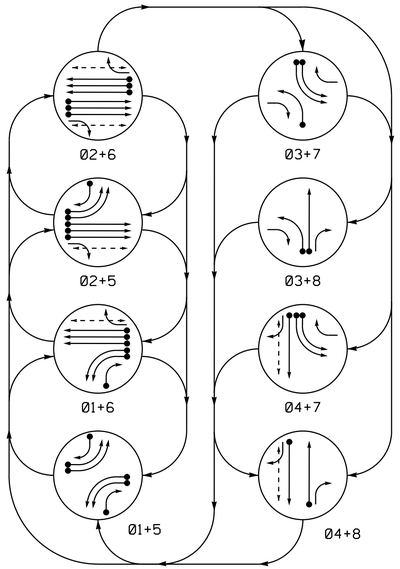
PROJECT REFERENCE NO.	SHEET NO.
W-5705C	Sig.1.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

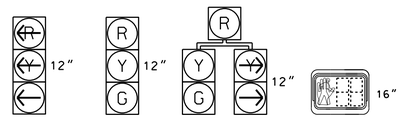
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

EV PREEMPT PHASES

EVB
(Ø3+8)

SIGNAL FACE I.D.

All Heads L.E.D.



11, 12
31
51, 52
71, 72

21, 22
41
61, 62
81

23
42
63
82

P21, P22
P41, P42
P61, P62

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	EVB	FLASH
11, 12	←	←	R	R	R	R	R	R	R	R
21, 22	R	R	G	G	R	R	R	R	Y	Y
23	R	R	G	G	R/	R/	R	R	R/	Y
31	R	R	R	R	←	←	R	R	←	R
41	R	R	R	R	R	R	G	G	R	R
42	R/	R	R/	R	R	R	G	G	R	R
51, 52	←	R	←	R	R	R	R	R	R	R
61, 62	R	G	R	G	R	R	R	R	Y	Y
63	R	G	R	G	R/	R	R/	R	Y	Y
71, 72	R	R	R	R	←	R	←	R	R	R
81	R	R	R	R	R	G	R	G	G	R
82	R/	R/	R	R	R	G	R	G	G	R
P21, P22	DW	DW	W	W	DW	DW	DW	DW	DW	DRK
P41, P42	DW	DW	DW	DW	DW	DW	W	W	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DRK	DW	DRK

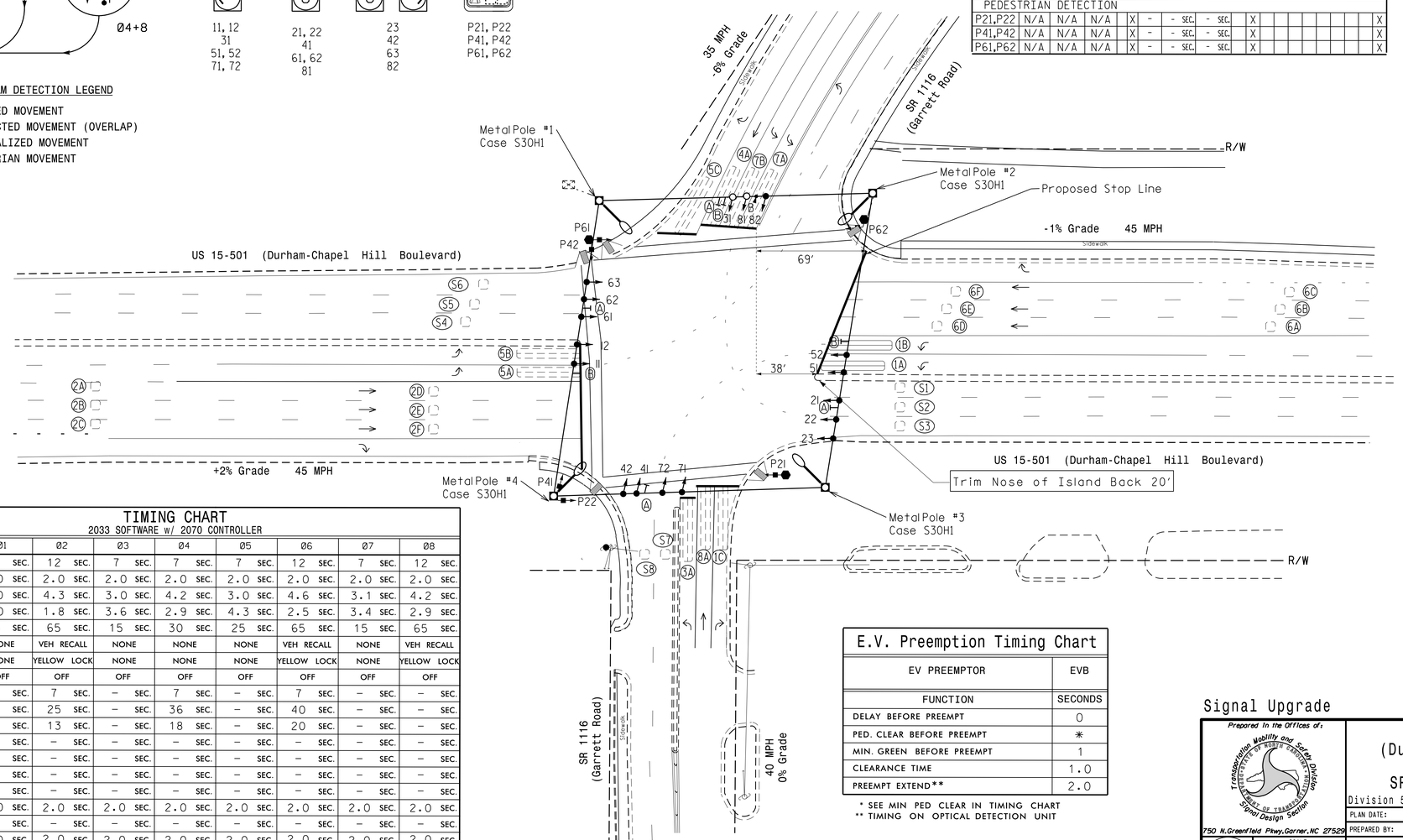
2033 SOFTWARE w/ 2070 CONTROLLER
LOOP & DETECTOR UNIT INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING												
						TIMING		ATTRIBUTES								STATUS	
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW / EXISTING	NEMA PHASE	DELAY	CARRY (STRETCH)	1 LOW DELAY / PEDESTRIAN DELAY	2 PEDESTRIAN DELAY	3 RESERVED	4 COUNT	5 EXTENSION	6 TYPE 3	7 CALLING	8 ALTERNATE	SYSTEM LOOPS	NEW	EXISTING
1A	6X40	+10	2-4-2	X	1	- SEC.	- SEC.					X		X				X
1B	6X40	+15	2-4-2	X	1	- SEC.	- SEC.					X		X				X
1C	6X40	0	2-4-2	X	1	15 SEC.	- SEC.					X		X				X
2A,2B,2C	6X6	275	EXIST	X	2	- SEC.	1.6 SEC.					X		X				X
2D,2E,2F	6X6	65	EXIST	X	2	- SEC.	- SEC.					X		X				X
3A	6X40	0	2-4-2	X	3	- SEC.	- SEC.					X		X				X
4A	6X40	0	2-4-2	X	4	- SEC.	- SEC.					X		X				X
5A	6X40	0	2-4-2	X	5	- SEC.	- SEC.					X		X				X
5B	6X40	0	2-4-2	X	5	- SEC.	- SEC.					X		X				X
5C	6X40	0	2-4-2	X	5	15 SEC.	- SEC.					X		X				X
6A,6B,6C	6X6	300	EXIST	X	6	- SEC.	1.6 SEC.					X		X				X
6D,6E,6F	6X6	90	EXIST	X	6	- SEC.	- SEC.					X		X				X
7A	6X40	0	2-4-2	X	7	3 SEC.	- SEC.					X		X				X
7B	6X40	0	2-4-2	X	7	- SEC.	- SEC.					X		X				X
8A	6X40	0	2-4-2	X	8	- SEC.	- SEC.					X		X				X
S1	6X6	+200	EXIST	X	-	- SEC.	- SEC.									X		X
S2	6X6	+200	EXIST	X	-	- SEC.	- SEC.									X		X
S3	6X6	+200	EXIST	X	-	- SEC.	- SEC.									X		X
S4	6X6	+225	EXIST	X	-	- SEC.	- SEC.									X		X
S5	6X6	+225	EXIST	X	-	- SEC.	- SEC.									X		X
S6	6X6	+225	EXIST	X	-	- SEC.	- SEC.									X		X
S7	6X6	+200	EXIST	X	-	- SEC.	- SEC.									X		X
S8	6X6	+200	EXIST	X	-	- SEC.	- SEC.									X		X
PEDESTRIAN DETECTION																		
P21,P22	N/A	N/A	N/A	X	-	- SEC.	- SEC.		X									X
P41,P42	N/A	N/A	N/A	X	-	- SEC.	- SEC.		X									X
P61,P62	N/A	N/A	N/A	X	-	- SEC.	- SEC.		X									X

8 Phase
Fully Actuated
w/ Emergency Vehicle Preemption
(Durham Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
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. Program all timing information into phase banks 1, 2, and 3 unless otherwise noted.
8. Set phase bank 3 maximum limit to 250 seconds for phases used.
9. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
10. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
11. Pavement markings are existing unless otherwise shown.
12. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
13. Upon completion of Emergency Vehicle Preemption, controller returns to normal operation based on vehicle demand.
14. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
15. Install new 2070 controller with 2033 software.
16. Install luminaires on existing signal poles.



LEGEND

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

TIMING CHART
2033 SOFTWARE w/ 2070 CONTROLLER

PHASE	01	02	03	04	05	06	07	08
MINIMUM INITIAL*	7 SEC.	12 SEC.	7 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.	12 SEC.
VEHICLE EXTENSION*	2.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.
YELLOW CHANGE INT.	3.0 SEC.	4.3 SEC.	3.0 SEC.	4.2 SEC.	3.0 SEC.	4.6 SEC.	3.1 SEC.	4.2 SEC.
RED CLEARANCE	4.0 SEC.	1.8 SEC.	3.6 SEC.	2.9 SEC.	4.3 SEC.	2.5 SEC.	3.4 SEC.	2.9 SEC.
MAXIMUM LIMIT*	25 SEC.	65 SEC.	15 SEC.	30 SEC.	25 SEC.	65 SEC.	15 SEC.	65 SEC.
RECALL POSITION	NONE	VEH RECALL	NONE	NONE	NONE	VEH RECALL	NONE	VEH RECALL
VEHICLE CALL MEMORY	NONE	YELLOW LOCK	NONE	NONE	NONE	YELLOW LOCK	NONE	YELLOW LOCK
DOUBLE ENTRY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
WALK*	– SEC.	7 SEC.	– SEC.	7 SEC.	– SEC.	7 SEC.	– SEC.	– SEC.
FLASHING DON'T WALK	– SEC.	25 SEC.	– SEC.	36 SEC.	– SEC.	40 SEC.	– SEC.	– SEC.
MIN PED CLEAR TIME	– SEC.	13 SEC.	– SEC.	18 SEC.	– SEC.	20 SEC.	– SEC.	– SEC.
TYPE 3 LIMIT	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
ALTERNATE EXTENSION	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
ADD PER VEHICLE	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAXIMUM INITIAL*	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAXIMUM GAP*	2.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 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.	2.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 SEC.	2.0 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.

E.V. Preemption Timing Chart

EV PREEMPTOR	EVB
FUNCTION	SECONDS
DELAY BEFORE PREEMPT	0
PED. CLEAR BEFORE PREEMPT	*
MIN. GREEN BEFORE PREEMPT	1
CLEARANCE TIME	1.0
PREEMPT EXTEND**	2.0

* SEE MIN PED CLEAR IN TIMING CHART
** TIMING ON OPTICAL DETECTION UNIT

Signal Upgrade

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

US 15-501 (Durham-Chapel Hill Blvd) at SR 1116 (Garrett Road)

Division 5 Durham County Durham

PLAN DATE: July 2017 REVIEWED BY:
PREPARED BY: M. Shahidi 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 8/22/2017
430320FAA26542C... DATE

SIG. INVENTORY NO. 05-0384

12-JAN-2018 09:09
S:*ITS&SU*ITS Signals*Signal Design Section*Central Region*Div 5*W-5705C*05-0384*050384_sig_dsn_20170822.dgn
rwhough