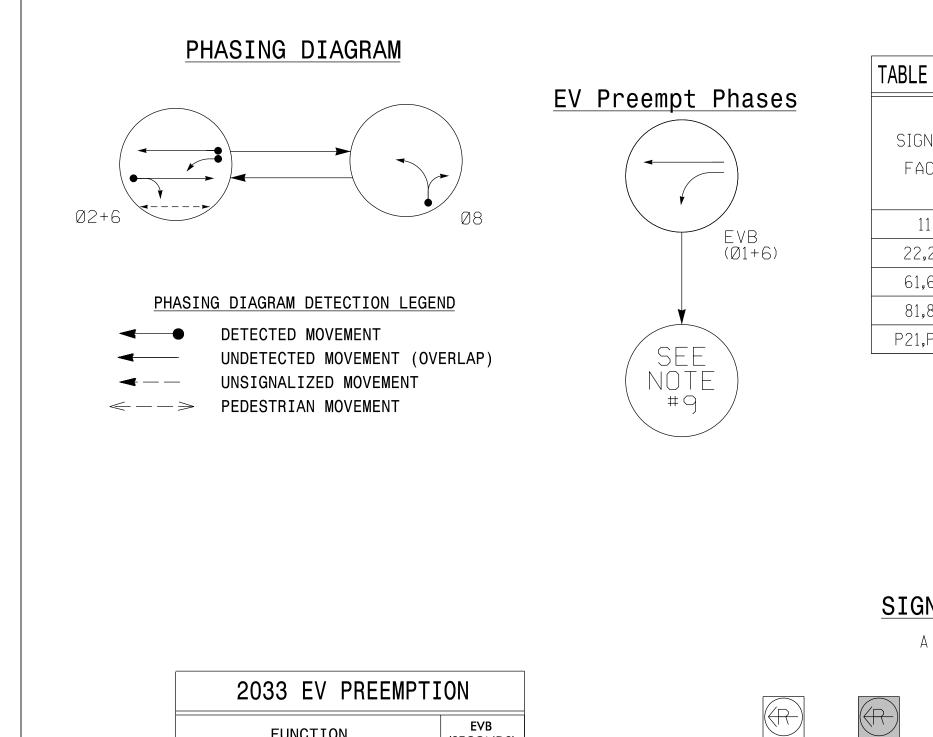
AC-

(install resistor as shown below)

ACCEPTABLE VALUES	PHASE 1 YELLOW FIELD
VALUE (ohms) WATTAGE] \sim TERMINAL (126)
1.5K - 1.9K 25W (min)	
2.0K - 3.0K 10W (min)]

ectrical Detail -	Temporary 6 - Sheet	1 of 2	
TRICAL AND PROGRAMMING DETAILS FOR:	NC 55 (North A	lston Avenue)	SEAL
Prepared in the Offices of:	at Taylor	SEAL	
Loosoor	Division 5 Durham PLAN DATE: November 2014	County Durham REVIEWED BY: T.Joyce	022013
	PREPARED BY: C. Strickland	THE C BRIT	
Stars Management Securit	REVISIONS	INIT. DATE	-Docusigned by: Jeorge C. Brown 4/2/2015
.Greenfield Pkwy.Garner.NC 27529			
			SIG. INVENTORY NO. 05-0228T6

		PROJECT REFERENCE NO.SHEET NO.U-3308Sig. 27.2
OVERLAP [3] PROGRAMMING DETAIL Program overlap as follows: Main Menu - 4) OVERLAP PRESS '+' TWICE OVERLAP [3]: LOADSWITCH = 11 NOTE: FOR SIGNAL HEAD 21 VEH SET 1 = 2.6 YELLOW CLEARANCE = 3.8 RED CLEARANCE = 2.5 END OF OVERLAP PROGRAMMING	<pre>FYA PPLT PROGRAMMING (SIGNAL HEAD 11) Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 1 Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) DUTPUTS - F) FYA PPLT Phase 1 = 99 Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu - 6) DUTPUTS - 8) REDIRECT PHASE Phase 1 RED = 97, Phase 1 YELLOW = 98 </pre>	 EMERGENCY VEHICLE PREEMPTION PROGRAMMING Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2 EVB Clearance Phases = 1,6 Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1 Ped Clear Before Preempt is a pedestrian timing parameter. and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 2 MIN FDW = 5 PHASE 4 MIN FDW = 5 Program extend time on optical detector units for 2.0 sec for EVB.
OVERLAP GREEN FLASH PROGRAMMING FOR 3 SECTION FYA	COUNTDOWN PEDESTRIAN SIGNAL OPERATION	SPECIAL NOTES EV PREEMPT PROGRAMMING Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y
The following will cause the overlap green output to flash, which is wired to the flashing yellow arrow. Program as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 3	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.	MIN WALK DURING PREEMPTION <u>PROGRAMMING</u> To disable MIN WALK pedestrian timing during preemption, program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3
estrickland	THIS ELECTRICAL THE SIGNAL DES DESIGNED: Sept SEALED: 04/02/ REVISED: N/A	ember 2014 Division 5 Durham County Durham



2033 EV PREEMPTION								
FUNCTION	EVB (SECONDS)							
DELAY BEFORE PREEMPT	0							
MIN. PED. CLEAR BEFORE PREEMPT	*							
MIN. GREEN BEFORE PREEMPT	1							
CLEARANCE TIME	2							
PREEMPT EXTEND**	2.0							

* See Timing Chart for Min Ped Clearance ** Program Timing on Optical Detector Unit

12"	(F)
11	21*

DocuSign Envelope ID: 2B82073C-8CA6-44D2-96FA-5BE27AB92A1C

TIMING CHART 2033 SOFTWARE w/2070 CONTROLLER									
PHASE	Ø1	Ø2	ØG	Ø8					
MINIMUM INITIAL *	– SEC.	10 SEC .	10 SEC .	7 SEC .					
VEHICLE EXTENSION *	— SEC.	3 . 0 SEC .	3 . 0 SEC .	2 . 0 SEC .					
YELLOW CHANGE INT.	3.8 SEC.	3.8 SEC.	3.8 SEC.	3 . 0 SEC .					
RED CLEARANCE	3 . 1 SEC .	2 . 4 SEC .	2 . 4 SEC .	2 . 1 SEC .					
MAXIMUM LIMIT *	— SEC.	50 SEC .	50 sec .	35 SEC .					
RECALL POSITION	NONE	VEH. RECALL	VEH. RECALL	NONE					
VEHICLE CALL MEMORY	NONE	YELLOW LOCK	YELLOW LOCK	NONE					
DOUBLE ENTRY	OFF	OFF	OFF	OFF					
WALK *	— SEC.	4 SEC.	– SEC.	– SEC.					
FLASHING DON'T WALK	— SEC.	10 SEC .	– SEC.	– SEC.					
MIN PED CLEARANCE	– SEC.	5 SEC .	– SEC.	– SEC.					
TYPE 3 LIMIT	– SEC.	— SEC.	— SEC.	– SEC.					
ALTERNATE EXTENSION	– SEC.	— SEC.	– SEC.	– SEC.					
ADD PER VEHICLE *	— SEC.	– SEC.	– SEC.	– SEC.					
MAXIMUM INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.					
MAXIMUM GAP*	— SEC.	3 . () SEC .	3 . () SEC .	2 . () SEC .					
REDUCE 0.1 SEC EVERY *	– SEC.	– SEC.	– SEC.	– SEC.					
MINIMUM GAP	– SEC.	3 . () SEC .	3 . () SEC .	2 . () SEC .					

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

E OF O	PER	AT]	ON							
PHASE										
GNAL ACE	Ø 2 + 6	Ø 8	E V B	FLANT						
11	F	≺R	+	- ¥-						
2,23	G	R	R	Y						
1,62	G	R	G	Y						
1,82	R	G	R	R						
1,P22	W	DW	DW	DRK						

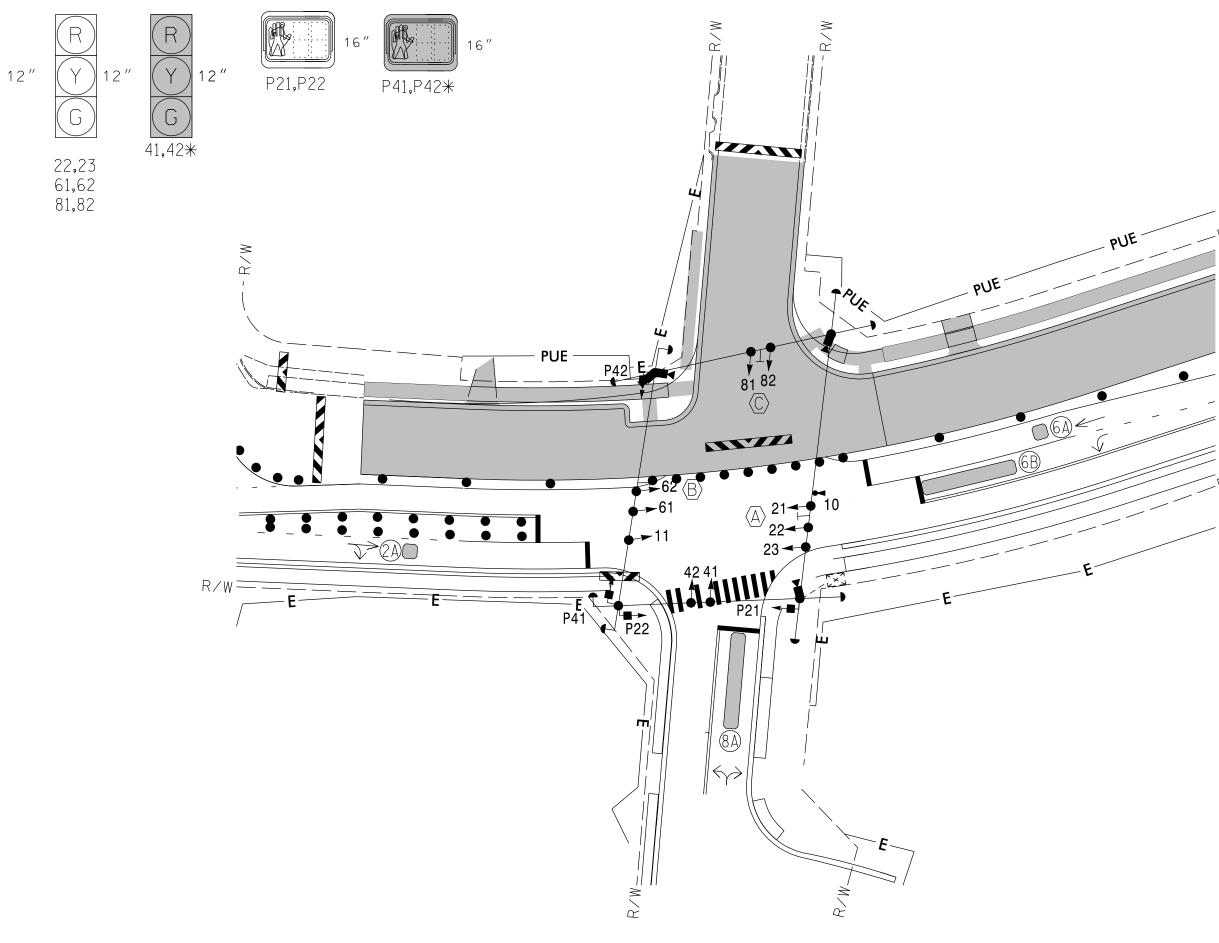
2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

DETECTOR PROGRAMMING																					
	INDUCT	IVE LOC)PS				-	•••			ATTRIBUTES								PS	STA	TUS
					1		I	IM	ING		1	2	3	4	5	6	7	8	00		υ
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	DELA	DELAY CARRY (STRETCH)		FULL TIME DELAY	PEDESTRIAN CALL	RESERVED	COUNT	EXTENSION	TYPE 3	CALLING	ALTERNATE	SYSTEM	NEW	EXISTING	
2A	6×6	*	70	-	*	2	– SE	EC.	-	SEC.	-	-	-	-	X	-	X	-	-	-	*
6 A	6×6	*	70	-	*	6	– SE	EC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
6B	6x40	*	0	-	*	6	– SE	EC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
8 A	6×40	*	0	-	*	8	10 SE	EC.	_	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
PEDESTRIAN DETECTION																					
P21,P22	N/A	N/A	N/A	-	Х	2	– SE	EC.	_	SEC.	-	Х	-	_	-	-	_	-	-	-	X

* Video Detection Zone

SIGNAL FACE I.D.

All Heads L.E.D. * See Note 11





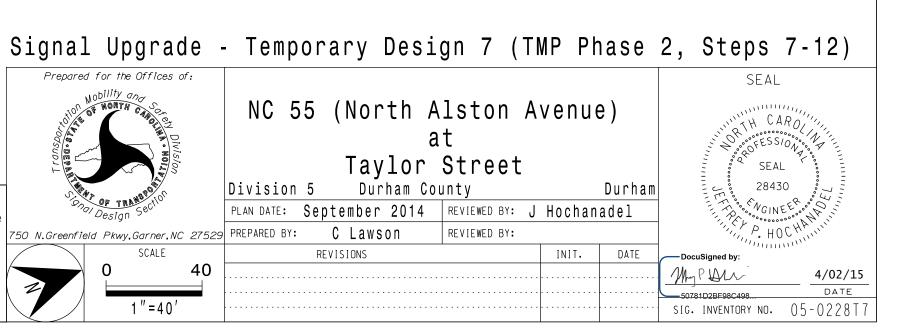
PROJECT REFERENCE NO.	SHEE	ET NO.
U-3308	Sig.	28.0

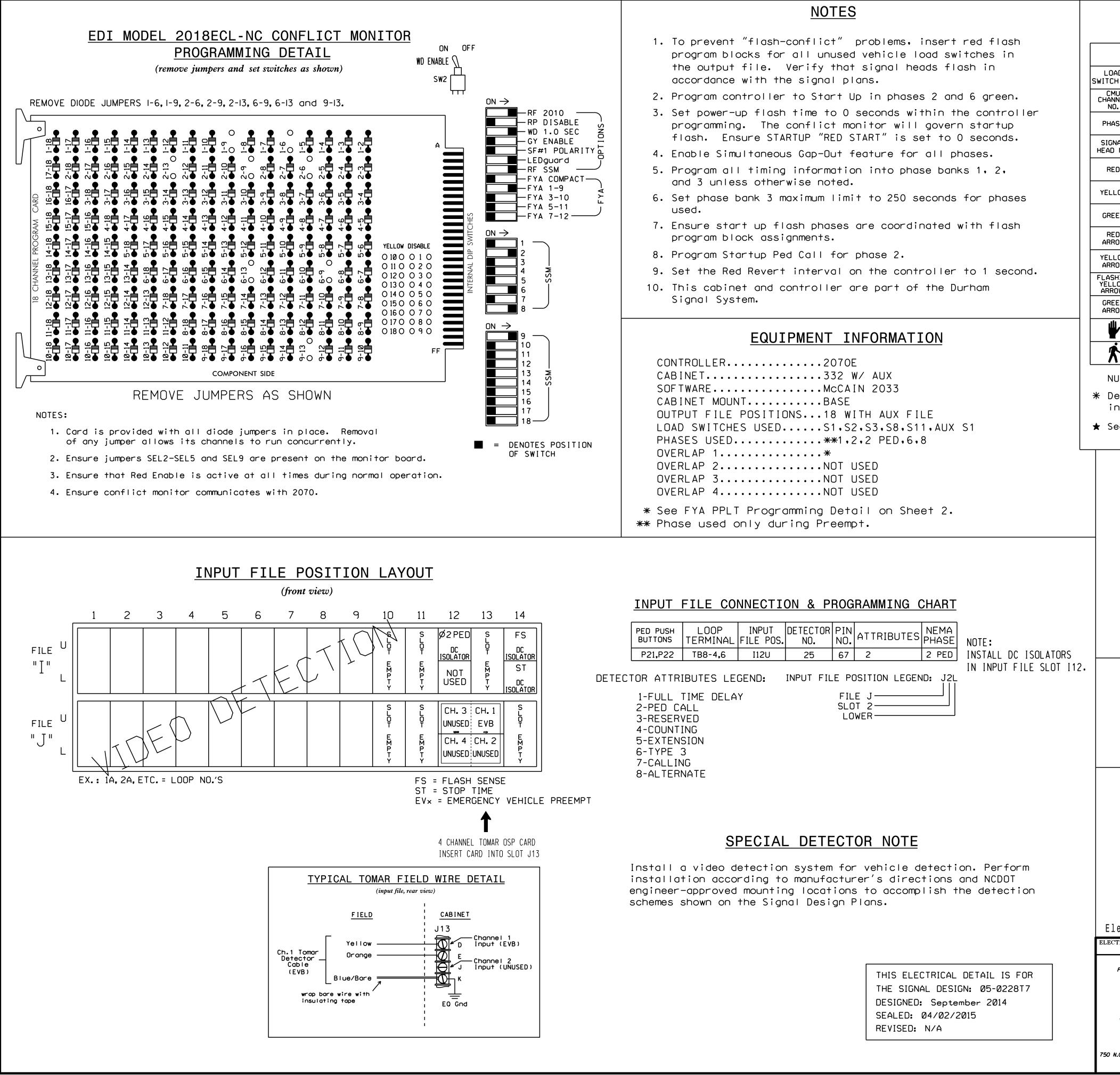
2 Phase Fully Actuated W/ EV Preemption (Durham Signal System)

NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- 3. Set all detector units to presence mode.
- 4. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.
- 5. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- 7. Program pedestrian heads to countdown the flashing "Don't Walk" time.
- 8. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
- 9. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
- 10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- 11. Disconnect and bag signal heads #21,#41 and #42 and pedestrian heads #P41 and #P42 during this phase of construction.
- 12. Contractor shall adjust video detection zones as required.

LEGEND <u>EXISTING</u> <u>PROPOSED</u> Traffic Signal Head $\bigcirc \rightarrow$ ●→ Modified Signal Head N/A ●→ Sign --+--Pedestrian Signal Head With Push Button & Sign Signal Pole with Guy \bigcirc $\overline{\mathbf{O}}$ Signal Pole with Sidewalk Guy \bigcirc Inductive Loop Detector \sum Controller & Cabinet Junction Box 2-in Underground Conduit -----_____ N/A Right of Way _____ Directional Arrow \longrightarrow \longrightarrow $\langle \underline{A} \rangle$ "No Left Turn" (R3-2) (A)"No Right Turn" (R3-1) B "Dual Turn Arrows" (R10-21) \bigcirc w/ Flags N/A Work Area N/A Drums ----- Construction Easement N/A ---- PUE ---- Permanent Utility Easement N/A Barricades N/A Direct Bury _____ _____ Video Detector Video Detection Area





													PF	ROJECT	REFERE	NCE NO	. SI	HEET NO.
														U	-3308		Si	g. 28.
				SIC	GNA	LF	IEA	Dŀ	100	K-l	JP	CHA	٩RT					
AD H NO.	S1	S2	S3	S4	S5	S6	S7	S8	59	S1Ø	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
4U NNEL 0.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
ASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
NAL) NO.	★	22,23	P21 . P22	NU	NU	NU	NU	61,62	NU	NU	81,82	NU	★	NU	NU	NU	NU	NU
ED		128						134			107							
LOW	*	129						135			108							
EEN		130						136			109							
ED Row													A121					
LOW ROW													A122					
SHING LOW													A123					
EEN ROW	127																	
			113															
ľ.			115															
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				<u> </u>	<u>IA</u>			<u>∖∟</u> ignal					AIL	=				
			l	OL1 RE	:D (A1	21) —		(-										
			0L1 \	(ELLO	W (A12	22) —			()									
			OL1	GREE	N (A1)	23) —		($\overline{\langle F_{Y} \rangle}$									
			Ø	01 GRE	EN (1'	27) —												
			Ľ			277 —			$\mathbf{\Sigma}$									
									11									
				<u>ST</u>	AR	TUP	C	ALL	S	PRC)GR/	AMN	IIN	<u>G</u>				
Pr	eve	nts	Ver	n Ca		to p	has	se 1	dur	ring) S+	arti	۰qL	Pha	se	1 us	sed	
or	nly	dur	-	Pre oin			9)	UTI		IES	- 1) S ⁻	TAR1	TUP				
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		<u>L</u>	<u>_UA</u>	ז ע	150			<u>L</u> ľ sistor					<u>v</u> U	<u>'[</u>]/	<u> </u>			
			ACC	EPT	BLE	VAL	UES		[PHAS	E 1	YELL	OW F	IELD	l		
			VALU	E (ol - 1.9	nms)	WAT	TAGE	. 4			IERM	IINAL	(126	5)				
				- 3.				<u>)</u>	\leq									
									I AC-									
	ectrical Detail - Temporary 7 - Sheet 1 of 2 TRICAL AND PROGRAMMING NC 55 (North Alston Avenue) SEAL																	
		DETA	ILS FOR		NU	00	עווט		at	υι Ο	н А	י כוונ	10)		!!		L \////////////////////////////////////	
•	Nobility	e Offices ana ™ So	; of:				Та	ylo	r S	tre	et				NON	ROFES	SIONA,	
, of the			ž												=	SE A 0220	NL)13	E E

T T T T T T T T T T T T T T T T T T T	Division 5 PLAN DATE: November	County REVIEWED BY:	T. J	Durham OVCe	022013	NMO NMO
	PREPARED BY: C. Strick	REVIEWED BY:			GE C	
Finals Management Social	REVISIONS		INIT.	DATE	— DocuSigned by:	
		 			George C. Brown	4/2/2015
Greenfield Pkwy,Garner,NC 27529		 			F12601ED0BEB434	DATE

SIG. INVENTORY NO. 05-0228T7

FYA PPLT PROGRAMMING (SIGNAL HEAD 11)

- 1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 1
- 2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu – 6) OUTPUTS – F) FYA PPLT Phase 1 = 99
- 3. Redirect RED and YELLOW outputs for the left turn phases as follows: Main Menu – 6) OUTPUTS – 8) REDIRECT PHASE Phase 1 RED = 97, Phase 1 YELLOW = 98

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.

EMERGENCY VEHICLE P

- 1. Program EVB preempt a Main Menu – 2) PREEMP EVB Clear EVB Clear
- 2. Program general preem Main Menu – 2) PREEMP Min Time
- 3. Ped Clear Before Pree parameter, and is pro Main Menu – 1) PHASE PHASE 2 M

Program extend time on optical

SPECIAL NOTES E

Setting 'FYA DURING PREEM when transitioning to pre-Main Menu FYA DURING

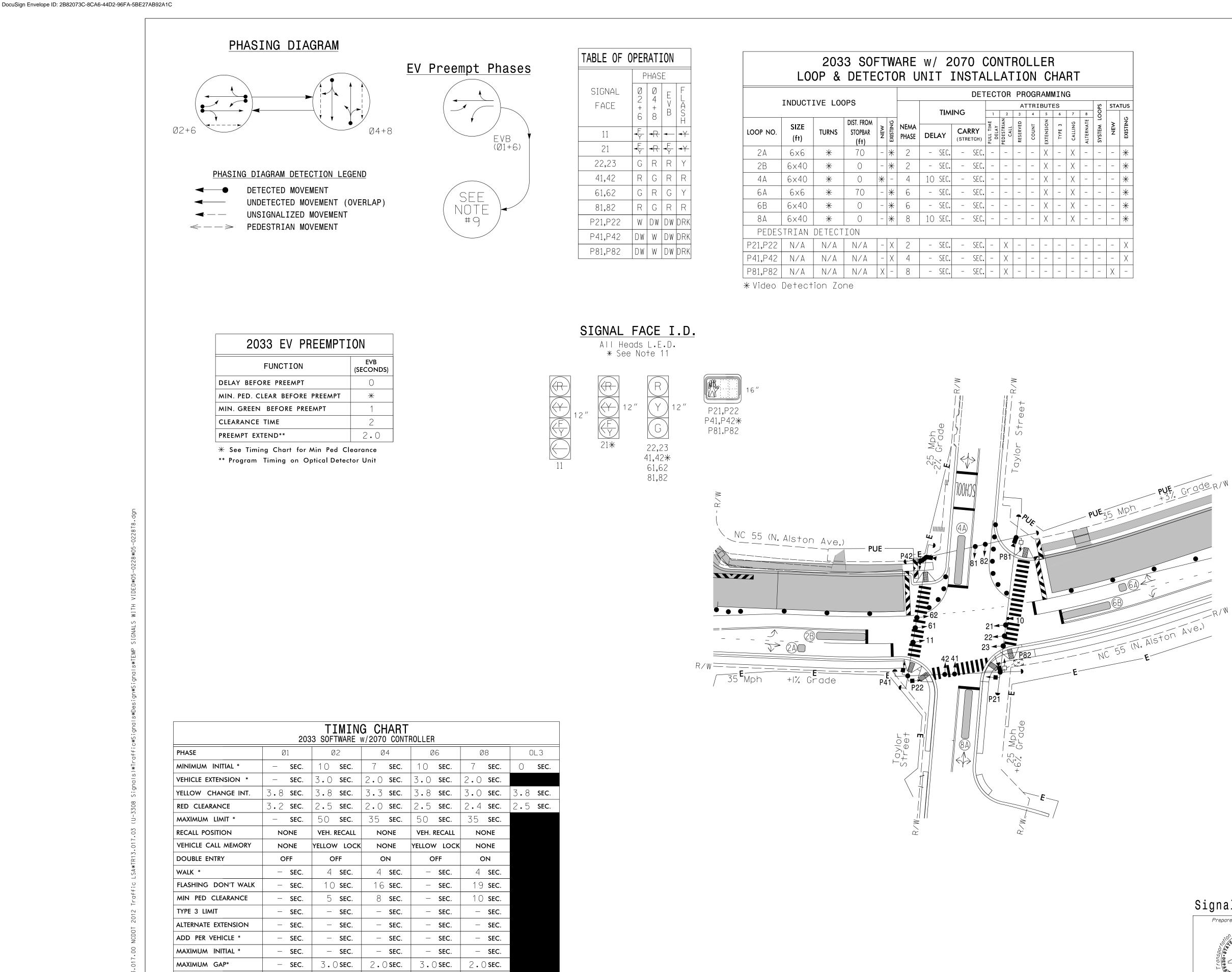
MIN WALK DURING PREEMPTION **PROGRAMMING**

To disable MIN WALK pedestrian timing during preemption, program the controller as follows: Main Menu – 9) UTILITIES – 5) CONFIGURATION EXTRA TWO = 3

	Electrical Detail -	Temporary 7 - Sheet	2 of 2					
	ELECTRICAL AND PROGRAMMING DETAILS FOR:	NC 55 (North	Alston /	Avenı	re)	SEAL		
IS FOR 0228T7	Prepared in the Offices of:		Taylor Street					
)14	DIVISION DIVISION TO BE SAME	Division 5 Durhar PLAN DATE: November 2014	County REVIEWED BY:	T.Jo	Durham yce	022013		
		PREPARED BY: C. Strickland	REVIEWED BY:			THE C. BUILT		
	Management Sect	REVISIONS		INIT.	DATE	Docusigned by: Jeorge C. Brown 4/2/2015		
	750 N.Greenfield Pkwy.Garner.NC 27529					F12601ED0BEB434DATE		
						SIG. INVENTORY NO. 05-0228T7		

THIS ELECTRICAL DETAIL THE SIGNAL DESIGN: 05-DESIGNED: September 20 SEALED: 04/02/2015 REVISED: N/A

	PROJECT REFERENCE NO. U-3308	SHEET NO. Sig. 28.2
	0-3300	JJJY. 20.2
REEMPTION PROGRAMMING		
s follows: PT - 4) EMERGENCY VEHICLE		
r = 2		
ance Phases = 1,6		
nption parameters as follows:		
T - 6) MISC PREEMPTION PARAMETERS		
Before PE ForceOff = 1		
empt is a pedestrian timing		
pgrammed as follows:		
- 5) PEDESTRIAN TIMING 1IN FDW = 5		
I detector units for 2.0 sec for EVB.		
V PREEMPT PROGRAMMING		
IPT' to 'Y' eliminates yellow trap empt from adjacent through phase.		
- 9) UTILITIES - 9) MISC		
PREEMPT $(Y/N) = Y$		



* 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

– SEC.

2 **.** () sec.

– SEC.

3 **.** () sec.

– SEC. 2 **.** 0 **SEC**.

– SEC.

– SEC. 3.0 SEC.

– SEC.

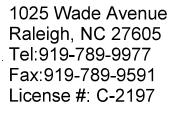
REDUCE 0.1 SEC EVERY *

MINIMUM GAP

E 0F 0	PER	AT I	ON						
	PHASE								
GNAL ACE	Ø 2 + 6	Ø 4 + 8	E V B	H LANT					
11	F	≺R	◄—	- ¥-					
21	F	≺R	F↓≻	- ¥-					
2,23	G	R	R	Y					
1,42	R	G	R	R					
1,62	G	R	G	Y					
1,82	R	G	R	R					
1,P22	W	DW	DW	DRK					
1,P42	DW	W	DW	DRK					
1,P82	DW	W	DW	DRK					

										DET	ЕСТ	OR	PR	OGF	AM	MIN	G				
	INDUCTIVE LOOPS										ATTRIBUTES							PS	STA	TUS	
						TIMING		1	2	3	4	5	6	7	8	LOOPS		0			
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	DEL	AY	CAI (STRI	RRY ETCH)	FULL TIME DELAY	S S	RESERVED	COUNT	EXTENSION	TYPE 3	CALLING	ALTERNATE	SYSTEM I	NEW	EXISTING
2A	6×6	*	70	-	*	2	-	SEC.	-	SEC.	-	-	-	-	Х	-	X	-	-	-	*
2B	6×40	*	0	-	*	2	-	SEC.	-	SEC.	-	-	-	-	Х	-	X	-	-	-	*
4 A	6×40	*	0	*	-	4	10	SEC.	-	SEC.	-	-	-	-	Х	-	X	-	-	-	*
6A	6×6	*	70	-	*	6	-	SEC.	-	SEC.	-	-	-	-	Х	-	X	-	-	-	*
6B	6×40	*	0	-	*	6	-	SEC.	-	SEC.	-	-	_	-	Х	-	Х	-	-	-	*
8 A	6×40	*	0	-	*	8	10	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	-	*
PEDES	TRIAN	DETECT	ION																		
P21,P22	N/A	N/A	N/A	-	Х	2	_	SEC.	-	SEC.	-	Х	-	-	-	-	-	-	-	-	X
P41,P42	N/A	N/A	N/A	-	Х	4	-	SEC.	-	SEC.	-	Х	-	-	_	-	-	-	-	-	Х
P81,P82	N/A	N/A	N/A	Х	-	8	_	SEC.	-	SEC.	-	Х	-	-	_	-	-	-	-	Х	-
¥ Vidoo														-				•			





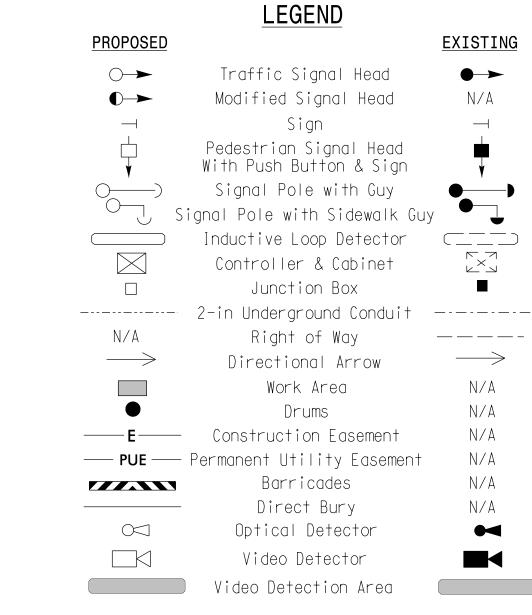


U-3308	Sig. 29.0
PROJECT REFERENCE NO.	SHEET NO.

2 Phase Fully Actuated W/ EV Preemption (Durham Signal System)

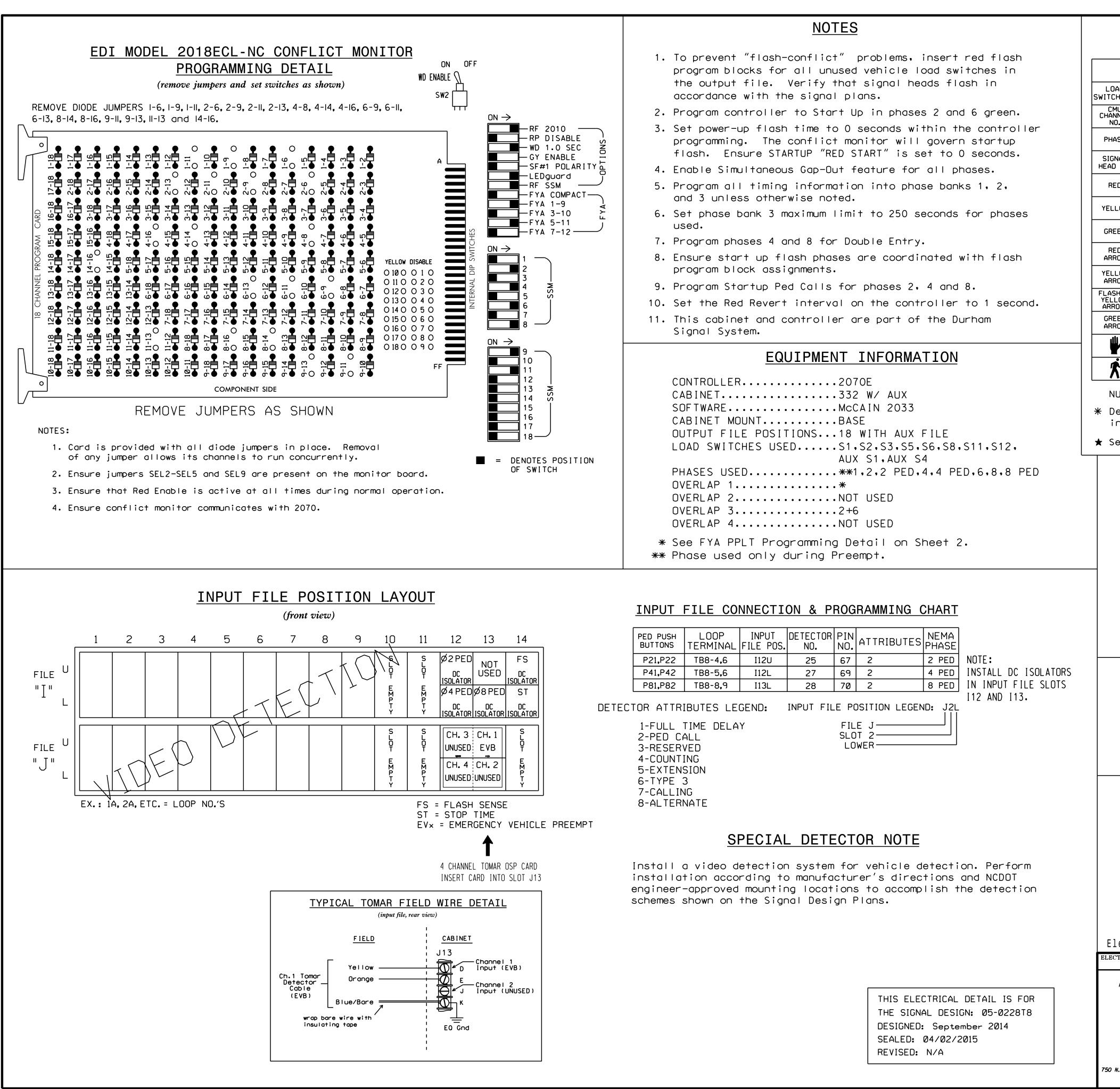
NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer
- 3. Set all detector units to presence mode.
- 4. Program all timing information into phase banks 1,2, and 3 unless otherwise noted.
- 5. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- 7. Program pedestrian heads to countdown the flashing "Don't Walk" time.
- 8. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
- 9. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation.
- 10. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- 11. Reconnect and unbag signal heads #21, #41 and #42 and pedestrian heads #P41 and #P42 during this phase of construction
- 12. Contractor shall adjust video detection zones as required.



gnal Upgrade ·	- Temporary Design 8	8 (TMP Phase	2, Steps 7-12)
Prepared for the Offices of:			SEAL
Nobility and Society Division	NC 55 (North Alst at Taylor Str		SEAL
	Division 5 Durham County	Durham	28430
Par Design Section	PLAN DATE: September 2014 REVIEWE		NGINEE
Greenfield Pkwy,Garner,NC 27529	PREPARED BY: C Lawson REVIEWE	ED BY:	P. HOCHAM
SCALE	REVISIONS	INIT. DATE	DocuSigned by:
0 40			MmPLAN 4/02/15
			50781D2BF98C498
1 "=40'			SIG. INVENTORY NO. 05-022818

SIG. INVENTORY NO. 05-0228T8



													PF	OJECT	REFERE	NCE NO	. s	HEET NO).
														U	-3308		Si	g. 29.	. 1
				SI	GNA	Lŀ	IEA	DF	100	K-l	JP	CHA	٩RT	1					
AD H NO.	S1	S2	53	S4	S5	S6	S7	S8	59	S1Ø	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6	
1U INEL).	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18	
ISE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE			SPARE	
NAL NO.	★	22,23	P21, P22	NU	41,42	P41, P42	NU	61,62	NU	NU	81,82	P81 . P82	★	NU	NU	21	NU	NU	
:D		128			101			134			107								
LOW	*	129			102			135			108								
EN		130			103			136			109								
:D IOW													A121			A114			
LOW IOW													A122			A115			
HING _OW OW													A123			A116			
EN IOW	127																		
			113			104						110							
i			115			106						112							

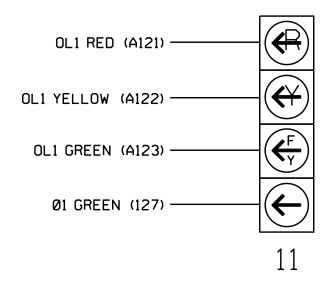
NU = Not Used

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

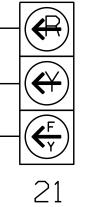
★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



OL3 RED (A114) OL3 YELLOW (A115)-OL3 GREEN (A116)-



STARTUP CALLS PROGRAMMING

Prevents Veh Call to phase 1 during Startup. Phase 1 used only during Preempt. Main Menu – 9) UTILITIES – 1) STARTUP

VEHICLE CALLS 2,4,6,8

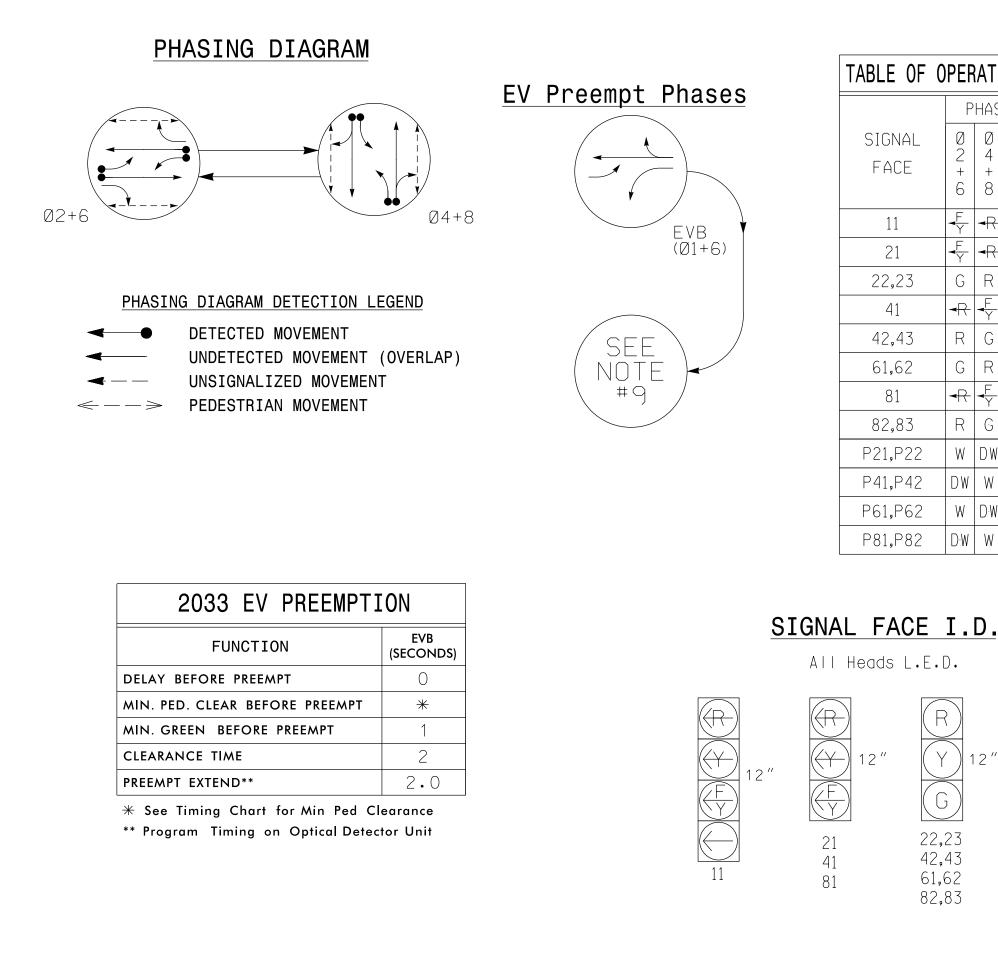
LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

ACCEPTABLE VALUES	PHASE 1 YELLOW FIELD
VALUE (ohms) WATTAGE	
<u>1.5K - 1.9K 25W (min)</u>	\leq
2.0K - 3.0K 10W (min)	\langle
	AC-

ectrical Detail -	Temporary 8 - Sheet	1 of 2	
TRICAL AND PROGRAMMING DETAILS FOR:	NC 55 (North	Alston Avenue	e) seal
Prepared in the Offices of:	a Taylor	t Street	SEAL 022013
Div	Division 5 Durham	Durham Ec	
	PLAN DATE: November 2014	Ce WGINEEK	
	PREPARED BY: C. Strickland	REVIEWED BY:	CE C Dini
STATIS ME TRANS Section	REVISIONS	INIT.	DATE DocuSigned by:
Management S			Leorge C. Brown 4/2/2015
I.Greenfield Pkwy,Garner,NC 27529			F12601ED0BEB434 DATE
			SIG. INVENTORY NO. 05-0228T8

		PROJECT REFERENCE NO. SHEET NO.
		U-3308 Sig. 29.2
		EMERGENCY VEHICLE PREEMPTION PROGRAMMING
		1. Program EVB preempt as follows:
	FYA PPLT PROGRAMMING	Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2
OVERLAP [3] PROGRAMMING DETAIL	<u>(SIGNAL HEAD 11)</u>	EVB Clearance Phases = 1,6
Program overlap as follows: Main Menu - 4) OVERLAP	1. Program Flashing Yellow Arrow phases as follows: Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE TWO PPLT FYA = PHASE 1	2. Program general preemption parameters as follows: Main Menu – 2) PREEMPT – 6) MISC PREEMPTION PARAMETERS Min Time Before PE ForceOff = 1
PRESS '+' TWICE	2. Assign output pin for Flashing Yellow Arrow as follows: Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 1 = 99	3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 2 MIN FDW = 5
OVERLAP [3]: LOADSWITCH = 11 NOTE: FOR SIGNAL HEAD 21 VEH SET 1 = 2.6	3. Redirect RED and YELLOW outputs for the left turn phases as follows:	PHASE 2 MIN FDW = 3 PHASE 4 MIN FDW = 8 PHASE 8 MIN FDW = 10
YELLOW CLEARANCE = 3.8 RED CLEARANCE = 2.5	Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE Phase 1 RED = 97, Phase 1 YELLOW = 98	Program extend time on optical detector units for 2.0 sec for EVB.
END OF OVERLAP PROGRAMMING		
		SPECIAL NOTES EV PREEMPT PROGRAMMING
		Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap
		when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC
		FYA DURING PREEMPT (Y/N) = Y
OVERLAP GREEN FLASH PROGRAMMING		
FOR 3 SECTION FYA	COUNTDOWN PEDESTRIAN SIGNAL OPERATION	
The following will cause the overlap green output to flash, which is wired to the flashing yellow arrow, Program as follows:	Countdown Ped Signals are required to display timing only during Ped Clearance Interval, Consult Ped Signal Module user's manual	
Main Menu – 1) PHASE – 2) PHASE FUNCTIONS PAGE TWO OLAP G FL = 3	for instructions on selecting this feature.	MIN WALK DURING PREEMPTION
		PROGRAMMING
		To disable MIN WALK pedestrian timing during preemption, program the controller as follows:
		Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3
		Electrical Detail - Temporary 8 - Sheet 2 of 2 ELECTRICAL AND PROGRAMMING DETAILS FOR: NC 55 (North Alston Avenue)
	THIS ELECTRICAL	Prepared in the Offices of:
	THE SIGNAL DESI DESIGNED: Septe	ember 2014 Division 5 Durham County Durham
	SEALED: 04/02/2 REVISED: N/A	PREPARED BY: C. Strickland REVIEWED BY: REVISIONS INIT. DATE DocuSigned by:
		Management Seorge C. Brown 4/2/2015 750 N.Greenfield Pkwy.Garner.NC 27529 DATE SIG. INVENTORY NO. 05-0228T8



			000	TIMIN 33 SOFTWARE			
PHASE	Ø1	Ø2	203		Ø8		OL3
		02	04	00	00	ULZ	ULS
MINIMUM INITIAL *	— SEC.	10 SEC .	7 SEC .	10 SEC .	7 SEC .	O SEC.	O SEC.
VEHICLE EXTENSION *	— SEC.	3.0 SEC.	2.0 SEC.	3.0 SEC.	2.0 SEC.		
YELLOW CHANGE INT.	3.8 SEC.	3.8 SEC.	3.3 SEC.	3.8 SEC.	3.3 SEC.	3.3 SEC.	3.8 SEC.
RED CLEARANCE	3.3 sec.	2.6 SEC.	2.6 SEC.	2.6 SEC.	2.6 SEC.	2.6 SEC.	2.6 SEC.
MAXIMUM LIMIT *	– SEC.	50 SEC .	35 sec .	50 SEC .	35 sec .		
RECALL POSITION	NONE	VEH. RECALL	NONE	VEH. RECALL	NONE		
VEHICLE CALL MEMORY	NONE	YELLOW LOCK	NONE	YELLOW LOCK	NONE	-	
DOUBLE ENTRY	OFF	OFF	ON	OFF	ON	-	
WALK *	– SEC.	4 SEC.	4 SEC.	4 SEC.	4 SEC.	-	
FLASHING DON'T WALK	– SEC.	10 sec.	16 SEC .	11 SEC.	16 SEC .		
MIN PED CLEARANCE	– SEC.	5 SEC .	8 SEC .	6 SEC .	8 SEC.	-	
TYPE 3 LIMIT	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	-	
ALTERNATE EXTENSION	– SEC.	- SEC.	– SEC.	– SEC.	– SEC.	_	
ADD PER VEHICLE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	-	
MAXIMUM INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	_	
MAXIMUM GAP*	– SEC.	3 . () SEC .	2 . () SEC .	3 . 0 SEC .	2 . () SEC .		
REDUCE 0.1 SEC EVERY *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.		
MINIMUM GAP	– SEC.	3 . () SEC .	2 . () SEC .	3 . 0 sec.	2 . () SEC .		

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

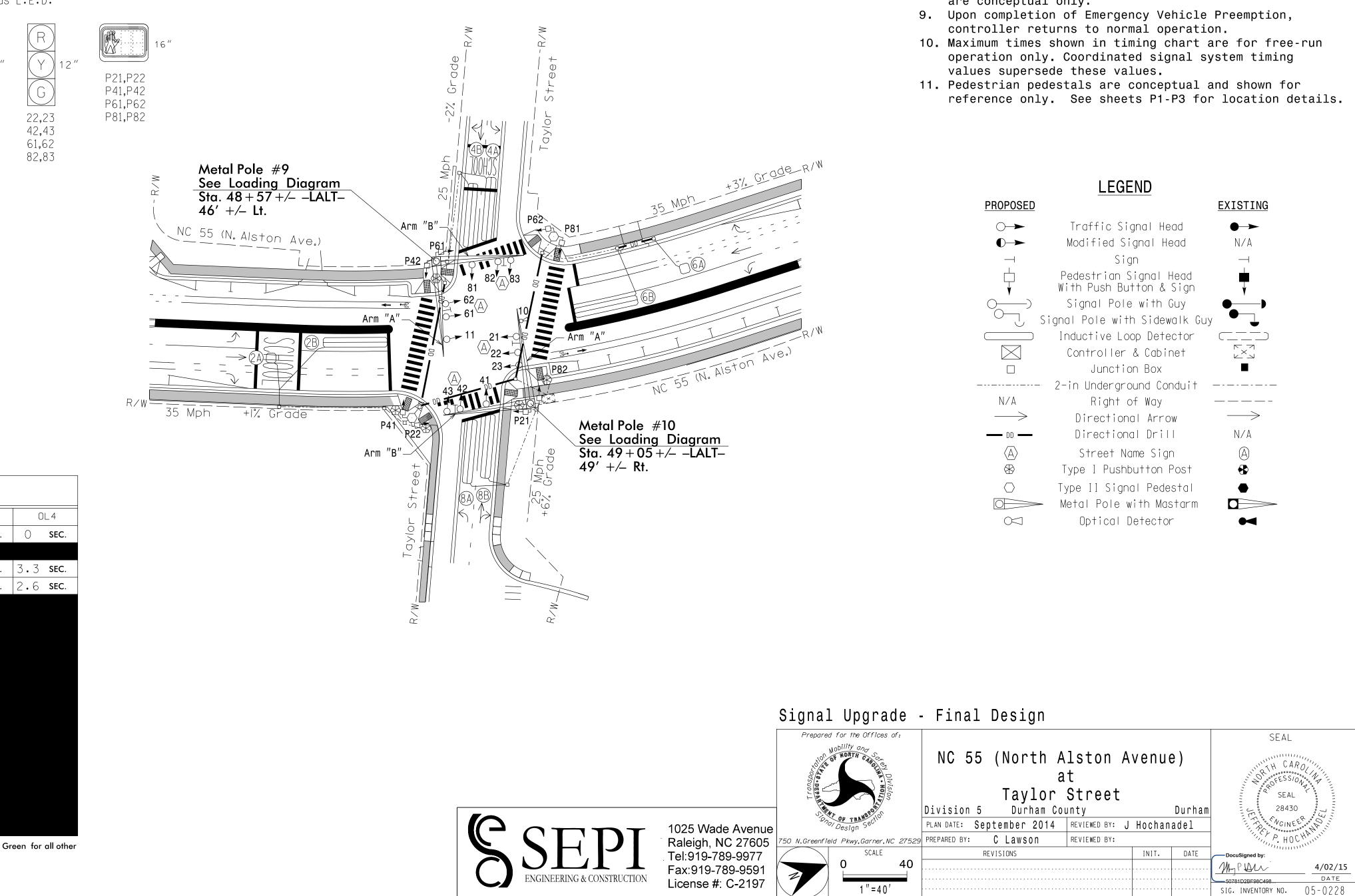
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	P	HAS	E	
GNAL ACE	Ø2+6	Ø 4 + 8	E V B	FLAST
11	⊸ F Y	≺R	-	╶┼
21	F↓≻	≺R	F↓≻	- ¥-
2,23	G	R	R	Y
41	₽	₽	₽	R
2,43	R	G	R	R
1,62	G	R	G	Y
81	₽	₽	₽	₽R
2,83	R	G	R	R
1,P22	W	DW	DW	DRK
1,P42	DW	W	DW	DRK
1,P62	W	D·W	D·W	DRK
1,P82	D·W	W	D·W	DRK

2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

				<u> </u>								/ \				17 1					
	_									DET	ЕСТ	OR	PR	OGR		IIN	G				
	INDUCT	IVE LOC)PS				-				ATTRIBUTES						PS	STA	TUS		
			DIST FROM				TIMING			1	2 Z	3	4	5	6	7	8 ш	LOOPS		U	
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	DELA	Y	CAF (STRE	RRY ETCH)	FULL TIME DELAY	PEDESTRIAN CALL	RESERVED	COUNT	EXTENSION	TYPE 3	CALLING	ALTERNATE	SYSTEM	NEW	EXISTING
2A	6×6	4	70	Х		2	- S	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	Х	-
2B	6×40	2-4-2	0	Х		2	- S	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	Х	_
4 A	6×40	2-4-2	0	Х	-	4	3 S	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	Х	-
4B	6×40	2-4-2	0	Х	-	4	10 S	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	Х	-
6 A	6×6	4	70	Х	-	6	- S	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	Х	-
6B	6×40	2-4-2	0	Х	-	6	- S	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	Х	-
8 A	6×40	2-4-2	0	Х	-	8	3 S	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	Х	-
8B	6×40	2-4-2	0	Х	-	8	10 S	SEC.	-	SEC.	-	-	-	-	Х	-	Х	-	-	Х	-
PEDES	TRIAN	DETECT	ION														_				
P21,P22	N/A	N/A	N/A	Х	-	2	- S	SEC.	-	SEC.	-	Х	-	I	-	-	-	-	-	-	Х
P41,P42	N/A	N/A	N/A	Х	-	4	- S	SEC.	-	SEC.	-	Х	-	-	-	-	-	-	-	-	Х
P61,P62	N/A	N/A	N/A	Х	_	6	- S	SEC.	-	SEC.	-	Х	-	-	-	-	-	-	-	Х	-
P81,P82	N/A	N/A	N/A	Х	-	8	- S	SEC.	-	SEC.	_	Х	-	-	-	-	-	-	-	-	Х
			-					I													

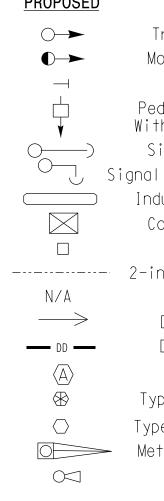


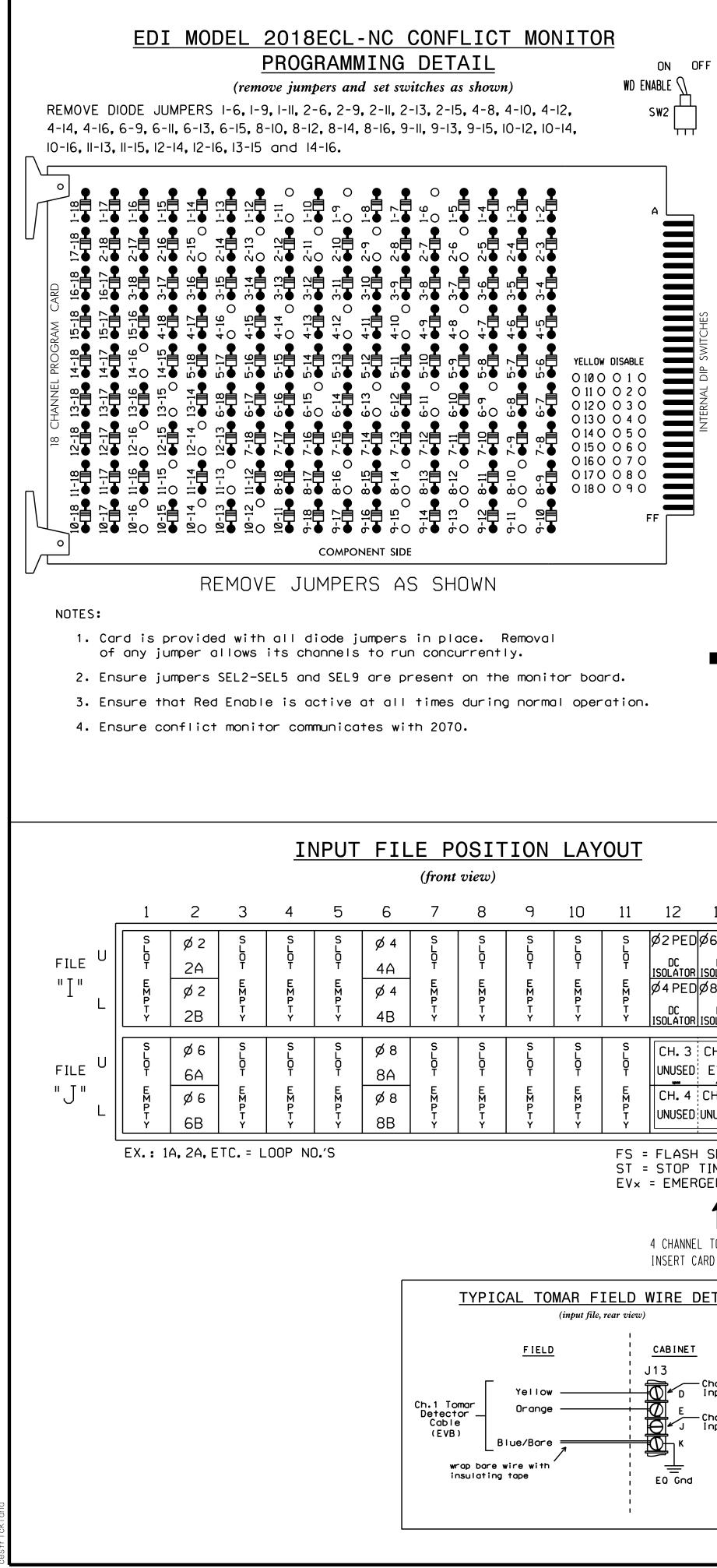
PROJECT REFERENCE NO.	SHEET NO.
U - 3308	Sig. 30.0

2 Phase Fully Actuated W/ EV Preemption (Durham Signal System)

NOTES

- 1. Refer to "Road Standard Drawings NCDOT" dated January 2012, "Standard Specifications for Roads and Structures" dated January 2012.
- 2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer
- 3. Set all detector units to presence mode.
- 4. Program all timing information into phase banks
- 1,2, and 3 unless otherwise noted. 5. Set phase bank 3 maximum limit to 250 seconds for phases used.
- 6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls
- 7. Program pedestrian heads to countdown the flashing "Don't Walk" time.
- 8. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.





MAR-2015 16:17 iTSASII#ITS Sianals#Workaroins#Sia Man#Strick|and#050228 sm ele xx

	NOTES	
F	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.	_OAC TCH
ON → RF 2010 RP DISABLE WD 1.0 SEC	3. Set power-up flash time to 0 seconds within the controller	CMU IANNE NO. PHASE
GY ENABLE	SI	igna Ad N
RF SSM	5. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.	RED
FYA 3-10	6. Set phase bank 3 maximum limit to 250 seconds for phases	ELLO
$ \square FYA 7-12 $ $ ON \rightarrow $ $ \square 1 2$	7. Program phases 4 and 8 for Double Entry.	REE
	9. Program Startup Ped Calls for phases 2, 4, 6, and 8.	ELLO RRON
	10. Set the Red Revert interval on the controller to 1 second.	ELLO RROV
□ 8 ON →	Signal System.	
9 10 11		₩ *
	CONTROLLER	NU
14 ö 15 16	SOFTWAREMcCAIN 2033 *	Dei in:
17 18	OUTPUT FILE POSITIONS18 WITH AUX FILE	See
DENOTES POSITION OF SWITCH	AUX S1,AUX S2,AUX S4,AUX S5	
UI SWITCH	PHASES USED	
	OVERLAP 2	
	OVERLAP 44+8 * See FYA PPLT Programming Detail on Sheet 2.	
	** Phase used only during Preempt.	
	INPUT FILE CONNECTION & PROGRAMMING CHART	
	LOOP NO. LOOP INPUT DETECTOR PIN ATTRIBUTES NEMA TERMINAL FILE POS. NO. NO. ATTRIBUTES PHASE	
13 14	LOOPNO.LOOPINPUTDETECTORPINATTRIBUTESNEMA2ATB2-5.6I2U139572	
SOLATOR ISOLATOR	2B TB2-7,8 I2L 5 43 5 7 2 4A TB4-9,10 I6U 3 41 5 7 4	
SOLATOR ISOLATOR SPED ST	4B TB4-11,12 I6L 7 45 5 7 4 6A TB3-5,6 J2U 2 40 5 7 6	
DC DC SOLATOR ISOLATOR	6B TB3-7,8 J2L 6 44 5 7 6	
CH.1 S	8A TB5-9,10 J6U 4 42 5 7 8 8B TB5-11,12 J6L 8 46 5 7 8	
EVB P	PED PUSH	
	BUTTONS P21,P22 TB8-4,6 I12U 25 67 2 2 PED NOTE:	
	P41,P42 TB8-5,6 I12L 27 69 2 4 PED INSTALL DC ISOLATORS	
SENSE IME	P61,P62 TB8-7,9 II3U 26 68 2 6 PED IN INPUT FILE SLOTS P81,P82 TB8-8,9 II3L 28 70 2 8 PED I12 AND I13.	
ENCY VEHICLE PREEMPT	NOTE: PROGRAM DETECTOR DELAY AND CARRYOVER TIMES	
	AS SPECIFIED ON SIGNAL DESIGN PLANS. DETECTOR ATTRIBUTES LEGEND: INPUT FILE POSITION LEGEND: J2L	
TOMAR OSP CARD L RD INTO SLOT J13	1-FULL TIME DELAY	
ETAIL	2-PED CALL SLOT 2	
	4-COUNTING 5-EXTENSION	
	6-TYPE 3 7-CALLING	E1 elec
Channel 1 Input (EVB)	8-ALTERNATE	SLEC
Channel 2 Input (UNUSED)		
	THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-0228	

750	N.Greenfield	Pkwy.Garner.NC	27529
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DESIGNED: September 2014

SEALED: 04/02/2015

REVISED: N/A

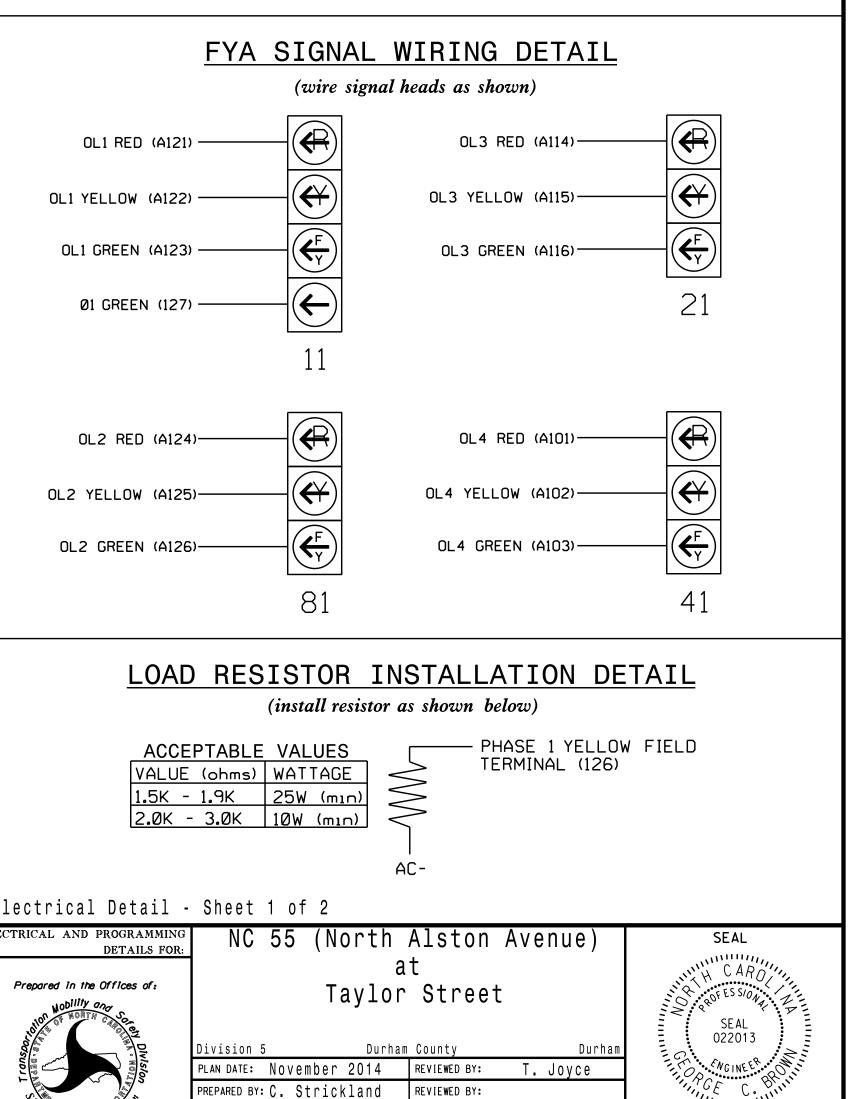
PROJECT REFERENCE NO.	SHEET NO.
U - 3308	Sig. 30.

				SIC	GNA		IEA	DH	100	K-l	JP	CHA	٩RT					
D I NO.	S1	S2	S3	S4	S5	S6	S7	S8	59	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
J NEL	1	2	13	3	4	14	5	6	15	7	8	16	q	10	17	11	12	18
ε	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1		SPARE	0L3	OL4	SPARE
AL NO.	★	22,23	P21 . P22	NU	42,43	P41. P42	NU	61,62	P61. P62	NU	82,83	P81. P82	★	★ 81	NU	21 *	★ 41	NU
)		128			101			134			107							
ow	*	129			102			135			108							
IN		130			103			136			109							
))W													A121	A124		A114	A1Ø1	
OW)W													A122	A125		A115	A102	
IING DW W													A123	A126		A116	A103	
EN DW	127																	
•			113			104			119			110						
•			115			106			121			112						

= Not Used

enotes install load resistor. See load resistor Installation detail this sheet.

e pictorial of head wiring in detail below.



INIT. DATE

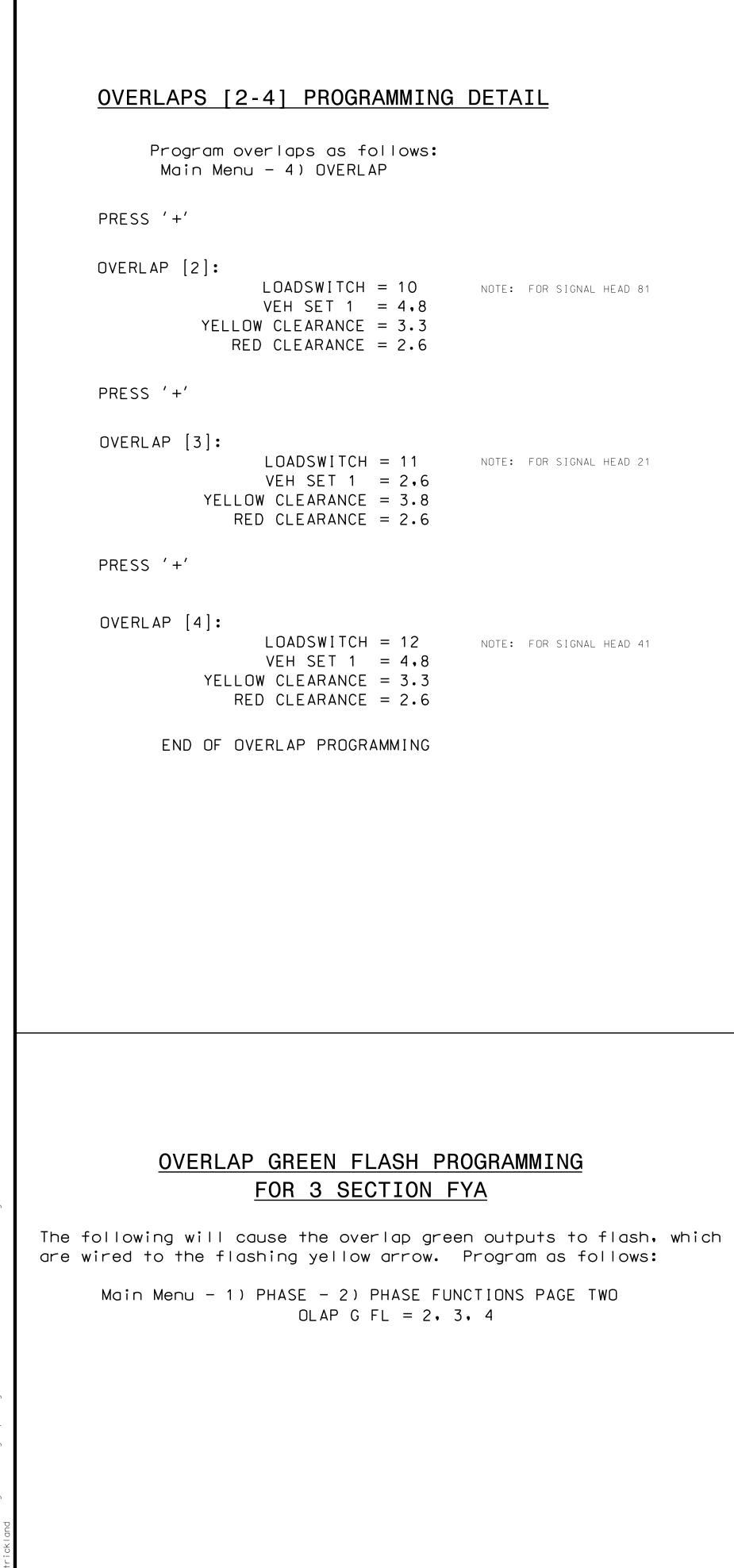
DocuSigned by

George C. Brown 4/2/2015

SIG. INVENTORY NO. 05-0228

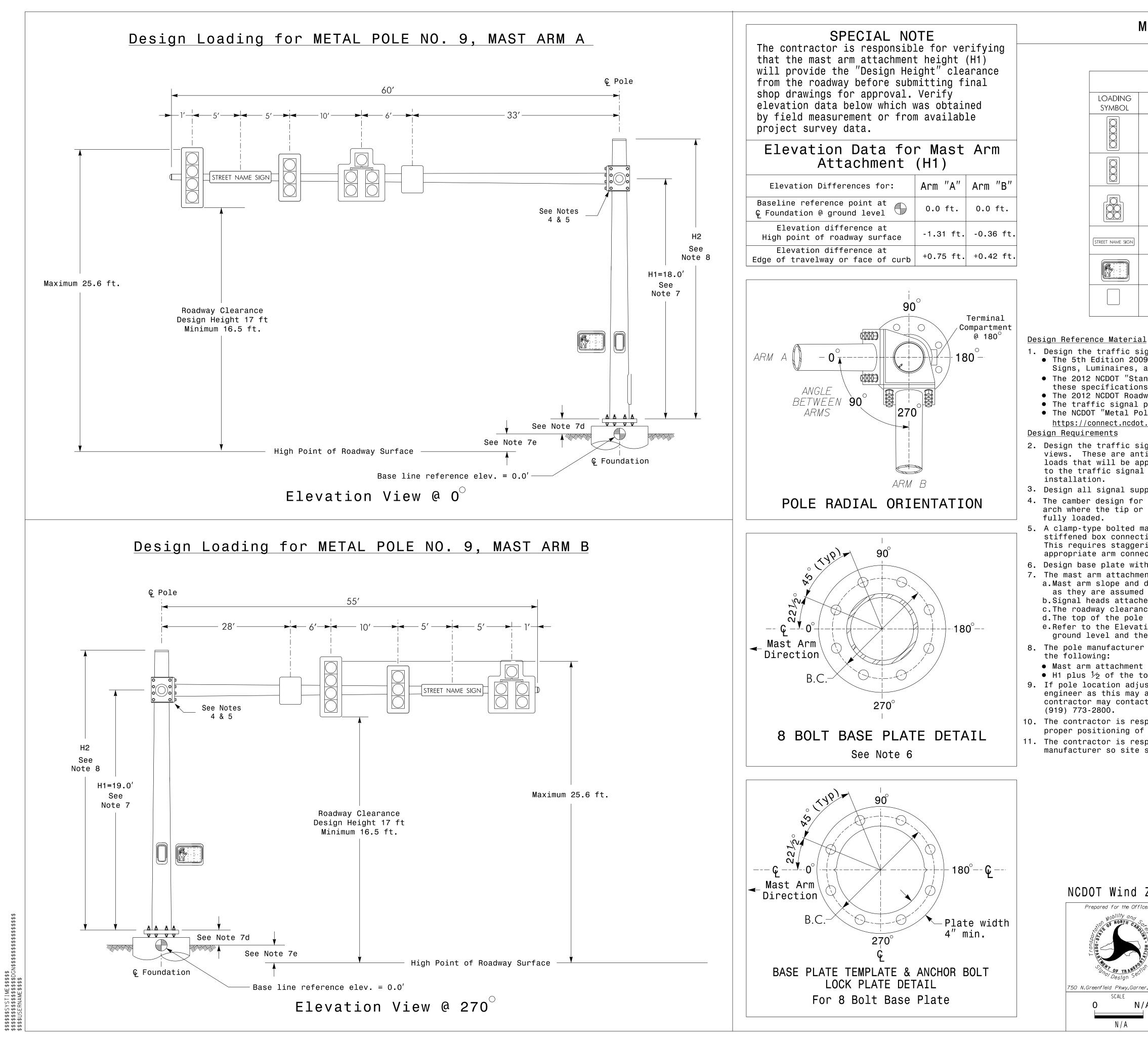
DATE

REVISIONS



AR-2015 16:18 TS&SU*LTS Signgls*Workgroups*Sig Man*Strick|and*050228_sm_ele_x

		PROJECT REFERENCE NO. SHEET NO.
		U-3308 Sig. 30.2
<pre>FYA PPLT PROGRAMMING (SIGNAL HEAD 11) Program Flashing Yellow Arrow phases as follows Main Menu - 1) PHASE - 2) PHASE FUNCTIONS PAGE PPLT FYA = PHASE 1 Assign output pin for Flashing Yellow Arrow as f Main Menu - 6) OUTPUTS - F) FYA PPLT Phase 1 = 99 Redirect RED and YELLOW outputs for the left tu as follows: Main Menu - 6) OUTPUTS - 8) REDIRECT PHASE Phase 1 RED = 97, Phase 1 YELLOW = </pre>	TWO ollows: rn phases	<pre>EMERGENCY VEHICLE PREEMPTION PROGRAMMING 1. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2 EVB Clearance Phases = 1.6 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS Min Time Before Pre ForceOff = 1 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 2 MIN FDW = 5 PHASE 4 MIN FDW = 8 PHASE 6 MIN FDW = 8 PHASE 8 MIN FDW = 8 </pre>
COUNTDOWN PEDESTRIAN SIGNAL OPERA Countdown Ped Signals are required to display timing Ped Clearance Interval. Consult Ped Signal Module us for instructions on selecting this feature.	only during	SPECIAL NOTES EV PREEMPT PROGRAMMING Setting 'FYA DURING PREEMPT' to 'Y' eliminates yellow trap when transitioning to preempt from adjacent through phase. Main Menu - 9) UTILITIES - 9) MISC FYA DURING PREEMPT (Y/N) = Y
FLASHER CIRCUIT MODIFICATION DET IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTL' SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT	Y ON THE	MIN WALK DURING PREEMPTION PROGRAMMING To disable MIN WALK pedestrian timing during preemption, program the controller as follows: Main Menu - 9) UTILITIES - 5) CONFIGURATION EXTRA TWO = 3
1. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERM 2. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERM 3. REMOVE FLASHER UNIT 2. THE CHANGES LISTED ABOVE TIES ALL PHASES AND OVERLAPS TO	INATE ON T2-3.	STARTUP CALLS PROGRAMMING Prevents Veh Call to phase 1 during Startup. Phase 1 used only during Preempt. Main Menu - 9) UTILITIES - 1) STARTUP VEHICLE CALLS 2,4,6,8
	THIS ELECTRICAL THE SIGNAL DESIO DESIGNED: Septer SEALED: 04/02/2 REVISED: N/A	IGN: 05-0228 ember 2014 Division 5 Durham County Durham



			<u>.</u>				
	METAL POLE No. 9		PROJEC	T REFEREN	CE NO.	SHEE	ET NO.
	METAL TOLL NOT 0			U-3308		Sig.	30.3
	MAST ARM LOADING SCH	HEDUL	E				
loading symbol	DESCRIPTION	AREA	SIZE	WEIGHT			
0000	SIGNAL HEAD 12″–4 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	15.8 S.F.	31.5″ W X 72.0″ L	78 LBS			
000	SIGNAL HEAD 12″–3 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	12.8 S.F.	31.5″ W X 58.5″ L	63 LBS			
	SIGNAL HEAD 12″–5 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	20.7 S.F.	48.0″ W X 62.0″ L	107 LBS			
STREET NAME SIGN	street name sign rigid mounted	12.0 S.F.	18.0" W X 96.0" L	27 LBS			
	pedestrian signal head with mounting hardware	2.2 S.F.	18.5″ W X 17.0″ L	21 LBS			
	sign Rigid mounted	7.5 S.F.	30.0" W X 36.0" L	14 LBS			

NOTES

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

• The traffic signal project plans and special provisions.

• The NCDOT "Metal Pole Standards" located at the following NCDOT website: https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

0 ____

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

3. Design all signal supports using stress ratios that do not exceed 0.9. 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when

5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.

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.Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.

b.Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm. c. The roadway clearance height for design is as shown in the elevation views. d The top of the pole base plate is .75 feet above the ground elevation.

e Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.

8. The pole manufacturer will determine the total height (H2) of the pole using the greater of

• Mast arm attachment height (H1) plus 2 feet, or

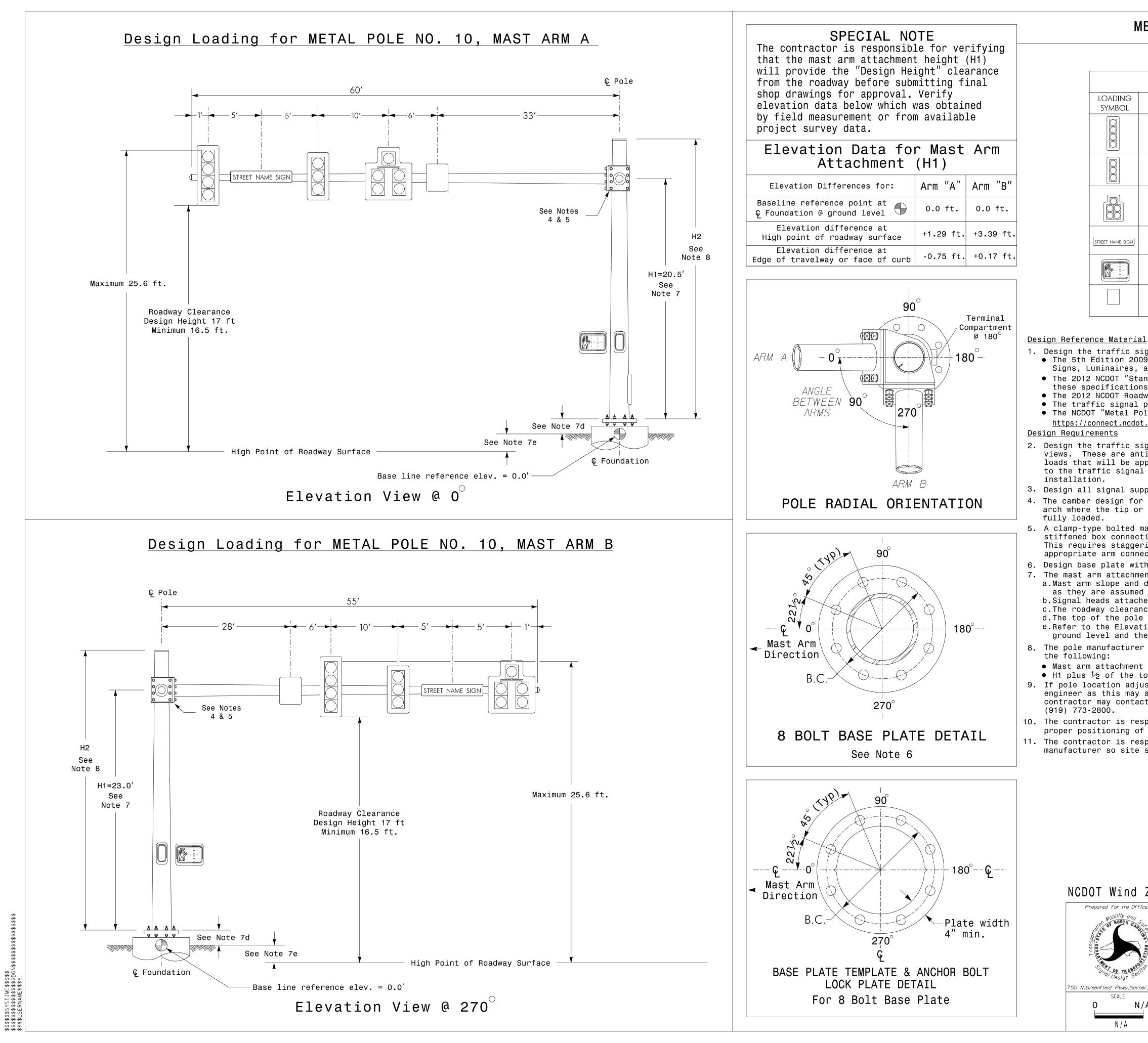
 \bullet H1 plus 1_{2} of the total height of the mast arm attachment assembly plus 1 foot. 9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Structural Engineer for assistance at

10. The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway. 11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.



Wind Zone	4 (90 mph)					
for the Offices of:					SEAL	
NODILITY ON SON	NC 55 (North A	t	venue	9)	TH CARC	
Sion	Taylor	Street			SEAL	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
	Division 5 Durham Cou	unty		Durham	28430	
Design Section	PLAN DATE: December 2014	REVIEWED BY: J	Hochan	adel		
eld Pkwy,Garner,NC 27529	PREPARED BY: M Copple	REVIEWED BY:			ADDH P. HOCK	1A''''''
SCALE	REVISIONS	·	INIT.	DATE	DocuSigned by:	
N/A					MMPAN	4/02/15
					50781D2BF98C498	DATE
N / A					SIG. INVENTORY NO.	05-0228

DocuSign Envelope ID: 2B82073C-8CA6-44D2-96FA-5BE27AB92A1C



Ν	METAL POLE No. 10		PROJEC	T REFERENCE	NO.	SHE	ET NO.
				U-3308		Sig.	30.4
	MAST ARM LOADING SCI	HEDUL	.E				
loading symbol	DESCRIPTION	AREA	SIZE	WEIGHT			
	SIGNAL HEAD 12″–4 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	15.8 S.F.	31.5″ W X 72.0″ L	78 LBS			
000	SIGNAL HEAD 12″–3 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	12.8 S.F.	31.5″ W X 58.5″ L	63 LBS			
	SIGNAL HEAD 12″–5 SECTION WITH 8″ BACKPLATE RIGID MOUNTED	20.7 S.F.	48.0″ W X 62.0″ L	107 LBS			
STREET NAME SIGN	street name sign Rig i d Mounted	12.0 S.F.	18.0" W X 96.0" L	27 LBS			
	PEDESTRIAN SIGNAL HEAD WITH MOUNTING HARDWARE	2.2 S.F.	18.5″ W X 17.0″ L	21 LBS			
	SIGN RIGID MOUNTED	7.5 S.F.	30.0" W X 36.0" L	14 LBS			

NOTES

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

• The traffic signal project plans and special provisions.

• The NCDOT "Metal Pole Standards" located at the following NCDOT website: <u>https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx</u>

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

3. Design all signal supports using stress ratios that do not exceed 0.9. 4. The camber design for mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when

5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.

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.Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.

b.Signal heads attached to the mast arm are rigid mounted and vertically centered on the arm. c. The roadway clearance height for design is as shown in the elevation views. d. The top of the pole base plate is .75 feet above the ground elevation.

e Refer to the Elevation Data chart for elevation differences between the proposed foundation ground level and the high point on the roadway.

8. The pole manufacturer will determine the total height (H2) of the pole using the greater of

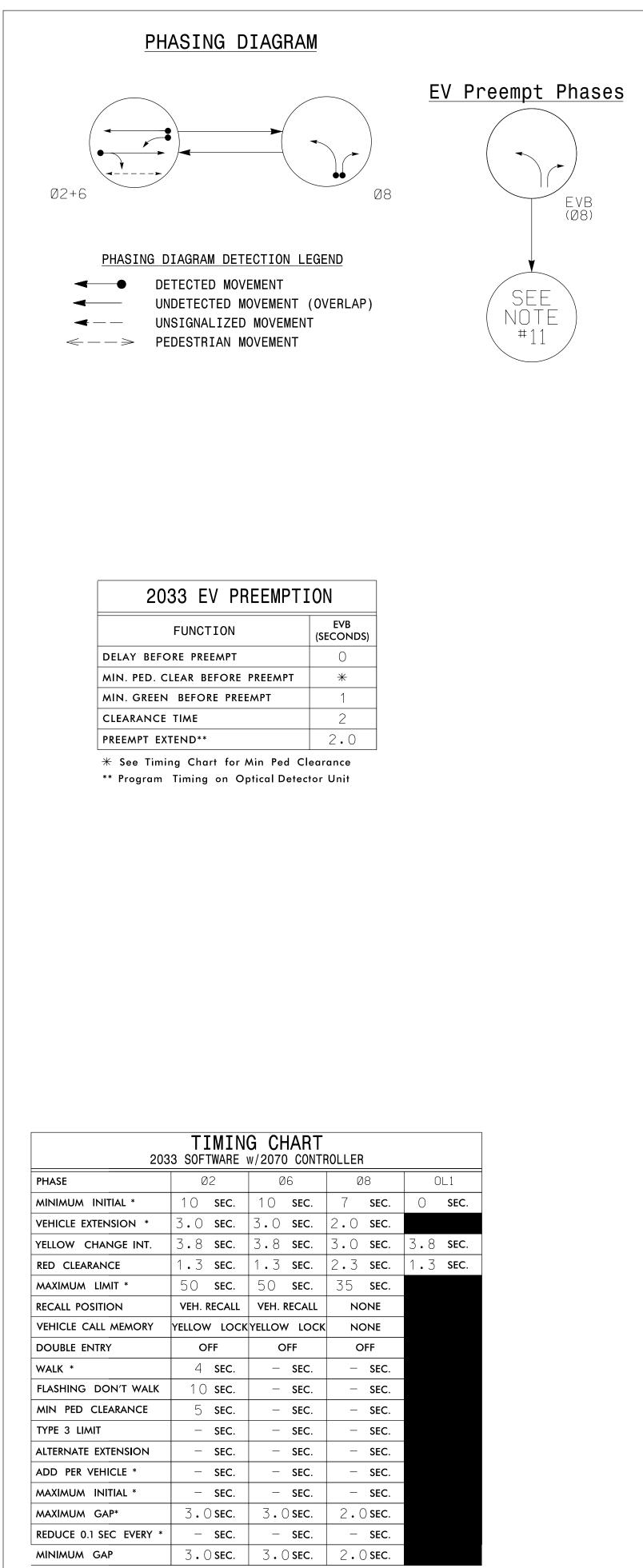
• Mast arm attachment height (H1) plus 2 feet, or • H1 plus $\frac{1}{2}$ of the total height of the mast arm attachment assembly plus 1 foot. 9. If pole location adjustments are required, the contractor must gain approval from the engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Structural Engineer for assistance at

10. The contractor is responsible for verifying that the mast arm lengths shown will allow proper positioning of the signal heads over the roadway.

11. The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.



Wind Zone	4 (90 mph)					
d for the Offices of:					SEAL	
NODILITY ON CAROLE	a	t	venue	e)	TH CARC	
North Sion	Taylor	Street			SEAL	×
	Division 5 Durham Cou	unty		Durham	28430	, , , , , , , , , , , , , , , , , , ,
Design Section	NC 55 (North Alston Avenue) at Taylor Street Division 5 Durham County Durham PLAN DATE: December 2014 REVIEWED BY: J Hochanadel REVISIONS INIT. DATE REVISIONS INIT. DATE REVISIONS		F TO CINEE			
eld Pkwy,Garner,NC 27529	PREPARED BY: M Copple	REVIEWED BY:			P. HOCK	AR. IN
SCALE	REVISIONS		INIT.	DATE	DocuSigned by:	
N/A					MMPAN	4/02/15
					50781D2BF98C498	DATE
N / A					SIG. INVENTORY NO.	05-0228

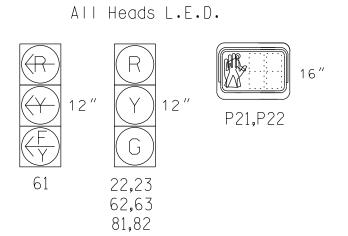


* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds

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TABLE OF	0P	ERA	TIO	N						
	PHASE									
SIGNAL FACE	Ø 2 + 6	Ø 8	E V B	FLANT						
22,23	G	R	R	Y						
61	F	-R	≺R	- ¥-						
62,63	G	R	R	Y						
81,82	R	G	G	R						
P21,P22	W	D·W	D·W	DRK						

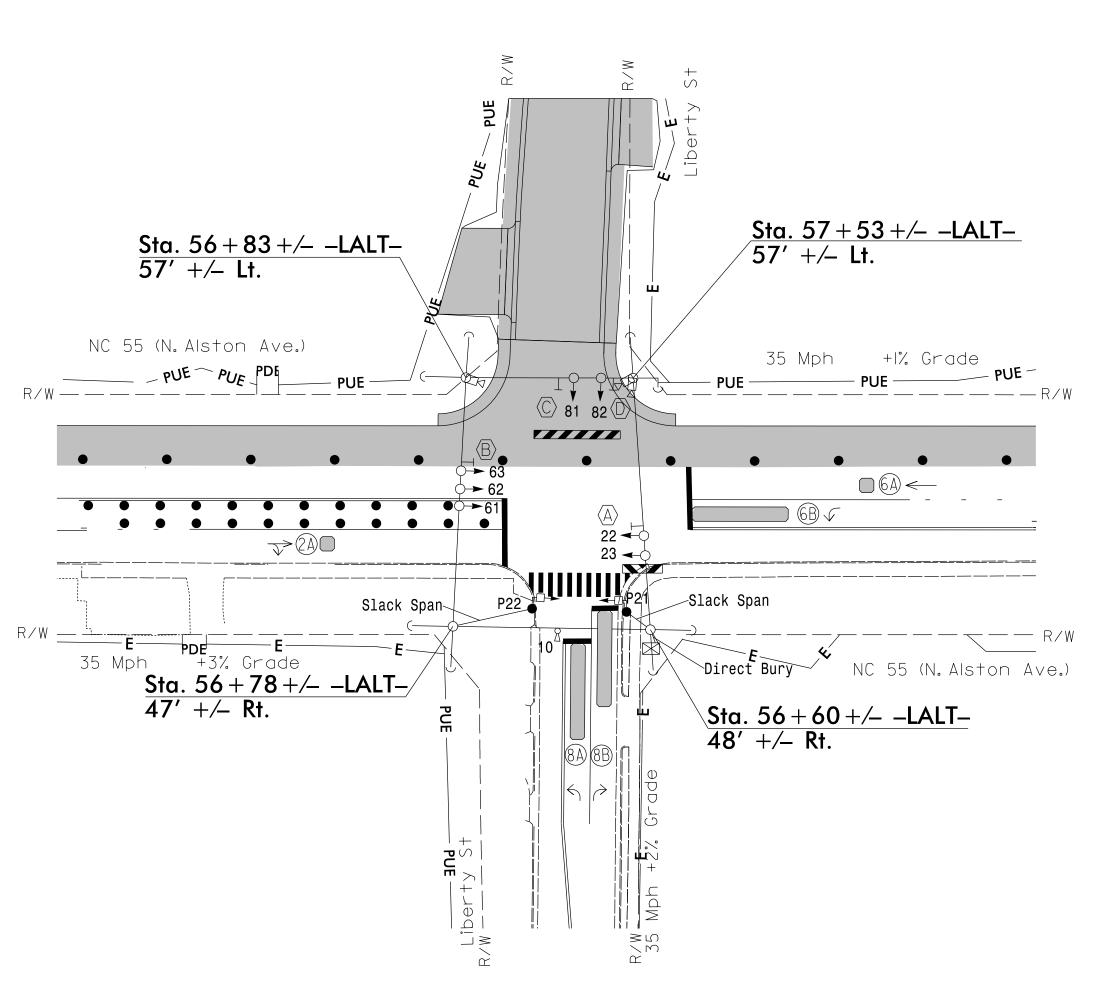
SIGNAL FACE I.D.



2033 SOFTWARE w/ 2070 CONTROLLER LOOP & DETECTOR UNIT INSTALLATION CHART

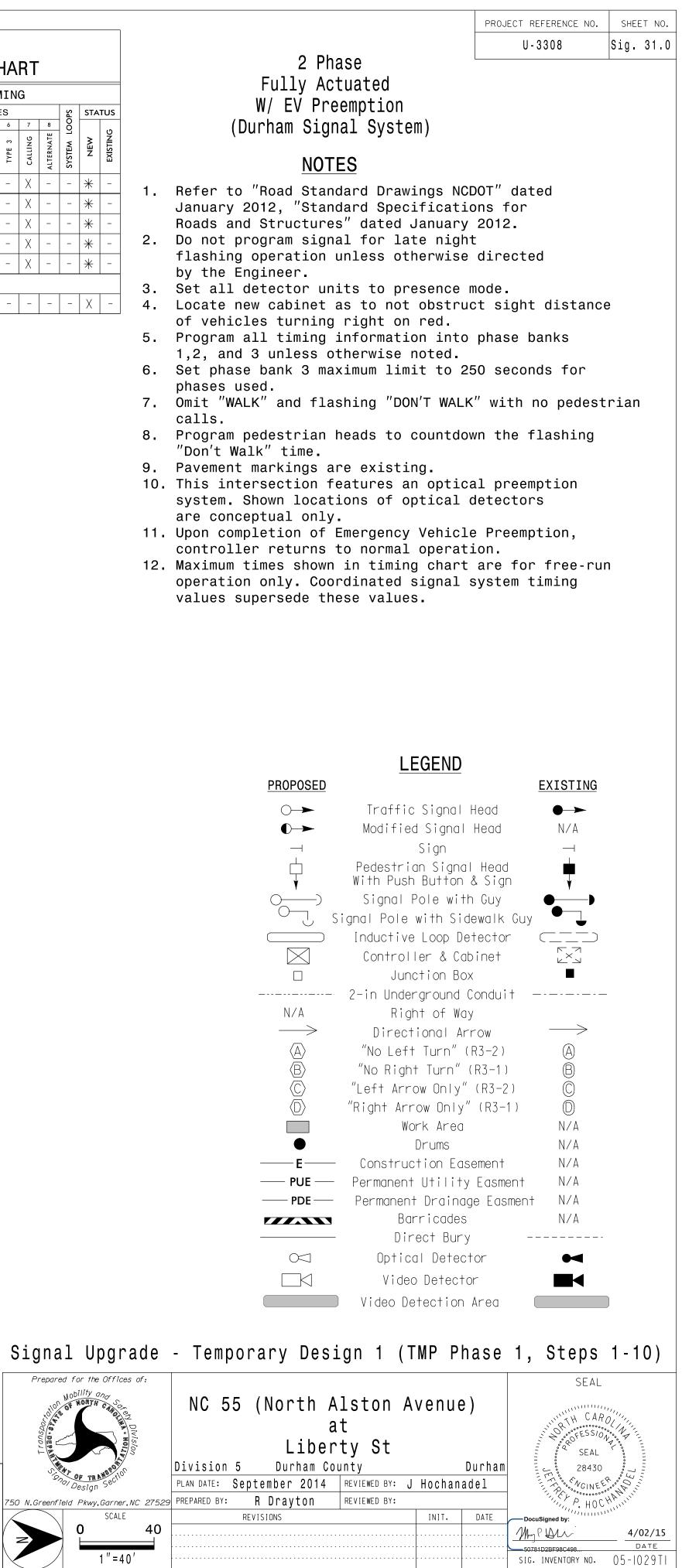
							DETECTOR PROGRAM										 G	
	INDUCT	IVE LOO)PS								ATTRIBUTES							
							TIMING				1	1 2		3 4 5		6	7	
	CIZE		DIST. FROM		ų						JLL TIME DELAY	IAN	ED	т	NO		ŋ	
LOOP NO.	SIZE (ft)	TURNS	STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	DEL	DELAY		CARRY (STRETCH)		PEDESTRIAN CALL	RESERVED	COUNT	EXTENSION	ТҮРЕ	CALLING	
2A	6x6	*	70	*	-	2	-	SEC.	-	SEC.	-	-	-	-	Х	-	Х	
6A	6×6	*	70	*	-	6	-	SEC.	-	SEC.	-	-	_	-	Х	-	Х	
6B	6×40	*	0	*	-	6	-	SEC.	-	SEC.	-	-	-	-	Х	-	Х	
8 A	6×40	*	0	*	-	8	3	SEC.	-	SEC.	-	-	-	-	Х	-	Х	
8B	6x40	*	0	*	-	8	15	SEC.	-	SEC.	-	-	-	-	Х	-	Х	
PEDESTR	IAN DE	TECTIO	Ν															
P21,P22	N/A	N/A	N/A	Х	-	2	-	SEC.	-	SEC.	-	Х	-	-	-	-	-	
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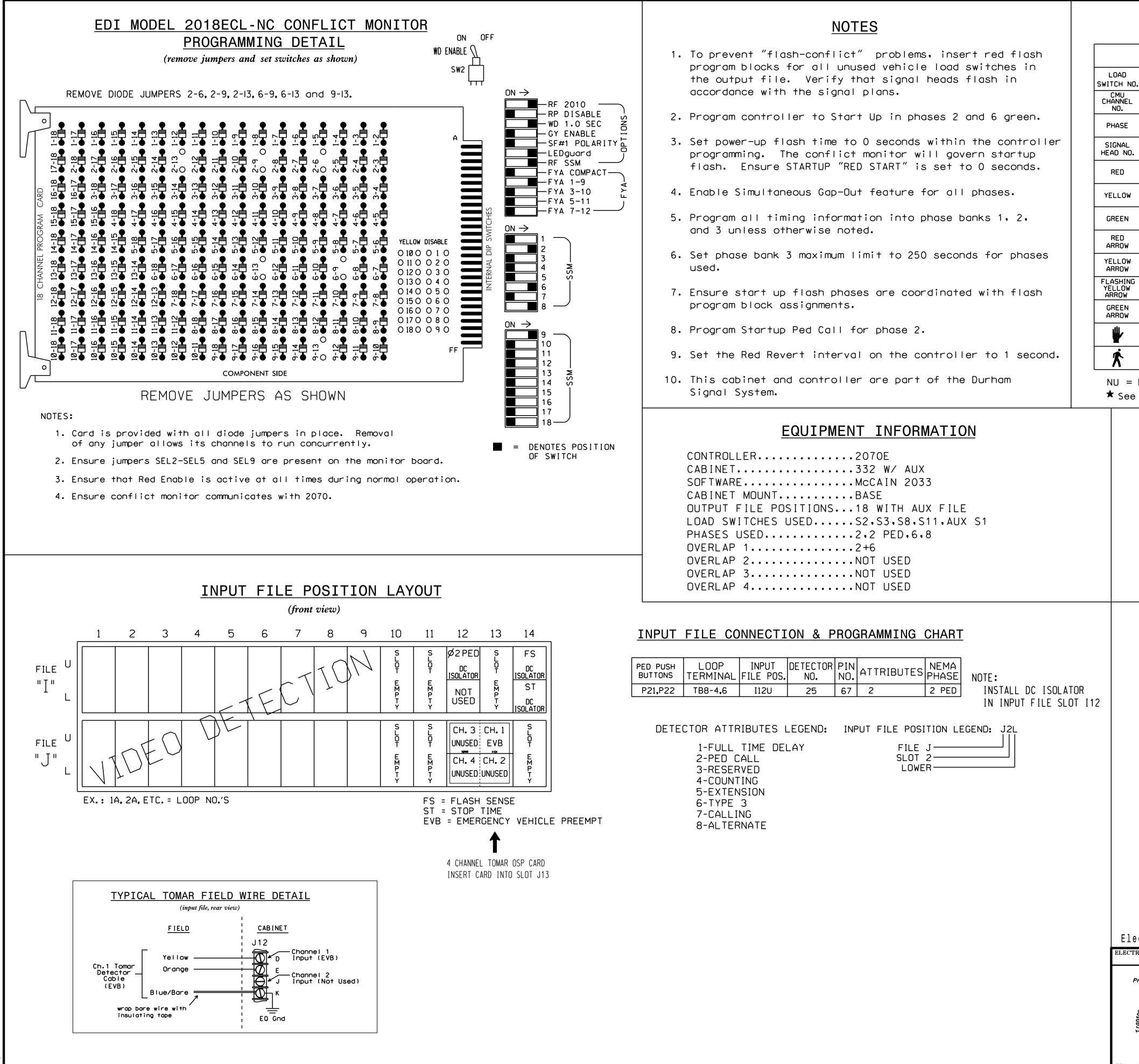
* Video Detection Zone











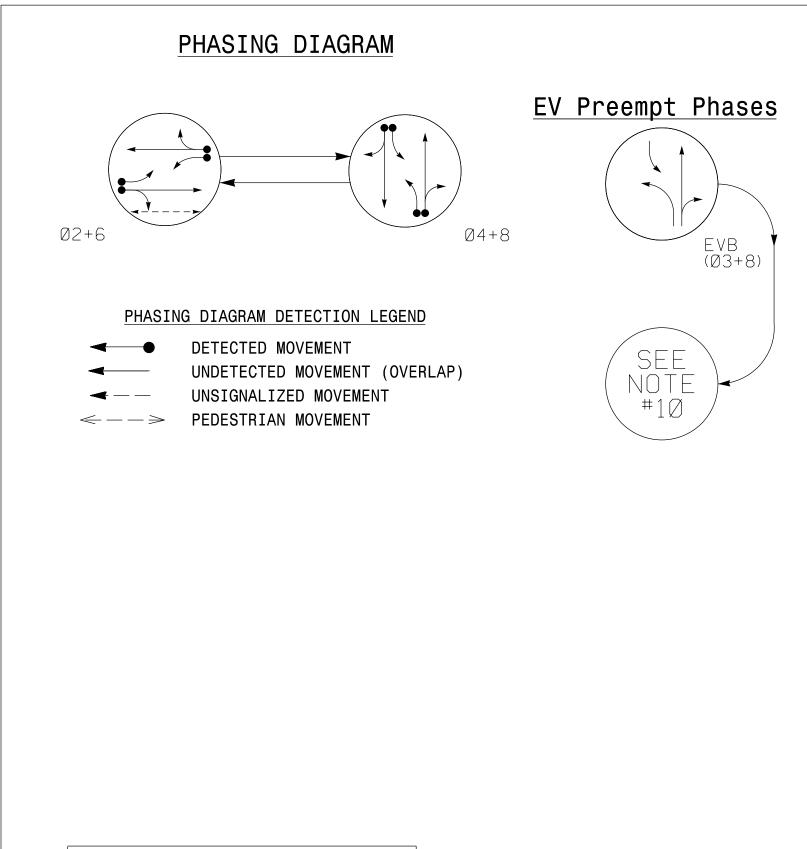
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				ST	GNA				100	K - I	IP	СНА							
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NO. EL										7			S1 9			S4	S5		
	1	2	13 2	3	4	14 4	5	6	15 6		8	16 8		10	17	11	12	18	
E	1	2	2 PED P21	3	4	PED	5	6	6 PED	7	8	8 PED	OL1 ★	OL2	SPARE	OL3	OL4	SPARE	
NO.	NU	22,23	P21, P22	NU	NU	NU	NU	62,63	NU	NU	81,82	NU	61	NU	NU	NU	NU	NU	
		128						134			107								
W		129						135			108								
N		130						136			109								
w													A121						
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			113																
			115																
		Used																	
ee	pic ⁻	toric	l of	he	ad wi	iring	g in	det	oil	belo	W•								
	FYA SIGNAL WIRING DETAIL (wire signal heads as shown)																		
												2							
						OL1	RED	(A121)				<u>}</u>							
					Οι	_1 YEL	LOW	(A122)											
							REEN	(6123)											
OL1 GREEN (A123)																			
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	•4	Pkwy.Gor		27529											Geor	· · ·	. Brow	€ 4/7/2	
				-													NO. 0	5-1029	

<u>COUNTDOWN P</u> Countdown Ped Signals Ped Clearance Interva for instructions on se	<pre>EMERGENCY VEHICLE PREEMPTION PROGRAMMING 1. Program EVB preempt as follows: Main Menu - 2) PREEMPT - 4) EMERGENCY VEHICLE EVB Clear = 2 EVB Clearance Phases = 8 2. Program general preemption parameters as follows: Main Menu - 2) PREEMPT - 6) MISC PREEMPTION PARAMETERS</pre>
	Min Time Before PE ForceOff = 1 3. Ped Clear Before Preempt is a pedestrian timing parameter, and is programmed as follows: Main Menu - 1) PHASE - 5) PEDESTRIAN TIMING PHASE 2 MIN FDW = 5
MIN WAL	Program extend time on optical detector units for 2.0 sec for EVB
To disable MIN WALK program the controll Main Menu – 9) L EXTF	
<u>OVERLAP GREE</u> (SIG	
The following will cause th is wired to th Main Menu - 1) PHAS (OVERLAP (1) PROGRAMMING DETAIL Program overlaps as follows: Main Menu - 4) OVERLAP OVERLAP [1]: LOADSWITCH = 9 VEH SET 1 = 2.6 YELLOW CLEARANCE = 3.8 RED CLEARANCE = 1.3 END OF OVERLAP PROGRAMMING
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 05-1029T1 DESIGNED: September 2014 SEALED: 4/2/15 REVISED: N/A 750 M.Greenfield Pk	

N V

		PROJ	ECT REFERENCE NO	
			U-3308	Sig. 31.2
DWN PEDESIR.	IAN SIGNAL OPERATION			
	ired to display timing only du It Ped Signal Module user's ma			
s on selecting –				
<u>I WALK DURII</u> PROGRA	NG PREEMPTION MMING			
<u>i noun</u> A				
N WALK pedestri Antroller as fo	an timing during preemption	• ٦		
- 9) UTILITIES	- 5) CONFIGURATION			
EXTRA TWO =	3			
(SIGNAL HE	SH PROGRAMMING			
ise the over l	ap green output to flas	sh.whi	ich	
	Program as follows:			
PHASE - 2)	PHASE FUNCTIONS PAGE TW	0		
OLAP G F				
lectrical Detail -	Sheet 2 of 2 (Temporary Design 1)		
DETAILS FOR:	NC 55 (North Alston Aver	nue)		_
Prepared in the Offices of:	at Liberty St		ROFES	SIONAL DE
Longen of the solution	Division 5 Durham County	Durham	SE/ 0220	AL 013
Noision	PLAN DATE: November 2014 REVIEWED BY: T.	Joyce	ENGIN COPCE	REER
Sing Management Section	PREPARED BY: B. SIMMONS REVIEWED BY: REVISIONS INT	IT. DATE	DocuSigned by: Jeorge C. B	
			a rayo D	

m ~~~ Signals Mano N.Greenfield Pkwy.Garner.NC 27529 F12601ED0BEB434... DATE SIG. INVENTORY NO. 05-1029T1



2033 EV PREEMPTI	ON
FUNCTION	EVB (SECONDS)
DELAY BEFORE PREEMPT	0
MIN. PED. CLEAR BEFORE PREEMPT	*
MIN. GREEN BEFORE PREEMPT	1
CLEARANCE TIME	2
PREEMPT EXTEND**	2.0

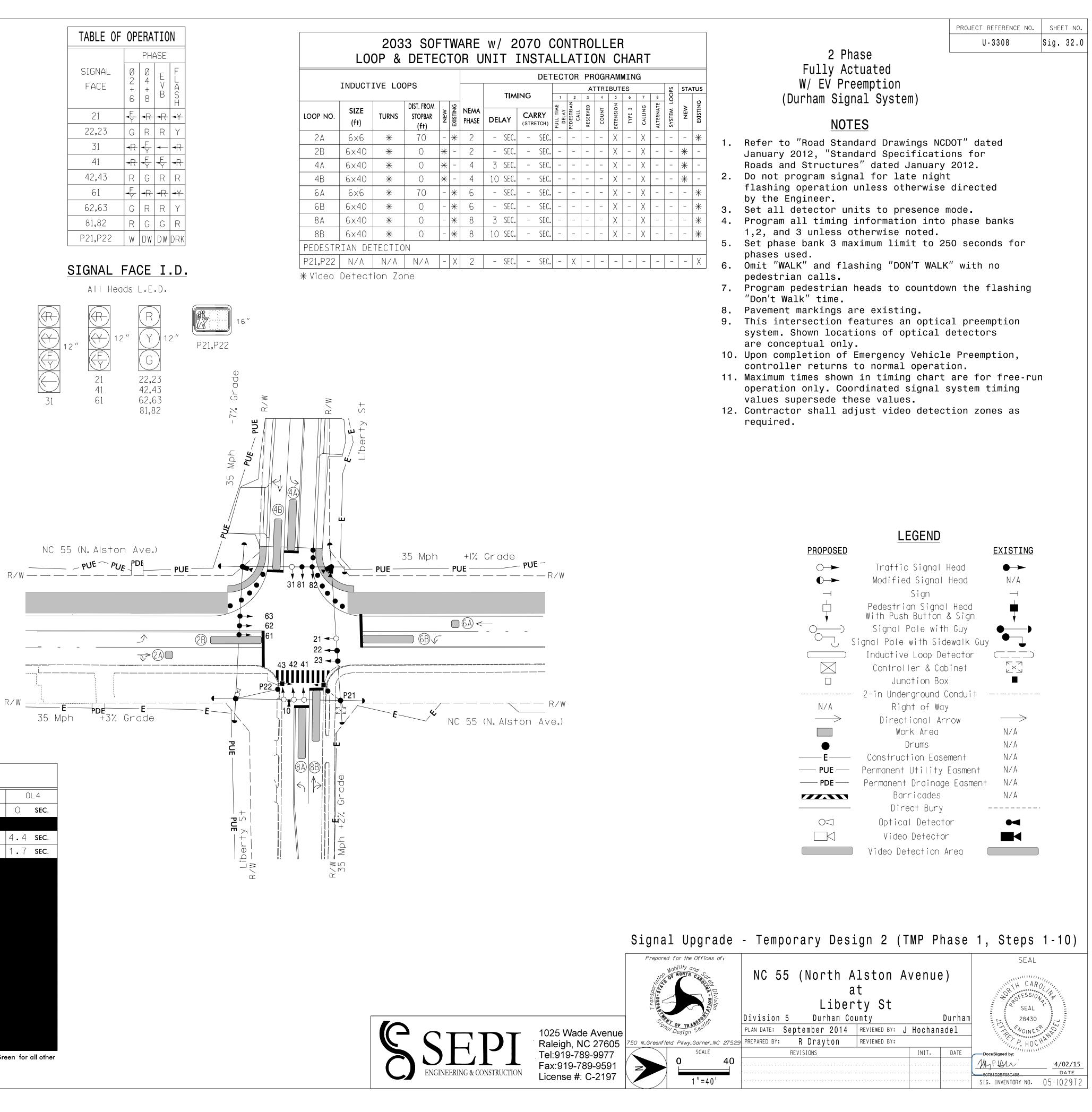
* See Timing Chart for Min Ped Clearance
** Program Timing on Optical Detector Unit

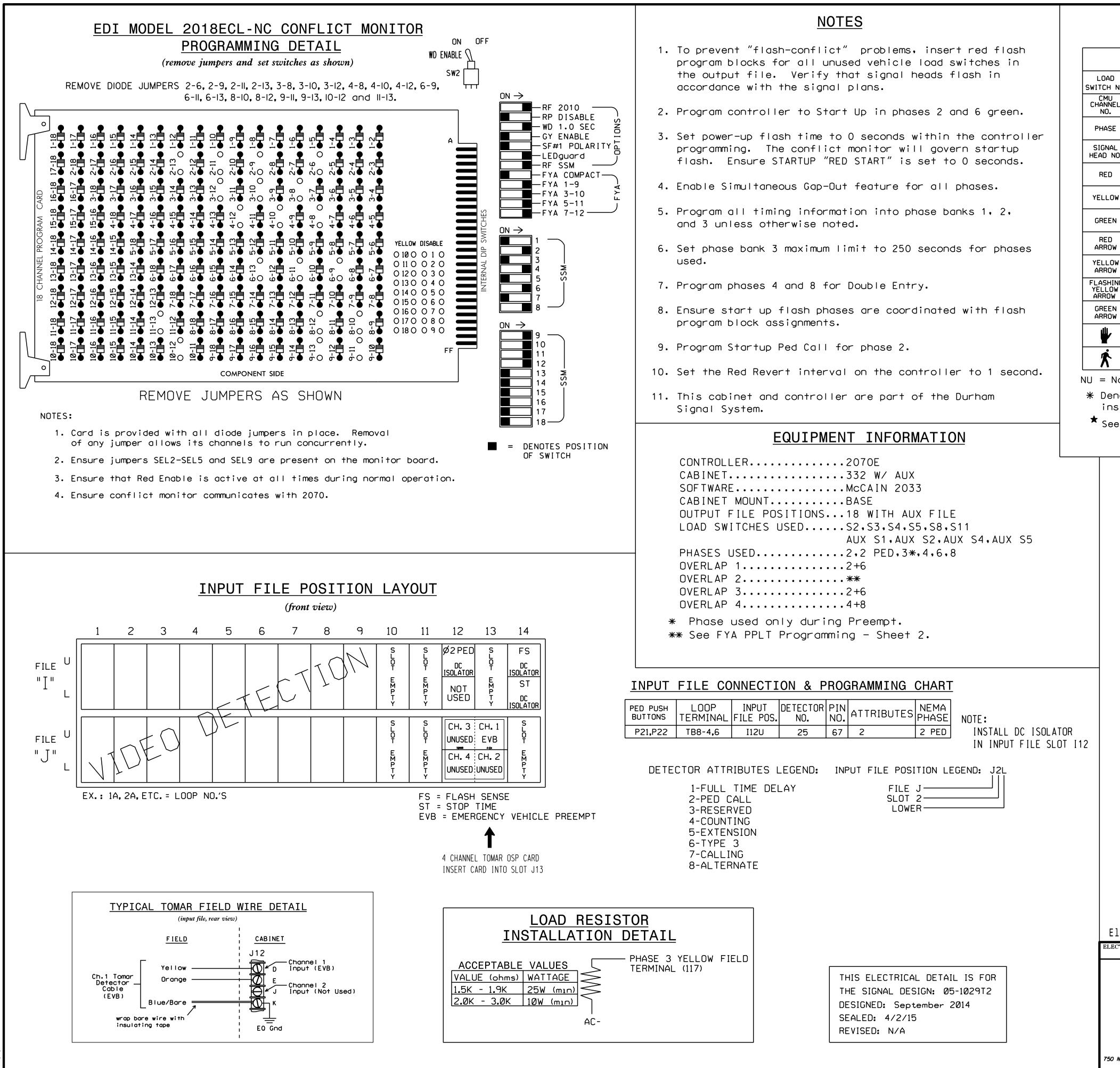
		203		G CHART w/2070 CONTE	ROLLER			
PHASE	Ø2	Ø3	Ø4	Ø6	Ø8	OL1	OL3	
MINIMUM INITIAL *	10 SEC.	– SEC.	7 SEC.	10 SEC .	7 SEC .	O SEC.	O SEC.	
VEHICLE EXTENSION *	3.0 SEC.	– SEC.	2.0 SEC.	3.0 SEC.	2.0 SEC.			
YELLOW CHANGE INT.	3.8 SEC.	4.4 SEC.	4.4 SEC.	3.8 SEC.	4.4 SEC.	3.8 SEC.	3.8 SEC.	4
RED CLEARANCE	1.5 SEC.	2.4 SEC.	1.7 SEC.	1.5 SEC.	1.7 SEC.	1.5 SEC.	1.5 SEC.	1
MAXIMUM LIMIT *	50 SEC .	35 SEC .	35 SEC .	50 SEC .	35 SEC .			
RECALL POSITION	VEH. RECALL	NONE	NONE	VEH. RECALL	NONE	_		
VEHICLE CALL MEMORY	YELLOW LOCK	NONE	NONE	YELLOW LOCK	NONE	_		
DOUBLE ENTRY	OFF	OFF	ON	OFF	ON	-		
WALK *	4 SEC.	– SEC.	– SEC.	– SEC.	– SEC.	_		
FLASHING DON'T WALK	10 sec.	– SEC.	– SEC.	– SEC.	– SEC.	_		
MIN PED CLEARANCE	5 SEC .	– SEC.	– SEC.	– SEC.	– SEC.	_		
TYPE 3 LIMIT	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	_		
ALTERNATE EXTENSION	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.			
ADD PER VEHICLE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	_		
MAXIMUM INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	_		
MAXIMUM GAP*	3 . () SEC .	– SEC.	2 . () SEC .	3 . () SEC .	2 . () SEC .	-		
REDUCE 0.1 SEC EVERY *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	-		
MINIMUM GAP	3.0 SEC.	– SEC.	2 . 0 SEC.	3.0 SEC.	2 . () SEC .			

sportation*TR13.017.00 NCDDT 2012 Traffic LSA*TR13.017.03 (U-3308 Signals)*Traffic*Signals*Design*Signals*TEMP SIGNALS WITH VIDED*05-1029*05-1029T2.dgn

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NO. EL	1	2	13	3	4	14	5	6	15	7	8	16	9	52 10	S3 17	54 11	12	18	
E	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	0L2	SPARE	OL3		SPARE	
AL NO.	NU	22,23	PED P21. P22	*	42,43		NU	62,63		NU	81,82	NU	★		NU	★		NU	
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		OL2 F	RED (4	4124)-)		()L4 RI	ED (A)	101) —		_((\mathbf{R})			
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	OI	2 GRE	ΈN (Δ	126) -)		0[_4	GREE	EN (A1	Ø3) —			$\overline{\langle F \rangle}$			
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