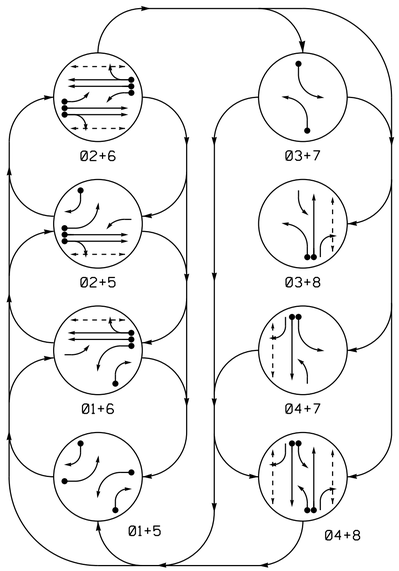
PROJECT REFERENCE NO.	SHEET NO.
SS-4905CK	Sig. 7.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

EV PREEMPT PHASES

**See Note 15

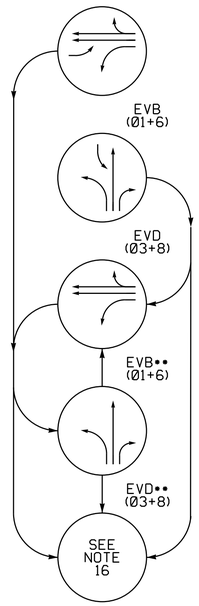


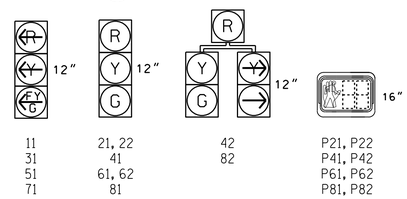
TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	EVB	EVD	FLASH
11	←●	←●	F/Y	F/Y	~~R~~	~~R~~	~~R~~	~~R~~	←●	~~R~~	~~Y~~
21, 22	R	R	G	G	R	R	R	R	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	←●	←●	F/Y	F/Y	~~R~~	←●	~~R~~
41	R	R	R	R	R	R	G	G	R	R	R
42	R/←	R	R/←	R	R	R	G	G	R	R	R
51	←●	F/Y	←●	F/Y	~~R~~	~~R~~	~~R~~	~~R~~	F/Y	~~R~~	~~Y~~
61, 62	R	G	R	G	R	R	R	R	G	R	Y
71	~~R~~	~~R~~	~~R~~	~~R~~	←●	F/Y	←●	F/Y	~~R~~	~~R~~	~~R~~
81	R	R	R	R	R	G	R	G	R	G	R
82	R/←	R	R/←	R	R	R	G	R	G	R	G
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DW	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DW	DW	DRK
P81, P82	DW	DW	DW	DW	DW	W	DW	W	DW	DW	DRK

W - Walk
DW - Don't Walk
DRK - Dark

SIGNAL FACE I.D.

All Heads L.E.D.
F/Y/G = Bimodal Section



2033 EV PREEMPTION TIMING CHART

FUNCTION	EVB (SECONDS)	EVD (SECONDS)
DELAY BEFORE PREEMPT	0	0
PED. CLEAR BEFORE PREEMPT	#	#
MIN. GREEN BEFORE PREEMPT	1.0	1.0
CLEARANCE TIME	2.0	2.0
PREEMPT EXTEND***	2.0	2.0

See Timing Chart this sheet
*** Program Timing on Optical Detector Unit

TIMING CHART

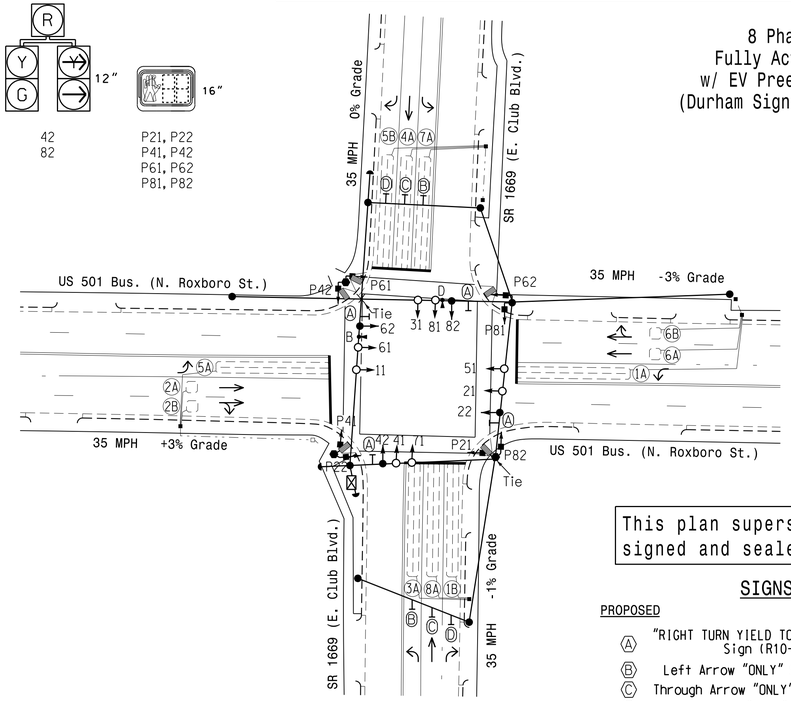
2033 SOFTWARE w/ 2070 CONTROLLER

PHASE	01	02	03	04	05	06	07	08	OL 6
MINIMUM INITIAL *	7 SEC.	10 SEC.	7 SEC.	7 SEC.	7 SEC.	10 SEC.	7 SEC.	7 SEC.	– SEC.
VEHICLE EXTENSION *	2.0 SEC.	3.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	3.0 SEC.	2.0 SEC.	2.0 SEC.	– SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.1 SEC.	3.0 SEC.	3.9 SEC.	3.0 SEC.	4.1 SEC.	3.0 SEC.	3.9 SEC.	3.0 SEC.
RED CLEARANCE	2.6 SEC.	1.7 SEC.	2.4 SEC.	1.8 SEC.	2.4 SEC.	1.7 SEC.	2.4 SEC.	1.8 SEC.	2.6 SEC.
MAXIMUM LIMIT *	25 SEC.	60 SEC.	15 SEC.	30 SEC.	20 SEC.	60 SEC.	15 SEC.	30 SEC.	
RECALL POSITION	NONE	VEH. RECALL	NONE	NONE	NONE	VEH. RECALL	NONE	NONE	
VEHICLE CALL MEMORY	NONLOCK	YELLOW LOCK	NONLOCK	NONLOCK	NONLOCK	YELLOW LOCK	NONLOCK	NONLOCK	
DOUBLE ENTRY	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	
WALK *	– SEC.	7 SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.	
FLASHING DON'T WALK	– SEC.	15 SEC.	– SEC.	18 SEC.	– SEC.	14 SEC.	– SEC.	17 SEC.	
PED CLEAR BEFORE PREEMPT	– SEC.	8 SEC.	– SEC.	9 SEC.	– SEC.	7 SEC.	– SEC.	9 SEC.	
TYPE 3 LIMIT	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	
ALTERNATE EXTENSION	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	
ADD PER VEHICLE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	
MAXIMUM INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	
MAXIMUM GAP*	2.0 SEC.	3.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	3.0 SEC.	2.0 SEC.	2.0 SEC.	
REDUCE 0.1 SEC EVERY *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	
MINIMUM GAP	2.0 SEC.	3.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	3.0 SEC.	2.0 SEC.	2.0 SEC.	

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

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

INDUCTIVE LOOPS						DETECTOR PROGRAMMING														
							TIMING		ATTRIBUTES									STATUS	
LOOP NO.	SIZE (ft)	TURNS	DIST. FROM STOPBAR (ft)	NEW	EXISTING	NEMA PHASE	DELAY	CARRY (STRETCH)	1 FULL TIME DETECTION	2 PEDESTRIAN CALL	3 RESERVED	4 COUNT	5 EXTENSION	6 TYPE 3	7 CALLING	8 ALTERNATE	SYSTEM LOOPS	NEW	EXISTING
1A	6X60	2-4-2	0	-	X	1	15 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
						6	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
1B	6X60	2-4-2	0	-	X	1	15 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
2A	6X6	EXIST	70	-	X	2	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
2B	6X6	EXIST	70	-	X	2	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
3A	6X60	2-4-2	0	-	X	3	15 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
						8	3 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
4A	6X60	2-4-2	0	-	X	4	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
5A	6X60	2-4-2	0	-	X	5	15 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
						2	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
5B	6X60	2-4-2	0	-	X	5	15 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
6A	6X6	EXIST	70	-	X	6	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
6B	6X6	EXIST	70	-	X	6	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
7A	6X60	2-4-2	0	-	X	7	15 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
						4	3 SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
8A	6X60	2-4-2	0	-	X	8	- SEC.	- SEC.	-	-	-	-	X	-	X	-	-	X	-
PEDESTRIAN DETECTION																			
P21, P22	N/A	N/A	N/A	-	X	2	- SEC.	- SEC.	-	X	-	-	-	-	-	-	-	X	-
P41, P42	N/A	N/A	N/A	-	X	4	- SEC.	- SEC.	-	X	-	-	-	-	-	-	-	X	-
P61, P62	N/A	N/A	N/A	-	X	6	- SEC.	- SEC.	-	X	-	-	-	-	-	-	-	X	-
P81, P82	N/A	N/A	N/A	-	X	8	- SEC.	- SEC.	-	X	-	-	-	-	-	-	-	X	-



8 Phase
Fully Actuated
w/ EV Preemptions
(Durham Signal System)

This plan supersedes the plan signed and sealed on 3/10/15.

SIGNS

PROPOSED		EXISTING
Ⓐ	"RIGHT TURN YIELD TO PEDESTRIANS" Sign (R10-15)	Ⓐ
Ⓑ	Left Arrow "ONLY" Sign (R3-5L)	Ⓑ
Ⓒ	Through Arrow "ONLY" Sign (R3-5A)	Ⓒ
Ⓓ	Right Arrow "ONLY" Sign (R3-5R)	Ⓓ

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Phase 3 and/or phase 7 may be lagged.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
9. Set phase bank 3 maximum limit to 250 seconds for phases used.
10. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
11. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
12. Pedestrian pedestals are conceptual and shown for reference only. See sheets P1-P3 for pushbutton location details.
13. Pavement markings are existing.
14. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
15. If preempt phasing resides in the barrier being serviced then the opposing 4-section FYA will flash continuously. If the preempt phase requires crossing the barrier then the opposing 4-section FYA will display a red arrow.
16. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation based on vehicle demand.
17. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Directional Arrow	
	Metal Strain Pole	
	Optical Detector	
	Type I Pushbutton Post	
	Type II Signal Pedestal	
N/A	Wheelchair Ramp	

Signal Upgrade

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

US 501 Bus. (N. Roxboro St.) at SR 1669 (E. Club Blvd.)

Division 5 Durham County Durham

PLAN DATE: September 2015 REVIEWED BY:
PREPARED BY: R. W. Hough REVIEWED BY:

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 036833 ENGINEER RYAN W. HOUGH
DocuSigned by: Ryan W. Hough E30320FAA2654C0... 2/1/2016
DATE
SIG. INVENTORY NO. 05-0307

01-FEB-2016 11:07
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