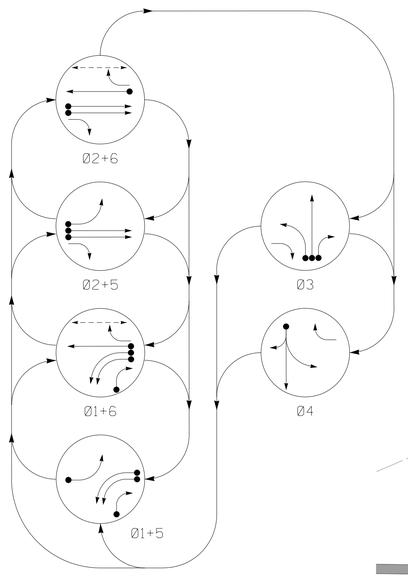
PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.2

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

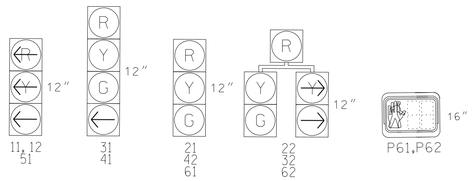


TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11, 12	←	←	←R	←R	←R	←R	←R
21	R	R	G	G	R	R	Y
22	R	R	G	G	R/←	R	Y
31	R	R	R	R	G/←	R	R
32	R/→	R/→	R	R	G	R	R
41	R	R	R	R	R	G/←	R
42	R	R	R	R	R	G	R
51	←	←R	←	←R	←R	←R	←R
61	R	G	R	G	R	R	Y
62	R	G	R	G	R	R/→	Y
P61, P62	DW	W	DW	W	DW	W	DRK

OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

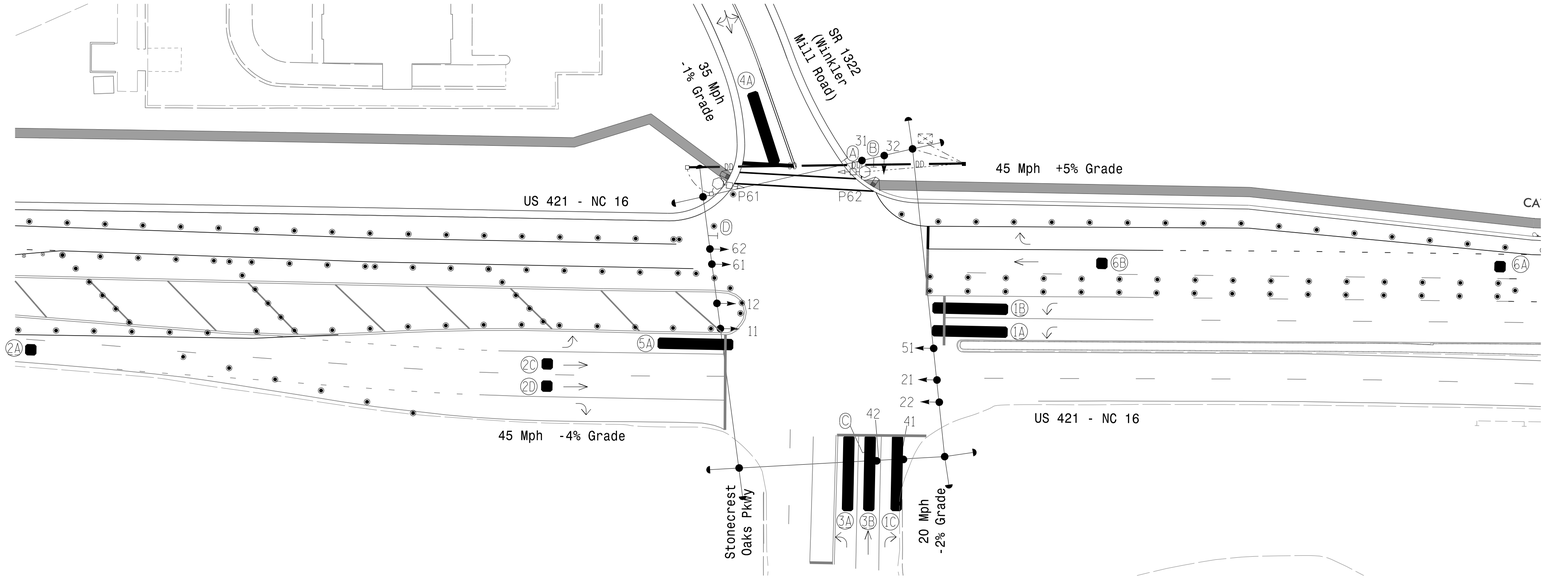
INDUCTIVE LOOPS					DETECTOR PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A, 1B	✳	+5	✳	✳	1	Y	Y	-	-	-	-	✳
1C	✳	0	✳	✳	1	Y	Y	-	-	15	-	✳
2A	✳	350	✳	✳	2	Y	Y	-	1.6	-	-	✳
2C, 2D	✳	90	✳	✳	2	Y	Y	-	-	-	-	✳
3A	✳	0	✳	✳	3	Y	Y	-	-	3	-	✳
3B	✳	0	✳	✳	3	Y	Y	-	-	-	-	✳
4A	✳	0	✳	✳	4	Y	Y	-	-	3	-	✳
5A	✳	+5	✳	✳	5	Y	Y	-	-	-	-	✳
6A	✳	300	✳	✳	6	Y	Y	-	1.6	-	-	✳
6B	✳	90	✳	✳	6	Y	Y	-	-	-	-	✳

✳Video Detection Zone

6 Phase Fully Actuated (Isolated)

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 operation unless otherwise directed by the Engineer.
3. Phase 1 and/or 5 may be lagged.
4. The order of phase 3 an 4 may be reversed.
5. Set all detector units to presence mode.
6. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
7. Omit "walk" and flashing "Don't Walk" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Refer to Pavement Marking Plans for proposed stop bar locations.
10. Reposition existing signal heads as shown on this plan.



LEGEND

PROPOSED		EXISTING
	Curb Ramp	
	Traffic Signal Head	
	Signal Pole with Sidewalk Guy	
	Pedestrian Signal Head	
	Type II Signal Pedestal	
	Video Detection Zone	N/A
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Construction Zone	N/A
	Wood Pole	
Ⓐ	Left Arrow "Only" Sign (R3-5L)	Ⓐ
Ⓑ	Combined Through and Left Arrow Sign (R3-6L)	Ⓑ
Ⓒ	Dual Turn and Through Arrow Sign (R3-19)	Ⓒ
Ⓓ	Right Arrow "Only" Sign (R3-5R)	Ⓓ

OASIS 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1	2.0	2.0	2.0	2.0	2.0	2.0
Max Green 1 *	25	60	15	15	25	60
Yellow Clearance	3.0	4.9	3.0	3.8	3.0	4.1
Red Clearance	3.4	1.5	3.5	2.4	3.3	1.6
Walk 1 *	-	-	-	-	-	7
Don't Walk 1	-	-	-	-	-	18
Seconds Per Actuation *	-	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade - Temporary Design 2 (Phase 11)

Prepared for the Offices of:
Traffic Engineering Branch, Signal Design Section
NC DEPARTMENT OF TRANSPORTATION

750 N.Greenfield Pkwy,Garner,NC 27529

US 421 - NC 16 at SR 1322 (Winkler Mill Road)/ Stonecrest Oaks Pkwy

Divsion 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRILATHA R CHILUKA

Developed by SRChiluka 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1044T2

2/14/2012 6:30:44 AM
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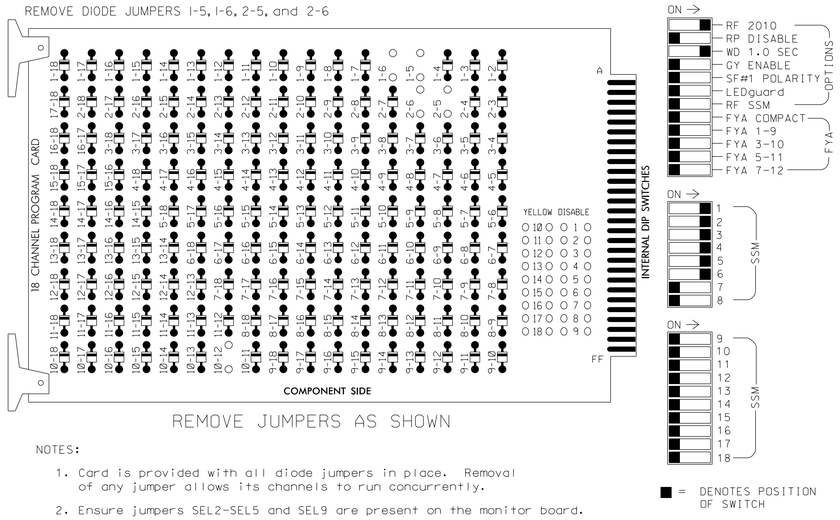
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.3

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Startup In Green.
4. Program phase 6 for Startup Ped Call.
5. Program phase 2 and 6 for Yellow Flash.
6. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332 W/ AUX
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6
PHASES USED.....1,2,3,4,5,6,6PED
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S2P	S3			S4			S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1		2	2 PED	3			4			4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11,12	32	21,22	NU	22	31	32	41	42	62	NU	51	61,62	P61, P62	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED			128			116	116	101	101				134										
YELLOW			129			117	117	102	102				135										
GREEN			130			118	118	103	103				136										
RED ARROW	125											131											
YELLOW ARROW	126	126			117					102		132											
GREEN ARROW	127	127			118	118		103		103		133											
✋														119									
🚶														121									

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	1O	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	∅6 PED DC ISOLATOR	FS DC ISOLATOR
	L													NOT USED	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
PED PUSH BUTTONS													
P61,P62	TB8-7,9	I13U	68	34	6	PED 6							

NOTE:
INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.

INPUT FILE POSITION LEGEND: J2L

- FILE J
- SLOT 2
- LOWER

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 DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1044T2
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Temporary Installation - Electrical Detail 1 of 1 (Phase 11)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

US 421 - NC 16
at
SR 1322 (Winkler Mill Road) / Stonecrest Oaks Pkwy

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L.Stygles
PREPARED BY:	S.R.Chiluka	REVIEWED BY:	J.Ma

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by: 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1044T2

5/23/2019 3:15:01 PM
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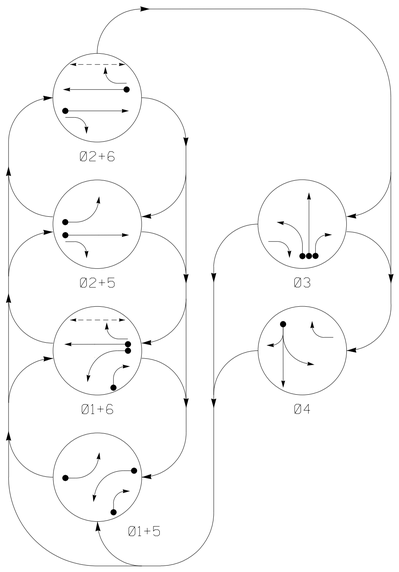
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.4

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

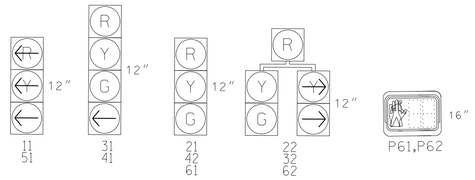


TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø3	Ø4	FLASH
11	←	←	←R	←R	←R	←R	←R
21	R	R	G	G	R	R	Y
22	R	R	G	G	R/←	R	Y
31	R	R	R	R	G	R	R
32	R/→	R/→	R	R	G	R	R
41	R	R	R	R	R	G	R
42	R	R	R	R	R	G	R
51	←	←R	←	←R	←R	←R	←R
61	R	G	R	G	R	R	Y
62	R	G	R	G	R	R/→	Y
P61,P62	DW	W	DW	W	DW	W	DRK

OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

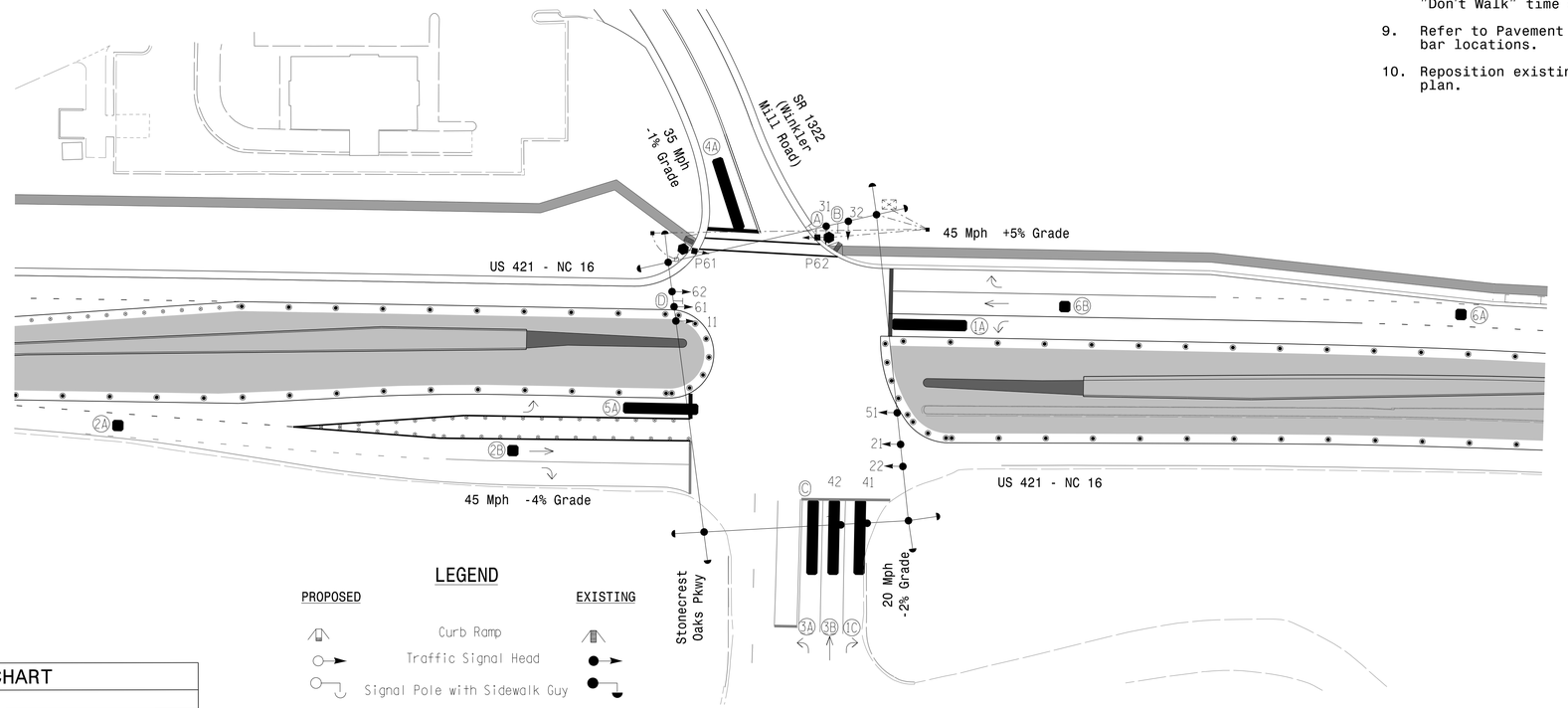
INDUCTIVE LOOPS					DETECTOR PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	✳	+5	✳	✳	1	Y	Y	-	-	-	-	✳
1C	✳	0	✳	✳	1	Y	Y	-	-	15	-	✳
2A	✳	300	✳	✳	2	Y	Y	-	1.6	-	-	✳
2B	✳	90	✳	✳	2	Y	Y	-	-	-	-	✳
3A	✳	0	✳	✳	3	Y	Y	-	-	3	-	✳
3B	✳	0	✳	✳	3	Y	Y	-	-	-	-	✳
4A	✳	0	✳	✳	4	Y	Y	-	-	3	-	✳
5A	✳	+5	✳	✳	5	Y	Y	-	-	-	-	✳
6A	✳	300	✳	✳	6	Y	Y	-	1.6	-	-	✳
6B	✳	90	✳	✳	6	Y	Y	-	-	-	-	✳

✳ Video Detection Zone

6 Phase Fully Actuated (Isolated)

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 operation unless otherwise directed by the Engineer.
3. Phase 1 and/or 5 may be lagged.
4. The order of phase 3 an 4 may be reversed.
5. Set all detector units to presence mode.
6. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
7. Omit "walk" and flashing "Don't Walk" with no pedestrian calls.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Refer to Pavement Marking Plans for proposed stop bar locations.
10. Reposition existing signal heads as shown on this plan.



LEGEND

PROPOSED		EXISTING
	Curb Ramp	
	Traffic Signal Head	
	Signal Pole with Sidewalk Guy	
	Video Detection Zone	N/A
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Construction Zone	N/A
	Wood Pole	
Ⓐ	Left Arrow "Only" Sign (R3-5L)	Ⓐ
Ⓑ	Combined Through and Left Arrow Sign (R3-6L)	Ⓑ
Ⓒ	Dual Turn and Through Arrow Sign (R3-19)	Ⓒ
Ⓓ	Right Arrow "Only" Sign (R3-5R)	Ⓓ
	Drum	N/A
	Skinny Drum	N/A

OASIS 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6
Min Green 1 *	7	12	7	7	7	12
Extension 1	2.0	2.0	2.0	2.0	2.0	2.0
Max Green 1 *	25	60	15	15	25	60
Yellow Clearance	3.0	4.9	3.0	3.8	3.0	4.1
Red Clearance	3.5	1.5	3.5	2.6	3.3	1.5
Walk 1 *	-	-	-	-	-	7
Don't Walk 1	-	-	-	-	-	18
Seconds Per Actuation *	-	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-	-
Time To Reduce *	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW
Dual Entry	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON

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

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade - Temporary Design 3 (Phase 12)

Prepared for 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 421 - NC 16 at SR 1322 (Winkler Mill Road)

Divsion 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

REVISIONS	INIT.	DATE

SCALE 1"=40' (0 — 40)

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 047250 SRINATHA R CHILUKA

Developed by: SRChiluka 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. II-1044T3

2/14/2012 6:30:44 AM
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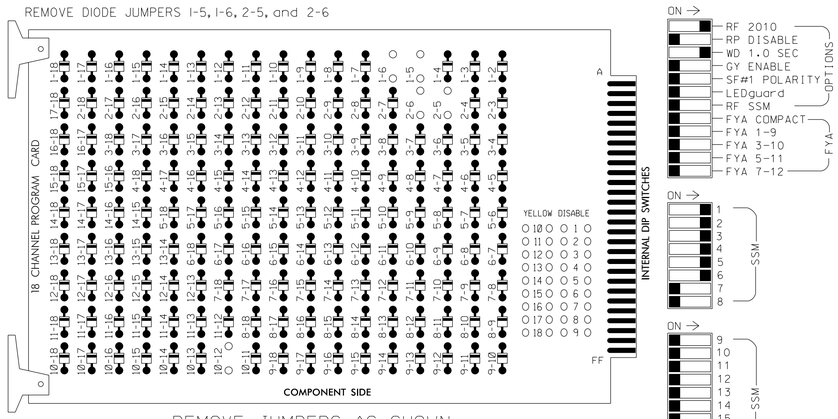
schiluka

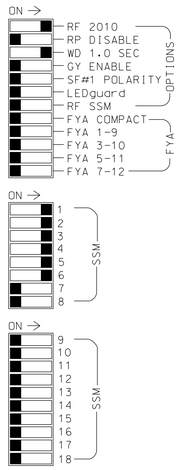
PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.5

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS I-5, I-6, 2-5, and 2-6





REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Startup In Green.
4. Program phase 6 for Startup Ped Call.
5. Program phase 2 and 6 for Yellow Flash.
6. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332 W/ AUX
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6
PHASES USED.....1,2,3,4,5,6,6PED
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S2P	S3			S4			S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1		2	2 PED	3			4			4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11,12	32	21,22	NU	22	31	32	41	42	62	NU	51	61,62	P61, P62	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED			128			116	116	101	101				134										
YELLOW			129			117	117	102	102				135										
GREEN			130			118	118	103	103				136										
RED ARROW	125											131											
YELLOW ARROW	126	126			117					102		132											
GREEN ARROW	127	127			118	118		103		103		133											
✋														119									
🚶														121									

NU = Not Used

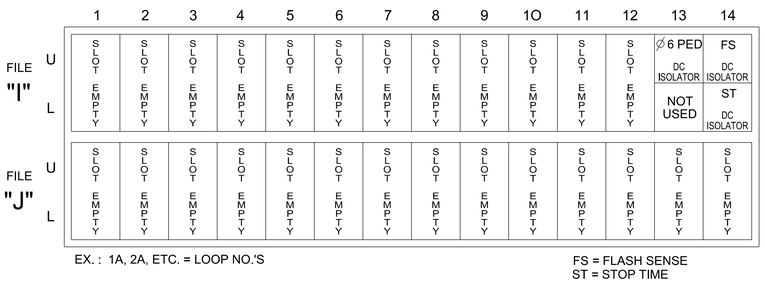
✳ Denotes install load resistor. See load resistor installation detail this sheet.

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.

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
PED PUSH BUTTONS													
P61,P62	TB8-7,9	I13U	68	34	6	PED 6							

NOTE:
INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.

INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1044T3
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

Temporary Installation - Electrical Detail 1 of 1
(Phase 12)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

US 421 - NC 16
at
SR 1322 (Winkler Mill Road) / Stonecrest Oaks Pkwy

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L.Stygles
PREPARED BY:	S.R.Chiluka	REVIEWED BY:	J.Ma

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by:
5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1044T3

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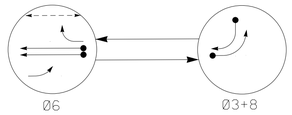
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.6

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

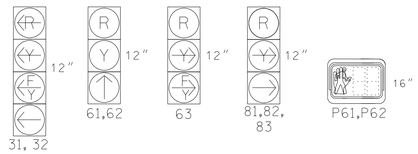


TABLE OF OPERATION

SIGNAL FACE	PHASE Ø6	PHASE Ø3+8	FLASH
31, 32	F Y	←	←
61,62	↑	R	Y
63	F Y →	R	→
81,82,83	R	→	R
P61,P62	W	DW	DRK

MAXTIME DETECTOR INSTALLATION CHART

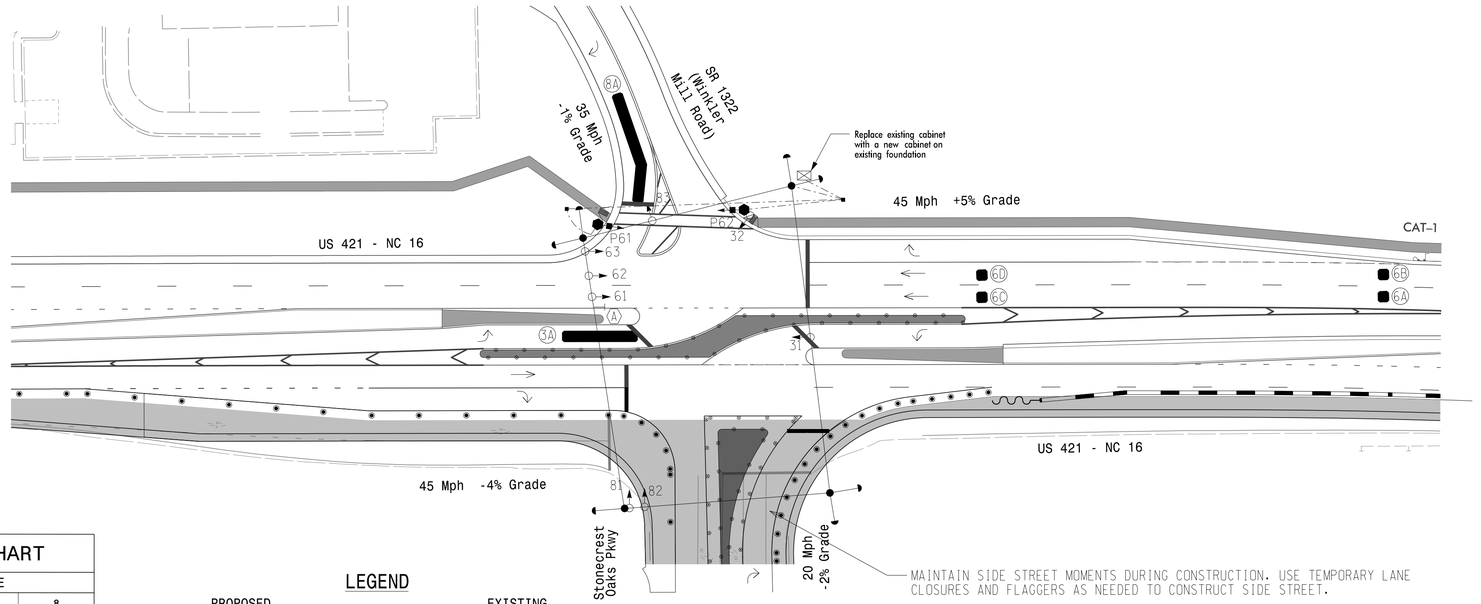
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
3A	✳	0	✳	✳	3	15.0	-	X	-	X	-	✳
6A,6B	✳	300	✳	✳	6	-	1.6	X	-	X	-	✳
6C,6D	✳	90	✳	✳	6	-	-	X	-	X	-	✳
8A	✳	0	✳	✳	8	15.0	-	X	-	X	-	✳

✳Video Detection Zone

2 Phase Fully Actuated (Isolated)

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 operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
6. Omit "walk" and flashing "Don't Walk" with no pedestrian calls.
7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
8. To provide a leading pedestrian interval on phase 2, program FYA heads 31, 32 and 63 to delay for 3 seconds after the start of the phase 6 walk interval. See electrical details.
9. Refer to Pavement Marking Plans for proposed stop bar locations.



MAXTIME TIMING CHART

FEATURE	PHASE 3	PHASE 6	PHASE 8
Walk *	–	7	–
Ped Clear *	–	16	–
Min Green	7	12	7
Passage *	2.0	2.0	2.0
Max 1 *	30	60	30
Yellow Change	3.0	4.9	2.1
Red Clear	2.3	1.6	1.0
Added Initial *	–	X	–
Maximum Initial *	–	X	–
Time Before Reduction *	–	X	–
Time To Reduce *	–	X	–
Minimum Gap	–	X	–
Advance Walk	–	**	–
Non Lock Detector	X	–	X
Vehicle Recall	–	MIN RECALL	–
Dual Entry	X	–	X

* 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.

* * See note 8

LEGEND

PROPOSED		EXISTING
	Curb Ramp	
	Traffic Signal Head	
	Signal Pole with Sidewalk Guy	
	Pedestrian Signal Head	
	Type II Signal Pedestal	
	Video Detection Zone	N/A
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Construction Zone	N/A
	Wood Pole	
	No Left Turn Sign (R3-2)	
	Drum	N/A
	Skinny Drum	N/A

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Signal Upgrade - Temporary Design 4 (Phase 13)

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

US 421 - NC 16 at SR 1322 (Winkler Mill Road)

Division 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M.L. Stygles

PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

SCALE: 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRIVATHA R CHILUKA

Developed by SRChiluka 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-10447

11/17/2011 9:38:53 AM
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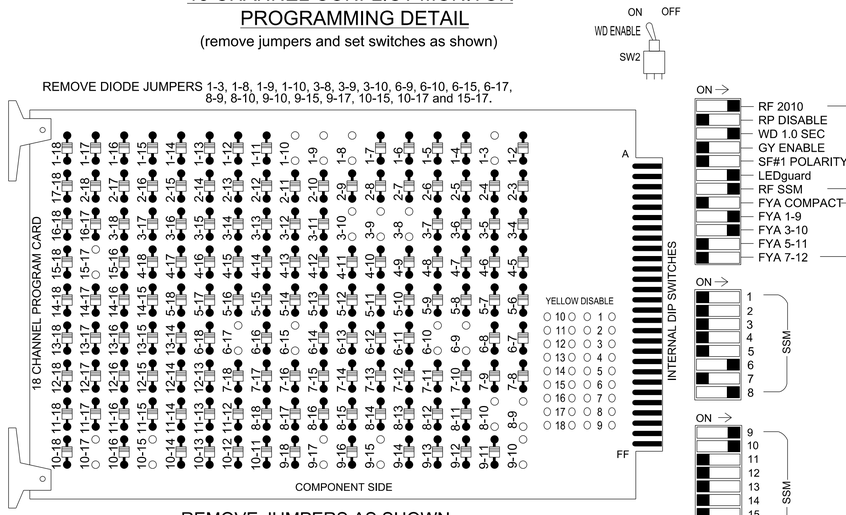
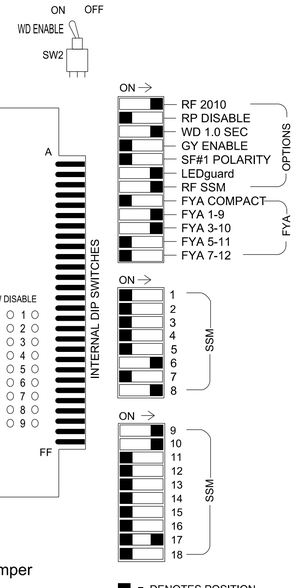
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.7

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)





REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S1,S4,S8,S9,S11,AUX S1,AUX S2,AUX S3
Phases Used.....3,6,6 PED,8
Overlap "1".....*
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....NOT USED
Overlap "5".....*
Overlap "7".....*

*See overlap programming detail on sheet 2.

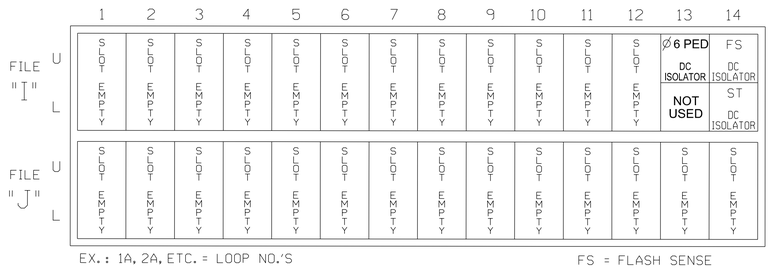
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	OL7	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	SPARE
SIGNAL HEAD NO.	32★	NU	NU	31★	NU	NU	NU	61,62	P61, P62	NU	81,82	NU	32★	31★	63★	NU	NU	NU
RED	.	.	.	.	.	.	.	134	.	.	107	.	.	.	A111	.	.	.
YELLOW	*	.	.	*	.	.	.	135	.	.	.	.	.	.	.	.	.	.
GREEN	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
RED ARROW	.	.	.	.	.	.	.	.	.	.	.	.	A121	A124	.	.	.	.
YELLOW ARROW	.	.	.	.	.	.	.	.	.	.	108	.	A122	A125	A112	.	.	.
FLASHING YELLOW ARROW	.	.	.	.	.	.	.	.	.	.	.	.	A123	A126	A113	.	.	.
GREEN ARROW	127	.	.	118	.	.	.	136	.	.	109	.	.	.	.	.	.	.
✋									119									
🚶									121									

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
PED PUSH BUTTONS							NOTE: INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.						
P61,P62	TB8-7,9	I13U	68	34	6	PED 6							

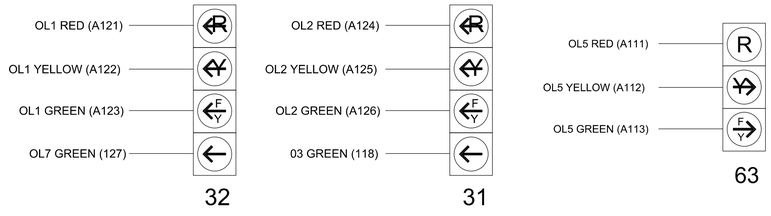
INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTE

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

FYA SIGNAL WIRING DETAIL

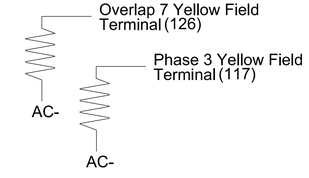
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1044T4
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Temporary Installation - Electrical Detail 1 of 2 (Phase 13)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
NC Department of Transportation Mobility and Safety Division Traffic Engineering Branch Signals & Signals Management Section

750 N.Greenfield Pkwy.Garner,NC 27529

US 421
at
SR 1322 (Winkler Mill Road)

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	J. Ma
PREPARED BY:	M.L. Stygles	REVIEWED BY:	S.R. Chiluka

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by: Matt Stygles 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1044T4

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schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.8

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

Front Panel
Main Menu >Controller >Overlap >Overlap Parameters/Overlap Timings

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	5	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	6	6	6	3
Modifier Phases	3	3	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0
FYA Ped Delay	3.0	3.0	3.0	0.0

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

ASSIGN CHANNEL 1 TO OVERLAP 7 →

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Overlap	7	-	X	X	1
2	Phase Vehicle	2	X	-	-	2
3	Phase Vehicle	3	-	X	X	3
4	Phase Vehicle	4	-	X	-	4
5	Phase Vehicle	5	-	X	-	5
6	Phase Vehicle	6	X	-	X	6
7	Phase Vehicle	7	-	X	-	7
8	Phase Vehicle	8	-	X	X	8
9	Overlap	1	X	-	X	9
10	Overlap	2	X	-	X	10
11	Overlap	3	X	-	-	11
12	Overlap	4	-	X	-	12
13	Phase Ped	2	-	-	-	13
14	Phase Ped	4	-	-	-	14
15	Phase Ped	6	-	-	-	15
16	Phase Ped	8	-	-	-	16
17	Overlap	5	X	-	X	17
18	Overlap	6	-	X	-	18

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1044T4
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Temporary Installation - Electrical Detail 2 of 2 (Phase 13)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
Traffic Engineering Branch, Mobility and Safety Division
Traffic Engineering & Signals Management Section
NC DEPARTMENT OF TRANSPORTATION

750 N.Greenfield Pkwy,Garner,NC 27529

US 421
at
SR 1322 (Winkler Mill Road)

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	J. Ma
PREPARED BY:	M.L. Stygles	REVIEWED BY:	S.R. Chiluka

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by:
[signature]
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SIGNATURE 5/24/2023 DATE

SIG. INVENTORY NO. 11-1044T4

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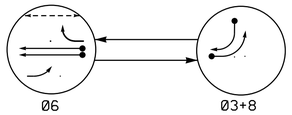
schiluka

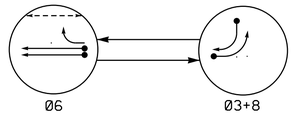
PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.9

2 Phase
Fully Actuated
W/ Alternate Phasing Operation
Wilkesboro Closed Loop System

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION			
SIGNAL FACE	PHASE Ø6	PHASE Ø3+8	PHASE FLASH
31,32	FYA	←	↛
61,62	↑	R	Y
63	FYA	R	↛
81,82,83	R	→	R
P61,P62	W	DW	DRK

ALTERNATE PHASING TABLE OF OPERATION			
SIGNAL FACE	PHASE Ø6	PHASE Ø3+8	PHASE FLASH
31,32	↛R	←	↛
61,62	↑	R	Y
63	FYA	R	↛
81,82,83	R	→	R
P61,P62	W	DW	DRK

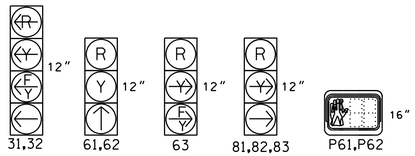
MAXTIME DETECTOR INSTALLATION CHART

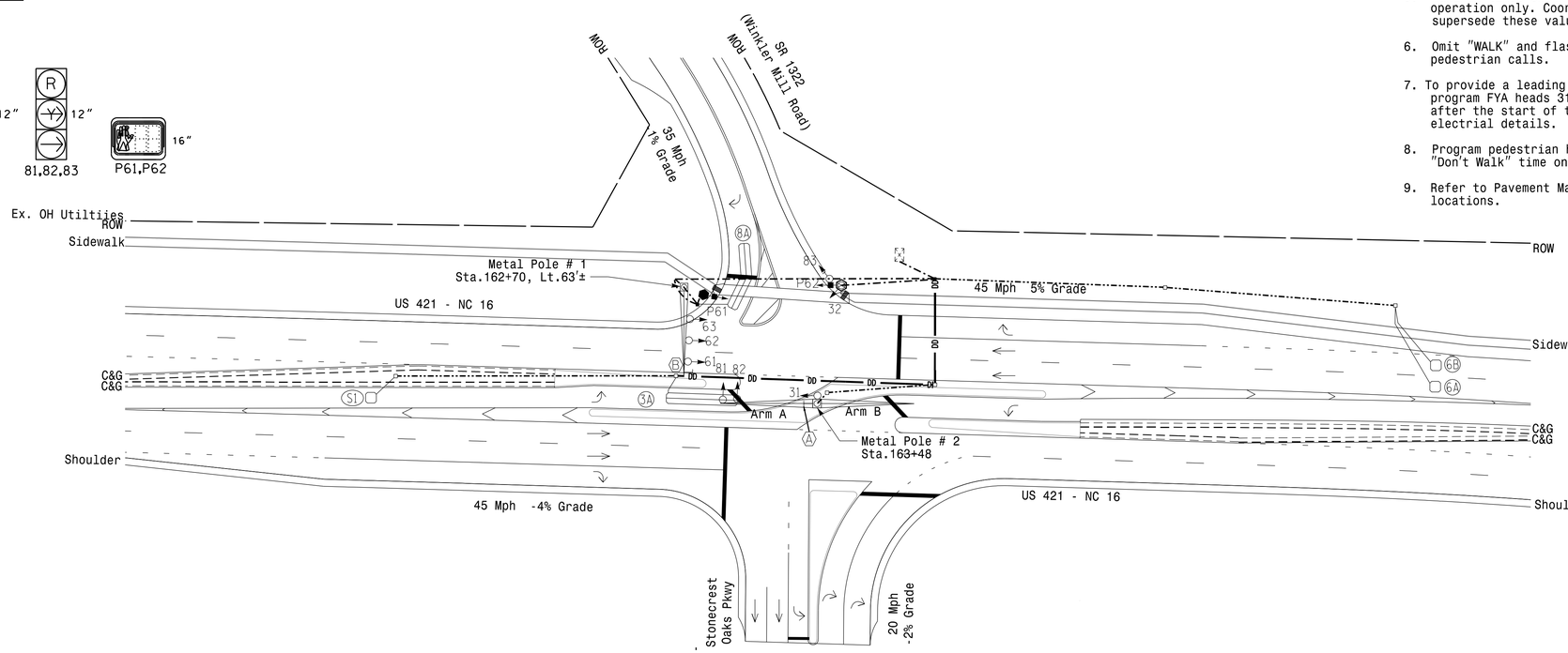
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
3A	6X40	0	2-4-2	X	3	15.0*	-	X	-	X	-	X
6A	6X6	300	4	X	6	-	-	X	X	X	-	X
6B	6X6	300	4	X	6	-	-	X	X	X	-	X
8A	6X40	0	2-4-2	X	8	15.0	-	X	-	X	-	X
S1	6X6	200	5	X	-	-	-	-	-	-	-	X

* Disable delay during alternate phasing operation

SIGNAL FACE I.D.

All Heads L.E.D.





MAXTIME TIMING CHART

FEATURE	PHASE 3	PHASE 6	PHASE 8
Walk *	–	7	–
Ped Clear *	–	16	–
Min Green	7	12	7
Passage *	2.0	6.0	2.0
Max 1 *	30	60	30
Yellow Change	3.0	4.1	3.0
Red Clear	2.3	1.6	2.1
Added Initial *	–	1.5	–
Maximum Initial *	–	34	–
Time Before Reduction *	–	15	–
Time To Reduce *	–	30	–
Minimum Gap	–	3.4	–
Advance Walk	–	**	–
Non Lock Detector	X	–	X
Vehicle Recall	–	MIN RECALL	–
Dual Entry	X	–	X

* 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.

** See Note 7

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
⊣	Sign	⊣
▭	Metal Pole with Mastarm	▭
⬡	Type II Signal Pedestal	⬢
⊗	Type III Signal Pedestal	⧓
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
-·-·-	2-in Underground Conduit	-·-·-
DD	Directional Drill	N/A
- - -	Right of Way	- - -
→	Directional Arrow	→
Ⓐ	No U Turn Sign (R3-4)	N/A
Ⓑ	No Left Turn Sign (R3-2)	N/A
	Curb Ramp	

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. Set all detector units to presence mode.
4. The Division (Town) Traffic Engineer will determine the hours of use for each phasing plan.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
7. To provide a leading pedestrian interval on phase 6, program FYA heads 31, 32 and 63 to delay for 3 seconds after the start of the phase 6 walk interval. See electrial details.
8. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
9. Refer to Pavement Marking Plans for proposed stop bar locations.

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919.829.0328

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Signal Upgrade - Final Design

Prepared for 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 421 - NC 16
at
SR 1322 (Winkler Mill Road)

Divsion 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE 0 40

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRIVATHA R CHILUKA

Designed by SRChiluka 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. II-1044

5/4/2023 2:09:05 AM
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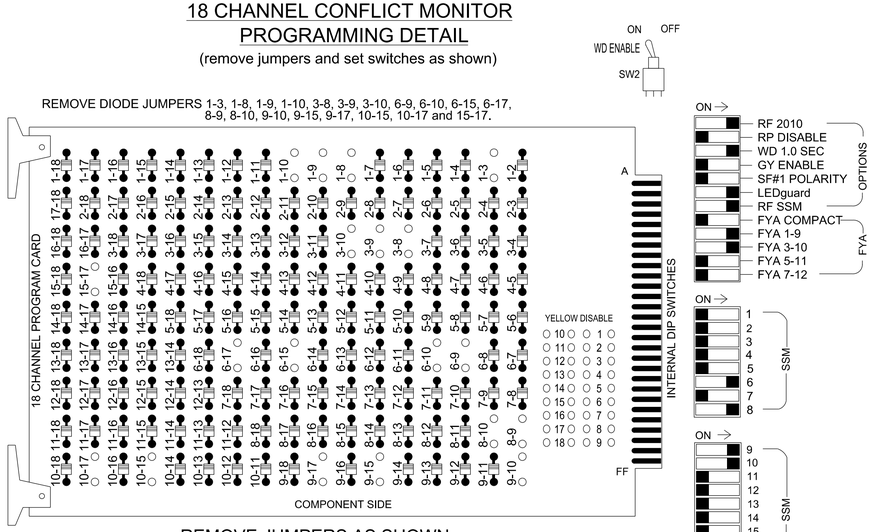
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.10

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 3 and 8 for Dual Entry.
3. Program controller to start up in phase 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the Wilkesboro Closed Loop System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S1, S4, S8, S9, S11, AUX S1, AUX S2, AUX S3
Phases Used.....3, 6, 6 PED, 8
Overlap "1".....*
Overlap "2".....*
Overlap "3".....*
Overlap "4".....NOT USED
Overlap "7".....*

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	OL7	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	OL5	OL3	OL4	SPARE
SIGNAL HEAD NO.	32★	NU	NU	31★	NU	NU	NU	61,62	P61, P62	NU	81,82	NU	32★	31★	63★	NU	NU	NU
RED	·	·	·	·	·	·	·	134	·	·	107	·	·	·	A111	·	·	·
YELLOW	*	·	·	*	·	·	·	135	·	·	·	·	·	·	·	·	·	·
GREEN	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
RED ARROW	·	·	·	·	·	·	·	·	·	·	·	·	A121	A124	·	·	·	·
YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	108	·	A122	A125	A112	·	·	·
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	A123	A126	A113	·	·	·
GREEN ARROW	127	·	·	118	·	·	·	136	·	·	109	·	·	·	·	·	·	·
✋	·	·	·	·	·	·	·	·	119	·	·	·	·	·	·	·	·	·
🚶	·	·	·	·	·	·	·	·	121	·	·	·	·	·	·	·	·	·

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	∅3 3A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	∅6 PED DC ISOLATOR	FS DC ISOLATOR
	L					NOT USED								NOT USED	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	∅6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	∅8 8A	SLOT EMPTY	SLOT EMPTY	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		∅6 6B				NOT USED			NOT USED					

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
3A	TB4-5,6	I5U	58	20	7	3	15		X			X	
6A	TB3-5,6	J2U	40	2	16	6			X	X		X	
6B	TB3-7,8	J2L	44	6	17	6			X	X		X	
8A	TB5-9,10	J6U	42	4	22	8	15		X			X	
*S1	TB7-9,10	J9U	59	21	27	SYS			X			X	
PED PUSH BUTTONS													
P61,P62	TB8-7,9	I13U	68	34	6	PED 6							

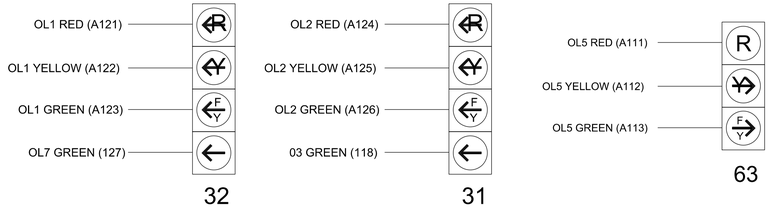
NOTE:
INSTALL DC ISOLATOR IN INPUT FILE SLOT I13.

*System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

FYA SIGNAL WIRING DETAIL

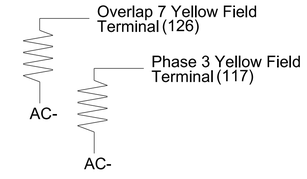
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1044
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

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919.829.0328

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Electrical Detail - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
NC Department of Transportation Mobility and Safety Division Traffic Engineering Branch Signals Section

750 N.Greenfield Pkwy,Garner,NC 27529

US 421
at
SR 1322 (Winkler Mill Road)

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	J. Ma
PREPARED BY:	M.L. Stygles	REVIEWED BY:	S.R. Chiluka

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by: Matthew L. Stygles 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1044

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schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.11

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2.
A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for heads 31 and 32 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 3 call on loop 3A to 0 seconds.

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

* The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 3A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

	Detector	Call Phase	Delay
3A	7	3	-

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

Front Panel
Main Menu >Controller >Overlap >Overlap Parameters/Overlap Timings

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	1	2	5	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	6	6	6	3
Modifier Phases	3	3	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0
FYA Ped Delay	3.0	3.0	3.0	0.0

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

Front Panel
Main Menu >Controller >Overlap >Overlap Parameters/Overlap Timings

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	1	2	5	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	-	-	6	3
Modifier Phases	3	3	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0
FYA Ped Delay	3.0	3.0	3.0	0.0

← NOTICE INCLUDED PHASE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1044
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

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Electrical Detail - Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ITS & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

US 421
at
SR 1322 (Winkler Mill Road)

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	J. Ma
PREPARED BY:	M.L. Stygles	REVIEWED BY:	S.R. Chiluka

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by: 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1044

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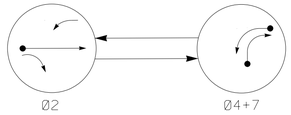
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.12

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

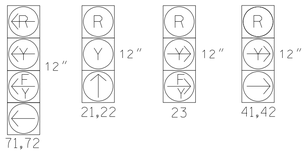


TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2	PHASE Ø4+7	FLASH
21,22	↑	R	Y
23	↓	R	Y
41,42	R	→	R
71	↓	←	Y

MAXTIME DETECTOR INSTALLATION CHART

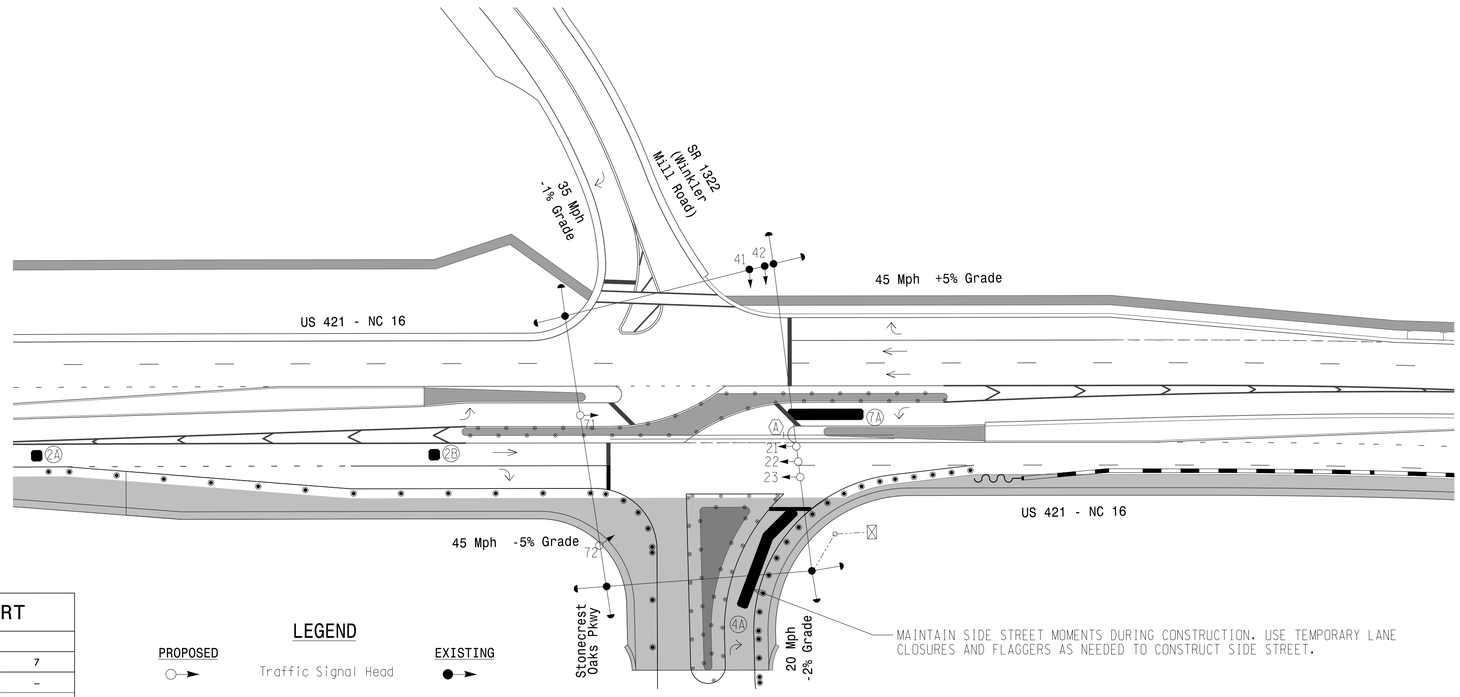
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	✳	300	✳	✳	2	-	1.6	X	-	X	-	✳
2B	✳	90	✳	✳	2	-	-	X	-	X	-	✳
4A	✳	0	✳	✳	4	15.0	-	X	-	X	-	✳
7A	✳	0	✳	✳	7	15.0	-	X	-	X	-	✳

✳Video Detection Zone

2 Phase
Fully Actuated
(Isolated)

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 operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Refer to Pavement Marking Plans for proposed stop bar locations.



MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 7
Walk *	–	–	–
Ped Clear *	–	–	–
Min Green	12	7	7
Passage *	2.0	2.0	2.0
Max 1 *	60	30	30
Yellow Change	4.9	3.0	3.0
Red Clear	1.7	1.8	2.4
Added Initial *	–	–	–
Maximum Initial *	–	–	–
Time Before Reduction *	–	–	–
Time To Reduce *	–	–	–
Minimum Gap	–	–	–
Advance Walk	–	–	–
Non Lock Detector	–	X	X
Vehicle Recall	MIN RECALL	–	–
Dual Entry	–	X	X

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

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
○	Signal Pole with Sidewalk Guy	●
▯	Pedestrian Signal Head	▪
⬡	Type II Signal Pedestal	⬢
▬	Video Detection Zone	N/A
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊡
□	Junction Box	■
·-·-·	2-in Underground Conduit	·-·-·
N/A	Right of Way	———
→	Directional Arrow	→
▩	Construction Zone	N/A
○	Wood Pole	●
Ⓐ	No Left Turn Sign (R3-2)	N/A
●	Drum	N/A
⊙	Skinny Drum	N/A

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New Installation - Temporary Design 1(Phase 13)

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

US 421 - NC 16
at
Stonecrest Oaks Pkwy

Divsion 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M.L. Stygles
PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 047250 SRILATHA R CHILUKA

Documents not considered final unless sealed and signed
SRChiluka 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. II-1465TI

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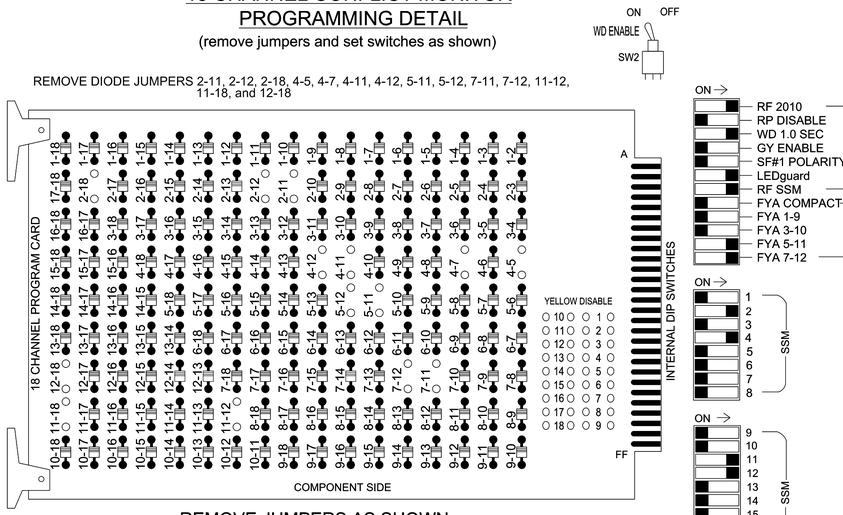
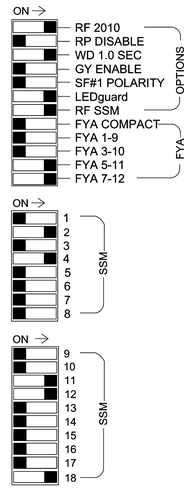
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.13

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)





■ = DENOTES POSITION OF SWITCH

REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 4 and 7 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S2,S5,S7,S10,AUX S4,AUX S5,AUX S6
Phases Used.....2, 4, 7
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....*
Overlap "4".....*
Overlap "6".....*
Overlap "7".....*

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	OL7	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	OL6
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	72 ★	NU	NU	71 ★	NU	NU	NU	NU	NU	72 ★	71 ★	23 ★
RED	·	128	·	·	101	·	·	·	·	·	·	·	·	·	·	·	·	A104
YELLOW	·	129	·	·	·	·	*	·	·	*	·	·	·	·	·	·	·	·
GREEN	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
RED ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	A114	A101	·
YELLOW ARROW	·	·	·	·	102	·	·	·	·	·	·	·	·	·	·	A115	A102	A105
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	A116	A103	A106
GREEN ARROW	·	130	·	·	103	·	133	·	·	124	·	·	·	·	·	·	·	·

NU = Not Used
★ Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

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

FS = FLASH SENSE
ST = STOP TIME

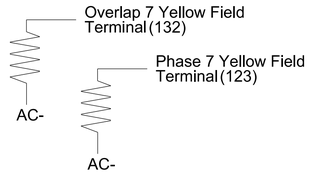
SPECIAL DETECTOR NOTE

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

LOAD RESISTOR INSTALLATION DETAIL

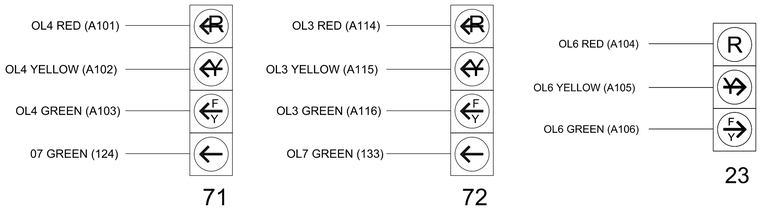
(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1465
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

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VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

Temporary Installation - Electrical Detail 1 of 2
(Phase 13)

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
NC Department of Transportation Mobility and Safety Division Traffic Engineering Branch Traffic Signal & Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

US 421 at Stonecrest Oaks Pkwy

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	J. Ma
PREPARED BY:	M.L. Stygles	REVIEWED BY:	S.R. Chiluka

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

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schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.14

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

ASSIGN CHANNEL 5 TO OVERLAP 7 →

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Phase Vehicle	1		X	X	1
2	Phase Vehicle	2	X			2
3	Phase Vehicle	3		X	X	3
4	Phase Vehicle	4		X		4
5	Overlap	7		X		5
6	Phase Vehicle	6	X		X	6
7	Phase Vehicle	7		X		7
8	Phase Vehicle	8		X	X	8
9	Overlap	1	X		X	9
10	Overlap	2		X	X	10
11	Overlap	3	X			11
12	Overlap	4	X			12
13	Phase Ped	2				13
14	Phase Ped	4				14
15	Phase Ped	6				15
16	Phase Ped	8				16
17	Overlap	5		X	X	17
18	Overlap	6	X			18

MAXTIME OVERLAP PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Overlap >Overlap Parameters/Overlap Timings

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	3	4	6	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	2	2	2	7
Modifier Phases	7	7	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1465
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

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Temporary Installation - Electrical Detail 2 of 2
(Phase 13)

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

750 N.Greenfield Pkwy,Garner,NC 27529

US 421
at
Stonecrest Oaks Pkwy

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	J. Ma
PREPARED BY:	M.L. Stygles	REVIEWED BY:	S.R. Chiluka

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

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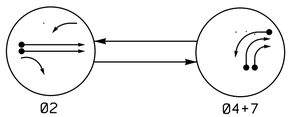
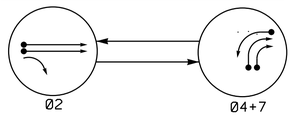
PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.15

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

DEFAULT PHASING TABLE OF OPERATION			
SIGNAL FACE	PHASE 02	PHASE 04+7	FLASH
21,22	↑	R	Y
23	~~F Y~~	R	~~Y~~
41,42	R	—	R
71,72	~~F Y~~	←	~~Y~~

ALTERNATE PHASING TABLE OF OPERATION			
SIGNAL FACE	PHASE 02	PHASE 04+7	FLASH
21,22	↑	R	Y
23	~~F Y~~	R	~~Y~~
41,42	R	—	R
71,72	~~R~~	←	~~Y~~

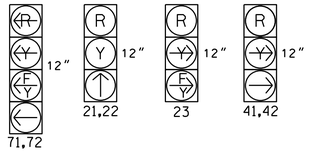
MAXTIME DETECTOR INSTALLATION CHART

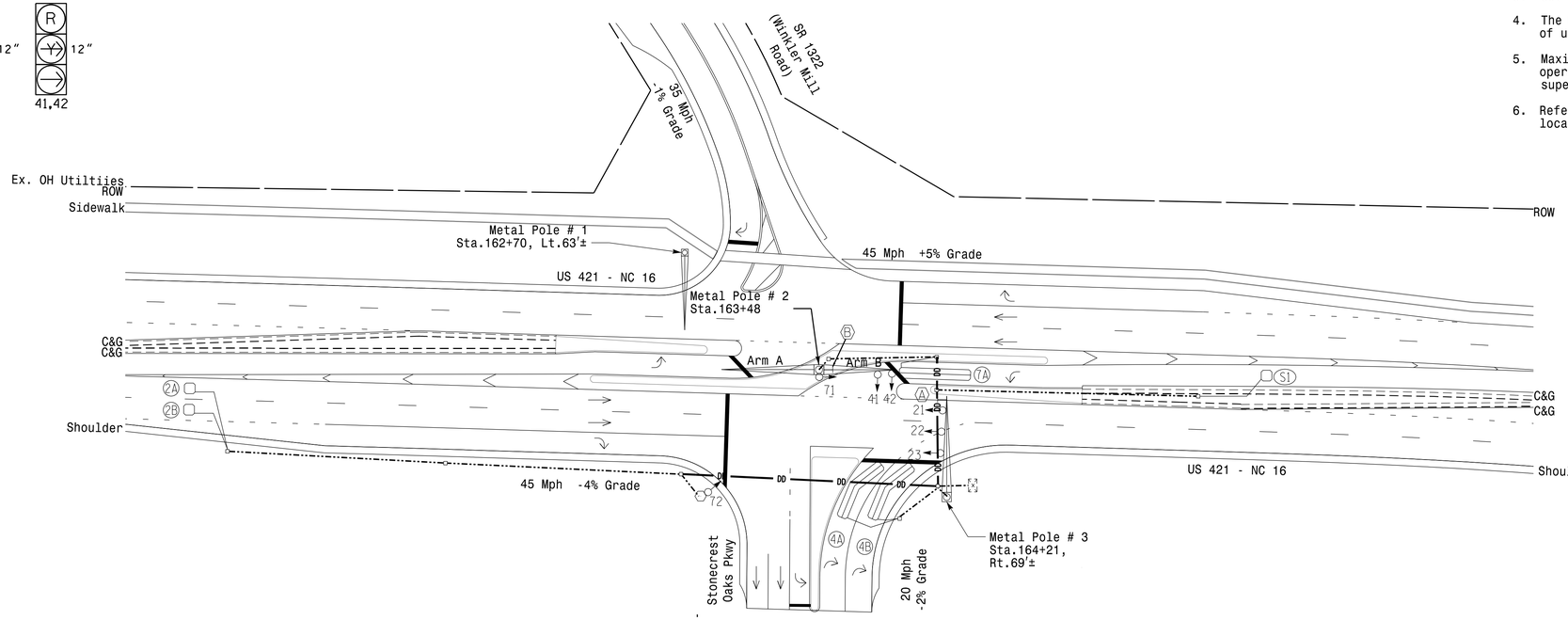
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
2A	6X6	300	5	X	2		-	X	X	X	-	X
2B	6X6	300	5	X	2		-	X	X	X	-	X
4A	6X40	0	2-4-2	X	4	15.0	-	X	-	X	-	X
4B	6X40	0	2-4-2	X	4	15.0	-	X	-	X	-	X
7A	6X40	0	2-4-2	X	7	15.0*	-	X	-	X	-	X
S1	6X6	200	3	X	-	-	-	-	-	-	-	X

* Disable delay during alternate phasing operation

SIGNAL FACE I.D.

All Heads L.E.D.





MAXTIME TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 7
Walk *	–	–	–
Ped Clear *	–	–	–
Min Green	12	7	7
Passage *	6.0	2.0	2.0
Max 1 *	60	30	30
Yellow Change	4.9	3.0	3.0
Red Clear	1.9	1.9	2.6
Added Initial *	1.5	–	–
Maximum Initial *	34	–	–
Time Before Reduction *	15	–	–
Time To Reduce *	30	–	–
Minimum Gap	3.4	–	–
Advance Walk	–	–	–
Non Lock Detector	–	X	X
Vehicle Recall	MIN RECALL	–	–
Dual Entry	–	X	X

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

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
⊣	Sign	⊣
	Metal Pole with Mastarm	
	Inductive Loop Detector	
⊠	Controller & Cabinet	⊠
□	Junction Box	■
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Right of Way	
→	Directional Arrow	→
Ⓐ	No Left Turn Sign (R3-2)	N/A
Ⓑ	No U-Turn Sign (R3-4)	N/A

2 Phase
Fully Actuated
W/ Alternate Phasing Operation
Wilkesboro Closed Loop 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. Set all detector units to presence mode.
4. The Division Traffic Engineer will determine the hours of use for each phasing plan.
5. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
6. Refer to Pavement Marking Plans for proposed stop bar locations.

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Signal Upgrade - Final Design

Prepared for 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 421 - NC 16
at
Stonecrest Oaks Pkwy

Divsion 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M. Stygles

PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

SCALE 0 40

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRILATHA R CHILUKA

Developed by VHB Engineering NC, P.C.

SRChiluka 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1465

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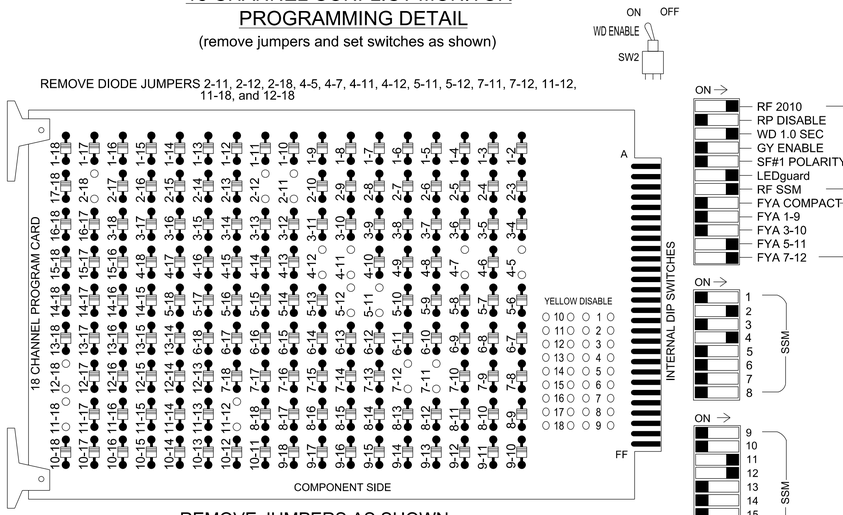
PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.16

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 4 and 7 for Dual Entry.
3. Program controller to start up in phase 2 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the Wilkesboro Closed Loop System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S2,S5,S7,S10,AUX S4,AUX S5, AUX S6
Phases Used.....2, 4, 7
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....*
Overlap "4".....*
Overlap "6".....*
Overlap "7".....*

*See overlap programming detail on sheet 2.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	OL7	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	OL6
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42	NU	72★	NU	NU	71★	NU	NU	NU	NU	NU	72★	71★	23★
RED	·	128	·	·	101	·	·	·	·	·	·	·	·	·	·	·	·	A104
YELLOW	·	129	·	·	·	·	*	·	·	*	·	·	·	·	·	·	·	·
GREEN	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
RED ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	A114	A101	·
YELLOW ARROW	·	·	·	·	102	·	·	·	·	·	·	·	·	·	·	A115	A102	A105
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	A116	A103	A106
GREEN ARROW	·	130	·	·	103	·	133	·	·	124	·	·	·	·	·	·	·	·

NU = Not Used
★ Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	∅ 2 2A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	∅ 4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		∅ 2 2B				∅ 4 4B								ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	∅ 7 7A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L					NOT USED				NOT USED					

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
2A	TB2-5,6	I2U	39	1	2	2			X	X		X	
2B	TB2-7,8	I2L	43	5	3	2			X	X		X	
4A	TB4-9,10	I6U	41	3	8	4	15		X			X	
4B	TB4-11,12	I6L	45	7	9	4			X			X	
7A	TB5-5,6	J5U	57	19	21	7	15		X			X	
*S1	TB7-9,10	J9U	59	21	27	SYS			X			X	

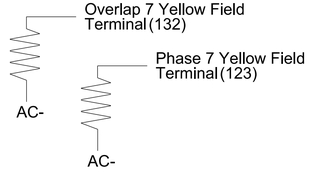
*System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

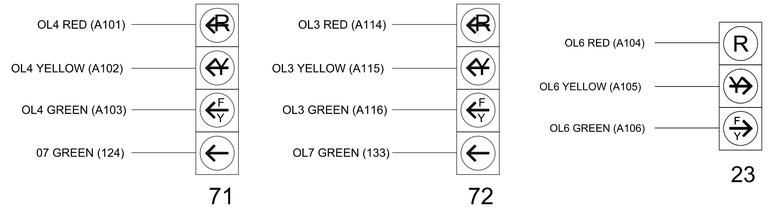
(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1465
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

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940 Main Campus Drive, Suite 500
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NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by: 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1465

Electrical Detail - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
NC Department of Transportation Mobility and Safety Division Traffic Engineering Branch Signals & Signals Management Section

750 N.Greenfield Pkwy.Garner,NC 27529

US 421 at Stonecrest Oaks Pkwy

Division 11 Wilkes County Wilkesboro

PLAN DATE:	MaY 2023	REVIEWED BY:	J. Ma
PREPARED BY:	M.L. Stygles	REVIEWED BY:	S.R. Chiluka

REVISIONS	INIT.	DATE

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PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.17

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2.
A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for heads 71 and 72 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 7 call on loop 7A to 0 seconds.

OUTPUT CHANNEL CONFIGURATION

Front Panel
Main Menu >Controller >More>Channels>Channels Config

Web Interface
Home >Controller >Advanced IO>Channels>Channels Configuration

Channel Configuration

ASSIGN CHANNEL 5 TO OVERLAP 7 ➡

Channel	Control Type	Control Source	Flash Yellow	Flash Red	Flash Alt	MMU Channel
1	Phase Vehicle	1	·	X	X	1
2	Phase Vehicle	2	X	·	·	2
3	Phase Vehicle	3	·	X	X	3
4	Phase Vehicle	4	·	X	·	4
5	Overlap	7	·	X	·	5
6	Phase Vehicle	6	X	·	X	6
7	Phase Vehicle	7	·	X	·	7
8	Phase Vehicle	8	·	X	X	8
9	Overlap	1	X	·	X	9
10	Overlap	2	·	X	X	10
11	Overlap	3	X	·	·	11
12	Overlap	4	X	·	·	12
13	Phase Ped	2	·	·	·	13
14	Phase Ped	4	·	·	·	14
15	Phase Ped	6	·	·	·	15
16	Phase Ped	8	·	·	·	16
17	Overlap	5	·	X	X	17
18	Overlap	6	X	·	·	18

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

*The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 7A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

	Detector	Call Phase	Delay
7A	21	7	-

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

Front Panel
Main Menu >Controller >Overlap >Overlap Parameters/Overlap Timings

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	3	4	6	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	2	2	2	7
Modifier Phases	7	7	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

Front Panel
Main Menu >Controller >Overlap >Overlap Parameters/Overlap Timings

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	3	4	6	7
Type	FYA 4 - Section	FYA 4 - Section	FYA 4 - Section	Normal
Included Phases	-	-	2	7
Modifier Phases	7	7	-	-
Trail Green	0	0	0	0
Trail Yellow	0.0	0.0	0.0	0.0
Trail Red	0.0	0.0	0.0	0.0

⬅ NOTICE INCLUDED PHASE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1465
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

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940 Main Campus Drive, Suite 500
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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:
Transportation Mobility and Safety Division
NC DEPARTMENT OF TRANSPORTATION
Traffic Engineering Branch
Traffic Signals Management Section
750 N.Greenfield Pkwy.Garner,NC 27529

US 421
at
Stonecrest Oaks Pkwy

Division 11 Wilkes County Wilkesboro

PLAN DATE:	MaY 2023	REVIEWED BY:	J. Ma
PREPARED BY:	M.L. Stygles	REVIEWED BY:	S.R. Chiluka

REVISIONS	INIT.	DATE

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NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

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Matthew Stygles
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5/24/2023
DATE

SIG. INVENTORY NO. 11-1465

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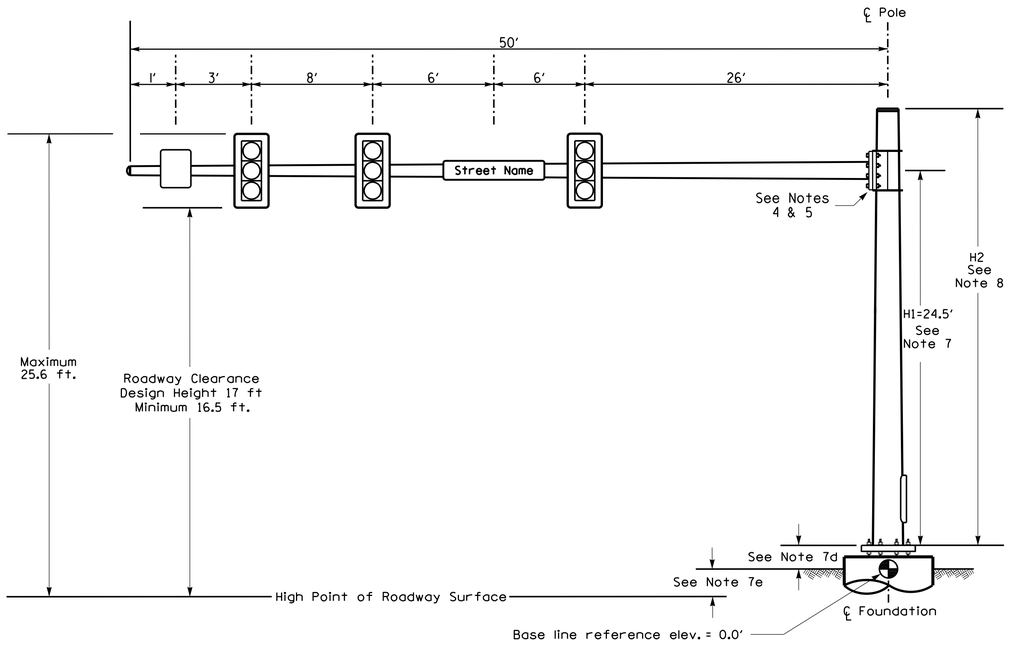
\\vhb.com\proj\Raleigh\38621.03 NCDOT U-5312 Wilkes Co\NCDOT\Traffic\Signals\Design\Signals\Plans\5312_11-XXXX_Sig_ele_Stonecrest Pkwy.dgn
schiluka

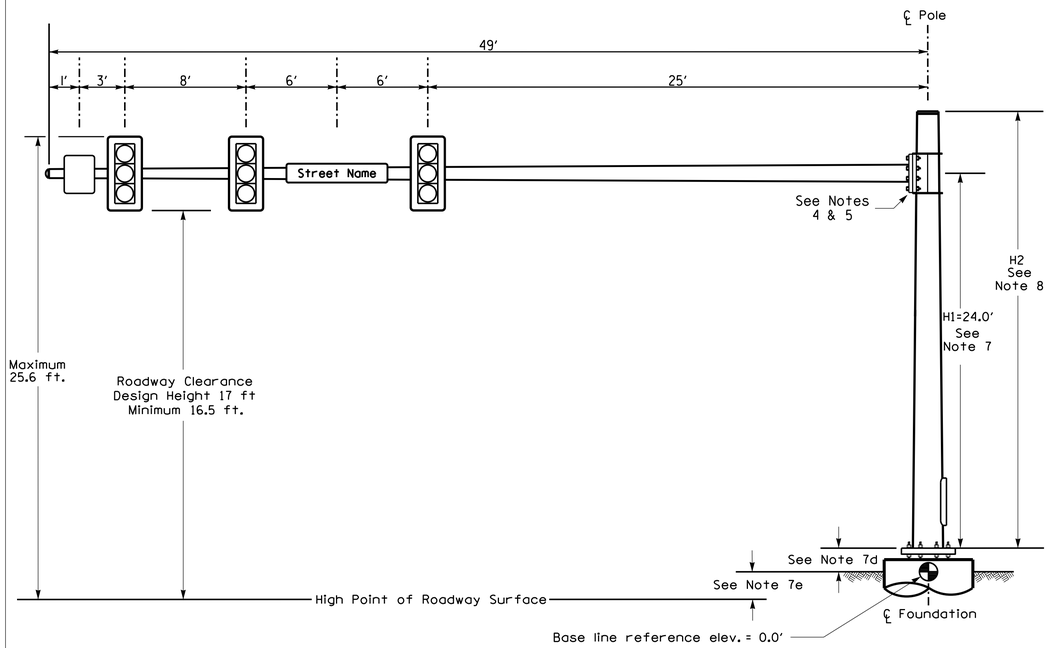
METAL POLE No. 1 and 3

Design Loading for METAL POLE NO. 1



Elevation View

Design Loading for METAL POLE NO. 3



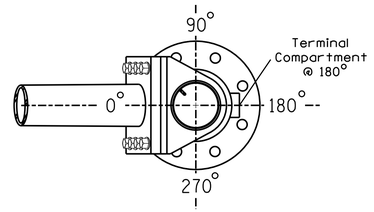
Elevation View

SPECIAL NOTE

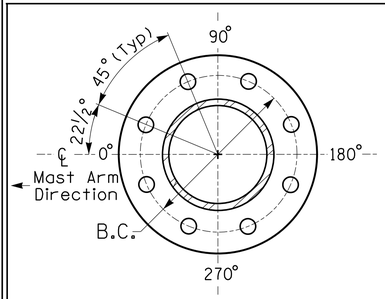
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	Pole 3
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+3.8 ft.	+3.1 ft.
Elevation difference at Edge of travelway or face of curb	+3.4 ft.	+2.5 ft.

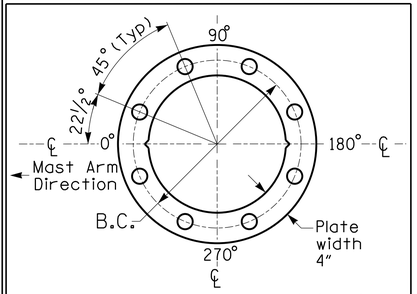


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
	SIGN RIGID MOUNTED	9.0 S.F.	36.0"W X 36.0"L	20 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 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

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
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 are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
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 Section Senior Structural Engineer for assistance at (919) 814-5000.
10. The contractor is responsible for verifying that the mast arm length 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.

NCDOT Wind Zone 4 (90 mph)

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for the Offices of: Transportation Mobility and Safety, State of North Carolina Department of Transportation, Signal Design Section

750 N.Greenfield Pkwy.Garner, NC 27529

US 421 - NC 16
at
SR 1322 (Winkler Mill Rd)/
Stonecrest Oaks Pkwy

Divsion 11 | Wilkes County | Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE 0 N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRINATHA R CHILUKA

Developed by SRChiluka 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1044/1465

10/31/2022 8:48:46 AM
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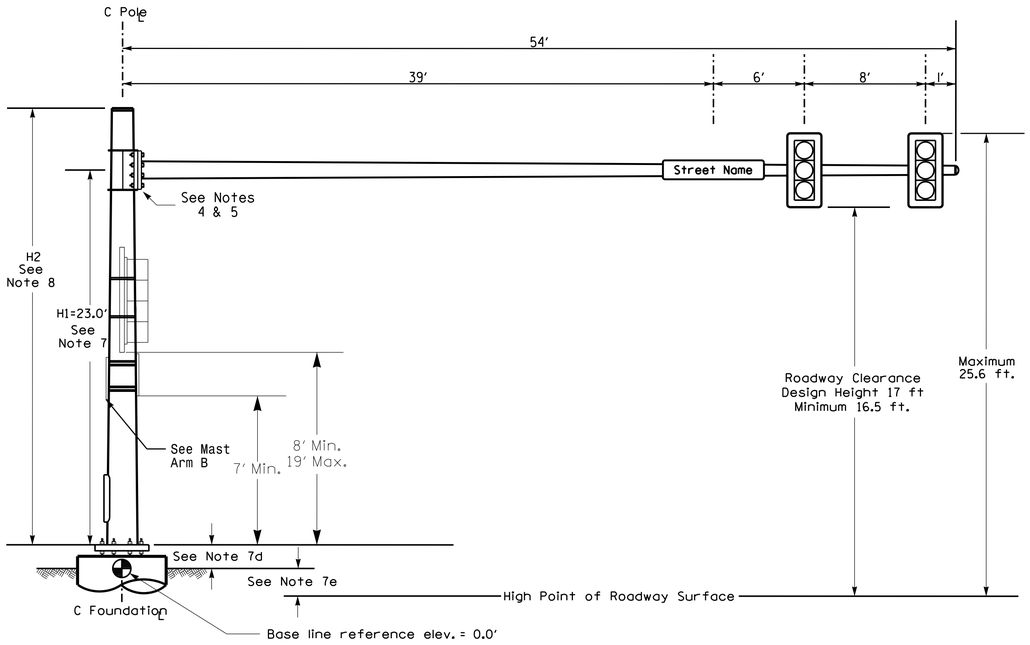
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.9.19

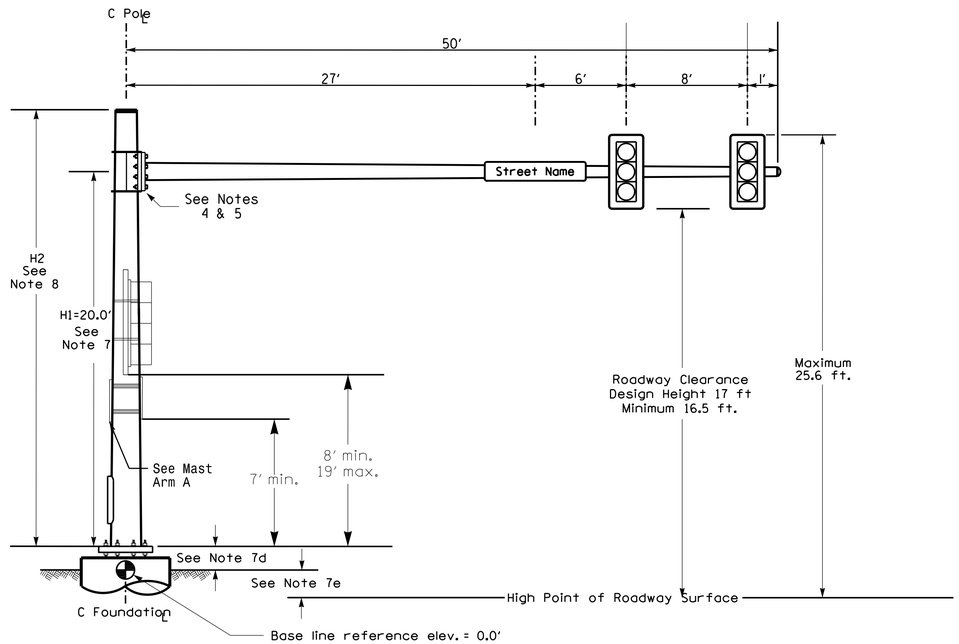
METAL POLE No. 2

Design Loading for METAL POLE NO. 2 (Arm A)



Elevation View @ 180°

Design Loading for METAL POLE NO. 2 (Arm B)



Elevation View @ 0°

10/31/2022 8:48:46 AM
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schiluka

SPECIAL NOTE

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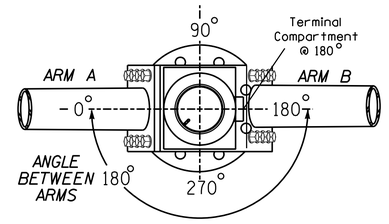
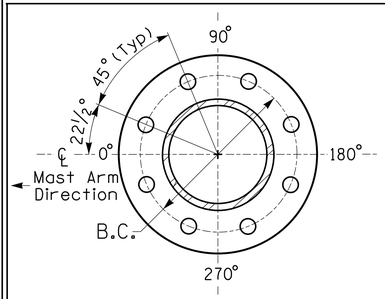
Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Arm A	Arm B
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+2.0 ft.	-1 ft.
Elevation difference at Edge of travelway or face of curb	+0.5 ft.	-1 ft.

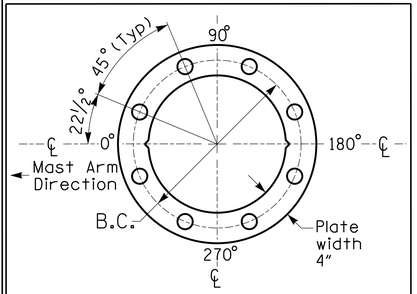


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

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VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

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NCDOT Wind Zone 4 (90 mph)

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

US 421
at
SR 1322 (Winkler Mill Road)/
Stonecrest Oaks Pkwy

Divsion 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE 0 N/A

REVISIONS	INIT.	DATE

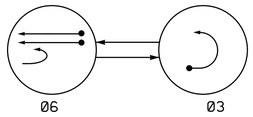
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRILATHA R CHILUKA

Developed by SRChiluka 5/24/2023
SIGNATURE DATE

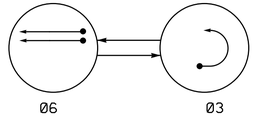
SIG. INVENTORY NO. II-1044/1465

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.10.0

DEFAULT PHASING DIAGRAM



ALTERNATE PHASING DIAGRAM



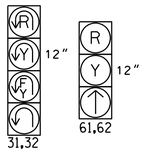
DEFAULT PHASING TABLE OF OPERATION			
SIGNAL FACE	PHASE Ø3	PHASE Ø6	FLASH
31,32			
61,62	R	↑	Y

ALTERNATE PHASING TABLE OF OPERATION			
SIGNAL FACE	PHASE Ø3	PHASE Ø6	FLASH
31,32			
61,62	R	↑	Y

DETECTED MOVEMENT
UNDETECTED MOVEMENT (OVERLAP)
UNSIGNALIZED MOVEMENT
PEDESTRIAN MOVEMENT

SIGNAL FACE I.D.

All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

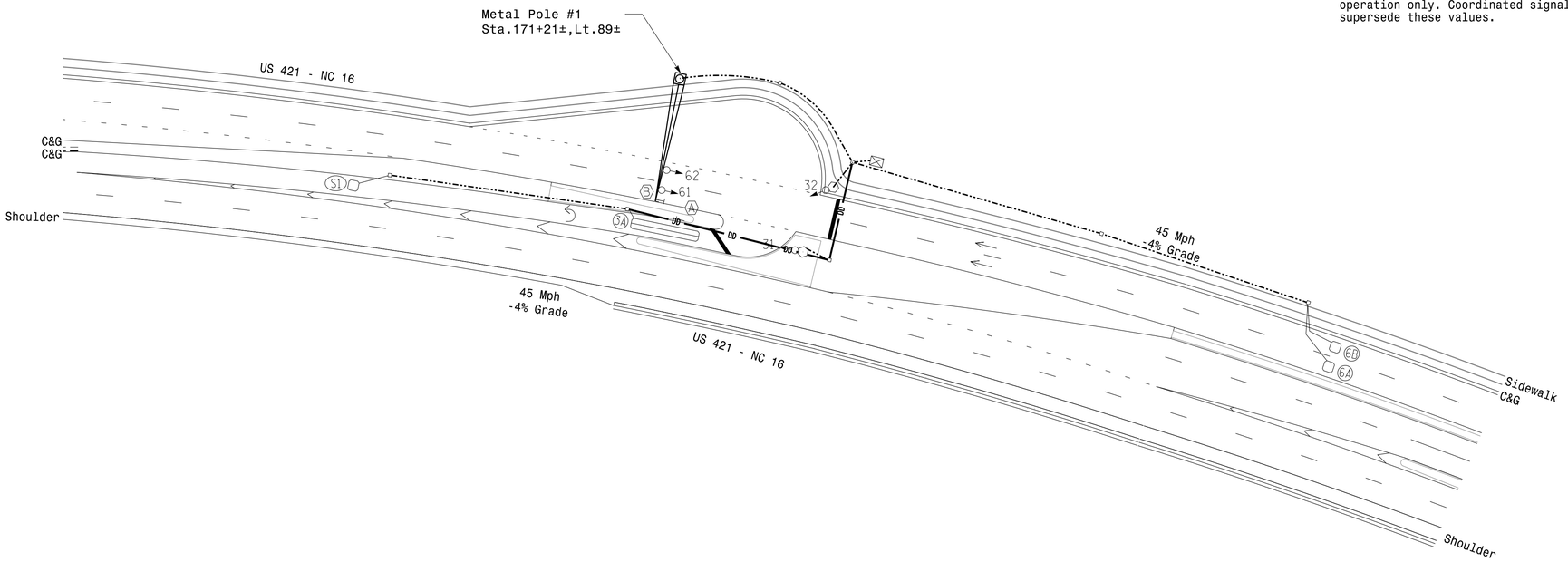
DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
3A	6X40	0	2-4-2	x	3	15.0*	-	X	-	X	-	X
6A	6X6	300	4	x	6	-	-	X	X	X	-	X
6B	6X6	300	4	x	6	-	-	X	X	X	-	X
S1	6X6	200	4	x	-	-	-	-	-	-	-	X

* Disable delay during alternate phasing.

2 Phase
Fully Actuated
W/ Alternate Phasing Operation
Wilkesboro Closed Loop 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. Set all detector units to presence mode.
4. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
5. The Division Traffic Engineer will determine the hours of use for each phasing plan.
6. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



MAXTIME TIMING CHART

FEATURE	PHASE 3	PHASE 6
Walk *	–	–
Ped Clear *	–	–
Min Green	7	12
Passage *	2.0	6.0
Max 1 *	30	60
Yellow Change	3.0	4.9
Red Clear	3.1	1.1
Added Initial *	–	1.5
Maximum Initial *	–	34
Time Before Reduction *	–	15
Time To Reduce *	–	30
Minimum Gap	–	3.4
Advance Walk	–	–
Non Lock Detector	X	–
Vehicle Recall	–	MIN RECALL
Dual Entry	–	–

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

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
▭	Metal Pole with Mastarm	■
⬡	Type II Signal Pedestal	⬢
⊣	Sign	⊣
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
-·-·-	2-in Underground Conduit	-·-·-
N/A	Right of Way	— — —
→	Directional Arrow	→
DD	Directional Drill	N/A
Ⓐ	"Stop Here on Red" Sign (R10-6)	Ⓐ
Ⓑ	No Left Turn Sign (R3-2)	Ⓑ

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940 Main Campus Drive, Suite 500
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919.829.0328

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New Installation - Final Design

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

US 421-NC 16 at
SR 1322 (Winkler Milll Rd)/
Stonecrest Oaks Pkwy
East U-Turn

Divsion 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE 0 40

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRILATHA R CHILUKA

Developed by SRChiluka 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1469

1/13/2023 5:25:31 PM
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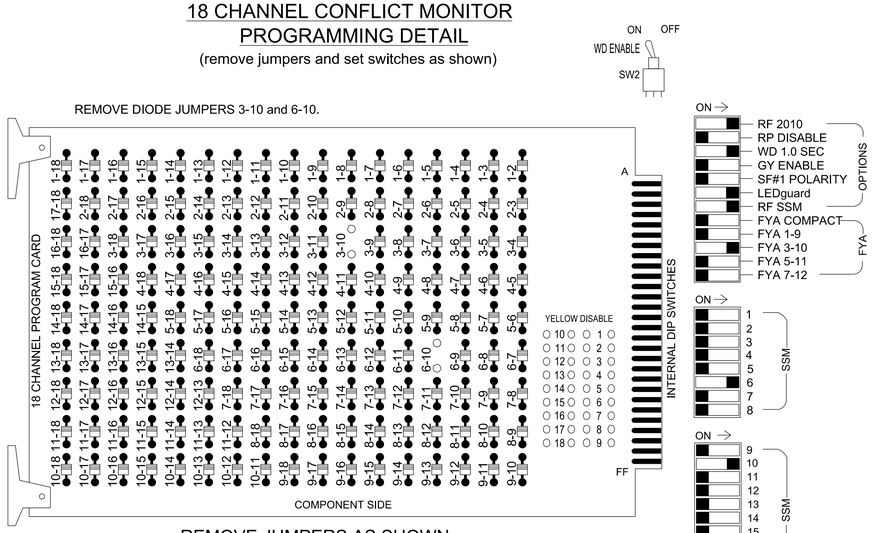
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.10.1

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 6 Green No Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
4. The cabinet and controller are part of the Wilkesboro Closed Loop System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S4, S8, AUX S2
Phases Used.....3,6
Overlap "1".....NOT USED
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....NOT USED

*See overlap programming detail on sheet 2.

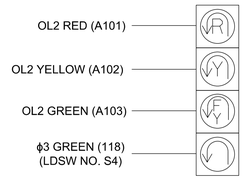
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	NU	NU	31,32 ★	NU	NU	NU	61,62	NU	NU	NU	NU	NU	31,32 ★	NU	NU	NU	NU
RED								134										
YELLOW				*				135										
GREEN								136										
RED ARROW														A124				
YELLOW ARROW														A125				
FLASHING YELLOW ARROW														A126				
GREEN ARROW				118														

NU = Not Used
* Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ϕ3 3A NOT USED	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SYS. DET. S1 NOT USED	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	ϕ6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		ϕ6 6B												

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
3A	TB4-5,6	I5U	58	20	7	3	15		X			X	
*S1	TB6-9,10	I9U	60	22	13	SYS			X			X	
6A	TB3-5,6	J2U	40	2	16	6			X	X		X	
6B	TB3-7,8	J2L	44	6	17	6			X	X		X	

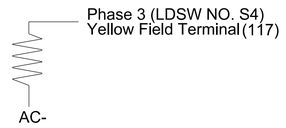
*System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1469
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

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Electrical Detail Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 421-NC 16 at SR 1322 (Winkler Mill Rd)/ Stonecrest Oaks Pkwy East U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M. L. Stygles
PREPARED BY:	S. R. Chiluka	REVIEWED BY:	J. Ma

REVISIONS	INIT.	DATE

Prepared for the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Traffic Engineering Branch
Signals Management Section
750 N.Greenfield Pkwy.Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by: Matthew L. Stygles 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1469

5/23/2023 3:15:01 PM
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schiluko

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.10.2

MAXTIME OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

Front Panel
Main Menu >Controller >Overlap >Overlap Parameters/Overlap Timings

Web Interface
Home >Controller >Overlap Configuration >Overlaps

Overlap Plan 1

Overlap	2
Type	FYA 4 - Section
Included Phases	6
Modifier Phases	3
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

MAXTIME OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

Front Panel
Main Menu >Controller >Overlap >Overlap Parameters/Overlap Timings

Web Interface
Home >Controller >Overlap Configuration >Overlaps

In the table view of the web interface, right click on "Overlap" in the top left corner of the table. Copy the entire contents of Overlap Plan 1. Paste Overlap Plan 1 into Overlap Plan 2. Modify Overlap Plan 2 as shown below and save changes.

Overlap Plan 2

Overlap	2
Type	FYA 4 - Section
Included Phases	-
Modifier Phases	3
Trail Green	0
Trail Yellow	0.0
Trail Red	0.0

← NOTICE INCLUDED PHASE

MAXTIME ALTERNATE PHASING ACTIVATION DETAIL

To run alternate phasing, select a Pattern that is programmed to run Overlap Plan 2 and Detector Plan 2.
A Pattern can be selected through the scheduler or manually by changing the Operational Mode.

PHASING	OVERLAP PLAN	VEH DET PLAN
ACTIVE PLAN REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PLAN REQUIRED TO RUN ALTERNATE PHASING	2	2

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN OVERLAP 2 AND VEHICLE DETECTOR PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAP PLAN 2: Modifies overlap included phases for heads 31 and 32 to run protected turns only.

VEH DET PLAN 2: Reduces delay time for phase 3 call on loop 3A to 0 seconds.

MAXTIME DETECTOR PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 7A

Front Panel
Main Menu >Controller >Detector >Veh Det Plans

Web Interface
Home >Controller >Detector Configuration >Vehicle Detectors

In the table view of web interface right click on "Detector" in the top left corner of the table. Copy the entire contents of Detector Plan 1. Paste Detector Plan 1 into Detector Plan 2. Modify Detector Plan 2 as shown below and save changes.

Plan 2

	Detector	Call Phase	Delay
3A	7	3	-

MAXTIME ALTERNATE PHASING PATTERN PROGRAMMING DETAIL

Front Panel
Main Menu >Controller >Coordination >Patterns

Web Interface
Home >Controller >Coordination >Patterns

Pattern Parameters

Pattern	Veh Det Plan	Overlap Plan
*	2	2

* The Pattern number(s) are to be determined by the Division and/or City Traffic Engineer.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-1469
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
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Electrical Detail Sheet 2 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

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

US 421-NC 16 at
SR 1322 (Winkler Mill Rd)/
Stonecrest Oaks Pkwy
East U-Turn

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M. L. Stygles
PREPARED BY:	S. R. Chiluka	REVIEWED BY:	J. Ma

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by:
SIGNATURE 5/24/2023 DATE

SIG. INVENTORY NO. 11-1469

5/23/2019 3:15:01 PM
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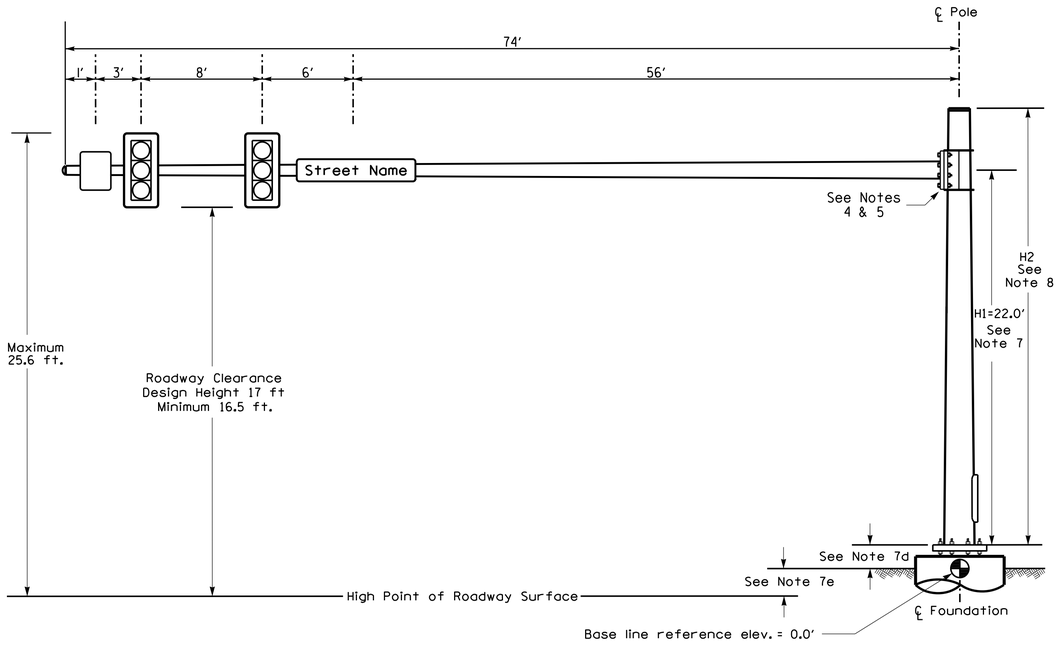
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.10.3

METAL POLE No. 1

Design Loading for METAL POLE NO. 1



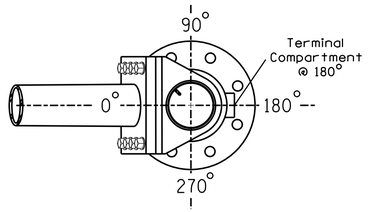
Elevation View

SPECIAL NOTE

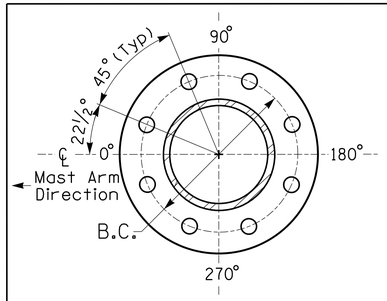
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

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

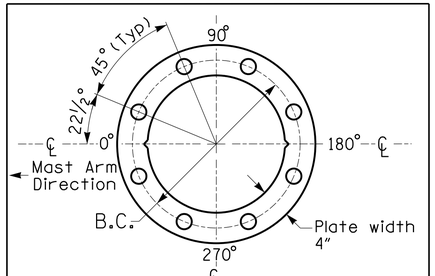


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
	SIGN RIGID MOUNTED	9.0 S.F.	36.0"W X 36.0"L	20 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 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

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
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 are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
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 Section Senior Structural Engineer for assistance at (919) 814-5000.
10. The contractor is responsible for verifying that the mast arm length 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.

NCDOT Wind Zone 4 (90 mph)

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Prepared for 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 421-NC 16
at
Winkler Mill Rd
East U-Turn

Divsion 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE 0 N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRIVATHA R CHILUKA

Developed by SRChiluka 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1469

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schiluka

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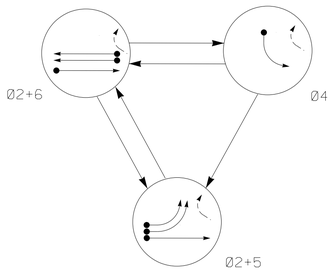
PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.11.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	PHASE Ø2+6	PHASE Ø4	PHASE FLASH
21, 22	G	G	R	Y
41,42,43	R	R	G	R
51, 52	~~←~~	~~R~~	~~R~~	~~Y~~
61, 62	R	↑	R	Y

OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	✳	300	✳	✳	2	Y	Y	-	1.6	-	-	✳
2B	✳	90	✳	✳	2	Y	Y	-	-	-	-	✳
4A	✳	0	✳	✳	4	Y	Y	-	-	3	-	✳
5A	✳	0	✳	✳	5	Y	Y	-	-	-	-	✳
5B	✳	0	✳	✳	5	Y	Y	-	-	-	-	✳
6A, 6B	✳	300	✳	✳	6	Y	Y	-	1.6	-	-	✳
6C, 6D	✳	90	✳	✳	6	Y	Y	-	-	-	-	✳

✳ Video Detection Zone

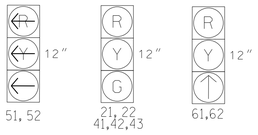
3 Phase Fully Actuated (Isolated)

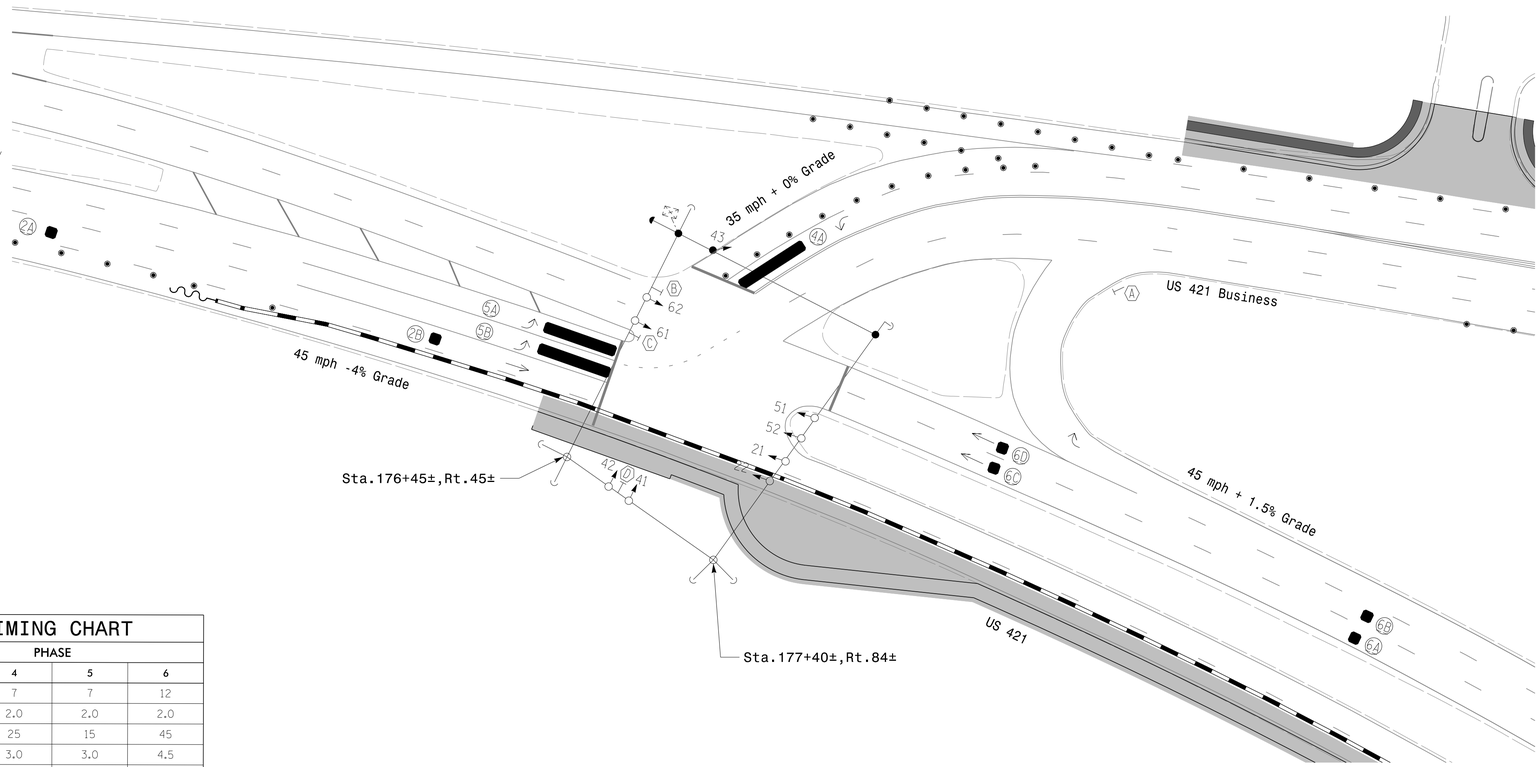
NOTES

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 operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
6. Refer to Pavement Marking Plans for proposed stop bar locations..

SIGNAL FACE I.D.

All Heads L.E.D.





LEGEND

PROPOSED		EXISTING
○—	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
○→	Traffic Signal Head	●→
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
▭	Inductive Loop Detector	▭
▬	Video Detection Zone	N/A
▒	Construction Zone	N/A
⊠	Controller & Cabinet	⊠
□	Junction Box	■
-·-·-	2-in Underground Conduit	-·-·-
—— ——	Right of Way	— — — —
—E—	Temporary Construction Easement	N/A
→	Directional Arrow	→
⬡	Type II Signal Pedestal	⬢
Ⓐ	Yield Sign (R1-2)	Ⓐ
Ⓑ	No Right Turn (R3-1)	Ⓑ
Ⓒ	No U Turn Sign (R3-4)	Ⓒ
Ⓓ	Left Arrow "Only" Sign (R3-5L)	Ⓓ
●	Drum	N/A
⊙	Skinny Drum	N/A

OASIS 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Min Green 1 *	12	7	7	12
Extension 1 *	2.0	2.0	2.0	2.0
Max Green 1 *	45	25	15	45
Yellow Clearance	4.9	3.0	3.0	4.5
Red Clearance	1.3	3.2	2.9	1.5
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

VHB Engineering NC, P.C. (C-3705)
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New Installation - Temporary Design 1 (Phase 1)

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

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 047250 SRILATHA R CHILUKA

US 421
at
US 421 Business

Divsion 11 | Wilkes County | Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE: 0 40, 1"=40'

REVISIONS	INIT.	DATE

DocuSigned by: SRChiluka 5/26/2023
DESIGNER SIGNATURE / DATE

SIG. INVENTORY NO. 11-1146TI

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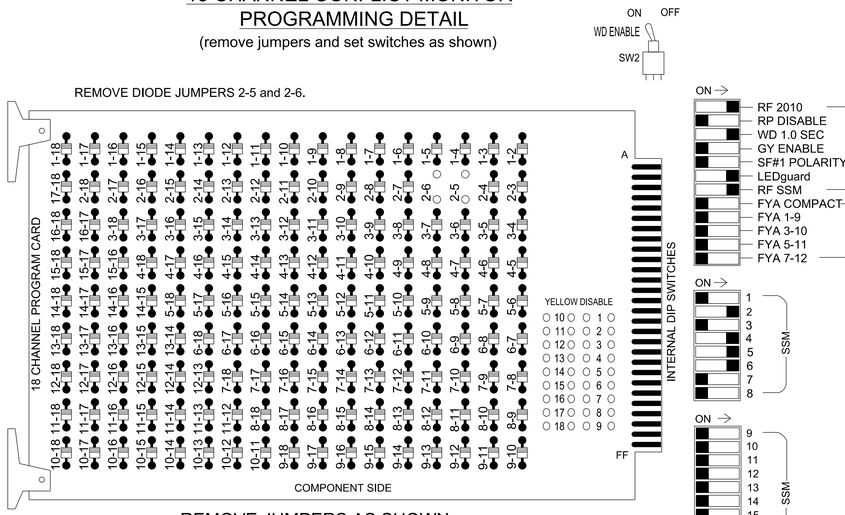
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.11.1

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Startup In Green.
4. Program phase 2 and 6 for Yellow Flash.
5. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332 W/ AUX OUTPUT FILE
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S2,S4,S5,S6
PHASES USED.....2,4,5,6
OVERLAPS.....NONE

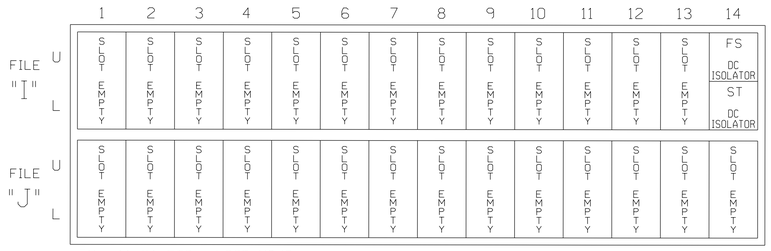
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42 43	NU	51,52	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134										
YELLOW		129			102			135										
GREEN		130			103													
RED ARROW							131											
YELLOW ARROW							132											
GREEN ARROW							133	136										

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1146T1
DESIGNED: May 2023
SEALED: 5/26/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
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919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Temporary Installation - Electrical Detail 1 of 1
(Phase 1)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 421
at
US 421 Business

Division 11 Wilkes County Wilksboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L.Stygles
PREPARED BY:	S.R.Chiluka	REVIEWED BY:	J.Ma

REVISIONS	INIT.	DATE

750 N.Greenfield Pkwy.Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L STYGLES

DocuSigned by: 5/26/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1146T1

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schiluka

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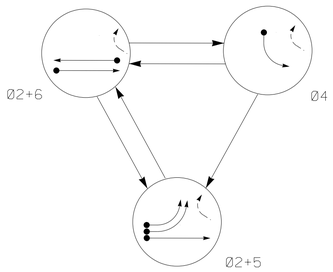
PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.11.2

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	PHASE Ø2+6	PHASE Ø4	PHASE FLASH
21, 22	G	G	R	Y
41,42,43	R	R	G	R
51, 52	←–	←R	←R	←Y
61, 62	R	↑	R	Y

OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	✳	300	✳	✳	2	Y	Y	-	1.6	-	-	✳
2B	✳	90	✳	✳	2	Y	Y	-	-	-	-	✳
4A	✳	0	✳	✳	4	Y	Y	-	-	3	-	✳
5A	✳	0	✳	✳	5	Y	Y	-	-	-	-	✳
5B	✳	0	✳	✳	5	Y	Y	-	-	-	-	✳
6A	✳	300	✳	✳	6	Y	Y	-	1.6	-	-	✳
6B	✳	90	✳	✳	6	Y	Y	-	-	-	-	✳

✳Video Detection Zone

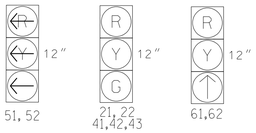
3 Phase
Fully Actuated
(Isolated)

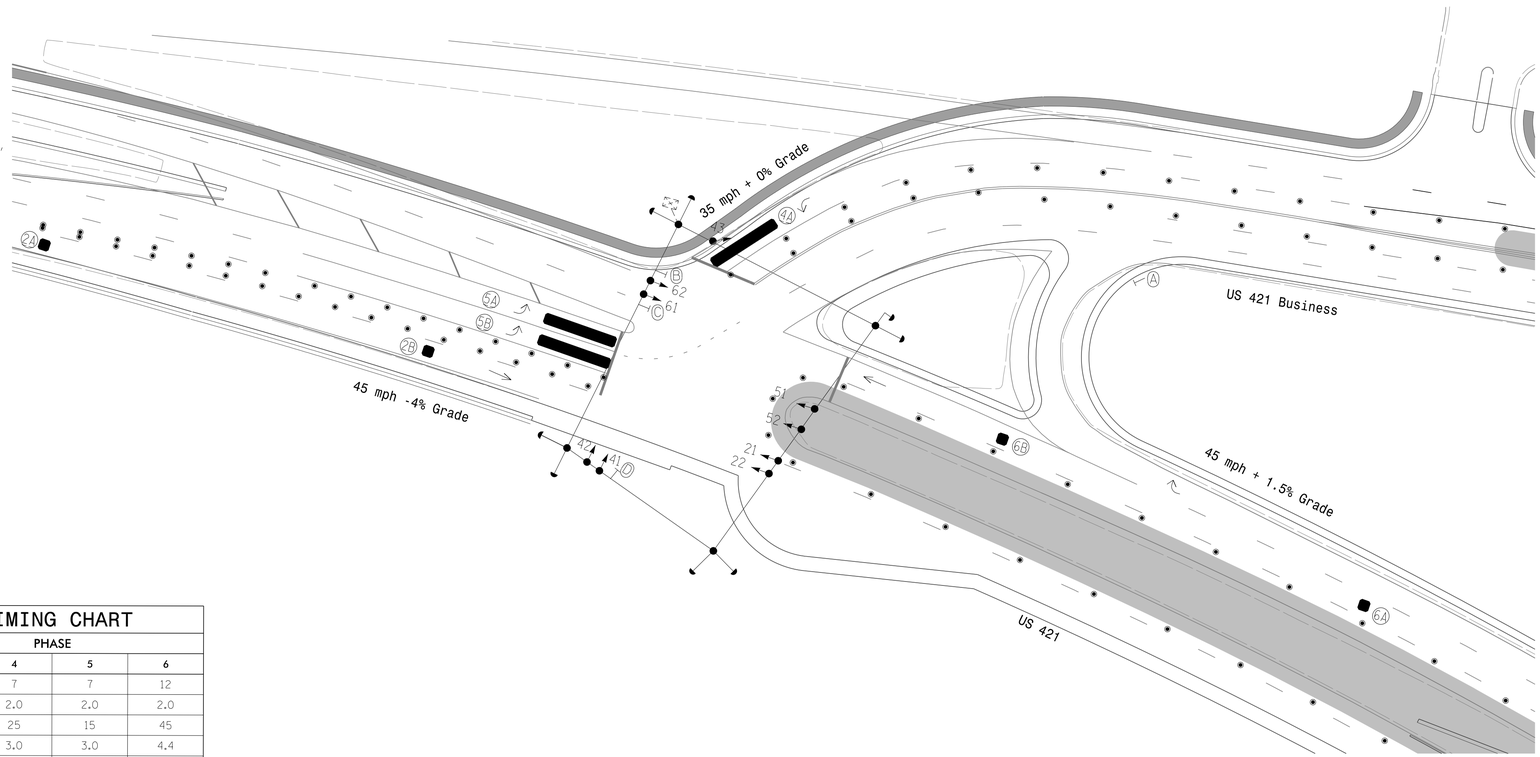
NOTES

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 operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
6. Refer to Pavement Marking Plans for proposed stop bar locations.
7. Reposition existing signal heads as shown on the plans.

SIGNAL FACE I.D.

All Heads L.E.D.





LEGEND

PROPOSED		EXISTING
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
○→	Traffic Signal Head	●→
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
▭	Inductive Loop Detector	▭
▬	Video Detection Zone	N/A
▒	Construction Zone	N/A
⊠	Controller & Cabinet	⊠
□	Junction Box	■
-----	2-in Underground Conduit	-----
—— ——	Right of Way	—— ——
——E——	Temporary Construction Easement	N/A
→	Directional Arrow	→
⬡	Type II Signal Pedestal	⬢
Ⓐ	Yield Sign (R1-2)	Ⓐ
Ⓑ	No Right Turn (R3-1)	Ⓑ
Ⓒ	No left Turn Sign (R3-2)	Ⓒ
Ⓓ	Left Arrow "Only" Sign (R3-5L)	Ⓓ
●	Drum	N/A
⬢	Skinny Drum	N/A

OASIS 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Min Green 1 *	12	7	7	12
Extension 1 *	2.0	2.0	2.0	2.0
Max Green 1 *	45	25	15	45
Yellow Clearance	4.9	3.0	3.0	4.4
Red Clearance	1.4	3.3	2.9	1.4
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

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Signal Upgrade - Temporary Design 2
(Phase 2)

Prepared for the Offices of:
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Traffic Engineering Branch
750 N.Greenfield Pkwy,Garner,NC 27529

US 421
at
US 421 Business

Divsion 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRILATHA R CHILUKA

DocuSigned by: SRChiluka 6/26/2023
C03E4C8B0A7B4EC... SIGNATURE DATE

SIG. INVENTORY NO. II-I4612

11/17/2011 9:38:53 AM
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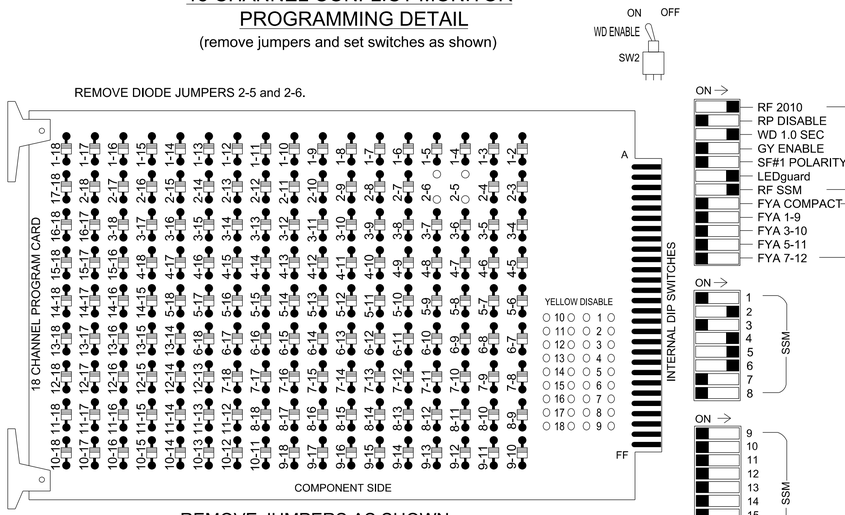
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.11.3

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Startup In Green.
4. Program phase 2 and 6 for Yellow Flash.
5. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332 W/ AUX OUTPUT FILE
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S2,S4,S5,S6
PHASES USED.....2,4,5,6
OVERLAPS.....NONE

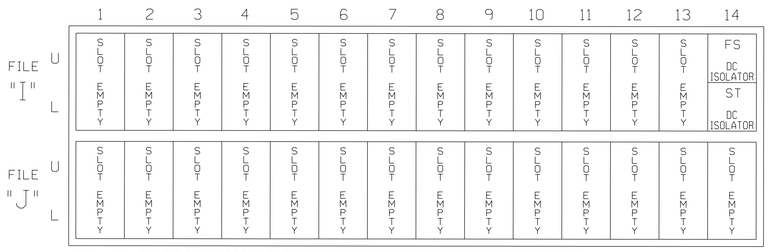
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42 43	NU	51,52	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134										
YELLOW		129			102			135										
GREEN		130			103													
RED ARROW							131											
YELLOW ARROW							132											
GREEN ARROW							133	136										

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1146T2
DESIGNED: May 2023
SEALED: 5/26/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

Temporary Installation - Electrical Detail 1 of 1 (Phase 2)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

US 421
at
US 421 Business

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L.Stygles
PREPARED BY:	S.R.Chiluka	REVIEWED BY:	J.Ma

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L STYGLES

DocuSigned by:
5/26/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1146T2

5/23/2019 3:15:01 PM
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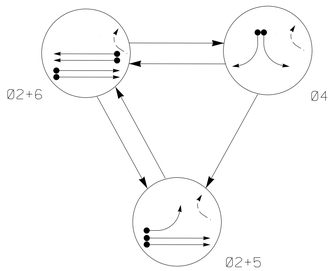
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.11.4

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	PHASE Ø2+6	PHASE Ø4	PHASE FLASH
21, 22	G	G	R	Y
41,42,43	R	R	G	R
51, 52	←	~~R~~	~~R~~	~~Y~~
61, 62	R	↑	R	Y

OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A,2B	✳	300	✳	✳	2	Y	Y	-	1.6	-	-	✳
2C,2D	✳	90	✳	✳	2	Y	Y	-	-	-	-	✳
4A	✳	0	✳	✳	4	Y	Y	-	-	3.0	-	✳
4B	✳	0	✳	✳	4	Y	Y	-	-	-	-	✳
5A	✳	0	✳	✳	5	Y	Y	-	-	-	-	✳
6A	✳	300	✳	✳	6	Y	Y	-	1.6	-	-	✳
6B	✳	90	✳	✳	6	Y	Y	-	-	-	-	✳

✳ Video Detection Zone

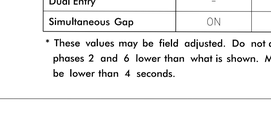
3 Phase
Fully Actuated
(Isolated)

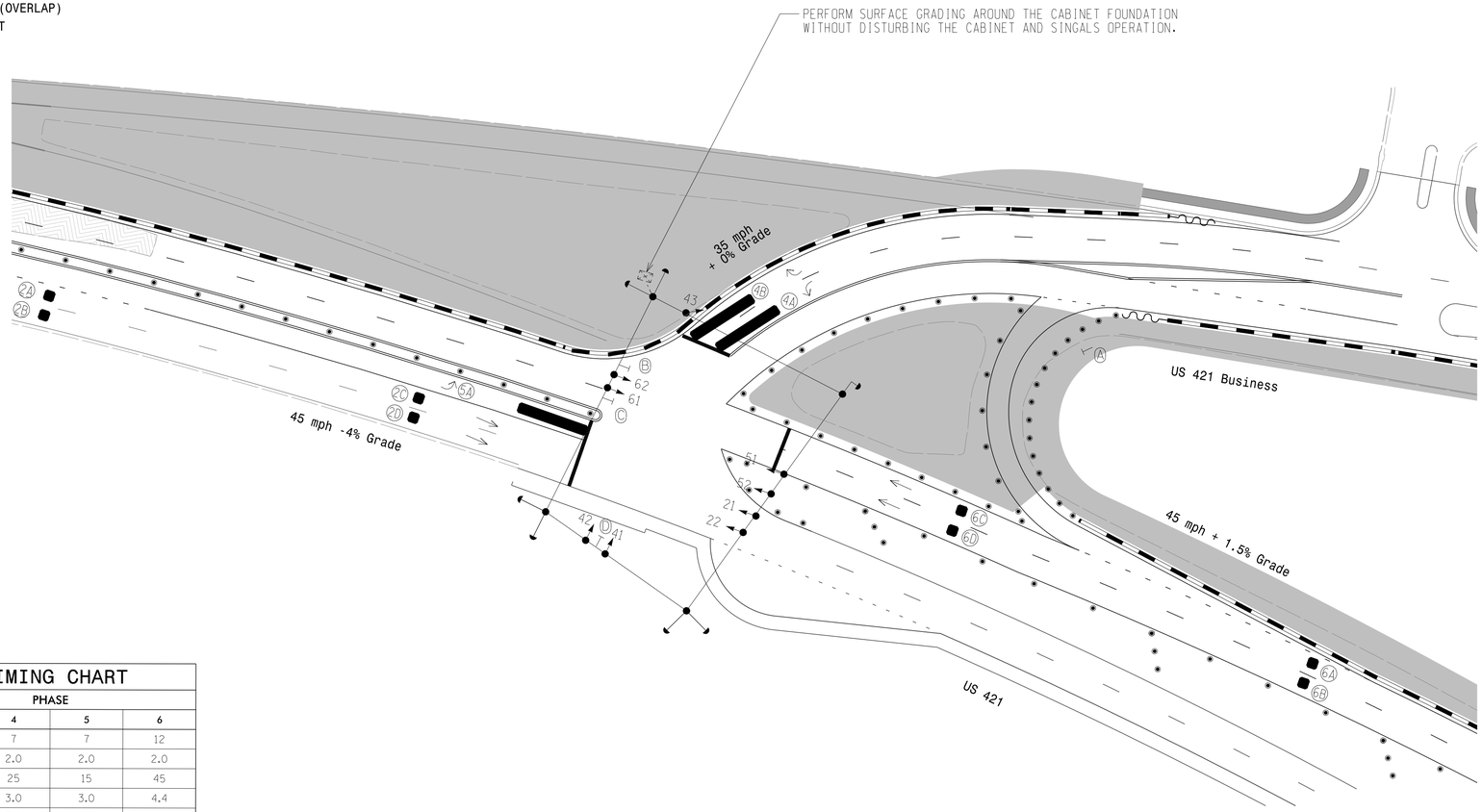
NOTES

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 operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
6. Refer to Pavement Marking Plans for proposed stop bar locations.
7. Reposition existing signal heads as shown on the plans.

SIGNAL FACE I.D.

All Heads L.E.D.





LEGEND

PROPOSED		EXISTING
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Traffic Signal Head	
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Inductive Loop Detector	
	Video Detection Zone	N/A
	Construction Zone	N/A
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Right of Way	
E	Temporary Construction Easement	N/A
	Directional Arrow	
	Type II Signal Pedestal	
A	Yield Sign (R1-2)	A
B	No Right Turn (R3-1)	B
C	No left Turn Sign (R3-2)	C
D	Left Arrow "Only" Sign (R3-5L)	D
	Drum	N/A
	Skinny Drum	N/A

OASIS 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Min Green 1 *	12	7	7	12
Extension 1 *	2.0	2.0	2.0	2.0
Max Green 1 *	45	25	15	45
Yellow Clearance	4.9	3.0	3.0	4.4
Red Clearance	1.4	3.2	2.4	1.6
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

VHB Engineering NC, P.C. (C-3705)
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Raleigh, NC 27606
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Signal Upgrade - Temporary Design 3
(Phase 3)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for the Offices of:
Traffic Engineering Branch
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

US 421
at
US 421 Business

Divsion 11 | Wilkes County | Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE: 0 40 — 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRI ATHA R CHILUKA

Developed by: SRChiluka 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. II-I4613

11/17/2011 9:38:53 AM
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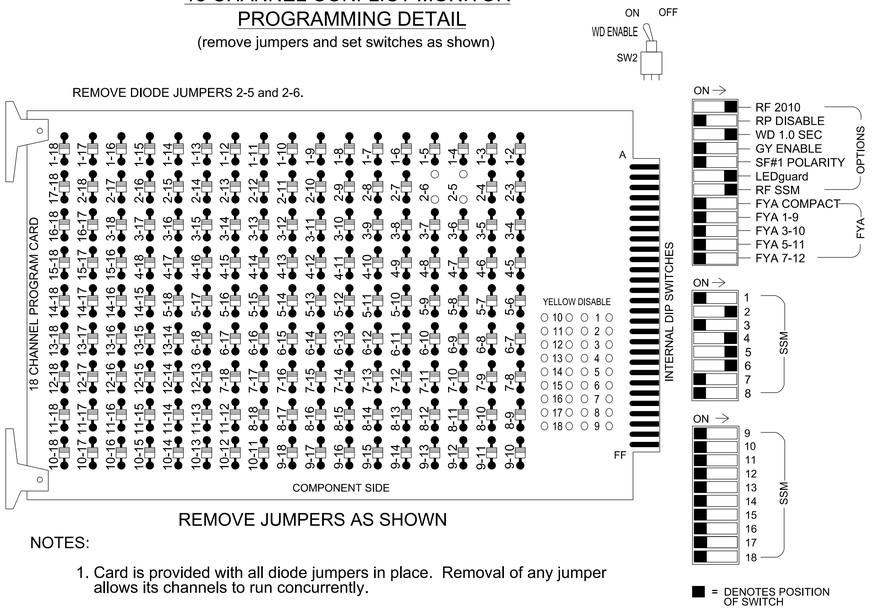
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.11.5

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Startup In Green.
4. Program phase 2 and 6 for Yellow Flash.
5. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332 W/ AUX OUTPUT FILE
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S2,S4,S5,S6
PHASES USED.....2,4,5,6
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42 43	NU	51,52	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134										
YELLOW		129			102			135										
GREEN		130			103													
RED ARROW							131											
YELLOW ARROW							132											
GREEN ARROW							133	136										

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "U"	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
FILE "L"	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	ST DC ISOLATOR
FILE "U"	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
FILE "L"														

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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1146T3
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Temporary Installation - Electrical Detail 1 of 1
(Phase 3)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

US 421
at
US 421 Business

Division 11 Wilkes County Wilksboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L.Stygles
PREPARED BY:	S.R.Chiluka	REVIEWED BY:	J.Ma

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by: 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1146T3

5/23/2019 3:15:01 PM
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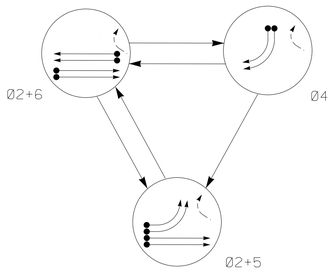
Schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.11.6

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø2+5	PHASE Ø2+6	PHASE Ø4	PHASE FLASH
21, 22	G	G	R	Y
41,42,43	R	R	G	R
51, 52	←	←R	R	←Y
61, 62	R	↑	R	Y

OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A,2B	✳	300	✳	✳	2	Y	Y	-	1.6	-	-	✳
2C,2D	✳	90	✳	✳	2	Y	Y	-	-	-	-	✳
4A	✳	0	✳	✳	4	Y	Y	-	-	-	-	✳
4B	✳	0	✳	✳	4	Y	Y	-	-	-	-	✳
5A	✳	0	✳	✳	5	Y	Y	-	-	-	-	✳
5B	✳	0	✳	✳	5	Y	Y	-	-	-	-	✳
6A,6B	✳	300	✳	✳	6	Y	Y	-	1.6	-	-	✳
6C,6D	✳	90	✳	✳	6	Y	Y	-	-	-	-	✳

✳ Video Detection Zone

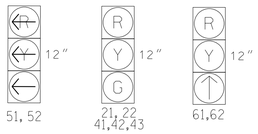
3 Phase
Fully Actuated
(Isolated)

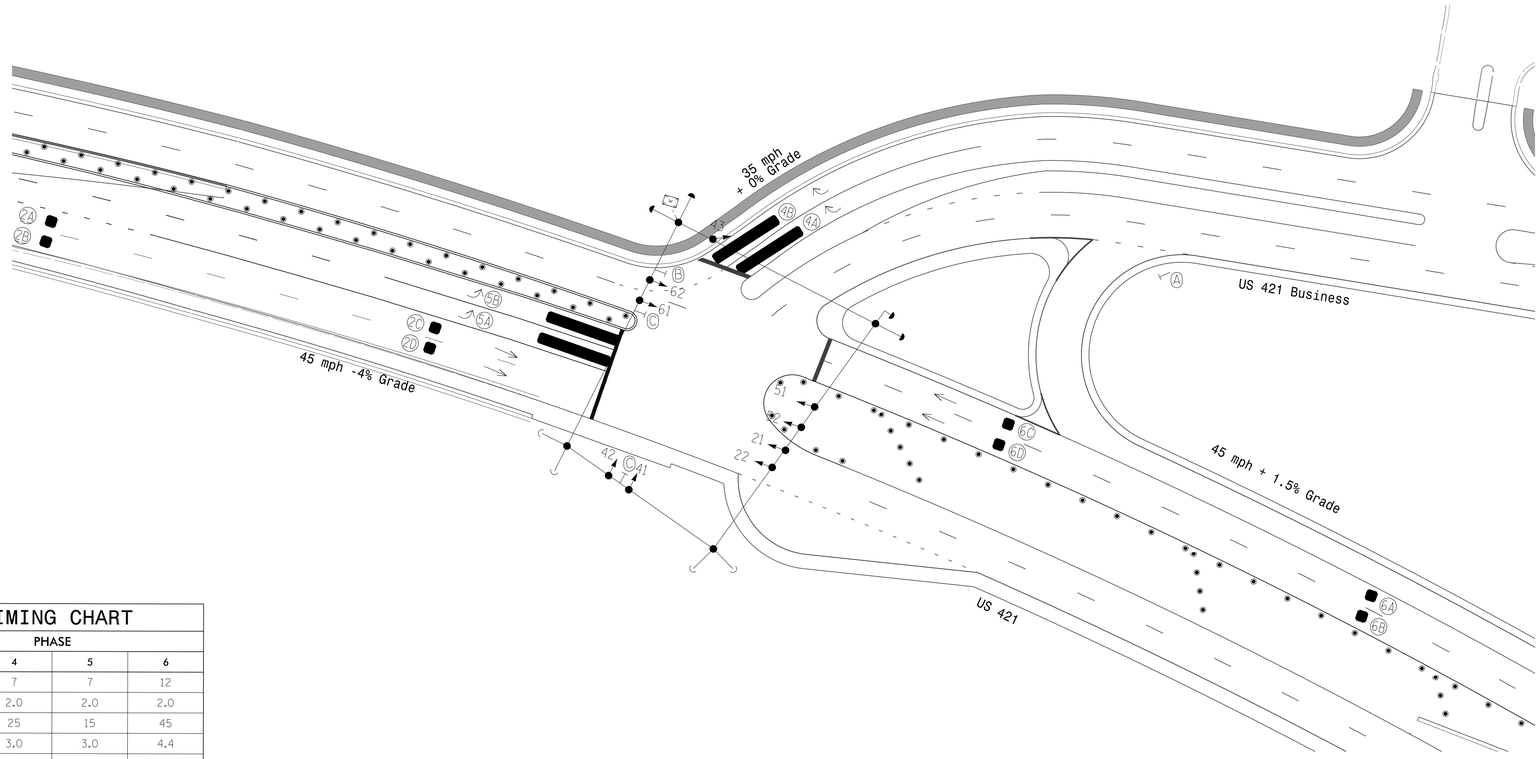
NOTES

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 operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
6. Refer to Pavement Marking Plans for proposed stop bar locations.
7. Reposition existing signal heads as shown on the plans.

SIGNAL FACE I.D.

All Heads L.E.D.





LEGEND

PROPOSED		EXISTING
○	Signal Pole with Guy	●
○	Signal Pole with Sidewalk Guy	●
○→	Traffic Signal Head	●→
⊣	Sign	⊣
□	Pedestrian Signal Head With Push Button & Sign	■
▭	Inductive Loop Detector	▭
▬	Video Detection Zone	N/A
▒	Construction Zone	N/A
⊠	Controller & Cabinet	⊡
□	Junction Box	■
-----	2-in Underground Conduit	-----
—— ——	Right of Way	—— ——
——E——	Temporary Construction Easement	N/A
→	Directional Arrow	→
⬡	Type II Signal Pedestal	⬢
Ⓐ	Yield Sign (R1-2)	Ⓐ
Ⓑ	No Right Turn (R3-1)	Ⓑ
Ⓒ	No Left Turn Sign (R3-2)	Ⓒ
Ⓓ	Left Arrow "Only" Sign (R3-5L)	Ⓓ
●	Drum	N/A
◉	Skinny Drum	N/A

OASIS 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Min Green 1 *	12	7	7	12
Extension 1 *	2.0	2.0	2.0	2.0
Max Green 1 *	45	25	15	45
Yellow Clearance	4.9	3.0	3.0	4.4
Red Clearance	1.4	2.3	2.8	1.6
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

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

VHB Engineering NC, P.C. (C-3705)
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Raleigh, NC 27606
919.829.0328

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Signal Upgrade - Temporary Design 4
(Phase 4)

Prepared for 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 421
at
US 421 Business

Divsion 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE: 0 40, 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 047250 SRILATHA R CHILUKA

Designed by: SRChiluka 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. II-I146T4

11/17/2011 9:38:53 AM
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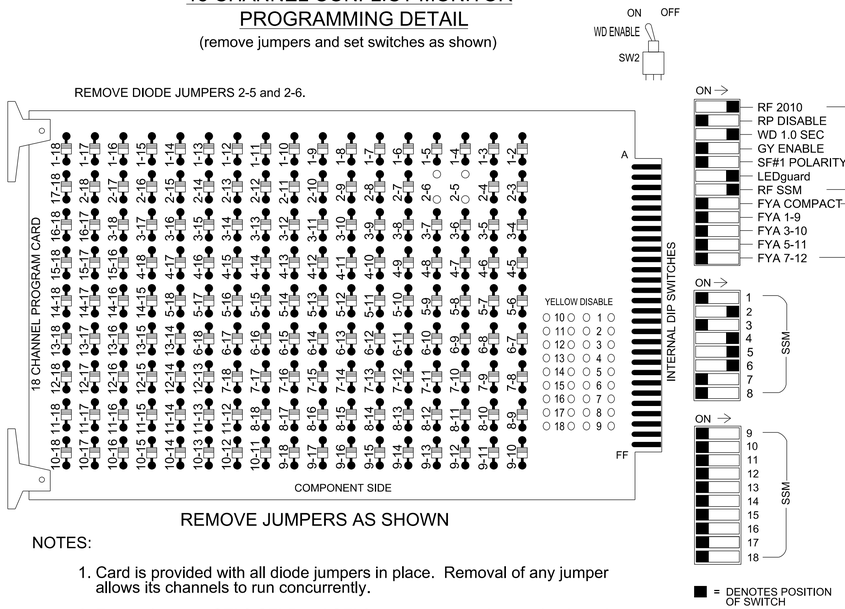
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.11.7

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Startup In Green.
4. Program phase 2 and 6 for Yellow Flash.
5. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332 W/ AUX OUTPUT FILE
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S2,S4,S5,S6
PHASES USED.....2,4,5,6
OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	NU	21,22	NU	NU	41,42 43	NU	51,52	61,62	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU
RED		128			101			134										
YELLOW		129			102			135										
GREEN		130			103													
RED ARROW							131											
YELLOW ARROW							132											
GREEN ARROW							133	136										

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I" U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
FILE "I" L														ST DC ISOLATOR
FILE "J" U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
FILE "J" L														

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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1146T4
DESIGNED: May 2023
SEALED: 5/24/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

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Temporary Installation - Electrical Detail 1 of 1
(Phase 4)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

US 421
at
US 421 Business

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L.Stygles
PREPARED BY:	S.R.Chiluka	REVIEWED BY:	J.Ma

REVISIONS	INIT.	DATE

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by:
SIGNATURE
5/24/2023
DATE

SIG. INVENTORY NO. 11-1146T4

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Schiluka

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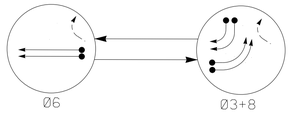
PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.11.8

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø6	PHASE Ø3+8	PHASE FLASH
31,32	F	←	Y
61,62	↑	R	Y
81,82,83	R	→	R

MAXTIME DETECTOR INSTALLATION CHART

DETECTOR						PROGRAMMING								
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP		CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD	
3A	✳	0	✳	✳		3	-	-	X	-	X	-	✳	
3B	✳	0	✳	✳		3	-	-	X	-	X	-	✳	
6A	✳	300	✳	✳		6	-	1.6	X	-	X	-	✳	
6B	✳	90	✳	✳		6	-	-	X	-	X	-	✳	
8A	✳	0	✳	✳		8	15.0	-	X	-	X	-	✳	
8B	✳	0	✳	✳		8	15.0	-	X	-	X	-	✳	

✳Video Detection Zone

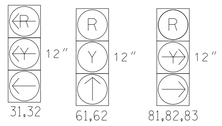
3 Phase Fully Actuated (Isolated)

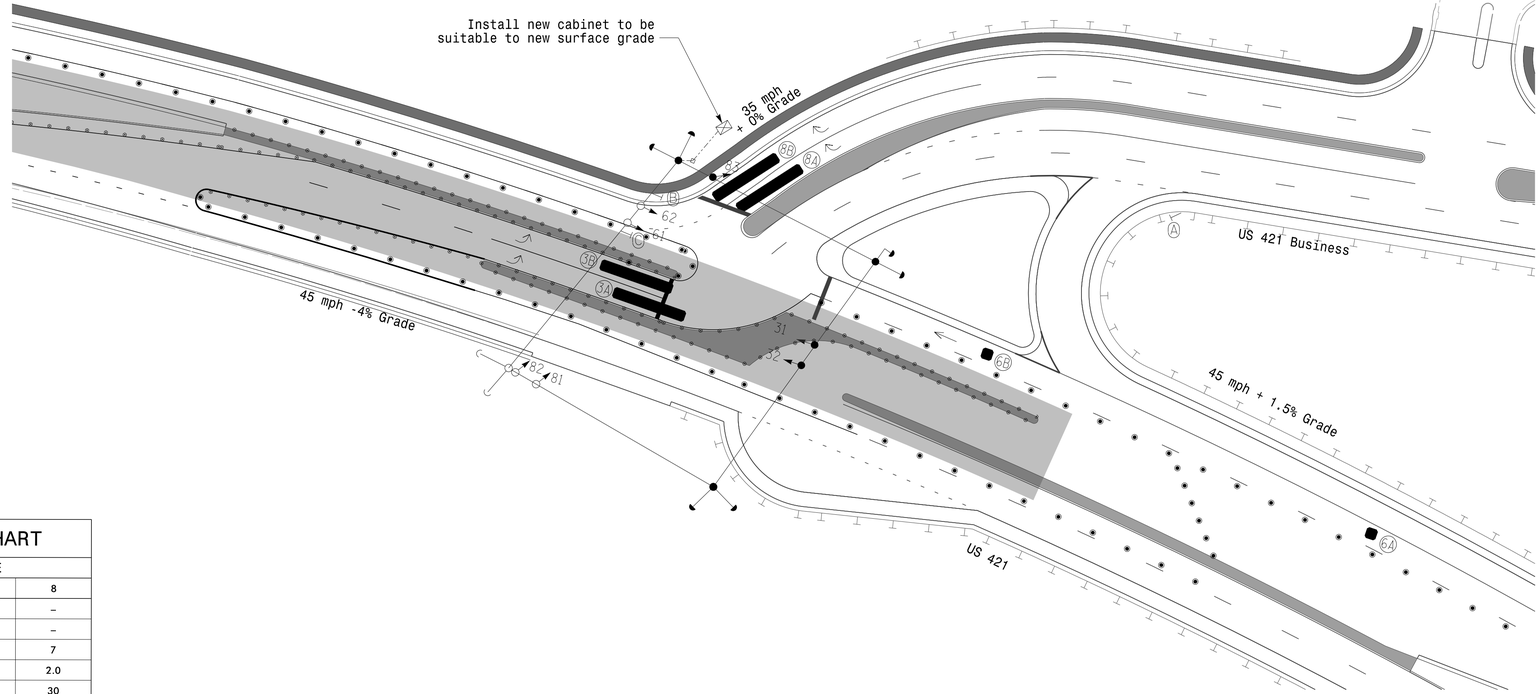
NOTES

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 operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
5. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
6. Refer to Pavement Marking Plans for proposed stop bar locations.
7. Reposition existing signal heads as shown on the plans.

SIGNAL FACE I.D.

All Heads L.E.D.





LEGEND

PROPOSED		EXISTING
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Traffic Signal Head	
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Inductive Loop Detector	
	Video Detection Zone	N/A
	Construction Zone	N/A
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
	Right of Way	
E	Temporary Construction Easement	N/A
	Directional Arrow	
	Type II Signal Pedestal	
Ⓐ	Yield Sign (R1-2)	Ⓐ
Ⓑ	No Right Turn (R3-1)	Ⓑ
Ⓒ	No Left Turn Sign (R3-2)	Ⓒ
	Drum	N/A
	Skinny Drum	N/A

MAXTIME TIMING CHART

FEATURE	PHASE 3	PHASE 6	PHASE 8
Walk *	–	–	–
Ped Clear *	–	–	–
Min Green	7	12	7
Passage *	2.0	2.0	2.0
Max 1 *	30	60	30
Yellow Change	3.0	4.4	3.0
Red Clear	2.4	1.3	1.4
Added Initial *	–	–	–
Maximum Initial *	–	–	–
Time Before Reduction *	–	–	–
Time To Reduce *	–	–	–
Minimum Gap	–	–	–
Advance Walk	–	–	–
Non Lock Detector	X	–	X
Vehicle Recall	–	MIN RECALL	–
Dual Entry	X	–	X

* 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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Signal Upgrade - Temporary Design 5
(Phase 12)

Prepared for the Offices of:
Traffic Engineering Branch
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

US 421
at
US 421 Business

Divsion 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE: 0 40 — 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRILATHA R CHILUKA

DocuSigned by: SRChiluka 6/26/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-114615

11/7/2011 9:38:53 AM
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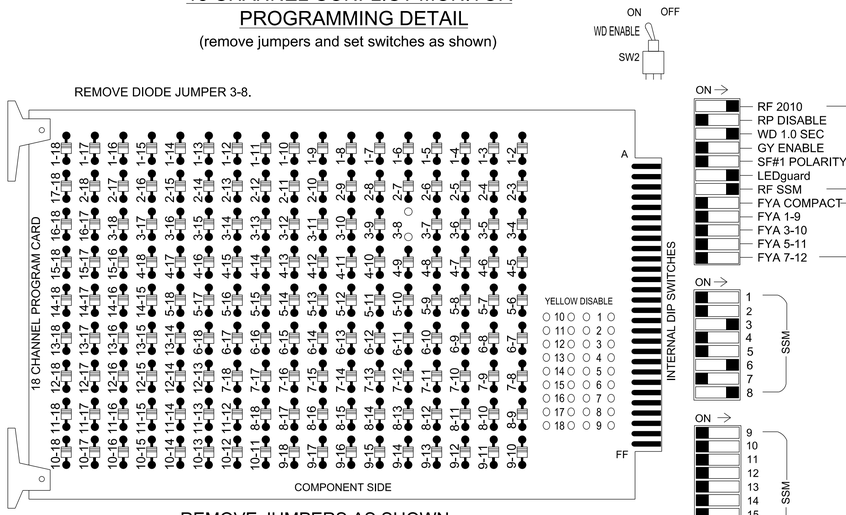
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.11.9

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 3 and 8 for Dual Entry.
3. Program controller to start up in phase 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S3, S8, S11
Phases Used.....3, 6, 8,
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....NOT USED
Overlap "4".....NOT USED

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	NU	NU	31,32	NU	NU	NU	61,62,63	NU	NU	81,82,83	NU	NU	NU	NU	NU	NU	NU
RED	·	·	·	·	·	·	·	134	·	·	107	·	·	·	·	·	·	·
YELLOW	·	·	·	·	·	·	·	135	·	·	·	·	·	·	·	·	·	·
GREEN	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
RED ARROW	·	·	·	116	·	·	·	·	·	·	·	·	·	·	·	·	·	·
YELLOW ARROW	·	·	·	117	·	·	·	·	·	·	108	·	·	·	·	·	·	·
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
GREEN ARROW	·	·	·	118	·	·	·	136	·	·	109	·	·	·	·	·	·	·
✋																		
🚶																		

NU = Not Used
★ Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

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

FS = FLASH SENSE
ST = STOP TIME

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1146T5
DESIGNED: May 2023
SEALED: 5/26/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Temporary Installation - Electrical Detail 1 of 1
(Phase 12)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Transportation Mobility and Safety Division
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

US 421
at
US 421 Business

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L.Stygles
PREPARED BY:	S.R.Chiluka	REVIEWED BY:	J.Ma

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by:
SIGNATURE 5/26/2023 DATE

SIG. INVENTORY NO. 11-1146T5

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schiluka

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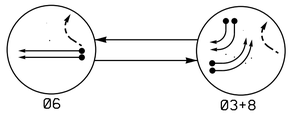
PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.11.10

2 Phase
Fully Actuated
Wilkesboro Closed Loop System

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

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

SIGNAL FACE I.D.

All Heads L.E.D.

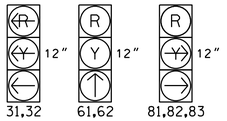


TABLE OF OPERATION			
SIGNAL FACE	PHASE Ø6	PHASE Ø3+8	FLASH
31,32	R	—	Y
61,62	↑	R	Y
81,82,83	R	—	R

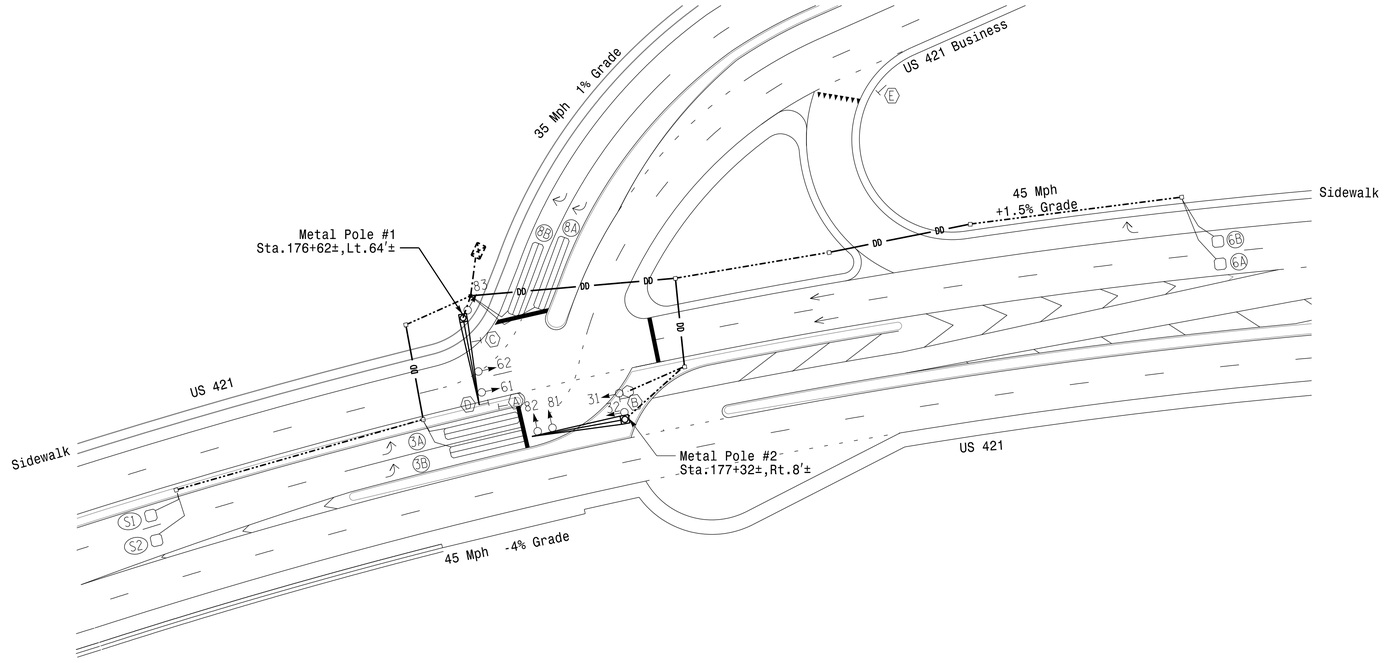
MAXTIME DETECTOR INSTALLATION CHART

DETECTOR					PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL	DELAY DURING GREEN	NEW CARD
3A	6X40	0	2-4-2	x	3	15.0*	-	X	-	X	-	X
3B	6X40	0	2-4-2	x	3	15.0*	-	X	-	X	-	X
6A	6X6	300	5	x	6	-	-	X	X	X	-	X
6B	6X6	300	5	x	6	-	-	X	X	X	-	X
8A	6X40	0	2-4-2	x	8	15.0	-	X	-	X	-	X
8B	6X40	0	2-4-2	x	8	15.0	-	X	-	X	-	X
S1	6X6	200	3	x	-	-	-	-	-	X	-	-
S2	6X6	200	3	x	-	-	-	-	-	-	-	-

* Disable delay during alternate phasing operation

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. Set all detector units to presence mode.
4. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
5. Refer to Pavement Marking Plans for proposed stop bar locations.



MAXTIME TIMING CHART

FEATURE	PHASE 3	PHASE 6	PHASE 8
Walk *	–	–	–
Ped Clear *	–	–	–
Min Green	7	12	7
Passage *	2.0	6.0	2.0
Max 1 *	30	60	30
Yellow Change	3.0	4.4	3.0
Red Clear	2.4	1.3	1.8
Added Initial *	–	1.5	–
Maximum Initial *	–	34	–
Time Before Reduction *	–	15	–
Time To Reduce *	–	30	–
Minimum Gap	–	3.4	–
Advance Walk	–	–	–
Non Lock Detector	X	–	X
Vehicle Recall	–	MIN RECALL	–
Dual Entry	X	–	X

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

LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
⊣	Sign	⊣
⬡	Type II Signal Pedestal	⬢
▯	Pedestrian Signal Head With Push Button & Sign	▯
	Metal Pole with Mastarm	
	Inductive Loop Detector	
⊠	Controller & Cabinet	⊠
□	Junction Box	■
	2-in Underground Conduit	
DD	Directional Drill	N/A
	Right of Way	
→	Directional Arrow	→
Ⓐ	"Stop Here on Red" Sign (R10-6)	N/A
Ⓑ	No U-Turn Sign (R3-4)	N/A
Ⓒ	No Right Turn Sign (R3-1)	N/A
Ⓓ	No Left Turn Sign (R3-2)	N/A
Ⓔ	"YIELD" Sign (R1-2)	N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
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919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Signal Upgrade - Final Design

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

SCALE 0 40

US 421 at US 421 Business

Divsion 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRILATHA R CHILUKA

DocuSigned by: SRChiluka 5/26/2023
SIGNATURE DATE

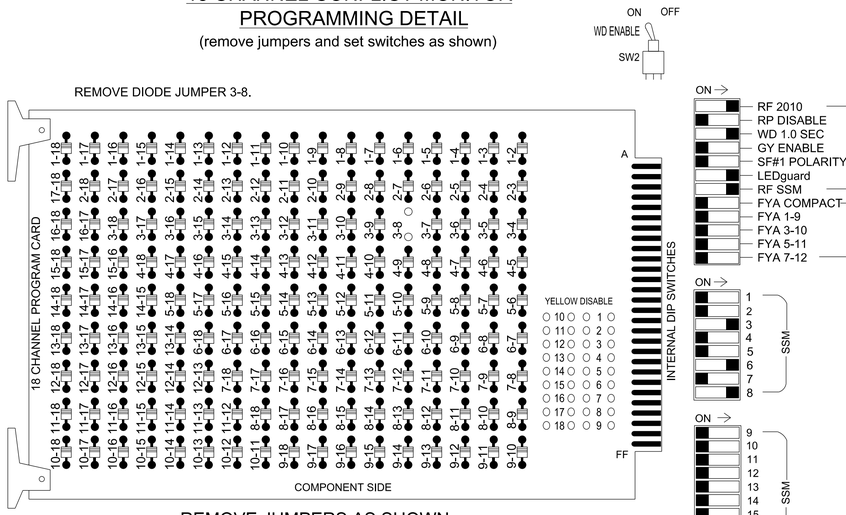
SIG. INVENTORY NO. 11-1146

5/25/2023 12:16:18 PM
\\vhb.com\gbl\proj\Raleigh\38621.03 NCDOT U-5312 Wilkes Co\NCDOT\Traffic\Signals\Design\Signals\100% Design Plans\111146_sig _dsn_202305.dgn
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.11.11

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program phases 3 and 8 for Dual Entry.
3. Program controller to start up in phase 6 Green No Walk.
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.
5. The cabinet and controller are part of the Wilkesboro Closed Loop System.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S3, S8, S11
Phases Used.....3, 6, 8,
Overlap "1".....NOT USED
Overlap "2".....NOT USED
Overlap "3".....NOT USED
Overlap "4".....NOT USED

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	NU	NU	NU	31,32	NU	NU	NU	61,62 63	NU	NU	81,82 83	NU	NU	NU	NU	NU	NU	NU
RED	·	·	·	·	·	·	·	134	·	·	107	·	·	·	·	·	·	·
YELLOW	·	·	·	·	·	·	·	135	·	·	·	·	·	·	·	·	·	·
GREEN	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
RED ARROW	·	·	·	116	·	·	·	·	·	·	·	·	·	·	·	·	·	·
YELLOW ARROW	·	·	·	117	·	·	·	·	·	·	108	·	·	·	·	·	·	·
FLASHING YELLOW ARROW	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
GREEN ARROW	·	·	·	118	·	·	·	136	·	·	109	·	·	·	·	·	·	·
✋																		
🚶																		

NU = Not Used
★ Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail this sheet.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 3 3A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L					Ø 3 3B				SYS. DET. S2					ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø 6 6A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		Ø 6 6B				Ø 8 8B								

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
3A	TB4-5,6	I5U	58	20	7	3	15		X			X	
3B	TB4-9,10	I5L	41	3	4	3			X			X	
*S1	TB6-9,10	I9U	60	22	13	SYS			X		X		
*S2	TB6-11,12	I9L	62	24	14	SYS			X		X		
6A	TB3-5,6	J2U	40	2	16	6			X			X	
6B	TB3-7,8	J2L	44	6	17	6			X		X		
8A	TB5-9,10	J6U	42	4	22	8	15		X			X	
8B	TB5-11,12	J6L	46	8	23	8	15		X			X	

*System detector only. Remove any assigned vehicle phase.

INPUT FILE POSITION LEGEND: J2L
J = FILE
2 = SLOT
L = LOWER

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1146
DESIGNED: May 2023
SEALED: 5/26/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

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Electrical Detail Sheet 1 of 1

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 421
at
US 421 Business

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M. L. Stygles
PREPARED BY:	S. R. Chiluka	REVIEWED BY:	J. Ma

REVISIONS	INIT.	DATE

Prepared for the Offices of:
North Carolina Department of Transportation, Mobility and Safety Division, Traffic Engineering Branch, Traffic Signal & Signals Management Section
750 N.Greenfield Pkwy.Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by: Matthew L. Stygles 5/26/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1146

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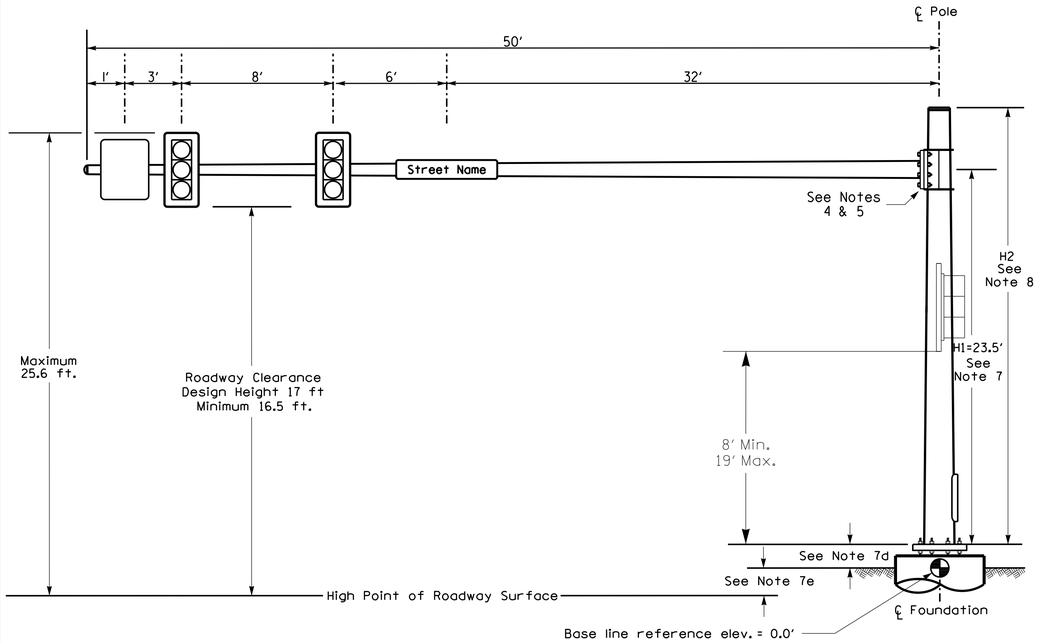
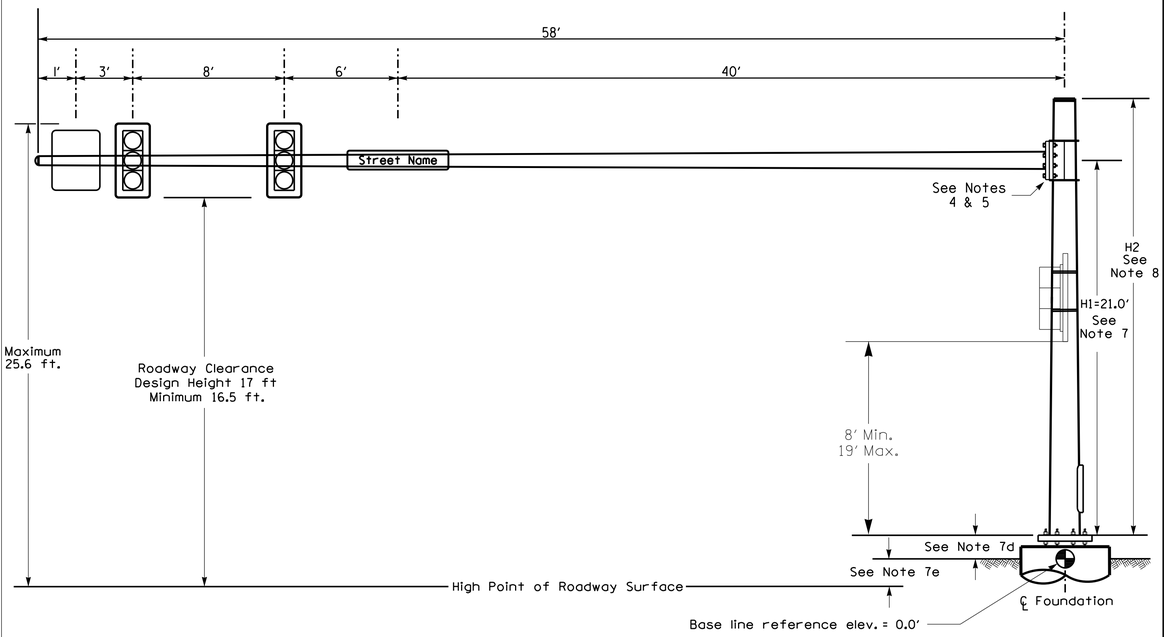
schiluka

Design Loading for METAL POLE NO. 1



Elevation View

Design Loading for METAL POLE NO. 2



Elevation View @ 360°

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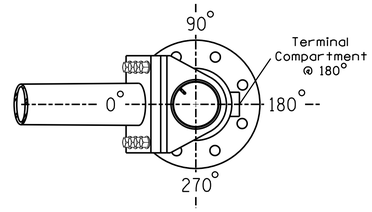
schiluka

SPECIAL NOTE

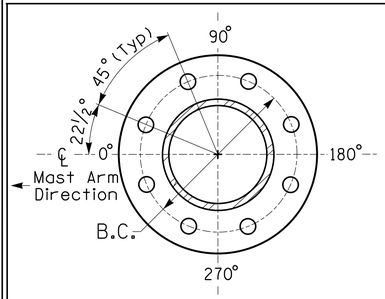
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

Elevation Differences for:	Pole 1	Pole 2
Baseline reference point at ℄ Foundation @ ground level	0.0 ft.	0.0 ft.
Elevation difference at High point of roadway surface	+3 ft.	+0.74 ft.
Elevation difference at Edge of travelway or face of curb	+1.0 ft.	+0.2 ft.

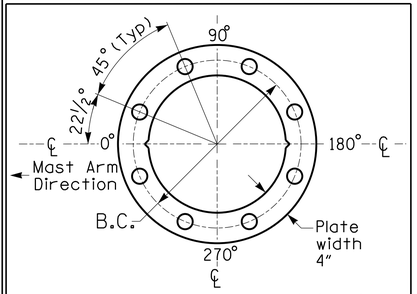


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL

For 8 Bolt Base Plate

METAL POLE No. 1 and 2

MAST ARM LOADING SCHEDULE

LOADING SYMBOL	DESCRIPTION	AREA	SIZE	WEIGHT
	RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE	9.3 S.F.	25.5"W X 52.5"L	60 LBS
Street Name	STREET NAME SIGN RIGID MOUNTED	16.0 S.F.	24.0"W X 96.0"L	36 LBS
	SIGN RIGID MOUNTED	9.0 S.F.	36.0"W X 36.0"L	20 LBS

NOTES

DESIGN REFERENCE MATERIAL

1. Design the traffic signal structure and foundation in accordance with:
   - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
   - The 2018 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
   - The 2018 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

DESIGN REQUIREMENTS

2. Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
3. Design all signal supports using stress ratios that do not exceed 0.9.
4. The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
5. A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
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 are rigidly mounted and vertically centered on the mast arm.
   c. The roadway clearance height for design is as shown in the elevation views.
   d. The top of the pole base plate is 0.75 feet above the ground elevation.
   e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
8. The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
   - Mast arm attachment height (H1) plus 2 feet, or
   - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
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 Section Senior Structural Engineer for assistance at (919) 814-5000.
10. The contractor is responsible for verifying that the mast arm length 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.

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

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NCDOT Wind Zone 4 (90 mph)

Prepared for the Offices of: Transportation Mobility and Safety Division, Traffic Engineering Branch, North Carolina Department of Transportation, Signal Design Section
750 N.Greenfield Pkwy.Garner,NC 27529

US 421
at
US 421 Business

Divsion 11 | Wilkes County | Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE 0 N/A

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRILATHA R CHILUKA

Developed by SRChiluka 5/24/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-1146

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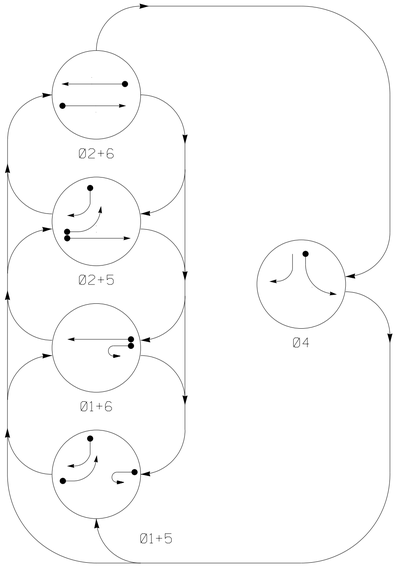
PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.12.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

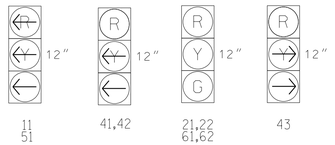
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

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

SIGNAL FACE I.D.

All Heads L.E.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

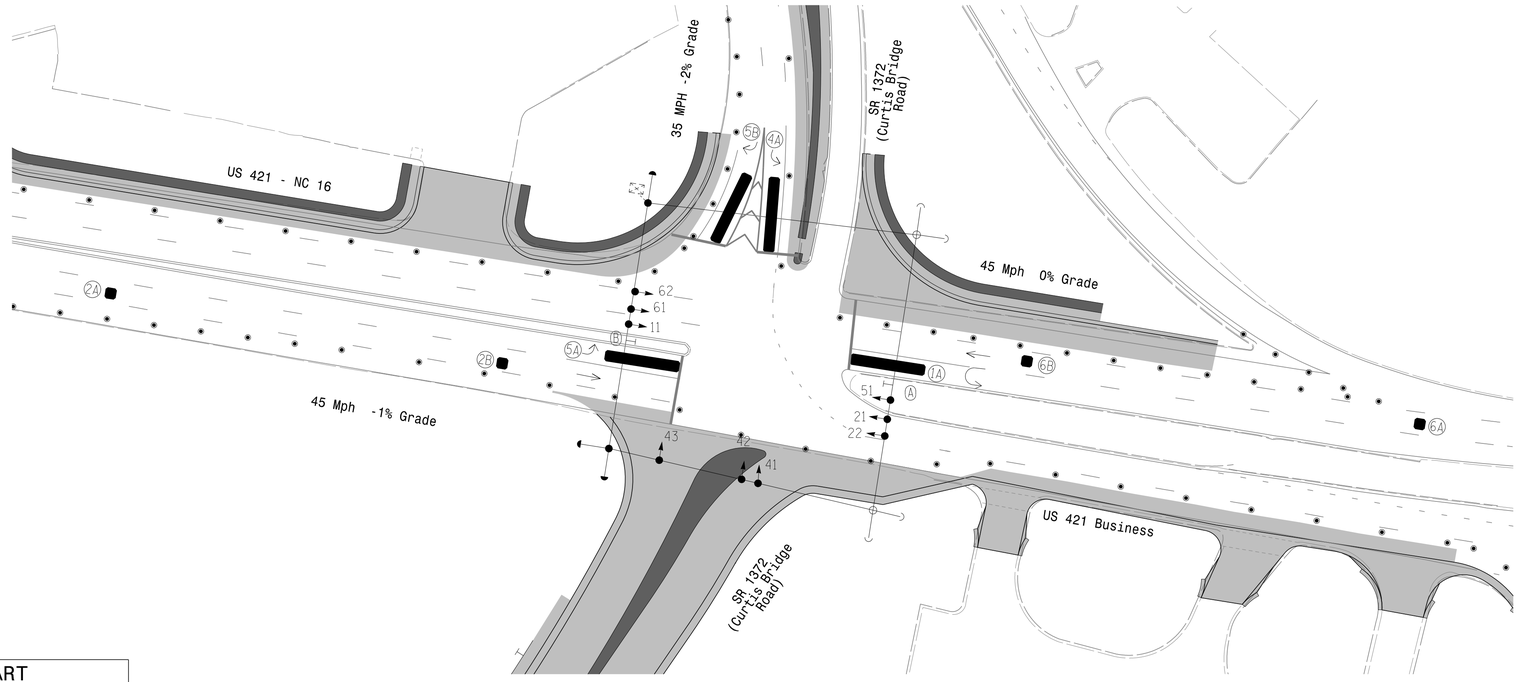
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	✳	0	✳	✳	1	Y	Y	-	-	-	-	✳
2A	✳	300	✳	✳	2	Y	Y	-	1.6	-	-	✳
2B	✳	90	✳	✳	2	Y	Y	-	-	-	-	✳
4A	✳	0	✳	✳	4	Y	Y	-	-	-	-	✳
5A	✳	0	✳	✳	5	Y	Y	-	-	-	-	✳
5B	✳	0	✳	✳	5	Y	Y	-	-	15.0	-	✳
6A	✳	300	✳	✳	6	Y	Y	-	1.6	-	-	✳
6B	✳	90	✳	✳	6	Y	Y	-	-	-	-	✳

* Video Detection Zone

5 Phase
Fully Actuated
(Isolated)

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 operation unless otherwise directed by the Engineer.
3. Phase 1 and/or Phase 5 may be lagged.
4. Set all detector units to presence mode.
5. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
6. Refer to Pavement Marking Plans for proposed stop bar locations.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
○~	Signal Pole with Sidewalk Guy	●
⊣	Sign	⊣
▫↓	Pedestrian Signal Head	■
⬡	Type II Signal Pedestal	⬢
▬	Video Detection Zone	N/A
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
┈┈	2-in Underground Conduit	┈┈
N/A	Right of Way	———
→	Directional Arrow	→
▒	Construction Zone	N/A
○	Wood Pole	●
●	Drum	N/A
⬡	Skinny Drum	N/A
Ⓐ	"LEFT TURN SIGNAL" Sign (R10-10L)	Ⓐ
Ⓑ	"U TURN SIGNAL" Sign	Ⓑ

OASIS 2070 TIMING CHART

FEATURE	PHASE 1	2	4	5	6
Min Green 1 *	7	12	7	7	12
Extension 1 *	2.0	2.0	2.0	2.0	2.0
Max Green 1 *	15	45	25	20	45
Yellow Clearance	3.0	4.6	3.0	3.0	4.5
Red Clearance	3.4	1.3	3.3	3.2	1.4
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON

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

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

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New Installation - Temporary Design 1(Phase 1)

Prepared for the Offices of:
Traffic Engineering Branch, Signal Design Section
NC Department of Transportation Mobility and Safety Division

750 N.Greenfield Pkwy.Garner,NC 27529

US 421 Business
at
Curtis Bridge Road

Divsion 11 | Wilkes County | Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE: 0 40 — 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 047250 SRI ATHA R CHILUKA

DocuSigned by: SRChiluka 9/26/2023
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SIG. INVENTORY NO. II-0944TI

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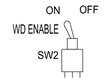
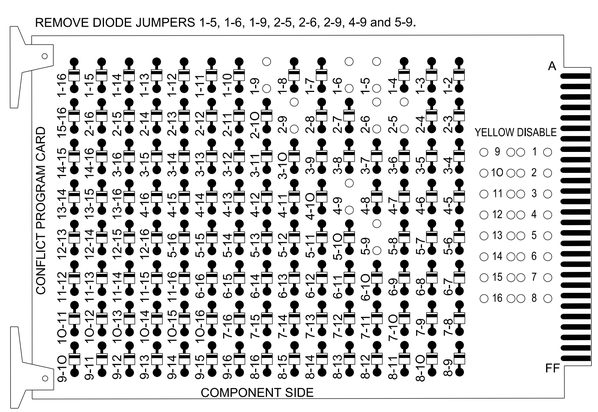
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.12.1

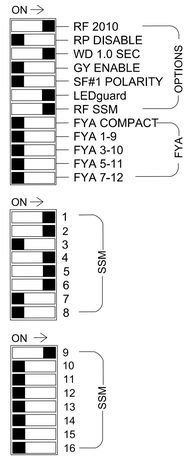
16 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)





REMOVE JUMPERS AS SHOWN



■ = DENOTES POSITION OF SWITCH

NOTES:
1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Make sure jumpers SEL2-SEL5 are present on the monitor board.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 3,7, 8,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	21,22	NU	NU	41,42	NU	51	61,62	NU	NU	NU	NU	43	NU	NU	NU	NU	NU
RED		128			101			134					A121					
YELLOW		129						135										
GREEN		130						136										
RED ARROW	125						131											
YELLOW ARROW	126				102		132						A122					
GREEN ARROW	127				103		133						A123					

NU = Not Used

FLASH NOTE: rewire OLA to flash on Flasher Unit #2, Circuit #2.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332 W/ AUX OUTPUT FILE
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S4,S5,S6,S9
PHASES USED.....1,2,4,5,6
OVERLAP A.....4+5
OVERLAP B.....NOT USED
OVERLAP C.....NOT USED
OVERLAP D.....NOT USED

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```
 PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE:          |12345678910111213141516
VEH OVL PARENTS: |   XX
VEH OVL NOT VEH: |
VEH OVL NOT PED: |
VEH OVL GRN EXT: |
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  _ GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

OVERLAP PROGRAMMING COMPLETE

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: **11-0944T1**
DESIGNED: May 2023
SEALED: 5/26/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Temporary Installation -Electrical Detail 1 of 1
(Phase 1)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Us 421 Business
at
Curtis Bridge Road

Divsion 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

REVISIONS	INIT.	DATE

Prepared for the Offices of:
North Carolina Department of Transportation, Mobility and Safety Division, Traffic Engineering Branch, Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by: 5/26/2023
SIGNATURE DATE

SIG. INVENTORY NO. 11-0944T1

5/23/2019 3:15:01 PM
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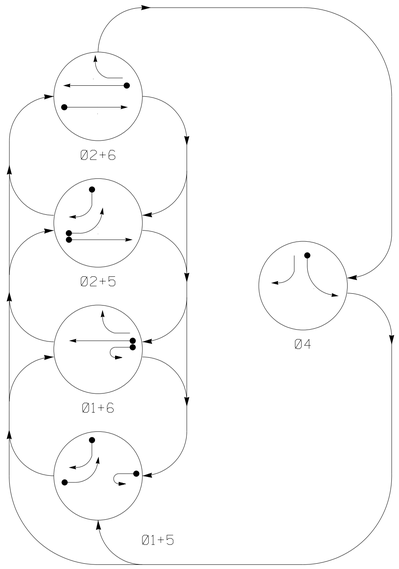
schiluka

DocuSign Envelope ID: 1AEED93C-A871-4705-8FEB-6C6FBB80BFC9

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.12.2

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

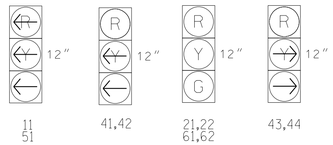
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+05	01+06	02+05	02+06	04	FLASH
11	←	←	~~R~~	~~R~~	~~R~~	~~R~~
21, 22	R	R	G	G	R	Y
41,42	R	R	R	R	←	R
43	→	R	→	R	→	R
51	←	~~R~~	←	~~R~~	~~R~~	~~R~~
61, 62	R	G	R	G	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

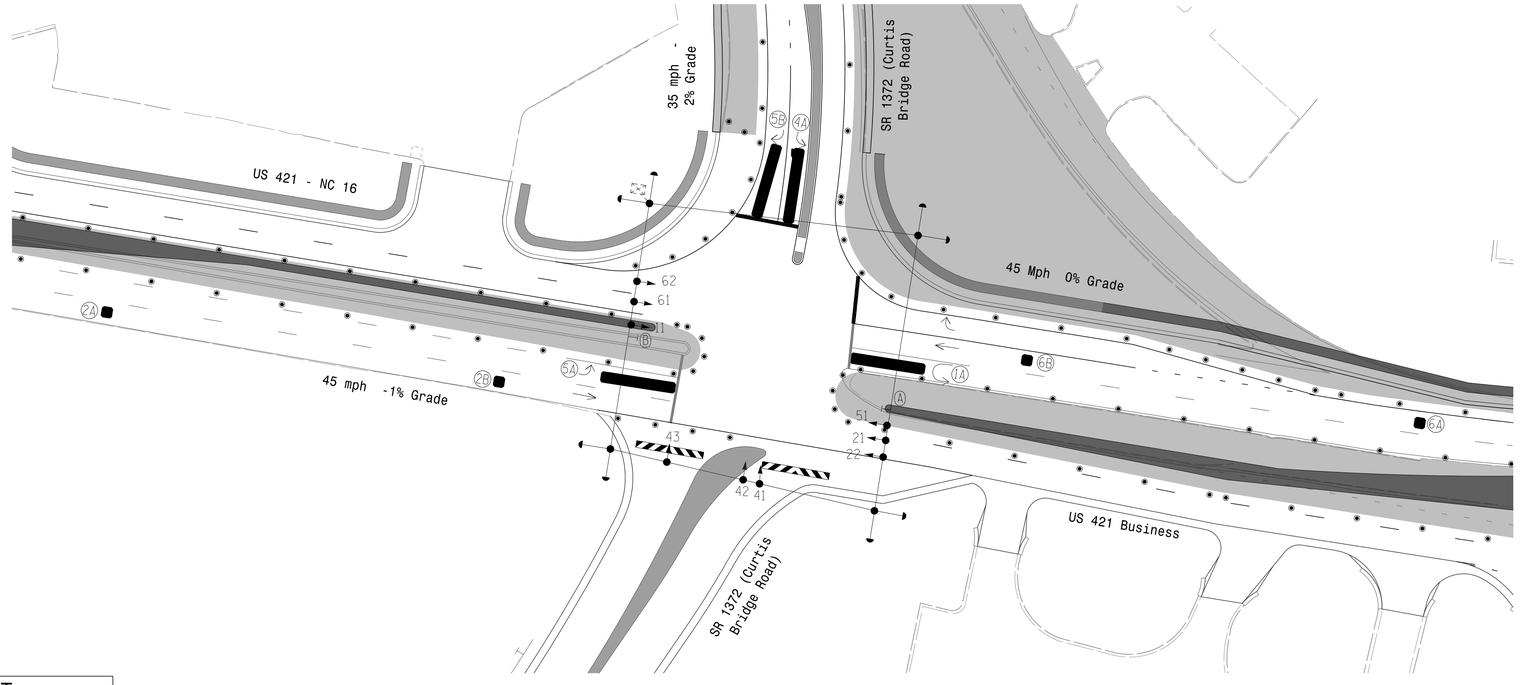
INDUCTIVE LOOPS					DETECTOR PROGRAMMING							
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	*	0	*	*	1	Y	Y	-	-	-	-	*
2A	*	300	*	*	2	Y	Y	-	1.6	-	-	*
2B	*	90	*	*	2	Y	Y	-	-	-	-	*
4A	*	0	*	*	4	Y	Y	-	-	-	-	*
5A	*	0	*	*	5	Y	Y	-	-	-	-	*
5B	*	0	*	*	5	Y	Y	-	-	15.0	-	*
6A	*	300	*	*	6	Y	Y	-	1.6	-	-	*
6B	*	90	*	*	6	Y	Y	-	-	-	-	*

*Video Detection Zone

5 Phase
Fully Actuated
(Isolated)

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 operation unless otherwise directed by the Engineer.
3. Phase 1 and/or Phase 5 may be lagged
4. Set all detector units to presence mode.
5. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
6. Refer to Pavement Marking Plans for proposed stop bar locations.
7. Reposition existing signal heads as shown on this plan.



LEGEND

PROPOSED		EXISTING
○→	Traffic Signal Head	●→
○	Signal Pole with Sidewalk Guy	●
⊣	Sign	⊣
▯	Pedestrian Signal Head	▪
⬡	Type II Signal Pedestal	⬢
▬	Video Detection Zone	N/A
▭	Inductive Loop Detector	▭
⊠	Controller & Cabinet	⊠
□	Junction Box	■
----------	2-in Underground Conduit	----------
N/A	Right of Way	————
→	Directional Arrow	→
▩	Construction Zone	N/A
○	Wood Pole	●
●	Drum	N/A
⊙	Skinny Drum	N/A
(A)	"LEFT TURN SIGNAL" Sign (R10-10L)	(A)
(B)	"U TURN SIGNAL" Sign	(B)

OASIS 2070 TIMING CHART

FEATURE	PHASE 1	2	4	5	6
Min Green 1 *	7	12	7	7	12
Extension 1 *	2.0	2.0	2.0	2.0	2.0
Max Green 1 *	15	45	25	20	45
Yellow Clearance	3.0	4.6	3.0	3.0	4.5
Red Clearance	4.2	1.4	3.5	3.3	1.1
Walk 1 *	-	-	-	-	-
Don't Walk 1	-	-	-	-	-
Seconds Per Actuation *	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON

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

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Signal Upgrade - Temporary Design 2(Phase 2)

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

US 421 Business at Curtis Bridge Road

Divsion 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

SCALE 0 40 1"=40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRILATHA R CHILUKA

DocuSigned by: SRChiluka 5/26/2023
CONSULTANT SIGNATURE DATE

SIG. INVENTORY NO. 11-0944T2

2/27/2020 2:39:55 PM
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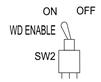
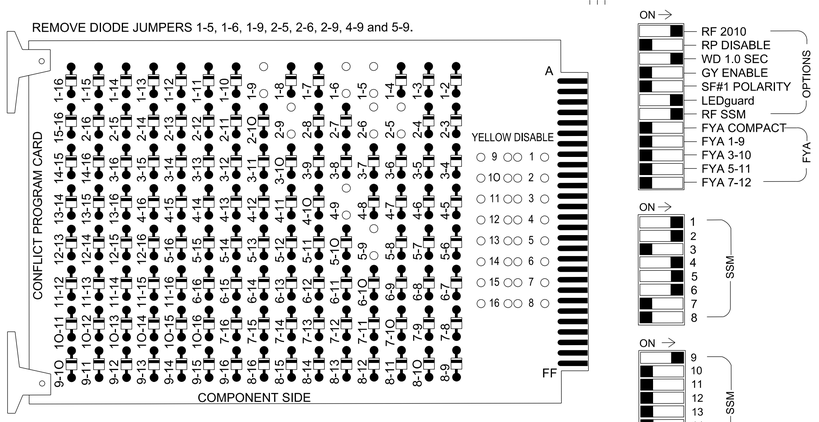
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.12.3

16 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)





REMOVE JUMPERS AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Make sure jumpers SEL2-SEL5 are present on the monitor board.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 3,7, 8,10,11,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11	21,22	NU	NU	41,42	NU	51	61,62	NU	NU	NU	NU	43,44	NU	NU	NU	NU	NU
RED		128			101			134					A121					
YELLOW		129						135										
GREEN		130						136										
RED ARROW	125						131											
YELLOW ARROW	126				102		132						A122					
GREEN ARROW	127				103		133						A123					

NU = Not Used

FLASH NOTE: rewire OLA to flash on Flasher Unit #2, Circuit #2.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332 W/ AUX OUTPUT FILE
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 (12-STD, 6-AUX)
LOAD SWITCHES USED.....S1,S2,S4,S5,S6,S9
PHASES USED.....1,2,4,5,6
OVERLAP A.....4+5
OVERLAP B.....NOT USED
OVERLAP C.....NOT USED
OVERLAP D.....NOT USED

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```
PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE:          |123456789101112131415 16
VEH OVL PARENTS:|   XX
VEH OVL NOT VEH:|
VEH OVL NOT PED:|
VEH OVL GRN EXT:|
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  _ GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

OVERLAP PROGRAMMING COMPLETE

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L														ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 11-0944T2
DESIGNED: May 2023
SEALED: 5/26/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

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Temporary Installation -Electrical Detail 1 of 1 (Phase 1)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Us 421 Business
at
Curtis Bridge Road

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M. Stygles
PREPARED BY:	S.R. Chiluka	REVIEWED BY:	J. Ma

REVISIONS	INIT.	DATE

Prepared for the Offices of:
North Carolina Department of Transportation, Mobility and Safety Division, Traffic Engineering Branch, Signals Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

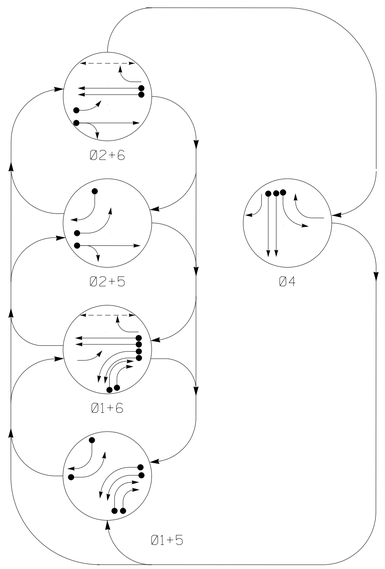
DocuSigned by: Matthew Stygles
SIGNATURE
5/26/2023
DATE

SIG. INVENTORY NO. 11-0944T2

DocuSign Envelope ID: 1AEED93C-A871-4705-8FEB-6C6FBB80BFC9

PROJECT REFERENCE NO.	SHEET NO.
U-5312	Sig.12.4

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

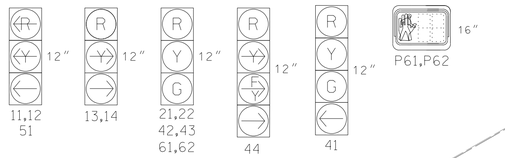
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+5	Ø1+6	Ø2+5	Ø2+6	Ø4	FLASH
11, 12	←	←	~~R~~	~~R~~	~~R~~	~~R~~
13,14	→	→	R	R	R	R
21,22	R	R	G	G	R	Y
41	R	R	R	R	←	R
42,43	R	R	R	R	G	R
44	→	R	→	R	FY	R
51	←	~~R~~	←	~~R~~	~~R~~	Y
61, 62	R	G	R	G	R	~~R~~
63	R	FY	R	FY	→	~~R~~
71	~~R~~	~~R~~	~~R~~	~~R~~	←	~~R~~

SIGNAL FACE I.D.

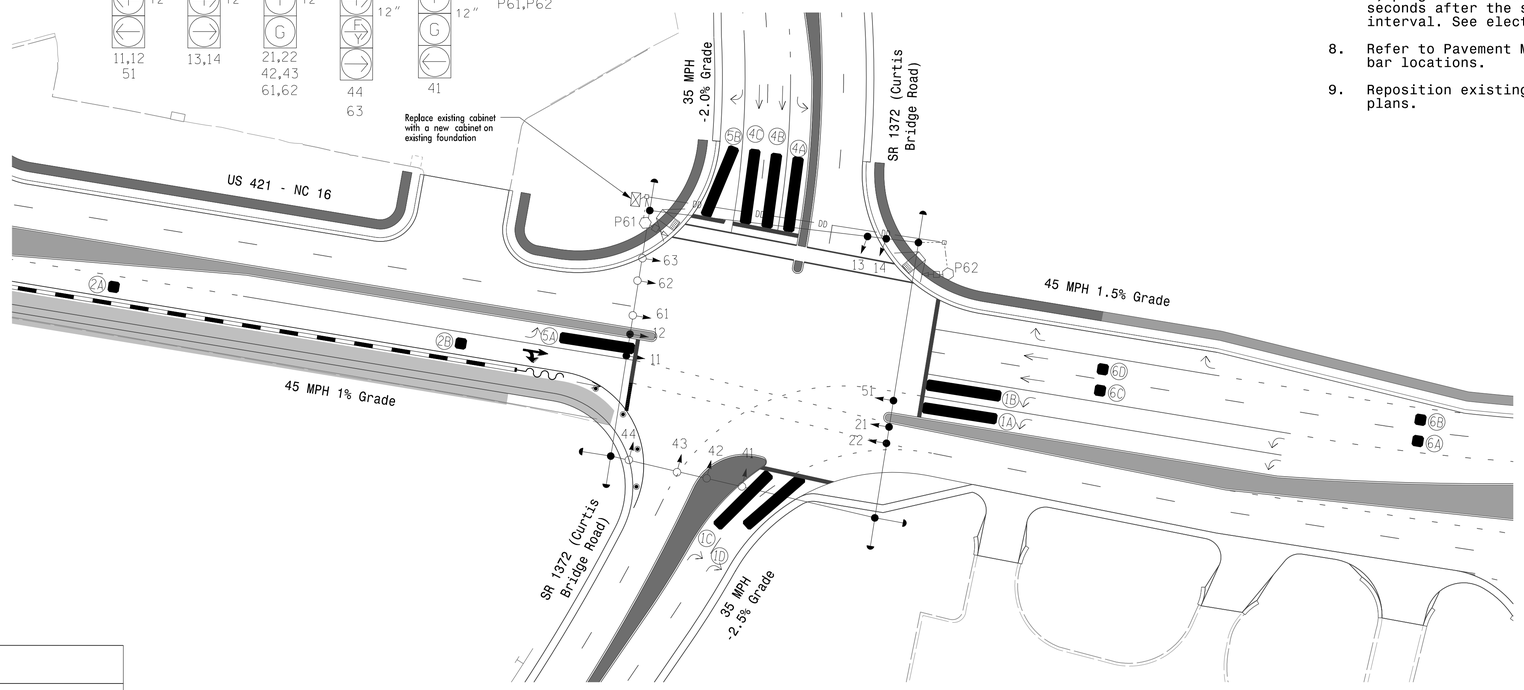
All Heads L.E.D.



MAXTIME DETECTOR INSTALLATION CHART

DETECTOR LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PROGRAMMING CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	CALL DELAY DURING GREEN	NEW CARD
1A,1B	✳	0	✳	✳	1	-	-	X	-	X -	✳
1C	✳	0	✳	✳	1	15.0	-	X	-	X -	✳
1D	✳	0	✳	✳	1	15.0	-	X	-	X -	✳
2A	✳	300	✳	✳	2	-	1.6	X	X	X -	✳
2B	✳	90	✳	✳	2	-	-	X	X	X -	✳
4A	✳	0	✳	✳	4	-	-	X		X -	✳
4B	✳	0	✳	✳	4	-	-	X	X	X -	✳
4C	✳	0	✳	✳	4	-	-	X	X	X -	✳
5A	✳	0	✳	✳	5	15.0	-	X	-	X -	✳
5B	✳	0	✳	✳	5	15.0	-	X	-	X -	✳
6A,6B	✳	300	✳	✳	6	-	1.6	X	X	X -	✳
6C,6D	✳	90	✳	✳	6	-	-	X	X	X -	✳

* Video Detection Zone



LEGEND

PROPOSED		EXISTING
	Curb Ramp	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Traffic Signal Head	
	Type II Signal Pedestal	
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Inductive Loop Detector	
	Video Detection Zone	N/A
	Construction Zone	N/A
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	

MAXTIME TIMING CHART

FEATURE	PHASE 1	2	4	5	6
Walk *	–	–	–	–	7
Ped Clear *	–	–	–	–	32
Min Green	7	12	7	7	12
Passage *	2.0	2.0	2.0	2.0	2.0
Max 1 *	30	60	30	30	60
Yellow Change	3.0	4.6	3.8	3.0	4.5
Red Clear	3.5	1.5	2.4	3.5	1.8
Added Initial *	–	2.5	–	–	1.5
Maximum Initial *	–	34	–	–	34
Time Before Reduction *	–	15	–	–	15
Time To Reduce *	–	30	–	–	30
Minimum Gap	–	3.4	–	–	3.4
Advance Walk	–	–	–	–	**
Non Lock Detector	X	–	X	X	–
Vehicle Recall	–	MIN RECALL	–	–	MIN RECALL
Dual Entry	–	–	–	–	–

* 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.

* * See note 7

6 Phase Fully Actuated (Isolated)

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 operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. This intersection uses video detection. Install detectors according to the manufacturer's instructions to schieve the desitred detection.
5. Omit "walk" and flashing "Don't Walk" with no pedestrian calls.
6. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
7. To provide a leading pedestrian interval on phase 2, program FYA heads 51 and 22 to delay for 3 seconds after the start of the phase 6 walk interval. See electrical details.
8. Refer to Pavement Marking Plans for proposed stop bar locations.
9. Reposition existing signal heads as shown on the plans.

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919.829.0328

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Signal Upgrade - Temporary Design 3(Phase 3)

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

US 421 Business at Curtis Bridge Road

Divsion 11 Wilkes County Wilkesboro

PLAN DATE: May 2023 REVIEWED BY: M.L. Stygles
PREPARED BY: S.R. Chiluka REVIEWED BY: J. Ma

SCALE 1"=40' (0 40)

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 047250 ENGINEER SRIATHA R CHILUKA
DocuSigned by: SRChiluka 5/26/2023
CONSULTANT SIGNATURE DATE
SIG. INVENTORY NO. 11-0944T3

2/27/2020 2:39:55 PM
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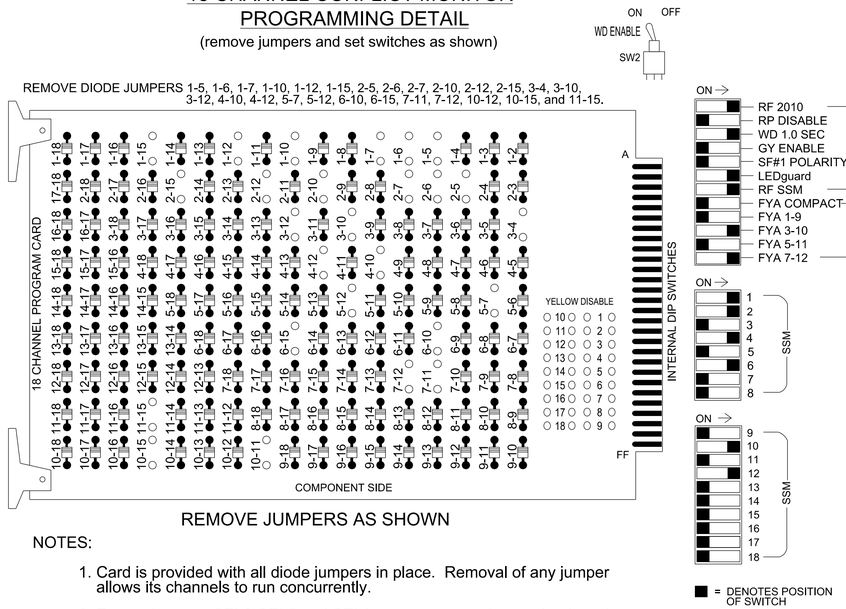
schiluka

PROJECT REFERENCE NO.	SHEET NO.
U-5312	

18 CHANNEL CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that the Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plan.
2. Program controller to start up in phase 2 Green No Walk and phase 6 Walk.
3. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location.

EQUIPMENT INFORMATION

Controller.....2070LX
Cabinet.....332 w/ Aux
Software.....Q-Free MAXTIME
Cabinet Mount.....Base
Output File Positions.....18 With Aux. Output File
Load Switches Used.....S1,S2,S4,S5,S7,S8,S9,S10,AUXS2, AUXS5
Phases Used.....1,2,4,5,6,6PED
Overlap "1".....NOT USED
Overlap "2".....*
Overlap "3".....NOT USED
Overlap "4".....*
Overlap "7".....*
Overlap "8".....*

*See overlap programming detail on sheet 2.

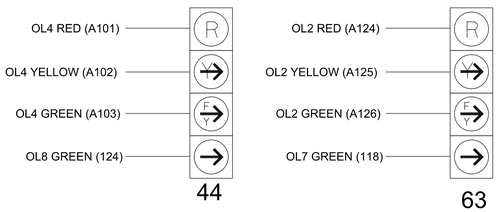
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5		S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4		14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	OL7	4		4 PED	5	6	6 PED	OL8	8	8 PED	OL1	OL2	SPARE	OL3	OL4	SPARE
SIGNAL HEAD NO.	11,12, 13,14	21,22	NU	63★	41	42,43	NU	51	61,62	P61, P62	44★	NU	NU	NU	63★	NU	NU	44★	NU
RED		128			101	101			134						A124			A101	
YELLOW		129		*	102	102			135		*								
GREEN		130			103	103			136										
RED ARROW	125							131											
YELLOW ARROW	126							132							A125			A102	
FLASHING YELLOW ARROW															A126			A103	
GREEN ARROW	127			118	103			133			124								
✋										119									
🚶										121									

NU = Not Used
★ Denotes install load resistor. See load resistor installation detail this sheet.
★ See pictorial of head wiring in detail this sheet.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	∅6 PED DC ISOLATOR	FS DC ISOLATOR
	L													NOT USED	ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L														

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT POINT	DETECTOR NO.	CALL PHASE	DELAY TIME	EXTEND TIME	EXTEND	ADDED INITIAL	QUEUE	CALL	DELAY DURING GREEN
PED PUSH BUTTONS													
P61,P62	TB8-7,9	I13U	68	34	6	PED 6							

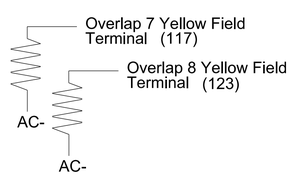
NOTE:
INSTALL DC ISOLATOR
IN INPUT FILE SLOT I13.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown)

ACCEPTABLE VALUES	
Value (ohms)	Wattage
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



SPECIAL DETECTOR NOTE

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: I1-0944T3
DESIGNED: May 2023
SEALED: 5/26/2023
REVISED: N/A

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
919.829.0328

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Temporary Installation - Electrical Detail 1 of 2 (Phase 3)

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Transportation Mobility and Safety Division STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION Signal Design Section

750 N.Greenfield Pkwy.Garner,NC 27529

US 421
at
SR 1372 (Curtis Bridge Rd)

Division 11 Wilkes County Wilkesboro

PLAN DATE:	May 2023	REVIEWED BY:	M.L.Stygles
PREPARED BY:	S.R.Chiluka	REVIEWED BY:	J.Ma

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 046057 ENGINEER MATTHEW L. STYGLES

DocuSigned by:
5/26/2023
SIGNATURE DATE

SIG. INVENTORY NO. I1-0944T3